DOCKET NO. 960258-WS

ORIGINAL

CERTIFICATION OF

PUBLIC SERVICE COMMISSION ADMINISTRATIVE RULES

FILED WITH THE

DEPARTMENT OF STATE

I do hereby certify:

/x/ (1) That all statutory rulemaking requirements of Chapter 120, F.S., have been complied with; and

/x/ (2) There is no administrative determination under subsection 120.56(2), F.S., pending on any rule covered by this certification; and

/x/ (3) All rules covered by this certification are filed within the prescribed time limitations of paragraph 120.54(3)(e), F.S. They are filed not less than 28 days after the notice required by paragraph 120.54(3)(a), F.S., and;

/_/ (a) Are filed not more than 90 days after the notice; or

/_/ (b) Are filed not more than 90 days after the notice not including days an administrative determination was pending; or

/_/ (c) Are filed more than 90 days after the notice, but not less than 21 days nor more than 45 days from the date of publication of the notice of change; or

/_/ (d) Are filed more than 90 days after the notice, but not less than 14 nor more than 45 days after the adjournment of the final public hearing on the rule; or

AFA ____
APP ____
CAF ____
CMU ____
CTR ____
EAG ____
LEG ____
MAS ____
OPC ____
PAI ____
SEC 1
WAW ____
OTH ____

/_/ (e) Are filed more than 90 days after the notice, but within 21 days after the date of receipt of all material authorized to be submitted at the hearing; or

/_/ (f) Are filed more than 90 days after the notice, but within 21 days after the date the transcript was received by this agency; or

/x/ (g) Are filed not more than 90 days after the notice, not including days the adoption of the rule was postponed following notification from the Joint Administrative Procedures Committee that an objection to the rule was being considered; or

/_/ (h) Are filed more than 90 days after the notice, but within 21 days after a good faith written proposal for a lower cost regulatory alternative to a proposed rule is submitted which substantially accomplishes the objectives of the law being implemented; or

/_/ (i) Are filed more than 90 days after the notice, but within 21 days after a regulatory alternative is offered by the small business ombudsman.

Attached are the original and two copies of each rule covered by this certification. The rules are hereby adopted by the undersigned agency by and upon their filing with the Department of State.

Rule No.

25-30.431

Under the provision of subparagraph 120.54(3)(e)6., F.S., the rules take effect 20 days from the date filed with the Department of State or a later date as set out below:

Effective: ______________________
(month) (day) (year)

Blanca S. Bayó

BLANCA S. BAYÓ, Director
Division of Records & Reporting

____
Number of Pages Certified

(S E A L)

CTM

25-30.431 Used and Useful Consideration

(1) In determining whether property is needed to serve customers more than five full years after the end of the test period as provided by section 367.081(2)(a)2.c., Florida Statutes (1999), the Commission shall consider the rate of growth in the number of equivalent residential connections (ERCs); the time needed to meet the guidelines of the Department of Environmental Protection (DEP) for planning, designing, and construction of plant expansion; and the technical and economic options available for sizing increments of plant expansion.

(2)(a) Property needed to serve customers after the end of the test year shall be calculated as follows:

EG x PT x D = PN

where:

EG = Equivalent Annual Growth in ERCs determined pursuant to (b) or (c) below, not to exceed 5 percent per year

PT = Post Test Year Period determined pursuant to section 367.081(2)(a)2.b. and c., Florida Statutes (1999)

U = Unit of measurement utilized in the used and useful calculations for plant components

PN = Property needed expressed in the units of measurement utilized

(b) The equivalent annual growth in ERCs (EG) is measured in terms of the projected annual growth and shall be calculated

CODING: Words underlined are additions; words in ~~struck through~~ type are deletions from existing law.

in Schedules F-9 and F-10 of Form PSC/WAW 19 for Class A utilities and Form PSC/WAW 20 for Class B utilities, incorporated by reference in Rule 25-30.437.

(c) The utility shall also submit a linear regression analysis using average ERCs for the last 5 years. The utility may submit other information that will affect growth in ERCs.

(3) As part of its application filed pursuant to Rule 25-30.437, the utility shall submit its most recent wastewater capacity analysis report, if any, filed with DEP.

Specific Authority: 367.121, F.S.

Law Implemented: 367.081(2)(a)2.b.c., F.S.

History--New ___________.

CODING: Words underlined are additions; words in ~~struck through~~ type are deletions from existing law.

Rule 25-30.431
Docket No. 960258-WS

SUMMARY OF RULE

Rule 25-30.431 lists what information the Commission will consider in determining whether utility property needed more than five years in the future will be found used and useful. The rule also describes the mechanical aspects and data submission requirements in order for property needed by the utility beyond the test year to be found used and useful.

SUMMARY OF HEARINGS ON THE RULE

The Commission held a rulemaking hearing on December 10, 1996. The Florida Waterworks Association (FWA), Southern States Utilities, Inc., now known as Florida Water Services Corporation (FWSC), Utilities, Inc., the Department of Environmental Protection, the Office of Public Counsel (OPC), the St. Johns River Water Management District, the Southwest Florida Water Management District, and the South Florida Water Management District participated in the hearing. A second public hearing was conducted by the Commission on June 10, 1997, and the Commission voted to adopt the rule with changes.

FWA and FWSC filed petitions with DOAH challenging the validity of the proposed rule pursuant to section 120.56, Florida Statutes (Supp. 1996). These proceedings were consolidated with the rule challenges previously filed by FWA and FWSC when the

Commission first proposed the rule in July, 1996. The Citizens of Florida, represented by OPC, intervened to support the proposed rule. A seven-day evidentiary hearing before Administrative Law Judge Don W. Davis was held in December, 1997. ALJ Davis issued his Final Order on March 2, 1998, concluding that the proposed rule was an invalid exercise of delegated legislative authority on numerous grounds.

The Commission appealed the ALJ's final order to the First District Court of Appeal and the court reversed the ALJ on every ground. That decision became final on May 25, 1999. Before the rule was filed for adoption, the Legislature amended the law that is implemented by Rule 25-30.431. This legislation became law on June 11, 1999.

A final public hearing was held by the Commission on October 19, 1999, to consider changes to the rules to reflect the statutory changes. The Florida Waterworks Association (FWA), Florida Water Services Corporation (FWSC), Frank Seidman of M & R Consulting, Inc., and the Office of Public Counsel participated.

FACTS AND CIRCUMSTANCES JUSTIFYING THE RULE

At issue in virtually every rate case determination of used and useful is whether to include margin reserve to accommodate future growth. Section 367.081(2)(a)2.b. and 2.c., Florida Statutes (1999), provides that property that is needed to serve customers 5 years after the end of the test year shall be considered used and useful. A longer period than five years will be considered used and useful "only to the extent that the utility presents clear and convincing evidence to justify such consideration." § 367.081(2)(a)2.c. The factors listed in section (1) of the rule will guide the Commission's determination.

Section (2) provides the formula for calculating the margin reserve. The calculation reflects the statutory cap on the growth rate used to determine the property in the margin reserve at "5 percent per year". The information required is needed by the Commission to determine growth.

Section (3) requires a utility to submit its most recent capacity analysis report filed with the Department of Environmental Protection in order that the Commission will be able to review and verify the utility's operations and plans for property needed beyond the test year.

THE FLORIDA PUBLIC SERVICE COMMISSION
RULE HEARING
DECEMBER 10-11, 1996

DOCKET NO. 960258-WS

COMPOSITE EXHIBIT NO. 1

IN RE: PETITION TO ADOPT RULES
ON MARGIN RESERVE AND IMPUTATION
OF CONTRIBUTIONS-IN-AID-OF-CONSTRUCTION
ON MARGIN RESERVE CALCULATION,
BY FLORIDA WATERWORKS ASSOCIATION.
_______________________________________/

1. FLORIDA ADMINISTRATIVE WEEKLY NOTICE OF RULEMAKING SUBMITTED JULY 24, 1996, AND PUBLISHED AUGUST 2, 1996.

2. STATEMENT OF FACTS AND CIRCUMSTANCES JUSTIFYING PROPOSED RULES;

   STATEMENT ON FEDERAL STANDARDS;

   STATEMENT OF IMPACT ON SMALL BUSINESS;

   STATEMENT THAT THE AGENCY HAS CHOSEN THE REGULATORY ALTERNATIVE THAT IMPOSES THE LOWEST NET COST ALTERNATIVE TO SOCIETY;

   ECONOMIC IMPACT STATEMENT;

   AS PROVIDED TO THE JOINT ADMINISTRATIVE PROCEDURES COMMITTEE ON JULY 26, 1996.

3. ORDER NO. PSC-96-0966-NOR-WS, NOTICE OF RULEMAKING, ISSUED JULY 26, 1996.

4. FLORIDA WATERWORKS ASSOCIATION'S PETITION FOR ADMINISTRATIVE DETERMINATION OF INVALIDITY OF PROPOSED RULES AND MOTION FOR ABATEMENT, FILED WITH DIVISION OF ADMINISTRATIVE HEARINGS AUGUST 14, 1996.

5. SOUTHERN STATES UTILITIES' PETITION FOR ADMINISTRATIVE DETERMINATION OF INVALIDITY OF PROPOSED RULES, FILED WITH DIVISION OF ADMINISTRATIVE HEARINGS AUGUST 23, 1996.

6. SOUTHERN STATES UTILITIES' PROPOSAL FOR LOWER COST REGULATORY ALTERNATIVE, FILED AUGUST 23, 1996.

7. COMMENTS OF OFFICE OF PUBLIC COUNSEL ON BEHALF OF THE CITIZENS OF THE STATE OF FLORIDA, FILED OCTOBER 17, 1996.

Doc# 14567-99
Contd.

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET
NO. 960258-WS EXHIBIT NO 1 Comp.
COMPANY/
WITNESS:
DATE: 12-10-96

8. TESTIMONY OF ARSENIO MILIAN ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION, FILED OCTOBER 18, 1996.

9. TESTIMONY AND EXHIBITS OF DEBORAH D. SWAIN ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION, FILED OCTOBER 18, 1996.

10. TESTIMONY AND EXHIBITS OF FRANK SEIDMAN ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION, FILED OCTOBER 18, 1996.

11. TESTIMONY OF NORVELL D. WALKER ON BEHALF OF THE FLORIDA PUBLIC SERVICE COMMISSION STAFF, FILED OCTOBER 18, 1996.

12. TESTIMONY AND EXHIBITS OF ROBERT J. CROUCH ON BEHALF OF THE FLORIDA PUBLIC SERVICE COMMISSION STAFF, FILED OCTOBER 18, 1996.

13. COMMENTS AND EXHIBITS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION, FILED OCTOBER 18, 1996.

14. TESTIMONY AND EXHIBITS OF GERALD C. HARTMAN ON BEHALF OF SOUTHERN STATES UTILITIES, INC., FILED OCTOBER 18, 1996.

15. TESTIMONY AND EXHIBITS OF HUGH GOWER ON BEHALF OF SOUTHERN STATES UTILITIES, INC., FILED OCTOBER 18, 1996.

16. TESTIMONY AND EXHIBITS OF RICHARD M. HARVEY ON BEHALF OF SOUTHERN STATES UTILITIES, INC., FILED OCTOBER 18, 1996.

17. TESTIMONY OF MARK F. KRAMER ON BEHALF OF UTILITIES, INC., FILED OCTOBER 25, 1996.

18. RESPONSIVE TESTIMONY OF FRANK SEIDMAN ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION, FILED NOVEMBER 15, 1996.

19. RESPONSIVE TESTIMONY OF DEBORAH D. SWAIN ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION, FILED NOVEMBER 15, 1996.

20. RESPONSIVE TESTIMONY OF ARSENIO MILIAN ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION, FILED NOVEMBER 15, 1996.

21. RESPONSIVE TESTIMONY OF JOHN F. GUASTELLA ON BEHALF OF SOUTHERN STATES UTILITIES, INC., FILED NOVEMBER 15, 1996.

22. REVISED STATEMENT OF ESTIMATED REGULATORY COSTS DATED NOVEMBER 25, 1996, FILED DECEMBER 4, 1996.

(b) Telephone number, name, and address of the individual who is to serve as primary liaison with the Commission in regards to the ongoing Florida operations of the certificated company.

Specific Authority 350.127(2) FS. Law Implemented 350.113, 350.115, 350.117, 364.17, 364.18, 364.185, 364.337 FS. History–New 2-23-87, Amended 4-5-88, 7-11-88, 6-3-90, 10-25-90, 11-20-91, 12-29-91, 12-22-92, 12-27-94, 3-13-96,________.

NAME OF PERSON ORIGINATING PROPOSED RULE: Tommy Williams

NAME OF SUPERVISOR OR PERSON WHO APPROVED THE PROPOSED RULE: Florida Public Service Commission

DATE PROPOSED RULE APPROVED: July 16, 1996

If any person decides to appeal any decision of the Commission with respect to any matter considered at the rulemaking hearing, if held, a record of the hearing is necessary. The appellant must ensure that a verbatim record, including testimony and evidence forming the basis of the appeal is made. The Commission usually makes a verbatim record of rulemaking hearings.

Any person requiring some accommodation at this hearing because of a physical impairment should call the Division of Records and Reporting at (904)413-6770 at least five calendar days prior to the hearing. If you are hearing or speech impaired, please contact the Florida Public Service Commission using the Florida Relay Service, which can be reached at: 1(800)955-8771 (TDD).

PUBLIC SERVICE COMMISSION

DOCKET NO. 960258-WS

RULE TITLE:	RULE NO.:
Margin Reserve	25-30.431

PURPOSE AND EFFECT: The purpose of this rule is to codify the current policy on margin reserve and imputation of contributions-in-aid-of-construction (CIAC) on margin reserve calculations for water and wastewater utilities.

SUMMARY: Rule 25-30.431 defines "margin reserve"; provides that upon request and justification, margin reserve will be included in the used and useful determination in certain rate cases; that unless otherwise justified, the margin reserve period will be 18 months for water source and treatment facilities and wastewater treatment and effluent disposal facilities, and 12 months for water transmission and distribution lines and the wastewater collection system; and describes the mechanical aspects and data submission requirements. If margin reserve is authorized, a corresponding provision for the imputation of CIAC is prescribed; however, it is limited to the rate base component associated with margin reserve.

SPECIFIC AUTHORITY: 367.121 FS.

LAW IMPLEMENTED: 367.081 FS.

A HEARING WILL BE HELD AT THE TIME, DATE AND PLACE SHOWN BELOW:

TIME AND DATE: 9:30 a.m., December 10, 1996, continuing on December 11, 1996, if necessary

PLACE: Room 148, Betty Easley Conference Center, 4075 Esplanade Way, Tallahassee, Florida

PERSONS WHO INTEND TO PARTICIPATE IN THIS RULEMAKING PROCEEDING SHOULD FILE A NOTICE OF INTENT TO PARTICIPATE WITH THE FPSC, DIVISION OF RECORDS AND REPORTING, WITHIN 21 DAYS OF THE DATE OF THIS NOTICE. AN ORDER WILL BE ISSUED ESTABLISHING PREHEARING AND HEARING PROCEDURES TO BE FOLLOWED. WRITTEN COMMENTS AND TESTIMONY ON THE PROPOSED RULE MAY BE FILED NO LATER THAN OCTOBER 18, 1996. RESPONSIVE COMMENTS AND TESTIMONY MAY BE FILED NO LATER THAN NOVEMBER 15, 1996.

THE PERSON TO BE CONTACTED REGARDING THE PROPOSED RULE AND ECONOMIC STATEMENT IS: Director of Appeals, Florida Public Service Commission, 2540 Shumard Oak Blvd., Tallahassee, Florida 32399

THE FULL TEXT OF THE PROPOSED RULE IS:

<u>25-30.431 Margin Reserve.</u>

<u>(1) "Margin reserve" is defined as the amount of plant capacity needed to meet the expected demand due to customer growth.</u>

<u>(2) "Margin reserve period" is defined as the time period needed to install the next economically feasible increment of plant capacity that will preclude a deterioration in the quality of service.</u>

<u>(3) Margin reserve is an acknowledged component of the used and useful rate base determination that when requested and justified shall be included in rate cases filed pursuant to section 367.081, Florida Statutes.</u>

<u>(4) Unless otherwise justified, the margin reserve period for water source and treatment facilities and wastewater treatment and effluent disposal facilities will be 18 months. Unless otherwise justified, the margin reserve period for water transmission and distribution lines and the wastewater collection system will be 12 months. In determining whether another margin reserve period is justified, the Commission shall consider the rate of growth in the number of equivalent residential connections (ERCs); the time needed to meet the guidelines of the Department of Environmental Protection (DEP) for planning, designing, and constructing of plant expansion; and the technical and economic options available for sizing increments of plant expansion.</u>

<u>(5)(a) Margin reserve for water source and treatment facilities and wastewater treatment and effluent disposal facilities shall be calculated as follows:</u>

<u>EG x MP x D = MR</u>

<u>where:</u>

EG = Equivalent Annual Growth in ERCs determined pursuant to (c) or (d) below
MP = Margin Reserve Period determined pursuant to subsection (4)
D = Demand per ERC (customer demand applied in the used and useful calculations for water and wastewater facilities)
MR = Margin reserve expressed in gallons per day (GPD)

(b) Margin reserve for water transmission and distribution lines and the wastewater collection system shall be calculated as follows:

EG x MP = MR

where:
EG = Equivalent Annual Growth in ERCs determined pursuant to (c) or (d) below
MP = Margin Reserve Period determined pursuant to subsection (4)
MR = Margin reserve expressed in ERCs

(c) The equivalent annual growth in ERCs (EG) is measured in terms of the projected annual growth and shall be calculated in Schedules F-9 and F-10 of Form PSC/WAW 19 for Class A utilities and Form PSC/WAW 20 for Class B utilities, incorporated by reference in Rule 25-30.437.

(d) The utility shall also submit a linear regression analysis using average ERCs for the last 5 years. The utility may submit other information that will affect growth in ERCs.

(6) As part of its application filed pursuant to Rule 25-30.437, the utility shall submit its most recent wastewater capacity analysis report, if any, filed with DEP.

(7) Contributions-in-aid-of-construction (CIAC) shall be imputed when a margin reserve is authorized. The amount of imputed CIAC shall be determined based on the number of ERCs included in the margin reserve period and the projected CIAC that will be collected from those ERCs. However, the imputed CIAC shall not exceed the rate base component associated with margin reserve.

Specific Authority 367.121 FS. Law Implemented 367.081 FS. History–New ________.

NAME OF PERSON ORIGINATING PROPOSED RULE: Charles H. Hill
NAME OF SUPERVISOR OR PERSON WHO APPROVED THE PROPOSED RULE: Florida Public Service Commission
DATE PROPOSED RULE APPROVED: July 16, 1996
If any person decides to appeal any decision of the Commission with respect to any matter considered at the rulemaking hearing, if held, a record of the hearing is necessary. The appellant must ensure that a verbatim record, including testimony and evidence forming the basis of the appeal is made. The Commission usually makes a verbatim record of rulemaking hearings.

Any person requiring some accommodation at this hearing because of a physical impairment should call the Division of Records and Reporting at (904)413-6770 at least five calendar days prior to the hearing. If you are hearing or speech impaired, please contact the Florida Public Service Commission using the Florida Relay Service, which can be reached at: 1(800)955-8771 (TDD).

AGENCY FOR HEALTH CARE ADMINISTRATION

RULE TITLE: RULE NO.:
Practical Examinations 59-1.073
PURPOSE AND EFFECT: Reenacts a rule recently deleted by the Department of Business and Professional Regulation which provides procedures for administration of practical examinations.
SUMMARY: The rule provides the procedures for choosing the examiners for practical examinations and grading practical examinations.
SPECIFIC AUTHORITY: 455.203(5) FS.
LAW IMPLEMENTED: 455.217 FS.
IF REQUESTED WITHIN 21 DAYS OF THE DATE OF THIS NOTICE, A HEARING WILL BE HELD AT THE TIME, DATE AND PLACE SHOWN BELOW:
TIME AND DATE: 9:00 a.m., August 26, 1996
PLACE: Agency for Health Care Administration, Fort Knox Executive Office Center, 2727 Mahan Drive, Bldg. 3, Conference Room G, Tallahassee, FL
THE PERSON TO BE CONTACTED REGARDING THE PROPOSED RULE AND ECONOMIC STATEMENT IS: Laura P. Gaffney, Senior Attorney, Agency for Health Care Administration, Office of the General Counsel, 2727 Mahan Drive, Bldg. 3, Tallahassee, FL 32308

THE FULL TEXT OF THE PROPOSED RULE IS:

59-1.073 Practical Examinations.

(1) Candidates required to take a practical examination shall be informed by the Agency in writing of the performance criteria and any special equipment required for such performance.

(2) In the event that professional examiners are employed to evaluate candidate performance in practical examinations, two (2) or more examiners shall independently evaluate the performance of each candidate and the independent grades of the examiners shall be averaged to produce the final score for each candidate unless computed in accordance with the following formulae:

(a) Dental Hygiene Formula: The examination consists of three (3) procedures: Root planing, scaling, and calculus removal and polishing. The candidate is required to perform these three (3) procedures on a live patient and is graded independently by three (3) examiners at the completion of the examination. Each examiner grades the completed product

Rule 25-30.431
Docket No. 960258-WS

STATEMENT OF FACTS AND CIRCUMSTANCES JUSTIFYING RULE

At issue in virtually every rate case determination of used and useful is whether to include a margin reserve to accommodate future growth. The Commission's current policy is to include, unless otherwise justified, an 18-month margin reserve for water source and treatment facilities and wastewater treatment and disposal facilities. This margin is usually offset by imputing the projected contributions-in-aid-of-construction (CIAC) during the margin reserve period. The policy should be codified in a rule.

STATEMENT ON FEDERAL STANDARDS

There is no federal standard on the same subject.

STATEMENT OF IMPACT ON SMALL BUSINESS

Little direct impact on small businesses is foreseen, as the adoption of the proposed rule would impose minimal additional expected costs on water and wastewater utilities in general, including those which qualify as a small business as defined in section 288.703(1), Florida Statutes (1995). Water and wastewater companies may experience a reduction in rate case expenses if the rule is adopted. No material impact is expected for other small businesses, as the rule is not expected to significantly affect the price of water and wastewater services.

STATEMENT THAT THE AGENCY HAS CHOSEN THE REGULATORY ALTERNATIVE THAT IMPOSES THE LOWEST NET COST ALTERNATIVE TO SOCIETY

The Commission has chosen the regulatory alternative that imposes the lowest net cost to society.

M E M O R A N D U M

June 26, 1996

TO: DIVISION OF APPEALS (Moore)

FROM: DIVISION OF RESEARCH AND REGULATORY REVIEW (Harlow) [handwritten initials]

SUBJECT: ECONOMIC IMPACT STATEMENT FOR DOCKET NO. WS-960258; PROPOSED REVISIONS TO RULE 25-30.431, FAC, MARGIN RESERVE

SUMMARY OF THE RULE

The proposed rule reflects the 1991 Commission standard operating procedure (SOP number 2406, effective 3/29/91) and recent Commission file and suspend rate case rulings regarding margin reserve and the imputation of contributions-in-aid-of-construction (CIAC). The proposed rule defines margin reserve for water and wastewater utilities as the amount of plant capacity needed to meet the expected demand resulting from customer growth. The rule specifies that, upon the utility's request and when justified, a provision for margin reserve shall be included in the used and useful determination in file and suspend rate case proceedings. The rule also indicates the data submission requirements for margin reserve, the specific calculation of margin reserve, and the additional information which will be considered by the Commission in margin reserve determinations. Unless otherwise justified, the rule sets the margin reserve period as follows: eighteen months for water source and treatment facilities, eighteen months for wastewater treatment and effluent disposal facilities, twelve months for water transmission and distribution facilities, and twelve months for wastewater transmission and collection facilities. If margin reserve is authorized, a corresponding provision for the imputation of CIAC is prescribed. However, CIAC imputation is limited to the rate base component associated with margin reserve.

DIRECT COSTS TO THE AGENCY AND OTHER STATE OR LOCAL GOVERNMENT ENTITIES

No direct costs to the Commission or other state or local government entities are expected to result from adoption of the proposed rule. However, the adoption of a rule regarding margin reserve and CIAC imputation may reduce the Commission staff effort required to prepare for and attend hearings on these issues in file and suspend rate case proceedings.

COSTS AND BENEFITS TO THOSE PARTIES DIRECTLY AFFECTED BY THE RULE

In order to determine the costs and benefits to those parties directly affected by the proposed rule, both the 1991 Commission SOP on margin reserve and recent case history were reviewed. Little material impact is expected because the proposed rule reflects the Commission SOP and recent Commission file and suspend rate case rulings regarding margin reserve and imputation of CIAC.

A review of the file and suspend rate cases completed from 1993 through 1995 revealed that in a slight majority of the cases, the Commission determined that utility plant was 100 percent used and useful. Therefore, margin reserve was not a relevant issue in those cases. It appears that in the majority of the cases for which plant was less than 100 percent used and useful (and margin reserve was requested by the utility), the Commission has adhered to an eighteen-month guideline for measuring a margin reserve period for plant other than lines. While all of these decisions did not follow the margin reserve period guidelines, the rule allows for deviation from the proposed reserve period if justified by a Commission review of other pertinent information. All but one of the file and suspend rate cases in the past three years included imputation of CIAC if margin reserve was approved.

The proposed rule requires two additional data filings that are not currently in the SOP for those utilities requesting margin reserve; however, the cost impact on the utility is expected to be minimal. The rule requires utilities to submit their most recent wastewater capacity analysis report to the Commission. This should result in minimal costs for the utilities because the report is currently prepared for the Department of Environmental Protection. Utilities are also expected to provide a linear regression of annual equivalent residential connections (ERCs) for the last five years. Although this calculation is currently performed by Commission staff, it is relatively straight forward and can be performed with a hand calculator.

The adoption of a Commission rule regarding margin reserve is expected to benefit ratepayers, the utilities, and Commission staff by reducing file and suspend rate case expenses. Rule adoption should help reduce rate case expenses by limiting testimony on margin reserve to special circumstances.

<u>REASONABLE ALTERNATIVE METHODS</u>

One alternative to the adoption of the proposed rule is to retain the non-rule practice. However, staff believes that without the adoption of a rule, both Commission and utility staff time and effort will continue to be expended on re-hearing these issues during file and suspend rate case proceedings. Staff believes a rule should be adopted concerning margin reserve and the imputation of CIAC in order to reduce uncertainty regarding the Commission treatment of used and useful plant capacity. Both ratepayers and utilities would benefit from the reduced uncertainty and rate case expense reductions which should result from rule adoption. While numerous alternatives to the specifics of the proposed rule are possible, staff believes that the alternative guidelines which deviate from current Commission policy will be most efficiently presented at hearing.

<u>IMPACT ON SMALL BUSINESSES</u>

Little direct impact on small businesses is foreseen, as the adoption of the proposed rule would impose minimal additional expected costs on water and wastewater utilities in general, including those which qualify as a small business as defined in Section 288.703(1), Florida Statutes (1995). Water and wastewater companies may experience a reduction in rate case expenses if the rule is adopted. No material impact is expected for other small businesses, as the rule is not expected to significantly affect the price of water and wastewater services.

<u>IMPACT ON COMPETITION</u>

No material impact on competition is expected because the proposed rule essentially adopts current Commission policy and imposes minimal additional expected costs. In addition, utilities may experience some rate case expense reductions if the rule is adopted.

IMPACT ON EMPLOYMENT

Minimal impact on employment is expected to result from the proposed rule. However, rule adoption may lead to a reduction in both Commission and utility staff effort required to prepare for and attend file and suspend rate case proceedings.

METHODOLOGY

Several meetings were held with other Commission staff to discuss: (1) the current Commission policy on margin reserve and the imputation of CIAC, (2) the 1991 Commission SOP on margin reserve, (3) recent Commission rate case rulings regarding margin reserve, and (4) the proposed rule. Portions of transcripts of Commission workshops and hearings on used and useful and margin reserve were also reviewed. Finally, the 1991 Commission margin reserve SOP and the Commission file and suspend rate case decisions from the last three years were analyzed for consistency with the proposed rule.

JGH:tf/e-margin.tnf

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In Re: Petition to Adopt Rules on Margin Reserve and Imputation of Contributions-In-Aid-Of Construction on Margin Reserve Calculation, by Florida Waterworks Association	DOCKET NO. 960258-WS ORDER NO. PSC-96-0966-NOR-WS ISSUED: July 26, 1996

The following Commissioners participated in the disposition of this matter:

SUSAN F. CLARK, Chairman
J. TERRY DEASON
JOE GARCIA
JULIA L. JOHNSON
DIANE K. KIESLING

NOTICE OF RULEMAKING

NOTICE is hereby given that the Florida Public Service Commission, pursuant to Section 120.54, Florida Statutes, has initiated rulemaking to adopt new Rule 25-30.431, Florida Administrative Code, relating to margin reserve.

The attached Notice of Rulemaking will appear in the August 2, 1996 edition of the Florida Administrative Weekly.

A hearing will be held at the following time and place:

Florida Public Service Commission
9:30 a.m., December 10, 1996, continuing
on December 11, 1996, if necessary
Betty Easley Conference Center
Room 148, 4075 Esplanade Way
Tallahassee, Florida

Persons who intend to participate in this rulemaking proceeding should file a notice of intent to participate with the Director, Division of Records and Reporting, Florida Public Service Commission, 2540 Shumard Oak Blvd., Tallahassee, FL 32399-0870, no later than August 23, 1996. An order will be issued establishing the prehearing and hearing procedures to be followed. Written comments and testimony on the proposed rule may be filed no later than October 18, 1996. Responsive comments and testimony may be filed no later than November 15, 1996.

By ORDER of the Florida Public Service Commission, this 26th day of July, 1996.

/s/ Blanca S. Bayó

BLANCA S. BAYÓ, Director
Division of Records & Reporting

This is a facsimile copy. A signed copy of the order may be obtained by calling 1-904-413-6770.

(S E A L)

CTM

FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 960258-WS

RULE TITLE: RULE NO.:

Margin Reserve 25-30.431

PURPOSE AND EFFECT: The purpose of this rule is to codify the current policy on margin reserve and imputation of contributions-in-aid-of-construction (CIAC) on margin reserve calculations for water and wastewater utilities.

SUMMARY: Rule 25-30.431 defines "margin reserve"; provides that upon request and justification, margin reserve will be included in the used and useful determination in certain rate cases; that unless otherwise justified, the margin reserve period will be 18 months for water source and treatment facilities and wastewater treatment and effluent disposal facilities, and 12 months for water transmission and distribution lines and the wastewater collection system; and describes the mechanical aspects and data submission requirements. If margin reserve is authorized, a corresponding provision for the imputation of CIAC is prescribed; however, it is limited to the rate base component associated with margin reserve.

RULEMAKING AUTHORITY: 367.121 FS.

LAW IMPLEMENTED: 367.081 FS.

HEARING: A HEARING WILL BE HELD AT THE DATE AND PLACE SHOWN BELOW:

TIME AND DATE: 9:30 A.M., December 10, 1996, continuing on December 11, 1996, if necessary.

PLACE: Room 148, Betty Easley Conference Center, 4075 Esplanade Way, Tallahassee, Florida.

PERSONS WHO INTEND TO PARTICIPATE IN THIS RULEMAKING PROCEEDING SHOULD FILE A NOTICE OF INTENT TO PARTICIPATE WITH THE FPSC, DIVISION OF RECORDS AND REPORTING, WITHIN 21 DAYS OF THE DATE OF THIS NOTICE. AN ORDER WILL BE ISSUED ESTABLISHING PREHEARING AND HEARING PROCEDURES TO BE FOLLOWED. WRITTEN COMMENTS AND TESTIMONY ON THE PROPOSED RULE MAY BE FILED NO LATER THAN OCTOBER 18, 1996. RESPONSIVE COMMENTS AND TESTIMONY MAY BE FILED NO LATER THAN NOVEMBER 15, 1996.

THE PERSON TO BE CONTACTED REGARDING THIS RULE AND THE ECONOMIC IMPACT STATEMENT IS: Director of Appeals, Florida Public Service Commission, 2540 Shumard Oak Blvd., Tallahassee, Florida 32399.

THE FULL TEXT OF THE RULE IS:

<u>25-30.431 Margin Reserve</u>

<u>(1) "Margin reserve" is defined as the amount of plant capacity needed to meet the expected demand due to customer growth.</u>

<u>(2) "Margin reserve period" is defined as the time period needed to install the next economically feasible increment of plant capacity that will preclude a deterioration in the quality of service.</u>

<u>(3) Margin reserve is an acknowledged component of the used and useful rate base determination that when requested and</u>

justified shall be included in rate cases filed pursuant to section 367.081, Florida Statutes.

(4) Unless otherwise justified, the margin reserve period for water source and treatment facilities and wastewater treatment and effluent disposal facilities will be 18 months. Unless otherwise justified, the margin reserve period for water transmission and distribution lines and the wastewater collection system will be 12 months. In determining whether another margin reserve period is justified, the Commission shall consider the rate of growth in the number of equivalent residential connections (ERCs); the time needed to meet the guidelines of the Department of Environmental Protection (DEP) for planning, designing, and constructing of plant expansion; and the technical and economic options available for sizing increments of plant expansion.

(5)(a) Margin reserve for water source and treatment facilities and wastewater treatment and effluent disposal facilities shall be calculated as follows:

$$EG \times MP \times D = MR$$

where:

EG = Equivalent Annual Growth in ERCs determined pursuant to (c) or (d) below

MP = Margin Reserve Period determined pursuant to subsection (4)

D = Demand per ERC (customer demand applied in the used and useful calculations for water and wastewater facilities)

MR = Margin reserve expressed in gallons per day (GPD)

(b) Margin reserve for water transmission and distribution lines and the wastewater collection system shall be calculated as follows:

EG x MP = MR

where:

EG = Equivalent Annual Growth in ERCs determined pursuant to (c) or (d) below

MP = Margin Reserve Period determined pursuant to subsection (4)

MR = Margin reserve expressed in ERCs

(c) The equivalent annual growth in ERCs (EG) is measured in terms of the projected annual growth and shall be calculated in Schedules F-9 and F-10 of Form PSC/WAW 19 for Class A utilities and Form PSC/WAW 20 for Class B utilities, incorporated by reference in Rule 25-30.437.

(d) The utility shall also submit a linear regression analysis using average ERCs for the last 5 years. The utility may submit other information that will affect growth in ERCs.

(6) As part of its application filed pursuant to Rule 25-30.437, the utility shall submit its most recent wastewater capacity analysis report, if any, filed with DEP.

(7) Contributions-in-aid-of-construction (CIAC) shall be imputed when a margin reserve is authorized. The amount of imputed CIAC shall be determined based on the number of ERCs included in the margin reserve period and the projected CIAC that will be collected from those ERCs. However, the imputed CIAC shall not exceed the rate base component associated with margin reserve.

Specific Authority 367.121, FS.

Law Implemented 367.081, FS.

History-New ____________.

NAME OF PERSON ORIGINATING PROPOSED RULE: Charles H. Hill

NAME OF SUPERVISOR OR PERSON(S) WHO APPROVED THE PROPOSED RULE: Florida Public Service Commission.

DATE PROPOSED RULE APPROVED: July 16, 1996.

If any person decides to appeal any decision of the Commission with respect to any matter considered at the rulemaking hearing, if held, a record of the hearing is necessary. The appellant must ensure that a verbatim record, including testimony and evidence forming the basis of the appeal is made. The Commission usually makes a verbatim record of rulemaking hearings.

Any person requiring some accommodation at this hearing because of a physical impairment should call the Division of Records and

Reporting at (904) 413-6770 at least five calendar days prior to the hearing. If you are hearing or speech impaired, please contact the Florida Public Service Commission using the Florida Relay Service, which can be reached at: 1-800-955-8771 (TDD).

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TELEPHONE (904) 877-7191
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8/14

August 14, 1996

Division of Administrative Hearings
1230 Apalachee Parkway
Tallahassee, Florida 32399-1550

HAND DELIVERY

Re: Florida Waterworks Association v.
Florida Public Service Commission

To Whom it May Concern:

Enclosed on behalf of Florida Waterworks Association are an original and five copies of the following:

1. Petition for Administrative Determination of Invalidity of Proposed Rules; and

2. Motion for Abatement.

Please open a docket for consideration of this Petition.

Please acknowledge receipt of the foregoing by stamping the enclosed extra copy of this letter and returning same to my attention. Thank you for your assistance.

Sincerely,

Wayne L Schiefelbein

Wayne L. Schiefelbein

WLS/ldv
Enclosures

cc:w/encl.: Blanca S. Bayo, Director
Division of Records & Reporting
Matthew J. Feil, Esq.
Southern States Utilities, Inc.
Charles H. Hill, Director
Division of Water & Wastewater
Christiana Moore, Esquire
Division of Appeals
David E. Smith, Esq., Director
Division of Appeals

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

FLORIDA WATERWORKS ASSOCIATION,

Petitioner,

v.

DOAH Case No. 96-3809RP
Filed: August 14, 1996

FLORIDA PUBLIC SERVICE COMMISSION,

Respondent.
_______________________________/

PETITION FOR ADMINISTRATIVE DETERMINATION OF INVALIDITY OF PROPOSED RULE

The Petitioner, the Florida Waterworks Association (FWA), by and through its undersigned counsel, and pursuant to Section 120.54(4), Florida Statutes, hereby seeks an administrative determination of the invalidity of proposed rule 25-30.431, Florida Administrative Code, as proposed by the Florida Public Service Commission (PSC). In support of this Petition, the FWA states:

(1) For the purposes of this proceeding, the address and telephone number of the Petitioner, the FWA, should be considered that of its undersigned counsel.

(2) The affected agency is the PSC at the address of 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850.

(3) The FWA is comprised of investor-owned water and/or wastewater utility companies in the State of Florida, and is the Florida Chapter of the National Association of Water Companies, Inc. The FWA exists to assist its members with regulatory, technical and operational matters. A substantial number of the members of the FWA are water and wastewater utilities regulated by

the PSC, and are subject to its rules and regulations, including the proposed rule. As such, the FWA is substantially affected by the proposed rule 25-30.431.

(4) The proposed rule was noticed in the Florida Administrative Weekly on August 2, 1996, at Volume 22, Number 31, in Docket No. 960258-WS. The text of the proposed rule is attached hereto. The proposed rule would codify the PSC's non-rule policy on applicable rate-making treatment in rate case proceedings for setting a margin reserve and the imputation of contributions-in-aid-of-construction (CIAC) on the margin reserve.

(5) The proposed rule defines the term margin reserve as "the amount of plant capacity needed to meet the expected demand due to customer growth" and declares that margin reserve is "an acknowledged component of the used and useful rate base determination." Margin reserve period is defined as the "time period needed to install the next economically feasible increment of plant capacity that will preclude a determination in the quality of service." Presumptively valid margin reserve periods are prescribed, "unless otherwise justified." In determining whether another margin reserve period is justified, the proposed rule provides that the PSC shall "consider" the rate of customer growth; the time needed to meet the guidelines of the Department of Environmental Protection (DEP) for planning, design, and construction of plant expansion; and the technical and economic options available for sizing increments of plant expansion.

The proposed rule further mandates the imputation of contributions-in-aid-of-construction (CIAC) when a margin reserve is authorized. A projection of future customers' payments of service availability charges during the margin reserved period is imputed or used as an offset to the margin reserve component of rate base. The rule limits the amount of imputed CIAC to the amount of the margin reserve.

(6) Under Chapter 367 of the Florida Statutes, and the Florida and Federal Constitutions, a water and/or wastewater utility is entitled to recover in rates those expenses reasonably necessary to provide service to its customers, and to earn a fair rate of return on its "rate base," that is, the investment in plant used and useful in providing service. West Ohio Gas Co. v. Public Utilities Commission, 234 U.S. 63, 55 S. Ct. 316, 79 L. Ed. 761 (1935); City of Miami v. Florida Public Service Commission, 208 So. 2d 249 (Fla. 1968); Gulf Power Company v. Bevis, 289 So. 2d 401 (Fla. 1974); Sec. 367.081(2)(a), Fla. Stat.

(7) A water and/or wastewater utility subject to the proposed rule is required by statute to provide safe, efficient and sufficient service, not less safe, less efficient, or less sufficient than is consistent with the approved engineering design of the system and the reasonable and proper operation of the utility in the public interest. Sec. 367.111(2), Fla. Stat. This obligation to serve applies to both existing and future customers located within the utility's certificated service area. Sec. 367.111(1), Fla. Stat.

(8) To meet the statutory responsibility of "readiness to

serve," a water and wastewater utility must have sufficient capacity to meet the existing and changing demands of existing customers and the demands of potential customers within a reasonable time and in an economic manner. The investment in that readiness to serve capacity is properly recognized in rate setting as a margin reserve.

(9) Investment in "margin reserve" is investment in plant used and useful in providing service. The proposed rule would deprive affected public utilities of an opportunity to earn a fair rate of return on this investment for two reasons. First, the proposed rule provides for presumptively valid assumptions that significantly understate a reasonable margin reserve. If the margin reserve is understated, the amount of capacity recognized by the PSC will be insufficient for the utility to meet its "readiness to serve" obligations in a timely and economic manner. Second, by its imputation, or offset of contributions-in-aid-of-construction (CIAC) that might be paid over the margin reserve period, against the margin reserve, the amount of investment in margin reserve on which a utility is allowed to earn a return is dramatically reduced or even eliminated.

(10) A capacity reserve, to assure a utility's ability to provide reliable service and to meet statutory requirements, is a necessity long recognized by the PSC for water, wastewater and electric utilities. Although the purpose of the reserve is similar for these types of utilities, they have different names and are measured in different ways. The investment in capacity reserve for

water and wastewater utilities is called a "margin reserve" and has historically been expressed in terms of equivalent annual growth. The investment in capacity reserve for electric utilities is called a "reserve margin" and has historically been expressed as a percentage of annual peak load demand. However, either reserve can be expressed in terms of percentage of peak load demand or equivalent annual growth. And although the reserves have similar purposes, the PSC has historically given them inconsistent ratemaking treatment. With regard to electric utilities, the PSC views the reserve as a current requirement, sets a minimum and allows the reserve to be greater than the minimum if economically justified. With regard to water and wastewater utilities, the PSC views the reserve as capacity held for future customers, sets a maximum, and will not allow it to be greater even if economically justified.

(11) The proposed rule codifies this latter policy by defining margin reserve as "the amount of plant needed to meet the expected demand due to customer growth." The proposed rule ignores the benefits of margin reserve to existing customers, that is, the availability of capacity which ensures that future customers will not overload existing facilities and impact on the quality and safety of service provided. A utility should have in place sufficient capacity to prevent deterioration in reliability and quality of service, until the next economic increment can be placed in service. Many factors affect the length of time between capacity increments. The utility must take into consideration, in

addition to the time actually needed for construction, the FDEP planning and permitting process; the permitting and approval processes of local governments and water management districts; design, bidding and bid evaluation; and testing, inspection, certification and startup. Concerns for strict environmental protection at all levels of government has substantially increased the length of time between conception and completion of facility construction. Obtaining a consumptive use permit alone may well take four years. Meeting environmental and conservation concerns in a manner acceptable to permitting agencies often leads to several alternatives being designed and considered before being accepted, a process that can entail many months or even years. During the period from conception to completion, capacity must be available to provide service. And as this time increases, the capacity reserve requirement also increases. These factors are not given their due weight, under existing PSC policy or the proposed rule. In practice, after "consideration" of such factors, the PSC routinely disregards them and establishes margin reserves at the presumptively valid levels set forth in the proposed rule. As a result, the amount of plant in which a utility should economically invest to serve the public is either not being built or, when it is built, its cost is not being allowed to be recovered through rates.

(12) The definitions and measure of margin reserve for water and wastewater utilities to be included as used and useful under the proposed rule are inadequate to allow a utility to build plant in economic increments, unlike that which is allowed for electric

utilities. In its regulation of electric utilities, the PSC requires that a minimum 15% reserve margin be maintained. However, the actual margins maintained by and allowed for electric utilities are often greater as a result of long-run economic choices, and often these margins include capacity capable of serving the equivalent of five to 20 years' annual growth. This reflects well-established PSC policy in electric rate cases for including the cost of capacity and land in rate base even if those assets are not used in the near term, if they enhance reliability or contribute to long-term economies.

(13) The PSC encourages such economic choices by allowing electric utilities to recover the cost of service associated with these assets through the rates of existing customers, even though it is acknowledged that to some extent they will be used to serve future customers and possibly not for many years. Since electric utilities do not collect CIAC through service availability charges, as is common with water and wastewater utilities, imputation of CIAC against these assets is not an issue. Electric capacity costs are evaluated in terms of their prudence, without regard to the fact that these costs are recovered through current customers.

(14) The PSC's nonrule policy is to offset water and wastewater utilities' actual investment represented by margin reserve by imputing uncollected amounts of CIAC that might be collected in a period following a rate case test year equal in length to the margin reserve period. While the PSC has recognized that margin reserve is necessary for a utility to meet its

statutory obligations and that it properly is a part of used and useful plant, it nonetheless denies utilities the ability to earn on their investment in margin reserve by imputing uncollected CIAC as an offset to such investment. The net result of imputing CIAC is to dramatically reduce the amount of margin reserve on which a utility is allowed to earn a return. In some cases, the imputation of CIAC has <u>entirely</u> offset allowed margin reserve. This imputation policy ultimately serves to subvert the PSC's margin reserve policy and to confiscate the utilities' investment in plant used and useful in the public service.

(15) The imputation policy has been justified by the PSC purportedly on the grounds of "fairness," that, without imputation, future customers may be subsidized by current customers. The policy rests on the assumption that the amount of capacity represented by the margin reserve exists solely to serve future customers, that those future customers are near term, and that those customers, with absolute certainty, will appear, and will appear in the time frame of the margin reserve period. This oversimplified connection between margin reserve and future customers ignores the legitimate purposes of a margin reserve. Margin reserve provides a cushion such that a utility can be prepared to meet the anticipated peak load conditions of its existing customers, with a reasonable degree of reliability, even when unanticipated outages occur. Margin reserve provides a cushion such that a utility can be prepared to meet changing load conditions of its existing customers, over and above the peak

loads historically experienced, with a reasonable degree of reliability. Margin reserve includes capacity over and above that required for existing loads that may exist merely because the economic sizing and timing of plant expansion dictate that result. As a fallout, margin reserve provides capacity adequate to meet ongoing projected growth. This is true for water and wastewater utilities as it is true for electric utilities.

(16) The imputation policy assumes that there would be no margin if there were no growth. No such assumption regarding the relationship between reserve capacity and the ability to serve growth is made for electric utilities. Reserve capacity is necessary even without growth, for water and wastewater, and electric utilities. The imputation policy also assumes that CIAC is forthcoming from growth and, therefore, CIAC should be imputed. But if it is logical to assume that CIAC is forthcoming from growth and should be imputed, then it is just as logical to assume that revenues, expenses, additional investment requirements and any other factors associated with growth should also be imputed. But the PSC doesn't do this because, in fact, neither argument is logical. The basis for ratemaking is the test period with all revenues, expenses, investment and offsets to investment, including CIAC, matching. The imputation policy, based on an illogical mismatching of period investment with out-of-period contributions, denies a utility the ability to earn on its investment in margin reserve. The policy results in a subsidy to current customers by passing on to either the future

customer or to the stockholder, the cost of maintaining a reliable level of service. The imputation policy in fact thwarts margin reserve policy because by offsetting real investment in margin reserve by imputed CIAC, it sends a signal to keep margin reserve at a minimum in order to reduce the risk of an inadequate return, even if reliability is affected. This policy also ignores that during the margin reserve period, the utility is continuing to make further investments by planning and constructing facilities to serve additional new customers who will connect beyond the margin reserve period. By the time the first customer connects to the plant allowed in margin reserve and pays his service availability charges (CIAC), the utility must be able to provide service for yet another future customer.

(17) The PSC provides for an Allowance for Funds Prudently Invested (AFPI). The AFPI charge is described as "a mechanism which allows a utility to earn a fair rate of return on prudently constructed plant held for future use from the future customers to be served by that plant in the form of a charge paid by those customers." Rule 25-30.434(1), Fla. Admin. Code. While costs associated with prudently invested "used" plant are recovered through rates to current customers, the costs associated with prudently invested "non-used" plant may be recovered through an AFPI charge from future customers. However, an AFPI charge does not recover earnings lost on the portion of margin reserve offset by imputed CIAC. Margin reserve is a component of used and useful plant and no portion of its cost is recovered through an

AFPI charge. There is no opportunity to earn on the investment in margin reserve against which CIAC has been imputed, from either current or future customers. Those earnings are lost forever.

(18) The proposed rule is an invalid exercise of delegated legislative authority in that it enlarges, modifies, or contravenes the provisions of the law implemented; fails to establish adequate standards for agency decisions, or vests unbridled discretion in the PSC; and is arbitrary and capricious.

(19) The proposed rule violates the constitutional rights of affected water and wastewater utilities to due process, to just compensation for taking of property, and the right to possess and protect property.

(20) As compared to PSC rate regulation of electric utilities, the proposed rule is unfairly discriminatory and violates the right of affected utilities to equal protection of the law.

(21) The following material facts are in dispute in this proceeding:

(a) whether to satisfy its statutory responsibility of readiness to serve, a water and/or wastewater utility must have as margin reserve sufficient capacity to meet the existing and changing demands of existing customers and the demands of potential customers within a reasonable time and in an economic manner;

(b) whether the PSC must recognize the investment necessary to comply with a water and/or wastewater utility's statutory responsibility of readiness to serve, as a part of used and useful plant;

(c) whether application of the proposed rule would understate a reasonable margin reserve;

(d) whether the imputation of CIAC as an offset to margin reserve would understate the investment in property used and useful in providing service and deny the utility an opportunity to earn a fair rate of return on such property;

(e) whether the proposed rule is unfairly discriminatory when compared to PSC policy for other PSC-regulated utilities;

(f) whether application of the proposed rule would likely cause affected utilities to size their facilities to reduce the risk of an inadequate return, disregarding economies of scale, with a net result, over the longer run, of a higher cost of service and, hence, higher rates, with reduced assurance of reliability and sufficiency of service.

(22) The FWA alleges that each of the disputed issues of material fact described in paragraph 21 are to be found in the affirmative, and that those facts demonstrate that the proposed rule is an invalid exercise of delegated legislative authority, and in violation of water and/or wastewater utilities' constitutional rights to due process, just compensation for taking of property to possess and protect property, and to equal protection of the law.

WHEREFORE, the Petitioner, the Florida Waterworks

Association, requests that

A) the Division of Administrative Hearings accept this Petition and assign a Hearing Officer to conduct a formal hearing in accordance with Section 120.57(1), Florida Statutes;

B) the assigned Hearing Officer enter a Final Order determining that proposed rule 25-30.431 constitutes an invalid exercise of delegated legislative authority and is therefore void;

C) the assigned Hearing Officer enter a Final Order finding that proposed rule 25-30.431 violates the constitutional rights of affected utilities to due process, to just compensation for taking of property, to possess and protect property, and to equal protection of the law; and

D) such other relief as may be deemed just and proper.

Respectfully submitted this 14th day of August, 1996.

Wayne L Schiefelbein

WAYNE L. SCHIEFELBEIN
Gatlin, Woods & Carlson
1709-D Mahan Drive
Tallahassee, Florida 32308
(904) 877-7191

Attorneys for Florida Waterworks Association

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing has been furnished by hand delivery to Christiana Moore, Esquire, Division of Appeals, Florida Public Service

Commission, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850, and David E. Smith, Esquire, Director, Division of Appeals, Florida Public Service Commission, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850 on this 14th day of August, 1996.

Wayne L. Schiefelbein

WAYNE L. SCHIEFELBEIN

PUBLIC SERVICE COMMISSION

DOCKET NO. 960258-WS

RULE TITLE: RULE NO.:

Margin Reserve 25-30.431

PURPOSE AND EFFECT: The purpose of this rule is to codify the current policy on margin reserve and imputation of contributions-in-aid-of-construction (CIAC) on margin reserve calculations for water and wastewater utilities.

SUMMARY: Rule 25-30.431 defines "margin reserve"; provides that upon request and justification, margin reserve will be included in the used and useful determination in certain rate cases; that unless otherwise justified, the margin reserve period will be 18 months for water source and treatment facilities and wastewater treatment and effluent disposal facilities, and 12 months for water transmission and distribution lines and the wastewater collection system; and describes the mechanical aspects and data submission requirements. If margin reserve is authorized, a corresponding provision for the imputation of CIAC is prescribed; however, it is limited to the rate base component associated with margin reserve.

SPECIFIC AUTHORITY: 367.121 FS.

LAW IMPLEMENTED: 367.081 FS.

A HEARING WILL BE HELD AT THE TIME, DATE AND PLACE SHOWN BELOW:

TIME AND DATE: 9:30 a.m., December 10, 1996, continuing on December 11, 1996, if necessary

PLACE: Room 148, Betty Easley Conference Center, 4075 Esplanade Way, Tallahassee, Florida

PERSONS WHO INTEND TO PARTICIPATE IN THIS RULEMAKING PROCEEDING SHOULD FILE A NOTICE OF INTENT TO PARTICIPATE WITH THE FPSC, DIVISION OF RECORDS AND REPORTING, WITHIN 21 DAYS OF THE DATE OF THIS NOTICE. AN ORDER WILL BE ISSUED ESTABLISHING PREHEARING AND HEARING PROCEDURES TO BE FOLLOWED. WRITTEN COMMENTS AND TESTIMONY ON THE PROPOSED RULE MAY BE FILED NO LATER THAN OCTOBER 18, 1996. RESPONSIVE COMMENTS AND TESTIMONY MAY BE FILED NO LATER THAN NOVEMBER 15, 1996.

THE PERSON TO BE CONTACTED REGARDING THE PROPOSED RULE AND ECONOMIC STATEMENT IS: Director of Appeals, Florida Public Service Commission, 2540 Shumard Oak Blvd., Tallahassee, Florida 32399

THE FULL TEXT OF THE PROPOSED RULE IS:

<u>25-30.431 Margin Reserve.</u>

<u>(1) "Margin reserve" is defined as the amount of plant capacity needed to meet the expected demand due to customer growth.</u>

<u>(2) "Margin reserve period" is defined as the time period needed to install the next economically feasible increment of plant capacity that will preclude a deterioration in the quality of service.</u>

<u>(3) Margin reserve is an acknowledged component of the used and useful rate base determination that when requested and justified shall be included in rate cases filed pursuant to section 367.081, Florida Statutes.</u>

<u>(4) Unless otherwise justified, the margin reserve period for water source and treatment facilities and wastewater treatment and effluent disposal facilities will be 18 months. Unless otherwise justified, the margin reserve period for water transmission and distribution lines and the wastewater collection system will be 12 months. In determining whether another margin reserve period is justified, the Commission shall consider the rate of growth in the number of equivalent residential connections (ERCs); the time needed to meet the guidelines of the Department of Environmental Protection (DEP) for planning, designing, and constructing of plant expansion; and the technical and economic options available for sizing increments of plant expansion.</u>

<u>(5)(a) Margin reserve for water source and treatment facilities and wastewater treatment and effluent disposal facilities shall be calculated as follows:</u>

<u>EG x MP x D = MR</u>

<u>where:</u>

EG = Equivalent Annual Growth in ERCs determined pursuant to (c) or (d) below

MP = Margin Reserve Period determined pursuant to subsection (4)

D = Demand per ERC (customer demand applied in the used and useful calculations for water and wastewater facilities)

MR = Margin reserve expressed in gallons per day (GPD)

(b) Margin reserve for water transmission and distribution lines and the wastewater collection system shall be calculated as follows:

EG x MP = MR

where:

EG = Equivalent Annual Growth in ERCs determined pursuant to (c) or (d) below

MP = Margin Reserve Period determined pursuant to subsection (4)

MR = Margin reserve expressed in ERCs

(c) The equivalent annual growth in ERCs (EG) is measured in terms of the projected annual growth and shall be calculated in Schedules F-9 and F-10 of Form PSC/WAW 19 for Class A utilities and Form PSC/WAW 20 for Class B utilities, incorporated by reference in Rule 25-30.437.

(d) The utility shall also submit a linear regression analysis using average ERCs for the last 5 years. The utility may submit other information that will affect growth in ERCs.

(6) As part of its application filed pursuant to Rule 25-30.437, the utility shall submit its most recent wastewater capacity analysis report, if any, filed with DEP.

(7) Contributions-in-aid-of-construction (CIAC) shall be imputed when a margin reserve is authorized. The amount of imputed CIAC shall be determined based on the number of ERCs included in the margin reserve period and the projected CIAC that will be collected from those ERCs. However, the imputed CIAC shall not exceed the rate base component associated with margin reserve.

Specific Authority 367.121 FS. Law Implemented 367.081 FS. History–New ________.

NAME OF PERSON ORIGINATING PROPOSED RULE: Charles H. Hill

NAME OF SUPERVISOR OR PERSON WHO APPROVED THE PROPOSED RULE: Florida Public Service Commission

DATE PROPOSED RULE APPROVED: July 16, 1996

If any person decides to appeal any decision of the Commission with respect to any matter considered at the rulemaking hearing, if held, a record of the hearing is necessary. The appellant must ensure that a verbatim record, including testimony and evidence forming the basis of the appeal is made. The Commission usually makes a verbatim record of rulemaking hearings.

Any person requiring some accommodation at this hearing because of a physical impairment should call the Division of Records and Reporting at (904)413-6770 at least five calendar days prior to the hearing. If you are hearing or speech impaired, please contact the Florida Public Service Commission using the Florida Relay Service, which can be reached at: 1(800)955-8771 (TDD).

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

FLORIDA WATERWORKS ASSOCIATION,

Petitioner,

v.

DOAH Case No. ________
Filed: August 14th, 1996

FLORIDA PUBLIC SERVICE COMMISSION,

Respondent.
_______________________________/

MOTION FOR ABATEMENT

The Petitioner, the FLORIDA WATERWORKS ASSOCIATION, by and through its undersigned counsel, hereby moves to abate the captioned proceeding for a time certain. As grounds for this Motion, Petitioner states:

(1) The Florida Public Service Commission (PSC) has scheduled a public hearing beginning on December 10, 1996 to receive and consider oral and written comments from interested persons, concerning the proposed rule challenged in this proceeding.

(2) It is anticipated that, as a result of the comments submitted, the PSC may determine to clarify, modify or revise the challenged proposed rule in a manner which may resolve some or all of the issues raised by the Petitioner in this proceeding.

(3) Administrative economy and efficiency will be served by an abatement of this formal proceeding pending the outcome of the public hearing to be conducted by the PSC beginning on December 10, 1996.

(4) Neither the Petitioner, the PSC nor the public will be prejudiced by an abatement of this proceeding pending the

conclusion of further proceedings to be conducted by the PSC.

(5) The Petitioner requests an abatement until February 28, 1997, whereupon the undersigned will notify and advise the Hearing Officer of the status of the PSC proceedings and the instant rule-challenge petition. Such abatement should be without prejudice to amend the Petition for Administrative Determination of Invalidity of Proposed Rule should changes be made in the proposed rule, as well as without prejudice to the PSC to file responsive pleadings at the end of the period of abatement.

WHEREFORE, the Petitioner, the FLORIDA WATERWORKS ASSOCIATION, hereby moves for an Order placing the captioned proceeding in abatement until and including February 28, 1997.

Respectfully submitted this 14th day of August, 1996.

Wayne L. Schiefelbein

WAYNE L. SCHIEFELBEIN
Gatlin, Woods & Carlson
1709-D Mahan Drive
Tallahassee, Florida 32308
(904) 877-7191

Attorneys for FLORIDA WATERWORKS ASSOCIATION

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing has been furnished by hand delivery to Christiana Moore, Esquire, Florida Public Service Commission, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850, and David E. Smith, Esquire, Director, Division of Appeals, Florida Public Service Commission, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850 on this 14th day of August, 1996.

Wayne L. Schiefelbein

WAYNE L. SCHIEFELBEIN

RUTLEDGE, EC NIA, UNDERWOOD, PURNELL & HOFFMAN
PROFESSIONAL ASSOCIATION
ATTORNEYS AND COUNSELORS AT LAW

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THOMAS W. KONRAD
R. DAVID PRESCOTT
HAROLD F. X. PURNELL
GARY R. RUTLEDGE
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PATRICK R. MALOY
AMY J. YOUNG

August 23, 1996

HAND DELIVERY

Division of Administrative Hearings
1230 Apalachee Parkway
Tallahassee, Florida 32399-1550

RE: Southern States Utilities v. Florida Public Service Commission

To Whom it May Concern:

Enclosed on behalf of Southern States Utilities, Inc. are an original and one copy of a Petition for Administrative Determination of Invalidity of Proposed Rule.

Please open a docket for consideration of this Petition.

Please acknowledge receipt of the foregoing by stamping the enclosed extra copy of this letter and returning same to my attention. Thank you for your assistance.

Sincerely,

Kenneth A. Hoffman

Kenneth A. Hoffman

KAH/emj
Enclosure

cc: Blanca S. Bayo, Director
Division of Records & Reporting
Charles H. Hill, Director
Division of Water & Wastewater
Christiana Moore, Esquire
Division of Appeals
David E. Smith, Esquire, Director
Division of Appeals
Wayne L. Schiefelbein, Esquire
Florida Waterworks Association

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8/23/96

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

SOUTHERN STATES UTILITIES, INC.,

Petitioner,

DOAH CASE NO: 96-3949RP

v.

FLORIDA PUBLIC SERVICE COMMISSION,

Respondent.

______________________________/

PETITION FOR ADMINISTRATIVE
DETERMINATION OF INVALIDITY OF PROPOSED RULE

The Petitioner, Southern States Utilities, Inc. ("SSU"), by and through its undersigned counsel, and pursuant to Section 120.54(4), Florida Statutes, hereby seeks an administrative determination of the invalidity of proposed rule 25-30.431, Florida Administrative Code, as proposed by the Florida Public Service Commission ("PSC"). In support of this Petition, SSU states:

1. SSU is an investor-owned water and wastewater utility providing water service in 104 service areas and wastewater service in 48 service areas in the State of Florida. SSU's home office address is 1000 Color Place, Apopka, Florida 32703. For the purposes of this proceeding, the address and telephone number of Petitioner SSU should be considered that of its undersigned counsel.

2. The affected agency is the PSC at the address of 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850.

3. SSU's land, facilities and the rates and charges for 97 of its water and 44 of its wastewater service areas are subject

to and regulated by the PSC's statutes, rules and regulations, including the proposed rule. As such, SSU is substantially affected by proposed rule 25-30.431.

4. The proposed rule was noticed in the Florida Administrative Weekly on August 2, 1996, at Volume 22, Number 31, in PSC Docket No. 960258-WS. The text of the proposed rule is attached hereto as Exhibit A. Apart from isolated exceptions, the proposed rule would codify the PSC's non-rule policy on applicable rate-making treatment in rate case proceedings for setting a margin reserve and the imputation of contributions-in-aid-of-construction ("CIAC") on the margin reserve. The proposed rule further mandates the imputation of contributions-in-aid-of-construction (CIAC) when a margin reserve is authorized. A projection of future customers' payments of service availability charges during the margin reserve period is imputed or used as an offset to the margin reserve component of rate base. The rule limits the amount of imputed CIAC to the amount of the margin reserve.

BACKGROUND

5. Under Chapter 367 of the Florida Statutes, and the Florida and Federal Constitutions, a water and/or wastewater utility is entitled to recover in rates those expenses reasonably necessary to provide service to its customers, and to earn a fair rate of return on its "rate base," that is, the investment in plant used and useful in providing service. West Ohio Gas Co. v.

Public Utilities Commission, 234 U.S. 63, 55 S.Ct. 316, 79 L.Ed. 761 (1935); City of Miami v. Florida Public Service Commission, 208 So.2d 249 (Fla. 1968); Gulf Power Company v. Bevis, 289 So.2d 401 (Fla. 1974); § 367.081(2)(a), Fla. Stat. (1995).

6. The proposed rule purports to implement Section 367.081(2)(a), Florida Statutes, which inter alia, requires the PSC to fix water and wastewater rates which provide a "fair return on the investment of the utility in property used and useful in the public service." (emphasis added). The margin reserve is considered part of a water and/or wastewater utility's used and useful property for purposes of establishing rates.

7. A water and/or wastewater utility subject to the proposed rule is required by statute to provide safe, efficient and sufficient service, not less safe, less efficient, or less sufficient than is consistent with the approved engineering design of the system and the reasonable and proper operation of the utility in the public interest. § 367.111(2), Fla. Stat. (1995). This obligation to serve applies to both existing and future customers located within the utility's certificated service area. § 367.111(1), Fla. Stat. (1995).

8. To meet the statutory responsibility of "readiness to serve," a water and wastewater utility must have sufficient capacity to meet the existing and changing demands of existing customers and the demands of potential customers within a reasonable time and in an economic manner. The investment in that readiness to serve capacity is properly recognized in rate

setting as a margin reserve.

MARGIN RESERVE

9. The proposed rule defines the term margin reserve as "the amount of plant capacity needed to meet the expected demand due to customer growth" and declares that margin reserve is "an acknowledged component of the used and useful rate base determination." Margin reserve period is defined as the "time period needed to install the next economically feasible increment of plant capacity that will preclude a determination in the quality of service." Presumptively valid margin reserve periods are prescribed, "unless otherwise justified." In determining whether another margin reserve period is justified, the proposed rule provides that the PSC shall "consider" the rate of customer growth; the time needed to meet the guidelines of the Department of Environmental Protection ("DEP") for planning, design, and construction of plant expansion; and the technical and economic options available for sizing increments of plant expansion.

10. Investment in "margin reserve" is investment in plant used and useful in providing service. § 367.081(2)(a), Fla. Stat. (1995). The proposed rule would deprive affected public utilities of an opportunity to earn a fair rate of return on this investment for two reasons. First, the proposed rule provides for presumptively valid assumptions that significantly understate a reasonable margin reserve. If the margin reserve is understated, the amount of capacity recognized by the PSC will be

insufficient for the utility to meet its "readiness to serve" obligations in a timely, economic and environmentally safe manner. Second, as discussed later in this Petition, by imputing or offsetting CIAC that might be paid over the margin reserve period, against the margin reserve, the amount of investment in margin reserve on which a utility is allowed to earn a return is dramatically reduced or even eliminated.

11. A capacity reserve, to assure a utility's ability to provide reliable service and to meet statutory requirements, is a necessity long recognized by the PSC for water, wastewater and electric utilities. Under Chapter 366, electric utilities, like water and wastewater utilities, are authorized to recover "the actual legitimate costs of the property . . . <u>actually used and useful in the public service</u>" as well as a return on "the money honestly and prudently invested . . . in <u>such property used and useful in serving the public</u>. . . ." § 366.06(1), Fla. Stat. (1995) (emphasis added). Although the purpose of the reserve is similar for these types of utilities, they have different names and are measured in different ways. The investment in capacity reserve for water and wastewater utilities is called a "margin reserve" and has historically been expressed in terms of equivalent annual growth. The investment in capacity reserve for electric utilities is called a "reserve margin" and has historically been expressed as a percentage of annual peak load

demand.[1] Specifically, in its regulation of electric utilities, the PSC requires that a minimum 15% reserve margin be maintained.[2] However, the actual margins maintained by and allowed for electric utilities are often greater as a result of long-run economic choices, and often these margins include capacity capable of serving the equivalent of five to 20 years' annual growth. This reflects well established PSC policy in electric rate cases for including the cost of capacity and land in rate base even if those assets are not used in the near term, *if* they enhance reliability or contribute to long-term economies. With regard to electric utilities, the PSC views the reserve as a current requirement, sets a minimum and allows the reserve to be greater than the minimum if economically justified.

12. The PSC encourages economic choices for electric utilities by allowing them to recover the cost of service associated with these assets through the rates of existing customers, even though it is acknowledged that to some extent they will be used to serve future customers and possibly not for many years. Since electric utilities typically do not collect CIAC through service availability charges, as is common with water and wastewater utilities, imputation of CIAC against these assets is not an issue. Electric capacity costs are evaluated in terms of their prudence, without regard to the fact that these

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1 Either "reserve" can be expressed in terms of percentage of peak load demand or equivalent annual growth.

2 *See* Fla. Admin. Code R. 25-6.035(1).

costs are recovered through current customers.

13. Although electric and water/wastewater "reserves" have similar purposes and are authorized pursuant to substantially similar language, the PSC has historically given them inconsistent ratemaking treatment and would continue to do so under the proposed rule. Unlike with electric utilities, the PSC views the reserve for water and wastewater utilities as capacity held only for future customers, sets an 18 month growth maximum, and prohibits a margin reserve above the 18 months even if economically justified.

14. The proposed rule codifies this policy by defining margin reserve as "the amount of plant needed to meet the expected demand due to customer growth." The proposed rule ignores the benefits of margin reserve to existing customers, that is, the availability of capacity which ensures that future customers will not overload existing facilities and impact on the quality and safety of service provided. A utility should have in place sufficient capacity to prevent deterioration in reliability and quality of service, until the next economic increment can be placed in service. Many factors affect the length of time between capacity increments. The utility must take into consideration, in addition to the time actually needed for construction, the DEP planning and permitting process; the permitting and approval processes of local governments and water management districts; design, bidding and bid evaluation; and testing, inspection, certification and startup. Concerns for

strict environmental protection at all levels of government has substantially increased the length of time between conception and completion of facility construction. Obtaining a consumptive use permit alone may well take four years. Meeting environmental and conservation concerns in a manner acceptable to permitting agencies often leads to several alternatives being designed and considered before being accepted, a process that can entail many months or even years. During the period from conception to completion, capacity must be available to provide service. And as this time increases, the capacity reserve requirement also increases. These factors are essentially ignored under existing PSC policy and the proposed rule. In practice, after "consideration" of such factors, the PSC routinely disregards them and establishes margin reserves at the presumptively valid levels set forth in the proposed rule. As a result, the amount of plant in which a utility should economically invest to serve the public is either not being built or, when it is built, its cost is not being allowed to be recovered through rates.

15. The definitions and measure of margin reserve for water and wastewater utilities to be included as used and useful under the proposed rule are inadequate to allow a utility to build plant in economic increments, unlike that which is allowed for electric utilities. The proposed rule discourages water and wastewater utilities from constructing plants which maximize economies of scale. Such economies of scale benefit both existing and future customers.

16. The proposed rule also discourages water and wastewater utilities from maintaining compliance with DEP rules concerning the planning, construction and permitting of wastewater market facilities. Rule 62-600.405(8), Florida Administrative Code, establishes a five year period for planning, construction and permitting of wastewater treatment facilities once a professional engineer submits a capacity analysis report to DEP confirming that the existing permitted capacity of a wastewater treatment facility will be equaled or exceeded within the next five years. The engineering, construction, permitting, consulting and legal expenses incurred by the utility over this five year period to install this next increment of wastewater plant cannot be recovered by a utility which is limited to an eighteen month margin reserve. The utility is in a constant "Catch 22." If it ignores the DEP rules, it is subject to fines. If it complies with DEP rules, it incurs costs that are not recoverable through rates under the proposed rule.

IMPUTATION OF CIAC

17. The effect of the proposed rule is to offset water and wastewater utilities' actual investment represented by margin reserve by imputing uncollected amounts of CIAC that might be collected in a period following a rate case test year equal in length to the margin reserve period. While the PSC has recognized that margin reserve is necessary for a utility to meet its statutory obligations and that it properly is a part of used

and useful plant, it nonetheless denies utilities the ability to earn on their investment in margin reserve by imputing uncollected CIAC as an offset to such investment. The net result of imputing CIAC is to dramatically reduce the amount of margin reserve on which a utility is allowed to earn a return. In some cases, the imputation of CIAC has <u>entirely</u> offset allowed margin reserve. This imputation policy serves to subvert the PSC's margin reserve policy and to confiscate the utilities' investment in plant used and useful in the public service.

18. The imputation policy has been justified by the PSC purportedly on the grounds of "fairness," that, without imputation, future customers may be subsidized by current customers. The policy rests on the assumption that the amount of capacity represented by the margin reserve exists solely to serve future customers, that those future customers are near term, and that those customers, with absolute certainty, will appear, and will appear in the time frame of the margin reserve period. This oversimplified connection between margin reserve and future customers ignores the legitimate purposes of a margin reserve. Margin reserve provides a cushion such that a utility can be prepared to meet the anticipated peak load conditions of its existing customers, with a reasonable degree of reliability, even when unanticipated outages occur. Margin reserve provides a cushion such that a utility can be prepared to meet changing load conditions of its existing customers, over and above the peak loads historically experienced, with a reasonable degree of

reliability. Margin reserve includes capacity over and above that required for existing loads that may exist merely because the economic sizing and timing of plant expansion dictate that result. As a fallout, margin reserve provides capacity adequate to meet ongoing projected growth. This is true for water and wastewater utilities as it is true for electric utilities.

19. The imputation policy assumes that there would be no margin if there were no growth. No such assumption regarding the relationship between reserve capacity and the ability to serve growth is made for electric utilities. Reserve capacity is necessary even without growth, for water and wastewater, and electric utilities. The imputation policy also assumes that CIAC is forthcoming from growth and, therefore, CIAC should be imputed. But if it is logical to assume that CIAC is forthcoming from growth and should be imputed, then it is just as logical to assume that revenues, expenses, additional investment requirements and any other factors associated with growth should also be imputed. But the PSC doesn't do this because, in fact, neither argument is logical. The basis for ratemaking is the test period with all revenues, expenses, investment and offsets to investment, including CIAC, matching. The imputation policy, based on an illogical mismatching of period investment with out-of-period contributions, denies a utility the ability to earn on its investment in margin reserve. The policy results in a subsidy to current customers by passing on to either the future customer or to the stockholder, the cost of maintaining a

reliable level of service. The imputation policy in fact thwarts margin reserve policy because by offsetting real investment in margin reserve by imputed CIAC, it sends a signal to keep margin reserve at a minimum in order to reduce the risk of an inadequate return, even if reliability is affected. This policy also ignores that during the margin reserve period, the utility is continuing to make further investments by planning and constructing facilities to serve additional new customers who will connect beyond the margin reserve period. By the time the first customer connects to the plant allowed in margin reserve and pays his service availability charges (CIAC), the utility must be able to provide service for yet another future customer.

20. The PSC provides for an Allowance for Funds Prudently Invested ("AFPI"). The AFPI charge is described as "a mechanism which allows a utility to earn a fair rate of return on prudently constructed plant held for future use from the future customers to be served by that plant in the form of a charge paid by those customers." Fla. Admin. Code R. 25-30.434(1). While costs associated with prudently invested "used" plant are recovered through rates to current customers, the costs associated with prudently invested "non-used" plant <u>may</u> be recovered through an AFPI charge from future customers. However, an AFPI charge, even where authorized, does not recover earnings lost on the portion of margin reserve offset by imputed CIAC. Margin reserve is a component of used and useful plant and no portion of its cost is recovered through an AFPI charge. There is no opportunity to

earn on the investment in margin reserve against which CIAC has been imputed, from either current or future customers. Those earnings are lost forever.

THE ECONOMIC IMPACT STATEMENT

21. SSU has standing to challenge the proposed rule on the basis of the defective Economic Impact Statement ("EIS") purporting to support the proposed rule. See § 120.54(2)(d), Fla. Stat. (1995); Florida East Coast Industries, Inc. v. State of Florida, Department of Community Affairs, 21 Fla.L.Weekly D1532 (Fla. 1st DCA July 2, 1996).

22. The defective EIS was attached to the PSC Staff's written recommendation for the PSC to adopt the proposed rule. A copy of that written recommendation and the EIS are attached hereto as Exhibit B.

23. The proposed rule must be invalidated because the PSC failed to adhere to the procedure for preparation of the EIS as provided in Section 120.54, Florida Statutes, and because the PSC has failed to consider information submitted to it which demonstrates that the EIS fails to present specific analysis concerning the costs, benefits, impacts and substantive alternatives to the proposed rule. Such failures substantially impair the fairness of the PSC's rulemaking proceeding currently scheduled for December 10-11, 1996 in Docket Number 960258-WS and the fairness of the instant proceeding.

24. The EIS fails to adequately analyze and provide the information required for each part of Section 120.54(2)(c),

Florida Statutes. The specific defects in the EIS include, but are not limited to, the following:

(a) The EIS purporting to support the proposed rule is fatally flawed as to each of the elements required by Section 120.54(2)(c), Florida Statutes, because the EIS evaluates merely the economic impacts of transforming a policy statement into a rule -- not the economic impacts of the proposed rule itself.

(b) The EIS fails to adequately address the estimated cost to state agencies and local government entities directly affected by the proposed rule and how such costs could be reduced by alternatives to the proposed rules which would serve to minimize rate case expense, regulatory and permitting fees and expenses, and consulting and legal fees incurred in connection therewith.

(c) The EIS fails to adequately address the estimated cost or economic benefits to all persons directly affected by the proposed rule. Although the EIS contends that rate case expense in water and wastewater utility rate cases will be reduced as a result of the proposed rule, such a contention is not realistic. The proposed rule authorizes a party to attempt to justify a margin reserve beyond the limited presumptively valid margin reserve periods in the proposed rule. The issues of margin reserve and imputation of CIAC will continue to be vigorously litigated in rate cases since the margin reserves and imputation of the CIAC policies set forth in the proposed rule are not acceptable to the utility industry for the reasons stated in this petition. As in the past, water and wastewater utilities with adequate financial resources will contest the margin reserve and imputation of CIAC policies codified in the proposed rule.

(d) Similarly, the EIS fails to address the specific negative economic impacts of the proposed rule on affected utilities and customers such as: (1) the cost of depriving a utility of its ability to earn on investment in existing economically sized facilities; (2) the costs for utilities and customers of discouraging economic sizing for failure installations; and (3) the costs to utilities and customers of more frequent rate case filings which have been and will continue to be a product of the PSC margin reserve and imputation of CIAC policies codified in the proposed rule.

(e) Although the EIS openly acknowledges that "numerous alternatives to the specifics of the proposed rule are possible,"[3] the EIS fails to provide any substantive determination of whether less costly methods or less intrusive methods exist for achieving the purpose of the proposed rule.

(f) Similarly, the EIS fails to provide any in-depth description, analysis or substantive discussion of alternative proposed rules addressing margin reserves and imputation of CIAC nor a statement of reasons for rejecting those alternatives in favor of the proposed rule.

(g) The EIS fails to include a detailed statement and analysis of the data and methodology used in making the estimates

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[3] Economic Impact Statement, pg. 9 of Exhibit B.

required by Section 120.54(2)(c), Florida Statutes.

DISPUTED ISSUES OF MATERIAL FACT

25. Disputed issues of material fact to be resolved in this proceeding include, but are not limited to:

(a) whether proposed Rule 25-30.431, F.A.C., constitutes an invalid delegation of delegated legislative authority;

(b) whether proposed Rule 25-30.431, F.A.C. is arbitrary and capricious;

(c) whether to satisfy its statutory responsibility of readiness to serve, a water and/or wastewater utility must have a margin reserve sufficient capacity to meet the existing and changing demands of existing customers and the demands of potential customers within a reasonable time and in an economic manner;

(d) whether the PSC must recognize the investment necessary to comply with a water and/or wastewater utility's statutory responsibility of readiness to serve, as a part of used and useful plant;

(e) whether application of the proposed rule would understate a reasonable margin reserve;

(f) whether the margin reserve set forth in the proposed rule impairs or eliminates a water and/or wastewater utility's ability to recover and earn a return on prudently incurred and/or environmentally mandated costs;

(g) whether the margin reserve set forth in the proposed rule discourages employment of economies of scale in construction of water and wastewater treatment facilities, and, if so, the impact on existing and future customers;

(h) whether application of the proposed rule would likely cause affected utilities to size their facilities to reduce the risk of an inadequate return, disregarding economies of scale, with a net result, over the longer run, of a higher cost of service and, hence, higher rates, with reduced assurance of reliability and sufficiency of service;

(i) whether the imputation of CIAC as an offset to margin reserve would understate the investment in property used and useful in providing service and deny the utility an opportunity to earn a fair rate of return on such property;

(j) whether the proposed rule is unfairly and unduly discriminatory when compared to PSC policy for other PSC-regulated utilities;

(k) whether the PSC's Economic Impact Statement fails to comply with the requirements of Section 120.54(2)(c), Florida Statutes; and

(l) whether there are lower cost regulatory alternatives available for codification of a margin reserve policy by rule which would lower the costs of regulation for water and wastewater utilities and/or affected customers and agencies.

ULTIMATE FACTS ENTITLING SSU TO RELIEF

26. SSU alleges that each of the disputed issues of material fact described in paragraph 25 are to be found in the affirmative, and that those facts demonstrate that:

(a) the proposed rule is an invalid exercise of delegated legislative authority;

(b) the proposed rule is arbitrary and capricious;

(c) the proposed rule enlarges, modifies or contravenes the provisions of law implemented;

(d) the proposed rule fails to establish adequate standards for agency decisions or vests unbridled discretion in the PSC;

(e) the EIS in the proposed rule fails to meet the requirements of Section 120.54(2)(c), Florida Statutes;

(f) the proposed rule fails to consider lower cost regulatory alternatives available to accomplish the purposes of a margin reserve rule for ratemaking purposes;

(g) the proposed rule effects an unconstitutional confiscation of a water or wastewater utility's property;

(h) the proposed rule violates a water and/or wastewater utility's constitutional rights to due process and just compensation for taking of property to possess and protect property; and

(i) the proposed rule violates the constitutional rights of affected utilities to equal protection of the law.

WHEREFORE, Petitioner Southern States Utilities, Inc.

requests that:

(a) the Director of the Division of Administrative Hearings determine that this Petition satisfies the requirements of Section 120.54, Florida Statutes, and assign a Hearing Officer to conduct a formal hearing in accordance with Section 120.57(1), Florida Statutes;

(b) petitions filed by any other similarly situated parties be consolidated with this Petition;

(c) the assigned Hearing Officer enter a Final Order determining that proposed rule 25-30.431 constitutes an invalid exercise of delegated legislative authority and is therefore void;

(d) the assigned hearing Officer enter a Final Order finding that proposed rule 25-30.431 violates the constitutional rights of affected utilities to due process, to just compensation for taking of property, to possess and protect property, and to equal protection of the law; and

(e) such other relief as may be deemed just and proper.

Respectfully submitted this 23rd day of August, 1996.

Kenneth A. Hoffman

KENNETH A. HOFFMAN, ESQ.
Rutledge, Ecenia, Underwood,
Purnell & Hoffman, P.A.
Post Office Box 551
Tallahassee, FL 32302-0551
(904)681-6788

and

BRIAN P. ARMSTRONG, ESQ.
MATTHEW FEIL, ESQ.
Southern States Utilities, Inc.
1000 Color Place
Apopka, FL 32703
(407)880-0058

ATTORNEYS FOR SOUTHERN STATES UTILITIES, INC.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing has been furnished by hand delivery to Christiana Moore, Esq., Division of Appeals, Florida Public Service Commission, 2540 Shumard Oak Boulevard, Tallahassee, Florida 322399-0850; David E. Smith, Esq., Director, Division of Appeals, Florida Public Service Commission, 2540 Shumard Oak Boulevard, Tallahassee, Florida 322399-0850; and Wayne L. Schiefelbein, Esq., Gatlin, Woods & Carlson, 1709-D Mahan Drive, Tallahassee, Florida 32308 on this 23rd day of August, 1996.

Kenneth A. Hoffman
KENNETH A. HOFFMAN

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PUBLIC SERVICE COMMISSION

DOCKET NO. 960258-WS

RULE TITLE:	RULE NO.:
Margin Reserve	25-30.431

PURPOSE AND EFFECT: The purpose of this rule is to codify the current policy on margin reserve and imputation of contributions-in-aid-of-construction (CIAC) on margin reserve calculations for water and wastewater utilities.

SUMMARY: Rule 25-30.431 defines "margin reserve"; provides that upon request and justification, margin reserve will be included in the used and useful determination in certain rate cases; that unless otherwise justified, the margin reserve period will be 18 months for water source and treatment facilities and wastewater treatment and effluent disposal facilities, and 12 months for water transmission and distribution lines and the wastewater collection system; and describes the mechanical aspects and data submission requirements. If margin reserve is authorized, a corresponding provision for the imputation of CIAC is prescribed; however, it is limited to the rate base component associated with margin reserve.

SPECIFIC AUTHORITY: 367.121 FS.

LAW IMPLEMENTED: 367.081 FS.

A HEARING WILL BE HELD AT THE TIME, DATE AND PLACE SHOWN BELOW:

TIME AND DATE: 9:30 a.m., December 10, 1996, continuing on December 11, 1996, if necessary

PLACE: Room 148, Betty Easley Conference Center, 4075 Esplanade Way, Tallahassee, Florida

PERSONS WHO INTEND TO PARTICIPATE IN THIS RULEMAKING PROCEEDING SHOULD FILE A NOTICE OF INTENT TO PARTICIPATE WITH THE FPSC, DIVISION OF RECORDS AND REPORTING, WITHIN 21 DAYS OF THE DATE OF THIS NOTICE. AN ORDER WILL BE ISSUED ESTABLISHING PREHEARING AND HEARING PROCEDURES TO BE FOLLOWED. WRITTEN COMMENTS AND TESTIMONY ON THE PROPOSED RULE MAY BE FILED NO LATER THAN OCTOBER 18, 1996. RESPONSIVE COMMENTS AND TESTIMONY MAY BE FILED NO LATER THAN NOVEMBER 15, 1996.

THE PERSON TO BE CONTACTED REGARDING THE PROPOSED RULE AND ECONOMIC STATEMENT IS: Director of Appeals, Florida Public Service Commission, 2540 Shumard Oak Blvd., Tallahassee, Florida 32399

THE FULL TEXT OF THE PROPOSED RULE IS:

<u>25-30.431 Margin Reserve.</u>

<u>(1) "Margin reserve" is defined as the amount of plant capacity needed to meet the expected demand due to customer growth.</u>

<u>(2) "Margin reserve period" is defined as the time period needed to install the next economically feasible increment of plant capacity that will preclude a deterioration in the quality of service.</u>

<u>(3) Margin reserve is an acknowledged component of the used and useful rate base determination that when requested and justified shall be included in rate cases filed pursuant to section 367.081, Florida Statutes.</u>

<u>(4) Unless otherwise justified, the margin reserve period for water source and treatment facilities and wastewater treatment and effluent disposal facilities will be 18 months. Unless otherwise justified, the margin reserve period for water transmission and distribution lines and the wastewater collection system will be 12 months. In determining whether another margin reserve period is justified, the Commission shall consider the rate of growth in the number of equivalent residential connections (ERCs); the time needed to meet the guidelines of the Department of Environmental Protection (DEP) for planning, designing, and constructing of plant expansion; and the technical and economic options available for sizing increments of plant expansion.</u>

<u>(5)(a) Margin reserve for water source and treatment facilities and wastewater treatment and effluent disposal facilities shall be calculated as follows:</u>

$$\underline{EG \times MP \times D = MR}$$

<u>where:</u>

EXHIBIT

A

EG =	Equivalent Annual Growth in ERCs determined pursuant to (c) or (d) below
MP =	Margin Reserve Period determined pursuant to subsection (4)
D =	Demand per ERC (customer demand applied in the used and useful calculations for water and wastewater facilities)
MR =	Margin reserve expressed in gallons per day (GPD)

(b) Margin reserve for water transmission and distribution lines and the wastewater collection system shall be calculated as follows:

$$EG \times MP = MR$$

where:

EG =	Equivalent Annual Growth in ERCs determined pursuant to (c) or (d) below
MP =	Margin Reserve Period determined pursuant to subsection (4)
MR =	Margin reserve expressed in ERCs

(c) The equivalent annual growth in ERCs (EG) is measured in terms of the projected annual growth and shall be calculated in Schedules F-9 and F-10 of Form PSC/WAW 19 for Class A utilities and Form PSC/WAW 20 for Class B utilities, incorporated by reference in Rule 25-30.437.

(d) The utility shall also submit a linear regression analysis using average ERCs for the last 5 years. The utility may submit other information that will affect growth in ERCs.

(6) As part of its application filed pursuant to Rule 25-30.437, the utility shall submit its most recent wastewater capacity analysis report, if any, filed with DEP.

(7) Contributions-in-aid-of-construction (CIAC) shall be imputed when a margin reserve is authorized. The amount of imputed CIAC shall be determined based on the number of ERCs included in the margin reserve period and the projected CIAC that will be collected from those ERCs. However, the imputed CIAC shall not exceed the rate base component associated with margin reserve.

Specific Authority 367.121 FS. Law Implemented 367.081 FS. History–New ______.

NAME OF PERSON ORIGINATING PROPOSED RULE: Charles H. Hill

NAME OF SUPERVISOR OR PERSON WHO APPROVED THE PROPOSED RULE: Florida Public Service Commission

DATE PROPOSED RULE APPROVED: July 16, 1996

If any person decides to appeal any decision of the Commission with respect to any matter considered at the rulemaking hearing, if held, a record of the hearing is necessary. The appellant must ensure that a verbatim record, including testimony and evidence forming the basis of the appeal is made. The Commission usually makes a verbatim record of rulemaking hearings.

Any person requiring some accommodation at this hearing because of a physical impairment should call the Division of Records and Reporting at (904)413-6770 at least five calendar days prior to the hearing. If you are hearing or speech impaired, please contact the Florida Public Service Commission using the Florida Relay Service, which can be reached at: 1(800)955-8771 (TDD).

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FLORIDA PUBLIC SERVICE COMMISSION
Capital Circle Office Center ● 2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

M E M O R A N D U M

July 2, 1996

TO: DIRECTOR, DIVISION OF RECORDS AND REPORTING (BAYO)

FROM: DIVISION OF APPEALS (MOORE) CYM DS
DIVISION OF WATER & WASTEWATER (HILL, WILLIAMS, SHAFER, CROUCH, STARLING, WALKER)
DIVISION OF AUDITING & FINANCIAL ANALYSIS (CAUSSEAUX)
DIVISION OF RESEARCH & REGULATORY REVIEW (HARLOW, HEWITT)

RE: DOCKET NO. 960258-WS - PETITION TO ADOPT RULES ON MARGIN RESERVE AND IMPUTATION OF CONTRIBUTIONS-IN-AID-OF-CONSTRUCTION ON MARGIN RESERVE CALCULATION, BY FLORIDA WATERWORKS ASSOCIATION

AGENDA: 7/16/96 - REGULAR AGENDA - INTERESTED PERSONS MAY PARTICIPATE

CRITICAL DATES: NONE

SPECIAL INSTRUCTIONS: I:\PSC\APP\WP\960258WS.RCM

CASE BACKGROUND

In 1993, as part of an extensive review of rules governing water and wastewater utilities in Docket No. 911082-WS, the Commission proposed a rule to address used and useful determinations in rate case proceedings. The staff-recommended proposed rule included calculations to determine margin reserve and addressed imputation of CIAC. After further consideration, however, the Commission withdrew the proposed used and useful rules to permit further analysis.

Accordingly, staff conducted additional studies concerning appropriate used and useful calculations. This led to a comprehensive draft of a rule that established parameters to apply in calculating used and useful factors in rate proceedings. This rule was reviewed at a staff workshop in July, 1995. Staff's proposed draft provided for a three-year margin reserve, but it did not address imputation of CIAC, nor any particular treatment

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rules do not enjoy universal support, their proposal will set the procedural stage for a hearing and further consideration.

The recommended rule includes a definition of "margin reserve"; provides that upon request and justification, margin reserve will be included in the used and useful determination in file and suspend ratemaking proceedings; that unless otherwise justified, the margin reserve period will be 18 months for water source and treatment facilities and wastewater treatment and effluent disposal facilities, and 12 months for water transmission and distribution lines and the wastewater collection system; and describes the mechanical aspects and data submission requirements. (Attachment 1) If margin reserve is authorized, a corresponding provision for the imputation of CIAC is prescribed; however, it is limited to the rate base component associated with margin reserve.

An Economic Impact Statement has been prepared and is attached. (Attachment 2)

ISSUE 2: Should the Commission set this matter for hearing?

RECOMMENDATION: Yes.

STAFF ANALYSIS: The FWA requested in its rulemaking petition that this matter be set for a hearing. The Commission denied the request as premature; however, since that time a rule codifying current policy has been drafted and an Economic Impact Statement has been completed. Once the Commission votes to propose a rule, a hearing may be conducted. In addition, staff believes a hearing is necessary for the Commission to hear evidence and argument supporting a change in its current policy. The dates December 10 and 11, 1996, have been reserved for a Commission rule hearing.

ISSUE 3: Should this docket remain open?

RECOMMENDATION: Yes.

STAFF ANALYSIS: If the Commission proposes a rule and sets the matter for hearing, the docket should remain open pending adoption of a rule.

CTM/

(6) The utility shall submit as part of its rate filing its most recent wastewater capacity analysis report, if any, filed with DEP.

(7) For purposes of this rule, margin reserve, expressed in units of demand; e.g., gallons per day (GPD), equals:

EG x MP x D

where:

EG = Equivalent Annual Growth in ERCs

MP = Margin Reserve Period

D = Demand per ERC

(a) The equivalent annual growth in ERCs (EG) is measured in terms of the projected annual growth and shall be calculated in Schedules F-9 and F-10 of Form PSC/WAW 19 for Class A utilities and Form PSC/WAW 20 for Class B utilities, incorporated by reference in Rule 25-30.437. The Commission shall consider the growth in ERCs over the last 5 years, including the test year, and other factors that affect growth.

(b) As part of its filing, the utility shall provide a calculation of the EG based on a simple average of the annual ERCs for the last 5 years; a linear regression of annual ERCs for the last 5 years; and other factors that affect growth.

CODING: Words underlined are additions; words in ~~struck through~~ type are deletions from existing law.

M E M O R A N D U M

June 26, 1996

TO: DIVISION OF APPEALS (Moore)

FROM: DIVISION OF RESEARCH AND REGULATORY REVIEW (Harlow)

SUBJECT: ECONOMIC IMPACT STATEMENT FOR DOCKET NO. WS-960258; PROPOSED REVISIONS TO RULE 25-30.431, FAC, MARGIN RESERVE

SUMMARY OF THE RULE

The proposed rule reflects the 1991 Commission standard operating procedure (SOP number 2406, effective 3/29/91) and recent Commission file and suspend rate case rulings regarding margin reserve and the imputation of contributions-in-aid-of-construction (CIAC). The proposed rule defines margin reserve for water and wastewater utilities as the amount of plant capacity needed to meet the expected demand resulting from customer growth. The rule specifies that, upon the utility's request and when justified, a provision for margin reserve shall be included in the used and useful determination in file and suspend rate case proceedings. The rule also indicates the data submission requirements for margin reserve, the specific calculation of margin reserve, and the additional information which will be considered by the Commission in margin reserve determinations. Unless otherwise justified, the rule sets the margin reserve period as follows: eighteen months for water source and treatment facilities, eighteen months for wastewater treatment and effluent disposal facilities, twelve months for water transmission and distribution facilities, and twelve months for wastewater transmission and collection facilities. If margin reserve is authorized, a corresponding provision for the imputation of CIAC is prescribed. However, CIAC imputation is limited to the rate base component associated with margin reserve.

DIRECT COSTS TO THE AGENCY AND OTHER STATE OR LOCAL GOVERNMENT ENTITIES

No direct costs to the Commission or other state or local government entities are expected to result from adoption of the proposed rule. However, the

The adoption of a Commission rule regarding margin reserve is expected to benefit ratepayers, the utilities, and Commission staff by reducing file and suspend rate case expenses. Rule adoption should help reduce rate case expenses by limiting testimony on margin reserve to special circumstances.

REASONABLE ALTERNATIVE METHODS

One alternative to the adoption of the proposed rule is to retain the non-rule practice. However, staff believes that without the adoption of a rule, both Commission and utility staff time and effort will continue to be expended on re-hearing these issues during file and suspend rate case proceedings. Staff believes a rule should be adopted concerning margin reserve and the imputation of CIAC in order to reduce uncertainty regarding the Commission treatment of used and useful plant capacity. Both ratepayers and utilities would benefit from the reduced uncertainty and rate case expense reductions which should result from rule adoption. While numerous alternatives to the specifics of the proposed rule are possible, staff believes that the alternative guidelines which deviate from current Commission policy will be most efficiently presented at hearing.

IMPACT ON SMALL BUSINESSES

Little direct impact on small businesses is foreseen, as the adoption of the proposed rule would impose minimal additional expected costs on water and wastewater utilities in general, including those which qualify as a small business as defined in Section 288.703(1), Florida Statutes (1995). Water and wastewater companies may experience a reduction in rate case expenses if the rule is adopted. No material impact is expected for other small businesses, as the rule is not expected to significantly affect the price of water and wastewater services.

IMPACT ON COMPETITION

No material impact on competition is expected because the proposed rule essentially adopts current Commission policy and imposes minimal additional expected costs. In addition, utilities may experience some rate case expense reductions if the rule is adopted.

IMPACT ON EMPLOYMENT

Minimal impact on employment is expected to result from the proposed rule. However, rule adoption may lead to a reduction in both Commission and utility staff effort required to prepare for and attend file and suspend rate case proceedings.

METHODOLOGY

Several meetings were held with other Commission staff to discuss: (1) the current Commission policy on margin reserve and the imputation of CIAC, (2) the 1991 Commission SOP on margin reserve, (3) recent Commission rate case rulings regarding margin reserve, and (4) the proposed rule. Portions of transcripts of Commission workshops and hearings on used and useful and margin reserve were also reviewed. Finally, the 1991 Commission margin reserve SOP and the Commission file and suspend rate case decisions from the last three years were analyzed for consistency with the proposed rule.

JGH:tf/e-margin.tnf

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GOVERNMENTAL CONSULTANTS:
PATRICK R. MALOY
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August 23, 1996

HAND DELIVERY

Ms. Blanca Bayo, Director
Division of Records and Reporting
Florida Public Service Commission
2540 Shumard Oak Boulevard
Betty Easley Conference Center
Room 110
Tallahassee, Florida 32399-0850

Re: Docket Number 960258-WS

Dear Ms. Bayo:

Enclosed herewith for filing on behalf of Southern States Utilities, Inc. ("SSU") are an original and fifteen copies of this letter and an attachment which sets forth SSU's good faith written proposal for a lower cost regulatory alternative to proposed Rule 25-30.431, Florida Administrative Code. SSU's lower cost regulatory alternative is an alternative proposed Rule 25-30.431, Florida Administrative Code. SSU's alternative proposed rule would substantially accomplish the objectives of the law being implemented. SSU's alternative proposed Rule 25-30.431 was originally proposed by the Florida Waterworks Association and included in the Order Granting Petition to Initiate Rulemaking, Order Number PSC-96-0586-FOF-WS issued May 6, 1996 in the above referenced docket, attached hereto as Exhibit A.

In support of SSU's lower cost regulatory alternative, SSU relies on and incorporates herein by reference the prefiled rebuttal testimony of Gerald C. Hartman, P.E. and Mr. Hartman's prefiled rebuttal exhibits GCH-4 through 9 in Docket Number 950495-WS. Mr. Hartman's rebuttal testimony is found in the transcript of the final hearing in Docket Number 950495-WS at pages 705 through 757. Mr. Hartman's prefiled rebuttal exhibits were identified and admitted in the record in Docket Number 950495-WS as Composite Exhibit 91. Copies of Mr. Hartman's rebuttal testimony and exhibits, as identified above, are on file with the Commission and available from SSU.

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Please acknowledge receipt of these documents by stamping the extra copy of this letter "filed" and returning the same to me.

Thank you for your assistance with this filing.

Sincerely,

Kenneth A. Hoffman

Kenneth A. Hoffman

KAH/emj
Enclosure

cc: Charles H. Hill, Director
Division of Water & Wastewater
Christiana Moore, Esquire
Division of Appeals
David E. Smith, Esquire, Director
Division of Appeals
Brian P. Armstrong, General Counsel
Southern States Utilities, Inc.
Matthew Feil, Esquire
Southern States Utilities, Inc.
Wayne L. Schiefelbein, Esquire
Florida Waterworks Association

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In Re: Petition to Adopt Rules on Margin Reserve and Imputation of Contributions-In-Aid-Of-Construction on Margin Reserve Calculation, by Florida Waterworks Association	DOCKET NO. 960258-WS ORDER NO. PSC-96-0586-FOF-WS ISSUED: May 6, 1996

The following Commissioners participated in the disposition of this matter:

SUSAN F. CLARK, Chairman
J. TERRY DEASON
JOE GARCIA
JULIA L. JOHNSON
DIANE K. KIESLING

ORDER GRANTING PETITION TO INITIATE RULEMAKING

BY THE COMMISSION:

On March 1, 1996, pursuant to Section 120.54(5), Florida Statutes, and Rule 25-22.010, Florida Administrative Code, the Florida Waterworks Association (FWA or the association) petitioned the Commission to adopt the attached rule concerning margin reserve determinations for water and wastewater utilities. (Attachment A) The rule FWA recommends for proposal sets the margin reserve period for water source and treatment facilities and wastewater treatment and effluent disposal facilities at five years, and provides that a utility may justify a different reserve period based on factors set forth in the rule. FWA's recommended rule also states that "CIAC shall not be imputed against the allowance for margin reserve." In addition, the association recommends a 100 percent used and useful determination for reclaimed water reuse facilities.

FWA's rule does not codify our current policy, which is to include in rate base an 18-month margin reserve of plant investment that is needed to accommodate future growth. This margin is offset by imputing any CIAC projected for collection during the margin reserve period. In addition, our staff has been developing a comprehensive used and useful rule.

In its petition, FWA argues that to expedite matters, the Commission should adopt the association's more limited version of the rule. While we decline to propose FWA's recommended rule at

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this time, we find that rulemaking shall be initiated on this subject.

The association also requested that we require all interested persons to file written testimony and exhibits by July 1996 and that a full Commission hearing be scheduled so we can adopt a rule by the end of this year. We find that FWA's request is premature and therefore deny its request for hearing. Within 21 days from the date a proposed rule is published in the Florida Administrative Weekly, FWA or any other interested person may file comments or request a hearing, as provided in Section 120.54, Florida Statutes.

It is therefore

ORDERED by the Florida Public Service Commission that Florida Waterworks Association's petition to initiate rulemaking is granted. It is further

ORDERED that Florida Waterworks Association's request for hearing is denied. It is further

ORDERED that this docket shall remain open.

By ORDER of the Florida Public Service Commission, this 6th day of May, 1996.

Blanca S. Bayó

BLANCA S. BAYÓ, Director
Division of Records and Reporting

(S E A L)

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NOTICE OF FURTHER PROCEEDINGS OR JUDICIAL REVIEW

The Florida Public Service Commission is required by Section 120.59(4), Florida Statutes, to notify parties of any administrative hearing or judicial review of Commission orders that is available under Sections 120.57 or 120.68, Florida Statutes, as well as the procedures and time limits that apply. This notice should not be construed to mean all requests for an administrative hearing or judicial review will be granted or result in the relief sought.

Any party adversely affected by this order, which is preliminary, procedural or intermediate in nature, may request: (1) reconsideration within 10 days pursuant to Rule 25-22.038(2), Florida Administrative Code, if issued by a Prehearing Officer; (2) reconsideration within 15 days pursuant to Rule 25-22.060, Florida Administrative Code, if issued by the Commission; or (3) judicial review by the Florida Supreme Court, in the case of an electric, gas or telephone utility, or the First District Court of Appeal, in the case of a water or wastewater utility. A motion for reconsideration shall be filed with the Director, Division of Records and Reporting, in the form prescribed by Rule 25-22.060, Florida Administrative Code. Judicial review of a preliminary, procedural or intermediate ruling or order is available if review of the final action will not provide an adequate remedy. Such review may be requested from the appropriate court, as described above, pursuant to Rule 9.100, Florida Rules of Appellate Procedure.

ATTACHMENT A

25-30.431 Margin Reserve

(1) Margin reserve is recognized as a component of used and useful rate base. The Commission shall include an allowance for margin reserve if requested by the utility. CIAC shall not be imputed against the allowance for margin reserve.

(2) The Commission recognizes that for a utility to meet its statutory responsibilities, it must have sufficient capacity and investment to meet the existing and changing demands of present customers and the demands of potential customers within a reasonable time and in an economic manner.

(a) Margin Reserve is defined as the investment needed to meet the changing demands of existing customers and the demands of potential customers in a reasonable time and in an economic manner.

(b) Margin Reserve Period is defined as the period during which current capacity is required to be available until the next economic capacity addition can be placed in service without causing a deterioration in the quality of service. In determining the margin reserve period, the Commission shall consider, but not be limited to, the rate of growth in customers and demand, the time needed to meet the guidelines of the Department of Environmental Protection for planning, design and construction of plant expansion, and the available technical and economic options

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available for sizing increments of plant expansion. Unless otherwise justified, the margin reserve period for water source and treatment facilities and wastewater treatment and effluent disposal facilities is set at five years.

(3) As a part of its rate filing, the utility shall submit historical, reliable data for a minimum of five years, if available, preceding the test year, and for the test year, for the year-end number of customers by class and meter size; the annual sales by class; the annual treated or pumped flows for the system; the water system maximum day, and if available, peak hour flows for each year; and the wastewater system annual average, maximum month average, and three-month average daily flows. The utility's most recent wastewater capacity analysis report, if any, filed with DEP shall also be submitted as part of the rate filing.

(4) For purposes of this rule, Margin Reserve (expressed in units of demand; e.g., GPD (gallons per day)) equals:

EG x MP x D

where:

EG = Equivalent Annual Growth in ERCs

MP = Margin Reserve Period

D = Demand/ERC on the plant component

a. The equivalent growth (EG) in ERCs is measured in terms of the projected annual growth and shall be determined by the utility based on its knowledge of growth in its certificated area. The utility shall take into consideration the growth in ERCs over the last five years, including the test year, and other factors which in the judgement of the utility affect the pattern of growth.

b. As part of its filing, the utility shall provide a calculation of the EG based on (1) a simple average of the annual ERCs for the last five years and (2) a linear regression of annual ERCs for the last five years.

(5) Reclaimed Water Reuse Facilities constructed in accordance with Section 403.064, Florida Statutes, shall be considered 100% used and useful. Margin Reserve shall therefore not be a factor.

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION
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FLORIDA PUBLIC SERVICE COMM.
DIVISION OF APPEALS

In Re: Petition to Adopt Rules on Margin Reserve and Imputation of of Contributions-in-Aid-of Construction on Margin Reserve Calculation, by Florida Waterworks Association	Docket No. 960258-WS

COMMENTS ON PROPOSED RULE

The Citizens of the State of Florida, by and through JACK SHREVE, Public Counsel, hereby submit comments to Proposed Rule 25-30.431, Florida Administrative Code, proposed by the Commission on July 26, 1996, and say as follows:

1. Florida statutes authorize the Commission to approve rates which provide a reasonable return on investment which is used and useful in the provision of utility services to the public. Both the intent and language of Proposed Rule 25-30.431, however, inappropriately include investment "which is required to meet the expected demand due to customer growth" as used and useful investment.[1] While the investment which is required to meet the expected demand due to customer growth will be used and useful in the future (if the expectations of growth are correct), it is neither used by, nor useful to, present customers and, therefore, should not be included in the used and useful calculations.

Present customers have no interest in future growth. Inclusion of margin reserve in the used and useful calculations causes current customers to underwrite the provision of service to future customers.

[1] Proposed Rule 25-30.431(1)

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2. If margin reserve is included in the used and useful calculations, then, to achieve a proper matching of Contributions-in-Aid-of Construction (CIAC) and investment, an amount of CIAC equivalent to the number of equivalent residential connections (ERCs) represented by the margin reserve should be reflected in the rate base. The CIAC that will be collected from these future customers would, at least, serve to mitigate the impact on the existing customers resulting from requiring them to pay for plant that will be used to serve future customers.

Imputation of CIAC on margin reserve has been a longstanding policy of the Commission. The Commission's practice of imputing CIAC on margin reserve is well documented in Order No. 20434 and Order No. PSC-93-0301-FOF-WS. If the Commission does not continue to impute CIAC associated with margin reserve, it will place the risk of future customer connections on the backs of current ratepayers. The risk that future customers will not connect to a utility's system, as projected by the utility in its margin reserve calculations, is a risk that should be borne by stockholders, not customers. This is a risk that the utility is compensated for in its allowed return on equity. If the Commission changes its policy and does not impute CIAC on margin reserve, it will need to adjust its leverage graph formula to account for the lower risk of the utility inherent in requiring current customers to bear the risk that future customers will not connect to the system.

In addition, if the Commission does not impute CIAC on margin reserve, it will provide the utility with an opportunity to overearn. This occurs because the utility will collect this CIAC (assuming its projections are correct), yet the associated CIAC will not be included as an offset to the rate base. Moreover, failure to impute CIAC on margin reserve would create a significant incentive for the utility to overproject customer growth for margin reserve purposes. Imputation of CIAC on margin reserve provides the utility with an incentive to properly project future connections, and it matches plant in service with CIAC.

3. In paragraph 19 of its Petition, The Florida Waterworks Association (FWA) makes a flawed analogy to the electric industry. Residential electric customers do not contribute substantial sums of money up front when requesting service from an electric utility. Water and wastewater customers do. This contribution is ideally targeted at 75% of the cost of the "piece" of plant constructed to serve one customer. By investing in the utility up front, the water and/or wastewater customer has already paid for his or her share of the utility's requirement to stand ready to serve based on anticipated usage patterns. In addition to the initial contribution, the customer pays the utility a return on the portion not contributed.

In paragraph 20b of the Petition, the water and wastewater industry makes the argument that if a margin reserve is not allowed, then service to existing customers will be degraded. Existing customers should not have to pay a premium, in the form of a margin reserve, to ensure that adequate service is provided them when they have already paid for their service.

Margin reserve is inherently unfair to the existing customer. In paragraph 24 of the Petition, the FWA argues that margin reserve provides a "cushion" for the utility so changing load conditions for existing customers can be met. Averages used to calculate used and useful already take plant load fluctuations into consideration. Finally, in paragraph 26 of its petition, the FWA argues that the margin reserve is a component of used and useful plant and no portion of its cost is recovered through an Allowance for Funds Prudently Invested (AFPI) charge. Public Counsel believes that margin reserve should not be considered as a component of the used and useful calculation and should be eliminated entirely. It serves no benefit to existing customers. Eliminating the margin reserve and replacing it with AFPI would alleviate the FWA's concern of lost returns on imputed CIAC and give relief to existing customers paying a return on plant not serving them.

Respectfully submitted,

Harold McLean
Associate Public Counsel

Office of the Public Counsel
c/o The Florida Legislature
111 West Madison Street
Room 812
Tallahassee, FL 32399-1400
Attorney for the Citizens of the
State of Florida

Comments.rle

CERTIFICATE OF SERVICE
DOCKET NO. 960258-WS

I HEREBY CERTIFY that a copy of the foregoing has been furnished by U.S. Mail or hand-delivery to the following parties representatives on this 17th day of October, 1996.

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TESTIMONY OF ARSENIO MILIAN, P.E.
BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION REGARDING THE RULES FOR MARGIN RESERVE AND IMPUTATION OF CIAC ON MARGIN RESERVE

on behalf of:

THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

prepared by:

Milian, Swain & Associates, Inc.

2025 S.W. 32 Avenue
Miami, Florida 33145
(305) 441-0123
(305) 441-0688

October 1996

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FLORIDA PUBLIC SERVICE COMM.
DIVISION OF APPEALS

TESTIMONY OF ARSENIO MILIAN, P.E.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

REGARDING THE RULES FOR MARGIN RESERVE AND

IMPUTATION OF CIAC ON MARGIN RESERVE

ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

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TESTIMONY OF ARSENIO MILIAN, P.E.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

REGARDING THE RULES FOR MARGIN RESERVE AND

IMPUTATION OF CIAC ON MARGIN RESERVE

ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Arsenio Milian. My business address is 2025 S.W. 32nd Avenue, Miami, Florida 33145.

Q. BY WHOM ARE YOU PRESENTLY EMPLOYED, AND IN WHAT CAPACITY?

A. I am President of the firm Milian, Swain & Associates, Inc. (MSA), which was established to provide civil engineering consulting services as well as utility management, systems valuation and rate consulting services.

Q. PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I have received both B.S. and M.E. degrees from the University of Florida. After graduating, I worked for Post, Buckley, Schuh, & Jernigan, Inc. in Miami for approximately 11 months. I was then employed by The Deltona Corporation in August, 1969, as Utilities Engineer. In 1972, I became Chief Utilities Engineer for Deltona, a position in which I served until December, 1975, when I became Vice President of Utility Operations. In December 1982, I became President of all Utility Divisions, a position I held until June 1989. I have been President of MSA since that time.

Q. WHAT PROFESSIONAL LICENSES DO YOU HOLD?

A. I have been a licensed professional engineer in the State of Florida since 1972.

Q. WHAT PROFESSIONAL AND CIVIC ORGANIZATIONS ARE YOU ASSOCIATED WITH?

A. I am a member of the American Water Works Association, American Society of Civil Engineers, Water Environment Federation, and National Association of Water Companies. I am a member of the Dade County Environmental Task Force and the Technical Advisory Committee of the Governor's Commission For a Sustainable South Florida. I am also President of Citizens for a Better South Florida, a Council member of the Wilderness Society, Board member of 1000 Friends of Florida, and Governor's appointee to the Miami River Coordinating Committee. I serve as a Board member of the National Audubon Society and as Chairman of its Everglades Campaign. I served a four year term as a member of the Governing Board of the South Florida Water Management District and was its representative on the Advisory Committee on the Dade County West Well field, the Committee on Inter-District Water Transfer and the Lake Okeechobee Technical Advisory Committee. I have recently completed a six year term on the City of Miami Zoning Board.

Q. HAVE YOU ATTENDED PROFESSIONAL SEMINARS?

A. Yes, I have attended numerous seminars relating to water quality and treatment, wastewater treatment and disposal, utility management, environmental issues, NARUC seminars on rates and regulation of water utilities, and others.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE REGULATORY BODIES?

A. Yes, I have testified as an expert witness in rate hearings before the Florida Public Service Commission. Additionally, I have appeared before the St. Johns, Hillsborough, and Collier County Boards of County Commissioners in water and sewer rate proceedings.

Q. IN EACH OF THESE PROCEEDINGS, WERE YOU QUALIFIED AS AN EXPERT WITNESS?

A. Yes, I was qualified as an expert in connection with utility engineering, utility operations and utility regulation.

Q. WHAT IS THE NATURE OF YOUR ASSIGNMENT IN THIS CASE?

A. MSA was engaged by the Florida Waterworks Association (FWA) to provide services in support of the FWA proposed rulemaking. Specifically, I was asked to perform a study that would accomplish the following:

- Determine and describe the general impact of environmental regulations commonly experienced by private and public utilities in the state of Florida on expected planning and construction schedules, including a comparison of expected impact between private and public utilities,
- Determine and describe the general impact of used and useful / margin reserve policies on incremental construction management and planning, including specific case experiences by Florida utilities,
- Determine and describe the calculated expected construction costs of incremental construction as compared to responsible, long term construction.

In addition, the impact on utility rates and utilities earnings has been determined and described by Mrs. Swain.

Q. HOW DID YOU CONDUCT YOUR STUDY?

A. MSA conducted a survey of private utilities and utility financial and engineering consultants, which resulted in the gathering of a tremendous amount of information. Much of this information is described in Ms. Swain's report, EXHIBIT DS-2. I reviewed pertinent parts of the information we obtained, as well as other documents, including specifically those related to:

- Environmental regulations
- Planning, design, permitting and construction schedules
- Construction cost estimates

I also reviewed the rule proposed by both the FWA and Florida Public Service Commission.

Q. WHAT DID YOU FIND IN YOUR REVIEW?

A. First, I found that the experiences of many utilities with regard to the impact of environmental regulation is very much in line with my own experiences. As an expert in environmental permitting for water and wastewater utilities, I have found that regulations are becoming more stringent, and that utilities are finding it more and more difficult to adhere to projected construction schedules because of unexpected delays in permitting. These delays have been related to new requirements, including zoning, conditions for wastewater reuse attached to water consumptive use permits and new restrictions applied to surface water discharge. It is not uncommon for utilities, private and public alike, to invest five years into the permitting and design phases. I am also aware of one utility's ten-year permitting experience.

Second, I can attest that the construction cost estimates upon which Ms. Swain's financial model was based, appear to be reasonable.

Q. WHAT CONCLUSIONS DID YOU DRAW FROM YOUR STUDY?

A. Based upon my study, and based upon my many years of experience as a utility engineer and a utility manager, I have concluded that the rule proposed by the Commission staff will likely cause utilities to make decisions regarding sizing utility construction projects that are not prudent from an engineering standpoint. It is also my opinion that the rule proposed by the FWA will encourage and enable utilities to make the more appropriate decisions – and economically size their plant construction.

Q. DID YOU HAVE AN OPPORTUNITY TO REVIEW THE RESULTS OF MS. SWAIN'S FINANCIAL MODELS?

A. Yes, I did. Although I expected to see a significant beneficial impact on both the utilities' customers and shareholders when plant was prudently sized, I was, quite frankly, surprised at how quickly the beneficial economic impact could be seen. Ms. Swain's model shows that the per customer cost is lower when plants are sized economically. In the wastewater model , the benefit is immediate, and in the water model, the cost is lower in larger sized plants after the third year the plant is in service. These results demonstrate that incentive must be given to utilities to economically size plant -- further supporting the FWA position, that a five year margin reserve period is appropriate for treatment and disposal plant.

Furthermore, the return on investment to utility shareholders should not be reduced as a result of compliance with environmental regulation. No one benefits from a reduction in earnings – this only serves as a disincentive to comply with environmental regulations. This disincentive will cause utilities to delay necessary actions and make less beneficial construction sizing decisions. And there is very little doubt that the impact will be higher customer rates in the future as the utility struggles to "catch up".

This is a difficult lesson learned by utilities throughout the state.

Q. WHAT IS YOUR OPINION AS TO THE APPROPRIATE TREATMENT OF REUSE FACILITIES?

A. I agree with the FWA, that there need not be a margin reserve applied to reuse facilities because these facilities should be 100% used and useful. In addition to the specific provisions of the Florida Statutes which indicate that they should be fully recovered, DEP and the water management districts have made it policy to encourage and in many cases require wastewater reuse. In order to comply with this environmental policy, utilities must develop reuse plans and construct facilities. To deny the utilities an opportunity to earn on these facilities is contrary to the implementation of this policy. The Commission has recognized this, and in a Memorandum of Understanding between DEP and the Commission executed in 1992, the Commission agreed to the following:

> Review proposed rate structures for reuse projects for private utilities within PSC jurisdiction. As noted in Section 403.064(6). F.S. and pursuant to Chapter 367, F.S., <u>the PSC shall allow utilities which implement reuse projects to recover the full cost of such facilities through their rate structures</u> *(emphasis added).*

Q. DOES THIS COMPLETE YOUR DIRECT TESTIMONY AT THIS TIME?

A. Yes.

TESTIMONY OF DEBORAH D. SWAIN
BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION REGARDING THE RULES FOR MARGIN RESERVE AND IMPUTATION OF CIAC ON MARGIN RESERVE

on behalf of:

THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

prepared by:

Milian, Swain & Associates, Inc.
2025 S.W. 32 Avenue
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October 1996

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FLORIDA PUBLIC SERVICE COMM.
DIVISION OF APPEALS

TESTIMONY OF DEBORAH D. SWAIN

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

REGARDING THE RULES FOR MARGIN RESERVE AND

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TESTIMONY OF DEBORAH D. SWAIN

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

REGARDING THE RULES FOR MARGIN RESERVE AND

IMPUTATION OF CIAC ON MARGIN RESERVE

ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

Q. PLEASE STATE YOUR NAME AND ADDRESS FOR THE RECORD.

A. My name is Deborah Swain. My business address is 2025 S.W. 32nd Avenue, Miami, Florida 33145.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY ARE YOU SO EMPLOYED?

A. Since September 1989, I have been Vice President of Milian, Swain & Associates, Inc., a firm providing utility rate, management, valuation and engineering consulting services.

Q. MS. SWAIN, COULD YOU PLEASE PROVIDE YOUR EDUCATIONAL BACKGROUND AND YOUR EXPERIENCE IN THE FIELD OF UTILITY RATE MAKING AND MANAGEMENT?

A. Yes, it is attached to this testimony as EXHIBIT DS-1.

Q. Ms. Swain, have you ever presented expert testimony in utility rate hearings?

A. Yes, I have presented expert testimony before the Florida Public Service Commission (Commission) and before several County Commissions. I have prepared applications for rate increases involving many individual water and wastewater systems, the vast majority of which were regulated by the Commission.

Q. **IN WHAT CAPACITY HAVE YOU BEEN ACCEPTED AS AN EXPERT BEFORE THE FPSC?**

A. I have been accepted as an expert in regulatory accounting and in rate regulation matters in general.

Q. **ON WHOSE BEHALF ARE YOU APPEARING IN THIS PROCEEDING?**

A. I am appearing on behalf of the Florida Water works Association (FWA).

Q. **WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A. As Mr. Milian indicated, the work to be performed for FWA includes determining the impact of the Commission's proposed rule on the cost of providing utility service and the impact on customer rates and utility earnings. The purpose of my testimony is to present the findings of our study and recommend a course of action in this rulemaking proceeding.

Q. **COULD YOU PLEASE SUMMARIZE THE MAJOR FINDINGS OF YOUR STUDY?**

A. Based on the survey we conducted and the analysis we performed, we found that:

- Under the Commission's proposed rule for margin reserve and imputation of CIAC, a utility can never hope to earn its authorized rate of return, even assuming no regulatory lag and full recovery of all authorized operating revenues, CIAC and an allowance for funds prudently invested (AFPI).
- Under the Commission's proposed rule for margin reserve and

imputation of CIAC, a utility can maximize its earnings only by choosing the construction alternative that results in higher unit costs and higher rates to the customer.

- A five year margin reserve policy, without imputed CIAC, will encourage economies of scale, resulting in lower long term costs and rates than the 18 month margin reserve period proposed by the Commission.

Q. **WHAT DOES THE COMMISSION PROPOSED RULE PROVIDE REGARDING MARGIN RESERVE?**

A. Proposed rulemaking issued by the Commission in July 1996, would allow 18 months margin reserve for water source and treatment facilities and wastewater treatment and effluent disposal facilities, and a 12 month margin reserve for water transmission and distribution lines and wastewater collection systems.

Q. **PLEASE EXPLAIN THE STUDY YOU PERFORMED.**

A. As I describe, the FWA asked us to perform an analysis to identify and quantify the long-term impacts of environmental regulation and the Commission proposed rule related to the margin reserve. Margin reserve is the investment in plant needed to meet the demands of potential customers and the changing demands of existing customers within a reasonable time. These reserve requirements are considered when preparing planning and construction schedules and cash flow requirements to finance this construction. Over the years, the Commission has reviewed various construction and investment decisions resulting from margin reserve policy. Testimony presented for consideration is usually in conjunction with a utility rate increase application for a particular investor at a certain point in time. Our study attempts to provide an overall view of the costs to customers for construction decisions resulting from environmental and economic rulemaking. In order to gauge the impact of environmental and economic regulation on utility decision making and the resulting costs to customers across the industry, utilities of all sizes throughout the State of Florida were polled. Numerical data and anecdotal information provided by utilities, consulting engineers and regulatory agencies have been tabulated and summarized. Those who provided information are acknowledged in my study.

Based on this information, financial models were developed to demonstrate the overall return on investment resulting from various alternative margin reserve policies.

Q. WHAT IS THE IMPACT OF A LESS THAN 5 YEAR MARGIN RESERVE?

A. The model demonstrates that even in an otherwise perfect world where all other costs are fully recovered, a utility can never earn its authorized rate of return with less than a five-year margin reserve.

Q. HOW DOES ENVIRONMENTAL REGULATION AFFECT PLANNING AND CONSTRUCTION SCHEDULES?

A. Environmental regulation has become more stringent in recent years. The permitting process has become more complex and certain environmental regulators, such as the Florida Department of Environmental Protection (DEP), even have schedules which dictate certain actions based upon reaching stated capacities of facilities. Greater demands on water and wastewater utilities result in higher costs of providing service to customers. This requires more time for planning and permitting, and it requires that utilities give consideration to economic issues involving the various alternatives they may face. Because of the time involved, many utilities are in a constant state of planning, design, permitting and construction.

Q. HOW HAS THE COMMISSION SUPPORTED ENVIRONMENTAL COMPLIANCE?

A. Although the Commission has supported utility compliance with environmental regulations by allowing pass-through rate adjustments for a limited number of statutorily mandated expenses, Commission support, in terms of adequate rate recovery, for construction of economically sized water and wastewater treatment, distribution and disposal facilities has been uncommon.

Q. WHAT DO YOU MEAN BY "ECONOMICALLY SIZED"?

A. By that I mean sized to take advantage of the economies of scale. In the long run it is better for both the utility investor and the utility customers to incorporate the economy of scaling a plant by constructing a larger size plant and providing for some reasonable amount of extra capacity. To demonstrate this, we prepared financial models which compared two alternative scenarios for construction of water and wastewater treatment plant additions over a 30 year period. We used actual construction cost data provided by FWA utility members. We also assumed that the utility would fully recover all other costs, including AFPI. Under both model scenarios, we found that the economically sized construction resulted in lower rates and service availability charges than the smaller sized plants -- in the short term and over the long-term. In addition, the net present value of revenue requirements, including CIAC and AFPI, is lower when economically sizing plant. This is fully documented in the Attachment to my study, EXHIBIT DS-2.

Q. IF IT IS MORE BENEFICIAL TO BOTH THE UTILITY INVESTOR AND THE UTILITY CUSTOMER TO ADD PLANT WITH RESERVE CAPACITY, WHY WOULD THE UTILITY CHOOSE TO BUILD SMALLER, LESS OPTIMAL PLANT WITH LESS RESERVE CAPACITY?

A. Under the Commission proposed rule, the benefits to the utility are realized in the long term. However, in the short term, the utility will "lose less money by building smaller less optimal plants. Unfortunately, this will result in higher costs to the utility customer. If the utility expands facilities in larger increments, at less frequent intervals, it is likely that the plant will be deemed less than 100% used and useful by the regulator in a rate adjustment hearing. While the cost to customers may be lower, if the utility cannot operate at a profit, other costs, such as higher financing costs, may offset the savings to customers.

Using the calculations in my model, I have prepared two graphs to demonstrate the impact of economies of scale on the customers. In EXHIBIT DS-3 I have used a wastewater treatment plant example, while EXHIBIT DS-4 uses a water treatment plant example. The wastewater graph shows that the customers realize a lower cost immediately as a result of economically sizing plant. In the case of the water example, the customers' cost will be lower after the third year the plant is in service. These findings are not merely theoretical. They result from our survey of investor-owned utilities, indicating that investment recovery and the timing of that recovery are given serious consideration when making decision for plant expansion. Having been negatively impacted by used and useful decisions in rate hearings, some utility managers are giving greater weight to economic regulation than to economies of scale when deciding the appropriate size for facility expansion. One utility company responding to our survey directed its engineering consultants to design a master plan calling for ten phases rather than three to four construction phases. Another utility reported that facility expansions for 2.25 MGD, the ultimate facility demand, will be constructed in up to nine stages, rather than the optimal four stages, to avoid unfavorable non-used and useful adjustments. Based upon our study, the impact of these decisions will be higher customer rates.

In addition to the economies of scale that could be realized from larger, more optimal expansions, additional saving could be obtained from lower engineering costs, permitting fees, and equipment mobilization.

Q. **WHAT CAN BE DONE TO PROMOTE A MORE PRUDENT APPROACH TO PLANT EXPANSIONS ?**

A. Several things can be done to help the utility achieve a fair return while planning for lower long-term costs to customers. First, the margin reserve period should be a minimum of 5 years instead of 18 months because, on average, the utility is required to begin spending money by investing in plans for expansion five years before the plant reaches full capacity. In other words, utilities always require a five-year reserve period to comply with environmental regulations. Secondly, CIAC should not be imputed on margin reserve.

Q. **WHY IS IT INAPPROPRIATE TO IMPUTE CIAC ON MARGIN RESERVE**

A. The requirement to have excess capacity is ongoing and should not be diminished through the imputation of CIAC. Margin reserve benefits existing customers by ensuring that future customers will not overload existing facilities and impact the quality and safety of service provided. As customers connect to the system, the need for additional plant to serve additional customers does not diminish. The imputation of CIAC removes all or most of the benefit of margin reserve. Since the existing plant, including margin reserve, requires actual capital expenditures on a current basis, there will always be current costs for future growth. However, contributions from future customers are not a current offset of these costs. There is always a gap between the time existing plant must be available, and paid for, and the time that future customers will provide contributions to partially cover the cost of that plant.

Also, there is always the risk that the imputed contributions will never materialize. The utility is required to have sufficient plant to serve new customers and must invest capital for this reserve capacity. Imputation of this speculative CIAC unfairly denies the utility recovery of a required cost of providing service.

Furthermore, the combination of margin reserve and imputation of CIAC has the impact of completely removing that portion of plant from inclusion in <u>any</u> rate calculation. Because the plant, and related equivalent residential connections (ERC's) are allowed in used and useful through margin reserve, they are not included in recovery through AFPI – which is limited to nonused and useful plant. However, because CIAC is imputed, the cost and ERC's are also eliminated from current customer rates. That investment made by the utility for customers connecting over the margin reserve period required will never be recovered if CIAC is imputed.

Q. IF THE UTILITY WERE GRANTED A FIVE YEAR MARGIN OF RESERVE WITHOUT AN OFFSET FOR CIAC, WOULD THE UTILITY EARN MORE THAN THE AUTHORIZED RATE OF RETURN?

A. No, not at all. If the utility were granted a five year margin of reserve with no offset for CIAC, the utility would only come closer to achieving its authorized rate of return in both the long-term and short term as indicated on my EXHIBIT DS-5. Again I have assumed in this calculation that it is a perfect world: full recovery of operation and maintenance expenses, predictable customer growth and optimal plant utilization, and no regulatory lag.

Q. IS YOUR PROPOSED MARGIN RESERVE POLICY CONSISTENT WITH THE POLICIES OF OTHER REGULATED INDUSTRIES?

A. Our request is more conservative than the policies granted to electric, gas and telephone utilities regulated by this Commission, and public water and wastewater utilities in the state of Florida. As an example, power utilities investments in electric generating plants, with possible rare exceptions, are sized to handle considerable growth (margin reserve and CWIP) but yet no used and useful adjustments are made, because the investments are economically prudent.

Q. IS THERE SIMILAR TREATMENT OF NONUSED AND USEFUL PLANT MADE TO GOVERNMENT OWNED UTILITIES?

A. No. Since public water and wastewater utilities must have revenues adequate to meet cash flow requirements, no adjustments are made for non-used and useful, and therefore margin reserve is not specifically addressed. Municipal and county-owned water and wastewater utilities typically fund plant expansions with revenue bonds, CIAC, and directly from monthly user fees. Revenues must be adequate to cover operating and maintenance expenses, renewal and replacement funding, the full cost of debt service including principal and interest, and bond coverage requirements.

These utilities are required to review rates annually and make rate adjustments, if necessary, to meet cash flow and debt coverage requirements. The relevant comparison of public and investor-owned water and wastewater utilities is that public utilities must recover the debt costs associated with plant expansion, including reserve capacity, from existing customers, whereas investor owned utility shareholders bear the cost of reserve capacity. In other words, public utilities recover 100% of the cost associated with current plant, even if sized for future customers, and 100% of construction work in progress. As a result, public utilities give primary consideration to economies of scale and readiness to serve when making decisions regarding plant expansions.

Q. WOULD YOU PLEASE SUMMARIZE YOUR TESTIMONY?

A. It is appropriate to allow a margin reserve of 5 years for rate making purposes to encourage prudently sized plant additions and encourage compliance with DEP planning schedules. It is inappropriate to offset margin reserve by the imputation of CIAC because this practice discourages long-term planning for growth.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

EXHIBIT DS-1

DEBORAH D. SWAIN
VICE PRESIDENT

PROFESSIONAL SPECIALIZATION

Management, accounting, systems development, financial planning and modeling. Utility rate regulation, including rate design, revenue deficiency studies, and cost of service studies.

RELEVANT EXPERIENCE

Utility Economic Regulation

Perform and supervise cost of service studies for over 200 individual private and public utility systems, calculate revenue deficiencies and revenue requirements, design rates, including determination and implementation of conservation water rates. Calculate and implement service availability fees (impact or connection fees), allowance for funds prudently invested (AFPI) and ancillary charges (miscellaneous service charges).

Prepare and present expert testimony in the area of regulatory accounting, rate regulation, and utilities in general before federal, county and state courts and regulatory agencies.

Utility System Valuation

Analyze financial and operational data for utility system acquisition program. Present expert testimony using a variety of financial models.

System Development

Supervise the development of numerous computer systems, including accounting and financial systems, utility billing, scheduling, and databases. Acted as project manager on a $1.4 million utility billing implementation project. Responsibilities included selection of consultants, assignment of project team, supervision of implementation team and training team. Directly involved in identifying system modifications, system testing, procedures development, and controls development.

Utility Alternative Revenue Sources

Developed other revenue sources for water and wastewater utilities, in particular wastewater disposal products, including effluent and sludge, and performed rate studies to support sales fees. Provided expert testimony in public hearings when required. Participated in negotiations with end users on a pertinent issues including shared benefits, required utilization, and liability.

Utility Management

Provide management consulting services to private and public utility companies. Directly supervised entire accounting, rate regulation, budgeting, cash management, and management information systems for water, wastewater, and LP gas utilities throughout the state of Florida.

Stormwater Utility Systems

Performed analysis of costs for recovery through user fees for several large systems, including Metropolitan Dade County, City of Coral Gables, and the City of Miami Beach. Developed a preliminary needs analysis for several municipalities in Metropolitan Dade County by analyzing available information, including the Cities of Hialeah, North Miami, Sweetwater, and South Miami, and Medley.

Evaluated alternative billing mechanisms, including utility user fees and special assessments, recommend appropriate mechanism.

Assisted in establishment of billing, administrative, and customer service department for new stormwater management system in Metropolitan Dade County.

Economic Analyses

Established telecommunication permit fee to charge to private telecommunication companies and toll providers for the use of City of Miami easements, in compliance with Florida Statutes.

GENERAL EXPERIENCE

Vice President, Milian, Swain & Associates, Inc., 1989 - present.
Vice President, Deltona Utility Consultants, Inc., United Florida Utilities Corporation, and Deltona Utilities, Inc., 1988 - 1989.
Controller, Deltona Utility Consultants, Inc., 1984 - 1988.
Rate Analyst, Deltona Utility Consultants, Inc., 1982 - 1984.
Controller, Southern States Utilities, Inc., 1977 - 1982.

EDUCATION

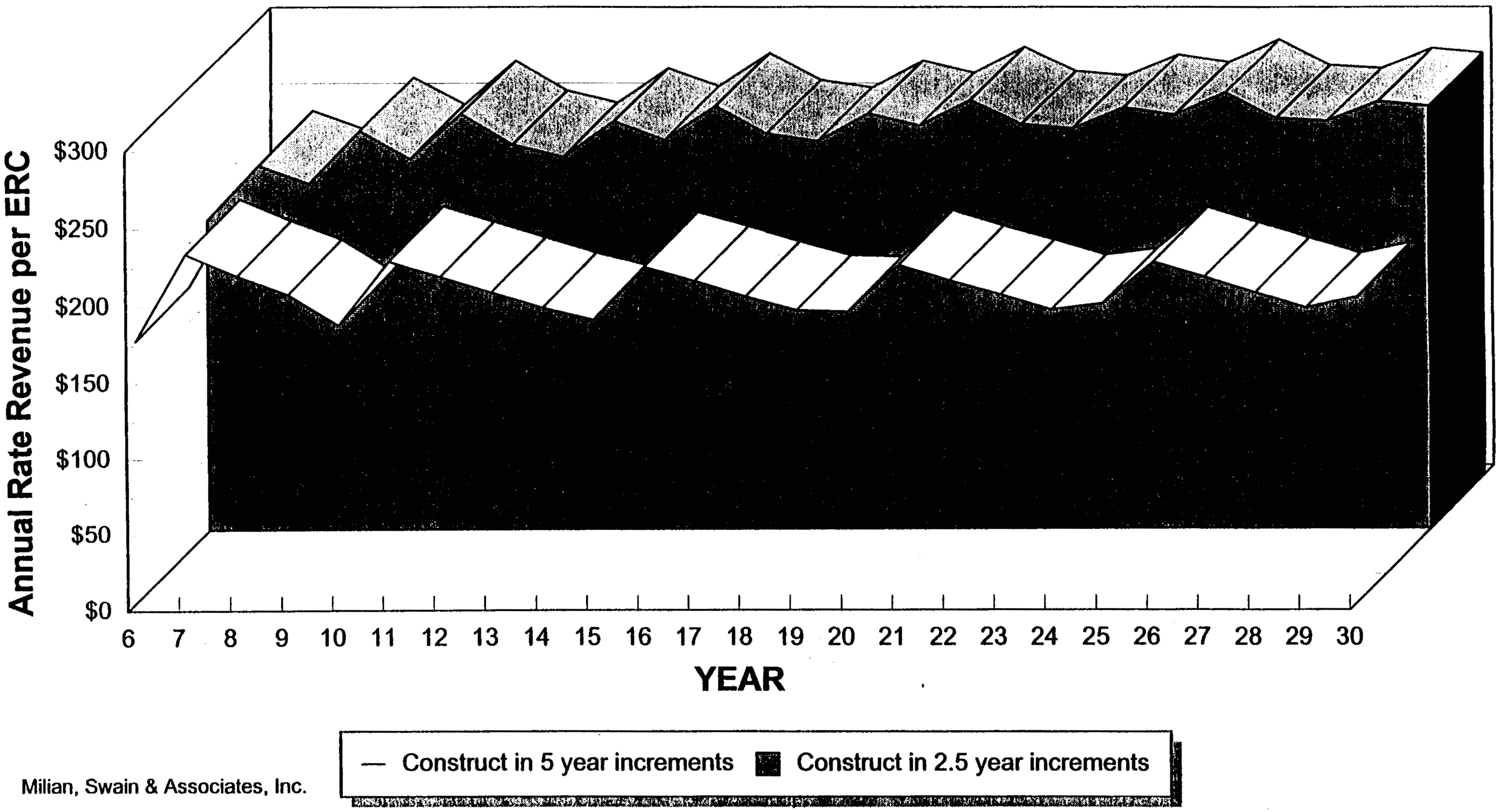
B.S.	Accounting	Florida State University	1976

MEMBERSHIPS (past and present)

- American Waterworks Association
- Citizens for a Better South Florida - Board of Directors, Treasurer, Executive Committee
- Florida Waterworks Association - Board of Directors, Treasurer, Secretary,
- National Association of Water Companies

EXHIBIT DS - 3

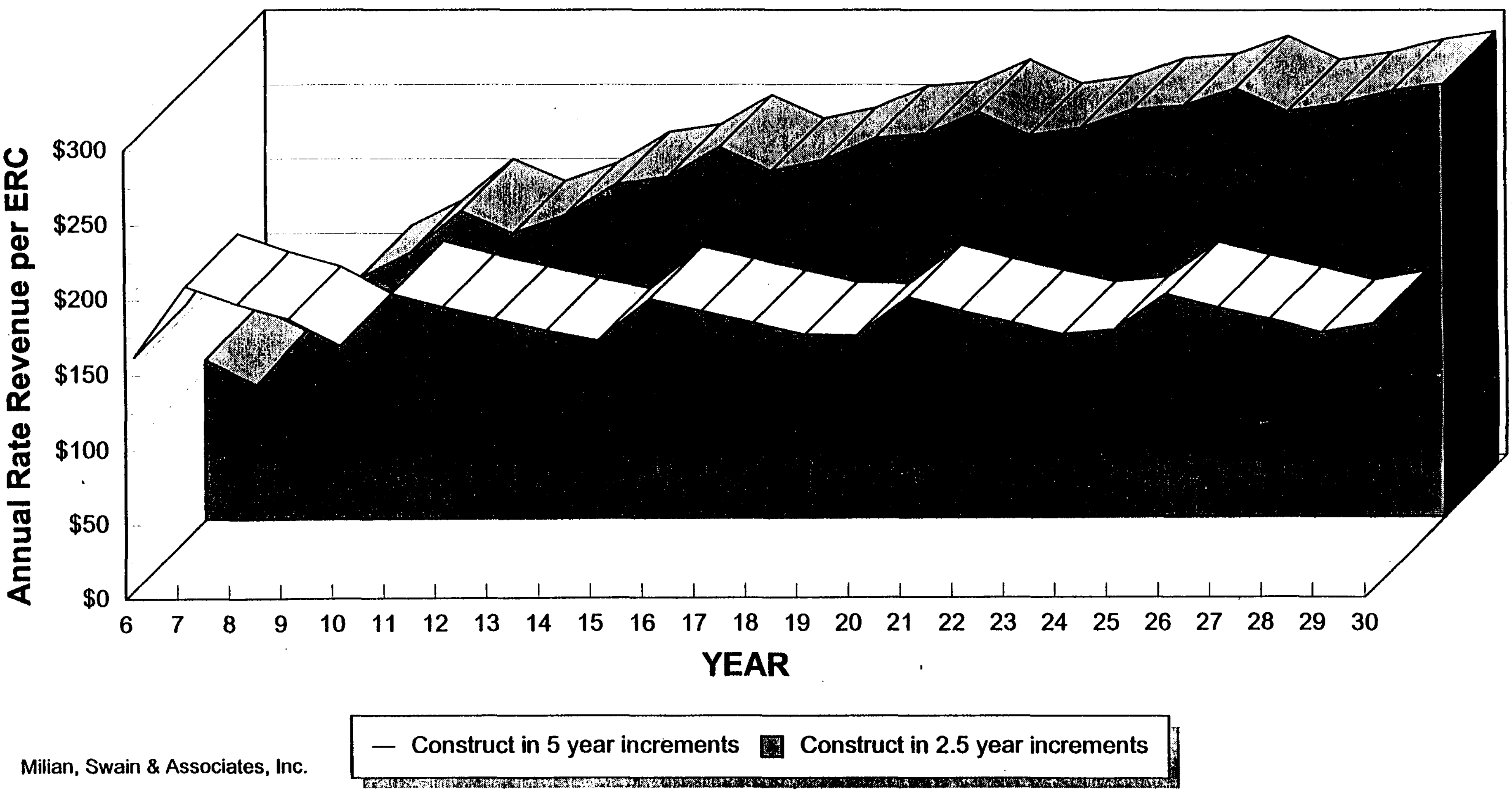
Effects of Economies of Scale on Customer Rates
Comparison - Incremental Expansion of Wastewater Treatment Plant



Milian, Swain & Associates, Inc.

EXHIBIT DS - 4

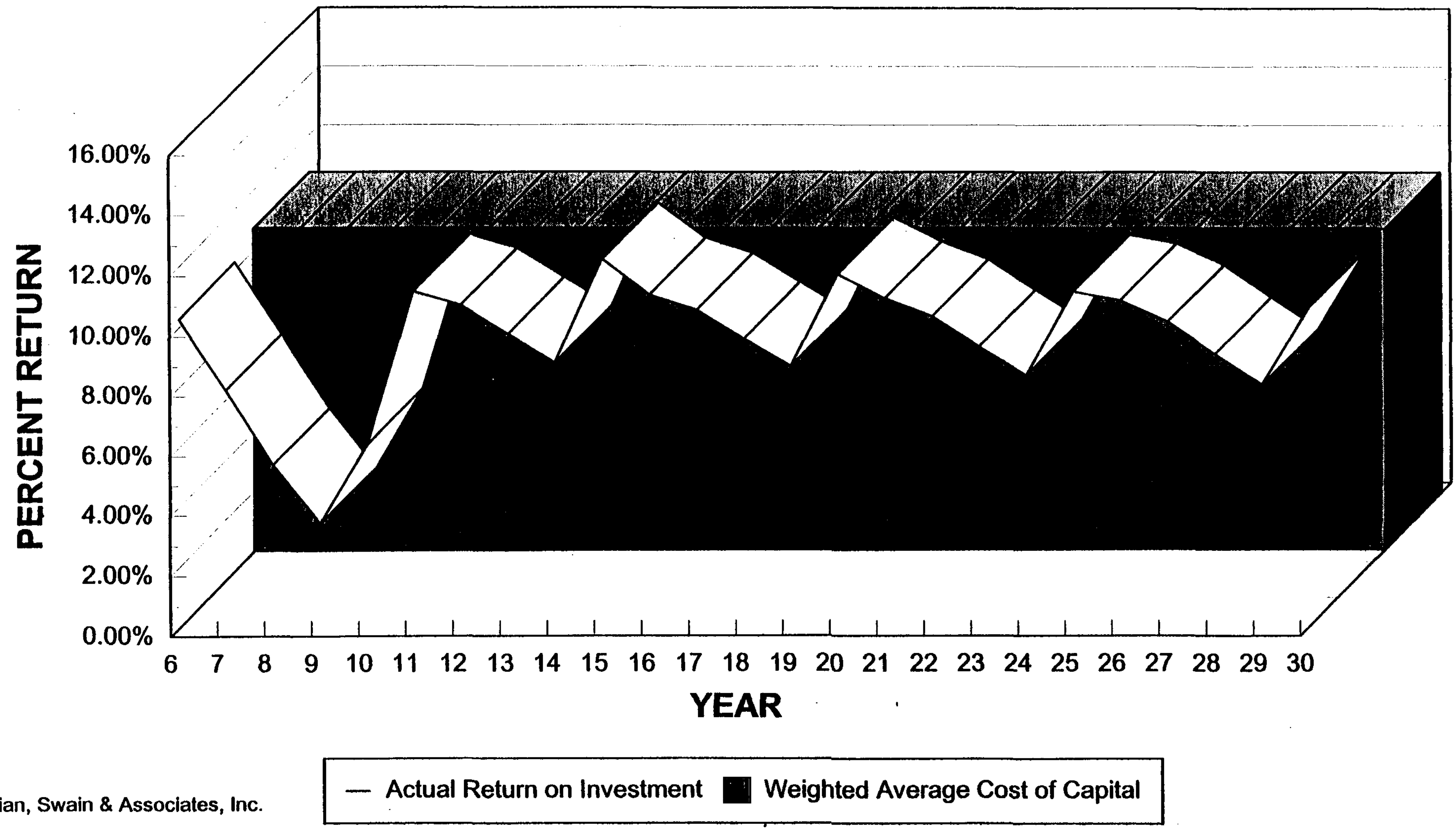
Effects of Economies of Scale on Customer Rates
Comparison - Incremental Expansion of Water Treatment Plant



Milian, Swain & Associates, Inc.

EXHIBIT DS - 5

FWA Proposal - 5 Year Margin Reserve / No Imputation of CIAC
Comparison - Actual Return to Allowed Return



Milian, Swain & Associates, Inc.

EXHIBIT DS - 2

STUDY OF MARGIN RESERVE AND IMPUTATION OF CIAC

on behalf of:

THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

prepared by:

Milian, Swain & Associates, Inc.

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October 1996

EXHIBIT DS-2

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STUDY FOR FLORIDA WATER WORKS ASSOCIATION

MARGIN RESERVE AND IMPUTATION OF CIAC

MILIAN, SWAIN & ASSOCIATES, INC.
OCTOBER 1996

DOCUMENT NUMBER-DATE
11170 OCT 18 96
FPSC-RECORDS/REPORTING

STUDY FOR FLORIDA WATERWORKS ASSOCIATION
MARGIN RESERVE AND IMPUTATION OF CIAC

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STUDY FOR FLORIDA WATERWORKS ASSOCIATION
MARGIN RESERVE AND IMPUTATION OF CIAC

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SECTION I

SUMMARY

STUDY FOR FLORIDA WATERWORKS ASSOCIATION
MARGIN RESERVE AND IMPUTATION OF CIAC

I. Summary

Introduction

Investor-owned water and wastewater utilities in Florida have found themselves financially squeezed by conflicting policies of state and local environmental and economic regulators. They are required by environmental regulators, in particular the Department of Environmental Protection (DEP), to invest in plant expansion to protect the level of service provided to current customers while providing for future growth. At the same time they are denied the ability to receive a return on the required investment by the Florida Public Service Commission's (PSC) policies of limiting margin reserve to 18 months and imputing contributions-in-aid-of-construction (CIAC) on margin reserve plant.

Commissioner Kiesling has noted that Florida has the greatest number of water and wastewater utility abandonments in the country. The decision is made all too often that the cost of running a water and wastewater utility in Florida, and the associated risks, outweigh the return on investment that is allowed. When a utility is abandoned, the customers suffer because they receive an inferior level of service and often end up paying higher rates so that problems can be remedied after the fact on an emergency basis. While abandonment represents the extreme case and historically has occurred only with smaller utilities, it is an indicator of the severity of the problems facing the industry.

Utilities have repeatedly presented testimony to the PSC as to the inadequacy of the margin reserve generally allowed to provide the financial stability needed to comply with requirements imposed by environmental regulators, the fact that imputing CIAC against margin reserve defeats the purpose of margin reserve and is inappropriate, and the detrimental effects of the Commission's policies on the long term cost of providing service. Even so, the PSC has only occasionally deviated from its long standing policies.

In March 1996, the Florida Waterworks Association (FWA) filed a petition for rulemaking on margin reserve and imputation of CIAC on the margin reserve calculation. The Association's proposed rule would:

- allow a margin reserve period of five years for water source and treatment facilities and wastewater treatment and effluent disposal facilities, unless otherwise justified, and
- not impute CIAC against the allowance for margin reserve.

The PSC denied FWA's proposal and, instead, in July 1996 proposed a rule that would:

- allow 18 months margin reserve for water source and treatment facilities and wastewater treatment and effluent disposal facilities and 12 months margin reserve for water transmission and distribution lines and the wastewater collection system, unless otherwise justified, and
- impute CIAC when margin reserve is authorized.

It is the Association's hope that, through rulemaking, outside the context of any particular rate hearing, the long-term impacts of these alternative margin reserve policies can be evaluated and duly considered and a policy can be codified that is fair to the utilities' existing and future customers as well as shareholders. Then in future rate hearings, evidence before the Commission may be limited to those cases which are exceptions to the rule.

<u>Description of Study</u>

Milian, Swain & Associates, Inc. (MSA) has undertaken a study for the FWA to identify and quantify the long-term impacts of environmental regulation and PSC policy related to margin reserve on planning and construction schedules and the resulting costs to utilities and their customers of the incremental construction decisions resulting from such policies. Over the years these issues have been reviewed by the Commission repeatedly. Testimony presented in water and wastewater rate cases has generally related to the specifics of one investor-owned utility at a given point in time.

In order to gauge the impact of environmental and economic regulation on utility decision making and the resulting costs to customers across the industry, utilities of all sizes throughout the State of Florida were polled. Data was gathered from investor-owned, PSC-regulated utilities as well as municipal and county utilities. Numerical data and anecdotal information provided by utilities was tabulated and summarized. Financial models were developed to demonstrate the impacts of alternative policies on rates over the long-term. The study is limited to the issues related to margin reserve and the imputation of CIAC. We have attempted to isolate these issues from others related to used and useful adjustments and economic regulation. This report summarizes our findings.

Section II presents a brief summary of environmental regulation which has a bearing on planning and construction schedules of water and wastewater utilities in Florida. This is not intended to be a comprehensive discussion of all environmental regulation affecting utilites. Certain timetables must be adhered to in planning and constructing expansion of water source and treatment and wastewater treatment and effluent disposal facilities. These timetables are presented along with actual experiences to demonstrate what utilities are facing.

Section III presents a model of utility cost recovery which shows that, with the PSC's proposed rule on margin reserve and imputation of CIAC, it will be impossible for utilities to earn a fair rate of return on investment.

Section IV presents information obtained as to economies of scale of constructing different increments of plant. This information was distilled from engineering estimates, reports provided by water and wastewater utilities and their consulting engineers and PSC orders. Calculations are also presented to demonstrate the impacts of utilities' decisions on customer rates over the long-term.

Section V discusses imputation of CIAC. In most cases, CIAC imputation has the effect of removing the benefits of margin reserve. The obligation to meet the demands of existing customers while plant expansions are made to accommodate growth is on-going.

Section VI discusses Allowance for Funds Prudently Invested (AFPI) and how AFPI is no substitute for inadequate margin reserve and imputation of CIAC.

Section VII presents a comparison of rate recovery methods between municipal and investor-owned utilities.

The conclusions drawn as a result of the study are summarized below.

Conclusions

A. Environmental regulations have an impact on planning and construction schedules of utilities. Particularly in recent years such regulation has substantially extended the time it takes to obtain permits and has increased the associated costs. As shown in the following table, it typically requires 3 ½ to 5 years to plan, design, permit, construct, test and certify water and wastewater facility expansions.

Timetables for Water & Wastewater Facility Expansion

	Water	Wastewater
Planning	3-6 months	3-18 months
Design	3-6 months	6-24 months
Permitting	3-6 months	6-36 months
Construction	18-36 months	12-36 months
Testing & Certification	6 months	6 months

B. 18 month margin reserve does not allow utilities to recover costs associated with investment required by environmental regulators. Imputation of CIAC further reduces cost recovery on prudent, mandated investment.

Our model of utility cost recovery - a "best case" scenario assuming no regulatory lag, full recovery of operation and maintenance expenses and predictable customer growth and plant utilization - shows that if only 18 month margin reserve is allowed and CIAC is imputed, a utility will never be able to earn its authorized rate of return. In the example presented, actual return on investment, including monthly rates and AFPI, never exceeds 70% of the authorized weighted cost of capital.

C. The PSC's policies have had an impact on utilities' decisions relating to incremental plant expansion. In many cases utilities have chosen to expand in smaller increments in order to achieve a higher level of cost recovery, rather than in larger increments which would provide economies of scale, but on which cost recovery is unlikely. Additional costs which are incurred and passed along to customers as a result of these decisions include:

- higher construction costs associated with smaller incremental expansions
- duplicative engineering, permitting and contractor mobilization costs
- higher rate case expense from more frequent rate hearings

D. The PSC's proposed rule will result in higher costs to customers in both the long and short-term. Yet the PSC's proposed rule provides disincentives for utilities to expand in larger increments.

When utilities make smaller incremental expansions, customer rates are higher in the short-term as well as in the long-term under the PSC's proposed rule. Our comparison of two alternative programs for incremental expansion of wastewater treatment facilities shows that the net present value of revenue requirements over 25 years is 16% higher if plant is expanded in smaller increments. Service availability charges and AFPI are also higher. Rates are higher from the first year.

A similar comparison for water treatment facilities shows even more dramatic results: the net present value of revenue requirements over 25 years is 41% higher if plant is expanded in smaller increments. Rates are initially lower, but become higher by the fourth year.

E. Allowance of AFPI does not adequately compensate utilities for disallowance of full margin reserve.

The results of the utility cost recovery model show that utilities are not made whole by AFPI, even when growth occurs as projected. Revenues from rates plus AFPI never provides more than 70% of the authorized rate of return. Even though the Commission recognizes that investment is prudent, the utility bears the entire risk for growth occuring as projected.

In addition, when CIAC has been imputed, the number of future customers subject to AFPI has not been increased. Using the utility cost recovery model we determined that over the 25 year period $3.4 million in AFPI collections was lost due to this flaw in the calculation.

F. Government-owned utilities must routinely include the full cost of investment in plant as well as construction work in progress in rates, without making adjustments for used-and-useful or margin reserve, in order to adequately compensate for the associated debt. They are under the same pressures as investor-owned utilities to keep rates low and stable, to comply with environmental regulation and to protect the health and safety of their customers. Yet they are required to recover these costs in order to meet bond covenants and maintain their credit ratings. Investor -owned utilities are being prevented from doing so under the PSC's proposed rules.

SECTION II

IMPACT OF ENVIRONMENTAL REGULATION ON PLANNING AND CONSTRUCTION SCHEDULES

II. Impact of environmental regulation on planning and construction schedules

As detailed below, environmental regulation has become more stringent in recent years. The greater demands on water and wastewater utilities result in higher costs of providing service to customers. The Commission has supported compliance with environmental regulation over the years in a number of ways. One example is the provision allowing utilities to recover required increased testing costs via the pass-through rate adjustment - which allows pass through of a mandated expense without a full rate case.

The Association's position is that where capital investment is mandated by environmental regulators, allowing full recovery in the form of current return on that investment is appropriate and in the best interest of utility customers as well as investors. Some counties which regulate investor-owned utilites have allowed pass-through of capital costs when those costs were mandated (eg: In 1994, Hillsborough County required demolition and restoration of Southern States Utilities' Seaboard Wastewater Treatment plant and then allowed pass-through of the associated costs).

Testimony has been presented to the Commission that, to the extent that used and useful allowances do not parallel design and regulatory requirements, used and useful is a direct financial disincentive for regulatory compliance and environmental protection which promotes resource endangerment *[Rebuttal Testimony of Richard M. Harvey, P.E. on behalf of Southern States Utilities, Inc., Docket No. 950495-WS].* In this section we discuss the impact of environmental regulation on water and wastewater utilities in Florida.

<u>Wastewater Treatment and Disposal Facilities</u>
The Florida Department of Environmental Protection is charged with enforcing Section 62-600 F.A.C., which requires long range planning of wastewater treatment facilities. Section 62-600.100 (2) F.A.C. states: "It is the policy of the Department to encourage an applicant, before submittal of a permit application, to study and evaluate alternative wastewater treatment techniques and to discuss alternatives with the Department."

Section 62-600.405 F.A.C. establishes timetables by which particular action must be taken to expand plant. When plant flows reach 50% of permitted capacity, a capacity analysis report must be prepared and submitted. A preliminary design must be initiated five years in advance of the time permitted capacity will be equaled or exceeded . Detailed plans and specification preparation must be underway four years in advance of the time permitted capacity will be equaled or exceeded. A construction permit application must be filed with DEP for expansion of the facility three years in advance of the time permitted capacity will be equaled or exceeded. An operating permit application for the expanded facility must be filed six months prior to the time permitted capacity will be equaled or exceeded.

As one utility manager stated, "Under the current DEP rule for wastewater capacity, planning & design of expansions is virtually continuous." *[Palm Coast]*

Florida Cities' Golden Gate Wastewater Treatment Plant provides a good example of how the involvement of a number of different environmental regulators and changing requirements can affect a single plant expansion. The plant is currently under contract to be expanded from 0.75 MGD to 0.95 MGD, at a cost of $1.4 million. Regulatory considerations increased the scope and timing of the expansions as follows:

- The expansion is required pursuant to DEP rules and a study required by PSC Order No. PSC-92-0811-FOF-WS.

- DEP has indicated that Rule 62-600.400(1)(b) applies, requiring an additional clarifier and chlorine contact chamber as part of the expansion. This rule applies to new facilities and modifications of facilities for which a completed construction permit application is received by DEP after July 1,1991.

- An anerobic digester, also included in the project, is required to meet EPA standards for sewage sludge promulgated by February 19, 1993. DEP is currently revising 62-640, F.A.C. to concur with EPA requirements.

- Collier County Resolution No. 94-533 requires that site improvements be included in the project to improve odor control, landscaping, sidewalks and noise abatement. Zoning approval could not be obtained from the County without these improvements.

<u>Reuse Facilities</u>

Reuse feasibility studies are required by Rule 62.401(5) F.A.C. and Section 403.064 of the Florida Statutes. Rule 62-40.401(5), F.A.C. requires a reasonable amount of reuse of reclaimed water from domestic wastewater treatment facilities within designated critical water supply areas unless reuse is not economically, environmentally or technically feasible. Section 403.064 FS requires the evaluation of the costs and benefits of reclaimed water reuse as part of permit applications to construct or operate domestic wastewater treatment facilities submitted after January 1, 1992.

Rule 62-600.700 requires a preliminary design report as a basis for issuance of a construction permit for wastewater facilities. In addition, the applicant must have applied for a reuse of disposal system construction permit from DEP for a portion of the permitted capacity or must demonstrate that sufficient disposal and reuse capacity is available.

In many cases, counties, cities and unrelated development companies have become involved in utilities' plans to expand wastewater treatment plants because of reuse issues. Palm Coast is involved in regional planning for reuse of effluent disposal, together with Flagler County, the St. John's Water Management District and other local utilities and developers in the area. Obtaining concensus from all interested parties extends the time required for planning, design, permitting and construction of facilities.

Utilities expect to face compliance with new or changed environmental regulation as they prepare to construct new facilities or expand existing facilities. However, in order to coordinate reuse issues with their neighbors, utilities may be forced to incur costs for planning and design outside of their own normal facility planning periods. For example, Utilities, Inc./Alafaya Utilities found itself in the position of having to complete a reuse feasibility study well in advance of its next planned wastewater plant expansion when its neighbor, the City of Oviedo, announced plans to use Alafaya's service area for disposal of the City's effluent. Alafaya has had to expend funds to prove that it will need this area for disposal of its own effluent, far in advance of any potential construction.

<u>Discharge to surface waters</u>
In recent years there have been dramatic changes in federal, state and local regulation related to discharge to surface waters. Examples of specific regulatory requirements cited by utilities as those causing additional cost and time in planning, design, permitting and construction of wastewater treatment and disposal facilities are:

- The Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System (NPDES) regulations.

- The Indian River Lagoon System Wastewater Act, which stipulates the elimination of all surface water discharges within the system by July 1, 1995

- The Grizzle-Figg Act of 1987, which required all point discharges to portions of Tampa Bay either to cease or to upgrade the wastewater treatment facilities to advanced wastewater treatment.

- Sarasota County Ordinance No. 82-90, which requires effluent discharges to off-site surface waters to meet advanced wastewater treatement criteria.

- DEP permit requirements, which in some cases have included provisions prohibiting discharge into off-site surface waters even in where effluent is treated to advanced waste treatement criteria.

If discharge to surface waters is not specifically prohibited by federal, state or local regulations, Rule 62.620, F.A.C. requires utilities to obtain permits from DEP (which enforces NPDES regulations in Florida). Consulting engineers estimate that obtaining the required permit takes at least six months and has taken as long as two years. Permits must be renewed every five years. The criteria for discharge to surface waters is very stringent; requiring advanced treatment of wastewater so that discharge contains significantly lower levels of total suspended solids than both the receiving body of water and runoff from farmland and roadways.

<u>Water Treatment Facilities</u>

DEP staff indicates that utilities are encouraged to conduct capacity analyses for water treatment facilities (similar to that required for wastewater treatment facilities), but the rules have not yet been changed to require it. The current rules call for action at certain times based upon utilization of the plant. County Public Health Units of the Florida Department of Health and Rehabilitative Services (HRS) are responsible for enforcement of this rule.

Water utilities must obtain consumptive use permits through the Water Management Districts. According to one consulting engineer who works for both private and public water and wastewater utilities around the state, obtaining a consumptive use permit takes a minimum of six months, but it is not unusual for the process to take one to two years. The most contentious issues are usually the population projections and flow rates. Private utility generally have a more difficult time supporting their population projections. The Districts have been encouraging reuse, but have not had the means to enforce reuse on customers. More recently they have been offering the incentive of a 20 year permit (rather than the usual 5 year permit) where utilities will commit to 100% reuse. *[Kirk Martin of Missimer International, Inc.]*

Obtaining permits for construction or expansion of reverse osmosis or membrane softening water treatment plants has become particularly difficult in recent years due to increased regulation regarding disposal of concentrate (also referred to as brine or by-surface water. Concentrate is now classified as industrial waste by the EPA. In the mid-1980's DEP issued new rules requiring toxicity tests and making it virtually impossible to obtain a permit for discharge to saline surface water. Construction of very expensive injection wells is required. *[Jeff Hart of Montgomery Watson]*

Changes in environmental regulation has been particularly difficult for those utilities constructing plant in small increments in order to limit non-used and useful plant. These utilities have master plans, outlining the phasing of the various facilities over many years as growth occurs. When permits are sought for expansion of existing facilities, the new facilities must be designed to comply with new or changed environmental regulations. In addition, regulators usually require that existing facilities be brought into compliance with new or changed regulations. If the regulations have changed since the master plan was prepared, additional time and cost must be incurred to redesign the facilities. Obviously, the more often plant is expanded, the more time and expense is incurred for compliance.

<u>Time required for planning, design, permitting and construction of facilities</u>
Data provided by utilities and their consulting engineers shows that under normal circumstances it takes from 3 to 5 ½ years to complete a water or wastewater facility expansion:

TABLE 2.1
Timetables for Water & Wastewater Facility Expansion

	Water	Wastewater
Planning	3-6 months	3-18 months
Design	3-6 months	6-24 months
Permitting	3-6 months	6-36 months
Construction	18-36 months	12-36 months
Testing & Certification	6 months	6 months

Where more than one environmental regulator is involved, the time it takes to obtain permits is often prolonged, as described in the following situations.

In 1990 Palm Coast began the study and the permitting process for a surface water discharge or a limited wet weather discharge to Graham Swamp. In 1993 after submitting all necessary permit application and supporting documents, including several Graham Swamp baseline monitoring reports, Palm Coast had to withdraw this permit application primarily due to strong objections from the Flagler County government.

In the early 1980's Atlantic Utilities of Sarasota planned construction of an advanced wastewater treatment plant to comply with a Sarasota County ordinance, with effluent disposal to offsite surface water. DEP issued a permit for construction of the treatment facility in March 1984. In August 1984, DEP notified Atlantic Utilities that it was prohibited from discharging into offsite surface waters. Atlantic proceeded with plans for a deep injection well. Permits were required from DEP, the Sarasota County Health Department and the County Utilities Department. Due to changes in regulation along the way, the facilities were not completed until 1989, six years after the original DEP permit was obtained.

It took Florida Cities approximately fifteen years to achieve compliance with regulatory requirements associated with the surface water discharge at Barefoot Bay. The Barefoot Bay advanced wastewater treatment plant upgrade was designed to eliminate a full time surface water discharge. The project involved consent order negotiations with DEP. An original consent order was negotiated with DEP, but further negotiations were required when the St. Johns River Water Management would not issue a permit to construct an injection well. The consent order was amended and DEP issued a permit to construct a restricted access slow rate land application site. Adjacent property owners intervened, and an administrative hearing was held. The permit was upheld, but the intervenors appealed. DEP directed Florida Cities to investigate other options for effluent disposal, a course which led to amendment of the consent order for irrigation on land with public access and discharge to surface water during periods of wet weather. Florida Cities began the planning process for the injection well in 1981; testing and certification of the advanced wastewater treatment plant upgrade was finally completed in 1996.

General Development Utilities applied for a permit for limited wet weather discharge to surface waters for its Julington Creek Division in the early 1990's. Dye studies and modeling of the St. Johns River were required by DEP. Consulting engineers developed the model and ran a number of iterations based on review by both the Jacksonville and Tallahassee offices of DEP. In addition, the company was required to apply to EPA for a NPDES permit. The permitting process alone took 1 ½ to 2 years and cost the company approximately $300,000.

Southern States Utilities commenced its Burnt Store Water Supply and Reverse Osmosis plant expansion in 1989. Subsequent to issuance of the last disposal permit for brine, DEP changed its classification of brine to hazardous waste. Therefore, SSU's permit application was denied and SSU was order to cease discharge of brine to the Charlotte Harbour. The brine disposal issue had to be resolved before construction of the reverse osmosis expansion could begin. Several alternatives were presented to DEP, and all were rejected except the most costly alternative, to build a deep injection well. DEP agreed to allow SSU to replace the existing reverse osmosis facilities and continue discharge to Charlotte Harbour while the deep injection well was under construction. The first skid of reverse osmosis units was replaced and on-line in mid-1995, over five years after the plant expansion commenced. The deep injection well was completed by the end of 1995.

<u>Mandated costs</u>

It is the Association's position that mandated costs should be fully recoverable in current rates. In 1992 DEP and the PSC entered into a memorandum of understanding (MOU), which formally establishes the policies and procedures to be followed by the two agencies to promote and encourage water conservation and reuse, and safe and efficient water supply and wastewater management services. The PSC agreed to adopt and implement policies and procedures necessary to administer its duties under the MOU, including:

- review proposed rate structures for private utilities within its jurisdiction

- in light of DEP rules, evaluate capacity constraints imposed by statute and rules on private utilities within its jurisdiction, by its application of the used and useful concept and, if justified, asses the possible need for statutory rule revisions

- allow utilities which implement reuse projects to recover full cost of such facilities through their rate structures.

This MOU gave utilities reason to hope that the Commission would begin to allow full recovery of mandated costs by (1) deeming reuse facilities 100% used and useful, (2) allowing a margin reserve reflective of DEP's requirements for investment in plant expansion and (3) discontinuing imputation of CIAC, which effectively removes the benefit of margin reserve allowed in rate base. Unfortunately, this has not proved to be the case. The Commission has not allowed full recovery of mandated costs in recent decisions, nor does the PSC's proposed rule on margin reserve and imputation of CIAC provide for full recovery.

For example Southern States Utilities has entered into several consent agreements with DEP that have required capital improvements. Yet the costs of those improvements have not been fully allowed in subsequent rate cases due to used and useful adjustments. In the company's recent rate case, capital projects with "Regulatory Mandate" made up approximately 37% of the total $98 million spent from 1992 to 1996. The PSC affirmed those classifications, yet still subjected some of the regulatory mandated investment to used and useful adjustments, thus denying the company a full return on them.

"Pay now or pay later"

If utilities are not allowed to earn a fair return on investment and maintain financial stability, it is likely they will be seeking ways to cut costs and defer improvements to their systems. This could result in higher rates to current and future customers and could also pose risks to health and safety. The cost of improving systems and bringing them into compliance with environmental regulation is usually greater than the cost of maintaining compliance. Associated rate increases would be more drastic.

Dade County provides a classic example of the maxim "pay now or pay later," which applies here. For years Miami-Dade Water and Sewer Authority kept rates low by deferring expenditures needed to comply with environmental regulation. In recent years, federal regulators have stepped in to force compliance. Significant investment has been required over a short period of time to remedy the problems. Rates are now skyrocketing for all customers - those who benefitted from the low rates in prior years as well as new customers on the system.

SECTION III

MODEL OF UTILITY COST RECOVERY

III. Model of utility cost recovery

The PSC authorizes investor-owned water and wastewater utilities in Florida to recover costs through a combination of:

- rates,
- miscellaneous service charges,
- Service Availability Charges, and
- Allowance for Funds Prudently Invested (AFPI).

In order to illustrate the financial impacts on utilities of the proposed rule on margin reserve and imputation of CIAC, a model of utility investment, allowed return and resulting return on equity to the utility is discussed in this section. Detailed calculations and schedules are presented in Appendix A. This model is a "best case" scenario in that it assumes no regulatory lag, full recovery of operation and maintenance expenses and predictable customer growth and plant utilization. Even under these ideal, unrealistic assumptions, under the PSC's recommended rule, the utility never achieves the allowed rate of return over a 25 year period. In the example presented, actual return on net investment, including monthly rates and AFPI, never exceeds 70% of the authorized weighted average cost of capital. In other words, in the best possible case, a utility can never hope to earn its authorized rate of return.

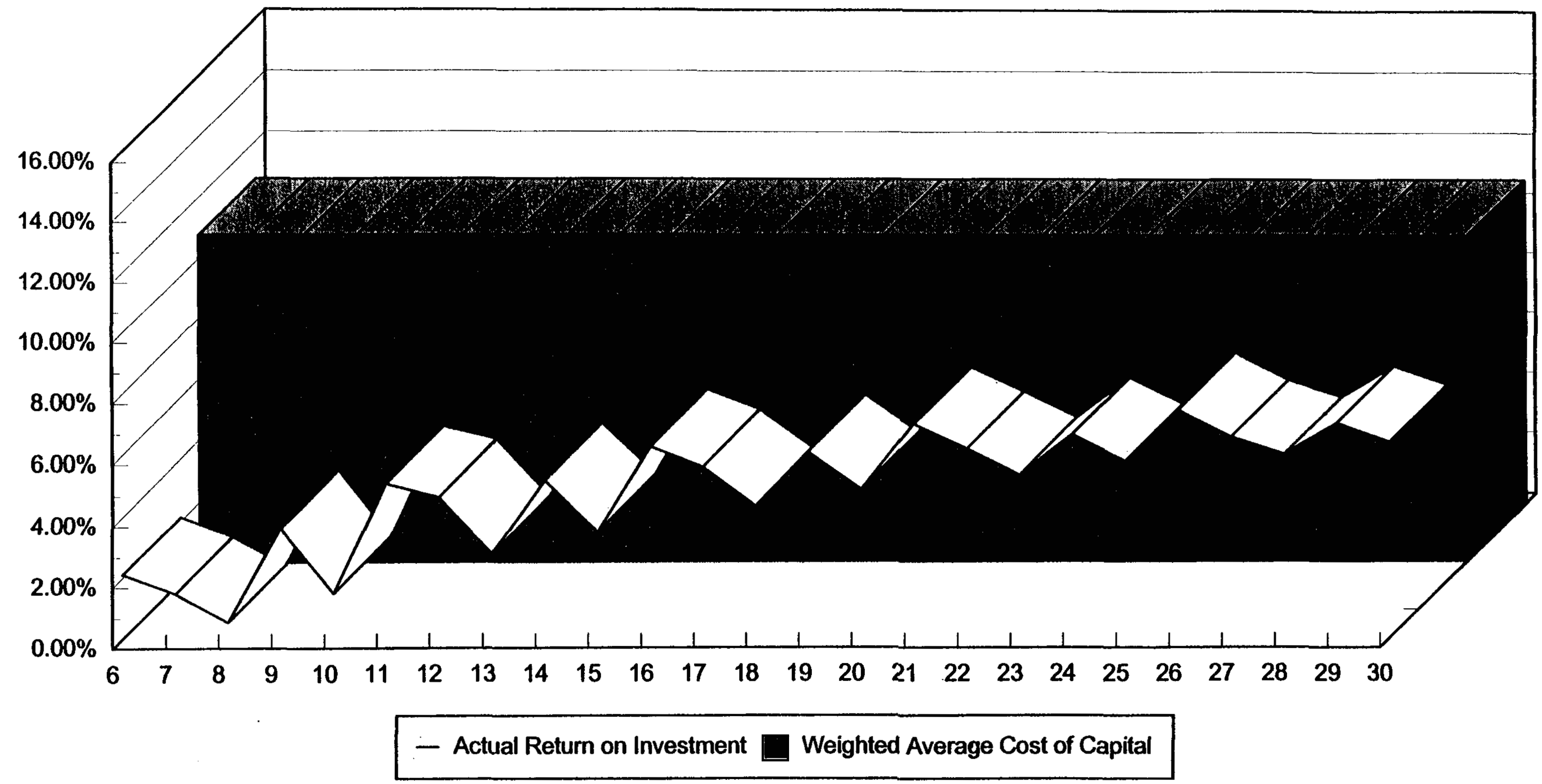
Through a combination of non-used and useful adjustments to rate base, allowance of only 18 months margin reserve in rate base and imputation of CIAC on margin reserve, utilities are denied a fair return, even when they are well managed and operating in compliance with environmental regulation.

Chart 3.1 shows a comparison of the actual return on investment (net income divided by net investment) to the authorized rate of return (weighted average cost of capital).

An explanation of the model follows.

CHART 3.1

Model Wastewater Utility
Actual Return on Investment vs. Allowed Weighted Average Cost of Capital
Plant Constructed in 30 Month Increments
Staff Recommendation: 18 Months Margin Reserve and Imputed CIAC



MODEL WASTEWATER UTILITY
DESCRIPTION & ASSUMPTIONS

(1) The purpose of this model is to present the financial impacts of proposed rules related to margin reserve and imputation of CIAC on investor-owned utilities in Florida.

(2) Financial impacts are presented over a 30 year projection period, including an initial 5 year construction period.

(3) Rate revenue for return on investment begins in the 6th year - the first year after plant is placed in service

(4) An assumption is made that rate revenues provide 100% reimbursement of operation and maintenance expenses and rate case expense.

(5) Plant additions are made in 2.5 year increments. Permitting, design and construction takes 5 years. Plant additions are placed in service six months before demand would otherwise exceed capacity, in accordance with DEP regulations.

(6) Customer growth is even and predictable.

(7) AFPI is calculated as of the beginning of the year the plant is placed in service.
AFPI charge compounds for 2.5 years and re-starts when new plant comes on-line.

(8) Capital structure includes only long-term debt and equity.

(9) Capital Structure

	Initial	Ratio	Cost Rate	Weighted Cost
Long Term Debt	$19,500,000	60.0%	10.00%	6.00%
Short Term Debt		0.0%	9.00%	0.00%
Customer Deposits		0.0%	6.00%	0.00%
Deferred ITCs		0.0%	10.00%	0.00%
Deferred Income Taxes		0.0%	0.00%	0.00%
Common Equity	13,000,000	40.0%	11.88%	4.75%
Total Capital	$32,500,000	100.00%		10.75%

(10) AFUDC Rate 10.75%

(11) Inflation on the cost of plant construction is 3.0%

(12) Size of each increment of plant 2.500 MGD

(13) Cost per MG of plant capacity $3.90 /MG of capacity

(14) Consumption 275 gpd/ERC

(15) New ERC's per Year 3,636

(16) Margin Reserve allowed 18 months

(17) CIAC Imputed? Yes

STUDY FOR FLORIDA WATERWORKS ASSOCIATION
MARGIN RESERVE AND IMPUTATION OF CIAC

MODEL WASTEWATER UTILITY
Key Results
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed

		Rates	Service Availabilty	AFPI	Total
(1)	Average Cost per ERC /year:				
	Five years	$194	$185	$21	$378
	Ten years	183	92	37	275
	Fifteen years	186	62	43	248
	Twenty years	193	46	46	240
	Twenty-five years	202	37	47	238
	Total cost per ERC over twenty-five years				$5,962
(2)	Net Present Value of Revenue Requirement				
	Rates				$28,138,655
	CIAC				17,285,480
	AFPI				788,292
	Total				$46,212,428
(3)	Net Present Value of Return to the Utility				
	Rates				$6,708,917
	AFPI				788,292
	Total				$7,497,209
(4)	Average Rate of Return on Investment Earned				5.30%
	Maximum Rate of Return on Investment Earned				7.46%

IV. Economies of Scale

The Commission has officially recognized that economies of scale provide benefits to utility customers. Proposed rule 25-30.432(3) states, "Utilities are encouraged to undertake planning that recognizes conservation, environmental protection, economies of scale and which is economically beneficial to its customers over the long term."

Despite widespread recognition of the benefits of economies of scale to utility customers, the PSC proposed rule in this Docket would allow only 18 months margin reserve in rate base and impute CIAC on margin reserve serve, thereby providing disincentives to utilities to size plants any larger than what would be considered 100% used and useful.

<u>Cost recovery vs. economies of scale in decision making</u>
In making decisions on plant expansion, utility managers are forced to choose between two unattractive alternatives:

(1) Expand facilities in smaller, more frequent increments in order to ensure as full a return on investment as possible for their investors. The result will usually be higher costs to customers in the long term; or

(2) Expand facilities in larger increments at less frequent intervals realizing that the plant will be deemed less than 100% used and useful by the PSC in the next rate case. The long-term cost to customers would be lower given larger, less frequent expansions, but investors could not expect to receive a full return on their investment.

Given these alternatives, the utility manager is forced to choose between the best alternative for the customers (existing and future customers) and the best alternative for the investors. The recommended rule virtually precludes finding a single alternative that is beneficial to both parties.

This is not merely a theoretical discussion. We found that managers of investor-owned utilities give serious consideration to economic regulation when making plant expansion decisions. Having been "burned" by used and useful decisions in rate cases in the past, some utilities place the consequences of traditional economic regulation above economies of scale when deciding on the appropriate size for water and wastewater facility expansions.

Gulf Utility Company has suffered financial loss due to the PSC's used-and-useful policies. As a result, plant expansions are always designed with used-and-useful considerations in mind. The utility is continuously involved in constructing the next plant expansion. The company directed its engineering consultants to master plan the Three Oaks Wastewater Treatment and Disposal System expansion with emphasis on incremental phasing, respecting the PSC policy. The design calls for ten phases providing total treatment capacity of 6.0 MGD. Jim Elliott of Source, Inc., the consulting engineer for this project, stated that, from an engineering standpoint, a prudent plan for this project would be to provide three to four construction phases such that economy of scale could be realized. In addition to savings due to the lower cost per gallon of larger plant expansions, savings could have been realized in lower engineering and permitting fees and the avoided costs due to mobilization and re-mobilization. Elliott estimates engineering fees for each phase are $100,000, permitting fees approximately $5,000 and the cost of contractors' mobilization or re-mobilization is 20 to 25% of the total construction cost.

Similarly, Southern States Utilities has been expanding its Burnt Store Reverse Osmosis Water Treatment Plant in phases of approximately .25 MGD each. The ultimate demand is expected to be 2.25 MGD. Preliminary planning for Phase Four began in July 1996, four months before construction of Phase Three was scheduled for completion. Elliot, the consulting engineer for this project as well, states that, here again, from an engineering standpoint a prudent plan would be to provide three to four construction phases such that economy of scale could be realized.

Florida Cities Water Company states that economic regulation is the primary consideration in its plant expansion decisions. Since its Fiesta Key rate case in 1988, Florida Cities has chosen to make smaller plant expansions on which full recovery can be achieved rather than larger expansions on which only partial recovery is expected.

Cost comparison - wastewater treatment facilities

To illustrate the effect of alternative decisions on customer rates and return on investment over the long-term, various plant expansion scenarios were evaluated using the model described in Section III.

The first comparison uses cost data from Order No. PSC-93-1288-FOF-SU. In the 1980's Florida Cities had constructed a 2.5 MGD advanced wastewater treatment plant Florida Cities in its South Fort Myers Division in Lee County. The utility constructed components of the plant so that it could easily be expanded to 5.0 MGD, but activated only the 2.5 MGD train. The cost of constructing a 2.5 MGD plant would have been $9.7 million or approximately $3.90/1000 gallons. The cost of constructing a 5.0 MGD plant would have been $14.3 million, or approximately $2.86/1000 gallons. We have used these cost figures and the following assumptions:

WWTP A construction of facilities in five year increments. Each increment has capacity of 5.0 million gallons per day

WWTP B construction of facilities in two and a half year increments. Each increment has capacity of 2.5 million gallons per day.

Planning, design, permitting and construction takes five years for each increment. Facilities are placed in service six months prior to the time demand would otherwise exceed capacity (as required by DEP rules). Customer growth occurs evenly over a 5 year period beginning in Year 6.

Major assumptions are the same as those presented in Section III. The model presents a "best case" scenario in that it assumes no regulatory lag, full recovery of operation and maintenance expenses and even and predictable customer growth and plant utilization.

A comparison between the two alternatives is presented in the following table:

TABLE 4.1
Comparison of Alternatives for Wastewater Treatment Plant Expansion

	WWTP A	WWTP B
Capacity	5.0 MGD	2.5 MGD
Cost per thousand gallons	$2.86	$3.90
Frequency of expansion	5 years	2.5 years
Net Present Value of Revenue Requirement:		
Rates	$24.3 million	$28.1 million
Service Availability Charges	11.9 million	17.3 million
AFPI	.8 million	2.9 million
Total	$37.0 million	$48.3 million
Net Present Value of Return to Utility		
Rates	$ 5.4 million	$ 6.7 million
AFPI	2.9 million	.8 million

Alternative WWTP A, constructing less frequently in larger increments, produces lower revenue requirements over the 25 year period and lower service availability charges than Alternative WWTP B. The net present value of revenue requirement from rates is 16% higher under Alternative WWTP B than under Alternative WWTP A. Alternative WWTP A is clearly more beneficial to both current and future customers over the long-term.

The utility is likely to choose alternative WWTP B, constructing plant in smaller increments. The net present value of allowed return on rate base is higher under this alternative over 30 years (including the initial construction period). Lower up-front investment is required and there is a quicker recovery of costs. Projected AFPI collections are higher under alternative WWTP A, but there is no guarantee that AFPI revenues will be achieved. Alternative WWTP A represents greater risk to the utility, which is not factored into the model.

<u>Cost comparison - water treatment facilities</u>
A similar comparison is presented for water treatment plant expansion using cost data provided by Southern States Utilities for alternative increments of expansion of its Venice Gardens water treatment plant. The cost of a .5 MGD expansion would be $1.7 million, or $3.40 per thousand gallons. The cost of a 1.0 MGD expansion would be $1.9 million, or $1.90 per thousand gallons. We have used these costs and the following assumptions to compare the economic consequences associated with the two alternatives:

WTP A construction of facilities in five year increments. Each increment has capacity of 1.0 million gallons per day

WTP B construction of facilities in two and a half year increments. Each increment has capacity of .5 million gallons per day.

A comparison between the two alternatives is presented in Table 3.2 on the following page.

The results are more dramatic in this example since the incremental cost of expansion is smaller. Alternative WTP A, construction of plant in larger less frequent increments, produces lower revenue requirements over 25 years than alternative WTP B, and lower service availability and AFPI charges. The net present value of revenue requirement recovered in rates is 40% lower under alternative WTP A. But, again, the utility would be likely to choose to expand in smaller, more costly increments because lower up-front investment is required and there is a quicker recovery of costs with less risk to the utility. In this example, the net present value of return on investment to the utility from rates is 60% higher under alternative WTP B.

TABLE 4.2
Comparison of Alternatives for Water Treatment Plant Expansion

	WTP A	WTP B
Capacity	1.0 MGD	.5 MGD
Cost per thousand gallons	$1.90	$3.40
Frequency of expansion	5 years	2.5 years
Net Present Value of Revenue Requirement:		
Rates	$3.4 million	$4.8 million
Service Availability Charges	1.6 million	3.0 million
AFPI	.4 million	.1 million
Total	$5.4 million	$7.9 million
Net Present Value of Return to Utility:		
Rates	$ .8 million	$1.2 million
AFPI	.4 million	.1 million

Effects on Current and Future customers
As shown above, the PSC's proposed rule on margin reserve and imputation of CIAC encourages utilities to make choices that cost current and future customers much more over the long-term. The proposed rule may keep rates low for today's customers in the very short-term, but even these customers will feel the effects of increased rates within a few years. If utilities expand plant in smaller increments in order to maximize recovery, future rate increases will be more frequent and greater. More frequent rate cases means higher rate case expense passed through to the customers (a cost that is not factored into the model).

Future customers will pay higher service availability charges, AFPI and user rates. Higher connection fees could discourage growth, resulting in even higher rates to those customers already on-line. Adding new customers to the system tends to offset the level of rate increases needed in the future.

SECTION V

IMPUTATION OF CIAC

V. Imputation of CIAC

The Commission has acknowledged that inclusion of margin reserve in the calculation of used and useful plant is proper on the basis that:

> "A margin reserve allows the utility to recover investment in plant which is needed to serve future customers the utility must, by law, serve within a reasonable time. Further, a margin reserve benefits existing customers by ensuring that future customers will not overload existing facilities and impact on the quality and safety of service provided." [Order No. PSC-93-0423-FOF-WS]

Under the PSC's proposed rule, margin reserve is to be allowed, but CIAC is to be imputed on margin reserve. The net effect is that the imputation of CIAC removes most of the benefit of margin reserve from rate base. In the model described in Section III, imputation of CIAC removes 84% of margin reserve from rate base over the 25 year period. It is not uncommon for the entire margin reserve to be eliminated by imputing CIAC. In one recent case, imputation of CIAC exactly matched the rate base component associated with margin reserve so that the utility received no benefit from margin reserve. [Florida Cities Water Company - Golden Gate Division, Docket No. 941108-WS, Order No. PSC-95-0720-FOF-WS].

Utility managers have indicated that extending the margin reserve period to more closely approximate the time frame required for planning, designing, permitting and constructing plant expansions would be virtually useless if the provision requiring imputation of CIAC is not deleted from the proposed rule.

By eliminating margin reserve through the imputation of CIAC, the rule fails to recognize that the need for margin reserve plant "rolls forward." Utilities are *required* to have sufficient capacity to meet changes in demands of existing customers as well as growth in service demands on a continuous basis. They are *required* to start making capital investment long before contributions to partially cover that cost can be collected. There will always be a gap between the time plant must be made available, and paid for, and the time future customers provide contributions to partially cover the cost of that plant. This gap does not narrow with time because, as time passes, additional plant must be available to serve other future customers.

Historical data shows that utilities continuously make plant investment well in excess of CIAC collections. Table 4.1 shows a comparison of additions to plant versus CIAC collections by a number of utilities which have filed rate cases before the Commission over the past five years. 118 water systems and 56 wastewater systems are included in the tabulation, representing over $200 million in investment. Total additions to plant

TABLE 5.1
COMPARISON OF PLANT ADDITIONS TO CIAC COLLECTIONS

YEAR	WATER		WASTEWATER		TOTAL	
	Plant Additions	CIAC	Plant Additions	CIAC	Plant Additions	CIAC
1985	6,165,515	1,451,397	285,597	496,066	6,451,112	1,947,463
1986	7,020,051	2,144,882	1,821,260	683,794	8,841,311	2,828,676
1987	4,957,554	1,102,019	17,745,531	319,126	22,703,085	1,421,145
1988	5,540,827	1,423,572	6,897,334	3,101,227	12,438,161	4,524,799
1989	4,189,044	3,279,443	5,662,663	5,191,288	9,851,707	8,470,731
1990	8,573,150	3,082,830	7,203,152	3,088,111	15,776,302	6,170,941
1991	5,597,355	2,106,884	3,202,306	3,395,984	8,799,661	5,502,868
1992	12,665,207	3,292,178	10,001,272	3,450,274	22,666,479	6,742,452
1993	14,666,916	3,688,144	14,174,845	3,628,307	28,841,761	7,316,451
1994	23,992,409	4,699,813	11,883,351	4,727,903	35,875,760	9,427,716
1995	23,148,469	5,700,038	21,015,318	4,024,722	44,163,787	9,724,760
Total	116,516,497	31,971,200	99,892,629	32,106,802	216,409,126	64,078,002

By offsetting out-of-period, speculative CIAC collections against required investment that has already been made, imputation of CIAC violates the most basic utility accounting and rate setting principle of matching revenues and costs in a consistent period. Costs associated with margin reserve plant, which are mandated, ongoing costs, are incurred by the utility on a current basis. As customers connect to the system there will be a need for yet additional plant to serve new growth. Under the proposed rule, when this additional investment is required, the funds will not be available to provide for it.

SECTION VI

ALLOWANCE FOR FUNDS PRUDENTLY INVESTED

VI. *Allowance for Funds Prudently Invested*

AFPI vs. current rates

The PSC allows utilities to recover carrying costs and expenses associated with prudent non-used and useful plant from future customers as they connect through Allowance for Funds Prudently Invested (25-30.434, F.A.C.). Generally the charge compounds for five years and is established at the time of a rate case. By approving the charge, the Commission has acknowledged that investment in non-used and useful plant is prudent and the utility should receive a return on that investment. However, AFPI does not accomplish this because:

- Utilities are not made whole by AFPI, even when growth occurs as projected (as shown in the model discussed in Section III and presented in Appendix A).
- AFPI is speculative; collection of the revenue is entirely dependent upon growth occurring as projected. This risk is borne entirely by the utility.
- There is no adjustment to increase the number of future customers subject to AFPI when CIAC is imputed.

In addition, as used in the past, AFPI has resulted in an unfair shifting of costs from current customers to future customers. When cost recovery is shifted from current revenue requirement to AFPI, future customers end up paying for all "non-used and useful" plant while current customers receive the benefits of any economies of scale associated with that plant. This study is limited to the effects of the proposed rule on margin reserve and imputation of CIAC and does not include a full discussion of used and useful concepts.

Computation problems related to Imputation of CIAC

Utilities are permitted to collect AFPI in the future from a designated number of equivalent residential connections (ERC's), determined as those which will be served by prudent non-used and useful plant. Under the proposed rules on margin reserve and imputation of CIAC, some ERC's are excluded from both current revenue requirements and AFPI charges. Where margin reserve is allowed in rate base, a certain number of ERC's is included in margin reserve plant, thereby increasing used and useful percentages. ERC's included in margin reserve are used and useful, and therefore are not included as those from which AFPI could be collected.

Because CIAC is imputed on margin reserve, those ERC's are included in neither rates nor AFPI. As explained in the previous section, imputation of CIAC eliminates most of the benefits of margin reserve. As applied in previous rate cases, imputation is calculated by multiplying the number of ERC's expected to connect to the system over the margin reserve period by the approved service availability charge. No corresponding adjustment has been made to increase the number of ERC's on which AFPI can be collected.

In the model discussed in Section III, over the 25 year period $3.4 million in AFPI collections is lost. At least one-half of the future ERC's are included in margin reserve and eliminated by imputing CIAC. This problem will not arise if CIAC is not imputed on margin reserve.

SECTION VII

COMPARISON OF COST RECOVERY METHODS

MUNICIPAL/COUNTY-OWNED UTILITIES VS. INVESTOR-OWNED UTILITIES

VII. Municipal and county-owned utilities

Municipal and county-owned water and wastewater utilities typically fund plant expansions from a combination of revenue bonds, contributions in aid of construction, and directly from monthly user fees. When bond financed, two assurances of debt coverage must be met: (1) Revenues from rates and fees must be at least 110% of operation and maintenance expenses plus additions to renewal and replacement fund and bond reserve funds and (2) Revenues from rates and fees plus connection fees must be at least 120% of operation and maintenance expenses plus additions to renewal and replacement fund and bond reserve funds. These utilities are required to review rates annually and make rate adjustments if necessary to meet debt coverage requirements. Rate stabilization funds are generally established to mitigate the effects of minor fluctuations in cash flow requirements from year to year.

Municipal and county-owned water and wastewater utilities establish rates and charges to meet cash flow requirements. Whereas the PSC's policies are designed to prevent investor-owned water and wastewater utilities from currently recovering the costs associated with plant expansions made to serve future customers from existing customers, government-owned utilities *must* recover all debt service costs from existing customers. As a result, economies of scale are given primary consideration in decisions about plant expansions and the cost of complying with environmental regulation is passed through immediately to current customers.

Public utilities are "owned" by their customers. They are under at least as much pressure as investor-owned utilities to keep rates low. They are also under the same pressures to make the necessary investment to preserve quality of service, comply with environmental regulation and protect the health and safety of customers. And when they incur costs, they must recover those costs in rates in order to meet bond covenants and maintain their credit ratings. The difference is that public utilities are able to recover those costs whereas investor-owned utilities are being prevented from doing so. Although investor-owned utilities also must meet coverage requirements on 100% of its debt, the Commission is only allowing them to recover the "used and useful" portion of debt service.

SECTION VIII

CONCLUSIONS

VIII. Summary of Conclusions

- Environmental regulations have an impact on planning and construction schedules of utilities. Particularly, in recent years regulation has prolonged the time it takes to obtain permits and has increased the associated costs.

- 18 month margin reserve does not allow utilities to recover costs associated with investment required by environmental regulators.

- Imputation of CIAC further reduces cost recovery on prudent, mandated investment.

- The PSC's policies have had an impact on utilities' decisions relating to incremental plant expansion. In some cases utilities have chosen to expand in smaller increments in order to achieve a higher level of cost recovery, rather than in larger increments which would provide economies of scale, but on which cost recovery is unlikely.

- The PSC's proposed rule will result in higher costs to customers in the long and short-term.

- Allowance of AFPI does not adequately compensate utilities for disallowance of full margin reserve.

- Government-owned utilities routinely include the full cost of required plant expansions in rates, without making adjustments for used-and-useful or margin reserve.

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APPENDIX A

MODEL OF UTILITY COST RECOVERY

Scenario WWTP A:
Wastewater treatment plant constructed in 5 year increments

MODEL WASTEWATER UTILITY
DESCRIPTION & ASSUMPTIONS

(1) The purpose of this model is to present the financial impacts of proposed rules related to margin reserve and imputation of CIAC on investor-owned utilities in Florida.

(2) Financial impacts are presented over a 30 year projection period, including an initial 5 year construction period.

(3) Rate revenue for return on investment begins in the 6th year - the first year after plant is placed in service

(4) An assumption is made that rate revenues provide 100% reimbursement of operation and maintenance expenses and rate case expense.

(5) Plant additions are made in 5 year increments. Permitting, design and construction takes 5 years. Plant additions are placed in service six months before demand would otherwise exceed capacity, in accordance with DEP regulations.

(6) Customer growth is even and predictable.

(7) AFPI is calculated as of the beginning of the year the plant is placed in service.
AFPI charge compounds for 5 years and re-starts when new plant comes on-line.

(8) Capital structure includes only long-term debt and equity.

(9) Capital Structure

	Initial	Ratio	Cost Rate	Weighted Cost
Long Term Debt	$14,300,000	60.0%	10.00%	6.00%
Short Term Debt		0.0%	9.00%	0.00%
Customer Deposits		0.0%	6.00%	0.00%
Deferred ITCs		0.0%	10.00%	0.00%
Deferred Income Taxes		0.0%	0.00%	0.00%
Common Equity	9,533,333	40.0%	11.88%	4.75%
Total Capital	$23,833,333	100.00%		10.75%

(10)	AFUDC Rate	10.75%
(11)	Inflation rate on cost of plant expansions	3.0%
(12)	Size of each increment of plant:	5.000 MGD
(13)	Cost per MG of plant capacity	$2.86 /MG of capacity
(14)	Consumption	275 gpd/ERC
(15)	New ERC's per Year	3,636
(16)	Margin Reserve allowed	18 months
(17)	CIAC Imputed?	Yes

MODEL WASTEWATER UTILITY
Key Results
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed

		Rates	Service Availability	AFPI	Total
(1)	Average Cost per ERC / year				
	Five Years	$178	$127	$133	$438
	Ten Years	162	64	150	375
	Fifteen Years	161	42	159	363
	Twenty Years	165	32	164	360
	Twenty-five Years	169	25	166	361
	Total cost per ERC over twenty-five years				$9,020
(2)	Net Present Value of Revenue Requirement:				
	Rates				$24,302,988
	CIAC				11,894,710
	AFPI				2,931,886
	Total				$39,129,584
(3)	Net Present Value of Return to the Utility				
	Rates				$5,440,750
	AFPI				2,931,886
	Total				$8,372,635
(4)	Average Rate of Return on Investment Earned				6.16%
	Maximum Rate of Return on Investment Earned				8.59%

MODEL WASTEWATER UTILITY
LIST OF SCHEDULES

Schedule I

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed
PROJECTED NET INVESTMENT

a	b	c	d	e	f	g	h	i	j	k
YEAR	CWIP	Net Plant	Net CIAC	Net Investment	Rate Base	Allowed Rate of Return	Net Income at Allowed Rate of Rtn	AFPI	Total	Overall Rate of Return
1	753,431	0	0	753,431	0	10.75%	0	0	0	0.00%
2	3,090,588	0	0	3,090,588	0	10.75%	0	0	0	0.00%
3	7,406,292	0	0	7,406,292	0	10.75%	0	0	0	0.00%
4	12,145,973	0	0	12,145,973	0	10.75%	0	0	0	0.00%
5	17,732,817	0	0	17,732,817	0	10.75%	0	0	0	0.00%
6	2,228,136	16,604,256	(2,264,217)	16,568,175	2,251,638	10.75%	242,051	278,673	520,724	3.14%
7	6,084,380	15,912,412	(4,436,017)	17,560,776	3,008,559	10.75%	323,420	806,545	1,129,965	6.43%
8	11,333,217	15,220,568	(6,515,399)	20,038,386	3,581,159	10.75%	384,975	1,337,011	1,721,986	8.59%
9	17,065,716	14,528,724	(8,502,365)	23,092,075	3,969,439	10.75%	426,715	0	426,715	1.85%
10	506,274	33,941,169	(10,396,914)	24,050,530	1,695,004	10.75%	182,213	0	182,213	0.76%
11	2,583,020	32,411,646	(12,199,045)	22,795,621	8,529,181	10.75%	916,887	199,255	1,116,141	4.90%
12	7,053,464	30,882,124	(13,908,760)	24,026,828	8,867,280	10.75%	953,233	574,407	1,527,640	6.36%
13	13,138,305	29,352,601	(15,526,058)	26,964,848	8,991,892	10.75%	966,628	946,991	1,913,619	7.10%
14	19,783,842	27,823,078	(17,050,938)	30,555,982	8,903,016	10.75%	957,074	1,303,429	2,260,504	7.40%
15	586,911	49,599,937	(18,483,402)	31,703,445	7,224,943	10.75%	776,681	0	776,681	2.45%
16	2,994,428	47,099,315	(19,823,449)	30,270,294	16,129,950	10.75%	1,733,970	212,255	1,946,224	6.43%
17	8,176,898	44,598,693	(21,071,078)	31,704,512	15,892,214	10.75%	1,708,413	612,324	2,320,737	7.32%
18	15,230,896	42,098,071	(22,226,291)	35,102,675	15,413,480	10.75%	1,656,949	1,010,599	2,667,548	7.60%
19	22,934,895	39,597,449	(23,289,087)	39,243,258	14,693,746	10.75%	1,579,578	1,392,731	2,972,308	7.57%
20	680,390	64,115,310	(24,259,465)	40,536,235	14,314,502	10.75%	1,538,809	0	1,538,809	3.80%
21	3,471,363	60,488,918	(25,137,427)	38,822,854	24,862,026	10.75%	2,672,668	213,200	2,885,868	7.43%
22	9,479,266	56,862,526	(25,922,971)	40,418,820	23,881,625	10.75%	2,567,275	615,136	3,182,411	7.87%
23	17,656,783	53,236,134	(26,616,099)	44,276,817	22,631,003	10.75%	2,432,833	1,015,380	3,448,213	7.79%
24	26,587,830	49,609,742	(27,216,810)	48,980,762	21,110,158	10.75%	2,269,342	1,399,480	3,668,822	7.49%
25	788,759	77,305,177	(27,725,103)	50,368,833	22,436,984	10.75%	2,411,976	0	2,411,976	4.79%
26	4,024,261	72,373,709	(28,140,980)	48,256,990	34,529,343	10.75%	3,711,904	208,709	3,920,613	8.12%
27	10,989,067	67,442,241	(28,464,439)	49,966,868	32,616,302	10.75%	3,506,252	602,020	4,108,273	8.22%
28	20,469,050	62,510,772	(28,695,482)	54,284,341	30,401,161	10.75%	3,268,125	993,358	4,261,483	7.85%
29	30,822,582	57,579,304	(28,834,107)	59,567,779	27,883,919	10.75%	2,997,521	1,368,552	4,366,073	7.33%
30	914,388	88,958,418	(28,880,316)	60,992,490	31,246,143	10.75%	3,358,960	0	3,358,960	5.51%
			AVG	31,709,310				AVG	1,954,484	6.16%
			NPV	172,256,432			NPV 5,440,750	2,931,886	8,372,635	4.86%

Schedule II

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed
PROJECTED REGULATORY INCOME

a YEAR	b Revenue From Rates	c O&M Expense	d Allowed Depreciation Expense	e Allowed Amortization Expense	f Property Taxes	g Gross Receipts Tax	h Allowed Interest Expense	i Allowed Pretax Profit	j Income Tax	k Allowed Net Profit	l Avg 5 Year Revenue Per ERC
1											
2											
3											
4											
5											
6	950,714	(90,909)	(276,738)	46,209	(172,961)	(42,782)	(135,098)	278,434	(171,481)	106,953	
7	1,334,781	(272,727)	(415,106)	138,626	(172,961)	(60,065)	(180,514)	372,034	(229,127)	142,907	
8	1,683,402	(454,545)	(553,475)	231,043	(172,961)	(75,753)	(214,870)	442,840	(272,735)	170,105	$178
9	1,996,576	(636,364)	(691,844)	323,460	(172,961)	(89,846)	(238,166)	490,855	(302,306)	188,548	
10	2,108,588	(818,182)	(917,714)	415,877	(382,381)	(94,886)	(101,700)	209,601	(129,089)	80,513	
11	3,676,658	(1,000,000)	(1,070,666)	508,294	(382,381)	(165,450)	(511,751)	1,054,705	(649,569)	405,136	
12	3,995,452	(1,181,818)	(1,223,618)	600,711	(382,381)	(179,795)	(532,037)	1,096,514	(675,318)	421,196	
13	4,273,190	(1,363,636)	(1,376,570)	693,128	(382,381)	(192,294)	(539,514)	1,111,923	(684,808)	427,115	$156
14	4,509,871	(1,545,455)	(1,529,523)	785,545	(382,381)	(202,944)	(534,181)	1,100,933	(678,040)	422,893	
15	4,853,589	(1,727,273)	(1,833,789)	877,962	(625,155)	(218,412)	(433,497)	893,425	(550,240)	343,185	
16	6,834,310	(1,909,091)	(2,000,498)	970,379	(625,155)	(307,544)	(967,797)	1,994,604	(1,228,431)	766,173	
17	7,056,768	(2,090,909)	(2,167,206)	1,062,796	(625,155)	(317,555)	(953,533)	1,965,206	(1,210,326)	754,880	
18	7,232,879	(2,272,727)	(2,333,914)	1,155,213	(625,155)	(325,480)	(924,809)	1,906,006	(1,173,866)	732,140	$161
19	7,362,642	(2,454,545)	(2,500,622)	1,247,630	(625,155)	(331,319)	(881,625)	1,817,005	(1,119,052)	697,953	
20	8,097,390	(2,636,364)	(2,901,114)	1,340,047	(906,598)	(364,383)	(858,870)	1,770,109	(1,090,170)	679,939	
21	10,409,267	(2,818,182)	(3,082,433)	1,432,464	(906,598)	(468,418)	(1,491,722)	3,074,399	(1,893,452)	1,180,946	
22	10,504,222	(3,000,000)	(3,263,753)	1,524,881	(906,598)	(472,690)	(1,432,898)	2,953,164	(1,818,787)	1,134,377	
23	10,547,188	(3,181,818)	(3,445,072)	1,617,298	(906,598)	(474,623)	(1,357,860)	2,798,514	(1,723,541)	1,074,973	$169
24	10,538,188	(3,363,636)	(3,626,392)	1,709,715	(906,598)	(474,218)	(1,266,610)	2,610,449	(1,607,716)	1,002,733	
25	11,768,968	(3,545,455)	(4,142,433)	1,802,132	(1,232,867)	(529,604)	(1,346,219)	2,774,522	(1,708,765)	1,065,757	
26	14,394,646	(3,727,273)	(4,339,692)	1,894,549	(1,232,867)	(647,759)	(2,071,761)	4,269,844	(2,629,700)	1,640,144	
27	14,326,912	(3,909,091)	(4,536,951)	1,986,966	(1,232,867)	(644,711)	(1,956,978)	4,033,280	(2,484,006)	1,549,274	
28	14,201,080	(4,090,909)	(4,734,209)	2,079,383	(1,232,867)	(639,049)	(1,824,070)	3,759,359	(2,315,304)	1,444,055	$178
29	14,017,151	(4,272,727)	(4,931,468)	2,171,800	(1,232,867)	(630,772)	(1,673,035)	3,448,081	(2,123,595)	1,324,486	
30	15,837,908	(4,454,545)	(5,585,155)	2,264,217	(1,611,102)	(712,706)	(1,874,769)	3,863,848	(2,379,657)	1,484,192	

Net Present Value of Revenue Requirement $24,302,988

Schedule III

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month Increments / 18 month MR / CIAC Imputed
PROJECTED RATE BASE & ALLOWED RETURN

a	b	c	d	e	f	g	h	i
			Rate Base					
YEAR	Average Net Plant	Used & Useful %	Net Plant U & U	Average Net CIAC	Imputed CIAC	Total	Allowed Rate of Return	Allowed Return on Rate Base
1								
2								
3								
4								
5								
6	$16,950,178	40%	$6,780,071	($1,132,108)	($3,396,325)	$2,251,638	10.75%	242,051
7	16,258,334	60%	9,755,001	(3,350,117)	(3,396,325)	3,008,559	10.75%	323,420
8	15,566,490	80%	12,453,192	(5,475,708)	(3,396,325)	3,581,159	10.75%	384,975
9	14,874,646	100%	14,874,646	(7,508,882)	(3,396,325)	3,969,439	10.75%	426,715
10	24,234,947	60%	14,540,968	(9,449,639)	(3,396,325)	1,695,004	10.75%	182,213
11	33,176,408	70%	23,223,485	(11,297,980)	(3,396,325)	8,529,181	10.75%	916,887
12	31,646,885	80%	25,317,508	(13,053,903)	(3,396,325)	8,867,280	10.75%	953,233
13	30,117,362	90%	27,105,626	(14,717,409)	(3,396,325)	8,991,892	10.75%	966,628
14	28,587,840	100%	28,587,840	(16,288,498)	(3,396,325)	8,903,016	10.75%	957,074
15	38,711,507	73%	28,388,439	(17,767,170)	(3,396,325)	7,224,943	10.75%	776,681
16	48,349,626	80%	38,679,700	(19,153,425)	(3,396,325)	16,129,950	10.75%	1,733,970
17	45,849,004	87%	39,735,803	(20,447,264)	(3,396,325)	15,892,214	10.75%	1,708,413
18	43,348,382	93%	40,458,490	(21,648,685)	(3,396,325)	15,413,480	10.75%	1,656,949
19	40,847,760	100%	40,847,760	(22,757,689)	(3,396,325)	14,693,746	10.75%	1,579,578
20	51,856,379	80%	41,485,104	(23,774,276)	(3,396,325)	14,314,502	10.75%	1,538,809
21	62,302,114	85%	52,956,797	(24,698,446)	(3,396,325)	24,862,026	10.75%	2,672,668
22	58,675,722	90%	52,808,150	(25,530,199)	(3,396,325)	23,881,625	10.75%	2,567,275
23	55,049,330	95%	52,296,863	(26,269,535)	(3,396,325)	22,631,003	10.75%	2,432,833
24	51,422,938	100%	51,422,938	(26,916,454)	(3,396,325)	21,110,158	10.75%	2,269,342
25	63,457,459	84%	53,304,266	(27,470,956)	(3,396,325)	22,436,984	10.75%	2,411,976
26	74,839,443	88%	65,858,710	(27,933,041)	(3,396,325)	34,529,343	10.75%	3,711,904
27	69,907,975	92%	64,315,337	(28,302,710)	(3,396,325)	32,616,302	10.75%	3,506,252
28	64,976,506	96%	62,377,446	(28,579,961)	(3,396,325)	30,401,161	10.75%	3,268,125
29	60,045,038	100%	60,045,038	(28,764,795)	(3,396,325)	27,883,919	10.75%	2,997,521
30	73,268,861	87%	63,499,680	(28,857,212)	(3,396,325)	31,246,143	10.75%	3,358,960
AVG								

Schedule IV

MODEL WASTEWATER UTILITY

Scenario: WWTP - 60 month Increments / 18 month MR / CIAC Imputed

PROJECTED CWIP AND PLANT IN SERVICE BALANCES

a	b	c	d	e	f	g	h	i
	Total				Book Value - Utility Plant in Service			Average
YEAR	Total $ Spent	Total AFUDC	Transfers to Plant	CWIP Balance	Gross	Accum. Deprec	Net	Net Plant
1	715,000	38,431		753,431				
2	2,145,000	192,156		3,090,588				
3	3,803,800	511,904		7,406,292				
4	3,818,100	921,581		12,145,973				
5	4,232,540	1,354,303		17,732,817				
6	1,657,762	133,657	(17,296,100)	2,228,136	17,296,100	(691,844)	16,604,256	16,950,178
7	3,448,145	408,100		6,084,380	17,296,100	(1,383,688)	15,912,412	16,258,334
8	4,417,936	830,901		11,333,217	17,296,100	(2,075,532)	15,220,568	15,566,490
9	4,426,224	1,306,275		17,065,716	17,296,100	(2,767,376)	14,528,724	14,874,646
10	2,693,562	1,688,963	(20,941,968)	506,274	38,238,068	(4,296,899)	33,941,169	24,234,947
11	1,921,800	154,945		2,583,020	38,238,068	(5,826,421)	32,411,646	33,176,408
12	3,997,345	473,099		7,053,464	38,238,068	(7,355,944)	30,882,124	31,646,885
13	5,121,598	963,242		13,138,305	38,238,068	(8,885,467)	29,352,601	30,117,362
14	5,131,207	1,514,331		19,783,842	38,238,068	(10,414,990)	27,823,078	28,587,840
15	3,122,577	1,957,972	(24,277,480)	586,911	62,515,548	(12,915,612)	49,599,937	38,711,507
16	2,227,893	179,624		2,994,428	62,515,548	(15,416,233)	47,099,315	48,349,626
17	4,634,018	548,452		8,176,898	62,515,548	(17,916,855)	44,598,693	45,849,004
18	5,937,336	1,116,662		15,230,896	62,515,548	(20,417,477)	42,098,071	43,348,382
19	5,948,475	1,755,524		22,934,895	62,515,548	(22,918,099)	39,597,449	40,847,760
20	3,619,922	2,269,826	(28,144,253)	680,390	90,659,801	(26,544,491)	64,115,310	51,856,379
21	2,582,739	208,233		3,471,363	90,659,801	(30,170,883)	60,488,918	62,302,114
22	5,372,097	635,806		9,479,266	90,659,801	(33,797,275)	56,862,526	58,675,722
23	6,883,000	1,294,517		17,656,783	90,659,801	(37,423,667)	53,236,134	55,049,330
24	6,895,913	2,035,134		26,587,830	90,659,801	(41,050,060)	49,609,742	51,422,938
25	4,196,482	2,631,350	(32,626,903)	788,759	123,286,705	(45,981,528)	77,305,177	63,457,459
26	2,994,102	241,400		4,024,261	123,286,705	(50,912,996)	72,373,709	74,839,443
27	6,227,733	737,073		10,989,067	123,286,705	(55,844,464)	67,442,241	69,907,975
28	7,979,283	1,500,700		20,469,050	123,286,705	(60,775,932)	62,510,772	64,976,506
29	7,994,254	2,359,278		30,822,582	123,286,705	(65,707,400)	57,579,304	60,045,038
30	4,864,873	3,050,456	(37,823,523)	914,388	161,110,228	(72,151,810)	88,958,418	73,268,861

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month Increments / 18 month MR / CIAC Imputed
PROJECTED CONSTRUCTION

Cost of each increment of plant	$2.86 / MGD capacity
Capacity of each increment of plant	5.000 MGD
Inflation on cost of plant expansions	3.0%
Depreciable Life of Plant	25

All plant expansions are placed in service the first day of the year

Cost of construction for each increment of Plant			
% Complete	$ Spent	AFUDC	Total
5.0%	$715,000	$38,431	$753,431
15.0%	$2,145,000	192,156	2,337,156
26.6%	$3,803,800	511,904	4,315,704
26.7%	$3,818,100	921,581	4,739,681
26.7%	$3,818,100	1,332,027	5,150,127
	$14,300,000	$2,996,100	$17,296,100

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
						CWIP								
YEAR	1st Increment		2nd Increment		3rd Increment		4th Increment		5th Increment		6th Increment		7th Increment	
	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC
1	715,000	38,431												
2	2,145,000	192,156												
3	3,803,800	511,904												
4	3,818,100	921,581												
5	3,818,100	1,332,027	414,440	22,276										
6			1,657,762	133,657										
7			3,448,145	408,100										
8			4,417,936	830,901										
9			4,426,224	1,306,275										
10			2,213,112	1,663,139	480,450	25,824								
11					1,921,800	154,945								
12					3,997,345	473,099								
13					5,121,598	963,242								
14					5,131,207	1,514,331								
15					2,565,604	1,928,034	556,973	29,937						
16							2,227,893	179,624						
17							4,634,018	548,452						
18							5,937,336	1,116,662						
19							5,948,475	1,755,524						
20							2,974,238	2,235,120	645,685	34,706				
21									2,582,739	208,233				
22									5,372,097	635,806				
23									6,883,000	1,294,517				
24									6,895,913	2,035,134				
25									3,447,957	2,591,117	748,526	40,233		
26											2,994,102	241,400		
27											6,227,733	737,073		
28											7,979,283	1,500,700		
29											7,994,254	2,359,278		
30											3,997,127	3,003,815	867,746	46,641

Schedule V

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month Increments / 18 month MR / CIAC Imputed
CALCULATION OF USED & USEFUL %

a YEAR	b Capacity MGD	c ERC's	d Year-end Connections (ERCs)	e Average Connections (ERCs)	f Margin Reserve (ERCs)	g Total ERCs in Rate Base	h Used & Useful %
1							
2							
3							
4							
5							
6	5.000	18,182	3,636	1,818	5,455	7,273	40%
7	5.000	18,182	7,273	5,455	5,455	10,909	60%
8	5.000	18,182	10,909	9,091	5,455	14,545	80%
9	5.000	18,182	14,545	12,727	5,455	18,182	100%
10	10.000	36,364	18,182	16,364	5,455	21,818	60%
11	10.000	36,364	21,818	20,000	5,455	25,455	70%
12	10.000	36,364	25,455	23,636	5,455	29,091	80%
13	10.000	36,364	29,091	27,273	5,455	32,727	90%
14	10.000	36,364	32,727	30,909	5,455	36,364	100%
15	15.000	54,545	36,364	34,545	5,455	40,000	73%
16	15.000	54,545	40,000	38,182	5,455	43,636	80%
17	15.000	54,545	43,636	41,818	5,455	47,273	87%
18	15.000	54,545	47,273	45,455	5,455	50,909	93%
19	15.000	54,545	50,909	49,091	5,455	54,545	100%
20	20.000	72,727	54,545	52,727	5,455	58,182	80%
21	20.000	72,727	58,182	56,364	5,455	61,818	85%
22	20.000	72,727	61,818	60,000	5,455	65,455	90%
23	20.000	72,727	65,455	63,636	5,455	69,091	95%
24	20.000	72,727	69,091	67,273	5,455	72,727	100%
25	25.000	90,909	72,727	70,909	5,455	76,364	84%
26	25.000	90,909	76,364	74,545	5,455	80,000	88%
27	25.000	90,909	80,000	78,182	5,455	83,636	92%
28	25.000	90,909	83,636	81,818	5,455	87,273	96%
29	25.000	90,909	87,273	85,455	5,455	90,909	100%
30	30.000	109,091	90,909	89,091	5,455	94,545	87%

Schedule VI

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF IMPUTED CIAC IN RATE BASE

a	b	c	d	e	f	g	h
	Calculated Imputed CIAC					Limitation	
YEAR	Service Avail. Charge	Margin Res. ERC's	Gross Imputed CIAC	Amortization	Calc. Net Imputed CIAC	MR Plant in RateBase	Imputed CIAC in Rate Base
1							
2							
3							
4							
5							
6	$635.37	5,455	($3,465,638)	$69,313	($3,396,325)	$5,085,053	($3,396,325)
7	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,877,500	(3,396,325)
8	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,669,947	(3,396,325)
9	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,462,394	(3,396,325)
10	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	3,635,242	(3,396,325)
11	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,976,461	(3,396,325)
12	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,747,033	(3,396,325)
13	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,517,604	(3,396,325)
14	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,288,176	(3,396,325)
15	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	3,871,151	(3,396,325)
16	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,834,963	(3,396,325)
17	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,584,900	(3,396,325)
18	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,334,838	(3,396,325)
19	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,084,776	(3,396,325)
20	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	3,889,228	(3,396,325)
21	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,672,659	(3,396,325)
22	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,400,679	(3,396,325)
23	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,128,700	(3,396,325)
24	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	3,856,720	(3,396,325)
25	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	3,807,448	(3,396,325)
26	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,490,367	(3,396,325)
27	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	4,194,478	(3,396,325)
28	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	3,898,590	(3,396,325)
29	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	3,602,702	(3,396,325)
30	$635.37	5,455	(3,465,638)	69,313	(3,396,325)	3,663,443	(3,396,325)

Schedule VII

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month Increments / 18 month MR / CIAC Imputed
PROJECTED CIAC BALANCES

a	b	c	d	e	f	g
	New	CIAC	CIAC - Year End Balance			Average Net
YEAR	ERCs	Collected	Gross	Acc. Amort	Net	CIAC
1		$0				
2		0				
3		0				
4		0				
5		0				
6	3,636	2,310,425	2,310,425	(46,209)	2,264,217	1,132,108
7	3,636	2,310,425	4,620,851	(184,834)	4,436,017	3,350,117
8	3,636	2,310,425	6,931,276	(415,877)	6,515,399	5,475,708
9	3,636	2,310,425	9,241,701	(739,336)	8,502,365	7,508,882
10	3,636	2,310,425	11,552,126	(1,155,213)	10,396,914	9,449,639
11	3,636	2,310,425	13,862,552	(1,663,506)	12,199,045	11,297,980
12	3,636	2,310,425	16,172,977	(2,264,217)	13,908,760	13,053,903
13	3,636	2,310,425	18,483,402	(2,957,344)	15,526,058	14,717,409
14	3,636	2,310,425	20,793,827	(3,742,889)	17,050,938	16,288,498
15	3,636	2,310,425	23,104,253	(4,620,851)	18,483,402	17,767,170
16	3,636	2,310,425	25,414,678	(5,591,229)	19,823,449	19,153,425
17	3,636	2,310,425	27,725,103	(6,654,025)	21,071,078	20,447,264
18	3,636	2,310,425	30,035,528	(7,809,237)	22,226,291	21,648,685
19	3,636	2,310,425	32,345,954	(9,056,867)	23,289,087	22,757,689
20	3,636	2,310,425	34,656,379	(10,396,914)	24,259,465	23,774,276
21	3,636	2,310,425	36,966,804	(11,829,377)	25,137,427	24,698,446
22	3,636	2,310,425	39,277,230	(13,354,258)	25,922,971	25,530,199
23	3,636	2,310,425	41,587,655	(14,971,556)	26,616,099	26,269,535
24	3,636	2,310,425	43,898,080	(16,681,270)	27,216,810	26,916,454
25	3,636	2,310,425	46,208,505	(18,483,402)	27,725,103	27,470,956
26	3,636	2,310,425	48,518,931	(20,377,951)	28,140,980	27,933,041
27	3,636	2,310,425	50,829,356	(22,364,917)	28,464,439	28,302,710
28	3,636	2,310,425	53,139,781	(24,444,299)	28,695,482	28,579,961
29	3,636	2,310,425	55,450,206	(26,616,099)	28,834,107	28,764,795
30	3,636	2,310,425	57,760,632	(28,880,316)	28,880,316	28,857,212

Schedule VIIa

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month Increments / 18 month MR / CIAC Imputed
SERVICE AVAILABILITY CHARGES & CIAC BALANCES

A	Gross Book Value	$17,296,100
B	Land	0
C	Depreciable Assets	$17,296,100
D	Accumulated Depreciation to Date	0
E	Accumulated Depreciation at Design Capacity	3,459,220
F	Net Plant at Design Capacity	13,836,880
G	Transmission & Distribution Mains	0
H	Minimum Level of CIAC	0.00%
I	CIAC to Date	0
J	Accumulated Amortization of CIAC to Date	0
K	Acc. Amort. of CIAC at design capacity	0
L	Future Customers	18,182
M	Composite Depreciation Rate	4.00%
N	Number of Years to Design Capacity	5
O	Existing Service Availability Charge per ERC	0
P	Level of CIAC at Design Capacity	0.00%
Q	Requested Service Availability Charge per ERC	$635.37
R	Level of CIAC at Design Capacity	75.00%
S	Minimum Service Availability Charge per ERC	0
T	Level of CIAC at Design Capacity	0.00%
U	Maximum Service Availability Charge per ERC	$635.37
V	Level of CIAC at Design Capacity	75.00%
W	No. of Customers at Design Capacity	18,182
X	Current No. of Customers	0
Y	Annual Growth	3,636
Z	Depreciation/Amortization multiplier	1848.484848
AA	Number of Years	
AB	Depreciation rate	4.00%

Schedule VIII

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imput
PROJECTED AFPI COLLECTIONS

Projected AFPI Collections:

a YEAR	b New ERCs	c ERC's paying AFPI	d Average AFPI Charge	e AFPI Colected (k * l)
1	0	0	$0.00	$0
2	0	0	0.00	0
3	0	0	0.00	0
4	0	0	0.00	0
5	0	0	0.00	0
6	3,636	3,636	76.64	278,673
7	3,636	3,636	221.80	806,545
8	3,636	3,636	367.68	1,337,011
9	3,636	0	509.12	0
10	3,636	0	646.12	0
11	3,636	3,636	54.80	199,255
12	3,636	3,636	157.96	574,407
13	3,636	3,636	260.42	946,991
14	3,636	3,636	358.44	1,303,429
15	3,636	0	452.02	0
16	3,636	3,636	58.37	212,255
17	3,636	3,636	168.39	612,324
18	3,636	3,636	277.91	1,010,599
19	3,636	3,636	383.00	1,392,731
20	3,636	0	483.65	0
21	3,636	3,636	58.63	213,200
22	3,636	3,636	169.16	615,136
23	3,636	3,636	279.23	1,015,380
24	3,636	3,636	384.86	1,399,480
25	3,636	0	486.04	0
26	3,636	3,636	57.40	208,709
27	3,636	3,636	165.56	602,020
28	3,636	3,636	273.17	993,358
29	3,636	3,636	376.35	1,368,552
30	3,636	0	475.09	0

Schedule VIIIa

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	1st Increment
Cost of Qualifying Asset	$10,170,107
Divided by Future ERCs	10,909
Cost / ERC	$932.27
Rate of Return	10.75%
Annual Return per ERC	$100.22
Annual Reduction in Return per ERC	$4.01
Annual Depreciation Expense	$406,804
Divided by Future ERCs	10,909
Annual Depreciation per ERC	$37.29
Weighted Cost of Equity	4.30%
Divided by Rate of Return	10.75%
Percentage of Equity in Retur	40.00%

	Year 6	Year 7	Year 8	Year 9	Year 10
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	37.29	37.29	37.29	37.29	37.29
Unfunded Exp - Prior Year					
Total Unfunded Expense	37.29	74.58	111.87	149.16	186.45
Unfunded Returns					
Return on Expense - Crnt Yr.	4.01	4.01	4.01	4.01	4.01
Return on Expense - Prior Yr.	0.00	4.01	8.02	12.03	16.04
Return on Plant - Current Yr.	100.22	96.21	92.20	88.19	84.18
Earnings - Prior Year	0.00	100.22	196.43	288.63	376.82
Compound Earnings - Prior Y	0.00	10.77	21.12	31.03	40.51
Total Compound Earnings	104.23	215.22	321.77	423.89	521.56
Year-end AFPI Charge (net of taxes)	141.52	289.80	433.64	573.05	708.01
Jan	11.79	153.84	301.75	445.22	584.26
Feb	23.58	166.19	313.74	456.84	595.50
Mar	35.37	178.55	325.72	468.46	606.75
Apr	47.16	190.91	337.71	480.07	618.00
May	58.95	203.26	349.70	491.69	629.24
Jun	70.74	215.62	361.68	503.31	640.49
Jul	82.53	227.98	373.67	514.93	651.74
Aug	94.32	240.34	385.66	526.54	662.99
Sep	106.11	252.69	397.65	538.16	674.23
Oct	117.90	265.05	409.63	549.78	685.48
Nov	129.69	277.41	421.62	561.39	696.73
Dec	141.48	289.76	433.61	573.01	707.97
AVG	76.64	221.80	367.68	509.12	646.12
New ERC's	3,636	3,636	3,636	3,636	3,636
Limitation	10,909	10,909	10,909	10,909	10,909
# of ERC's to pay AFPI:					
Jan	303	303	303	0	0
Feb	303	303	303	0	0
Mar	303	303	303	0	0
Apr	303	303	303	0	0
May	303	303	303	0	0
Jun	303	303	303	0	0
Jul	303	303	303	0	0
Aug	303	303	303	0	0
Sep	303	303	303	0	0
Oct	303	303	303	0	0
Nov	303	303	303	0	0
Dec	303	303	303	0	0
Total	3,636	3,636	3,636	0	0
Cumulative	3,636	7,273	10,909	10,909	10,909
AFPI Collected:					
Jan	$3,573	$46,617	$91,439	$0	$0
Feb	7,145	50,362	95,072	0	0
Mar	10,718	54,106	98,704	0	0
Apr	14,291	57,851	102,337	0	0
May	17,864	61,595	105,969	0	0
Jun	21,436	65,340	109,601	0	0
Jul	25,009	69,084	113,234	0	0
Aug	28,582	72,829	116,866	0	0
Sep	32,155	76,573	120,499	0	0
Oct	35,727	80,318	124,131	0	0
Nov	39,300	84,062	127,763	0	0
Dec	42,873	87,807	131,396	0	0
Total	278,673	806,545	1,337,011	0	0

Schedule VIIIb

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI
2nd Increment (based on Year 10 figures)

Cost of Qualifying Asset	9,693,979
Divided by Future ERCs	14,545
Cost / ERC	$666.48
Rate of Return	10.75%
Annual Return per ERC	$71.65
Annual Reduction in Return per ERC	$2.87
Annual Depreciation Expense	$387,759
Divided by Future ERCs	14,545
Annual Depreciation per ERC	$26.66
Weighted Cost of Equity	4.30%
Divided by Rate of Return	10.75%
Percentage of Equity in Return	40.00%

	Year 11	Year 12	Year13	Year14	Year 15
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	26.66	26.66	26.66	26.66	26.66
Unfunded Exp - Prior Year					
Total Unfunded Expense	26.66	53.32	79.98	106.64	133.30
Unfunded Returns					
Return on Expense - Crnt Yr.	2.87	2.87	2.87	2.87	2.87
Return on Expense - Prior Yr.	0.00	2.87	5.73	8.60	11.46
Return on Plant - Current Yr.	71.65	67.64	63.63	59.62	55.61
Earnings - Prior Year	0.00	71.65	139.28	202.91	262.53
Compound Earnings - Prior Yr	0.00	7.70	14.97	21.81	28.22
Total Compound Earnings	74.51	152.72	226.48	295.81	360.70
Year-end AFPI Charge (net of taxes)	101.17	206.04	306.46	402.45	493.99
Jan	8.43	109.90	214.39	314.45	410.07
Feb	16.86	118.64	222.76	322.45	417.69
Mar	25.29	127.38	231.13	330.45	425.32
Apr	33.72	136.12	239.50	338.45	432.95
May	42.15	144.85	247.87	346.44	440.58
Jun	50.58	153.59	256.24	354.44	448.21
Jul	59.01	162.33	264.61	362.44	455.84
Aug	67.44	171.07	272.98	370.44	463.47
Sep	75.87	179.81	281.34	378.44	471.10
Oct	84.30	188.55	289.71	386.44	478.73
Nov	92.73	197.29	298.08	394.44	486.35
Dec	101.16	206.03	306.45	402.44	493.98
AVG	54.80	157.96	260.42	358.44	452.02
New ERC's	3,636	3,636	3,636	3,636	3,636
Limitation	14,545	14,545	14,545	14,545	14,545
# of ERC's to pay AFPI:					
Jan	303	303	303	303	0
Feb	303	303	303	303	0
Mar	303	303	303	303	0
Apr	303	303	303	303	0
May	303	303	303	303	0
Jun	303	303	303	303	0
Jul	303	303	303	303	0
Aug	303	303	303	303	0
Sep	303	303	303	303	0
Oct	303	303	303	303	0
Nov	303	303	303	303	0
Dec	303	303	303	303	0
Total	3,636	3,636	3,636	3,636	0
Cumulative	3,636	7,273	10,909	14,545	14,545
AFPI Collected:					
Jan	$2,555	$33,303	$64,968	$95,288	$0
Feb	5,109	35,951	67,504	97,712	0
Mar	7,664	38,599	70,040	100,136	0
Apr	10,218	41,247	72,576	102,559	0
May	12,773	43,895	75,112	104,983	0
Jun	15,327	46,543	77,648	107,407	0
Jul	17,882	49,191	80,184	109,831	0
Aug	20,436	51,839	82,720	112,255	0
Sep	22,991	54,488	85,256	114,679	0
Oct	25,545	57,136	87,792	117,103	0
Nov	28,100	59,784	90,328	119,527	0
Dec	30,655	62,432	92,864	121,950	0
Total	199,255	574,407	946,991	1,303,429	0

Schedule VIIIc

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	3rd Increment	(based on Year 15 figures)
Cost of Qualifying Asset	10,323,069	
Divided by Future ERCs	14,545	
Cost / ERC	$709.73	
Rate of Return	10.75%	
Annual Return per ERC	$76.30	
Annual Reduction in Return per ERC	$3.05	
Annual Depreciation Expense	$412,923	
Divided by Future ERCs	14,545	
Annual Depreciation per ERC	$28.39	
Weighted Cost of Equity	4.30%	
Divided by Rate of Return	10.75%	
Percentage of Equity in Retur	40.00%	

	Year 16	Year 17	Year18	Year19	Year 20
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	28.39	28.39	28.39	28.39	28.39
Unfunded Exp - Prior Year					
Total Unfunded Expense	28.39	56.78	85.17	113.56	141.95
Unfunded Returns					
Return on Expense - Crnt Yr.	3.05	3.05	3.05	3.05	3.05
Return on Expense - Prior Yr.	0.00	3.05	6.10	9.16	12.21
Return on Plant - Current Yr.	76.30	72.29	68.28	64.27	60.26
Earnings - Prior Year	0.00	76.30	148.58	216.86	281.13
Compound Earnings - Prior Y	0.00	8.20	15.97	23.31	30.22
Total Compound Earnings	79.35	162.89	241.99	316.65	386.88
Year-end AFPI Charge (net of taxes)	107.74	219.67	327.16	430.21	528.82
Jan	8.98	117.09	228.65	335.77	438.45
Feb	17.96	126.42	237.61	344.36	446.67
Mar	26.94	135.74	246.56	352.94	454.89
Apr	35.92	145.07	255.52	361.53	463.10
May	44.90	154.40	264.48	370.12	471.32
Jun	53.88	163.73	273.44	378.71	479.54
Jul	62.86	173.05	282.39	387.29	487.76
Aug	71.84	182.38	291.35	395.88	495.97
Sep	80.82	191.71	300.31	404.47	504.19
Oct	89.80	201.04	309.27	413.06	512.41
Nov	98.78	210.36	318.22	421.65	520.63
Dec	107.76	219.69	327.18	430.23	528.84
AVG	58.37	168.39	277.91	383.00	483.65
New ERC's	3,636	3,636	3,636	3,636	3,636
Limitation	14,545	14,545	14,545	14,545	14,545
# of ERC's to pay AFPI:					
Jan	303	303	303	303	0
Feb	303	303	303	303	0
Mar	303	303	303	303	0
Apr	303	303	303	303	0
May	303	303	303	303	0
Jun	303	303	303	303	0
Jul	303	303	303	303	0
Aug	303	303	303	303	0
Sep	303	303	303	303	0
Oct	303	303	303	303	0
Nov	303	303	303	303	0
Dec	303	303	303	303	0
Total	3,636	3,636	3,636	3,636	0
Cumulative	3,636	7,273	10,909	14,545	14,545
AFPI Collected:					
Jan	$2,721	$35,481	$69,287	$101,748	$0
Feb	5,442	38,308	72,002	104,351	0
Mar	8,164	41,134	74,716	106,953	0
Apr	10,885	43,961	77,431	109,555	0
May	13,606	46,787	80,145	112,157	0
Jun	16,327	49,614	82,859	114,760	0
Jul	19,048	52,440	85,574	117,362	0
Aug	21,770	55,267	88,288	119,964	0
Sep	24,491	58,093	91,003	122,567	0
Oct	27,212	60,920	93,717	125,169	0
Nov	29,933	63,746	96,431	127,771	0
Dec	32,655	66,573	99,146	130,374	0
Total	212,255	612,324	1,010,599	1,392,731	0

Schedule VIIId

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI
4th Increment (based on Year 20 figures)

Cost of Qualifying Asset	10,371,276
Divided by Future ERCs	14,545
Cost / ERC	$713.05
Rate of Return	10.75%
Annual Return per ERC	$76.65
Annual Reduction in Return per ERC	$3.07
Annual Depreciation Expense	$414,851
Divided by Future ERCs	14,545
Annual Depreciation per ERC	$28.52
Weighted Cost of Equity	4.30%
Divided by Rate of Return	10.75%
Percentage of Equity in Return	40.00%

	Year 21	Year 22	Year 23	Year 24	Year 25
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	28.52	28.52	28.52	28.52	28.52
Unfunded Exp - Prior Year					
Total Unfunded Expense	28.52	57.04	85.57	114.09	142.61
Unfunded Returns					
Return on Expense - Crnt Yr.	3.07	3.07	3.07	3.07	3.07
Return on Expense - Prior Yr.	0.00	3.07	6.13	9.20	12.26
Return on Plant - Current Yr.	76.65	72.64	68.64	64.63	60.62
Earnings - Prior Year	0.00	76.65	149.30	217.93	282.56
Compound Earnings - Prior Yr	0.00	8.24	16.05	23.43	30.37
Total Compound Earnings	79.72	163.67	243.18	318.25	388.88
Year-end AFPI Charge (net of taxes)	108.24	220.71	328.74	432.34	531.49
Jan	9.02	117.61	229.71	337.38	440.60
Feb	18.04	126.99	238.72	346.01	448.86
Mar	27.06	136.36	247.72	354.64	457.13
Apr	36.08	145.73	256.72	363.28	465.39
May	45.10	155.10	265.73	371.91	473.65
Jun	54.12	164.48	274.73	380.54	481.91
Jul	63.14	173.85	283.73	389.17	490.18
Aug	72.16	183.22	292.73	397.81	498.44
Sep	81.18	192.59	301.74	406.44	506.70
Oct	90.20	201.97	310.74	415.07	514.96
Nov	99.22	211.34	319.74	423.70	523.23
Dec	108.24	220.71	328.74	432.34	531.49
AVG	58.63	169.16	279.23	384.86	486.04
	3,636	3,636	3,636	3,636	3,636
	14,545	14,545	14,545	14,545	14,545
Jan	303	303	303	303	0
Feb	303	303	303	303	0
Mar	303	303	303	303	0
Apr	303	303	303	303	0
May	303	303	303	303	0
Jun	303	303	303	303	0
Jul	303	303	303	303	0.
Aug	303	303	303	303	0
Sep	303	303	303	303	0
Oct	303	303	303	303	0
Nov	303	303	303	303	0
Dec	303	303	303	303	0
Total	3,636	3,636	3,636	3,636	0
Cumulative	3,636	7,273	10,909	14,545	14,545
Jan	$2,733	$35,640	$69,611	$102,235	$0
Feb	5,467	38,480	72,339	104,851	0
Mar	8,200	41,321	75,067	107,467	0
Apr	10,933	44,161	77,795	110,083	0
May	13,667	47,001	80,523	112,699	0
Jun	16,400	49,841	83,251	115,315	0
Jul	19,133	52,681	85,979	117,931	0
Aug	21,867	55,522	88,707	120,547	0
Sep	24,600	58,362	91,435	123,163	0
Oct	27,333	61,202	94,163	125,779	0
Nov	30,067	64,042	96,891	128,395	0
Dec	32,800	66,882	99,619	131,011	0
Total	213,200	615,136	1,015,380	1,399,480	0

MODEL WASTEWATER UTILITY
Scenario: WWTP - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI
5th Increment (based on Year 25 figures)

Cost of Qualifying Asset	10,153,194
Divided by Future ERCs	14,545
Cost / ERC	$698.05
Rate of Return	10.75%
Annual Return per ERC	$75.04
Annual Reduction in Return per ERC	$3.00
Annual Depreciation Expense	$406,128
Divided by Future ERCs	14,545
Annual Depreciation per ERC	$27.92
Weighted Cost of Equity	4.30%
Divided by Rate of Return	10.75%
Percentage of Equity in Retur	40.00%

	Year 26	Year 27	Year 28	Year 29	Year 30
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	27.92	27.92	27.92	27.92	27.92
Unfunded Exp - Prior Year					
Total Unfunded Expense	27.92	55.84	83.77	111.69	139.61
Unfunded Returns					
Return on Expense - Crnt Yr.	3.00	3.00	3.00	3.00	3.00
Return on Expense - Prior Yr.	0.00	3.00	6.00	9.00	12.01
Return on Plant - Current Yr.	75.04	71.03	67.02	63.01	59.01
Earnings - Prior Year	0.00	75.04	146.07	213.10	276.11
Compound Earnings - Prior Y	0.00	8.07	15.70	22.91	29.68
Total Compound Earnings	78.04	160.14	237.80	311.03	379.81
Year-end AFPI Charge (net of taxes)	105.96	215.99	321.57	422.71	519.42
Jan	8.83	115.13	224.78	329.99	430.77
Feb	17.66	124.30	233.58	338.42	438.83
Mar	26.49	133.47	242.38	346.85	446.88
Apr	35.32	142.63	251.18	355.28	454.94
May	44.15	151.80	259.98	363.71	463.00
Jun	52.98	160.97	268.77	372.14	471.06
Jul	61.81	170.14	277.57	380.57	479.12
Aug	70.64	179.31	286.37	388.99	487.18
Sep	79.47	188.48	295.17	397.42	495.24
Oct	88.30	197.65	303.97	405.85	503.30
Nov	97.13	206.81	312.77	414.28	511.35
Dec	105.96	215.98	321.57	422.71	519.41
AVG	57.40	165.56	273.17	376.35	475.09
	3,636	3,636	3,636	3,636	3,636
	14,545	14,545	14,545	14,545	14,545

Jan	303	303	303	303	0
Feb	303	303	303	303	0
Mar	303	303	303	303	0
Apr	303	303	303	303	0
May	303	303	303	303	0
Jun	303	303	303	303	0
Jul	303	303	303	303	0
Aug	303	303	303	303	0
Sep	303	303	303	303	0
Oct	303	303	303	303	0
Nov	303	303	303	303	0
Dec	303	303	303	303	0
Total	3,636	3,636	3,636	3,636	0
Cumulative	3,636	7,273	10,909	14,545	14,545

Jan	$2,676	$34,887	$68,116	$99,998	$0
Feb	5,352	37,666	70,782	102,552	0
Mar	8,027	40,444	73,448	105,107	0
Apr	10,703	43,222	76,114	107,661	0
May	13,379	46,001	78,780	110,215	0
Jun	16,055	48,779	81,447	112,769	0
Jul	18,730	51,558	84,113	115,323	0
Aug	21,406	54,336	86,779	117,877	0
Sep	24,082	57,114	89,445	120,431	0
Oct	26,758	59,893	92,112	122,985	0
Nov	29,433	62,671	94,778	125,540	0
Dec	32,109	65,449	97,444	128,094	0
Total	208,709	602,020	993,358	1,368,552	0

APPENDIX B

MODEL OF UTILITY COST RECOVERY

Scenario WWTP B:
Wastewater treatment plant constructed in 2 ½ year increments

MODEL WASTEWATER UTILITY
DESCRIPTION & ASSUMPTIONS

(1) The purpose of this model is to present the financial impacts of proposed rules related to margin reserve and imputation of CIAC on investor-owned utilities in Florida.

(2) Financial impacts are presented over a 30 year projection period, including an initial 5 year construction period.

(3) Rate revenue for return on investment begins in the 6th year - the first year after plant is placed in service

(4) An assumption is made that rate revenues provide 100% reimbursement of operation and maintenance expenses and rate case expense.

(5) Plant additions are made in 2.5 year increments. Permitting, design and construction takes 5 years. Plant additions are placed in service six months before demand would otherwise exceed capacity, in accordance with DEP regulations.

(6) Customer growth is even and predictable.

(7) AFPI is calculated as of the beginning of the year the plant is placed in service.
AFPI charge compounds for 2.5 years and re-starts when new plant comes on-line.

(8) Capital structure includes only long-term debt and equity.

(9) Capital Structure

	Initial	Ratio	Cost Rate	Weighted Cost
Long Term Debt	$19,500,000	60.0%	10.00%	6.00%
Short Term Debt		0.0%	9.00%	0.00%
Customer Deposits		0.0%	6.00%	0.00%
Deferred ITCs		0.0%	10.00%	0.00%
Deferred Income Taxes		0.0%	0.00%	0.00%
Common Equity	13,000,000	40.0%	11.88%	4.75%
Total Capital	$32,500,000	100.00%		10.75%

(10) AFUDC Rate 10.75%

(11) Inflation on the cost of plant construction is 3.0%

(12) Size of each increment of plant: 2.500 MGD

(13) Cost per MG of plant capacity $3.90 /MG of capacity

(14) Consumption 275 gpd/ERC

(15) New ERC's per Year 3,636

(16) Margin Reserve allowed 18 months

(17) CIAC Imputed? Yes

MODEL WASTEWATER UTILITY
Key Results
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed

(1) Average Cost per ERC / year:

	Rates	Service Availabilty	AFPI	Total
Five years	$194	$185	$21	$378
Ten years	183	92	37	275
Fifteen years	186	62	43	248
Twenty years	193	46	46	240
Twenty-five years	202	37	47	238
Total cost per ERC over twenty-five years				$5,962

(2) Net Present Value of Revenue Requirement

Rates	$28,138,655
CIAC	17,285,480
AFPI	788,292
Total	$46,212,428

(3) Net Present Value of Return to the Utility

Rates	$6,708,917
AFPI	788,292
Total	$7,497,209

(4) Average Rate of Return on Investment Earned 5.30%

Maximum Rate of Return on Investment Earned 7.46%

MODEL WASTEWATER UTILITY
LIST OF SCHEDULES

Schedule I

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
PROJECTED NET INVESTMENT

a	b	c	d	e	f	g	h	i	j	k
	Net Investment				Return on Investment					Overall
YEAR	CWIP	Net Plant	Net CIAC	Total (b+c+d)	Rate Base	Allowed Rate of Return	Allowed Return (f * g)	AFPI	Total (h+j)	Rate of Return (j / e)
1	513,703	0	0	513,703	0		0	0	0	0.00%
2	2,107,219	0	0	2,107,219	0		0	0	0	0.00%
3	5,594,732	0	0	5,594,732	0		0	0	0	0.00%
4	10,516,894	0	0	10,516,894	0		0	0	0	0.00%
5	17,447,831	0	0	17,447,831	0		0	0	0	0.00%
6	10,304,863	11,321,084	(3,290,377)	18,335,570	2,664,799	10.75%	286,466	102,347	388,813	2.12%
7	16,659,418	10,849,372	(6,446,452)	21,062,338	2,926,437	10.75%	314,592	0	314,592	1.49%
8	8,358,983	22,388,198	(9,468,226)	21,278,955	402,124	10.75%	43,228	73,587	116,815	0.55%
9	14,227,329	21,416,047	(12,355,700)	23,287,676	6,054,595	10.75%	650,869	199,736	850,605	3.65%
10	6,555,736	34,151,366	(15,108,872)	25,598,230	3,559,115	10.75%	382,605	0	382,605	1.49%
11	11,946,160	32,608,070	(17,727,743)	26,826,488	9,800,532	10.75%	1,053,557	304,577	1,358,134	5.06%
12	19,312,831	31,064,775	(20,212,313)	30,165,293	9,576,018	10.75%	1,029,422	366,493	1,395,915	4.63%
13	9,690,353	43,444,985	(22,562,582)	30,572,756	7,206,380	10.75%	774,686	82,481	857,167	2.80%
14	16,493,373	41,321,543	(24,778,550)	33,036,367	13,777,133	10.75%	1,481,042	223,878	1,704,919	5.16%
15	7,599,894	55,088,816	(26,860,216)	35,828,494	11,665,610	10.75%	1,254,053	0	1,254,053	3.50%
16	13,848,874	52,303,261	(28,807,582)	37,344,553	18,778,733	10.75%	2,018,714	317,067	2,335,781	6.25%
17	22,388,864	49,517,707	(30,620,647)	41,285,924	17,905,993	10.75%	1,924,894	381,641	2,306,535	5.59%
18	11,233,775	62,873,310	(32,299,410)	41,807,675	16,053,548	10.75%	1,725,756	82,943	1,808,700	4.33%
19	19,120,340	59,415,208	(33,843,873)	44,691,675	23,137,053	10.75%	2,487,233	225,132	2,712,366	6.07%
20	8,810,361	74,378,798	(35,254,034)	47,935,124	21,678,456	10.75%	2,330,434	0	2,330,434	4.86%
21	16,054,640	70,153,124	(36,529,894)	49,677,870	29,373,690	10.75%	3,157,672	314,294	3,471,966	6.99%
22	25,954,830	65,927,451	(37,671,453)	54,210,827	27,649,237	10.75%	2,972,293	378,278	3,350,571	6.18%
23	13,023,024	80,413,804	(38,678,712)	54,758,116	26,401,449	10.75%	2,838,156	80,999	2,919,155	5.33%
24	22,165,715	75,408,463	(39,551,669)	58,022,509	33,860,379	10.75%	3,639,991	219,854	3,859,845	6.65%
25	10,213,623	91,758,913	(40,290,325)	61,682,211	33,154,881	10.75%	3,564,150	0	3,564,150	5.78%
26	18,611,728	85,863,747	(40,894,679)	63,580,796	41,309,678	10.75%	4,440,790	305,426	4,746,217	7.46%
27	30,088,762	79,968,581	(41,364,733)	68,692,610	38,496,081	10.75%	4,138,329	367,523	4,505,852	6.56%
28	15,097,254	95,765,783	(41,700,486)	69,162,550	37,884,320	10.75%	4,072,564	77,814	4,150,379	6.00%
29	25,696,138	88,966,768	(41,901,938)	72,760,969	45,629,499	10.75%	4,905,171	211,210	5,116,381	7.03%
30	11,840,388	106,924,969	(41,969,088)	76,796,268	45,732,289	10.75%	4,916,221	0	4,916,221	6.40%
			AVG	38,152,741				AVG	2,023,939	5.30%
			NPV	193,875,622		NPV	6,708,917	788,292	7,497,209	3.87%

Schedule II

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
PROJECTED REGULATORY INCOME

a YEAR	b Revenue From Rates	c O&M Expense	d Allowed Depreciation Expense	e Allowed Amortization Expense	f Property Taxes	g Gross Receipts Tax	h Allowed Interest Expense	i Allowed Pretax Profit	j Income Tax	k Allowed Net Profit	l Avg 5 Year Revenue Per ERC
1											
2											
3											
4											
5											
6	1,055,988	(90,909)	(377,369)	67,151	(117,928)	(47,519)	(159,888)	329,525	(202,947)	126,578	
7	1,254,848	(272,727)	(471,712)	201,452	(117,928)	(56,468)	(175,586)	361,879	(222,873)	139,006	
8	1,270,581	(454,545)	(777,721)	335,753	(243,038)	(57,176)	(24,127)	49,726	(30,625)	19,101	$194
9	2,610,969	(636,364)	(972,151)	470,054	(243,038)	(117,494)	(363,276)	748,702	(461,108)	287,593	
10	2,605,182	(818,182)	(1,234,636)	604,355	(385,824)	(117,233)	(213,547)	440,114	(271,057)	169,058	
11	4,070,709	(1,000,000)	(1,440,409)	738,656	(385,824)	(183,182)	(588,032)	1,211,918	(746,393)	465,525	
12	4,185,023	(1,181,818)	(1,543,295)	872,957	(385,824)	(188,326)	(574,561)	1,184,155	(729,294)	454,861	
13	4,316,071	(1,363,636)	(1,911,097)	1,007,258	(530,860)	(194,223)	(432,383)	891,129	(548,826)	342,303	$179
14	5,851,815	(1,545,455)	(2,123,442)	1,141,559	(530,860)	(263,332)	(826,628)	1,703,658	(1,049,245)	654,414	
15	6,012,122	(1,727,273)	(2,451,288)	1,275,860	(696,389)	(270,545)	(699,937)	1,442,551	(888,434)	554,116	
16	7,663,165	(1,909,091)	(2,674,132)	1,410,161	(696,389)	(344,842)	(1,126,724)	2,322,148	(1,430,158)	891,990	
17	7,661,755	(2,090,909)	(2,785,555)	1,544,462	(696,389)	(344,779)	(1,074,360)	2,214,227	(1,363,692)	850,535	
18	7,994,158	(2,272,727)	(3,227,563)	1,678,764	(864,526)	(359,737)	(963,213)	1,985,156	(1,222,613)	762,544	$189
19	9,647,564	(2,454,545)	(3,458,103)	1,813,065	(864,526)	(434,140)	(1,388,223)	2,861,091	(1,762,081)	1,099,010	
20	10,042,220	(2,636,364)	(3,863,473)	1,947,366	(1,056,418)	(451,900)	(1,300,707)	2,680,723	(1,650,997)	1,029,727	
21	11,824,711	(2,818,182)	(4,104,940)	2,081,667	(1,056,418)	(532,112)	(1,762,421)	3,632,304	(2,237,054)	1,395,250	
22	11,669,255	(3,000,000)	(4,225,673)	2,215,968	(1,056,418)	(525,116)	(1,658,954)	3,419,061	(2,105,722)	1,313,339	
23	12,237,494	(3,181,818)	(4,755,074)	2,350,269	(1,251,335)	(550,687)	(1,584,087)	3,264,761	(2,010,692)	1,254,069	$202
24	13,983,755	(3,363,636)	(5,005,341)	2,484,570	(1,251,335)	(629,269)	(2,031,623)	4,187,121	(2,578,753)	1,608,368	
25	14,650,997	(3,545,455)	(5,502,155)	2,618,871	(1,473,791)	(659,295)	(1,989,293)	4,099,880	(2,525,023)	1,574,857	
26	16,543,376	(3,727,273)	(5,764,162)	2,753,172	(1,473,791)	(744,452)	(2,478,581)	5,108,289	(3,146,079)	1,962,210	
27	16,189,219	(3,909,091)	(5,895,166)	2,887,473	(1,473,791)	(728,515)	(2,309,765)	4,760,364	(2,931,800)	1,828,564	
28	17,019,598	(4,090,909)	(6,527,054)	3,021,774	(1,699,754)	(765,882)	(2,273,059)	4,684,715	(2,885,210)	1,799,505	$216
29	18,843,624	(4,272,727)	(6,799,014)	3,156,075	(1,699,754)	(847,963)	(2,737,770)	5,642,471	(3,475,070)	2,167,401	
30	19,816,097	(4,454,545)	(7,403,443)	3,290,377	(1,957,641)	(891,724)	(2,743,937)	5,655,182	(3,482,898)	2,172,284	

Net Present Value of Revenue Requirement $28,138,655

Schedule III

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED RATE BASE & ALLOWED RETURN

a	b	c	d	e	f	g	h	i
			Rate Base					
YEAR	Average Net Plant	Used & Useful %	Net Plant U & U	Average Net CIAC	Imputed CIAC	Total	Allowed Rate of Return	Allowed Return on Rate Base
1								
2								
3								
4								
5								
6	$11,556,940	80%	$9,245,552	($1,645,188)	($4,935,565)	$2,664,799	10.75%	286,466
7	11,085,228	100%	11,085,228	(4,868,414)	(3,290,377)	2,926,437	10.75%	314,592
8	16,618,785	80%	13,295,028	(7,957,339)	(4,935,565)	402,124	10.75%	43,228
9	21,902,123	100%	21,902,123	(10,911,963)	(4,935,565)	6,054,595	10.75%	650,869
10	27,783,706	80%	22,226,965	(13,732,286)	(4,935,565)	3,559,115	10.75%	382,605
11	33,379,718	93%	31,154,404	(16,418,307)	(4,935,565)	9,800,532	10.75%	1,053,557
12	31,836,423	100%	31,836,423	(18,970,028)	(3,290,377)	9,576,018	10.75%	1,029,422
13	37,254,880	90%	33,529,392	(21,387,447)	(4,935,565)	7,206,380	10.75%	774,686
14	42,383,264	100%	42,383,264	(23,670,566)	(4,935,565)	13,777,133	10.75%	1,481,042
15	48,205,179	88%	42,420,558	(25,819,383)	(4,935,565)	11,665,610	10.75%	1,254,053
16	53,696,038	96%	51,548,197	(27,833,899)	(4,935,565)	18,778,733	10.75%	2,018,714
17	50,910,484	100%	50,910,484	(29,714,114)	(3,290,377)	17,905,993	10.75%	1,924,894
18	56,195,509	93%	52,449,141	(31,460,028)	(4,935,565)	16,053,548	10.75%	1,725,756
19	61,144,259	100%	61,144,259	(33,071,641)	(4,935,565)	23,137,053	10.75%	2,487,233
20	66,897,003	91%	61,162,974	(34,548,953)	(4,935,565)	21,678,456	10.75%	2,330,434
21	72,265,961	97%	70,201,219	(35,891,964)	(4,935,565)	29,373,690	10.75%	3,157,672
22	68,040,288	100%	68,040,288	(37,100,674)	(3,290,377)	27,649,237	10.75%	2,972,293
23	73,170,627	95%	69,512,096	(38,175,083)	(4,935,565)	26,401,449	10.75%	2,838,156
24	77,911,133	100%	77,911,133	(39,115,190)	(4,935,565)	33,860,379	10.75%	3,639,991
25	83,583,688	93%	78,011,442	(39,920,997)	(4,935,565)	33,154,881	10.75%	3,564,150
26	88,811,330	98%	86,837,745	(40,592,502)	(4,935,565)	41,309,678	10.75%	4,440,790
27	82,916,164	100%	82,916,164	(41,129,706)	(3,290,377)	38,496,081	10.75%	4,138,329
28	87,867,182	96%	84,352,495	(41,532,610)	(4,935,565)	37,884,320	10.75%	4,072,564
29	92,366,275	100%	92,366,275	(41,801,212)	(4,935,565)	45,629,499	10.75%	4,905,171
30	97,945,868	95%	92,603,367	(41,935,513)	(4,935,565)	45,732,289	10.75%	4,916,221
AVG								

Schedule IV

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED CWIP AND PLANT IN SERVICE BALANCES

a	b	c	d	e	f	g	h	i
	Total				Book Value - Utility Plant in Service			Average
YEAR	Total $ Spent	Total AFUDC	Transfers to Plant	CWIP Balance	Gross	Accum. Deprec	Net	Net Plant
1	487,500	26,203		513,703				
2	1,462,500	131,016		2,107,219				
3	3,110,689	376,825		5,594,732				
4	4,154,816	767,345		10,516,894				
5	5,637,267	1,293,670		17,447,831				
6	3,892,080	757,747	(11,792,796)	10,304,863	11,792,796	(471,712)	11,321,084	11,556,940
7	5,112,796	1,241,759		16,659,418	11,792,796	(943,424)	10,849,372	11,085,228
8	3,611,792	598,750	(12,510,977)	8,358,983	24,303,773	(1,915,575)	22,388,198	16,618,785
9	4,816,571	1,051,775		14,227,329	24,303,773	(2,887,725)	21,416,047	21,902,123
10	5,026,198	1,580,824	(14,278,614)	6,555,736	38,582,387	(4,431,021)	34,151,366	27,783,706
11	4,511,988	878,437		11,946,160	38,582,387	(5,974,316)	32,608,070	33,379,718
12	5,927,132	1,439,539		19,312,831	38,582,387	(7,517,612)	31,064,775	31,836,423
13	4,187,057	694,116	(14,503,651)	9,690,353	53,086,038	(9,641,053)	43,444,985	37,254,880
14	5,583,726	1,219,295		16,493,373	53,086,038	(11,764,495)	41,321,543	42,383,264
15	5,826,741	1,832,608	(16,552,827)	7,599,894	69,638,865	(14,550,050)	55,088,816	48,205,179
16	5,230,630	1,018,349		13,848,874	69,638,865	(17,335,604)	52,303,261	53,696,038
17	6,871,170	1,668,821		22,388,864	69,638,865	(20,121,159)	49,517,707	50,910,484
18	4,853,947	804,670	(16,813,707)	11,233,775	86,452,572	(23,579,262)	62,873,310	56,195,509
19	6,473,068	1,413,497		19,120,340	86,452,572	(27,037,365)	59,415,208	61,144,259
20	6,754,789	2,124,495	(19,189,264)	8,810,361	105,641,836	(31,263,038)	74,378,798	66,897,003
21	6,063,734	1,180,546		16,054,640	105,641,836	(35,488,711)	70,153,124	72,265,961
22	7,965,569	1,934,621		25,954,830	105,641,836	(39,714,385)	65,927,451	68,040,288
23	5,627,055	932,833	(19,491,694)	13,023,024	125,133,530	(44,719,726)	80,413,804	73,170,627
24	7,504,060	1,638,631		22,165,715	125,133,530	(49,725,067)	75,408,463	77,911,133
25	7,830,652	2,462,872	(22,245,616)	10,213,623	147,379,146	(55,620,233)	91,758,913	83,583,688
26	7,029,530	1,368,576		18,611,728	147,379,146	(61,515,399)	85,863,747	88,811,330
27	9,234,278	2,242,756		30,088,762	147,379,146	(67,410,565)	79,968,581	82,916,164
28	6,523,299	1,081,409	(22,596,216)	15,097,254	169,975,362	(74,209,579)	95,765,783	87,867,182
29	8,699,263	1,899,622		25,696,138	169,975,362	(81,008,594)	88,966,768	92,366,275
30	9,077,872	2,855,143	(25,788,766)	11,840,388	195,764,127	(88,839,159)	106,924,969	97,945,868

Schedule IVa

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED CONSTRUCTION

Cost of each increment of plant	$3.90 / MGD capacity
Inflation rate	3.0%
Capacity of each increment of plant	2.500 MGD
Depreciable Life of Plant	25

All plant expansions are placed in service six months before demand would otherwise exceed capacity.

Cost of construction for each increment of Plant				
Year	% Complete	$ Spent	AFUDC	Total
1	5.0%	$487,500	$26,203	$513,703
2	15.0%	$1,462,500	131,016	1,593,516
3	26.6%	$2,593,500	349,026	2,942,526
4	26.7%	$2,603,250	628,351	3,231,601
5	26.7%	$2,603,250	908,200	3,511,450
Total	100.0%	$9,750,000	$2,042,796	$11,792,796

	a	b	c	d	e	f	g	h	i	j	k	l
	CWIP											
YEAR	1st Increment		2nd Increment		3rd Increment		4th Increment		5th Increment		6th Increment	
	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC
1	487,500	26,203										
2	1,462,500	131,016										
3	2,593,500	349,026	517,189	27,799								
4	2,603,250	628,351	1,551,566	138,994								
5	2,603,250	908,200	2,751,444	370,281	282,573	15,188						
6			2,761,788	666,618	1,130,292	91,130						
7			2,761,788	963,510	2,351,008	278,250						
8					3,012,229	566,524	599,564	32,227				
9					3,017,880	890,642	1,798,691	161,133				
10					1,508,940	1,133,959	3,189,678	429,257	327,580	17,607		
11							3,201,669	772,792	1,310,318	105,644		
12							3,201,669	1,116,972	2,725,462	322,568		
13									3,491,999	656,756	695,058	37,359
14									3,498,550	1,032,498	2,085,175	186,797
15									1,749,275	1,314,569	3,697,711	497,627
16											3,711,612	895,878
17											3,711,612	1,294,876
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
Total		11,792,796		12,510,977		14,278,614		14,503,651		16,552,827		16,813,707

Schedule IVb

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED CONSTRUCTION

a	b	c	d	e	f	g	h	i	j	k	l	m	o
7th Increment		8th Increment		9th Increment		10th Increment		11th Increment		12th Increment		13th Increment	
$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC
379,755	20,412												
1,519,018	122,471												
3,159,558	373,944												
4,048,184	761,360	805,763	43,310										
4,055,779	1,196,948	2,417,290	216,549										
2,027,889	1,523,946	4,286,660	576,886	440,240	23,663								
		4,302,776	1,038,568	1,760,958	141,977								
		4,302,776	1,501,117	3,662,794	433,504								
				4,692,954	882,625	934,100	50,208						
				4,701,759	1,387,591	2,802,301	251,039						
				2,350,880	1,766,671	4,969,414	668,769	510,358	27,432				
						4,988,096	1,203,985	2,041,433	164,591				
						4,988,096	1,740,206	4,246,182	502,550				
								5,440,420	1,023,205	1,082,878	58,205		
								5,450,627	1,608,599	3,248,635	291,024		
								2,725,314	2,048,055	5,760,913	775,287	591,645	31,801
	19,189,264		19,491,694		22,245,616		22,596,216		25,788,766		11,216,942		623,446

Schedule V

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month Increments / 18 month MR / CIAC Imputed
CALCULATION OF USED & USEFUL %

a YEAR	b Year-end Capacity MGD	c ERC's	d Year-end Connections (ERCs)	e Average Connections (ERCs)	f Margin Reserve (ERCs)	g Total ERCs in Rate Base	h Used & Useful %
1							
2							
3							
4							
5							
6	2.500	9,091	3,636	1,818	5,455	7,273	80%
7	2.500	9,091	7,273	5,455	3,636	9,091	100%
8	5.000	18,182	10,909	9,091	5,455	14,545	80%
9	5.000	18,182	14,545	12,727	5,455	18,182	100%
10	7.500	27,273	18,182	16,364	5,455	21,818	80%
11	7.500	27,273	21,818	20,000	5,455	25,455	93%
12	7.500	27,273	25,455	23,636	3,636	27,273	100%
13	10.000	36,364	29,091	27,273	5,455	32,727	90%
14	10.000	36,364	32,727	30,909	5,455	36,364	100%
15	12.500	45,455	36,364	34,545	5,455	40,000	88%
16	12.500	45,455	40,000	38,182	5,455	43,636	96%
17	12.500	45,455	43,636	41,818	3,636	45,455	100%
18	15.000	54,545	47,273	45,455	5,455	50,909	93%
19	15.000	54,545	50,909	49,091	5,455	54,545	100%
20	17.500	63,636	54,545	52,727	5,455	58,182	91%
21	17.500	63,636	58,182	56,364	5,455	61,818	97%
22	17.500	63,636	61,818	60,000	3,636	63,636	100%
23	20.000	72,727	65,455	63,636	5,455	69,091	95%
24	20.000	72,727	69,091	67,273	5,455	72,727	100%
25	22.500	81,818	72,727	70,909	5,455	76,364	93%
26	22.500	81,818	76,364	74,545	5,455	80,000	98%
27	22.500	81,818	80,000	78,182	3,636	81,818	100%
28	25.000	90,909	83,636	81,818	5,455	87,273	96%
29	25.000	90,909	87,273	85,455	5,455	90,909	100%
30	27.500	100,000	90,909	89,091	5,455	94,545	95%

Schedule VI

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month Increments / 18 month MR / CIAC Imputed
CALCULATION OF IMPUTED CIAC IN RATE BASE

a	b	c	d	e	f	g	h
	Calculated Imputed CIAC					Limitation	
YEAR	Service Avail. Charge	Margin Res. ERC's	Gross Imputed CIAC	Amortization	Calc. Net Imputed CIAC	MR Plant in RateBase	Imputed CIAC in Rate Base
1							
2							
3							
4							
5							
6	$923.32	5,455	($5,036,291)	$100,726	($4,935,565)	$6,934,164	($4,935,565)
7	$923.32	3,636	(3,357,527)	67,151	(3,290,377)	4,434,091	(3,290,377)
8	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	4,985,635	(4,935,565)
9	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	6,570,637	(4,935,565)
10	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,556,741	(4,935,565)
11	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	6,675,944	(4,935,565)
12	$923.32	3,636	(3,357,527)	67,151	(3,290,377)	4,244,856	(3,290,377)
13	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,588,232	(4,935,565)
14	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	6,357,490	(4,935,565)
15	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,784,622	(4,935,565)
16	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	6,443,525	(4,935,565)
17	$923.32	3,636	(3,357,527)	67,151	(3,290,377)	4,072,839	(3,290,377)
18	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,619,551	(4,935,565)
19	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	6,114,426	(4,935,565)
20	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,734,029	(4,935,565)
21	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	6,194,225	(4,935,565)
22	$923.32	3,636	(3,357,527)	67,151	(3,290,377)	3,888,016	(3,290,377)
23	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,487,797	(4,935,565)
24	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,843,335	(4,935,565)
25	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,572,246	(4,935,565)
26	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,920,755	(4,935,565)
27	$923.32	3,636	(3,357,527)	67,151	(3,290,377)	3,685,163	(3,290,377)
28	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,272,031	(4,935,565)
29	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,541,977	(4,935,565)
30	$923.32	5,455	(5,036,291)	100,726	(4,935,565)	5,342,502	(4,935,565)

Schedule VII

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
PROJECTED CIAC BALANCES

a	b	c	d	e	f	g
	New	CIAC	CIAC - Year End Balance			Average Net
YEAR	ERCs	Collected	Gross	Acc. Amort	Net	CIAC
1		$0				
2		0				
3		0				
4		0				
5		0				
6	3,636	3,357,527	3,357,527	(67,151)	3,290,377	1,645,188
7	3,636	3,357,527	6,715,054	(268,602)	6,446,452	4,868,414
8	3,636	3,357,527	10,072,581	(604,355)	9,468,226	7,957,339
9	3,636	3,357,527	13,430,108	(1,074,409)	12,355,700	10,911,963
10	3,636	3,357,527	16,787,635	(1,678,764)	15,108,872	13,732,286
11	3,636	3,357,527	20,145,162	(2,417,419)	17,727,743	16,418,307
12	3,636	3,357,527	23,502,689	(3,290,377)	20,212,313	18,970,028
13	3,636	3,357,527	26,860,216	(4,297,635)	22,562,582	21,387,447
14	3,636	3,357,527	30,217,743	(5,439,194)	24,778,550	23,670,566
15	3,636	3,357,527	33,575,270	(6,715,054)	26,860,216	25,819,383
16	3,636	3,357,527	36,932,798	(8,125,215)	28,807,582	27,833,899
17	3,636	3,357,527	40,290,325	(9,669,678)	30,620,647	29,714,114
18	3,636	3,357,527	43,647,852	(11,348,441)	32,299,410	31,460,028
19	3,636	3,357,527	47,005,379	(13,161,506)	33,843,873	33,071,641
20	3,636	3,357,527	50,362,906	(15,108,872)	35,254,034	34,548,953
21	3,636	3,357,527	53,720,433	(17,190,538)	36,529,894	35,891,964
22	3,636	3,357,527	57,077,960	(19,406,506)	37,671,453	37,100,674
23	3,636	3,357,527	60,435,487	(21,756,775)	38,678,712	38,175,083
24	3,636	3,357,527	63,793,014	(24,241,345)	39,551,669	39,115,190
25	3,636	3,357,527	67,150,541	(26,860,216)	40,290,325	39,920,997
26	3,636	3,357,527	70,508,068	(29,613,389)	40,894,679	40,592,502
27	3,636	3,357,527	73,865,595	(32,500,862)	41,364,733	41,129,706
28	3,636	3,357,527	77,223,122	(35,522,636)	41,700,486	41,532,610
29	3,636	3,357,527	80,580,649	(38,678,712)	41,901,938	41,801,212
30	3,636	3,357,527	83,938,176	(41,969,088)	41,969,088	41,935,513

Schedule VIIa

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF SERVICE AVAILABILITY CHARGES

A	Gross Book Value	$11,792,796
B	Land	0
C	Depreciable Assets	$11,792,796
D	Accumulated Depreciation to Date	0
E	Accumulated Depreciation at Design Capacity	1,179,280
F	Net Plant at Design Capacity	10,613,516
G	Transmission & Distribution Mains	0
H	Minimum Level of CIAC	0.00%
I	CIAC to Date	0
J	Accumulated Amortization of CIAC to Date	0
K	Acc. Amort. of CIAC at design capacity	0
L	Future Customers	9,091
M	Composite Depreciation Rate	4.00%
N	Number of Years to Design Capacity	2.5
O	Existing Service Availability Charge per ERC	0
P	Level of CIAC at Design Capacity	0.00%
Q	Requested Service Availability Charge per ERC	$923.32
R	Level of CIAC at Design Capacity	75.00%
S	Minimum Service Availability Charge per ERC	0
T	Level of CIAC at Design Capacity	0.00%
U	Maximum Service Availability Charge per ERC	$923.32
V	Level of CIAC at Design Capacity	75.00%
W	No. of Customers at Design Capacity	0
X	Current No. of Customers	0
Y	Annual Growth	3,636
Z	Depreciation/Amortization multiplier	469.696970
AA	Number of Years	
AB	Depreciation rate	4.00%

Schedule VIII

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month Increments / 18 month MR / CIAC Imputed
Projected AFPI Collections

a YEAR	b New ERC's	c ERC's paying AFPI	d Avg AFPI	e AFPI Colected (k * l)
1	0	0	0.00	$0
2	0	0	0.00	0
3	0	0	0.00	0
4	0	0	0.00	0
5	0	0	0.00	0
6	3,636	1,818	56.29	102,347
7	3,636	0	0.00	0
8	3,636	1,818	40.47	73,587
9	3,636	1,818	109.85	199,736
10	3,636	0	0.00	0
11	3,636	3,636	83.76	304,577
12	3,636	1,818	201.57	366,493
13	3,636	1,818	45.36	82,481
14	3,636	1,818	123.13	223,878
15	3,636	0	0.00	0
16	3,636	3,636	87.19	317,067
17	3,636	1,818	209.90	381,641
18	3,636	1,818	45.62	82,943
19	3,636	1,818	123.82	225,132
20	3,636	0	0.00	0
21	3,636	3,636	86.43	314,294
22	3,636	1,818	208.05	378,278
23	3,636	1,818	44.55	80,999
24	3,636	1,818	120.92	219,854
25	3,636	0	0.00	0
26	3,636	3,636	83.99	305,426
27	3,636	1,818	202.14	367,523
28	3,636	1,818	42.80	77,814
29	3,636	1,818	116.17	211,210
30	3,636	0	0.00	0

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	1st Increment	2nd Increment (based on Year 8 figures)
Cost of Qualifying Asset	$2,311,388	$3,323,757
Divided by Future ERCs	1,818	3,636
Cost / ERC	$1,271.39	$914.12
Rate of Return	10.75%	10.75%
Annual Return per ERC	$136.67	$98.27
Annual Reduction in Return per ERC	$5.47	$3.93
Annual Depreciation Expense	$92,456	$132,950
Divided by Future ERCs	1,818	3,636
Annual Depreciation per ERC	$50.86	$36.56
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Return	40.00%	40.00%

	1st Increment			2nd Increment		
	Year 6	Year 7	Year 8a	Year 8b	Year 9	Year 10
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	50.86	50.86	50.86	36.56	36.56	36.56
Unfunded Exp - Prior Year						
Total Unfunded Expense	50.86	101.71	152.57	36.56	73.13	109.69
Unfunded Returns						
Return on Expense - Crnt Yr.	5.47	5.47	5.47	3.93	3.93	3.93
Return on Expense - Prior Yr.	0.00	5.47	10.93	0.00	3.93	7.86
Return on Plant - Current Yr.	136.67	131.21	125.74	98.27	94.34	90.41
Earnings - Prior Year	0.00	136.67	267.88	0.00	98.27	192.61
Compound Earnings - Prior Yr	0.00	14.69	28.80	0.00	10.56	20.71
Total Compound Earnings	142.14	293.51	438.82	102.20	211.03	315.51
Year-end AFPI Charge (net of taxes)	193.00	395.22	591.39	138.76	284.16	425.21
Jan	16.08	209.85	411.57		80.95	223.58
Feb	32.17	226.70	427.91		92.51	235.70
Mar	48.25	243.55	444.26		104.07	247.81
Apr	64.33	260.40	460.61		115.64	259.93
May	80.42	277.26	476.96		127.20	272.04
Jun	96.50	294.11	493.30		138.76	284.16
Jul	112.58	310.96		11.56	150.88	295.92
Aug	128.66	327.81		23.13	163.00	307.67
Sep	144.75	344.66		34.69	175.11	319.42
Oct	160.83	361.52		46.25	187.23	331.18
Nov	176.91	378.37		57.82	199.35	342.93
Dec	193.00	395.22		69.38	211.46	354.68
AVG	104.54	302.53	>>>>>	246.45	145.51	289.58
New ERC's	3,636	3,636	1,818	1,818	3,636	3,636
Limitation	1,818	1,818	1,818	3,636	3,636	3,636
# of ERC's to pay AFPI:						
Jan	303	0	0	0	303	0
Feb	303	0	0	0	303	0
Mar	303	0	0	0	303	0
Apr	303	0	0	0	303	0
May	303	0	0	0	303	0
Jun	303	0	0	0	303	0
Jul	0	0	0	303	0	0
Aug	0	0	0	303	0	0
Sep	0	0	0	303	0	0
Oct	0	0	0	303	0	0
Nov	0	0	0	303	0	0
Dec	0	0	0	303	0	0
Total	1,818	0	0	1,818	1,818	0
Cumulative	1,818	1,818	1,818	1,818	3,636	3,636
AFPI Collected:						
Jan	$4,874	$0	$0	$0	$24,529	$0
Feb	9,747	0	0	0	28,033	0
Mar	14,621	0	0	0	31,537	0
Apr	19,495	0	0	0	35,041	0
May	24,368	0	0	0	38,546	0
Jun	29,242	0	0	0	42,050	0
Jul	0	0	0	3,504	0	0
Aug	0	0	0	7,008	0	0
Sep	0	0	0	10,512	0	0
Oct	0	0	0	14,017	0	0
Nov	0	0	0	17,521	0	0
Dec	0	0	0	21,025	0	0
Total	102,347	0	0	73,587	199,736	0

Schedule VIIIb

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	3rd Increment (based on Year 10 figures)	4th Increment (based on Year 13 figures)
Cost of Qualifying Asset	$5,556,741	$3,725,488
Divided by Future ERCs	5,455	3,636
Cost / ERC	$1,018.65	$1,024.61
Rate of Return	10.75%	10.75%
Annual Return per ERC	$109.50	$110.15
Annual Reduction in Return per ERC	$4.38	$4.41
Annual Depreciation Expense	$222,270	$149,020
Divided by Future ERCs	5,455	3,636
Annual Depreciation per ERC	$40.75	$40.98
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Retur	40.00%	40.00%

	3rd Increment			4th Increment		
	Year 11	Year12	Year13a	Year 13b	Year 14	Year 15
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	40.75	40.75	40.75	40.98	40.98	40.98
Unfunded Exp - Prior Year						
Total Unfunded Expense	40.75	81.49	122.24	40.98	81.97	122.95
Unfunded Returns						
Return on Expense - Cmt Yr.	4.38	4.38	4.38	4.41	4.41	4.41
Return on Expense - Prior Yr.	0.00	4.38	8.76	0.00	4.41	8.81
Return on Plant - Current Yr.	109.50	104.04	98.57	110.15	105.74	101.33
Earnings - Prior Year	0.00	109.50	213.54	0.00	110.15	215.89
Compound Earnings - Prior Y	0.00	11.77	22.96	0.00	11.84	23.21
Total Compound Earnings	113.89	234.08	348.21	114.55	236.54	353.64
Year-end AFPI Charge (net of taxes)	154.63	315.57	470.45	155.54	318.51	476.60
Jan	12.89	168.04	328.47		90.73	250.60
Feb	25.77	181.45	341.38		103.69	264.18
Mar	38.66	194.87	354.29		116.65	277.76
Apr	51.54	208.28	367.19		129.61	291.35
May	64.43	221.69	380.10		142.57	304.93
Jun	77.32	235.10	393.01		155.54	318.51
Jul	90.20	248.51		12.96	169.12	331.68
Aug	103.09	261.92		25.92	182.70	344.86
Sep	115.97	275.33		38.88	196.28	358.03
Oct	128.86	288.74		51.85	209.86	371.20
Nov	141.75	302.16		64.81	223.44	384.38
Dec	154.63	315.57		77.77	237.02	397.55
AVG	83.76	241.80	>>>>>	203.05	163.10	324.59
New ERC's	3,636	3,636	1,818	1,818	3,636	3,636
Limitation	5,455	5,455	5,455	3,636	3,636	3,636
# of ERC's to pay AFPI:						
Jan	303	303	0	0	303	0
Feb	303	303	0	0	303	0
Mar	303	303	0	0	303	0
Apr	303	303	0	0	303	0
May	303	303	0	0	303	0
Jun	303	303	0	0	303	0
Jul	303	0	0	303	0	0
Aug	303	0	0	303	0	0
Sep	303	0	0	303	0	0
Oct	303	0	0	303	0	0
Nov	303	0	0	303	0	0
Dec	303	0	0	303	0	0
Total	3,636	1,818	0	1,818	1,818	0
Cumulative	3,636	5,455	5,455	1,818	3,636	3,636
AFPI Collected:						
Jan	$3,905	$50,922	$0	$0	$27,494	$0
Feb	7,810	54,986	0	0	31,421	0
Mar	11,714	59,050	0	0	35,349	0
Apr	15,619	63,114	0	0	39,277	0
May	19,524	67,178	0	0	43,204	0
Jun	23,429	71,242	0	0	47,132	0
Jul	27,334	0	0	3,928	0	0
Aug	31,239	0	0	7,855	0	0
Sep	35,143	0	0	11,783	0	0
Oct	39,048	0	0	15,711	0	0
Nov	42,953	0	0	19,638	0	0
Dec	46,858	0	0	23,566	0	0
Total	304,577	366,493	0	82,481	223,878	0

Schedule VIIIc

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	5th Increment (based on Year 15 figures)	6th Increment (based on Year 18 figures)
Cost of Qualifying Asset	$5,784,622	$3,746,367
Divided by Future ERCs	5,455	3,636
Cost / ERC	$1,060.43	$1,030.35
Rate of Return	10.75%	10.75%
Annual Return per ERC	$114.00	$110.76
Annual Reduction in Return per ERC	$4.56	$4.43
Annual Depreciation Expense	$231,385	$149,855
Divided by Future ERCs	5,455	3,636
Annual Depreciation per ERC	$42.42	$41.21
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Return	40.00%	40.00%

	5th Increment			6th Increment		
	Year 16	Year17	Year18a	Year 18b	Year 19	Year 20
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	42.42	42.42	42.42	41.21	41.21	41.21
Unfunded Exp - Prior Year						
Total Unfunded Expense	42.42	84.83	127.25	41.21	82.43	123.64
Unfunded Returns						
Return on Expense - Crnt Yr.	4.56	4.56	4.56	4.43	4.43	4.43
Return on Expense - Prior Yr.	0.00	4.56	9.12	0.00	4.43	8.86
Return on Plant - Current Yr.	114.00	108.53	103.06	110.76	106.33	101.90
Earnings - Prior Year	0.00	114.00	222.52	0.00	110.76	217.10
Compound Earnings - Prior Yr	0.00	12.25	23.92	0.00	11.91	23.34
Total Compound Earnings	118.56	243.90	363.19	115.19	237.86	355.63
Year-end AFPI Charge (net of taxes)	160.97	328.73	490.44	156.41	320.29	479.27
Jan	13.41	174.95	342.21		91.24	252.01
Feb	26.83	188.93	355.68		104.27	265.66
Mar	40.24	202.91	369.16		117.31	279.32
Apr	53.66	216.89	382.63		130.34	292.98
May	67.07	230.87	396.11		143.37	306.63
Jun	80.49	244.85	409.59		156.41	320.29
Jul	93.90	258.83		13.03	170.06	333.54
Aug	107.32	272.81		26.07	183.72	346.79
Sep	120.73	286.79		39.10	197.38	360.04
Oct	134.14	300.77		52.14	211.04	373.28
Nov	147.56	314.75		65.17	224.69	386.53
Dec	160.97	328.73		78.20	238.35	399.78
AVG	87.19	251.84	>>>>>	210.76	164.02	326.40
	3,636	3,636	1,818	1,818	3,636	3,636
	5,455	5,455	5,455	3,636	3,636	3,636
Jan	303	303	0	0	303	0
Feb	303	303	0	0	303	0
Mar	303	303	0	0	303	0
Apr	303	303	0	0	303	0
May	303	303	0	0	303	0
Jun	303	303	0	0	303	0
Jul	303	0	0	303	0	0
Aug	303	0	0	303	0	0
Sep	303	0	0	303	0	0
Oct	303	0	0	303	0	0
Nov	303	0	0	303	0	0
Dec	303	0	0	303	0	0
Total	3,636	1,818	0	1,818	1,818	0
Cumulative	3,636	5,455	5,455	1,818	3,636	3,636
Jan	$4,065	$53,016	$0	$0	$27,648	$0
Feb	8,130	57,252	0	0	31,598	0
Mar	12,195	61,489	0	0	35,547	0
Apr	16,260	65,725	0	0	39,497	0
May	20,325	69,961	0	0	43,447	0
Jun	24,390	74,198	0	0	47,396	0
Jul	28,455	0	0	3,950	0	0
Aug	32,520	0	0	7,899	0	0
Sep	36,585	0	0	11,849	0	0
Oct	40,650	0	0	15,799	0	0
Nov	44,715	0	0	19,748	0	0
Dec	48,780	0	0	23,698	0	0
Total	317,067	381,641	0	82,943	225,132	0

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	7th Increment (based on Year 20 figures)	8th Increment (based on Year 23 figures)
Cost of Qualifying Asset	$5,734,029	$3,658,531
Divided by Future ERCs	5,455	3,636
Cost / ERC	$1,051.15	$1,006.20
Rate of Return	10.75%	10.75%
Annual Return per ERC	$113.00	$108.17
Annual Reduction in Return per ERC	$4.52	$4.33
Annual Depreciation Expense	$229,361	$146,341
Divided by Future ERCs	5,455	3,636
Annual Depreciation per ERC	$42.05	$40.25
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Return	40.00%	40.00%

	7th Increment			8th Increment		
	Year 21	Year 22	Year 23a	Year 23b	Year 24	Year 25
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	42.05	42.05	42.05	40.25	40.25	40.25
Unfunded Exp - Prior Year						
Total Unfunded Expense	42.05	84.09	126.14	40.25	80.50	120.74
Unfunded Returns						
Return on Expense - Crnt Yr.	4.52	4.52	4.52	4.33	4.33	4.33
Return on Expense - Prior Yr.	0.00	4.52	9.04	0.00	4.33	8.65
Return on Plant - Current Yr.	113.00	107.53	102.06	108.17	103.84	99.51
Earnings - Prior Year	0.00	113.00	220.53	0.00	108.17	212.01
Compound Earnings - Prior Yr	0.00	12.15	23.71	0.00	11.63	22.79
Total Compound Earnings	117.52	241.72	359.86	112.49	232.29	347.29
Year-end AFPI Charge (net of taxes)	159.56	325.81	486.00	152.74	312.78	468.03
Jan	13.30	173.42	339.16		89.10	246.10
Feb	26.59	187.27	352.51		101.83	259.44
Mar	39.89	201.13	365.86		114.56	272.77
Apr	53.19	214.98	379.21		127.28	286.11
May	66.49	228.83	392.56		140.01	299.45
Jun	79.78	242.69	405.91		152.74	312.78
Jul	93.08	256.54		12.73	166.08	325.72
Aug	106.38	270.39		25.46	179.41	338.66
Sep	119.67	284.25		38.19	192.75	351.60
Oct	132.97	298.10		50.91	206.09	364.53
Nov	146.27	311.96		63.64	219.42	377.47
Dec	159.56	325.81		76.37	232.76	390.41
AVG	86.43	249.61	>>>>>	208.54	160.17	318.75
	3,636	3,636	1,818	1,818	3,636	3,636
	5,455	5,455	5,455	3,636	3,636	3,636
Jan	303	303	0	0	303	0
Feb	303	303	0	0	303	0
Mar	303	303	0	0	303	0
Apr	303	303	0	0	303	0
May	303	303	0	0	303	0
Jun	303	303	0	0	303	0
Jul	303	0	0	303	0	0
Aug	303	0	0	303	0	0
Sep	303	0	0	303	0	0
Oct	303	0	0	303	0	0
Nov	303	0	0	303	0	0
Dec	303	0	0	303	0	0
Total	3,636	1,818	0	1,818	1,818	0
Cumulative	3,636	5,455	5,455	1,818	3,636	3,636
Jan	$4,029	$52,551	$0	$0	$27,000	$0
Feb	8,059	56,749	0	0	30,857	0
Mar	12,088	60,947	0	0	34,714	0
Apr	16,118	65,145	0	0	38,571	0
May	20,147	69,343	0	0	42,428	0
Jun	24,176	73,542	0	0	46,285	0
Jul	28,206	0	0	3,857	0	0
Aug	32,235	0	0	7,714	0	0
Sep	36,265	0	0	11,571	0	0
Oct	40,294	0	0	15,428	0	0
Nov	44,324	0	0	19,285	0	0
Dec	48,353	0	0	23,143	0	0
Total	314,294	378,278	0	80,999	219,854	0

MODEL WASTEWATER UTILITY
Scenario: WWTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	9th Increment (based on Year 25 figures)	10th Increment (based on Year 28 figures)
Cost of Qualifying Asset	$5,572,246	$3,514,687
Divided by Future ERCs	5,455	3,636
Cost / ERC	$1,021.49	$966.64
Rate of Return	10.75%	10.75%
Annual Return per ERC	$109.81	$103.91
Annual Reduction in Return per ERC	$4.39	$4.16
Annual Depreciation Expense	$222,890	$140,587
Divided by Future ERCs	5,455	3,636
Annual Depreciation per ERC	$40.86	$38.67
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Retur	40.00%	40.00%

	9th Increment			10th Increment		
	Year 26	Year 27	Year 28a	Year 28b	Year 29	Year 30
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	40.86	40.86	40.86	38.67	38.67	38.67
Unfunded Exp - Prior Year						
Total Unfunded Expense	40.86	81.72	122.58	38.67	77.33	116.00
Unfunded Returns						
Return on Expense - Crnt Yr.	4.39	4.39	4.39	4.16	4.16	4.16
Return on Expense - Prior Yr.	0.00	4.39	8.78	0.00	4.16	8.31
Return on Plant - Current Yr.	109.81	104.34	98.88	103.91	99.76	95.60
Earnings - Prior Year	0.00	109.81	214.15	0.00	103.91	203.67
Compound Earnings - Prior Y	0.00	11.80	23.02	0.00	11.17	21.89
Total Compound Earnings	114.20	234.74	349.23	108.07	223.15	333.63
Year-end AFPI Charge (net of taxes)	155.06	316.46	471.81	146.74	300.48	449.63
Jan	12.92	168.51	329.41		85.60	236.42
Feb	25.84	181.96	342.35		97.82	249.23
Mar	38.77	195.41	355.30		110.05	262.05
Apr	51.69	208.86	368.24		122.28	274.86
May	64.61	222.31	381.19		134.51	287.67
Jun	77.53	235.76	394.14		146.74	300.48
Jul	90.45	249.21		12.23	159.55	312.91
Aug	103.38	262.66		24.46	172.36	325.34
Sep	116.30	276.11		36.68	185.17	337.77
Oct	129.22	289.56		48.91	197.99	350.20
Nov	142.14	303.01		61.14	210.80	362.63
Dec	155.06	316.46		73.37	223.61	375.06
AVG	83.99	242.49	>>>>>	202.28	153.87	306.22
	3,636	3,636	1,818	1,818	3,636	3,636
	5,455	5,455	5,455	3,636	3,636	3,636
Jan	303	303	0	0	303	0
Feb	303	303	0	0	303	0
Mar	303	303	0	0	303	0
Apr	303	303	0	0	303	0
May	303	303	0	0	303	0
Jun	303	303	0	0	303	0
Jul	303	0	0	303	0	0
Aug	303	0	0	303	0	0
Sep	303	0	0	303	0	0
Oct	303	0	0	303	0	0
Nov	303	0	0	303	0	0
Dec	303	0	0	303	0	0
Total	3,636	1,818	0	1,818	1,818	0
Cumulative	3,636	5,455	5,455	1,818	3,636	3,636
Jan	$3,916	$51,064	$0	$0	$25,938	$0
Feb	7,831	55,140	0	0	29,643	0
Mar	11,747	59,216	0	0	33,349	0
Apr	15,663	63,292	0	0	37,054	0
May	19,579	67,368	0	0	40,760	0
Jun	23,494	71,443	0	0	44,465	0
Jul	27,410	0	0	3,705	0	0
Aug	31,326	0	0	7,411	0	0
Sep	35,242	0	0	11,116	0	0
Oct	39,157	0	0	14,822	0	0
Nov	43,073	0	0	18,527	0	0
Dec	46,989	0	0	22,233	0	0
Total	305,426	367,523	0	77,814	211,210	0

APPENDIX C

MODEL OF UTILITY COST RECOVERY

Scenario WTP A:
Water treatment plant constructed in 5 year increments

MODEL WATER UTILITY
DESCRIPTION & ASSUMPTIONS

(1) The purpose of this model is to present the financial impacts of proposed rules related to margin reserve and imputation of CIAC on investor-owned utilities in Florida.

(2) Financial impacts are presented over a 30 year projection period, including an initial 5 year construction period.

(3) Rate revenue for return on investment begins in the 6th year - the first year after plant is placed in service

(4) An assumption is made that rate revenues provide 100% reimbursement of operation and maintenance expenses and rate case expense.

(5) Plant additions are made in 5 year increments. Permitting, design and construction takes 5 years. Plant additions are placed in service six months before demand would otherwise exceed capacity.

(6) Customer growth is even and predictable.

(7) AFPI is calculated as of the beginning of the year the plant is placed in service. AFPI charge compounds for 5 years and re-starts when new plant comes on-line.

(8) Capital structure includes only long-term debt and equity.

(9) Capital Structure

	Initial	Ratio	Cost Rate	Weighted Cost
Long Term Debt	$1,900,000	60.0%	10.00%	6.00%
Short Term Debt		0.0%	9.00%	0.00%
Customer Deposits		0.0%	6.00%	0.00%
Deferred ITCs		0.0%	10.00%	0.00%
Deferred Income Taxes		0.0%	0.00%	0.00%
Common Equity	1,266,667	40.0%	11.88%	4.75%
Total Capital	$3,166,667	100.00%		10.75%

(10)	AFUDC Rate	10.75%
(11)	Inflation on the cost of plant construction is	3.0%
(12)	Size of each increment of plant:	1.000 MGD
(13)	Cost per MG of plant capacity	$1.90 /MG of capacity
(14)	Consumption	350 gpd/ERC
(15)	New ERC's per Year	571
(16)	Margin Reserve allowed	18 months
(17)	CIAC Imputed?	Yes

MODEL WATER UTILITY
Key Results
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed

(1) Average Cost per ERC / year:

	Rates	Service Availability	AFPI	Total
Five Years	$158	$107	$113	$378
Ten Years	145	54	127	325
Fifteen Years	144	36	134	315
Twenty Years	147	27	139	313
Twenty-five Years	151	21	140	313
Total cost per ERC over twenty-five years				$7,829

(2) Net Present Value of Revenue Requirement:

Rates	$3,412,068
CIAC	1,580,416
AFPI	389,568
Total	$5,382,053

(3) Net Present Value of Return to the Utility

Rates	$722,897
AFPI	389,568
Total	$1,112,465

(4) Average Rate of Return on Investment Earned 8.59%

Maximum Rate of Return on Investment Earned 6.16%

MODEL WATER UTILITY
LIST OF SCHEDULES

Schedule I

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month Increments / 18 month MR / CIAC Imputed
PROJECTED RETURN ON NET INVESTMENT

a YEAR	b CWIP	c Net Plant	d Net CIAC	e Net Investment	f Rate Base	g Allowed Rate of Return	h Net Income at Allowed Rate of Rtn	i AFPI	j Total	k Overall Rate of Return
1	100,106	0	0	100,106	0	10.75%	0	0	0	0.00%
2	410,638	0	0	410,638	0	10.75%	0	0	0	0.00%
3	984,053	0	0	984,053	0	10.75%	0	0	0	0.00%
4	1,613,801	0	0	1,613,801	0	10.75%	0	0	0	0.00%
5	2,356,109	0	0	2,356,109	0	10.75%	0	0	0	0.00%
6	296,046	2,206,160	(300,840)	2,201,366	299,169	10.75%	32,161	37,031	69,192	3.14%
7	808,414	2,114,237	(589,401)	2,333,250	399,739	10.75%	42,972	107,179	150,151	6.44%
8	1,505,812	2,022,313	(865,682)	2,662,443	475,818	10.75%	51,150	177,671	228,822	8.59%
9	2,267,473	1,930,390	(1,129,685)	3,068,178	527,408	10.75%	56,696	0	56,696	1.85%
10	67,267	4,509,666	(1,381,408)	3,195,525	225,210	10.75%	24,210	0	24,210	0.76%
11	343,198	4,306,443	(1,620,852)	3,028,789	1,133,248	10.75%	121,824	26,483	148,307	4.90%
12	937,174	4,103,219	(1,848,017)	3,192,376	1,178,170	10.75%	126,653	76,331	202,984	6.36%
13	1,745,649	3,899,996	(2,062,903)	3,582,742	1,194,727	10.75%	128,433	125,826	254,259	7.10%
14	2,628,622	3,696,773	(2,265,509)	4,059,886	1,182,918	10.75%	127,164	173,176	300,340	7.40%
15	77,981	6,590,201	(2,455,837)	4,212,346	959,958	10.75%	103,195	0	103,195	2.45%
16	397,861	6,257,951	(2,633,885)	4,021,927	2,143,140	10.75%	230,388	28,191	258,579	6.43%
17	1,086,441	5,925,700	(2,799,654)	4,212,488	2,111,553	10.75%	226,992	81,334	308,326	7.32%
18	2,023,685	5,593,450	(2,953,144)	4,663,992	2,047,945	10.75%	220,154	134,242	354,396	7.60%
19	3,047,294	5,261,199	(3,094,354)	5,214,139	1,952,316	10.75%	209,874	185,006	394,879	7.57%
20	90,402	8,518,817	(3,223,286)	5,385,933	1,901,927	10.75%	204,457	0	204,457	3.80%
21	461,230	8,036,989	(3,339,938)	5,158,281	3,303,346	10.75%	355,110	28,340	383,450	7.43%
22	1,259,483	7,555,161	(3,444,311)	5,370,333	3,173,083	10.75%	341,106	81,750	422,856	7.87%
23	2,346,006	7,073,332	(3,536,405)	5,882,934	3,006,916	10.75%	323,244	134,920	458,163	7.79%
24	3,532,649	6,591,504	(3,616,219)	6,507,933	2,804,846	10.75%	301,521	185,945	487,466	7.49%
25	104,800	10,271,317	(3,683,755)	6,692,362	2,981,138	10.75%	320,472	0	320,472	4.79%
26	534,692	9,616,087	(3,739,011)	6,411,768	4,587,815	10.75%	493,190	27,746	520,936	8.12%
27	1,460,086	8,960,857	(3,781,988)	6,638,955	4,333,635	10.75%	465,866	80,012	545,878	8.22%
28	2,719,664	8,305,627	(3,812,686)	7,212,605	4,039,315	10.75%	434,226	131,999	566,225	7.85%
29	4,095,308	7,650,397	(3,831,105)	7,914,600	3,704,856	10.75%	398,272	181,840	580,112	7.33%
30	121,492	11,819,650	(3,837,245)	8,103,897	4,151,585	10.75%	446,295	0	446,295	5.51%
			AVG	4,213,125				AVG	259,688	6.16%
			NPV	22,887,218		NPV	722,897	389,568	1,112,465	4.86%

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month Increments / 18 month MR / CIAC Imputed
PROJECTED REGULATORY INCOME

a YEAR	b Revenue From Rates	c O&M Expense	d Allowed Depreciation Expense	e Allowed Amortization Expense	f Property Taxes	g Gross Receipts Tax	h Allowed Interest Expense	i Allowed Pretax Profit	j Income Tax	k Allowed Net Profit	l Avg 5 Year Revenue Per ERC
1											
2											
3											
4											
5											
6	128,629	(14,286)	(36,769)	6,140	(22,981)	(5,788)	(17,950)	36,995	(22,784)	14,211	
7	184,281	(42,857)	(55,154)	18,419	(22,981)	(8,293)	(23,984)	49,431	(30,443)	18,988	
8	235,223	(71,429)	(73,539)	30,698	(22,981)	(10,585)	(28,549)	58,839	(36,238)	22,601	$158
9	281,455	(100,000)	(91,923)	42,977	(22,981)	(12,665)	(31,644)	65,218	(40,167)	25,052	
10	300,960	(128,571)	(121,934)	55,256	(50,806)	(13,543)	(13,513)	27,849	(17,152)	10,697	
11	513,927	(157,143)	(142,256)	67,536	(50,806)	(23,127)	(67,995)	140,136	(86,306)	53,829	
12	560,906	(185,714)	(162,579)	79,815	(50,806)	(25,241)	(70,690)	145,691	(89,728)	55,963	
13	602,430	(214,286)	(182,901)	92,094	(50,806)	(27,109)	(71,684)	147,738	(90,989)	56,750	$140
14	638,499	(242,857)	(203,223)	104,373	(50,806)	(28,732)	(70,975)	146,278	(90,089)	56,189	
15	688,789	(271,429)	(243,650)	116,652	(83,063)	(30,996)	(57,597)	118,707	(73,109)	45,598	
16	956,584	(300,000)	(265,800)	128,931	(83,063)	(43,046)	(128,588)	265,017	(163,218)	101,799	
17	990,763	(328,571)	(287,950)	141,211	(83,063)	(44,584)	(126,693)	261,111	(160,813)	100,299	
18	1,018,784	(357,143)	(310,100)	153,490	(83,063)	(45,845)	(122,877)	253,246	(155,968)	97,277	$144
19	1,040,647	(385,714)	(332,250)	165,769	(83,063)	(46,829)	(117,139)	241,420	(148,685)	92,735	
20	1,142,892	(414,286)	(385,463)	178,048	(120,457)	(51,430)	(114,116)	235,189	(144,848)	90,342	
21	1,454,689	(442,857)	(409,554)	190,327	(120,457)	(65,461)	(198,201)	408,487	(251,578)	156,909	
22	1,471,925	(471,429)	(433,645)	202,607	(120,457)	(66,237)	(190,385)	392,378	(241,657)	150,721	
23	1,482,255	(500,000)	(457,737)	214,886	(120,457)	(66,701)	(180,415)	371,831	(229,002)	142,829	$151
24	1,485,681	(528,571)	(481,828)	227,165	(120,457)	(66,856)	(168,291)	346,843	(213,613)	133,230	
25	1,653,833	(557,143)	(550,393)	239,444	(163,808)	(74,422)	(178,868)	368,643	(227,039)	141,604	
26	2,007,321	(585,714)	(576,602)	251,723	(163,808)	(90,329)	(275,269)	567,322	(349,401)	217,921	
27	2,002,943	(614,286)	(602,812)	264,002	(163,808)	(90,132)	(260,018)	535,890	(330,043)	205,848	
28	1,990,846	(642,857)	(629,021)	276,282	(163,808)	(89,588)	(242,359)	499,495	(307,628)	191,867	$159
29	1,971,030	(671,429)	(655,230)	288,561	(163,808)	(88,696)	(222,291)	458,137	(282,156)	175,981	
30	2,217,570	(700,000)	(742,083)	300,840	(214,063)	(99,791)	(249,095)	513,378	(316,178)	197,200	

Net Present Value of Revenue Requirement $3,412,068

Schedule III

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
PROJECTED RATE BASE & ALLOWED RETURN

a	b	c	d	e	f	g	h	i
	Average	Used &	Rate Base				Allowed Rate	Allowed
YEAR	Net Plant	Useful %	Net Plant U & U	Average Net CIAC	Imputed CIAC	Total	of Return	Return on Rate Base
1								
2								
3								
4								
5								
6	$2,252,122	40%	$900,849	($150,420)	($451,260)	$299,169	10.75%	32,161
7	2,160,198	60%	1,296,119	(445,120)	(451,260)	399,739	10.75%	42,972
8	2,068,275	80%	1,654,620	(727,542)	(451,260)	475,818	10.75%	51,150
9	1,976,352	100%	1,976,352	(997,684)	(451,260)	527,408	10.75%	56,696
10	3,220,028	60%	1,932,017	(1,255,546)	(451,260)	225,210	10.75%	24,210
11	4,408,054	70%	3,085,638	(1,501,130)	(451,260)	1,133,248	10.75%	121,824
12	4,204,831	80%	3,363,865	(1,734,435)	(451,260)	1,178,170	10.75%	126,653
13	4,001,608	90%	3,601,447	(1,955,460)	(451,260)	1,194,727	10.75%	128,433
14	3,798,384	100%	3,798,384	(2,164,206)	(451,260)	1,182,918	10.75%	127,164
15	5,143,487	73%	3,771,890	(2,360,673)	(451,260)	959,958	10.75%	103,195
16	6,424,076	80%	5,139,261	(2,544,861)	(451,260)	2,143,140	10.75%	230,388
17	6,091,826	87%	5,279,582	(2,716,769)	(451,260)	2,111,553	10.75%	226,992
18	5,759,575	93%	5,375,604	(2,876,399)	(451,260)	2,047,945	10.75%	220,154
19	5,427,325	100%	5,427,325	(3,023,749)	(451,260)	1,952,316	10.75%	209,874
20	6,890,008	80%	5,512,007	(3,158,820)	(451,260)	1,901,927	10.75%	204,457
21	8,277,903	85%	7,036,218	(3,281,612)	(451,260)	3,303,346	10.75%	355,110
22	7,796,075	90%	7,016,467	(3,392,124)	(451,260)	3,173,083	10.75%	341,106
23	7,314,247	95%	6,948,534	(3,490,358)	(451,260)	3,006,916	10.75%	323,244
24	6,832,418	100%	6,832,418	(3,576,312)	(451,260)	2,804,846	10.75%	301,521
25	8,431,411	84%	7,082,385	(3,649,987)	(451,260)	2,981,138	10.75%	320,472
26	9,943,702	88%	8,750,458	(3,711,383)	(451,260)	4,587,815	10.75%	493,190
27	9,288,472	92%	8,545,394	(3,760,500)	(451,260)	4,333,635	10.75%	465,866
28	8,633,242	96%	8,287,912	(3,797,337)	(451,260)	4,039,315	10.75%	434,226
29	7,978,012	100%	7,978,012	(3,821,896)	(451,260)	3,704,856	10.75%	398,272
30	9,735,024	87%	8,437,020	(3,834,175)	(451,260)	4,151,585	10.75%	446,295
AVG								

Schedule IV

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month Increments / 18 month MR / CIAC Imputed
PROJECTED CWIP AND PLANT IN SERVICE BALANCES

a	b	c	d	e	f	g	h	i
	Total				Book Value - Utility Plant in Service			Average
YEAR	Total $ Spent	Total AFUDC	Transfers to Plant	CWIP Balance	Gross	Accum. Deprec	Net	Net Plant
1	95,000	5,106		100,106				
2	285,000	25,531		410,638				
3	505,400	68,015		984,053				
4	507,300	122,448		1,613,801				
5	562,366	179,942		2,356,109				
6	220,262	17,759	(2,298,083)	296,046	2,298,083	(91,923)	2,206,160	2,252,122
7	458,145	54,223		808,414	2,298,083	(183,847)	2,114,237	2,160,198
8	586,998	110,399		1,505,812	2,298,083	(275,770)	2,022,313	2,068,275
9	588,100	173,561		2,267,473	2,298,083	(367,693)	1,930,390	1,976,352
10	357,886	224,408	(2,782,499)	67,267	5,080,582	(570,917)	4,509,666	3,220,028
11	255,344	20,587		343,198	5,080,582	(774,140)	4,306,443	4,408,054
12	531,116	62,859		937,174	5,080,582	(977,363)	4,103,219	4,204,831
13	680,492	127,983		1,745,649	5,080,582	(1,180,587)	3,899,996	4,001,608
14	681,769	201,205		2,628,622	5,080,582	(1,383,810)	3,696,773	3,798,384
15	414,888	260,150	(3,225,679)	77,981	8,306,262	(1,716,060)	6,590,201	5,143,487
16	296,014	23,866		397,861	8,306,262	(2,048,311)	6,257,951	6,424,076
17	615,709	72,871		1,086,441	8,306,262	(2,380,561)	5,925,700	6,091,826
18	788,877	148,368		2,023,685	8,306,262	(2,712,812)	5,593,450	5,759,575
19	790,357	233,251		3,047,294	8,306,262	(3,045,062)	5,261,199	5,427,325
20	480,969	301,585	(3,739,446)	90,402	12,045,708	(3,526,890)	8,518,817	6,890,008
21	343,161	27,667		461,230	12,045,708	(4,008,719)	8,036,989	8,277,903
22	713,775	84,478		1,259,483	12,045,708	(4,490,547)	7,555,161	7,796,075
23	914,524	171,999		2,346,006	12,045,708	(4,972,375)	7,073,332	7,314,247
24	916,240	270,402		3,532,649	12,045,708	(5,454,204)	6,591,504	6,832,418
25	557,575	349,620	(4,335,043)	104,800	16,380,751	(6,109,434)	10,271,317	8,431,411
26	397,818	32,074		534,692	16,380,751	(6,764,664)	9,616,087	9,943,702
27	827,461	97,933		1,460,086	16,380,751	(7,419,894)	8,960,857	9,288,472
28	1,060,184	199,394		2,719,664	16,380,751	(8,075,124)	8,305,627	8,633,242
29	1,062,174	313,470		4,095,308	16,380,751	(8,730,354)	7,650,397	7,978,012
30	646,382	405,305	(5,025,503)	121,492	21,406,254	(9,586,604)	11,819,650	9,735,024

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month Increments / 18 month MR / CIAC Imputed
PROJECTED CONSTRUCTION

Cost of each increment of plant	$1.90 / MGD capacity
Capacity of each increment of plant	1.000 MGD
Inflation on cost of plant expansions	3.0%
Depreciable Life of Plant	25

All plant expansions are placed in service the first day of the year

Cost of construction for each Increment of Plant			
% Complete	$ Spent	AFUDC	Total
5.0%	$95,000	$5,106	$100,106
15.0%	$285,000	25,531	310,531
26.6%	$505,400	68,015	573,415
26.7%	$507,300	122,448	629,748
26.7%	$507,300	176,983	684,283
	$1,900,000	$398,083	$2,298,083

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
	CWIP													
YEAR	1st Increment		2nd Increment		3rd Increment		4th Increment		5th Increment		6th Increment		7th Increment	
	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC
1	95,000	5,106												
2	285,000	25,531												
3	505,400	68,015												
4	507,300	122,448												
5	507,300	176,983	55,066	2,960										
6			220,262	17,759										
7			458,145	54,223										
8			586,998	110,399										
9			588,100	173,561										
10			294,050	220,977	63,836	3,431								
11					255,344	20,587								
12					531,116	62,859								
13					680,492	127,983								
14					681,769	201,205								
15					340,884	256,172	74,003	3,978						
16							296,014	23,866						
17							615,709	72,871						
18							788,877	148,368						
19							790,357	233,251						
20							395,178	296,974	85,790	4,611				
21									343,161	27,667				
22									713,775	84,478				
23									914,524	171,999				
24									916,240	270,402				
25									458,120	344,274	99,454	5,346		
26											397,818	32,074		
27											827,461	97,933		
28											1,060,184	199,394		
29											1,062,174	313,470		
30											531,087	399,108	115,295	6,197

Schedule V

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF USED & USEFUL %

a YEAR	b Capacity MGD	c ERC's	d Year-end Connections (ERCs)	e Average Connections (ERCs)	f Margin Reserve (ERCs)	g Total ERCs in Rate Base	h Used & Useful %
1							
2							
3							
4							
5							
6	1.000	2,857	571	286	857	1,143	40%
7	1.000	2,857	1,143	857	857	1,714	60%
8	1.000	2,857	1,714	1,429	857	2,286	80%
9	1.000	2,857	2,286	2,000	857	2,857	100%
10	2.000	5,714	2,857	2,571	857	3,429	60%
11	2.000	5,714	3,429	3,143	857	4,000	70%
12	2.000	5,714	4,000	3,714	857	4,571	80%
13	2.000	5,714	4,571	4,286	857	5,143	90%
14	2.000	5,714	5,143	4,857	857	5,714	100%
15	3.000	8,571	5,714	5,429	857	6,286	73%
16	3.000	8,571	6,286	6,000	857	6,857	80%
17	3.000	8,571	6,857	6,571	857	7,429	87%
18	3.000	8,571	7,429	7,143	857	8,000	93%
19	3.000	8,571	8,000	7,714	857	8,571	100%
20	4.000	11,429	8,571	8,286	857	9,143	80%
21	4.000	11,429	9,143	8,857	857	9,714	85%
22	4.000	11,429	9,714	9,429	857	10,286	90%
23	4.000	11,429	10,286	10,000	857	10,857	95%
24	4.000	11,429	10,857	10,571	857	11,429	100%
25	5.000	14,286	11,429	11,143	857	12,000	84%
26	5.000	14,286	12,000	11,714	857	12,571	88%
27	5.000	14,286	12,571	12,286	857	13,143	92%
28	5.000	14,286	13,143	12,857	857	13,714	96%
29	5.000	14,286	13,714	13,429	857	14,286	100%
30	6.000	17,143	14,286	14,000	857	14,857	87%

Schedule VI

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF IMPUTED CIAC IN RATE BASE

a	b	c	d	e	f	g	h
	Calculated Imputed CIAC					Limitation	
YEAR	Service Avail. Charge	Margin Res. ERC's	Gross Imputed CIAC	Amortization	Calc. Net Imputed CIAC	MR Plant in RateBase	Imputed CIAC in Rate Base
1							
2							
3							
4							
5							
6	$537.21	857	(460,469)	$9,209	($451,260)	$675,636	($451,260)
7	$537.21	857	(460,469)	9,209	(451,260)	648,059	(451,260)
8	$537.21	857	(460,469)	9,209	(451,260)	620,482	(451,260)
9	$537.21	857	(460,469)	9,209	(451,260)	592,905	(451,260)
10	$537.21	857	(460,469)	9,209	(451,260)	483,004	(451,260)
11	$537.21	857	(460,469)	9,209	(451,260)	661,208	(451,260)
12	$537.21	857	(460,469)	9,209	(451,260)	630,725	(451,260)
13	$537.21	857	(460,469)	9,209	(451,260)	600,241	(451,260)
14	$537.21	857	(460,469)	9,209	(451,260)	569,758	(451,260)
15	$537.21	857	(460,469)	9,209	(451,260)	514,349	(451,260)
16	$537.21	857	(460,469)	9,209	(451,260)	642,408	(451,260)
17	$537.21	857	(460,469)	9,209	(451,260)	609,183	(451,260)
18	$537.21	857	(460,469)	9,209	(451,260)	575,958	(451,260)
19	$537.21	857	(460,469)	9,209	(451,260)	542,732	(451,260)
20	$537.21	857	(460,469)	9,209	(451,260)	516,751	(451,260)
21	$537.21	857	(460,469)	9,209	(451,260)	620,843	(451,260)
22	$537.21	857	(460,469)	9,209	(451,260)	584,706	(451,260)
23	$537.21	857	(460,469)	9,209	(451,260)	548,568	(451,260)
24	$537.21	857	(460,469)	9,209	(451,260)	512,431	(451,260)
25	$537.21	857	(460,469)	9,209	(451,260)	505,885	(451,260)
26	$537.21	857	(460,469)	9,209	(451,260)	596,622	(451,260)
27	$537.21	857	(460,469)	9,209	(451,260)	557,308	(451,260)
28	$537.21	857	(460,469)	9,209	(451,260)	517,995	(451,260)
29	$537.21	857	(460,469)	9,209	(451,260)	478,681	(451,260)
30	$537.21	857	(460,469)	9,209	(451,260)	486,751	(451,260)

Schedule VII

MODEL WATER UTILITY

Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed

PROJECTED CIAC BALANCES

a	b	c	d	e	f	g
	New	CIAC	CIAC - Year End Balance			Average Net
YEAR	ERCs	Collected	Gross	Acc. Amort	Net	CIAC
1		$0				
2		0				
3		0				
4		0				
5		0				
6	571	306,980	306,980	(6,140)	300,840	150,420
7	571	306,980	613,959	(24,558)	589,401	445,120
8	571	306,980	920,939	(55,256)	865,682	727,542
9	571	306,980	1,227,918	(98,233)	1,129,685	997,684
10	571	306,980	1,534,898	(153,490)	1,381,408	1,255,546
11	571	306,980	1,841,877	(221,025)	1,620,852	1,501,130
12	571	306,980	2,148,857	(300,840)	1,848,017	1,734,435
13	571	306,980	2,455,837	(392,934)	2,062,903	1,955,460
14	571	306,980	2,762,816	(497,307)	2,265,509	2,164,206
15	571	306,980	3,069,796	(613,959)	2,455,837	2,360,673
16	571	306,980	3,376,775	(742,891)	2,633,885	2,544,861
17	571	306,980	3,683,755	(884,101)	2,799,654	2,716,769
18	571	306,980	3,990,735	(1,037,591)	2,953,144	2,876,399
19	571	306,980	4,297,714	(1,203,360)	3,094,354	3,023,749
20	571	306,980	4,604,694	(1,381,408)	3,223,286	3,158,820
21	571	306,980	4,911,673	(1,571,735)	3,339,938	3,281,612
22	571	306,980	5,218,653	(1,774,342)	3,444,311	3,392,124
23	571	306,980	5,525,632	(1,989,228)	3,536,405	3,490,358
24	571	306,980	5,832,612	(2,216,393)	3,616,219	3,576,312
25	571	306,980	6,139,592	(2,455,837)	3,683,755	3,649,987
26	571	306,980	6,446,571	(2,707,560)	3,739,011	3,711,383
27	571	306,980	6,753,551	(2,971,562)	3,781,988	3,760,500
28	571	306,980	7,060,530	(3,247,844)	3,812,686	3,797,337
29	571	306,980	7,367,510	(3,536,405)	3,831,105	3,821,896
30	571	306,980	7,674,490	(3,837,245)	3,837,245	3,834,175

Schedule VIIa

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
SERVICE AVAILABILITY CHARGES & CIAC BALANCES

A	Gross Book Value	$2,298,083
B	Land	0
C	Depreciable Assets	$2,298,083
D	Accumulated Depreciation to Date	0
E	Accumulated Depreciation at Design Capacity	459,617
F	Net Plant at Design Capacity	1,838,467
G	Transmission & Distribution Mains	0
H	Minimum Level of CIAC	0.00%
I	CIAC to Date	0
J	Accumulated Amortization of CIAC to Date	0
K	Acc. Amort. of CIAC at design capacity	0
L	Future Customers	2,857
M	Composite Depreciation Rate	4.00%
N	Number of Years to Design Capacity	5
O	Existing Service Availability Charge per ERC	0
P	Level of CIAC at Design Capacity	0.00%
Q	Requested Service Availability Charge per ERC	$537.21
R	Level of CIAC at Design Capacity	75.00%
S	Minimum Service Availability Charge per ERC	0
T	Level of CIAC at Design Capacity	0.00%
U	Maximum Service Availability Charge per ERC	$537.21
V	Level of CIAC at Design Capacity	75.00%
W	No. of Customers at Design Capacity	2,857
X	Current No. of Customers	0
Y	Annual Growth	571
Z	Depreciation/Amortization multiplier	290.476190
AA	Number of Years	
AB	Depreciation rate	4.00%

Schedule VIII

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
PROJECTED AFPI COLLECTIONS

Projected AFPI Collections:

a YEAR	b New ERCs	c ERC's paying AFPI	d Average AFPI Charge	e AFPI Colected (k * l)
1	0	0	$0.00	$0
2	0	0	0.00	0
3	0	0	0.00	0
4	0	0	0.00	0
5	0	0	0.00	0
6	571	571	64.81	37,031
7	571	571	187.56	107,179
8	571	571	310.92	177,671
9	571	0	430.53	0
10	571	0	546.39	0
11	571	571	46.35	26,483
12	571	571	133.58	76,331
13	571	571	220.20	125,826
14	571	571	303.06	173,176
15	571	0	382.17	0
16	571	571	49.34	28,191
17	571	571	142.33	81,334
18	571	571	234.92	134,242
19	571	571	323.76	185,006
20	571	0	408.84	0
21	571	571	49.60	28,340
22	571	571	143.06	81,750
23	571	571	236.11	134,920
24	571	571	325.40	185,945
25	571	0	410.94	0
26	571	571	48.56	27,746
27	571	571	140.02	80,012
28	571	571	231.00	131,999
29	571	571	318.22	181,840
30	571	0	401.69	0

Schedule VIIIa

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	1st Increment
Cost of Qualifying Asset	$1,351,273
Divided by Future ERCs	1,714
Cost / ERC	$788.37
Rate of Return	10.75%
Annual Return per ERC	$84.75
Annual Reduction in Return per ERC	$3.39
Annual Depreciation Expense	$54,051
Divided by Future ERCs	1,714
Annual Depreciation per ERC	$31.53
Weighted Cost of Equity	4.30%
Divided by Rate of Return	10.75%
Percentage of Equity in Retur	40.00%

	Year 6	Year 7	Year 8	Year 9	Year 10
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	31.53	31.53	31.53	31.53	31.53
Unfunded Exp - Prior Year					
Total Unfunded Expense	31.53	63.07	94.60	126.14	157.67
Unfunded Returns					
Return on Expense - Crnt Yr.	3.39	3.39	3.39	3.39	3.39
Return on Expense - Prior Yr.	0.00	3.39	6.78	10.17	13.56
Return on Plant - Current Yr.	84.75	81.36	77.97	74.58	71.19
Earnings - Prior Year	0.00	84.75	166.11	244.08	318.66
Compound Earnings - Prior Y	0.00	9.11	17.86	26.24	34.26
Total Compound Earnings	88.14	182.00	272.11	358.46	441.06
Year-end AFPI Charge (net of taxes)	119.68	245.07	366.71	484.60	598.73
Jan	9.97	130.09	255.17	376.50	494.08
Feb	19.94	140.54	265.31	386.32	503.59
Mar	29.91	150.99	275.45	396.15	513.10
Apr	39.88	161.44	285.58	405.97	522.61
May	49.85	171.89	295.72	415.80	532.12
Jun	59.82	182.34	305.86	425.62	541.63
Jul	69.79	192.79	315.99	435.44	551.14
Aug	79.76	203.24	326.13	445.27	560.65
Sep	89.73	213.69	336.27	455.09	570.16
Oct	99.70	224.14	346.40	464.92	579.67
Nov	109.67	234.59	356.54	474.74	589.19
Dec	119.64	245.04	366.68	484.56	598.70
AVG	64.81	187.56	310.92	430.53	546.39
New ERC's	571	571	571	571	571
Limitation	1,714	1,714	1,714	1,714	1,714
# of ERC's to pay AFPI:					
Jan	48	48	48	0	0
Feb	48	48	48	0	0
Mar	48	48	48	0	0
Apr	48	48	48	0	0
May	48	48	48	0	0
Jun	48	48	48	0	0
Jul	48	48	48	0	0
Aug	48	48	48	0	0
Sep	48	48	48	0	0
Oct	48	48	48	0	0
Nov	48	48	48	0	0
Dec	48	48	48	0	0
Total	571	571	571	0	0
Cumulative	571	1,143	1,714	1,714	1,714
AFPI Collected:					
Jan	$475	$6,195	$12,151	$0	$0
Feb	950	6,692	12,634	0	0
Mar	1,424	7,190	13,116	0	0
Apr	1,899	7,688	13,599	0	0
May	2,374	8,185	14,082	0	0
Jun	2,849	8,683	14,565	0	0
Jul	3,323	9,180	15,047	0	0
Aug	3,798	9,678	15,530	0	0
Sep	4,273	10,176	16,013	0	0
Oct	4,748	10,673	16,495	0	0
Nov	5,222	11,171	16,978	0	0
Dec	5,697	11,668	17,461	0	0
Total	37,031	107,179	177,671	0	0

Schedule VIIIb

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI
2nd Increment (based on Year 10 figures)

Cost of Qualifying Asset	1,288,011
Divided by Future ERCs	2,286
Cost / ERC	$563.43
Rate of Return	10.75%
Annual Return per ERC	$60.57
Annual Reduction in Return per ERC	$2.42
Annual Depreciation Expense	$51,520
Divided by Future ERCs	2,286
Annual Depreciation per ERC	$22.54
Weighted Cost of Equity	4.30%
Divided by Rate of Return	10.75%
Percentage of Equity in Return	40.00%

	Year 11	Year 12	Year13	Year14	Year 15
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	22.54	22.54	22.54	22.54	22.54
Unfunded Exp - Prior Year					
Total Unfunded Expense	22.54	45.07	67.61	90.15	112.69
Unfunded Returns					
Return on Expense - Crnt Yr.	2.42	2.42	2.42	2.42	2.42
Return on Expense - Prior Yr.	0.00	2.42	4.85	7.27	9.69
Return on Plant - Current Yr.	60.57	57.18	53.79	50.40	47.01
Earnings - Prior Year	0.00	60.57	117.75	171.54	221.94
Compound Earnings - Prior Yr	0.00	6.51	12.66	18.44	23.86
Total Compound Earnings	62.99	129.11	191.46	250.07	304.92
Year-end AFPI Charge (net of taxes)	85.53	174.18	259.08	340.22	417.60
Jan	7.13	92.95	181.29	265.87	346.70
Feb	14.26	100.34	188.36	272.63	353.15
Mar	21.39	107.72	195.43	279.39	359.60
Apr	28.52	115.11	202.51	286.15	366.04
May	35.65	122.50	209.58	292.92	372.49
Jun	42.78	129.89	216.66	299.68	378.94
Jul	49.91	137.27	223.73	306.44	385.39
Aug	57.04	144.66	230.81	313.20	391.84
Sep	64.17	152.05	237.88	319.96	398.29
Oct	71.30	159.44	244.96	326.72	404.74
Nov	78.43	166.82	252.03	333.49	411.19
Dec	85.56	174.21	259.11	340.25	417.64
AVG	46.35	133.58	220.20	303.06	382.17
New ERC's	571	571	571	571	571
Limitation	2,286	2,286	2,286	2,286	2,286
# of ERC's to pay AFPI:					
Jan	48	48	48	48	0
Feb	48	48	48	48	0
Mar	48	48	48	48	0
Apr	48	48	48	48	0
May	48	48	48	48	0
Jun	48	48	48	48	0
Jul	48	48	48	48	0
Aug	48	48	48	48	0
Sep	48	48	48	48	0
Oct	48	48	48	48	0
Nov	48	48	48	48	0
Dec	48	48	48	48	0
Total	571	571	571	571	0
Cumulative	571	1,143	1,714	2,286	2,286
AFPI Collected:					
Jan	$340	$4,426	$8,633	$12,660	$0
Feb	679	4,778	8,970	12,982	0
Mar	1,019	5,130	9,306	13,304	0
Apr	1,358	5,481	9,643	13,626	0
May	1,698	5,833	9,980	13,948	0
Jun	2,037	6,185	10,317	14,270	0
Jul	2,377	6,537	10,654	14,592	0
Aug	2,716	6,889	10,991	14,914	0
Sep	3,056	7,240	11,328	15,236	0
Oct	3,395	7,592	11,665	15,558	0
Nov	3,735	7,944	12,002	15,880	0
Dec	4,074	8,296	12,338	16,202	0
Total	26,483	76,331	125,826	173,176	0

Schedule VIIIc

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	3rd Increment	(based on Year 15 figures)
Cost of Qualifying Asset	1,371,597	
Divided by Future ERCs	2,286	
Cost / ERC	$600.00	
Rate of Return	10.75%	
Annual Return per ERC	$64.50	
Annual Reduction in Return per ERC	$2.58	
Annual Depreciation Expense	$54,864	
Divided by Future ERCs	2,286	
Annual Depreciation per ERC	$24.00	
Weighted Cost of Equity	4.30%	
Divided by Rate of Return	10.75%	
Percentage of Equity in Retur	40.00%	

	Year 16	Year 17	Year18	Year19	Year 20
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	24.00	24.00	24.00	24.00	24.00
Unfunded Exp - Prior Year					
Total Unfunded Expense	24.00	48.00	72.00	96.00	120.00
Unfunded Returns					
Return on Expense - Crnt Yr.	2.58	2.58	2.58	2.58	2.58
Return on Expense - Prior Yr.	0.00	2.58	5.16	7.74	10.32
Return on Plant - Current Yr.	64.50	61.11	57.72	54.33	50.94
Earnings - Prior Year	0.00	64.50	125.61	183.33	237.66
Compound Earnings - Prior Y	0.00	6.93	13.50	19.71	25.55
Total Compound Earnings	67.08	137.70	204.57	267.69	327.05
Year-end AFPI Charge (net of taxes)	91.08	185.70	276.57	363.69	447.05
Jan	7.59	98.97	193.28	283.83	370.63
Feb	15.18	106.85	200.85	291.09	377.58
Mar	22.77	114.74	208.42	298.35	384.53
Apr	30.36	122.62	215.99	305.61	391.47
May	37.95	130.51	223.57	312.87	398.42
Jun	45.54	138.39	231.14	320.13	405.37
Jul	53.13	146.28	238.71	327.39	412.31
Aug	60.72	154.16	246.28	334.65	419.26
Sep	68.31	162.05	253.86	341.91	426.21
Oct	75.90	169.93	261.43	349.17	433.15
Nov	83.49	177.82	269.00	356.43	440.10
Dec	91.08	185.70	276.57	363.69	447.05
AVG	49.34	142.33	234.92	323.76	408.84
New ERC's	571	571	571	571	571
Limitation	2,286	2,286	2,286	2,286	2,286
# of ERC's to pay AFPI:					
Jan	48	48	48	48	0
Feb	48	48	48	48	0
Mar	48	48	48	48	0
Apr	48	48	48	48	0
May	48	48	48	48	0
Jun	48	48	48	48	0
Jul	48	48	48	48	0
Aug	48	48	48	48	0
Sep	48	48	48	48	0
Oct	48	48	48	48	0
Nov	48	48	48	48	0
Dec	48	48	48	48	0
Total	571	571	571	571	0
Cumulative	571	1,143	1,714	2,286	2,286
AFPI Collected:					
Jan	$361	$4,713	$9,204	$13,516	$0
Feb	723	5,088	9,564	13,862	0
Mar	1,084	5,464	9,925	14,207	0
Apr	1,446	5,839	10,285	14,553	0
May	1,807	6,215	10,646	14,899	0
Jun	2,169	6,590	11,007	15,244	0
Jul	2,530	6,966	11,367	15,590	0
Aug	2,891	7,341	11,728	15,936	0
Sep	3,253	7,717	12,088	16,281	0
Oct	3,614	8,092	12,449	16,627	0
Nov	3,976	8,468	12,810	16,973	0
Dec	4,337	8,843	13,170	17,318	0
Total	28,191	81,334	134,242	185,006	0

Schedule VIIId

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI
4th Increment (based on Year 20 figures)

Cost of Qualifying Asset	1,378,002
Divided by Future ERCs	2,286
Cost / ERC	$602.80
Rate of Return	10.75%
Annual Return per ERC	$64.80
Annual Reduction in Return per ERC	$2.59
Annual Depreciation Expense	$55,120
Divided by Future ERCs	2,286
Annual Depreciation per ERC	$24.11
Weighted Cost of Equity	4.30%
Divided by Rate of Return	10.75%
Percentage of Equity in Return	40.00%

	Year 21	Year 22	Year 23	Year 24	Year 25
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	24.11	24.11	24.11	24.11	24.11
Unfunded Exp - Prior Year					
Total Unfunded Expense	24.11	48.22	72.34	96.45	120.56
Unfunded Returns					
Return on Expense - Crnt Yr.	2.59	2.59	2.59	2.59	2.59
Return on Expense - Prior Yr.	0.00	2.59	5.18	7.78	10.37
Return on Plant - Current Yr.	64.80	61.41	58.02	54.63	51.24
Earnings - Prior Year	0.00	64.80	126.21	184.23	238.86
Compound Earnings - Prior Yr	0.00	6.97	13.57	19.81	25.68
Total Compound Earnings	67.39	138.36	205.58	269.04	328.74
Year-end AFPI Charge (net of taxes)	91.51	186.59	277.91	365.49	449.30
Jan	7.63	99.48	194.25	285.27	372.53
Feb	15.26	107.41	201.86	292.56	379.51
Mar	22.89	115.33	209.47	299.86	386.49
Apr	30.52	123.25	217.08	307.16	393.48
May	38.15	131.18	224.69	314.46	400.46
Jun	45.78	139.10	232.30	321.75	407.45
Jul	53.41	147.02	239.92	329.05	414.43
Aug	61.04	154.95	247.53	336.35	421.42
Sep	68.67	162.87	255.14	343.65	428.40
Oct	76.30	170.79	262.75	350.94	435.39
Nov	83.93	178.72	270.36	358.24	442.37
Dec	91.56	186.64	277.97	365.54	449.36
AVG	49.60	143.06	236.11	325.40	410.94
	571	571	571	571	571
	2,286	2,286	2,286	2,286	2,286

Jan	48	48	48	48	0
Feb	48	48	48	48	0
Mar	48	48	48	48	0
Apr	48	48	48	48	0
May	48	48	48	48	0
Jun	48	48	48	48	0
Jul	48	48	48	48	0
Aug	48	48	48	48	0
Sep	48	48	48	48	0
Oct	48	48	48	48	0
Nov	48	48	48	48	0
Dec	48	48	48	48	0
Total	571	571	571	571	0
Cumulative	571	1,143	1,714	2,286	2,286

Jan	$363	$4,737	$9,250	$13,584	$0
Feb	727	5,115	9,612	13,932	0
Mar	1,090	5,492	9,975	14,279	0
Apr	1,453	5,869	10,337	14,627	0
May	1,817	6,247	10,700	14,974	0
Jun	2,180	6,624	11,062	15,322	0
Jul	2,543	7,001	11,425	15,669	0
Aug	2,907	7,378	11,787	16,017	0
Sep	3,270	7,756	12,149	16,364	0
Oct	3,633	8,133	12,512	16,712	0
Nov	3,997	8,510	12,874	17,059	0
Dec	4,360	8,888	13,237	17,407	0
Total	28,340	81,750	134,920	185,945	0

Schedule VIIIe

MODEL WATER UTILITY
Scenario: Water Treatment Plant - 60 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI
5th Increment (based on Year 25 figures)

Cost of Qualifying Asset	1,349,026
Divided by Future ERCs	2,286
Cost / ERC	$590.12
Rate of Return	10.75%
Annual Return per ERC	$63.44
Annual Reduction in Return per ERC	$2.54
Annual Depreciation Expense	$53,961
Divided by Future ERCs	2,286
Annual Depreciation per ERC	$23.60
Weighted Cost of Equity	4.30%
Divided by Rate of Return	10.75%
Percentage of Equity in Retur	40.00%

	Year 26	Year 27	Year 28	Year 29	Year 30
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	23.60	23.60	23.60	23.60	23.60
Unfunded Exp - Prior Year					
Total Unfunded Expense	23.60	47.21	70.81	94.42	118.02
Unfunded Returns					
Return on Expense - Crnt Yr.	2.54	2.54	2.54	2.54	2.54
Return on Expense - Prior Yr.	0.00	2.54	5.08	7.61	10.15
Return on Plant - Current Yr.	63.44	60.05	56.66	53.27	49.88
Earnings - Prior Year	0.00	63.44	123.49	180.15	233.41
Compound Earnings - Prior Y	0.00	6.82	13.27	19.37	25.09
Total Compound Earnings	65.98	135.38	201.03	262.93	321.07
Year-end AFPI Charge (net of taxes)	89.58	182.59	271.85	357.35	439.10
Jan	7.47	97.39	190.09	279.03	364.22
Feb	14.94	105.14	197.53	286.16	371.03
Mar	22.41	112.89	204.96	293.28	377.85
Apr	29.88	120.64	212.40	300.41	384.66
May	37.35	128.39	219.84	307.53	391.47
Jun	44.82	136.15	227.28	314.66	398.28
Jul	52.29	143.90	234.72	321.78	405.09
Aug	59.76	151.65	242.15	328.91	411.91
Sep	67.23	159.40	249.59	336.03	418.72
Oct	74.70	167.15	257.03	343.16	425.53
Nov	82.17	174.90	264.47	350.28	432.34
Dec	89.64	182.65	271.91	357.41	439.16
AVG	48.56	140.02	231.00	318.22	401.69
	571	571	571	571	571
	2,286	2,286	2,286	2,286	2,286
Jan	48	48	48	48	0
Feb	48	48	48	48	0
Mar	48	48	48	48	0
Apr	48	48	48	48	0
May	48	48	48	48	0
Jun	48	48	48	48	0
Jul	48	48	48	48	0
Aug	48	48	48	48	0
Sep	48	48	48	48	0
Oct	48	48	48	48	0
Nov	48	48	48	48	0
Dec	48	48	48	48	0
Total	571	571	571	571	0
Cumulative	571	1,143	1,714	2,286	2,286
Jan	$356	$4,638	$9,052	$13,287	$0
Feb	711	5,007	9,406	13,627	0
Mar	1,067	5,376	9,760	13,966	0
Apr	1,423	5,745	10,114	14,305	0
May	1,779	6,114	10,469	14,644	0
Jun	2,134	6,483	10,823	14,984	0
Jul	2,490	6,852	11,177	15,323	0
Aug	2,846	7,221	11,531	15,662	0
Sep	3,201	7,590	11,885	16,002	0
Oct	3,557	7,959	12,240	16,341	0
Nov	3,913	8,329	12,594	16,680	0
Dec	4,269	8,698	12,948	17,019	0
Total	27,746	80,012	131,999	181,840	0

APPENDIX D

MODEL OF UTILITY COST RECOVERY

Scenario WTP B:
Water treatment plant constructed in 2 ½ year increments

MODEL WATER UTILITY
DESCRIPTION & ASSUMPTIONS

(1) The purpose of this model is to present the financial impacts of proposed rules related to margin reserve and imputation of CIAC on investor-owned utilities in Florida.

(2) Financial impacts are presented over a 30 year projection period, including an initial 5 year construction period.

(3) Rate revenue for return on investment begins in the 6th year - the first year after plant is placed in service

(4) An assumption is made that rate revenues provide 100% reimbursement of operation and maintenance expenses and rate case expense.

(5) Plant additions are made in 2.5 year increments. Permitting, design and construction takes 5 years. Plant additions are placed in service six months before demand would otherwise exceed capacity.

(6) Customer growth is even and predictable.

(7) AFPI is calculated as of the beginning of the year the plant is placed in service. AFPI charge compounds for 2.5 years and re-starts when new plant comes on-line.

(8) Capital structure includes only long-term debt and equity.

(9) Capital Structure

	Initial	Ratio	Cost Rate	Weighted Cost
Long Term Debt	$3,400,000	60.0%	10.00%	6.00%
Short Term Debt		0.0%	9.00%	0.00%
Customer Deposits		0.0%	6.00%	0.00%
Deferred ITCs		0.0%	10.00%	0.00%
Deferred Income Taxes		0.0%	0.00%	0.00%
Common Equity	2,266,667	40.0%	11.88%	4.75%
Total Capital	$5,666,667	100.00%		10.75%

(10)	AFUDC Rate	10.75%
(11)	Inflation on the cost of plant construction is	3.0%
(12)	Size of each increment of plant:	0.500 MGD
(13)	Cost per MG of plant capacity	$3.40 /MG of capacity
(14)	Consumption	350 gpd/ERC
(15)	New ERC's per Year	571
(16)	Margin Reserve allowed	18
(17)	CIAC Imputed?	Yes

MODEL WATER UTILITY
Key Results
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed

		Rates	Service Availabilty	AFPI	Total
(1)	Average Cost per ERC / year:				
	Five years	$209	$205	$23	$414
	Ten years	197	102	41	300
	Fifteen years	201	68	48	269
	Twenty years	209	51	51	260
	Twenty-five years	218	41	53	259
	Total cost per ERC over twenty-five years				$6,472
(2)	Net Present Value of Revenue Requirement				
	Rates				$4,776,445
	CIAC				3,013,879
	AFPI				137,487
	Total				$7,927,811
(3)	Net Present Value of Return to the Utility				
	Rates				$1,169,760
	AFPI				137,487
	Total				$1,307,247
(4)	Maximum Return on Investment to Utility				5.30%
	Maximum Return on Investment to Utility				7.46%

MODEL WATER UTILITY
LIST OF SCHEDULES

Schedule I

MODEL WATER UTILITY
Scenario: WTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED NET INVESTMENT

a	b	c	d	e	f	g	h	i	j	k
	Net Investment				Return on Investment					Overall
YEAR	CWIP	Net Plant	Net CIAC	Total (b+c+d)	Rate Base	Allowed Rate of Return	Allowed Return (f * g)	AFPI	Total (h+j)	Rate of Return (j / e)
1	89,569	0	0	89,569	0		0	0	0	0.00%
2	367,413	0	0	367,413	0		0	0	0	0.00%
3	975,492	0	0	975,492	0		0	0	0	0.00%
4	1,833,715	0	0	1,833,715	0		0	0	0	0.00%
5	3,042,186	0	0	3,042,186	0		0	0	0	0.00%
6	1,796,745	1,973,933	(573,707)	3,196,971	464,632	10.75%	49,948	17,825	67,773	2.12%
7	2,904,719	1,891,685	(1,123,997)	3,672,408	510,251	10.75%	54,852	0	54,852	1.49%
8	1,457,464	3,903,583	(1,650,870)	3,710,177	70,114	10.75%	7,537	12,839	20,376	0.55%
9	2,480,662	3,734,080	(2,154,327)	4,060,415	1,055,673	10.75%	113,485	34,848	148,333	3.65%
10	1,143,051	5,954,597	(2,634,367)	4,463,281	620,564	10.75%	66,711	0	66,711	1.49%
11	2,082,920	5,685,510	(3,090,991)	4,677,439	1,708,811	10.75%	183,697	53,119	236,816	5.06%
12	3,367,365	5,416,422	(3,524,198)	5,259,590	1,669,665	10.75%	179,489	63,918	243,407	4.63%
13	1,689,600	7,575,023	(3,933,989)	5,330,634	1,256,497	10.75%	135,073	14,391	149,464	2.80%
14	2,875,768	7,204,782	(4,320,362)	5,760,187	2,402,167	10.75%	258,233	39,060	297,293	5.16%
15	1,325,110	9,605,229	(4,683,320)	6,247,019	2,034,004	10.75%	218,655	0	218,655	3.50%
16	2,414,675	9,119,543	(5,022,860)	6,511,358	3,274,241	10.75%	351,981	55,297	407,278	6.25%
17	3,903,699	8,633,857	(5,338,985)	7,198,571	3,122,071	10.75%	335,623	66,560	402,182	5.59%
18	1,958,709	10,962,526	(5,631,692)	7,289,543	2,799,080	10.75%	300,901	14,471	315,372	4.33%
19	3,333,803	10,359,575	(5,900,983)	7,792,395	4,034,153	10.75%	433,671	39,279	472,951	6.07%
20	1,536,165	12,968,611	(6,146,857)	8,357,919	3,779,833	10.75%	406,332	0	406,332	4.86%
21	2,799,271	12,231,827	(6,369,315)	8,661,783	5,121,567	10.75%	550,568	54,814	605,382	6.99%
22	4,525,458	11,495,043	(6,568,356)	9,452,144	4,820,893	10.75%	518,246	65,973	584,219	6.18%
23	2,270,681	14,020,868	(6,743,980)	9,547,569	4,603,330	10.75%	494,858	14,132	508,990	5.33%
24	3,864,791	13,148,142	(6,896,188)	10,116,745	5,903,861	10.75%	634,665	38,358	673,023	6.65%
25	1,780,837	15,998,990	(7,024,980)	10,754,847	5,780,851	10.75%	621,441	0	621,441	5.78%
26	3,245,122	14,971,115	(7,130,354)	11,085,882	7,202,713	10.75%	774,292	53,267	827,559	7.46%
27	5,246,246	13,943,240	(7,212,312)	11,977,173	6,712,137	10.75%	721,555	64,098	785,652	6.56%
28	2,632,342	16,697,624	(7,270,854)	12,059,111	6,605,471	10.75%	710,088	13,576	723,665	6.00%
29	4,480,352	15,512,154	(7,305,979)	12,686,528	7,955,913	10.75%	855,261	36,850	892,111	7.03%
30	2,064,478	18,643,328	(7,317,687)	13,390,119	7,973,835	10.75%	857,187	0	857,187	6.40%
			AVG	6,652,273				AVG	352,901	5.30%
			NPV	33,803,955		NPV	1,169,760	137,487	1,307,247	3.87%

Schedule II

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed
PROJECTED REGULATORY INCOME

a YEAR	b Revenue From Rates	c O&M Expense	d Allowed Depreciation Expense	e Allowed Amortization Expense	f Property Taxes	g Gross Receipts Tax	h Allowed Interest Expense	i Allowed Pretax Profit	j Income Tax	k Allowed Net Profit	l Avg 5 Year Revenue Per ERC
1											
2											
3											
4											
5											
6	182,482	(14,286)	(65,798)	11,708	(20,562)	(8,212)	(27,878)	57,456	(35,386)	22,070	
7	213,878	(42,857)	(82,247)	35,125	(20,562)	(9,624)	(30,615)	63,097	(38,860)	24,237	
8	213,343	(71,429)	(135,603)	58,541	(42,376)	(9,600)	(4,207)	8,670	(5,340)	3,330	$209
9	443,774	(100,000)	(169,503)	81,958	(42,376)	(19,970)	(63,340)	130,543	(80,398)	50,144	
10	439,487	(128,571)	(215,270)	105,375	(67,272)	(19,777)	(37,234)	76,738	(47,261)	29,477	
11	691,737	(157,143)	(251,148)	128,791	(67,272)	(31,128)	(102,529)	211,309	(130,140)	81,169	
12	708,391	(185,714)	(269,087)	152,208	(67,272)	(31,878)	(100,180)	206,468	(127,159)	79,309	
13	727,963	(214,286)	(333,217)	175,624	(92,560)	(32,758)	(75,390)	155,376	(95,693)	59,684	$193
14	992,456	(242,857)	(370,241)	199,041	(92,560)	(44,661)	(144,130)	297,048	(182,945)	114,103	
15	1,017,129	(271,429)	(427,404)	222,458	(121,422)	(45,771)	(122,040)	251,522	(154,906)	96,615	
16	1,301,726	(300,000)	(466,259)	245,874	(121,422)	(58,578)	(196,454)	404,887	(249,361)	155,526	
17	1,298,202	(328,571)	(485,686)	269,291	(121,422)	(58,419)	(187,324)	386,070	(237,772)	148,298	
18	1,352,882	(357,143)	(562,755)	292,707	(150,738)	(60,880)	(167,945)	346,130	(213,173)	132,956	$204
19	1,637,890	(385,714)	(602,951)	316,124	(150,738)	(73,705)	(242,049)	498,857	(307,235)	191,622	
20	1,703,424	(414,286)	(673,631)	339,541	(184,196)	(76,654)	(226,790)	467,408	(287,866)	179,542	
21	2,010,940	(442,857)	(715,733)	362,957	(184,196)	(90,492)	(307,294)	633,325	(390,050)	243,274	
22	1,980,557	(471,429)	(736,784)	386,374	(184,196)	(89,125)	(289,254)	596,144	(367,152)	228,992	
23	2,076,357	(500,000)	(829,090)	409,790	(218,182)	(93,436)	(276,200)	569,240	(350,582)	218,658	$219
24	2,377,556	(528,571)	(872,726)	433,207	(218,182)	(106,990)	(354,232)	730,062	(449,629)	280,433	
25	2,490,618	(557,143)	(959,350)	456,624	(256,969)	(112,078)	(346,851)	714,851	(440,260)	274,590	
26	2,817,293	(585,714)	(1,005,033)	480,040	(256,969)	(126,778)	(432,163)	890,676	(548,547)	342,129	
27	2,752,265	(614,286)	(1,027,875)	503,457	(256,969)	(123,852)	(402,728)	830,012	(511,186)	318,827	
28	2,893,771	(642,857)	(1,138,050)	526,873	(296,367)	(130,220)	(396,328)	816,822	(503,062)	313,760	$234
29	3,208,529	(671,429)	(1,185,469)	550,290	(296,367)	(144,384)	(477,355)	983,816	(605,910)	377,906	
30	3,374,811	(700,000)	(1,290,857)	573,707	(341,332)	(151,866)	(478,430)	986,032	(607,275)	378,757	

Net Present Value of Revenue Requirement $4,776,445

Schedule III

MODEL WATER UTILITY
Scenario: WTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED RATE BASE & ALLOWED RETURN

a	b	c	d	e	f	g	h	i
			Rate Base					
YEAR	Average Net Plant	Used & Useful %	Net Plant U & U	Average Net CIAC	Imputed CIAC	Total	Allowed Rate of Return	Allowed Return on Rate Base
1								
2								
3								
4								
5								
6	$2,015,056	80%	$1,612,045	($286,853)	($860,560)	$464,632	10.75%	49,948
7	1,932,809	100%	1,932,809	(848,852)	(573,707)	510,251	10.75%	54,852
8	2,897,634	80%	2,318,107	(1,387,433)	(860,560)	70,114	10.75%	7,537
9	3,818,832	100%	3,818,832	(1,902,599)	(860,560)	1,055,673	10.75%	113,485
10	4,844,339	80%	3,875,471	(2,394,347)	(860,560)	620,564	10.75%	66,711
11	5,820,053	93%	5,432,050	(2,862,679)	(860,560)	1,708,811	10.75%	183,697
12	5,550,966	100%	5,550,966	(3,307,595)	(573,707)	1,669,665	10.75%	179,489
13	6,495,723	90%	5,846,150	(3,729,093)	(860,560)	1,256,497	10.75%	135,073
14	7,389,902	100%	7,389,902	(4,127,176)	(860,560)	2,402,167	10.75%	258,233
15	8,405,006	88%	7,396,405	(4,501,841)	(860,560)	2,034,004	10.75%	218,655
16	9,362,386	96%	8,987,891	(4,853,090)	(860,560)	3,274,241	10.75%	351,981
17	8,876,700	100%	8,876,700	(5,180,923)	(573,707)	3,122,071	10.75%	335,623
18	9,798,191	93%	9,144,978	(5,485,338)	(860,560)	2,799,080	10.75%	300,901
19	10,661,050	100%	10,661,050	(5,766,337)	(860,560)	4,034,153	10.75%	433,671
20	11,664,093	91%	10,664,313	(6,023,920)	(860,560)	3,779,833	10.75%	406,332
21	12,600,219	97%	12,240,213	(6,258,086)	(860,560)	5,121,567	10.75%	550,568
22	11,863,435	100%	11,863,435	(6,468,835)	(573,707)	4,820,893	10.75%	518,246
23	12,757,956	95%	12,120,058	(6,656,168)	(860,560)	4,603,330	10.75%	494,858
24	13,584,505	100%	13,584,505	(6,820,084)	(860,560)	5,903,861	10.75%	634,665
25	14,573,566	93%	13,601,995	(6,960,584)	(860,560)	5,780,851	10.75%	621,441
26	15,485,052	98%	15,140,940	(7,077,667)	(860,560)	7,202,713	10.75%	774,292
27	14,457,177	100%	14,457,177	(7,171,333)	(573,707)	6,712,137	10.75%	721,555
28	15,320,432	96%	14,707,614	(7,241,583)	(860,560)	6,605,471	10.75%	710,088
29	16,104,889	100%	16,104,889	(7,288,416)	(860,560)	7,955,913	10.75%	855,261
30	17,077,741	95%	16,146,228	(7,311,833)	(860,560)	7,973,835	10.75%	857,187
AVG								

Schedule IV

MODEL UTILITY
Scenario: WTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED CWIP AND PLANT IN SERVICE BALANCES

a	b	c	d	e	f	g	h	i
	Total				Book Value - Utility Plant in Service			Average
YEAR	Total $ Spent	Total AFUDC	Transfers to Plant	CWIP Balance	Gross	Accum. Deprec	Net	Net Plant
1	85,000	4,569		89,569				
2	255,000	22,844		367,413				
3	542,377	65,703		975,492				
4	724,430	133,794		1,833,715				
5	982,908	225,563		3,042,186				
6	678,619	132,120	(2,056,180)	1,796,745	2,056,180	(82,247)	1,973,933	2,015,056
7	891,462	216,512		2,904,719	2,056,180	(164,494)	1,891,685	1,932,809
8	629,748	104,397	(2,181,401)	1,457,464	4,237,581	(333,998)	3,903,583	2,897,634
9	839,812	183,386		2,480,662	4,237,581	(503,501)	3,734,080	3,818,832
10	876,363	275,631	(2,489,605)	1,143,051	6,727,185	(772,588)	5,954,597	4,844,339
11	786,706	153,163		2,082,920	6,727,185	(1,041,676)	5,685,510	5,820,053
12	1,033,449	250,997		3,367,365	6,727,185	(1,310,763)	5,416,422	5,550,966
13	730,051	121,025	(2,528,842)	1,689,600	9,256,027	(1,681,004)	7,575,023	6,495,723
14	973,573	212,595		2,875,768	9,256,027	(2,051,245)	7,204,782	7,389,902
15	1,015,945	319,532	(2,886,134)	1,325,110	12,142,161	(2,536,932)	9,605,229	8,405,006
16	912,007	177,558		2,414,675	12,142,161	(3,022,618)	9,119,543	9,362,386
17	1,198,050	290,974		3,903,699	12,142,161	(3,508,305)	8,633,857	8,876,700
18	846,329	140,301	(2,931,621)	1,958,709	15,073,782	(4,111,256)	10,962,526	9,798,191
19	1,128,638	246,456		3,333,803	15,073,782	(4,714,207)	10,359,575	10,661,050
20	1,177,758	370,425	(3,345,820)	1,536,165	18,419,602	(5,450,991)	12,968,611	11,664,093
21	1,057,266	205,839		2,799,271	18,419,602	(6,187,775)	12,231,827	12,600,219
22	1,388,868	337,318		4,525,458	18,419,602	(6,924,559)	11,495,043	11,863,435
23	981,127	162,648	(3,398,552)	2,270,681	21,818,154	(7,797,286)	14,020,868	12,757,956
24	1,308,400	285,710		3,864,791	21,818,154	(8,670,012)	13,148,142	13,584,505
25	1,365,344	429,424	(3,878,723)	1,780,837	25,696,877	(9,697,887)	15,998,990	14,573,566
26	1,225,662	238,623		3,245,122	25,696,877	(10,725,762)	14,971,115	15,485,052
27	1,610,079	391,045		5,246,246	25,696,877	(11,753,637)	13,943,240	14,457,177
28	1,137,396	188,553	(3,939,853)	2,632,342	29,636,730	(12,939,106)	16,697,624	15,320,432
29	1,516,794	331,216		4,480,352	29,636,730	(14,124,575)	15,512,154	16,104,889
30	1,582,808	497,820	(4,496,503)	2,064,478	34,133,232	(15,489,905)	18,643,328	17,077,741

Schedule IVa

MODEL WATER UTILITY
Scenario: WTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED CONSTRUCTION

Cost of each increment of plant	$3.40 / MGD capacity
Inflation rate	3.0%
Capacity of each increment of plant	0.500 MGD
Depreciable Life of Plant	25

All plant expansions are placed in service six months before demand would otherwise exceed capacity.

Cost of construction for each increment of Plant				
Year	% Complete	$ Spent	AFUDC	Total
1	5.0%	$85,000	$4,569	$89,569
2	15.0%	$255,000	22,844	277,844
3	26.6%	$452,200	60,856	513,056
4	26.7%	$453,900	109,559	563,459
5	26.7%	$453,900	158,353	612,253
Total	100.0%	$1,700,000	$356,180	$2,056,180

a	b	c	d	e	f	g	h	i	j	k	l	m
						CWIP						
YEAR	1st Increment		2nd Increment		3rd Increment		4th Increment		5th Increment		6th Increment	
	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC
1	85,000	4,569										
2	255,000	22,844										
3	452,200	60,856	90,177	4,847								
4	453,900	109,559	270,530	24,235								
5	453,900	158,353	479,739	64,562	49,269	2,648						
6			481,543	116,231	197,077	15,889						
7			481,543	167,997	409,919	48,515						
8					525,209	98,778	104,539	5,619				
9					526,195	155,291	313,618	28,095				
10					263,097	197,716	556,149	74,845	57,116	3,070		
11							558,240	134,743	228,466	18,420		
12							558,240	194,754	475,209	56,243		
13									608,861	114,511	121,190	6,514
14									610,004	180,025	363,569	32,570
15									305,002	229,207	644,729	86,766
16											647,153	156,204
17											647,153	225,773
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
Total		2,056,180		2,181,401		2,489,605		2,528,842		2,886,134		2,931,621

MODEL WATER UTILITY
Scenario: WTP - 30 month Increments / 18 month MR / CIAC Imputed
PROJECTED CONSTRUCTION

a	b	c	d	e	f	g	h	i	j	k	l	m	n
7th Increment		8th Increment		9th Increment		10th Increment		11th Increment		12th Increment		13th Increment	
$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC	$ Spent	AFUDC
66,214	3,559												
264,854	21,354												
550,897	65,201												
705,837	132,750	140,492	7,551										
707,161	208,699	421,476	37,757										
353,581	265,714	747,418	100,585	76,760	4,126								
		750,228	181,084	307,039	24,755								
		750,228	261,733	638,641	75,585								
				818,259	153,894	162,869	8,754						
				819,794	241,939	488,606	43,771						
				409,897	308,035	866,462	116,606	88,986	4,783				
						869,719	209,926	355,942	28,698				
						869,719	303,420	740,360	87,624				
								948,586	178,405	188,810	10,149		
								950,366	280,474	566,429	50,743		
								475,183	357,097	1,004,467	135,178	103,159	5,545
	3,345,820		3,398,552		3,878,723		3,939,853		4,496,503		1,955,774		108,703

Schedule V

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF USED & USEFUL %

a	b	c	d	e	f	g	h
	Year-end Capacity		Year-end	Average	Margin	Total	Used &
YEAR	MGD	ERC's	Connections (ERCs)	Connections (ERCs)	Reserve (ERCs)	ERCs in Rate Base	Useful %
1							
2							
3							
4							
5							
6	0.500	1,429	571	286	857	1,143	80%
7	0.500	1,429	1,143	857	571	1,429	100%
8	1.000	2,857	1,714	1,429	857	2,286	80%
9	1.000	2,857	2,286	2,000	857	2,857	100%
10	1.500	4,286	2,857	2,571	857	3,429	80%
11	1.500	4,286	3,429	3,143	857	4,000	93%
12	1.500	4,286	4,000	3,714	571	4,286	100%
13	2.000	5,714	4,571	4,286	857	5,143	90%
14	2.000	5,714	5,143	4,857	857	5,714	100%
15	2.500	7,143	5,714	5,429	857	6,286	88%
16	2.500	7,143	6,286	6,000	857	6,857	96%
17	2.500	7,143	6,857	6,571	571	7,143	100%
18	3.000	8,571	7,429	7,143	857	8,000	93%
19	3.000	8,571	8,000	7,714	857	8,571	100%
20	3.500	10,000	8,571	8,286	857	9,143	91%
21	3.500	10,000	9,143	8,857	857	9,714	97%
22	3.500	10,000	9,714	9,429	571	10,000	100%
23	4.000	11,429	10,286	10,000	857	10,857	95%
24	4.000	11,429	10,857	10,571	857	11,429	100%
25	4.500	12,857	11,429	11,143	857	12,000	93%
26	4.500	12,857	12,000	11,714	857	12,571	98%
27	4.500	12,857	12,571	12,286	571	12,857	100%
28	5.000	14,286	13,143	12,857	857	13,714	96%
29	5.000	14,286	13,714	13,429	857	14,286	100%
30	5.500	15,714	14,286	14,000	857	14,857	95%

Schedule VI

MODEL WATER UTILITY
Scenario: WTP - 30 month Increments / 18 month MR / CIAC Imputed
CALCULATION OF IMPUTED CIAC IN RATE BASE

a	b	c	d	e	f	g	h
	Calculated Imputed CIAC					Limitation	
YEAR	Service Avail. Charge	Margin Res. ERC's	Gross Imputed CIAC	Amortization	Calc. Net Imputed CIAC	MR Plant in RateBase	Imputed CIAC in Rate Base
1							
2							
3							
4							
5							
6	$1,024.48	857	($878,122)	$17,562	($860,560)	$1,209,034	($860,560)
7	$1,024.48	571	(585,415)	11,708	(573,707)	773,124	(573,707)
8	$1,024.48	857	(878,122)	17,562	(860,560)	869,290	(860,560)
9	$1,024.48	857	(878,122)	17,562	(860,560)	1,145,649	(860,560)
10	$1,024.48	857	(878,122)	17,562	(860,560)	968,868	(860,560)
11	$1,024.48	857	(878,122)	17,562	(860,560)	1,164,011	(860,560)
12	$1,024.48	571	(585,415)	11,708	(573,707)	740,129	(573,707)
13	$1,024.48	857	(878,122)	17,562	(860,560)	974,358	(860,560)
14	$1,024.48	857	(878,122)	17,562	(860,560)	1,108,485	(860,560)
15	$1,024.48	857	(878,122)	17,562	(860,560)	1,008,601	(860,560)
16	$1,024.48	857	(878,122)	17,562	(860,560)	1,123,486	(860,560)
17	$1,024.48	571	(585,415)	11,708	(573,707)	710,136	(573,707)
18	$1,024.48	857	(878,122)	17,562	(860,560)	979,819	(860,560)
19	$1,024.48	857	(878,122)	17,562	(860,560)	1,066,105	(860,560)
20	$1,024.48	857	(878,122)	17,562	(860,560)	999,779	(860,560)
21	$1,024.48	857	(878,122)	17,562	(860,560)	1,080,019	(860,560)
22	$1,024.48	571	(585,415)	11,708	(573,707)	677,911	(573,707)
23	$1,024.48	857	(878,122)	17,562	(860,560)	956,847	(860,560)
24	$1,024.48	857	(878,122)	17,562	(860,560)	1,018,838	(860,560)
25	$1,024.48	857	(878,122)	17,562	(860,560)	971,571	(860,560)
26	$1,024.48	857	(878,122)	17,562	(860,560)	1,032,337	(860,560)
27	$1,024.48	571	(585,415)	11,708	(573,707)	642,541	(573,707)
28	$1,024.48	857	(878,122)	17,562	(860,560)	919,226	(860,560)
29	$1,024.48	857	(878,122)	17,562	(860,560)	966,293	(860,560)
30	$1,024.48	857	(878,122)	17,562	(860,560)	931,513	(860,560)

Schedule VII

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed
PROJECTED CIAC BALANCES

a	b	c	d	e	f	g
	New	CIAC	CIAC - Year End Balance			Average Net
YEAR	ERCs	Collected	Gross	Acc. Amort	Net	CIAC
1		$0				
2		0				
3		0				
4		0				
5		0				
6	571	585,415	585,415	(11,708)	573,707	286,853
7	571	585,415	1,170,830	(46,833)	1,123,997	848,852
8	571	585,415	1,756,245	(105,375)	1,650,870	1,387,433
9	571	585,415	2,341,660	(187,333)	2,154,327	1,902,599
10	571	585,415	2,927,075	(292,707)	2,634,367	2,394,347
11	571	585,415	3,512,490	(421,499)	3,090,991	2,862,679
12	571	585,415	4,097,905	(573,707)	3,524,198	3,307,595
13	571	585,415	4,683,320	(749,331)	3,933,989	3,729,093
14	571	585,415	5,268,735	(948,372)	4,320,362	4,127,176
15	571	585,415	5,854,150	(1,170,830)	4,683,320	4,501,841
16	571	585,415	6,439,565	(1,416,704)	5,022,860	4,853,090
17	571	585,415	7,024,980	(1,685,995)	5,338,985	5,180,923
18	571	585,415	7,610,395	(1,978,703)	5,631,692	5,485,338
19	571	585,415	8,195,810	(2,294,827)	5,900,983	5,766,337
20	571	585,415	8,781,225	(2,634,367)	6,146,857	6,023,920
21	571	585,415	9,366,640	(2,997,325)	6,369,315	6,258,086
22	571	585,415	9,952,055	(3,383,699)	6,568,356	6,468,835
23	571	585,415	10,537,470	(3,793,489)	6,743,980	6,656,168
24	571	585,415	11,122,884	(4,226,696)	6,896,188	6,820,084
25	571	585,415	11,708,299	(4,683,320)	7,024,980	6,960,584
26	571	585,415	12,293,714	(5,163,360)	7,130,354	7,077,667
27	571	585,415	12,879,129	(5,666,817)	7,212,312	7,171,333
28	571	585,415	13,464,544	(6,193,690)	7,270,854	7,241,583
29	571	585,415	14,049,959	(6,743,980)	7,305,979	7,288,416
30	571	585,415	14,635,374	(7,317,687)	7,317,687	7,311,833

Schedule VIIa

MODEL WATER UTILITY
Scenario: WTP - 30 month Increments / 18 month MR / CIAC Imputed
CALCULATION OF SERVICE AVAILABILITY CHARGES

A	Gross Book Value	$2,056,180
B	Land	0
C	Depreciable Assets	$2,056,180
D	Accumulated Depreciation to Date	0
E	Accumulated Depreciation at Design Capacity	205,618
F	Net Plant at Design Capacity	1,850,562
G	Transmission & Distribution Mains	0
H	Minimum Level of CIAC	0.00%
I	CIAC to Date	0
J	Accumulated Amortization of CIAC to Date	0
K	Acc. Amort. of CIAC at design capacity	0
L	Future Customers	1,429
M	Composite Depreciation Rate	4.00%
N	Number of Years to Design Capacity	2.5
O	Existing Service Availability Charge per ERC	0
P	Level of CIAC at Design Capacity	0.00%
Q	Requested Service Availability Charge per ERC	$1,024.48
R	Level of CIAC at Design Capacity	75.00%
S	Minimum Service Availability Charge per ERC	0
T	Level of CIAC at Design Capacity	0.00%
U	Maximum Service Availability Charge per ERC	$1,024.48
V	Level of CIAC at Design Capacity	75.00%
W	No. of Customers at Design Capacity	0
X	Current No. of Customers	0
Y	Annual Growth	571
Z	Depreciation/Amortization multiplier	73.809524
AA	Number of Years	
AB	Depreciation rate	4.00%

Schedule VIII

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed
Projected AFPI Collections

a YEAR	b New ERC's	c ERC's paying AFPI	d Avg AFPI	e AFPI Colected (k * l)
1	0	0	0.00	$0
2	0	0	0.00	0
3	0	0	0.00	0
4	0	0	0.00	0
5	0	0	0.00	0
6	571	286	62.39	17,825
7	571	0	0.00	0
8	571	286	44.94	12,839
9	571	286	121.97	34,848
10	571	0	0.00	0
11	571	571	92.96	53,119
12	571	286	223.71	63,918
13	571	286	50.37	14,391
14	571	286	136.71	39,060
15	571	0	0.00	0
16	571	571	96.77	55,297
17	571	286	232.96	66,560
18	571	286	50.65	14,471
19	571	286	137.48	39,279
20	571	0	0.00	0
21	571	571	95.92	54,814
22	571	286	230.91	65,973
23	571	286	49.46	14,132
24	571	286	134.25	38,358
25	571	0	0.00	0
26	571	571	93.22	53,267
27	571	286	224.34	64,098
28	571	286	47.52	13,576
29	571	286	128.98	36,850
30	571	0	0.00	0

Schedule VIIIa

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	1st Increment	2nd Increment (based on Year 8 figures)
Cost of Qualifying Asset	$403,011	$579,527
Divided by Future ERCs	286	571
Cost / ERC	$1,409.13	$1,014.93
Rate of Return	10.75%	10.75%
Annual Return per ERC	$151.48	$109.11
Annual Reduction in Return per ERC	$6.06	$4.36
Annual Depreciation Expense	$16,120	$23,181
Divided by Future ERCs	286	571
Annual Depreciation per ERC	$56.37	$40.60
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Return	40.00%	40.00%

	1st Increment			2nd Increment		
	Year 6	Year 7	Year 8a	Year 8b	Year 9	Year 10
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	56.37	56.37	56.37	40.60	40.60	40.60
Unfunded Exp - Prior Year						
Total Unfunded Expense	56.37	112.73	169.10	40.60	81.19	121.79
Unfunded Returns						
Return on Expense - Crnt Yr.	6.06	6.06	6.06	4.36	4.36	4.36
Return on Expense - Prior Yr.	0.00	6.06	12.12	0.00	4.36	8.73
Return on Plant - Current Yr.	151.48	145.42	139.36	109.11	104.74	100.38
Earnings - Prior Year	0.00	151.48	296.90	0.00	109.11	213.85
Compound Earnings - Prior Yr	0.00	16.28	31.92	0.00	11.73	22.99
Total Compound Earnings	157.54	325.31	486.36	113.47	234.30	350.30
Year-end AFPI Charge	213.91	438.04	655.46	154.07	315.50	472.10
(net of taxes)						
Jan	17.83	232.58	456.16		89.87	248.24
Feb	35.65	251.26	474.27		102.71	261.69
Mar	53.48	269.94	492.39		115.55	275.14
Apr	71.30	288.62	510.51		128.39	288.59
May	89.13	307.29	528.63		141.23	302.05
Jun	106.95	325.97	546.75		154.07	315.50
Jul	124.78	344.65		12.84	167.52	328.55
Aug	142.60	363.33		25.68	180.97	341.60
Sep	160.43	382.00		38.52	194.42	354.65
Oct	178.25	400.68		51.36	207.88	367.70
Nov	196.08	419.36		64.19	221.33	380.75
Dec	213.91	438.04		77.03	234.78	393.80
AVG	115.87	335.31	>>>>>	273.19	161.56	321.52
New ERC's	571	571	286	286	571	571
Limitation	286	286	286	571	571	571
# of ERC's to pay AFPI:						
Jan	48	0	0	0	48	0
Feb	48	0	0	0	48	0
Mar	48	0	0	0	48	0
Apr	48	0	0	0	48	0
May	48	0	0	0	48	0
Jun	48	0	0	0	48	0
Jul	0	0	0	48	0	0
Aug	0	0	0	48	0	0
Sep	0	0	0	48	0	0
Oct	0	0	0	48	0	0
Nov	0	0	0	48	0	0
Dec	0	0	0	48	0	0
Total	286	0	0	286	286	0
Cumulative	286	286	286	286	571	571
AFPI Collected:						
Jan	$849	$0	$0	$0	$4,280	$0
Feb	1,698	0	0	0	4,891	0
Mar	2,546	0	0	0	5,502	0
Apr	3,395	0	0	0	6,114	0
May	4,244	0	0	0	6,725	0
Jun	5,093	0	0	0	7,337	0
Jul	0	0	0	611	0	0
Aug	0	0	0	1,223	0	0
Sep	0	0	0	1,834	0	0
Oct	0	0	0	2,446	0	0
Nov	0	0	0	3,057	0	0
Dec	0	0	0	3,668	0	0
Total	17,825	0	0	12,839	34,848	0

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	3rd Increment (based on Year 10 figures)	4th Increment (based on Year 13 figures)
Cost of Qualifying Asset	$968,868	$649,572
Divided by Future ERCs	857	571
Cost / ERC	$1,130.53	$1,137.60
Rate of Return	10.75%	10.75%
Annual Return per ERC	$121.53	$122.29
Annual Reduction in Return per ERC	$4.86	$4.89
Annual Depreciation Expense	$38,755	$25,983
Divided by Future ERCs	857	571
Annual Depreciation per ERC	$45.22	$45.50
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Retur	40.00%	40.00%

	3rd Increment			4th Increment		
	Year 11	Year12	Year13a	Year 13b	Year 14	Year 15
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	45.22	45.22	45.22	45.50	45.50	45.50
Unfunded Exp - Prior Year						
Total Unfunded Expense	45.22	90.44	135.66	45.50	91.01	136.51
Unfunded Returns						
Return on Expense - Crnt Yr.	4.86	4.86	4.86	4.89	4.89	4.89
Return on Expense - Prior Yr.	0.00	4.86	9.72	0.00	4.89	9.78
Return on Plant - Current Yr.	121.53	115.47	109.41	122.29	117.40	112.51
Earnings - Prior Year	0.00	121.53	237.01	0.00	122.29	239.69
Compound Earnings - Prior Y	0.00	13.06	25.48	0.00	13.15	25.77
Total Compound Earnings	126.39	259.79	386.48	127.18	262.62	392.64
Year-end AFPI Charge (net of taxes)	171.62	350.24	522.15	172.69	353.63	529.16
Jan	14.30	186.50	364.56		100.73	278.24
Feb	28.60	201.39	378.89		115.13	293.32
Mar	42.90	216.27	393.21		129.52	308.40
Apr	57.21	231.16	407.54		143.91	323.47
May	71.51	246.04	421.86		158.30	338.55
Jun	85.81	260.93	436.19		172.69	353.63
Jul	100.11	275.81		14.39	187.77	368.26
Aug	114.41	290.70		28.78	202.85	382.89
Sep	128.71	305.58		43.17	217.92	397.51
Oct	143.01	320.47		57.56	233.00	412.14
Nov	157.31	335.35		71.95	248.08	426.77
Dec	171.62	350.24		86.34	263.16	441.39
AVG	92.96	268.37	>>>>>	225.37	181.09	360.38
New ERC's	571	571	286	286	571	571
Limitation	857	857	857	571	571	571
# of ERC's to pay AFPI:						
Jan	48	48	0	0	48	0
Feb	48	48	0	0	48	0
Mar	48	48	0	0	48	0
Apr	48	48	0	0	48	0
May	48	48	0	0	48	0
Jun	48	48	0	0	48	0
Jul	48	0	0	48	0	0
Aug	48	0	0	48	0	0
Sep	48	0	0	48	0	0
Oct	48	0	0	48	0	0
Nov	48	0	0	48	0	0
Dec	48	0	0	48	0	0
Total	571	286	0	286	286	0
Cumulative	571	857	857	286	571	571
AFPI Collected:						
Jan	$681	$8,881	$0	$0	$4,797	$0
Feb	1,362	9,590	0	0	5,482	0
Mar	2,043	10,299	0	0	6,167	0
Apr	2,724	11,007	0	0	6,853	0
May	3,405	11,716	0	0	7,538	0
Jun	4,086	12,425	0	0	8,223	0
Jul	4,767	0	0	685	0	0
Aug	5,448	0	0	1,371	0	0
Sep	6,129	0	0	2,056	0	0
Oct	6,810	0	0	2,741	0	0
Nov	7,491	0	0	3,426	0	0
Dec	8,172	0	0	4,112	0	0
Total	53,119	63,918	0	14,391	39,060	0

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	5th Increment (based on Year 15 figures)	6th Increment (based on Year 18 figures)
Cost of Qualifying Asset	$1,008,601	$653,213
Divided by Future ERCs	857	571
Cost / ERC	$1,176.90	$1,143.98
Rate of Return	10.75%	10.75%
Annual Return per ERC	$126.52	$122.98
Annual Reduction in Return per ERC	$5.06	$4.92
Annual Depreciation Expense	$40,344	$26,129
Divided by Future ERCs	857	571
Annual Depreciation per ERC	$47.08	$45.76
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Return	40.00%	40.00%

	5th Increment			6th Increment	
	Year 16	Year17	Year18a	Year 18b	Year 19
Unfunded Expenses:					
Depreciation Expense:					
Unfunded Ann. Deprec. Exp	47.08	47.08	47.08	45.76	45.76
Unfunded Exp - Prior Year					
Total Unfunded Expense	47.08	94.15	141.23	45.76	91.52
Unfunded Returns					
Return on Expense - Crnt Yr.	5.06	5.06	5.06	4.92	4.92
Return on Expense - Prior Yr.	0.00	5.06	10.12	0.00	4.92
Return on Plant - Current Yr.	126.52	120.46	114.40	122.98	118.06
Earnings - Prior Year	0.00	126.52	246.97	0.00	122.98
Compound Earnings - Prior Yr	0.00	13.60	26.55	0.00	13.22
Total Compound Earnings	131.58	270.70	403.10	127.90	264.10
Year-end AFPI Charge (net of taxes)	178.65	364.85	544.33	173.66	355.61
Jan	14.89	194.17	379.80		101.30
Feb	29.78	209.69	394.76		115.77
Mar	44.66	225.20	409.72		130.24
Apr	59.55	240.72	424.68		144.71
May	74.44	256.23	439.63		159.18
Jun	89.33	271.75	454.59		173.66
Jul	104.21	287.27		14.47	188.82
Aug	119.10	302.78		28.94	203.98
Sep	133.99	318.30		43.41	219.15
Oct	148.88	333.81		57.89	234.31
Nov	163.77	349.33		72.36	249.47
Dec	178.65	364.85		86.83	264.63
AVG	96.77	279.51	>>>>>	233.92	182.10
	571	571	286	286	571
	857	857	857	571	571
Jan	48	48	0	0	48
Feb	48	48	0	0	48
Mar	48	48	0	0	48
Apr	48	48	0	0	48
May	48	48	0	0	48
Jun	48	48	0	0	48
Jul	48	0	0	48	0
Aug	48	0	0	48	0
Sep	48	0	0	48	0
Oct	48	0	0	48	0
Nov	48	0	0	48	0
Dec	48	0	0	48	0
Total	571	286	0	286	286
Cumulative	571	857	857	286	571
Jan	$709	$9,246	$0	$0	$4,824
Feb	1,418	9,985	0	0	5,513
Mar	2,127	10,724	0	0	6,202
Apr	2,836	11,463	0	0	6,891
May	3,545	12,202	0	0	7,580
Jun	4,254	12,940	0	0	8,269
Jul	4,963	0	0	689	0
Aug	5,672	0	0	1,378	0
Sep	6,380	0	0	2,067	0
Oct	7,089	0	0	2,756	0
Nov	7,798	0	0	3,446	0
Dec	8,507	0	0	4,135	0
Total	55,297	66,560	0	14,471	39,279

Schedule VIIId

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC imputed
CALCULATION OF AFPI

	7th Increment (based on Year 20 figures)	8th Increment (based on Year 23 figures)
Cost of Qualifying Asset	$999,779	$637,898
Divided by Future ERCs	857	571
Cost / ERC	$1,166.60	$1,117.16
Rate of Return	10.75%	10.75%
Annual Return per ERC	$125.41	$120.09
Annual Reduction in Return per ERC	$5.02	$4.80
Annual Depreciation Expense	$39,991	$25,516
Divided by Future ERCs	857	571
Annual Depreciation per ERC	$46.66	$44.69
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Return	40.00%	40.00%

	7th Increment			8th Increment		
	Year 21	Year 22	Year 23a	Year 23b	Year 24	Year 25
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	46.66	46.66	46.66	44.69	44.69	44.69
Unfunded Exp - Prior Year						
Total Unfunded Expense	46.66	93.33	139.99	44.69	89.37	134.06
Unfunded Returns						
Return on Expense - Cmt Yr.	5.02	5.02	5.02	4.80	4.80	4.80
Return on Expense - Prior Yr.	0.00	5.02	10.03	0.00	4.80	9.61
Return on Plant - Current Yr.	125.41	119.35	113.29	120.09	115.29	110.49
Earnings - Prior Year	0.00	125.41	244.76	0.00	120.09	235.39
Compound Earnings - Prior Yr	0.00	13.48	26.31	0.00	12.91	25.30
Total Compound Earnings	130.43	268.27	399.41	124.90	257.90	385.59
Year-end AFPI Charge (net of taxes)	177.09	361.60	539.41	169.58	347.28	519.65
Jan	14.76	192.47	376.42		98.92	273.24
Feb	29.52	207.84	391.24		113.06	288.05
Mar	44.27	223.22	406.05		127.19	302.85
Apr	59.03	238.59	420.87		141.32	317.66
May	73.79	253.97	435.69		155.45	332.47
Jun	88.55	269.35	450.50		169.58	347.28
Jul	103.30	284.72		14.13	184.39	361.64
Aug	118.06	300.10		28.26	199.20	376.00
Sep	132.82	315.48		42.40	214.01	390.37
Oct	147.58	330.85		56.53	228.82	404.73
Nov	162.33	346.23		70.66	243.62	419.10
Dec	177.09	361.60		84.79	258.43	433.46
AVG	95.92	277.03	>>>>>	231.46	177.83	353.90
	571	571	286	286	571	571
	857	857	857	571	571	571
Jan	48	48	0	0	48	0
Feb	48	48	0	0	48	0
Mar	48	48	0	0	48	0
Apr	48	48	0	0	48	0
May	48	48	0	0	48	0
Jun	48	48	0	0	48	0
Jul	48	0	0	48	0	0
Aug	48	0	0	48	0	0
Sep	48	0	0	48	0	0
Oct	48	0	0	48	0	0
Nov	48	0	0	48	0	0
Dec	48	0	0	48	0	0
Total	571	286	0	286	286	0
Cumulative	571	857	857	286	571	571
Jan	$703	$9,165	$0	$0	$4,711	$0
Feb	1,405	9,897	0	0	5,384	0
Mar	2,108	10,629	0	0	6,057	0
Apr	2,811	11,362	0	0	6,730	0
May	3,514	12,094	0	0	7,403	0
Jun	4,216	12,826	0	0	8,075	0
Jul	4,919	0	0	673	0	0
Aug	5,622	0	0	1,346	0	0
Sep	6,325	0	0	2,019	0	0
Oct	7,027	0	0	2,692	0	0
Nov	7,730	0	0	3,365	0	0
Dec	8,433	0	0	4,038	0	0
Total	54,814	65,973	0	14,132	38,358	0

Schedule VIIIe

MODEL WATER UTILITY
Scenario: WTP - 30 month increments / 18 month MR / CIAC Imputed
CALCULATION OF AFPI

	9th Increment (based on Year 25 figures)	10th Increment (based on Year 28 figures)
Cost of Qualifying Asset	$971,571	$612,817
Divided by Future ERCs	857	571
Cost / ERC	$1,133.69	$1,073.24
Rate of Return	10.75%	10.75%
Annual Return per ERC	$121.87	$115.37
Annual Reduction in Return per ERC	$4.87	$4.61
Annual Depreciation Expense	$38,863	$24,513
Divided by Future ERCs	857	571
Annual Depreciation per ERC	$45.35	$42.93
Weighted Cost of Equity	4.30%	4.30%
Divided by Rate of Return	10.75%	10.75%
Percentage of Equity in Retur	40.00%	40.00%

	9th Increment			10th Increment		
	Year 26	Year 27	Year 28a	Year 28b	Year 29	Year 30
Unfunded Expenses:						
Depreciation Expense:						
Unfunded Ann. Deprec. Exp	45.35	45.35	45.35	42.93	42.93	42.93
Unfunded Exp - Prior Year						
Total Unfunded Expense	45.35	90.70	136.04	42.93	85.86	128.79
Unfunded Returns						
Return on Expense - Crnt Yr.	4.87	4.87	4.87	4.61	4.61	4.61
Return on Expense - Prior Yr.	0.00	4.87	9.75	0.00	4.61	9.23
Return on Plant - Current Yr.	121.87	115.81	109.75	115.37	110.76	106.14
Earnings - Prior Year	0.00	121.87	237.68	0.00	115.37	226.13
Compound Earnings - Prior Y	0.00	13.10	25.55	0.00	12.40	24.31
Total Compound Earnings	126.75	260.53	387.61	119.99	247.76	370.43
Year-end AFPI Charge (net of taxes)	172.09	351.23	523.65	162.92	333.62	499.22
Jan	14.34	187.02	365.60		95.03	262.49
Feb	28.68	201.95	379.97		108.61	276.72
Mar	43.02	216.88	394.34		122.19	290.95
Apr	57.36	231.81	408.70		135.76	305.17
May	71.71	246.73	423.07		149.34	319.40
Jun	86.05	261.66	437.44		162.92	333.62
Jul	100.39	276.59		13.58	177.14	347.42
Aug	114.73	291.52		27.15	191.37	361.22
Sep	129.07	306.45		40.73	205.59	375.02
Oct	143.41	321.37		54.31	219.82	388.82
Nov	157.75	336.30		67.88	234.04	402.62
Dec	172.09	351.23		81.46	248.27	416.42
AVG	93.22	269.13	>>>>>	224.52	170.84	339.99
	571	571	286	286	571	571
	857	857	857	571	571	571
Jan	48	48	0	0	48	0
Feb	48	48	0	0	48	0
Mar	48	48	0	0	48	0
Apr	48	48	0	0	48	0
May	48	48	0	0	48	0
Jun	48	48	0	0	48	0
Jul	48	0	0	48	0	0
Aug	48	0	0	48	0	0
Sep	48	0	0	48	0	0
Oct	48	0	0	48	0	0
Nov	48	0	0	48	0	0
Dec	48	0	0	48	0	0
Total	571	286	0	286	286	0
Cumulative	571	857	857	286	571	571
Jan	$683	$8,906	$0	$0	$4,525	$0
Feb	1,366	9,617	0	0	5,172	0
Mar	2,049	10,328	0	0	5,818	0
Apr	2,732	11,038	0	0	6,465	0
May	3,415	11,749	0	0	7,111	0
Jun	4,097	12,460	0	0	7,758	0
Jul	4,780	0	0	646	0	0
Aug	5,463	0	0	1,293	0	0
Sep	6,146	0	0	1,939	0	0
Oct	6,829	0	0	2,586	0	0
Nov	7,512	0	0	3,232	0	0
Dec	8,195	0	0	3,879	0	0
Total	53,267	64,098	0	13,576	36,850	0

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FLORIDA PUBLIC SERVICE COMM
DIVISION OF APPEALS

TESTIMONY AND EXHIBITS OF FRANK SEIDMAN
BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION
REGARDING THE RULES FOR MARGIN RESERVE AND
IMPUTATION OF CIAC ON MARGIN RESERVE
ON BEHALF OF THE FLORIDA WATERWORKS
ASSOCIATION

DOCKET NO. 960258-WS

Filed: October 18, 1996

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FPSC-RECORDS/REPORTING

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EXHIBITS

TESTIMONY OF FRANK SEIDMAN

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

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OF CIAC ON MARGIN RESERVE

ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

Q. Please state your name, profession and address.

A. My name is Frank Seidman. I am President of Management and Regulatory Consultants, Inc., consultants in the utility regulatory field. My mailing address is P.O. Box 13427, Tallahassee, FL 32317-3427.

Q. State briefly your educational background and experience.

A. I am a graduate of the University of Miami. I hold the degree of Bachelor of Science in Electrical Engineering. I have also completed several graduate level courses in economics, including public utility economics. I am a Professional Engineer, registered to practice in the state of Florida. I have over 30 years experience in utility regulation, management and consulting. This experience includes nine years as a staff member of the Florida Public Service Commission (the Commission) , two years as a planning engineer for a Florida telephone company, four years as Manager of Rates and Research for a water and sewer holding company with operations in six states, and three years as Director of Technical Affairs for a national association of industrial users of electricity. I have either supervised or prepared ratė cases, rates studies, certificate applications and original cost studies or testified as an expert witness with regard to water and wastewater utilities in Florida, California, Indiana, Michigan, Missouri, North Carolina and Ohio.

I have participated in the development and revision of the rules of this Commission for electric, telephone and water and wastewater utilities as a staff member and as a consultant.

Q. **What is the purpose of your testimony?**

A. There are several purposes. The first is to present the position of the Florida Waterworks

Association (FWWA) regarding the proposed rule. The second is to provide what the FWWA believes should be the Commission's basis for margin reserve and imputation policy. The third purpose is to present alternative rule language.

POSITION OF FWWA

Q. What is the position of the FWWA regarding the proposed rules?

A. It is the position of the FWWA that the proposed rule codifies policies that 1) are inconsistent with statutory mandates and with the rules of the Florida Department of Environmental Protection (FDEP); 2) are inconsistent with the reasonable and proper operation of utilities in the public interest; 3) unfairly discriminate in their application to water and wastewater utilities; and 4) discourage the development of utility systems in an economic manner and encourage choices that have a long-term detrimental impact on utility customers.

BASIS FOR MARGIN RESERVE POLICY

Q. **What should be the basis for the Commission's policy on margin reserve and imputation?**

A. The primary basis for the Commission's policy should be the requirements of Chapter 367, Florida Statutes, the Water and Wastewater System Regulatory Law. That law empowers the Commission to regulate the rates and service of water and wastewater utilities so as to protect the public health, safety and welfare. Sec. 367.011(3), Fla. Stat. (1995). It requires that the Commission, in setting rates, shall consider the cost of providing service, including the utility's investment in property used and useful in the public service. Sec. 367.081(2)(a), Fla. Stat. (1995). And it also places a "readiness to serve" obligation on the utility. The state provides water and wastewater utilities with a monopoly status in its service area, in turn for which the utility is obligated to serve and obligated to be prepared to serve, within a reasonable time, all applicants for service in its service area. Sec. 367.111(1), Fla. Stat. (1995).

The basis for Commission policy should also recognize that the law obligates the utility to provide service that is safe, efficient and sufficient and to provide service that is consistent with the engineering design of the system and the reasonable and proper operation of the utility in the public interest. Sec. 367.111(2), Fla. Stat. (1995). In order for the utility to meet those statutory design and operation requirements, the Commission's policy must also be consistent with FDEP statutory and regulatory requirements for safety, adequacy and planning.

Finally, Commission policy should recognize that in order for a utility to be able to meet its statutory obligations in an economic manner, the Commission must fix rates that are just, reasonable, compensatory and not unfairly discriminatory.

Q. Does the current policy, as exemplified by the proposed rule, conform to the basis which you have outlined?

A. In my opinion, no. Current policy results in rates that are not and cannot be compensatory for the investment the utility must make to meet its statutory obligations in an economical manner. Primarily as a result of the Commission's policy to impute unrealized CIAC against current investment in margin reserve, a utility <u>never</u> has the opportunity to earn a fair return on its actual investment in plant serving the public. In addition, the Commission's policy drives the utility to make decisions that will maximize its return in the short term at the expense of investment that will maximize customer welfare in the long term. Commission policy, as reflected in the proposed rule, defines and establishes a margin reserve that is inadequate to support long term economic choices. Further, the policy erodes the allowed margin reserve by imputing future CIAC against the current investment in margin reserve.

FWWA ALTERNATIVE RULE PROPOSAL

Q. **Does the FWWA have an alternative to the rule proposed by the Commission?**

A. Yes. Exhibit ____ (FS-1) shows the FWWA's alternative to the proposed rule. It is presented in legislative format with additions underlined and deletions struck through. In addition, all additions and deletions are shaded. This alternative rule proposal would, if adopted, allow utilities to meet their statutory obligations in a more economic manner than under current policy.

THE MARGIN RESERVE AND USED AND USEFUL

Q. **Would you please provide some background on the concept of Margin Reserve as it has evolved in Florida?**

A. MARGIN RESERVE is a term of art unique to the regulation of the water and wastewater industry in Florida. As consistently recognized by this Commission, it is a necessary component of used and useful plant.[1] To fully understand the part

[1]See, for example, Order Nos. 20434, 12/8/88 [88 FPSC 12:95]; 22843, 4/23/90 [90 FPSC 4:361]; 22844, 4/23/90 [90 FPSC 4:449]; 25092, 9/23/91 [91 FPSC 9:341]; PSC-92-0594-FOF-SU, 7/1/92 [92 FPSC 7:15]; PSC-93-0301-FOF-WS, 2/25/93 [93 FPSC 2:783]; PSC-93-0423-FOF-WS, 3/23/93 [93 FPSC 3:522].

Margin Reserve plays in ratemaking, we must first examine the concept of USED and USEFUL plant.

Since 1959, when privately owned water and wastewater utilities in various counties became subject to rate regulation by the Florida Public Service Commission, the empowering statute has always required the Commission to consider the investment of the utility in property "used and useful" in serving the public.[2]

Q. Is the concept of Used and Useful unique to water and wastewater utilities?

A. No. Chapter 366, F.S., regulating electric and gas utilities requires the Commission "... to investigate and determine the actual legitimate costs of the property of each utility company, actually used and useful in the public service..." For ratemaking purposes the net investment in such property is "... the money honestly and prudently

[2]Florida Laws 59-372; 67-496; 71-278. The 1959 law referred to "a fair return on the fair value of the property of the public utility used and useful in the public service." The 1967 revision referred to "the money honestly and prudently invested by the public utility in property used and useful in serving the public." The 1971 version, which has been amended considerably, still retains the language "the utility's investment in property used and useful in the public service."

invested by the public utility company in such property <u>used and useful</u> in serving the public..."[3]

Q. Is the term USED AND USEFUL defined in the Florida statutes?

A. No, the term is not defined. But even without definition, people seem to grasp the basic concept that used and useful property is property employed in a beneficial manner to provide a service to the public.

A cogent explanation of the concept was given by the Commission itself in a 1977 order:

> The concept of "used and useful in the public service" basically an engineering concept, is one of the most valuable tools in regulation and ratemaking. It is basically a measuring rod or test used to determine <u>the portion or amount of the utility's assets which are to</u>

[3] This happens to be the same language as in Florida Laws 67-496, the 1967 water and sewer law.

> <u>be included in its rate base and upon which the utility has an opportunity to earn a return</u>.
>
> Basically a two step determination, the first step is to establish the physical existence and cost of the assets which the utility alleges are in its operations...
>
> Once the existence and cost of a utility's assets has been established, the second step in defining used and useful is to determine which identified assets are really used and useful in performing the utility's service obligation. <u>The asset must be reasonably necessary to furnish adequate service to the utility's customers during the course of the prudent operation of the utility's business.</u>

> Generally, any asset which is required to perform a function which is a necessary step in furnishing service to the public is considered used and useful.
>
> In addition, good engineering design will give a growing utility a sufficient capacity over and above actual demand to act as a cushion for maximum daily flow requirements and normal growth over a reasonable period of time.[4]
> [Emphasis added]

Although margin reserve was not specifically mentioned in the Commission's explanation, one can see the seeds for it. The Commission's concept of used and useful recognizes that a utility must have capacity "over and above actual demand" and that it must have capacity adequate not only for the present, but during the course of the prudent

[4]In re: Petition of Deltona Utilities, a Division of the Deltona Corporation, to increase its water and sewer rates in Volusia County, Florida, Order No. 7684, Docket No. R-750626-WS, 3/14/77 (hereinafter referred to as the **"1977 Deltona decision"**).

operation of the utility's business. It is the portion of capacity necessary to provide these functions with which margin reserve has come to be identified.

Q. When did the term MARGIN RESERVE come into use?

A. The term "margin reserve" came into use sometime during the 1970's. Initially, it was not fully developed. It simply appeared to have been a means to recognize only that portion of used and useful plant necessary to allow a utility to meet normal growth over a reasonable period of time.

The term was given formal recognition by the Commission staff as a part of used and useful plant in a 1978 staff memorandum:

> The term <u>Margin Reserve</u> will be used to identify that part of a plant and/or system that represents the capacity reserved to serve additional customers for a designated period subsequent to the end of a test year.

....

... the "margin reserve" is computed and made a part of the total allowable used and useful determination.[5]

Still, the definition in the 1978 staff memorandum was quite limited as compared to the more encompassing concept of adequate capacity described in the 1977 Deltona decision. The Deltona decision recognized a need for a cushion for current demand changes as well as for growth, and the necessity for capacity adequate to provide service to the utility's customers during the course of the prudent operation of the utility's business. The 1978 memorandum addressed only the ability to serve additional customers for short periods of time. And short periods of time generally meant 12 to 18 months.

[5] Memorandum, 5/2/78, from James O. Collier, Jr., Supervisor, Water & Sewer Section to Engineers, Water & Sewer Section, Engineering Dept. re Used & Useful Determination

Q. Has the Commission ever expanded the definition of margin reserve to recognize any of its purposes other than meeting short term growth?

A. No it hasn't. In some rate cases the Commission has approved margin reserve allowances longer than 18 months, implicitly recognizing economic considerations, but the definition upon which it bases its decisions is still limited to providing capacity for short term growth only. A more complete definition is necessary to fully capture the concept of used and useful as described in the 1977 Deltona decision.

A DEFINITION OF MARGIN RESERVE FOR THE RULE

Q. How does the proposed rule define margin reserve?

A. Proposed Rule 25-30.431(1), F.A.C. continues to limit the purpose of margin reserve to meeting the needs of customer growth. It ignores its purpose of meeting changing demands of current customers, maintaining the integrity of the system for those customers and of allowing the utility to serve in an economic manner.

Q. Does the FWWA have a proposed definition that recognizes these other purposes?

A. Yes. The FWWA proposes Margin Reserve be defined as "... the investment needed to meet the changing demands of existing customers and the demand of potential customers in a reasonable time and in an economic manner."

Q. Why do you support this definition?

A. We support this definition because, consistent with the 1977 Deltona decision, it recognizes that a margin reserve represents capacity that has several functions. It represents the capacity necessary to protect existing customers and the capacity necessary to be ready to serve future customers. In addition, by recognizing that economics must be considered in how a utility meets its obligations, the definition addresses that capacity necessary to furnish adequate service during the course of the prudent operation of the utility's business.

Q. Is it important that the proposed rule recognize that margin reserve serves all customers, not just potential customers?

A. It is extremely important. Even though the Commission has consistently ruled that margin reserve is part of used and useful plant, the Office of Public Counsel (OPC) has continually argued that investment to serve current demand is for existing customers but investment in margin reserve is only for future customers and therefore the cost for margin reserve should not be included in rates.

Q. Is there merit to that argument?

A. No. Margin reserve is most definitely necessary to serve existing customers.[6]

Q. Please explain further.

A. Without margin reserve, a utility would not have any capacity available to serve any increase in

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[6] The initial definitions of margin reserve, developed in the early 1970's, did not address the part played by margin reserve in serving existing customers. And even though the 1977 Deltona decision did address this function and fully recognize it, it was not a concept that was readily understood or accepted. Only recently, has the Commission formally recognized in its orders that margin reserve benefits existing customers. See Order No. PSC-93-0423-FOF-WS, 3/23/93 [93 FPSC 3:522].

the demand of existing customers. And increases in existing customer demand is a common occurrence. An existing residential customer can increase water and wastewater demand in many ways, such as adding a bathroom or a jacuzzi, or adding a waste disposal unit, a dishwasher or washing machine, or even a sprinkler system or swimming pool. Existing commercial customers can expand their businesses, or businesses, and their associated flows, can change at the same location. These types of demands can and do occur even without any increase in total customers. Any one of these changes in demand may seem inconsequential, but the cumulative effect can place additional demands on a system that the utility must be ready to and capable of serving.

Q. **How has the Commission reacted to the argument that margin reserve is only for future customers?**

A. Although this argument has not caused the Commission to disallow margin reserve, it has given it cause to pause and consider whether margin reserve does indeed serve existing customers.

Such concerns were made evident in the Commission's consideration of a rate application in 1984.[7] The Commissioners expressed concern that through margin reserve [for water and wastewater utilities] they were asking existing customers to pay for the growth of the utility (Tr. 5). <u>They were told by staff that the margin reserve protects the individual existing customers, that it preserved and protected the integrity of the system to serve them and did not subsidize future customers</u> (Tr. 5). This statement by staff was consistent with the Commission's findings in the 1977 <u>Deltona</u> decision.

Q. **Were the Commissioners concerned with consistency in the recognition of margin reserve as part of used and useful?**

A. I believe they were. In their discussion of the St. Lucie case, the Commissioners asked Staff if other utilities have a margin reserve. Staff told them they had talked with other department directors, looked at other rulings and determined

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[7] Transcript of Agenda Conference, 8/21/84, page 3, Item #29, Docket No. 830421-WS, In re: Application of General Development Utilities, Inc., Port St. Lucie Division, for an increase in water and sewer rates in St. Lucie county, hereinafter referred to as **"the St. Lucie case."**

that there is recognition of growth in electric and other utilities consistent with that for water and wastewater utilities (Tr. 7).

Although the explanation by staff confirmed that reserves for electric utilities and water and wastewater utilities served the same purposes - a margin to protect current customers and provide capacity for future customers - it did not satisfy all Commissioners that reserves for water and wastewater utilities were for anything other than speculative growth. Commissioner Leisner made an observation that differentiated, in her mind, water and wastewater utilities from electric and gas utilities. It was her conception that for electric utilities the Commission is up front and knows whether they are building the plant the right size to meet capacity because the Commission held certificate of need hearings. On the other hand she believed that in the case of water and wastewater utilities, the "developer" puts in capacity, to serve his development, and not to serve customers. (Tr. 7,8)

I believe these observations by Commissioner Leisner point out a serious misconception. First, it equates developer related utilities with developers. Second, it implies that for electric utilities, margin reserve is the necessary result of sound engineering and planning, while for water and wastewater utilities, it is a reward to developers for building capacity to sell houses.

The unfortunate result of this misconception is that Commission policy rewards electric utilities for good engineering by allowing substantial reserves when economically justified and punishes water and wastewater utilities by restricting allowed reserves below the level that is economically justified.

Q. **Does it matter whether a utility is a developer related or independent in defining and determining margin reserve?**

A. No. Regardless of these relationships, the utility's obligations and responsibilities are the same. The utility must provide service and be ready to provide service as required by law. The utility must have adequate capacity to serve in an economical manner. That is the point of the whole used and useful process - to recognize only the investment necessary to serve the public and meet obligations under the law.

When it comes to determining used and useful property, the criteria applied to developer related and independent utilities should be the same. If they are, then it doesn't matter who owns them or runs them. As discussed in the 1977 Deltona order, the criteria are:

A) The assets are necessary to furnish adequate service during the course of the prudent operation of the utility.

B) In keeping with good engineering design, capacity is sufficient to provide a cushion over maximum daily flows and to serve normal growth over a reasonable period of time.

If margin reserve is properly defined and the definition is applicable to all utilities, then a margin reserve allowance will protect customers, existing and potential, by assuring that capacity is adequate but not excessive, regardless of whether the utility is or is not developer related.

Q. Why is it important to recognize economics in the definition of margin reserve?

A. Because a simple measurement of capacity requirements, without consideration of cost, can lead to uneconomic decisions regarding the means of providing necessary capacity. The Commission is much more attuned to the relationship between capacity requirements and economics in its regulation of electric utilities. Its guiding principle in assessing the plans of electric utilities has been, "what alternative results in the lowest long run cost?"

Q. Is it fair and logical to compare reserve requirements of water and wastewater utilities with those of electric utilities.

A. Yes it is. The purposes of the reserve requirements are similar and the Commission should treat them similarly, but is has not. This has been primarily because the Commission has viewed the reserves for these respective utilities from different perspectives. <u>The Commission views</u>

reserves for electric utilities as providing reliability for existing customers, but no capacity for growth. And it views reserves for water and wastewater utilities as providing capacity for future growth but no degree of reliability for existing customers. In fact, both perceptions are incorrect. Reserves for electric, water and wastewater utilities, as previously observed by staff, serve both purposes. Reserves provide reliability for existing customers and capacity for future growth.

Q. **What has been the result of the Commission having different views regarding reserves for electric utilities versus reserves for water and wastewater utilities?**

A. The result has been that for electric utilities, the Commission has expected, even required, a minimum reserve level to be maintained and has included as used and useful, capacity resulting in reserves above the minimum, if it is reasonable, prudent and economical in the long run. But for water and wastewater utilities, except for a few limited cases, the Commission has set a maximum reserve, and has not included capacity resulting in reserves above the maximum as used and useful, even if it is reasonable, prudent and economical in the long run.

The meaning of and treatment of margin reserve for water and wastewater utilities should parallel that for reserve margin for electric utilities. That is, <u>if capacity is reasonable, prudent and economical in the long run, it should be treated as used and useful for ratemaking purposes</u>.

<u>THE MARGIN RESERVE PERIOD</u>

Q. The proposed rule includes a definition for a "Margin Reserve Period." What is the purpose of a margin reserve period?

A. The purpose of a margin reserve period is to provide a measure of the margin reserve. The margin reserve can be visualized as an amount of capacity over and above current capacity necessary to allow the utility to continue to serve existing customers until capacity can be economically expanded. The amount of capacity necessary for that purpose depends on the period of time that will elapse between the present and when an incremental addition can be added. That period of time is the "margin reserve period."

Q. Does the proposed rule define a "Margin Reserve Period?"

A. Yes it does, in proposed Rule 25-30.431(2), F.A.C. The proposed definition of Margin Reserve Period is "...the time period needed to install the next economically feasible increment of plant capacity that will preclude a deterioration in the quality of service."

Q. Does the FWWA agree with this proposed definition?

A. No. The definition is too limiting. It recognizes only the period necessary to "install" the next increment of capacity and ignores the period necessary to plan, design and obtain land and permits for that capacity and the economic time span between additions. A utility must maintain adequate capacity during all of that time, not just while additions are being installed. If the definition is limited as proposed, then a portion of capacity economically sized, and needed by the utility to meets its obligations, will be excluded from used and useful plant and therefore from the rate base upon which it will be allowed the opportunity to earn a return.

Q. What definition does the FWWA propose?

A. The FWWA proposes that Margin Reserve Period be defined as "the period during which current capacity is required to be available until the next economic capacity addition can be placed in service without causing a deterioration in the quality of service." This definition captures the entire period during which capacity will be required, until the next economic addition.

Q. You have indicated that reserves for water and wastewater utilities should be treated consistently with electric utilities. Why is that?

A. The treatment should be consistent because the purposes or end results are consistent. The means of expressing the measurement of reserve may be different, and the names of the reserve may be different, but the reserves are equivalent in purpose.[8] The difference in expressing the reserve reflects the different engineering approaches to how capacity requirements are determined.

Regardless of how we get there, the result is the same. With regard to electric utilities, the capacity necessary to maintain reliability at a minimum level and on a continuing and economic basis is determined. The resulting capacity requirement, based on an economic analysis, is expressed as a percent of current peak demand. But that capacity, relative to demand, is adequate for some period of time - some number of years at the projected rate of growth. The length of time into the future that capacity will serve is equivalent to margin reserve, in water and wastewater utility terms.

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[8] A capacity reserve, to assure a utility's ability to provide reliable service and meet statutory requirements, is a necessity long recognized by the PSC for water, wastewater and electric utilities. Although the purpose of the reserve is similar for these types of utilities, they have different names and are measured in different ways. The investment in capacity reserve for water and wastewater utilities is called a <u>margin reserve</u> and has historically been expressed <u>in terms of equivalent</u> annual growth. The investment in capacity reserve for electric utilities is called a <u>reserve margin</u> and has historically been expressed <u>as a percentage</u> of annual peak load demand. However, either reserve can be expressed in terms of percentage of peak load demand or equivalent annual growth.

With regard to water and wastewater, the capacity necessary to meet test year demand plus demand for a period until the next increment can be economically added is determined. The amount of capacity required during the margin reserve period, if expressed as a percent of the current demand instead of period of time, is equivalent to the reserve margin, in electric utility terms.

Q. **In discussing the measurement of margin reserve you have referred to peak demand as the basis of measurement. If the Commission allows a utility sufficient capacity to meet peak demand, is a margin reserve still necessary?**

A. Yes. Obviously, if a utility has sufficient capacity to meet its peak demand, it will have some reserve available during non-peak periods. But without a margin reserve it will have zero capacity to meet demands in excess of the historic peak, to meet any increased demand from existing customers, to meet historic peak demand if any major component of the system becomes unavailable at the peak, or to serve even one new customer in a timely manner without effecting the service of existing customers. This reasoning is consistent with that for electric utilities. As previously discussed, the percent reserve margin for electric utilities is expressed as the difference between available capacity and the annual <u>peak</u> day demand. Further, in my opinion, some reserve is always needed, even for a no growth utility, in order to have some capability to meet fluctuations in historic demand, regardless of cause.

<u>THE DEFAULT MARGIN RESERVE PERIOD</u>

Q. Does the proposed rule include a default margin reserve period?

A. Yes. Proposed Rule 25-30.431(4), F.A.C. sets margin reserve periods that would be applied by the Commission, unless otherwise justified. The margin reserve period is set at 18 months for water source and treatment facilities and wastewater treatment and effluent disposal facilities. It also sets a margin reserve period at 12 months for water distribution and transmission lines and the wastewater collection system.

Q. Does FWWA agree with the periods set out in the proposed rule?

A. No. These periods are far too short to allow a utility to plan and construct capacity additions in an economical manner or, in some cases, to operate in compliance with FDEP regulations.

Q. What time spans does FWWA recommend for the margin reserve periods?

A. The FWWA recommends that for water source and treatment facilities and wastewater treatment and effluent disposal facilities, the margin reserve period be set at five years. I will address the margin reserve for water distribution and transmission lines and the wastewater collection portions of the system later in my testimony.

Q. What are the reasons for selecting five years for source, treatment and disposal related facilities?

A. There are several reasons. First, there are practical considerations. In today's environmentally conscious society, it can take several months to several years to go through the process of acquiring a site or readying an existing site for use. Whether new or existing, a utility must perform the required tests on the site, obtain permits for its use, work out buffer requirements, obtain the necessary consumptive use permits, and gain approval for disposal of effluent. Obtaining a consumptive use permit alone may well take four years. A utility must maintain a level of capacity sufficient to adequately serve its customers during this planning and permitting process.

Another reason for selecting the five year margin reserve period is because it is compatible with the planning regulations for wastewater facilities set out by FDEP in Rule 62-600.405, F.A.C. That rule requires a utility to initiate planning and design for capacity expansion if the currently permitted capacity will be equalled or exceeded within the next five years. Therefore, regardless of whether this Commission recognizes the investment the utility must make to maintain capacity during that five year period, the utility is obligated to move ahead with a capacity expansion.

Q. **Does the FDEP have similar rules applicable to water systems?**

A. Not as yet. However, the FDEP is considering adopting planning rules for water systems and has already indicated that they will closely parallel the requirements of the planning rules for wastewater systems and will include the requirement to initiate planning and design for capacity expansion if the currently permitted capacity will be equalled or exceeded within the next five years.

Q. **Are there any other reasons to select a five year margin reserve period?**

A. Yes. There is a third and most compelling reason and that is when a utility is limited to building capacity that is adequate only for short periods - periods less than five years - it cannot take advantage of the economies of scale in system design and equipment sizing that will provide long run economic benefits. For water and wastewater facilities, there are still significant economies of scale in building larger units and five years provides a minimum incentive. The staff of FDEP has both acknowledged and recommended that water and wastewater systems should be planned for periods of ten years or longer.[9] Yet there is no incentive to consider the long run and build larger, lower unit cost facilities if a portion of the investment cannot be earned on because it results in capacity in excess of that allowed through an 18 month margin reserve period.

Q. **Can the FWWA provide the Commissioners with any evidence that economies of scale do exist and their impact on long run costs?**

A. Yes. The FWWA has had an analysis performed by Milian, Swain & Associates for that purpose. Their analysis supports the conclusion that economies of scale exist. They will be discussing the results of their analysis in this proceeding.

Q. **Is setting a five year margin reserve period the only means by which the Commission should recognize economies of scale?**

A. No. As previously discussed, a five year period is really a minimum period necessary to encourage a

[9] See June 29, 1995 Letter to John Williams from FDEP Director of Division of Water Facilities Richard M. Harvey. Also see statement of Van Hoofnagle, FDEP Drinking Water Section, Tr.40-42, FPSC Used and Useful Workshop, 7/12/95.

utility to take advantage of economies of scale that will provide long run benefits. A five year margin reserve period signals the utility that it can plan for the longer term and anticipate recovery of the associated costs. But, in addition, the Commission can further encourage economies of scale through other means. For example, similar to its treatment of electric utilities, if the Commission determines that capacity additions result in a margin reserve period greater than the five year default, but finds that they are reasonable, prudent and economical in the long run, it can include the cost of the expansion in used and useful plant. Also, the Commission may consider using an economies of scale factor as has been suggested at the margin reserve workshop and in a recent rate case before this Commission. The theory behind the economies of scale factor, as developed by Mr. John Guastella, is, in recognition of economies of scale, to consider, as a rule-of-thumb, 20% of all plant investment as 100% used and useful, and apply used and useful adjustments to only the remaining 80% of plant investment. These are two ways that the Commission can continue to encourage economies of scale in addition to providing the basic five year margin reserve period.

Q. **Would you please address the approach to margin reserve for water transmission and distribution lines and the wastewater collection system?**

A. These facilities are added to or expanded on the basis of system configuration, not strictly on the basis of the capacity of the mains. Margin reserve should not be a consideration for water transmission mains and off-site wastewater force and gravity collector mains and pumping stations, which are designed for relatively long periods of time, even for total buildout. It is expensive and impractical to lay parallel mains or change out small mains for larger ones in order to track annual growth patterns when these facilities are usually buried beneath paved roads and running through built up areas. This is also true for pump station structures. If these facilities are prudently constructed, they should be considered 100% used and useful, regardless of how many years of growth they can accommodate, and margin reserve should not be a factor.

However, a margin reserve period is appropriate for on-site distribution and collection lines and laterals. We recommend that the default margin reserve period for these facilities be increased from 12 months to two years. This would help to recognize that on-site mains must go where the customers go and as a result, a utility, in order to maintain continuity of flow, often must have more lines in the ground than a customer count would indicate. Water cannot flow through unconnected sections of line. Two customers on a street with ten lots, but not located on contiguous lots, will require more than 2/10ths of the line to serve them. Increasing the margin reserve period to the equivalent of two years of growth is a fair means of partially compensating the utility for the cost of meeting its obligation to serve under this most common of conditions, while, at the same time, responding to Commission concerns that developers bear the risk of, and not be rewarded for running lines to every lot.

Q. Is a five year margin reserve period compatible with the reserve periods that result from the reserve margins that the Commission has accepted for electric utilities?

A. A five year margin is compatible, but in general, is on the low side of the range. I have reviewed the planning documents of the three privately owned generating electric utilities serving peninsular Florida to compare the number of years of growth that can be accommodated by their planned reserve margins as filed with this Commission in their most recent Ten-Year Site Plans. The results are shown on Exhibit ____ (FS-2). The planned reserves for Florida Power & Light Company, Florida Power Corporation and Tampa Electric Company for the next ten years, provide capacity that is the equivalent of 6.5 years of growth on the low side to 24.3 years of growth on the high side. This compares to the currently allowed margin reserve period for water and wastewater utilities of 1.5 years and the FWWA proposal of 5 years.

Q. You stated that your comparison is based on the planned reserves of these utilities. Are the planned reserves in excess of the minimum that the Commission requires to be maintained?

A. Yes.

Q. How would the results compare if the reserves were kept at the minimum level?

A. A comparison at the minimum level is shown on Exhibit ____ (FS-3). Even at the minimum level, the reserves provide capacity that is the equivalent of 4 years of growth on the low side and 17 years of growth on the high side.

Q. Why do these electric utility plans include reserves in excess of the minimum required?

A. Generally, because the combination of capacity additions that result in those higher level of reserves represent the best economic choice of alternatives for serving the growing demand over the long run.

Q. **If the Commission applied the same rate treatment to the reserves of electric utilities as it does to water and wastewater utilities, what would be the consequence?**

A. The reserves in excess of the minimum would be considered non-used & useful plant and be excluded from rate base. For the three electric utilities, that would amount to about 1,500 MW of capacity, the cost of which, although economically justified, would not be recoverable through customer rates, on an ongoing basis.

Q. **What is your conclusion regarding the proper margin reserve period for water and wastewater utilities?**

A. If the Commission is to be consistent, and non discriminatory, in its policies regarding used and useful, it needs to define the margin reserve period in a way that results in used and useful being that plant adequate to meet the changing demands of existing customers until the next economic increment of plant can be placed in service. We believe that, at a minimum, that period should be set at five years for source, treatment and disposal related plant and two years for on-site distribution and collection plant. Prudently constructed off-site transmission and collector mains and pumping stations should be considered as 100% used and useful.

Our proposal provides utilities with the opportunity to earn on the full cost of plant that is necessary to provide safe, efficient and sufficient service in a reasonable time as required by law. If our proposal is adopted, utilities will be in a position to make decisions that have long term economic benefits for utility customers.

<u>STUDIES AND FACILITIES FOR REUSE OF RECLAIMED WATER</u>

Q. **The proposed rule does not specifically address policy regarding reuse feasibility studies and facilities for the reuse of reclaimed water. Should these studies and facilities be subjected to the same margin reserve policies as other effluent disposal facilities?**

A. No. Reuse feasibility studies and facilities for the reuse of reclaimed water need to be separately addressed because the statutory requirement for recovering their costs are set out in Section 403.064, F.S., Reuse of Reclaimed Water.

Section 403.064(10) requires the Commission to allow entities under its jurisdiction "to recover the full, prudently incurred cost of such studies and facilities through their rate structure." This is not permissive. If the studies or facilities meet the requirements of Section 403.064, F.S., then the Commission must allow full recovery of their prudently incurred costs through the utility's rate structure.

The FWWA proposes that the following language be included in the rule: In determining rates for water and wastewater utilities under its jurisdiction, the prudently incurred cost of studies and facilities for the purpose of reusing reclaimed water, that meet the requirements of Section 403.064, Florida Statutes shall be considered 100% used and useful.

IMPUTATION OF CIAC AGAINST MARGIN RESERVE

Q. **Proposed Rule 25-30.431(7) requires the imputation of CIAC when a margin reserve is authorized. Do you agree with this proposed rule?**

A. No. The imputation of CIAC is an illogical practice that not only defeats the purpose of margin reserve, but also is confiscatory in that it denies a utility the ability to ever earn a return on its investment in plant used and useful in the public interest.

Q. **The Commission has often justified imputation of CIAC as a policy of matching CIAC against the investment in margin reserve for the same period. Is that a proper justification?**

A. No. It is improper because the assumption upon which it is based is incorrect and illogical. The imputed CIAC and the investment in margin reserve are not from the same period. The margin reserve is an investment already made in the current period. Imputed CIAC is CIAC yet to be contributed by future customers sometime after the current period. If imputed CIAC was from the same period as the investment in margin reserve, it would not be necessary to "impute" it.

Q. Please explain further.

A. When the Commission considers rate base in a rate application, it does so for a test year. The investment in <u>margin reserve is an investment in plant already in service, for test year customers, during the test year</u>.

Then, the Commission imputes the <u>service availability charges for customers in the years subsequent to the test year, against test year investment</u>.

This is clearly a mismatch that violates the concept of the test year. It is a mismatch which the Commission does not even consider for any other revenue or cost category. For example, the Commission does not impute into the test year, the revenues or expenses, not yet incurred, but associated with future customers beyond the test year. That also would be an illogical mismatch.

If the Commission insists on imputing future CIAC against current investment in margin reserve, then it is logical to also impute the investment in margin reserve that will be necessary to serve those imputed future customers, because, after all, the need for margin reserve in a growing utility is a continuing one.[10] And that of course, is the point. That is why the imputation policy is an illogical mismatching of period investment with out-of-period contributions that denies a utility the ability to earn on its investment in margin reserve.

Q. **Hasn't a court ruled that it is within the authority of the Commission to impute CIAC to margin reserve?**

A. Yes, the First District Court of Appeal made such a ruling. Rolling Oaks Utilities, Inc. v Florida Public Service Commission, 533 So. 2d 770 (Fla. 1988). But to do so, the court interpreted the evidence in a specific case to mean that the margin reserve was an investment in "plant capacity which the utility has readily available, but not currently in use." We believe that was an

[10] Each existing customer has a margin reserve requirement associated with it that protects its quality of service as other customers are added to the system and assures that the utility has sufficient capacity to meet any additional demands that it may place on the system. As each new customer joins the system, it utilizes existing margin reserve, and that margin reserve must be replaced. Therefore, the utility must maintain a continuing investment in margin reserve in order to maintain the status quo as new customers become existing customers.

incorrect interpretation. In this rulemaking proceeding, and in cases before the Commission subsequent to Rolling Oaks, the evidence is that margin reserve is plant capacity that is not only available, but is currently in use to protect the service quality of existing customers and to provide capacity to meet the changing demands of existing customers as they improve their life styles and add or upgrade water consuming devices. The evidence is also clear that this has always been the case. Margin reserve is and always has been used and useful plant. To repeat the statements of staff to the Commissioners in their consideration of the St. Lucie (1984) case, "...margin of reserve protects the individual existing customers... and preserves and protects their (sic) integrity of the system to serve them".

Q. **You indicated that the imputation policy defeats the purpose of margin reserve. Would you please explain how that occurs?**

A. The margin reserve should not only protect the operational integrity of the system for its customers but also encourage the utility to take advantage of long run economics in its planning and construction. As encouragement toward that end, FWWA proposes that used and useful plant include the cost associated with facilities necessary to provide serve between increments capable of serving at least five years. However, if the cost of the investment in margin reserve in-place during the test year continues to be offset by the imputation of out-of-period, future CIAC, the earnings the utility would have received, and would have had available for reinvestment, are diluted, and an increase in the margin reserve period becomes a meaningless gesture. If CIAC is derived from service availability charges set at the 75% Commission guideline,[11] then the incentive to invest is diluted by approximately 75%.

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[11] Rule 25-30.580, F.A.C., Guidelines for Designing Service Availability Policy, defines the minimum and maximum amounts of CIAC for which a utility should design its service availability policy. The guideline maximum for CIAC net of amortization is no more than 75% of net plant when facilities are at design capacity. Current Commission policy encourages utilities to design toward the maximum guideline rather than the minimum.

Q. If the Commission were to adopt a five year margin reserve period, but then offset it with five years worth of CIAC, would the utility industry be any better off than it is today with an 18 month margin reserve period?

A. No. If the Commission merely extends the margin reserve period, but continues to net imputed CIAC against all of it, nothing is gained. In fact, with a five year margin and five year imputation, a utility would be in a worse financial position.

Q. Why is that?

A. Assume a utility actually builds for a five year cycle, rather than an 18 month cycle, in order to take advantage of a 25% economies of scale. Also assume that all of the cost of the margin reserve is allowed in rate base as used and useful plant, but is offset by CIAC equal to 75% of the margin reserve investment for the same period. Under these circumstances, as shown on my Exhibit ____ (FS-4), even though the margin reserve period is longer, the utility ends up investing 2.5 times as much in used plant that it cannot earn on as it would have under an 18 month cycle. Imputing CIAC for a period equal to the margin reserve period is an obvious disincentive against building more economical plant. The Milian, Swain analysis supports this conclusion.

Q. What does all of this mean in terms of financial impact on the utility?

A. Very simply, if CIAC is derived from service availability charges set at the 75% Commission guideline, a utility that is allowed a 10% return on rate base will earn a 2.5% return on its actual investment in margin reserve, when CIAC is imputed for the same number of years as the margin reserve period. This is shown on my Exhibit ____ (FS-4). In addition, the disincentive, in dollars of investment lost, is greater if the margin reserve period is increased and then imputed away in its entirety.

Q. Has the FWWA prepared a detailed analyses of the impact of the Commission's imputation policy?

A. Yes. As part of their analysis of economies of scale and long run costs, Milian, Swain & Associates, Inc. studied the impact of the imputation policy on the long run costs to consumers and on the financial condition of the utility. The results of their analysis, which they will present in this proceeding, clearly show the detrimental effect of that policy.

The fact is, that when CIAC is imputed, a growing utility never gets the opportunity to earn on the total investment it is required to make to serve the public.

Q. Doesn't AFPI [Allowance for Funds Prudently Invested] provide the opportunity for the utility to recover from future customers, the earnings not recovered from current customers?

A. No. Although the Commission may have intended that to be the purpose of AFPI, and has assumed that to be the result, it just doesn't work. AFPI, as determined using PSC Rule 25-30.434, F.A.C., accumulates certain fixed costs associated with non-used and useful plant. These costs are to be recovered from future customers at the time of hookup, along with the Service Availability Charge. But the investment in margin reserve is used and useful plant, and the portion offset by imputed CIAC that is not earned on in rate base is not recoverable through the AFPI charge.[12] As the Milian Swain analysis proves, as long as CIAC is imputed, the utility is never made whole. If the Commission comes away from this rulemaking with nothing else, it must come away with the understanding that the imputation policy is clearly confiscatory, since it does not provide an opportunity to earn a fair return on the utility's investment in used and useful plant serving the public in either the short or long term. Revising the margin reserve period without abandoning the imputation of CIAC is not a satisfactory solution.

Q. **Does that conclude your direct testimony?**

A. Yes, it does.

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[12] Margin Reserve is included in rate base as used and useful plant. The portion of margin reserve offset by imputed CIAC, even though no longer earned on in rate base, is still used and useful plant and not assignable to AFPI for recovery from future customers. The basis for the AFPI calculation is non-used and useful plant. See Rule 25-30.434(3)(f), F.A.C.

Docket No. 960258-WS
Frank Seidman
Exhibit ____ (FS-1)
Consisting of 7 pages

Florida Waterworks Association

Alternative Rule Proposal

FWWA Changes to Rule Proposed in Order No. PSC-96-0966-NOR-WS

Explanation for Changes

25-30.431 Margin Reserve

(1) "Margin reserve" is defined as the ~~amount of plant capacity~~ investment needed to meet the changing demands of existing customers and the demand of potential customers in a reasonable time and in an economic manner ~~expected demand due to customer growth~~.

More completely captures the factors recognized by the Commission [Order No. 7684] in defining used and useful, including the purposes of margin reserve. [Seidman Test. p.14-23]

(2) "Margin reserve period" is defined as the ~~time~~ period during which current capacity is required to be available until the next economic capacity addition can be placed in service without causing ~~needed to install the next economically feasible increment of plant capacity that will preclude~~ a deterioration in the quality of service.

Recognizes, in addition to time needed to install, the time needed for planning & engineering. Current capacity must be adequate during all of that time period; not just installation period. [Seidman Test. p.23-28]

(3) Margin reserve is an acknowledged component of the used and useful rate base determination. ~~that~~ An allowance for

CODING: Words underlined are additions to Commission Proposed Rule; words in ~~struck through~~ type are deletions from Commission Proposed Rule.

FWWA Changes to Rule Proposed in Order No. PSC-96-0966-NOR-WS

Explanation for Changes

margin reserve shall be in included in rate base when requested ~~and justified shall be included~~ in rate cases filed pursuant to section 367.081, Florida Statutes.

(4)(a) Unless otherwise justified, the margin reserve period for water source and treatment facilities and wastewater treatment and effluent disposal facilities, other than reuse facilities subject to (6) below will be 60 ~~18~~ months.

(b) Unless otherwise justified, the margin reserve period for on-site water ~~transmission and~~ distribution lines and services and ~~the~~ on-site wastewater collection lines and laterals ~~system~~ will be 24 ~~12~~ months. Prudently constructed water transmission and off-site distribution mains and off-site wastewater force and gravity collectors and pump

Commission policy already justifies margin reserve as a component of used & useful to be included in rate base. Only the amount is at issue & that is established by this rule. [Seidman Test. p.7-14]

Provides for addressing, in a separate paragraph, reuse facilities covered by Section 403.064, F.S. [Seidman Test. p.39-40]

Since this proposal addresses margin reserve for line as well as source, treatment & disposal facilities, this recognizes that on-site and off-site lines are designed differently & must be treated differently. [Seidman Test. p.28-39]

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stations are considered 100% used and useful.

(c) In determining whether another margin reserve period is justified, the Commission shall consider the rate of growth in the number of equivalent residential connections (ERCs); the time needed to meet the guidelines of the Department of Environmental Protection (DEP) for planning, designing, and construction of plant expansion; and the technical and economic options available for sizing increments of plant expansion.

(5)(a) Margin reserve for water source and treatment facilities and wastewater treatment and effluent disposal facilities shall be calculated as follows:

$$EG \times MP \times D = MR$$

where:

EG = Equivalent Annual Growth in

ERCs determined pursuant to (c) or (d) below

MP = Margin Reserve Period determined pursuant to subsection (4)

D = Demand per ERC (customer demand applied in the used and useful calculations for water and wastewater facilities)

MR = Margin reserve expressed in gallons per day (GPD)

(b) Margin reserve for on-site water ~~transmission and~~ distribution lines and services and ~~the~~ on-site wastewater collection lines and laterals ~~system~~ shall be calculated as follows:

EG x MP = MR

where:

EG = Equivalent Annual Growth in

Makes the treatment of on-site and off-site lines compatible with proposed Rule 25-30.431(4)(b). [Seidman Test. p.28-39]

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ERCs determined pursuant to (c) or (d) below

MP = Margin Reserve Period determined pursuant to subsection (4)

MR = Margin reserve expressed in ERCs

(c) The equivalent annual growth in ERCs (EG) is measured in terms of the projected annual growth and shall be calculated in Schedules F-9 and F-10 of Form PSC/WAW 19 for Class A utilities and Form PSC/WAW 20 for Class B utilities, incorporated by reference in Rule 25-30.437.

(d) The utility shall also submit a linear regression analysis using average ERCs for the last five years. The utility may submit other information that will affect growth in ERCs.

FWWA Changes to Rule Proposed in Order No. PSC-96-0966-NOR-WS

(6) In determining rates for water and wastewater utilities under its jurisdiction, the prudently incurred cost of studies and facilities for the purpose of reusing reclaimed water, that meet the requirements of section 403.064, Florida Statutes, shall be considered 100% used and useful.

(7 ~~6~~) As part of its application filed pursuant to Rule 25-30.437, the utility shall submit its most recent wastewater capacity analysis report, if any, filed with DEP.

(7) Contributions-in-aid-of-construction (CIAC) shall not be imputed when a margin reserve is authorized. ~~The amount of imputed CIAC shall be determined based on the number of ERCs included in the margin reserve period and the projected CIAC that will be collected from~~

Explanation for Changes

Implements the ratemaking requirements of Section 403.064, F.S. [Seidman Test. p.39-40]

Codifies proposed policy that CIAC not be imputed against margin reserve. [Seidman Test. p. 41-46]

CODING: Words underlined are additions to Commission Proposed Rule; words in ~~struck through~~ type are deletions from Commission Proposed Rule.

FWWA Changes to Rule Proposed in Order No. PSC-96-0966-NOR-WS	Explanation for Changes
~~those ERCs. However, the imputed CIAC shall not exceed the rate base component associated with margin reserve.~~	

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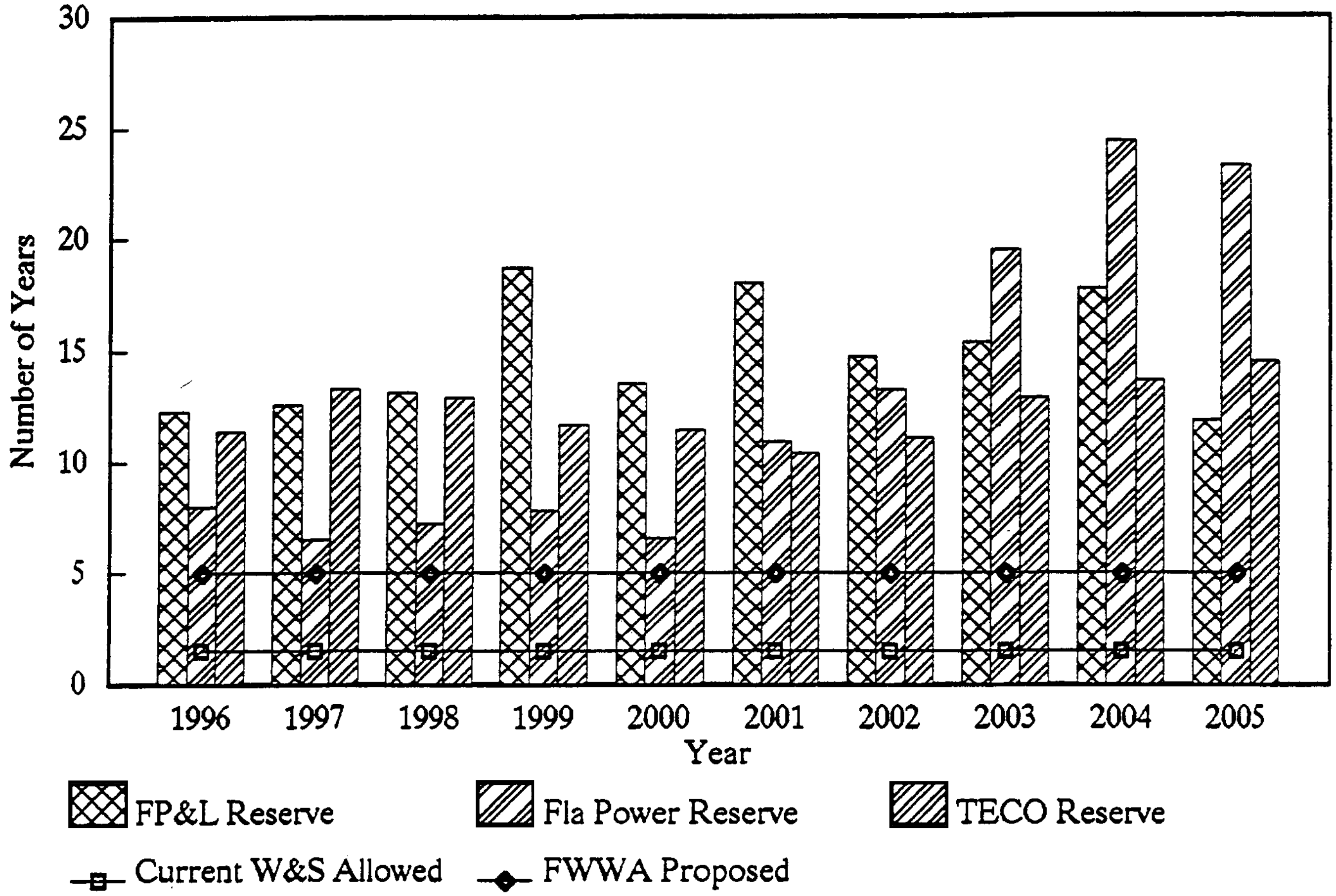
Docket No. 960258-WS
Frank Seidman
Exhibit ____ (FS-2)

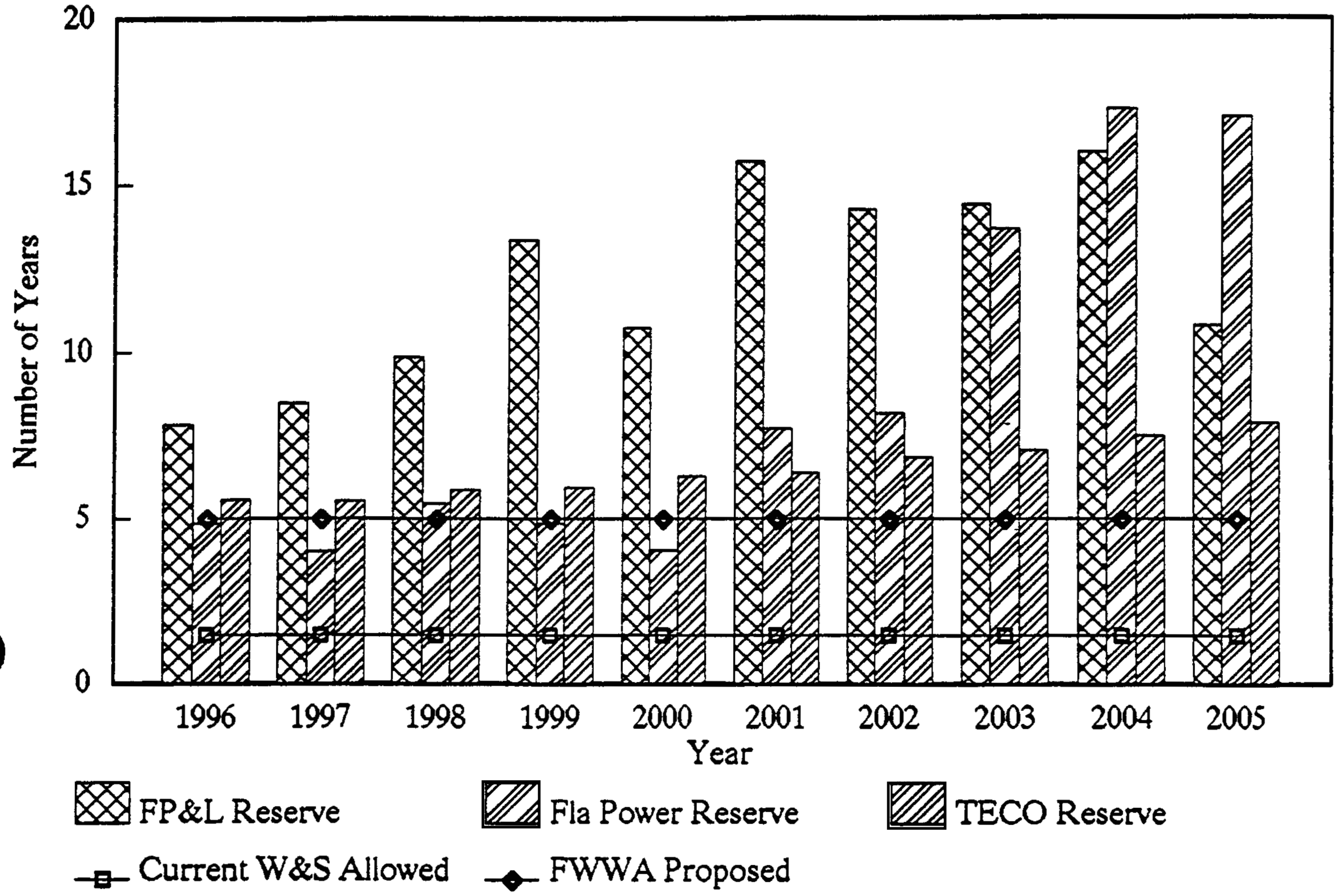
MARGIN RESERVE PERIODS

PLANNED RESERVE MARGINS In Equivalent Years of Growth



MARGIN RESERVE PERIODS

MINIMUM RESERVE MARGINS In Equivalent Years of Growth



Docket No. 960258–WS
Frank Seidman
Exhibit ____ (FS–4)

IMPACT OF IMPUTED CIAC ON RATE OF RETURN

Line No.	Assumptions	(1) Base	(2) Alt.
1	$/GPD Cost	$4.00	$3.00
2	GPD/ERC	350	350
3	Cost per ERC [line 1x2]	$1,400	$1,050
4	Economy of Scale [1–col.2/col.1]	Base Cost	0.25
5	ERC/ YR Growth	100	100
6	Margin Reserve Period, Yrs	1.5	5
	Margin Reserve Investment		
7	Year 1 [line 3x5]	140,000	105,000
8	Year 1.5 [.5 x line 3x5]	70,000	
9	Year 2		105,000
10	Year 3		105,000
11	Year 4		105,000
12	Year 5		105,000
13	MR Investment, $	210,000	525,000
	Imputed CIAC @ .75 x line 13		
13	[Used plant not earned on]	157,500	393,750
15	Additional used plant not earned on	Base	236,250
16	Increase in used plant not earned on [x Base]		2.5
17	Margin Reserve Investment, $	210,000	525,000
18	Imputed CIAC @ .75		
19	[Used plant not earned on]	157,500	393,750
20	Margin Reserve in Rate Base	52,500	131,250
21	Allowed R/R on RB @ 10%	5,250	13,125
22	Internal R/R on Investment [l.21/l.17]	2.50%	2.50%

LOST.WK3

DOCKET NO. 960258-WS

WITNESS: DIRECT TESTIMONY OF NORVELL D. WALKER,

APPEARING ON BEHALF OF STAFF

DATE FILED: OCTOBER 18, 1996

DIRECT TESTIMONY OF NORVELL D. WALKER

Q. Please state your name and business address.

A. Norvell D. Walker, 2540 Shumard Oak Boulevard, Tallahassee, Florida 32399-0850.

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

A. I am employed by the Florida Public Service Commission as a Professional Accounting Specialist with the Division of Water and Wastewater, presently with the Bureau of Policy Development and Industry Structure.

Q. Please give an overview of your educational and professional background.

A. I have worked for the Public Service Commission since my graduation from the University of Florida in 1974, where I received a Bachelor of Science degree in Accounting. On October 1, 1974, I joined the Commission as a field auditor with the Miami District Office. In 1977, I transferred to Tallahassee, thereafter working as a Public Utilities Accounting Analyst with the Commission's gas and transportation sections. In 1981, I transferred to the Commission's Water and Sewer Division. In this position, I have served as the accounting analyst in numerous rate case proceedings, certification proceedings, annual report studies, and various other regulation activities. I was accepted as an expert witness in Docket No. 850288-WS, a case which involved a transfer of plant facilities to Jacksonville Suburban Utilities Corporation; in Docket No. 830421-WS, a rate application filed by General Development Utilities, Inc. for its Port St. Lucie Division; in Docket No. 810485-WS, a rate application filed by Palm Coast Utility Corporation; and in Docket Nos. 850941-WS and 800364-WS, rate applications filed by Rolling Oaks Utilities, Inc.

Q. What is the purpose of your testimony?

A. I will testify concerning the Commission's practice of imputing Contributions in Aid of Construction (CIAC) to offset the margin reserve factor in the used and useful calculation. I will explain the mechanics of the calculation and how imputed CIAC affects the revenue requirement. Mr. Robert Crouch, supervisor of the engineering section of the Division's Bureau of Economic Regulation, will testify concerning the definition of margin reserve and why margin reserve is included in the used and useful determination. I will offer testimony about accounting matters as they relate to regulated water and wastewater utilities.

Q. How is CIAC imputed from a mechanical perspective?

A. Two simultaneous equations must be made. First, the engineer will specify which plant facilities depend upon margin reserve to enlarge the used and useful equation. Then, the rate base amount directly associated with margin reserve is calculated to determine the ceiling for imputation of CIAC. A second calculation of potential CIAC is made by multiplying the utility's plant capacity charges or main extension charges by the number of Equivalent Residential Connections (ERCs) included in the used and useful equation. The smaller amount, either the margin reserve element or the calculated CIAC, is adopted when imputing CIAC. Obviously, the imputed CIAC cannot exceed the rate base amount directly associated with margin reserve. The imputed CIAC, which is a credit entry in the rate base equation, offsets the debit balance associated with margin reserve. Likewise, offsetting provisions for depreciation expense and accumulated depreciation are determined. The net difference, if any, represents the net revenue requirement associated with margin reserve when CIAC is imputed.

Q. Would you explain how imputation of CIAC affects the revenue requirement calculation in a rate proceeding?

A. In some cases, a provision for margin reserve is not a factor in the engineer's used and useful calculation. For example, if the utility's distribution lines are largely contributed, the engineer will usually disregard margin reserve since the existing lines will be offset by a comparable amount of existing CIAC. In other cases, the subject plant will be deemed 100% used and useful irrespective of projected customer growth, since the full investment is needed to serve existing customers. Thus, since margin reserve is not a factor in these used and useful calculations, an imputation of CIAC is likewise unnecessary. However, when margin reserve is an element in the used and useful determination, that portion of the utility's investment will be reduced to the extent additional CIAC is expected due to customer growth. If connection charges are modest or non-existent, the imputed CIAC will be insubstantial. However, in most cases, particularly following any recent review of the utility's service availability charges, a substantial, if not identical, provision for CIAC is imputed to offset the plant balance associated with margin reserve. Thus, commonly, the utility's revenue requirement does not change when margin reserve is counted in the used and useful calculation, because an equal provision for CIAC is imputed as if, it too, existed during the test year.

Q. Do you harbor any reservations regarding the current practice whereby margin reserve is offset by imputed CIAC?

A. Yes. Personally and professionally, I have opposed this practice since its inception about twelve years ago. When first adopted, I believe this offsetting practice enjoyed considerable support among the Commission's accounting staff. Over time, this support has eroded to the point of dissolution. Indeed, I understand that the imputation practice is no longer advocated by any members of this Division's accounting staff.

Q. Why do you believe CIAC is imputed?

A. To reduce or eliminate the impact of including margin reserve in the used and useful calculation. Although there may be good technical and economic reasons to justify a margin reserve, those positive aspects are effectively swept aside by the CIAC imputation factor. The utility's existing investment in plant facilities is offset by pro forma recognition of projected CIAC. I believe the margin reserve is an investment pool that is constantly being replenished; when new customers are added, the investment needed to serve still future connections must be planned and completed. This investment may take the form of plant that was previously considered property held for future use, the non-used and useful portion per the utility's last rate proceeding. In this sense, margin reserve is constantly being updated, with expenditures to fund plant improvements preceding receipt of customer contributions.

Q. Isn't it true that the utility will eventually recover its investment in margin reserve from future customers?

A. Yes, to some degree. But, presumably, the utility will also be making future investments to serve additional customer growth. The utility cannot stand still when growth necessitates added expenditures to serve customers.

Q. Does the Allowance for Funds Prudently Invested (AFPI) recovery mechanism provide a return on margin reserve?

A. No. Since the margin reserve is typically considered part of the utility's investment in used and useful plant, it is excluded from the AFPI recovery formula. Likewise, the imputation amount is usually omitted from the AFPI formula. Thus, the utility does not earn a return on the imputation consideration from existing customers or future customers.

Q. Recently, in Docket No. 950495-WS, the Commission considered arguments regarding economies of scale and timing of CIAC collections, and voted to limit the CIAC imputation to 50% of the anticipated contributions. Do you believe the practice of imputing 50% of the anticipated CIAC is appropriate?

A. No. I believe that practice is a only a compromise consideration, a half-step measure that overlooks the presumptively valid co-argument that margin reserve is likewise being updated on collateral basis. As customers arrive, contributions in hand, the investment in plant capacity must also be enlarged. Maintenance of capacity for growth is a flowing stream. In most cases, an attempt is made to present the test year as a representative period, but under the averaging proposition, the CIAC imputation component is typically the single factor that presumably grows beyond the test year. Also, from another perspective, inclusion of different imputation terms under different averaging propositions is hard to rationalize - six months for lines, nine months or longer for treatment plant facilities, and possibly different terms for water and wastewater projects.

Q. Does this conclude your testimony?

A. Yes.

DOCKET NO. 960258-WS - [Proposed Rule 25-30.431, F.A.C.]

WITNESS: Direct Testimony of Robert J. Crouch, P.E. Appearing on behalf of the Florida Public Service Commission

DATE FILED: October 18, 1996

DIRECT TESTIMONY OF ROBERT J. CROUCH

Q. Please state your name and business address.

A. Robert J. Crouch. Florida Public Service Commission, 2540 Shumard Oak Boulevard, Tallahassee, FL 32399.

Q. Please state a brief description of your educational background and experience.

A. I received a B.S. in Engineering from the Air Force Institute of Technology in 1970. I completed post graduate work in Industrial Management from the Industrial College of the Armed Forces and graduated in 1976. I was certified as a Professional Engineer in March, 1976. I retired from the U.S. Air Force in 1979 as a Lieutenant Colonel after 23 years military service, primarily as an engineer and a manager. From 1979 to 1984, I was employed by Southwestern Bell Telephone Company as a design engineer.

In September, 1984, I started working for the Florida Public Service Commission (PSC) as a supervisor of an engineering section in the Division of Communications. In April, 1987, I transferred to the Division of Water and Wastewater where I supervised engineers in investigations of regulated water and wastewater utilities.

I am currently, or have been in the recent past, a member of the Florida Engineering Society, the Texas Society of Professional Engineers, National Society of Professional Engineers, Society of Military Engineers, American Water Works Association, Water Environment Federation, and the Florida Pollution Control Association.

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

A. I am employed by the PSC as the Supervisor of Engineering in the

Division of Water and Wastewater. As I stated earlier, I have worked for the PSC for over twelve years and have been in my current position for nine years.

Q. What are your general responsibilities at the PSC?

A. As Supervisor of Engineering in the Division of Water and Wastewater, I am responsible for the inspection and evaluation of regulated water and wastewater utilities and for determining their compliance with applicable PSC rules and state and federal regulatory standards. I also supervise assigned engineers who conduct field evaluations and prepare recommendations for Commission review.

Q. Have you ever testified before?

A. Yes. I have been accepted and testified as an expert witness in two separate hearings held by the U.S. House of Representatives, Military Appropriations sub-committee. Recently, I testified before this Commission in Docket No. 910560-WS -- application for a rate increase by Tamiami Village Utility, Inc. More recently, I testified in Dockets Nos. 920733-WS and 920734-WS -- application for a rate increase by General Development Utilities, Inc.; and 940847-WS -- application for a rate increase by Ortega Utility Company.

Q. What is the purpose of your testimony today?

A. The purpose of my testimony is to discuss the methods and procedures used by staff when calculating used and useful percentages and, specifically, the determination of a margin reserve for a rate case.

Q. Are used and useful methods, procedures and formulas, or margin reserve calculations covered in the Florida Statutes or Public Service Commission rules?

A. Not at this time. Staff is working on an update of Chapter 25-30 of the Florida Administrative Code, Water and Wastewater rules, which will include a detailed explanation of used and useful and the methodologies and formulas which may be used by regulated utilities when preparing their MFRs for a rate case. Margin Reserve is a major, and controversial, consideration when calculating used and useful percentages. The debate over whether to allow a margin reserve or not is argued in virtually every rate case that goes to hearing. Codification of a rule covering margin reserve could save a considerable amount of time, testimony, and rate case expense.

Q. Would you briefly explain the purpose of used and useful calculations when considering a request for a rate increase?

A. It is the intent of the Commission to allow a utility to recover, through authorized rates, charges and fees, the costs incurred in meeting its statutory obligations to provide safe, efficient and sufficient service. The utility's investment, prudently incurred, in meeting its statutory obligations shall be considered used and useful. On the other hand, investment not prudently incurred, and/or not required to provide safe, efficient and sufficient service to existing customers shall not be considered used and useful. Utilities should be encouraged to undertake planning that recognizes conservation, environmental protection, and economies of scale, which are economically beneficial to their customers over the long term.

Q. Why is it necessary for used and useful adjustments to be considered in a rate proceeding?

A. Used and useful adjustments to the investment in plant in service generally may be required when a utility is providing service in its territory but does not utilize the full design capacity of the system due to the connected load being less than that expected at build-out or design load.

Q. What concerns must the Commission balance in determining and establishing the level of adjustments to used and useful plant in a rate proceeding?

A. The Commission must balance the fairness of the level of the investment in plant that should be borne by the customers under a readiness to serve concept with a degree of encouragement for the utility to make prudent decisions and proper investment in plant necessary to serve its territory in the context of effective long-range planning and least-cost design and construction. On one hand, if the used and useful adjustment results in excessive rate base relative to the test year customers, service rates will be comparatively elevated and the potential for the utility to earn excess returns during periods of growth will exist. Alternatively, if the used and useful adjustment results in a rate base which is unfairly low, the utility will have little incentive to employ effective long range planning and seek economies of scale, the result being higher incremental costs and service rates to future as well as current customers.

Q. What does staff consider when calculating used and useful for a water system?

A. Historically, staff considers several factors when calculating used and useful percentages for a water plant in a rate case. First, the capacity of the plant being evaluated is determined. This capacity becomes the denominator in the used and useful equations. Second, staff determines the customers' demand placed upon the system; normally this is the maximum day demand exclusive of fireflow, line breaks, etc. Third, staff considers a Margin Reserve or projected short term growth demand if requested and justified by the utility in its filing. Fourth, the utility's obligation to provide fire flow is reviewed. The utility may or may not be required to furnish sufficient water to satisfy the demand for fire protection. This demand is normally specified by county ordinance and may or may not be obligatory. Finally, staff considers the demand placed upon the system by non-revenue producing or unaccounted-for-water. This demand, when it exceeds normal ranges, is subtracted from other system demands prior to final calculation.

The used and useful numerator consists of adding the maximum day, justified margin reserve, and required and producible fire flow demands and subtracting excessive unaccounted-for-water. This numerator is then divided by the plant capacity to give the used and useful ratio for a water plant. Exceptions, when documented and justified, may be considered, however.

Q. How does staff calculate used and used for a wastewater treatment plant?

A. Whereas a water system must be capable of meeting customer demands at any instant, a wastewater plant with a surge (or equalization) tank has the ability to "save" peak flows or surges and treat those flows after the surge has passed. Surge (or equalization) tanks ease the peaks allowing the plant to be designed to meet an average daily flow. The permitted capacity of the plant is the denominator while the average daily flow from the maximum month plus a margin reserve (if requested and justified) minus excess infiltration or inflow goes in the numerator. The result is the used and useful ratio. Wastewater treatment plants without surge tanks may need to be addressed somewhat differently. The engineer needs to review the maximum flows that the plant is receiving, less excessive infiltration and inflow, plus requested and justified margin reserve for the numerator in such instances.

Q. Would you briefly describe margin reserve?

A. Margin reserve is a factor in used and useful calculations which recognizes that amount of plant and distribution or collection system that is needed to be available to connect those customers who will be coming on line after the test year. It would be unduly burdensome, unrealistic, as well as very costly to a utility company to constantly be in some phase of construction in order to add new customers. The utility is required to provide service in its certificated service area when a customer is ready to tie in to the system (Section 367.111, F.S.). In the early 1980's, the PSC staff conducted research and found that the average planning, permitting, and construction time for plant was 1.5 years, and for distribution/collection systems, 1 year. These time frames allow for design, bids, actual construction and clearance for service from the appropriate regulatory agency. More recent cases, however, have shown that additional time is needed in order to meet the more stringent requirements imposed by EPA and other regulatory agencies such as the Florida Department of Environmental Protection. Preliminary design through construction completion now takes much longer for most wastewater plant construction or expansion projects. Current Commission policy as specified in this proposed margin reserve rule is to allow eighteen months for wastewater treatment plant planning and construction as a margin reserve. Staff, however, is more comfortable with a three year Margin Reserve due to the regulatory requirements mentioned above.

Staff's position is that the company should receive some recognition for the amount of plant it needs to hold in "reserve" (for the periods of times involved in new plant construction) so new customers can be added at any time. Some systems are "built out", consequently no more growth is anticipated. Built out systems would normally be considered 100% used and useful if they were properly sized. Those systems which are experiencing growth, however, should request and justify a margin reserve in their filing. When calculating margin reserve, staff attempts to use the growth pattern established over the most recent five years (the last of which is the test year in the rate case). The reason for this is to level out the growth spurts and slumps to reach a number that will be representative of anticipated growth in the future. Sometimes, due to circumstances, such as a newly constructed system, five year historical data are not available and staff uses the most reliable data that can be found. Linear regression applied to these data gives a reasonable projection of anticipated growth.

As a general rule, the amount of margin reserve should not exceed plant required to serve 20% of the existing customers. This cap on the amount of margin reserve included in rate base recognizes that there needs to be a limit to the amount of future plant that present customers should bear.

The basic premise behind the staff's normal recommendation for inclusion of margin reserve, when requested and justified, is to recognize the need for the utility to have some amount of capacity kept in reserve, beyond that which is demanded by the test year customers, to enable any new customer to connect during the next 1 to 1.5 (or 3 for wastewater treatment plants) years without constructing new plant.

Q. Has the PSC allowed a Margin Reserve in other Rate Cases ?

A. Yes. The Commission has consistently authorized a margin reserve in previous rate cases when it was requested and justified by the utility. For example: In Order No. 24733, issued July 1, 1991, in Docket No. 900521-WS, Lake Fairways Utility (FFEC-6), the Commission stated on page 5: "Our calculations for Margin Reserve are based upon the average growth in equivalent residential connections (ERCs) over the past five years. Margin Reserve should not exceed 20 percent of the number of ERCs served at the end of the test year." In Order No. PSC-93-1288-FOF-SU, issued September 7, 1993, in Docket No. 920808-SU, the Commission stated on page 12: "For these reasons, we find it appropriate to include a margin reserve in the treatment plant used and useful calculation. We shall recognize an eighteen month margin reserve period and calculate the needed capacity to be 400 ERCs per year, at 226 gpd/ERC, for 1.5 years." Commission Orders Nos. 24733 and PSC-93-1288-FOF-SU are attached to my testimony as Exhibit RJC-1

Q. Earlier, you referred to recent, more stringent requirements that have been imposed by DEP. Could you please elaborate?

A. Yes. DEP recently implemented Rule 62-600.405 F.A.C. which addresses planning for wastewater facility expansions. Let me digress for a moment and explain that there is no equivalent DEP rule governing water facility expansions at this time, only wastewater facilities are covered by the new, DEP expanded planning requirements. Rule 62-600.405 F.A.C. is attached to my testimony as Exhibit RJC-2.

Paragraph (5)(b) of this rule requires wastewater utilities to submit updated capacity analysis reports annually to DEP if the permitted capacity will be equaled or exceeded within the next 10 years. Paragraph (8)(c) states:

> If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next three years, the permittee shall submit a complete construction permit application to the department within 30 days of submittal of the initial capacity analysis report or the update of the capacity analysis report.

Before a utility can submit a construction permit application, it must invest a considerable amount of time, and sometimes money, to obtain land, design, and plan any new expansions. For this reason, staff is recommending that the time authorized for a margin reserve for wastewater treatment facilities be expanded from 18 months to 36 months. At this time, staff recommends that the margin reserve period authorized for distribution and/or collection lines remain 12 months and for water treatment facilities remain 18 months.

Q. Is there a difference between margin reserve and reserve margin?

A. Yes. Margin reserve is an economic consideration used by the PSC when determining rates for a utility. Reserve margin, also called reserve capacity, is a planning function used by DEP to determine the amount of capacity needed by a utility to function properly. DEP's reserve capacity is not the same as PSC's margin reserve. A legitimate reserve capacity may in fact be a prudent, wise investment by a utility, but it might not be totally included in the margin reserve period covered by the PSC.

Q. Are there other methods of recovering new construction expenses if a margin reserve is not allowed and that plant is considered non-used and useful?

A. Yes, there is another method available to the utility to recoup some prudent but non-used and useful expenditures. Allowance For Funds Prudently Invested (AFPI) is the economic concept developed in 1983, wherein the utility may show that the investment was legitimate and prudent even though it provided a capacity in excess of that required in the authorized margin reserve period. AFPI allows a utility to recover from new customers accumulated carrying costs on non-used and useful plant in the form of a one-time charge collected at the time on initial connection. AFPI is collected from <u>new</u> customers whereas margin reserve is collected from <u>existing</u> customers.

Q. Does this conclude your testimony?

A. Yes.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Application for a rate increase in Lee County by FFEC-Six, Ltd.	DOCKET NO. 900521-WS ORDER NO. 24733 ISSUED: 7/1/91

The following Commissioners participated in the disposition of this matter:

THOMAS M. BEARD, Chairman
J. TERRY DEASON
BETTY EASLEY
GERALD L. GUNTER
MICHAEL McK. WILSON

NOTICE OF PROPOSED AGENCY ACTION
ORDER GRANTING FINAL
RATES AND CHARGES

BY THE COMMISSION:

NOTICE is hereby given by the Florida Public Service Commission that the action discussed herein is preliminary and will become final unless a person whose interests are substantially affected files a petition for a formal proceeding pursuant to Rule 25-22.029, Florida Administrative Code.

BACKGROUND

FFEC-Six, Ltd. (FFEC or utility) is a Class B utility located in North Fort Myers, Florida. The FFEC water system serves approximately 1,297 customers and the wastewater system serves approximately 1,258 customers.

On December 3, 1990, the utility filed an application for increased water and wastewater rates. The information satisfied the minimum filing requirements (MFRs) and December 3, 1990 was established as the official date of filing. In accordance with Section 367.081(8), Florida Statutes, the utility has requested that this case be processed as a Proposed Agency Action (PAA).

No. 1-C. Those adjustments which are self-explanatory or essentially mechanical in nature are set forth in those schedules without any further discussion in the body of this Order. The major adjustments are discussed below.

Margin Reserve

Margin reserve represents capacity that the utility must have available, beyond that which is demanded by the test year customers, to enable the utility to connect new customers without plant expansion during the next 12 to 18 months which is the normal expected construction time to build new plant. Commission policy is to include a margin reserve in the used and useful calculation for both treatment plants and distribution and collection systems. This policy recognizes that utilities which are experiencing growth will continue to add customers to the system and that customers will pay plant capacity fees and connection fees for the availability of water and wastewater service. The Commission recognizes these service availability charges that will be paid as contributions-in-aid-of-construction (CIAC) and includes them in the projected test year, which impacts the utility's rate base.

Our calculations for margin reserve are based upon the average growth in equivalent residential connections (ERCs) over the past five years. Margin reserve should not exceed 20 percent of the number of ERCs served at the end of the test year.

Lake Fairways' water treatment plant provides treated water to the residents of Lake Fairways. The residents of Pine Lakes receive purchased treated water from Lee County. Due to the fact that Lake Fairways is essentially built-out, FFEC is requesting that no margin reserve be included in the used and useful calculations for the water treatment plant. FFEC has requested a margin reserve of 20 percent for its wastewater treatment plant, a margin reserve of 138 ERCs for the water distribution system and a margin reserve of 142 ERCs for the wastewater collection system.

Lake Fairways' wastewater treatment plant experienced an average growth of 19 percent from 1985 to 1989. Due to the fact that margin reserve should not exceed 20 percent, we agree with the utility and will include a margin reserve of 33,000 GPD.

For the Lake Fairways water distribution system, the average growth of ERCs over the last five years is 240 ERCs. However, since the utility only has the line distribution capacity to serve 1,551 ERCs and is already serving 1,413 ERCs, the total margin reserve added in ERCs should be limited to 138 ERCs.

The wastewater collection system experienced an average growth of 247 ERCs over the last five years. However, as mentioned above, only 142 ERCs are needed until the system is at build-out. Therefore, we will include a margin reserve of 142 ERCs in the calculation of used and useful.

Used and Useful

We calculated used and useful for the water treatment plant by adding peak flow, required fire flow, margin reserve, less any excessive unaccounted for water, and then dividing by total capacity. The used and useful percentage of the wastewater treatment plant was calculated in a similar manner by adding the average flow of the peak month and the margin reserve, less any excessive infiltration, and then dividing by total capacity.

The used and useful percentages for the water distribution system and the wastewater collection system are calculated by determining the average number of connections to the system for the test year, adding a margin reserve and then dividing by the capacity of the present distribution or collection system.

Lake Fairways' water treatment plant's maximum daily flow exceeds the total capacity. Therefore, the water treatment plant is considered 100 percent used and useful.

The wastewater treatment plant was expanded from .150 MGD to .300 MGD in 1989. Before its expansion, the wastewater treatment plant was considered 100 percent used and useful. In the MFRs, the utility showed an average daily flow of .165 MGD for 1990. Since the average growth of the utility for the last five years exceeded 20 percent, we believe it appropriate to cap the margin reserve at 20 percent. This adds 33,000 GPD to the average daily flow and results in a used and useful percentage of 66 percent for the wastewater treatment system.

The utility calculated its used and useful percentage for the wastewater treatment plant using the flows approved by DER for the design capacity of the wastewater treatment plant expansion. The utility projected 1,358 mobile homes in 1990. The permitted flow per mobile home is 150 GPD. The utility also added in a margin reserve of 20 percent or 272 mobile homes. This brought the total projected flow for 1990 to 244,500 GPD. Dividing this flow by the capacity of 300,000 GPD yielded a used and useful percentage of 82 percent.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In Re: Application for Rate Increase by South Fort Myers Division of FLORIDA CITIES WATER COMPANY in Lee County.	DOCKET NO. 920808-SU ORDER NO. PSC-93-1288-FOF-SU ISSUED: 09/07/93

The following Commissioners participated in the disposition of this matter:

J. TERRY DEASON, Chairman
SUSAN F. CLARK

APPEARANCES: B. KENNETH GATLIN, Esquire, Gatlin, Woods, Carlson & Cowdery, 1709-D Mahan Drive, Tallahassee, Florida 32308
On behalf of Florida Cities Water Company

STEVE C. REILLY, Esquire, Office of Public Counsel, The Claude Pepper Building, 111 West Madison Street, Tallahassee, Florida 32399-1400
On behalf of the Citizens of the State of Florida

LEEANN KNOWLES, Esquire, Florida Public Service Commission, 101 East Gaines Street, Tallahassee, Florida 32399-0863
On behalf of the Staff of the Commission

FINAL ORDER ESTABLISHING INCREASED RATES FOR WASTEWATER SERVICE

BY THE COMMISSION:

CASE BACKGROUND

Florida Cities Water Company, South Ft. Myers wastewater system, (FCWC or utility) is a class A utility which, as of June 30, 1992, provided wastewater service to 5,009 customers (a total of 7,469 equivalent residential connections (ERCs)) in Ft. Myers, Florida. This Commission last established rates for the South Ft. Myers Division of FCWC's wastewater system by Order No. PSC-92-0266-FOF-SU, issued on April 28, 1992.

As explained earlier in this Order, we find it appropriate that 2.5 mgd be recognized as the available treatment plant capacity. To arrive at the used and useful percentage of the wastewater treatment plant and disposal facilities using the flow method, we divide the sum of the average daily flows and the margin reserve by the capacity of the plant. Accordingly, we have divided the sum of the 2.291 average daily flow and .136 mgd margin reserve (calculated below) by the 2.5 mgd capacity of the plant. The quotient is .97. Therefore, we find that the wastewater treatment plant and disposal facilities are 97 percent used and useful.

Margin Reserve

The utility requested a margin reserve in its MFRs, and it asserted that a margin reserve is a necessary investment which benefits all customers, including existing customers. The utility stated that a margin reserve equivalent to growth at 400 customers per year for 2.3 years, at .021 mgd, is appropriate in this case, and that we should recognize both permitting and construction lead time is required to activate additional capacity.

FCWC cited several past Commission orders which addressed the concept of margin reserve. In Order No. 22843, the Commission stated:

> We believe that PCUC must have sufficient capacity to serve new customers at the time those customers connect. Section 367.111(1), Florida Statutes, requires each utility to provide service to the area described in its certificate within a reasonable time. The concept of margin reserve recognizes costs which the utility has incurred to provide service to customers in the near future. (Order No. 22843 [Palm Coast Utilities], p. 9)

This Commission has applied this same idea in other rate cases where margin reserve was considered:

> Margin reserve represents capacity that the utility must have available beyond that which is demanded by the test year's customers. The purpose of the margin reserve is to enable the utility to connect new customers during the next eighteen months or so--the normal construction time for building new plant--without plant expansion. (Order No. PSC-92-0266-FOF-SU [Florida Cities, South Ft. Myers],

p. 7 and Order No. 23660 [Florida Cities Golden Gate], p. 11)

According to Witness Smith, the second 2.5 mgd treatment train can be activated, which will allow the plant to reach its optimal capacity of 5.0 mgd. The principal concrete structures and most of the underground piping were installed in 1985 for the 5.0 mgd plant. The permitting process for the second train will take between nine and 15 months, and another 18 months would be required for construction of the additional equipment.

In the MFRs, the utility shows an average growth per year of approximately 400 ERCs. Witness Cardey supports this annual growth, explaining the average daily flow per ERC is 226 gpd. He refers to the Black and Veatch study which explains that 30 months are needed to activate the second 2.5 mgd of capacity at the existing plant.

OPC's witness Murphy testified that present customers should pay for a reasonable amount of excess capacity. In terms of margin reserve, he found 18 months to be reasonable. Witness Murphy testified that to plan, design, and permit a new 5.0 mgd plant would take three to four years. He did not believe the margin reserve period should begin when the planning and design work starts. The construction period would be about 18 months, indicating that the majority of time is taken up in planning and design. According to Witness Murphy, if the costs of construction are to be considered in ratemaking, those costs should be recognized when construction starts, not when planning begins. Calculating the amount of plant for the margin reserve would involve the gallons per day per ERC and the annual growth rate of ERCs for the 18 month period. This would be added to [average daily flow from] the maximum monthly flow.

There is no argument that the construction period for constructing a new plant is 18 months. Whether or not the design and permitting period should be included in the margin reserve period is a different argument, according to the record.

This Commission has a long standing practice of including a margin reserve period of 18 months, as presented by the above cited orders. We are persuaded by Witness Murphy's testimony that costs, and therefore investment, should be recognized when construction starts, not when planning begins. We also believe that the majority of investment is involved in construction, not in planning and design.

We have some concern about the utility's claim concerning the time required for activating the second 2.5 mgd train. According to Witness Smith's testimony, the time frames discussed appear to be liberal, allowing extra time for a worst case analysis. Construction time of eighteen months to activate the existing structure seems to be the very outside amount that it could possibly take. We do not believe that it is a normal time frame.

For these reasons, we find it appropriate to include a margin reserve in the treatment plant used and useful calculation. We shall recognize an eighteen month margin reserve period, and calculate the needed capacity to be 400 ERCs per year, at 226 gpd/ERC, for 1.5 years. This equates to additional demand and margin reserve of .136 mgd.

Used and Useful--Collection System

In the MFRs, the utility states that the on-site collection systems are designed and constructed in accordance with the regulations of the utility and DEP. Once constructed by the developers, those lines are deeded to the utility. FCWC concludes the collection system is 100 percent used and useful.

By Order No. PSC-92-0266-FOF-SU, issued April 28, 1992, this Commission found FCWC's collection system to be 100 percent used and useful. The utility had argued that since areas developed with the utility's funds had been fully developed and all other on-site lines were contributed, the collection system was 100 percent used and useful. (Order at p. 8) These circumstances remain the same in this case. Therefore, we find that the wastewater collection system is 100 percent used and useful.

Accrual of Depreciation on Non-used and Useful

The utility has proposed that we discontinue accruing depreciation on non-used and useful utility plant. The utility argues that because of slow growth, and the subsequent lack of collection of AFPI charges, it has lost the ability to recover its investment in plant. As a result of not being able to collect the carrying costs associated with the oversized plant that was built in 1986, the utility is now petitioning this Commission to change its long standing position on the accrual of depreciation on non-points for the purpose of obtaining representative influent and effluent samples. These access points shall be dry points which can be reached safely.

(b) Provisions for flow measurements shall be in accordance with Chapter 62-601, F.A.C.

Specific Authority 403.061, 403.087 FS.
Law Implemented 403.021, 403.061, 403.062, 403.086, 403.087, 403.088 FS.
History--New 11-27-89, Amended 1-30-91, 6-8-93, Formerly 17-600.400.

62-600.405 Planning for Wastewater Facilities Expansion.

(1) The permittee shall provide for the timely planning, design, and construction of wastewater facilities necessary to provide proper treatment and reuse or disposal of domestic wastewater and management of domestic wastewater residuals.

(2) The permittee shall routinely compare flows being treated at the wastewater facilities with the permitted capacities of the treatment, residuals, reuse, and disposal facilities.

(3) When the three-month average daily flow for the most recent three consecutive months exceeds 50 percent of the permitted capacity of the treatment plant or reuse and disposal systems, the permittee shall submit to the Department a capacity analysis report.

(4) The initial capacity analysis report shall be submitted according to the following:

(a) For new or expanded wastewater facilities for which the Department received a complete construction permit application after July 1, 1991, the initial capacity analysis report shall be submitted within 180 days after the last day of the last month in the three-month period referenced in Rule 62-600.405(3), F.A.C.

(b) For wastewater facilities for which the Department received a complete construction permit application on or before July 1, 1991, the initial capacity analysis report shall be submitted when the next application for a permit to construct or operate wastewater facilities is submitted to the Department unless:

1. The three-month average daily flow for any three consecutive months during the period July 1, 1990 to June 30, 1991 exceeds 90 percent of the permitted capacity. In such cases, the initial capacity analysis report shall be submitted to the Department no later than January 1, 1992.

2. The three-month average daily flow for any three consecutive months during the period July 1, 1990 to June 30, 1991 exceeds 75 percent of the permitted capacity. In such cases, the initial capacity analysis report shall be submitted to the Department no later than July 1, 1992.

(c) In no case shall the initial capacity analysis report be required to be submitted before July 1, 1991 or before the three-month average daily flow exceeds 50 percent of the permitted capacity of the treatment plant or reuse or disposal systems, as described in Rule 62-600.405(3), F.A.C.

(5) The permittee shall submit updated capacity analysis reports to the Department according to the following:

(a) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will not be equaled or exceeded for at least 10 years, an updated capacity analysis report shall be submitted to the Department at five-year intervals or at each time the permittee applies for an operation permit or renewal of an operation permit, whichever occurs first.

(b) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next 10 years, an updated capacity analysis shall be submitted to the Department annually.

(6) The capacity analysis report or an update of the capacity analysis report shall evaluate the capacity of the plant and contain data showing the permitted capacity; monthly average daily flows, three-month average daily flows, and annual average daily flows for the past 10 years or for the length of time the facility has been in operation, whichever is less; seasonal variations in flow; flow projections based on local population growth rates and water usage rates for at least the next 10 years; an estimate of the time required for the three-month average daily flow to reach the permitted capacity; recommendations for expansions; and a detailed schedule showing dates for planning, design, permit application submittal, start of construction, and placing new or expanded facilities into operation. The report shall update the flow-related and loading information contained in the preliminary design report submitted as part of the most recent permit application for the wastewater facilities pursuant to Rules 62-600.710 and 62-600.715, F.A.C.

(7) The capacity analysis report shall be signed by the permittee and shall be signed and sealed by a professional engineer registered in Florida.

(8) Documentation of timely planning, design, and construction of needed expansions shall be submitted according to the following schedule:

(a) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next five years, the report shall include a statement, signed and sealed by a professional engineer registered in Florida, that planning and preliminary design of the necessary expansion have been initiated.

(b) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next four years, the report shall include a statement, signed and sealed by an engineer registered in Florida, that plans and specifications for the necessary expansion are being prepared.

(c) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next three years, the permittee shall submit a complete construction permit application to the Department within 30 days of submittal of the initial capacity analysis report or the update of the capacity analysis report.

(d) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next six months, the permittee shall submit to the Department an application for an operation permit for the expanded facility. The operation permit application shall be submitted no later than the submittal of the initial capacity analysis report or the update of the capacity analysis report.

(9) If requested by the permittee, and if justified in the initial capacity analysis report or an update to the capacity analysis report based on design and construction schedules, population growth rates, flow projections, and the timing of new connections to the sewerage system such that adequate capacity will be available at the wastewater facility, the Secretary or Secretary's designee shall adjust the schedule specified in Rule 62-600.405(8), F.A.C.

Specific Authority 403.061, 403.087 FS.
Law Implemented 403.021, 403.061, 403.086, 403.087, 403.088, 403.0881, 403.101 FS.
History--New 1-30-91, Formerly 17-600.405.

62-600.410 Operation and Maintenance Requirements.

(1) All domestic wastewater treatment plants shall be operated and maintained in accordance with the applicable provisions of this chapter and so as to attain, at a minimum, the reclaimed water or effluent quality required by the operational criteria specified in this chapter, and to meet the appropriate domestic wastewater residuals management criteria specified in Chapters 62-2, 62-7, 62-640, and 62-701, F.A.C.

(2) All reuse and land application systems shall be operated and maintained in accordance with the applicable provisions of this chapter and the provisions of Chapter 62-610, F.A.C.

(3) All underground injection effluent disposal systems shall be operated and maintained in accordance with the applicable provisions of this chapter and the provisions of Chapter 62-28, F.A.C.

(4) Wetlands application systems shall be operated and maintained in accordance with the applicable provisions of this chapter and the provisions of Chapter 62-611, F.A.C.

(5) The operation of all treatment plants shall be under the supervision of an operator certified in accordance with Chapter 62-602, F.A.C. All facility operations shall provide for the minimum care and maintenance of the facility in accordance with Chapter 62-602, F.A.C.

~~Legal~~ appeals

Department of Environmental Protection

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FLORIDA PUBLIC SERVICE COMM.
DIVISION OF APPEALS

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

October 18, 1996

Ms. Blanca S. Bayó
Director
Division of Records and Reporting
Florida Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0870

Dear Ms. Bayó:

I am enclosing an original and 15 copies of the Department's comments and exhibits concerning proposed Rule 25-30.431, Margin Reserve, Florida Administrative Code, under Docket Number 960258-WS.

If you have any questions about the enclosed comments and exhibits, please call Van R. Hoofnagle, P.E., Administrator of the Drinking Water Section, at 487-1762; Elsa A. Potts, P.E., Administrator of the Domestic Wastewater Section, at 488-4524; or David W. York, Ph.D., P.E., Reuse Coordinator in the Domestic Wastewater Section, at 488-4524.

Sincerely,

Elsa A. Potts for
Richard D. Drew
Chief
Bureau of Water Facilities Regulation
Division of Water Facilities

RDD/js/s
Enclosures

cc: Wayne L. Schiefelbein, Esquire
Brian P. Armstrong, Esquire
Harold McLean, Esquire
Mark F. Kramer

DOCUMENT NUMBER-DATE
11188 OCT 18 96
FPSC-RECORDS/REPORTING

Docket Number 960258-WS

Proposed Rule 25-30.431, Margin Reserve, Florida Administrative Code

COMMENTS OF THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Filed October 18, 1996

COMMENTS OF THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMENT 1. To ensure the timely planning, design, and construction of wastewater facilities necessary to provide proper treatment and reuse or disposal of domestic wastewater, the Department of Environmental Protection (DEP) adopted Rule 62-600.405, Planning for Wastewater Facilities Expansion, Florida Administrative Code (F.A.C.), effective January 30, 1991. This rule, which is attached as Exhibit 1, requires each permittee to routinely compare flows being treated at its wastewater facilities with the permitted capacity of the facilities and to submit capacity analysis reports to the DEP at specified times. Furthermore, this rule requires permittees to submit documentation of timely planning, design, and construction of needed wastewater facility expansions according to the following schedule:

(1) if a capacity analysis report indicates that the permitted capacity of a facility will be equaled or exceeded within the next five years, the report shall include a statement, signed and sealed by a professional engineer, that planning and preliminary design of the needed expansion have been initiated;

(2) if a capacity analysis report indicates that the permitted capacity of a facility will be equaled or exceeded within the next four years, the report shall include a statement, signed and sealed by a professional engineer, that plans and specifications for the needed expansion are being prepared; and

(3) if a capacity analysis report indicates that the permitted

> capacity of a facility will be equaled or exceeded within the next three years, the permittee shall submit to the DEP, within 30 days after submittal of the capacity analysis report, a permit application for the needed expansion.

Clearly, the above schedule sets a five-year time period for installing needed expansions of wastewater facilities.

Rule 62-600.405, F.A.C., has been effective and has been generally well received by permittees. The DEP intends to implement a similar rule regulating community public water systems in order to ensure the timely planning, design, and construction of water facilities necessary to provide proper supply and treatment of drinking water.

Because the DEP and the Public Service Commission (PSC) share regulatory responsibilities for many investor-owned water and wastewater utilities in the State, the DEP believes it is essential that the DEP and the PSC be consistent in their rules and policies. The PSC is defining the term "margin reserve period" as the time period needed to install the next needed expansion of a water or wastewater facility. Therefore, the DEP strongly recommends that the PSC adopt a margin reserve period of five years for water supply and treatment facilities and wastewater treatment and disposal facilities to be consistent with the DEP's Rule 62-600.405, F.A.C. If the PSC adopts a margin reserve period of less than five years, the PSC will create a disincentive for complying with the DEP's rules regarding public health and water quality protection.

COMMENT 2. Reuse facilities need to be addressed in the PSC's proposed Rule 25-30.431, F.A.C. The following comments detail the DEP's concerns.

(1) Sections 367.0817 and 403.064, Florida Statutes (F.S.), which are attached as Exhibits 2 and 3, respectively, require the PSC to allow utilities to recover the full, prudently incurred cost of reuse facilities through their rate structure. This is consistent with the State objectives of encouraging and promoting reuse, as established in Section 373.250, F.S., which is attached as Exhibit 4, and Section 403.064, F.S. Section 403.064, F.S., establishes that all feasible reuse facilities are to be considered 100 percent used and useful.

(2) To minimize confusion, the proposed rule should clearly identify what types of facilities shall be considered as reuse facilities. Given the statutory language in Sections 373.250 and 403.064, F.S., it is clear that reuse is to be defined by the DEP. As a result, cross-references to the definition of "reuse" that appears in Chapter 62-610, F.A.C., and to the reuse criteria established in Chapter 62-610, F.A.C., are needed.

Below is the DEP's recommended amendment for addressing the above two concerns. This amendment would add a new Subsection (8) to proposed Rule 25-30.431, F.A.C. Recognizing the PSC's continuing interest in achieving the State's reuse objectives, the DEP is confident that the PSC will fully support this recommended amendment, which is based on clear statutory directives.

RECOMMENDED AMENDMENT TO PROPOSED RULE 25-30.431, F.A.C.

<u>(8) Reuse facilities.</u>

(a) As stated in Sections 373.250 and 403.064, F.S., the encouragement and promotion of reuse of reclaimed water, as defined by the Department of Environmental Protection, are State objectives. These sections also state that reuse is considered to be in the public interest.

(b) The Florida Public Service Commission encourages investor-owned utilities to implement reuse systems.

(c) "Reuse" is defined in Chapter 62-610, F.A.C. The Florida Public Service Commission shall use the criteria established in Chapter 62-610, F.A.C., for determining whether projects or portions of projects are to be considered as being reuse.

(d) Subsection 367.0817(3), F.S., states that all prudent costs of a reuse project shall be recovered in rates, and Subsection 403.064(10), F.S., states that, pursuant to Chapter 367, F.S., the Florida Public Service Commission shall allow entities under its jurisdiction that conduct studies or implement reuse projects, including any study required by Subsection 403.064(2), F.S., or facilities used for reliability purposes for a reclaimed water reuse system, to recover the full, prudently incurred cost of such studies and facilities through their rate structure.

(e) Calculation of margin reserve is not applicable to reuse facilities. Reuse facilities shall be considered 100 percent used and useful.

(f) Reuse facilities include the following:

1. Reuse systems and related components and appurtenances (such as irrigation systems, rapid infiltration basins, and others, as described in Chapter 62-610, F.A.C.).

2. Reclaimed water pumping facilities.

<u>3. Reclaimed water transmission and distribution piping and facilities.</u>

<u>4. Land for the reuse system.</u>

<u>5. System storage and reject storage facilities.</u>

<u>6. If high-level disinfection is required by Chapter 62-610, F.A.C., all treatment and disinfection facilities related to high-level disinfection (chemical feed systems, filters, disinfectant feed and contact facilities, and monitoring and control facilities).</u>

<u>7. If Class I reliability is required by Chapter 62-610, F.A.C., facilities that are needed to achieve Class I reliability but that would not have been needed to meet Class III reliability.</u>

The DEP recognizes that the PSC may have difficulty in categorizing all reuse facilities as 100 percent used and useful. Under some circumstances, this could pose a significant burden on existing utility customers. However, it is essential that the PSC's rules provide an incentive for reuse consistent with the statutory objectives of encouraging and promoting reuse stated in Sections 373.250 and 403.064, F.S., and further promoted by the cost-recovery provisions of Section 367.0817, F.S. It is crucial that the DEP and the PSC work together in order to achieve our mutual objectives.

landscaping, treatment of vented gases, setback distances, chemical additions, prechlorination, ozonation, innovative structural design or other similar techniques and methods. All such design measures shall be included in the preliminary design report.

(b) All treatment plant sites shall be enclosed with a fence or otherwise designed with appropriate features that discourage the entry of animals and unauthorized persons.

(c) The potential for damage or interruption of operation because of flooding shall be considered by the permittee when siting new treatment plants and expansions of existing plants at inland or coastal locations. The treatment plant structures essential for the purpose of treating, stabilizing, conveying, or holding incompletely treated waste and electrical and mechanical equipment shall be protected from physical damage by the 100-year flood. The treatment plant shall be designed to remain fully operational and accessible during the 25-year flood; lesser flood levels may be designed for, if justified in the preliminary design report based on local conditions, water surface elevations, forces arising from water movement, wave heights, flood protection measures provided, and provisions for wastewater storage such that applicable water quality standards will be met; but in no case shall less than a 10-year flood be used. Design for flood protection shall include considerations for wave action as appropriate. These flood protection considerations shall be addressed in the preliminary design report and shall be based upon available information; where site-specific information is unavailable, sound engineering practices shall be used in siting and design of treatment plant facilities.

(3) Permitted Capacity

(a) The permittee shall establish the design capacity of a wastewater facility in the permit application and shall specify the time frame (e.g., annual average daily flow, maximum monthly average daily flow, three-month average daily flow). The time frame selected shall reflect seasonal variations in flows, if any.

(b) The Department shall include the permitted capacity in the construction and operation permits and shall specify the time frame (e.g., annual average daily flow, maximum monthly average daily flow, three-month average daily flow). The permitted capacity shall not exceed the design capacity. The Department shall establish a permitted capacity less than the design capacity if:

1. The total available reuse and disposal permitted capacity is less than the design capacity; or

2. The preliminary design report does not provide reasonable assurances that the proposed wastewater facility technology will function as intended at the design capacity requested by the permittee.

(c) When the permit includes the treatment facilities and reuse or disposal systems, different permitted capacities may be established for the treatment, reuse, and disposal systems.

(4) Sampling Points

(a) Provisions shall be made in the design for easy access points for the purpose of obtaining representative influent and effluent samples. These access points shall be dry points which can be reached safely.

(b) Provisions for flow measurements shall be in accordance with Chapter 62-601, F.A.C.

Specific Authority: 403.061, 403.087, F.S.
Law Implemented: 403.021, 403.061, 403.062, 403.086, 403.087, 403.088, F.S.
History: New 11-27-89; Amended 1-30-91, 6-8-93, Formerly 17-600.400.

62-600.405 Planning for Wastewater Facilities Expansion.

(1) The permittee shall provide for the timely planning, design, and construction of wastewater facilities necessary to provide proper treatment and reuse or disposal of domestic wastewater and management of domestic wastewater residuals.

(2) The permittee shall routinely compare flows being treated at the wastewater facilities with the permitted capacities of the treatment, residuals, reuse, and disposal facilities.

(3) When the three-month average daily flow for the most recent three consecutive months exceeds 50 percent of the permitted capacity of the treatment plant or reuse and disposal systems, the permittee shall submit to the Department a capacity analysis report.

(4) The initial capacity analysis report shall be submitted according to the following:

(a) For new or expanded wastewater facilities for which the
Department received a complete construction permit application after July 1, 1991, the initial capacity analysis report shall be submitted within 180 days after the last day of the last month in the three-month period referenced in Rule 62-600.405(3), F.A.C.

(b) For wastewater facilities for which the Department received a complete construction permit application on or before July 1, 1991, the initial capacity analysis report

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shall be submitted when the next application for a permit to construct or operate wastewater facilities is submitted to the Department unless:

1. The three-month average daily flow for any three consecutive months during the period July 1, 1990 to June 30, 1991 exceeds 90 percent of the permitted capacity. In such cases, the initial capacity analysis report shall be submitted to the Department no later than January 1, 1992.

2. The three-month average daily flow for any three consecutive months during the period July 1, 1990 to June 30, 1991 exceeds 75 percent of the permitted capacity. In such cases, the initial capacity analysis report shall be submitted to the Department no later than July 1, 1992.

(c) In no case shall the initial capacity analysis report be required to be submitted before July 1, 1991 or before the three-month average daily flow exceeds 50 percent of the permitted capacity of the treatment plant or reuse or disposal systems, as described in Rule 62-600.405(3), F.A.C.

(5) The permittee shall submit updated capacity analysis reports to the Department according to the following:

(a) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will not be equaled or exceeded for at least 10 years, an updated capacity analysis report shall be submitted to the Department at five-year intervals or at each time the permittee applies for an operation permit or renewal of an operation permit, whichever occurs first.

(b) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next 10 years, an updated capacity analysis shall be submitted to the Department annually.

(6) The capacity analysis report or an update of the capacity analysis report shall evaluate the capacity of the plant and contain data showing the permitted capacity; monthly average daily flows, three-month average daily flows, and annual average daily flows for the past 10 years or for the length of time the facility has been in operation, whichever is less; seasonal variations in flow; flow projections based on local population growth rates and water usage rates for at least the next 10 years; an estimate of the time required for the three-month average daily flow to reach the permitted capacity; recommendations for expansions; and a detailed schedule showing dates for planning, design, permit application submittal, start of construction, and placing new or expanded facilities into operation. The report shall update the flow-related and loading information contained in the

preliminary design report submitted as part of the most recent permit application for the wastewater facilities pursuant to Rules 62-600.710 and 62-600.715, F.A.C.

(7) The capacity analysis report shall be signed by the permittee and shall be signed and sealed by a professional engineer registered in Florida.

(8) Documentation of timely planning, design, and construction of needed expansions shall be submitted according to the following schedule:

(a) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next five years, the report shall include a statement, signed and sealed by a professional engineer registered in Florida, that planning and preliminary design of the necessary expansion have been initiated.

(b) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next four years, the report shall include a statement, signed and sealed by an engineer registered in Florida, that plans and specifications for the necessary expansion are being prepared.

(c) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next three years, the permittee shall submit a complete construction permit application to the Department within 30 days of submittal of the initial capacity analysis report or the update of the capacity analysis report.

(d) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next six months, the permittee shall submit to the Department an application for an operation permit for the expanded facility. The operation permit application shall be submitted no later than the submittal of the initial capacity analysis report or the update of the capacity analysis report.

(9) If requested by the permittee, and if justified in the initial capacity analysis report or an update to the capacity analysis report based on design and construction schedules, population growth rates, flow projections, and the timing of new connections to the sewerage system such that adequate capacity will be available at the wastewater facility, the Secretary or Secretary's designee shall adjust

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the schedule specified in Rule 62-600.405(8), F.A.C.
Specific Authority: 403.061, 403.087, F.S.
Law Implemented: 403.021, 403.061, 403.086, 403.087, 403.088, 403.0881, 403.101, F.S.
History: New 1-30-91, Formerly 17-600.405.

62-600.410 Operation and Maintenance Requirements.

(1) All domestic wastewater treatment plants shall be operated and maintained in accordance with the applicable provisions of this chapter and so as to attain, at a minimum, the reclaimed water or effluent quality required by the operational criteria specified in this chapter, and to meet the appropriate domestic wastewater residuals management criteria specified in Chapters 62-2, 62-7, 62-640, and 62-701, F.A.C.

(2) All reuse and land application systems shall be operated and maintained in accordance with the applicable provisions of this chapter and the provisions of Chapter 62-610, F.A.C.

(3) All underground injection effluent disposal systems shall be operated and maintained in accordance with the applicable provisions of this chapter and the provisions of Chapter 62-28, F.A.C.

(4) Wetlands application systems shall be operated and maintained in accordance with the applicable provisions of this chapter and provisions of Chapter 62-611, F.A.C.

(5) The operation of all treatment plants shall be under the supervision of an operator certified in accordance with Chapter 62-602, F.A.C. All facility operations shall provide for the minimum care and maintenance of the facility in accordance with Chapter 62-602, F.A.C.

(6) All facilities and equipment necessary for the treatment, reuse, and disposal of domestic wastewater and domestic wastewater residuals shall be maintained, at a minimum, so as to function as intended.

(7) All treatment plant permittees shall be responsible for making all facilities safe in terms of public health and safety at all times, including periods of inactivation or abandonment. The permittee shall give the Department written notice at least 60 days before inactivation or abandonment of a treatment plant and shall specify what steps will be taken to safeguard public health and safety.

(8) In the event that the treatment facilities or equipment no longer function as intended, are no longer safe in terms of public health and safety, or odor, noise, aerosol drift, or lighting adversely affect neighboring developed areas at the levels prohibited by Rule 62-600.400(2)(a), F.A.C., corrective action (which may

include additional maintenance or modifications of the treatment plant) shall be taken by the permittee. Other corrective action may be required to ensure compliance with rules of the Department.

(9) After July 1, 1991, all applications to renew permits for a treatment and reuse or disposal facility shall include an operation and maintenance performance report accordance with Rule 62-660.735, F.A.C.

(10) All treatment plant permittees shall provide the operating data, records, and analytical results as required to document the operational results of the treatment plant, reuse system, and disposal system. These records shall be transmitted to the appropriate district office of the Department, in accordance with Chapters 62-601 and 62-602, F.A.C.

(11) Copies of the Department permit; record drawings pursuant to Rule 62-600.717 and 62-600.730(4)(b), F.A.C.; the approved operation and maintenance manual pursuant to Rules 62-600.720 and 62-600.730(4)(c), F.A.C.; schedules; logs; and all recorded operating data shall be kept available at all facilities or other acceptable sites approved by the Department for use by plant operators and inspection by the Department.
Specific Authority: 403.061, 403.087, 403.101, F.S.
Law Implemented: 403.021, 403.061, 403.062, 403.085, 403.086, 403.087, 403.088, 403.101, F.S.
History: New 11-27-89; Amended 1-30-91, Formerly 17-600.410.

62-600.420 Minimum Treatment Standards - Technology Based Effluent Limitations (TBELs).

(1) Secondary Treatment

(a) Surface water disposal (excluding ocean outfalls)
All domestic wastewater facilities are required, at a minimum, to provide secondary treatment of wastewater. New facilities and modifications of existing facilities shall be designed to achieve an effluent after disinfection containing not more than 20 mg/L $CBOD_5$ and 20 mg/L TSS, or 90% removal of each of these pollutants from the wastewater influent, whichever is more stringent. All facilities shall be operated to achieve, at a minimum, the specified effluent limitations (20 mg/L). All facilities shall be subject to provisions of Rule 62-600.110, F.A.C., regarding the applicability of the above requirements, and Rule 62-600.440, 62-600.445, and 62-600.740, F.A.C., regarding compliance with these requirements. Appropriate disinfection and pH control of effluents shall also be required.

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367.0817 Reuse projects.—

(1) A utility may submit a reuse project plan for commission approval. A reuse project plan shall include:

(a) A description of the project and other effluent disposal options considered by the utility.

(b) Copies of the pertinent Department of Environmental Protection and water management district permit applications filed or, in lieu thereof, a statement of the project's permit status.

(c) A statement that the reuse project is required or recommended pursuant to s. 403.064 or other relevant authority.

(d) The number and identity of the project's proposed reuse customer(s) and copies of written agreements, if any, between the utility and the customer(s) regarding the project.

(e) The projected costs associated with the reuse project. As used in this section, the term "costs" includes, but is not limited to, all capital investments, including a rate of return, any applicable taxes, and all expenses related to or resulting from the reuse project which were not considered in the utility's last rate proceeding.

(f) The utility's proposal for recovering the project's costs through rates.

(g) A proposed inservice schedule for the project.

(h) Any other information the commission may require pursuant to rule.

(2) The commission shall review the utility's reuse project plan and shall determine whether the projected costs are prudent and the proposed rates are reasonable and in the public interest. The commission shall issue a proposed agency action order to approve or disapprove the utility's reuse project plan. The commission shall enter its vote on the proposed agency action within 5 months of the date of filing. If the commission's proposed action is protested, the final decision shall be rendered by the commission within 8 months of the date the protest is filed.

(3) All prudent costs of a reuse project shall be recovered in rates. The Legislature finds that reuse benefits water, wastewater, and reuse customers. The commission shall allow a utility to recover the costs of a reuse project from the utility's water, wastewater, or reuse customers or any combination thereof as deemed appropriate by the commission.

(4) The commission's order approving the reuse project plan shall approve rates based on projected costs and shall provide for the implementation of rates without the need for a subsequent proceeding. The commission shall allow the approved rates to be implemented when the reuse project plan is approved or when the project is placed in service. If the commission allows the rates to be implemented when the plan is approved, the commission may order the utility to escrow the resulting revenues until the project is placed in service. Escrowed revenues shall be used exclusively for the reuse project.

(5) If the commission allows the rates to be implemented when the plan is approved, the utility may place its proposed rates into effect on a temporary basis, subject to refund, in the event of a protest by a party other than the utility. If the utility has requested rate implementation upon approval of the plan and the commission has exceeded the time allowed in subsection (2), the utility may place its proposed rates into effect on a temporary basis, subject to refund.

(6) After the reuse project is placed in service, the commission, by petition or on its own motion, may initiate a proceeding to true-up the costs of the reuse project and the resulting rates.

History.—s. 1, ch. 94-243.

367.082 *Interim rates; procedure.*—

(1) The commission may, during any proceeding for a change of rates, upon its own motion, upon petition from any party, or by a tariff filing of a utility or a regulated company, authorize the collection of interim rates until the effective date of the final order. Such interim rates may be based upon a test period different from the test period used in the request for permanent rate relief. Upon application by a utility, the commission may use the projected test-year rate base when determining the interim rates or revenues subject to refund. To establish a prima facie entitlement for interim relief, the commission, the petitioning party, the utility, or the regulated company shall demonstrate that the utility or the regulated company is earning outside the range of reasonableness on rate of return calculated in accordance with subsection (5).

(2)(a) In a proceeding for an interim increase in rates, the commission shall authorize, within 60 days of the filing for such relief, the collection of rates sufficient to earn the minimum of the range of rate of return calculated in accordance with subparagraph (5)(b)2. The difference between the interim rates and the previously authorized rates shall be collected under bond, escrow, letter of credit, or corporate undertaking subject to refund with interest at a rate ordered by the commission.

(b) In a proceeding for an interim decrease in rates, the commission shall authorize, within 60 days of the filing for such relief, the continued collection of the previously authorized rates; however, revenues collected under those rates sufficient to reduce the achieved rate of return to the maximum of the rate of return calculated in accordance with subsection (5) shall be placed under bond, escrow, letter of credit, or corporate undertaking subject to refund with interest at a rate ordered by the commission.

(c) The commission shall determine whether escrow, letter of credit, or corporate undertaking may be filed in lieu of the bond.

(3) In granting such relief, the commission may, in an expedited hearing but within 60 days of the commencement of the proceeding, upon petition or upon its own motion, preclude the recovery of any extraordinary or imprudently incurred expenditures or, for good cause shown, increase the amount of the bond, escrow, letter of credit, or corporate undertaking.

(4) Any refund ordered by the commission shall be calculated to reduce the rate of return of the utility or regulated company during the pendency of the proceeding to the same level within the range of the newly authorized rate of return which is found fair and reasonable on a prospective basis, but the refund shall not be in excess of the amount of the revenues collected sub-

The department shall implement such programs in conjunction with its other powers and duties and shall place special emphasis on reducing and eliminating contamination that presents a threat to humans, animals or plants, or to the environment.

History.—s. 7, ch. 67-436; ss. 19, 26, 35, ch. 69-106; s. 1, ch. 71-35; s. 2, ch. 71-36; s. 3, ch. 72-39; s. 1, ch. 72-53; s. 113, ch. 73-333; s. 3, ch. 74-133; s. 1, ch. 77-21; s. 137, ch. 77-104; s. 268, ch. 77-147; s. 2, ch. 77-369; s. 14, ch. 78-95; s. 2, ch. 78-437; s. 73, ch. 79-65; s. 1, ch. 79-130; s. 96, ch. 79-164; s. 160, ch. 79-400; s. 1, ch. 80-66; ss. 2, 5, ch. 81-228; s. 5, ch. 82-27; s. 1, ch. 82-79; s. 2, ch. 82-80; s. 66, ch. 83-310; s. 5, ch. 84-79; s. 1, ch. 84-338; s. 1, ch. 85-296; s. 5, ch. 85-345; s. 5, ch. 86-173; s. 52, ch. 86-186; s. 22, ch. 88-393; s. 31, ch. 89-279; s. 54, ch. 90-331; s. 24, ch. 91-305; s. 23, ch. 92-203; s. 127, ch. 92-279; s. 55, ch. 92-326; s. 36, ch. 93-213; s. 5, ch. 94-311; s. 1, ch. 94-321; s. 356, ch. 94-356; s. 55, ch. 95-144.

[1]**Note.**—Transferred to another location.

403.0615 Water resources restoration and preservation.—

(1) This section may be cited as the "Water Resources Restoration and Preservation Act."

(2) The department shall establish a program to assist in the restoration and preservation of bodies of water and to enhance existing public access when deemed necessary for the enhancement of the restoration effort. This program shall be funded from the General Revenue Fund, from funds available from the Pollution Recovery Fund, and from available federal moneys.

(3) The department shall adopt, by rule, criteria for the allocation of restoration and preservation funds. Such criteria shall include, but not be limited to, the following:

(a) The degree of water quality degradation;

(b) The degree to which sources of pollution which have contributed to the need for restoration or preservation have been abated;

(c) The public uses which can be made of the subject waters;

(d) The ecological value of the subject waters in relation to other waters proposed for restoration and preservation;

(e) The implementation by local government of regulatory or management programs to prevent further and subsequent degradation of the subject waters; and

(f) The commitment of local government resources to assist in the proposed restoration and preservation.

(4) The provisions of this act are for the benefit of the public and shall be liberally construed to accomplish the purposes set forth in this act.

History.—ss. 1, 4, 5, ch. 77-369; s. 2, ch. 79-130; s. 25, ch. 93-120; s. 357, ch. 94-356.

403.062 Pollution control; underground, surface, and coastal waters.—The department and its agents shall have general control and supervision over underground water, lakes, rivers, streams, canals, ditches, and coastal waters under the jurisdiction of the state insofar as their pollution may affect the public health or impair the interest of the public or persons lawfully using them.

History.—s. 2, ch. 29834, 1955; ss. 26, 35, ch. 69-106.
Note.—Former s. 381.43; s. 381.251.

403.0625 Environmental laboratory certification; water quality tests conducted by a certified laboratory.

(1) To assure the acceptable quality, reliability, and validity of testing results, the department and the Department of Health and Rehabilitative Services shall jointly establish criteria for certification of laboratories that perform analyses of environmental water quality samples which are not covered by the provisions in s. 403.863 and that wish to be certified. The Department of Health and Rehabilitative Services shall have the responsibility for the operation and implementation of such laboratory certification. The Department of Health and Rehabilitative Services may charge and collect fees for the certification of such laboratories. The fee schedule shall be based on the number of analytical functions for which certification is sought. Such fees shall be sufficient to meet the costs incurred by the Department of Health and Rehabilitative Services in administering this program in coordination with the department. All fees collected pursuant to this section shall be deposited in a trust fund to be administered by the Department of Health and Rehabilitative Services and shall be used only for the purposes of this section.

(2) An environmental water quality test to determine the quality of the effluent of a domestic wastewater facility must be conducted by a laboratory certified under this section if such test results are to be submitted to the department or a local pollution control program pursuant to s. 403.182.

History.—s. 7, ch. 85-269; s. 3, ch. 88-89; s. 358, ch. 94-356.

403.063 Groundwater quality monitoring.—

(1) The department, in cooperation with other state and federal agencies, water management districts, and local governments, shall establish a groundwater quality monitoring network designed to detect or predict contamination of the groundwater resources of the state.

(2) The department may by rule determine the priority of sites to be monitored within such groundwater quality monitoring network, based upon the following criteria:

(a) The degree of danger to the public health caused or potentially caused by contamination.

(b) The susceptibility of each site to contamination.

(3) This information shall be made available to state and federal agencies and local governments to facilitate their regulatory and land use planning decisions.

(4) To the greatest extent practicable, the actual sampling and testing of groundwater pursuant to the provisions of this section may be conducted by local and regional agencies.

History.—s. 3, ch. 83-310.

403.064 Reuse of reclaimed water.—

(1) The encouragement and promotion of water conservation, and reuse of reclaimed water, as defined by the department, are state objectives and are considered to be in the public interest. The Legislature finds that for those wastewater treatment plants permitted and operated under an approved reuse program by the department, the reclaimed water shall be considered environmentally acceptable and not a threat to public health and safety.

(2) All applicants for permits to construct or operate a domestic wastewater treatment facility located within, serving a population located within, or discharging within a water resource caution area shall prepare a reuse feasibility study as part of their application for the permit. Reuse feasibility studies shall be prepared in

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accordance with department guidelines adopted by rule and shall include, but are not limited to:

(a) Evaluation of monetary costs and benefits for several levels and types of reuse.

(b) Evaluation of water savings if reuse is implemented.

(c) Evaluation of rates and fees necessary to implement reuse.

(d) Evaluation of environmental and water resource benefits associated with reuse.

(e) Evaluation of economic, environmental, and technical constraints.

(f) A schedule for implementation of reuse. The schedule shall consider phased implementation.

(3) The study required under subsection (2) shall be performed by the applicant, and the applicant's determination of feasibility is final if the study complies with the requirements of subsection (2).

(4) A reuse feasibility study is not required if:

(a) The domestic wastewater treatment facility has an existing or proposed permitted or design capacity less than 0.1 million gallons per day; or

(b) The permitted reuse capacity equals or exceeds the total permitted capacity of the domestic wastewater treatment facility.

(5) A reuse feasibility study prepared under subsection (2) satisfies a water management district requirement to conduct a reuse feasibility study imposed on a local government or utility that has responsibility for wastewater management.

(6) Local governments may allow the use of reclaimed water for inside activities, including, but not limited to, toilet flushing, fire protection, and decorative water features, as well as for outdoor uses, provided the reclaimed water is from domestic wastewater treatment facilities which are permitted, constructed, and operated in accordance with department rules.

(7) Permits issued by the department for domestic wastewater treatment facilities shall be consistent with requirements for reuse included in applicable consumptive use permits issued by the water management district, if such requirements are consistent with department rules governing reuse of reclaimed water. This subsection applies only to domestic wastewater treatment facilities which are located within, or serve a population located within, or discharge within water resource caution areas and are owned, operated, or controlled by a local government or utility which has responsibility for water supply and wastewater management.

(8) Local governments may and are encouraged to implement programs for the reuse of reclaimed water. Nothing in this chapter shall be construed to prohibit or preempt such local reuse programs.

(9) A local government that implements a reuse program under this section shall be allowed to allocate the costs in a reasonable manner.

(10) Pursuant to chapter 367, the Florida Public Service Commission shall allow entities under its jurisdiction which conduct studies or implement reuse projects, including, but not limited to, any study required by subsection (2) or facilities used for reliability purposes for a reclaimed water reuse system, to recover the full, prudently incurred cost of such studies and facilities through their rate structure.

(11) In issuing consumptive use permits, the permitting agency shall consider the local reuse program.

(12) A local government shall require a developer, as a condition for obtaining a development order, to comply with the local reuse program.

(13) If, after conducting a feasibility study under subsection (2), an applicant determines that reuse of reclaimed water is feasible, domestic wastewater treatment facilities that dispose of effluent by Class I deep well injection, as defined in 40 C.F.R. part 144.6(a), must implement reuse according to the schedule for implementation contained in the study conducted under subsection (2), to the degree that reuse is determined feasible. Applicable permits issued by the department shall be consistent with the requirements of this subsection.

(a) This subsection does not limit the use of a Class I deep well injection facility as backup for a reclaimed water reuse system.

(b) This subsection applies only to domestic wastewater treatment facilities located within, serving a population located within, or discharging within a water resource caution area.

(14) If, after conducting a feasibility study under subsection (2), an applicant determines that reuse of reclaimed water is feasible, domestic wastewater treatment facilities that dispose of effluent by surface water discharges or by land application methods must implement reuse according to the schedule for implementation contained in the study conducted under subsection (2), to the degree that reuse is determined feasible. This subsection does not apply to surface water discharges or land application systems which are currently categorized as reuse under department rules. Applicable permits issued by the department shall be consistent with the requirements of this subsection.

(a) This subsection does not limit the use of a surface water discharge or land application facility as backup for a reclaimed water reuse system.

(b) This subsection applies only to domestic wastewater treatment facilities located within, serving a population located within, or discharging within a water resource caution area.

History.—s. 7, ch. 89-324; s. 3, ch. 94-243; s. 8, ch. 95-323.

403.072 Pollution Prevention Act.—Sections 403.072-403.074 may be cited as the "Pollution Prevention Act."

History.—s. 25, ch. 91-305.

403.073 Pollution prevention; state goal; agency programs; public education.—

(1) It is a goal of the state that all its agencies, the State University System, the State Board of Community Colleges, and all municipalities, counties, regional agencies, and special districts develop and implement strategies to prevent pollution, including public information programs and education programs.

(2) It is the policy of the state that pollution prevention is necessary for all materials and waste management activities.

History.—s. 26, ch. 91-305; s. 1, ch. 95-144.

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shall be construed to estop the governing board from subsequently denying an application for a permit pursuant to ss. 373.219 and 373.229.

History.—s. 1, ch. 79-160.

373.245 Violations of permit conditions.—Holders of consumptive use permits who violate conditions of such permits shall be liable to abutting consumptive use permitholders for damages caused by such permit violations. No cause of action shall accrue under this section until the complainant has first applied for and then been denied relief by the water management district for the permit violations complained of. The provisions of this section are supplemental, and nothing in this section is intended to preclude the use of any other existing cause of action, remedy, or procedure.

History.—s. 10, ch. 82-101.

373.246 Declaration of water shortage or emergency.—

(1) The governing board or the department by regulation shall formulate a plan for implementation during periods of water shortage. Copies of the water shortage plan shall be submitted to the Speaker of the House of Representatives and the President of the Senate no later than October 31, 1983. As a part of this plan the governing board or the department shall adopt a reasonable system of water-use classification according to source of water supply; method of extraction, withdrawal, or diversion; or use of water or a combination thereof. The plan may include provisions for variances and alternative measures to prevent undue hardship and ensure equitable distribution of water resources.

(2) The governing board or the department by order may declare that a water shortage exists for a source or sources within all or part of the district when insufficient water is or will be available to meet the present and anticipated requirements of the users or when conditions are such as to require temporary reduction in total use within the area to protect water resources from serious harm. Such orders will be final agency action.

(3) In accordance with the plan adopted under subsection (1), the governing board or the department may impose such restrictions on one or more classes of water uses as may be necessary to protect the water resources of the area from serious harm and to restore them to their previous condition.

(4) A declaration of water shortage and any measures adopted pursuant thereto may be rescinded by the governing board or the department.

(5) When a water shortage is declared, the governing board or the department shall cause notice thereof to be published in a prominent place within a newspaper of general circulation throughout the area. Publication of such notice will serve as notice to all users in the area of the condition of water shortage.

(6) The governing board or the department shall notify each permittee in the district by regular mail of any change in the condition of his or her permit or any suspension of his or her permit or of any other restriction on the permittee's use of water for the duration of the water shortage.

(7) If an emergency condition exists due to a water shortage within any area of the district, and if the department, or the executive director of the district with the concurrence of the governing board, finds that the exercise of powers under subsection (1) is not sufficient to protect the public health, safety, or welfare; the health of animals, fish, or aquatic life; a public water supply; or recreational, commercial, industrial, agricultural, or other reasonable uses, it or he or she may, pursuant to the provisions of s. 373.119, issue emergency orders reciting the existence of such an emergency and requiring that such action, including, but not limited to, apportioning, rotating, limiting, or prohibiting the use of the water resources of the district, be taken as the department or the executive director deems necessary to meet the emergency.

(8) An affected party to whom an emergency order is directed under subsection (7) shall comply immediately, but may challenge such an order in the manner set forth in s. 373.119.

History.—s. 10, part II, ch. 72-299; s. 14, ch. 78-95; s. 11, ch. 82-101; s. 10, ch. 84-341; s. 601, ch. 95-148.

373.249 Existing regulatory districts preserved.—The enactment of this chapter shall not affect any existing water regulatory districts pursuant to chapter 373, or orders issued by said regulatory districts, unless specifically revoked, modified, or amended by such regulatory district or by the department.

History.—s. 11, part II, ch. 72-299.

373.250 Reuse of reclaimed water.—

(1) The encouragement and promotion of water conservation and reuse of reclaimed water, as defined by the department, are state objectives and considered to be in the public interest. The Legislature finds that the use of reclaimed water provided by domestic wastewater treatment plants permitted and operated under a reuse program approved by the department is environmentally acceptable and not a threat to public health and safety.

(2)(a) For purposes of this section, "uncommitted" means the average amount of reclaimed water produced during the three lowest-flow months minus the amount of reclaimed water that a reclaimed water provider is contractually obligated to provide to a customer or user.

(b) Reclaimed water may be presumed available to a consumptive use permit applicant when a utility exists which provides reclaimed water, which has uncommitted reclaimed water capacity, and which has distribution facilities, which are initially provided by the utility at its cost, to the site of the affected applicant's proposed use.

(3) The water management district shall, in consultation with the department, adopt rules to implement this section. Such rules shall include, but not be limited to:

(a) Provisions to permit use of water from other sources in emergency situations or if reclaimed water becomes unavailable, for the duration of the emergency or the unavailability of reclaimed water. These provisions shall also specify the method for establishing the quantity of water to be set aside for use in emergencies or when reclaimed water becomes unavailable. The amount set aside is subject to periodic review and revision. The methodology shall take into account the risk

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that reclaimed water may not be available in the future, the risk that other sources may be fully allocated to other uses in the future, the nature of the uses served with reclaimed water, the extent to which the applicant intends to rely upon reclaimed water and the extent of economic harm which may result if other sources are not available to replace the reclaimed water. It is the intent of this paragraph to ensure that users of reclaimed water have the same access to ground or surface water and will otherwise be treated in the same manner as other users of the same class not relying on reclaimed water.

(b) A water management district shall not adopt any rule which gives preference to users within any class of use established under s. 373.246 who do not use reclaimed water over users within the same class who use reclaimed water.

(4) Nothing in this section shall impair a water management district's authority to plan for and regulate consumptive uses of water under this chapter.

(5) This section applies to new consumptive use permits and renewals of existing consumptive use permits.

(6) Each water management district shall submit to the Legislature, by January 30 of each year, an annual report which describes the district's progress in promoting the reuse of reclaimed water. The report shall include, but not be limited to:

(a) The number of permits issued during the year which required reuse of reclaimed water and, by categories, the percentages of reuse required.

(b) The number of permits issued during the year which did not require the reuse of reclaimed water and, of those permits, the number which reasonably could have required reuse.

(c) In the second and subsequent annual reports, a statistical comparison of reuse required through consumptive use permitting between the current and preceding years.

(d) A comparison of the volume of reclaimed water available in the district to the volume of reclaimed water required to be reused through consumptive use permits.

(e) A comparison of the volume of reuse of reclaimed water required in water resource caution areas through consumptive use permitting to the volume required in other areas in the district through consumptive use permitting.

(f) An explanation of the factors the district considered when determining how much, if any, reuse of reclaimed water to require through consumptive use permitting.

(g) A description of the district's efforts to work in cooperation with local government and private domestic wastewater treatment facilities to increase the reuse of reclaimed water. The districts, in consultation with the department, shall devise a uniform format for the report required by this subsection and for presenting the information provided in the report.

History.—s. 2, ch. 94-243.

PART III

REGULATION OF WELLS

373.302 Legislative findings.—The Legislature recognizes that the practice of constructing, repairing, and abandoning water wells, if conducted by incompetent contractors, is potentially threatening to the health of the public and to the environment. The Legislature finds that a threat to the public and the environment exists if water resources become contaminated as a result of wells drilled by incompetent or dishonest contractors, and that to prevent contamination, it is necessary to regulate the construction, repair, and abandonment of wells, and the persons and businesses responsible therefor.

History.—s. 9, ch. 88-242.

373.303 Definitions.—As used in this part, the term:

(1) "Abandoned water well" means a well the use of which has been permanently discontinued. Any well shall be deemed abandoned which is in such a state of disrepair, as determined by a representative of the department, that continued use for the purpose of obtaining groundwater or disposing of water or liquid wastes is impracticable.

(2) "Construction of water wells" means all parts necessary to obtain groundwater by wells, including the location and excavation of the well, but excluding the installation of pumps and pumping equipment.

(3) "Department" means the Department of Environmental Protection.

(4) "Political subdivision" means a city, town, county, district, or other public body created by or pursuant to state law, or any combination thereof acting cooperatively or jointly.

(5) "Repair" means any action which involves the physical alteration or replacement of any part of a well, but does not include the alteration or replacement of any portion of a well which is above ground surface.

(6) "Water well contractor" means a person who is responsible for the construction, repair, or abandonment of a water well and who is licensed under this part to engage in the business of construction, repair, or abandonment of water wells.

(7) "Well" means a
cored, bored, washed,
constructed when the i
is for the location, acqu
recharge of groundwa
include any well for the
pecting for oil, natural g
ing or quarrying; for ins
brines or to repressur
bearing formation; for st
other products; or for te
face formations for min
purposes.

(8) "Well seal" mean
device to prevent conta
at the upper terminal.

History.—s. 1, part III, ch. 72-299
10, 24, ch. 88-242; s. 4, ch. 91-429;

373.306 Scope.—Nc
abandon, or cause to be
doned, any water well c
part and applicable rules
not apply to equipment u
purposes or to the proce

History.—s. 2, part III, ch. 72-299;

**373.308 Implementa
water wells.**—

(1) The department
board of a water manag
program for the issuance
struction, repair, and aba

(2) The department
board of a water manag
power authorized to be
under ss. 373.309, 373.3
373.329, and 373.333 anc
fully exercise such powe

(3) Delegations pursu
and ss. 373.323 and 373
the secretary determines
being carried out in acc
department.

(4) Notwithstanding t
delegation of authority to
the department may pre
the location, construction
water wells throughout a
be determined by the de

History.—s. 2, ch. 79-160; s. 76, c

373.309 Authority to

(1) The department s
to time amend, rules gov
tion, repair, and abandon
be responsible for the ad
respect thereto, the depa

(a) Enforce the provis
adopted pursuant thereto

(b) Delegate, by inte
pursuant to s. 373.046, to
the Department of Health
any other political subdivi

TESTIMONY OF GERALD C. HARTMAN, P.E.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

ON BEHALF OF

SOUTHERN STATES UTILITIES, INC.

DOCKET NO. 960258-WS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Gerald C. Hartman. My business address is Hartman & Associates, Inc., Southeast Bank Building, Suite 1000, 201 East Pine Street, Orlando, Florida 32801.

Q. COULD YOU BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR PROFESSIONAL QUALIFICATIONS RELATIVE TO THE WATER AND WASTEWATER INDUSTRY.

A. I received my Bachelors of Science degree in Civil Engineering from Duke University in 1975 and my Masters of Science degree in Environmental Engineering in 1976 from Duke University. I have published over thirty papers on water and wastewater utility systems and have been involved in numerous technical training sessions and seminars. I have co-authored one book and my second book concerning water and wastewater systems is in preparation. I am a registered professional engineer in the States of Florida, Georgia, Maryland, North Carolina, South Carolina, Alabama, Arizona, Mississippi, Pennsylvania and Virginia. I am a Diplomate of the American Academy of Environmental Engineers. I also am a member of and have served as an officer in numerous organizations and associations operating in the water/wastewater industry.

Q. **PLEASE DESCRIBE YOUR PROFESSIONAL ENGINEERING EXPERIENCE CONCERNING WATER AND WASTEWATER UTILITIES.**

A. I have been the engineer of record for over forty water and wastewater master plans and numerous capital improvement programs. I have been involved in over fifty hydraulic model analyses of water and wastewater systems. In addition, I have been involved in numerous studies and investigations ranging from pilot programs to value engineering investigations. I have performed numerous water process evaluations from simple aeration to reverse osmosis and wastewater process evaluations from secondary treatment to advanced biological nutrient removal systems.

I also have been involved in the design of over $500 million of water and wastewater facilities in the State of Florida. These designs range from small, single well systems to large municipal and investor-owned systems. I have been involved in over $1 billion in publicly owned water and wastewater financing in Florida. Finally, I have prepared used and useful analyses on over 200 water and wastewater facilities for investor-owned utilities across the State of Florida. A copy of my resume and qualifications are attached to my comments as Exhibit _____ (GCH-1).

Q. **HAVE YOU TESTIFIED PREVIOUSLY AS AN EXPERT IN THE AREA OF WATER AND WASTEWATER FACILITY ENGINEERING PREVIOUSLY?**

A. Yes. I have testified before this Commission as an expert in the area of water and wastewater utility engineering in a number of cases, including Southern States' last four rate filings (Docket No. 950495-WS being the most recent). I have also testified as an expert in water and wastewater proceedings before county regulatory authorities. I have been accepted by the Florida DOAH and Florida courts as an expert in a variety of water and wastewater utility cases for subject areas such as water and wastewater facility design and valuation.

Q. **WHAT IS THE PURPOSE OF YOUR COMMENTS?**

A. To present expert opinion on behalf of and to present the position of Southern States Utilities, Inc. ("SSU") regarding the Commission's proposed Rule 25-30.431, Margin of Reserve.

Q. **WHAT IS THE POSITION OF SSU?**

A. SSU supports the position of the Florida Waterworks

Association ("FWWA") and the revisions to the proposed rule which FWWA advocates in the comments it has filed. In the event, however, that FWWA's positions are not accepted, SSU supports certain alternatives I will identify later in my testimony. My comments focus primarily on economies of scale and the traditional approach to margin reserve -- reminiscent of my testimony in Docket No. 950495-WS.

Q. WOULD YOU LIKE TO MAKE ANY GENERAL COMMENTS FIRST?

A. Yes. As I have testified to previously and cannot emphasize enough, it is absolutely critical that the Commission consider investment required by statutes, rules and regulations as used and useful. The Commission must keep this in mind when considering a proper margin reserve. In Section 367.111(2), Florida Statutes, the Commission is charged with insuring that utilities provide service "as prescribed by Part VI of Chapter 403 and Parts I and II of Chapter 373, or rules adopted pursuant thereto; but such service will not be less safe, less efficient, or less sufficient than is consistent with the approved engineering design of the system and the reasonable and proper operation of the utility in the public interest." Rule 25-

30.225, Florida Administrative Code, reinforces Section 367.111. It is improper for the Commission to disallow through the used and useful mechanism utility investment required by governmental regulations or by generally accepted design criteria referenced by those regulations. The Commission should not put the utility in the position where the utility cannot recover costs sufficient to comply with the rules and regulations which other governmental units and agencies (and the Commission itself through the laws I have cited) impose on the utility and for violation of which the utility is held accountable. It is similarly inappropriate for the Commission to disallow through an artificially short margin reserve period that investment necessary to provide the "efficient" service which is "consistent with the approved engineering design" of facilities, as referred to in Section 367.111(2) (i.e., economy of scale). The Commission must therefore utilize and develop used and useful practices, and in this situation margin reserve practices specifically, which do not deprive utilities of investment in facilities prudently planned and economically sized. Used and useful cannot be divorced from regulatory requirements and engineering considerations.

There is no question that the incentive created by the Commission's current used and useful methodologies, and in particular the margin reserve policy now reflected in the Commission's proposed rule, is for utilities to design and construct facilities in the smallest possible increments necessary to meet only immediate demand as that demand becomes clear and present. This incentive does not promote the prudent planning, economies of scale, and environmental protection goals the Commission should promote. There is also no question the incentive of the current policy will increase the cost to the utility to current and future customers, and to the State, as well as increase the likelihood of harm to the environment.

The Commission's proposed Rule 25-30.431 does not cure the inappropriate deprivation of required and economic investment which is caused by the Commission's current policies and does not strike a more reasoned balance between proper incentives and the Commission's concern with fair allocation of costs to different generations of customers.

Q. WHY IS THAT?

A. The proposed rule reflects current Commission policy on margin reserve and imputation of CIAC, which ignores the concerns I have mentioned.

The unfairness of the current used and useful policy is further underscored by the fact that under this policy, current customers receive <u>all</u> of the benefits of economies of scale -- a lower per unit cost, more reliable service, environmental safety -- while the utility must bear <u>all</u> of the risk from economies of scale -- a cost difference in unit sizes that is deemed non-used and useful and relegated to uncertain recovery through AFPI.

Current margin reserve policy is that a utility should have plant capacity available for growth without having to undertake plant expansion; therefore, the margin reserve period is equal to an estimated average duration for plant construction, when, the theory goes, most expansion costs are incurred. Aside from its other flaws, this reasoning is inconsistent in that the margin reserve is considered a surrogate for plant expansion, but the higher costs associated with expansion are not considered. Current margin reserve policy, a substitute for expansion, takes full advantage of the lower cost characteristics of existing plant -- due to economies of scale and other factors -- while ignoring the higher cost characteristics of the plant expansion the policy would have utilities avoid.

It is beyond doubt that economies of scale exist for utility facilities. The Economy of Scale Evaluation which I presented in Docket No. 950495-WS and which I will discuss herein proves the extent of those economies. Yet, it has only been in extremely rare cases, where a utility has invested a great deal of time and expense to present the Commission with a cost comparison/cost separation study showing the economies of a specific plant or plant component, that the Commission has in any way reflected economies of scale in used and useful. (E.g. Order No. PSC-93-1288-FOF-SU, issued September 7, 1993, Florida Cities Water Company, South Fort Myers.) Economies of scale are known to exist. They can be and have been measured. Yet economies of scale are steadfastly ignored by the Commission on a routine basis. It is not reasonable to require a painstaking dissection of a known fact at a considerable price in rate case expense. Nor is it practical to expect a utility to build facilities and take advantage of economies of scale when the utility's investment in those facilities, despite the fundamental existence of economies of scale, is subject to this kind of uncertainty and risk in a Commission rate proceeding.

I therefore strongly urge the Commission to accept the industry's proposals.

Q. **WHY IS A MARGIN RESERVE, AND MORE SPECIFICALLY AN ADEQUATE MARGIN RESERVE, NECESSARY?**

A. There are three basic reasons: (1) economic benefit to the customers and the utility, (2) public health and environmental protection, and (3) reduced regulatory costs. First, a margin reserve permits the utility an opportunity to achieve at least some portion of the economy of scale benefits I will describe. Second, if no margin reserve or an inadequate margin reserve is permitted, utilities will be forced into a situation where they would constantly be butting up against the capacity limitations of their facilities. The dangers to the public health and the environment which result from this are obvious: insufficient water pressure, connection moratoria, insufficient chlorine contact time, lack of sufficient disposal facilities, improper discharge of wastewater, and insufficient wastewater treatment to name a few. All of these problems can occur due simply to the variability of demand. Third, if utilities cannot earn a return on economically sized plant, forcing the utilities to constantly operate facilities on the edge of their capacity limitations, all of the activities associated with needed improvements and expansions will likewise be in constant motion. A perpetual permit and construction apparatus on the part of utilities requires the perpetual attention of the regulatory authorities' engineers, inspectors, analysts, etc. -- all at an increased cost to the utility, the customers and the state. Each of these adverse consequences results from there being no margin reserve or an inadequate margin reserve and should be scrupulously avoided.

Q. **IS MARGIN RESERVE SOLELY FOR FUTURE CUSTOMERS?**

A. No. The existing customers benefit from the capacity to serve their needs, to attenuate the impacts of growth in connections, and from the long-term economies of scale.

The variability of demand over the useful life of an asset (30-50 years) can be great, and only the existing customers create this variability, and smaller facilities demonstrate higher variability in demand than do larger facilities. To illustrate, if growth were only about 3% per year, in 3 years only 9% to 10% growth on the average would occur. For most water plants, the variability of the maximum day demand from existing customers can easily be 10% from year to year.

Further, margin reserve is an accepted regulatory allowance for growth in the need for service from both existing and new customers. The margin reserve cannot be sequestered for, or dedicated exclusively to, future customers. Those who oppose margin reserve expect the customers to receive all the benefits of the margin reserve but with the costs and risks therefor borne exclusively by the utility.

Q. **COULD YOU PLEASE DESCRIBE ECONOMIES OF SCALE AND HOW ECONOMIES OF SCALE SHOULD BE CONSIDERED IN SETTING MARGIN RESERVE?**

A. Yes. First, an economy of scale is the phenomenon of a decreased per unit cost attained through the use of larger units. To illustrate, a 10,000 gallon per day (gpd) wastewater treatment plant may cost $60,000 to build and thus have a per unit cost of $6.00 per gallon per day, whereas a 100,000 gpd plant may cost $250,000 and have a per unit cost of

$2.50 per gallon per day. In this example, the per unit cost for building the larger plant is much less than for building the smaller plant and reflects an economy of scale. An economy of scale can likewise be attained in the operation and maintenance costs for running a larger versus a smaller plant.

As I indicated earlier, that the economy of scale phenomenon occurs with water and wastewater facilities and facility components is without question. The purpose of the Economy of Scale Evaluation I prepared and which was submitted into evidence in Docket No. 950495-WS was to identify and measure the economies of scale for the capital costs of water and wastewater treatment facilities and components.

Briefly stated, this Evaluation examined the average cost and per unit cost of the following facilities/components: extended aeration package wastewater treatment plants; contact stabilization wastewater treatment plants; blowers, filters, and chlorination units for wastewater plants; standby generators for water and wastewater plants; prestressed concrete ground storage tanks, steel ground storage tanks; water plant disinfection (chlorination) equipment; high service pumps; hydropneumatic tanks; lime softening water treatment plants; reverse osmosis water treatment plants; gravity sewer lines; sewage pump stations; sewer force mains; and water mains. Unit cost curves, showing the cost per unit of capacity on one axis of a graph and capacity on the other, were created for all facilities/components examined and appear in the Evaluation text. These unit cost curves clearly demonstrate the economy of scale associated with the identified facilities/ components. The unit cost curves in the Evaluation also serve to illustrate the threshold minimum size which selected facilities/components must be before the rate of change in the per unit cost begins to decline. For ease in reference, I have attached as Exhibit __________ (GCH-2) a one page summary illustration of water plant component unit cost curves and a blow-up of the unit cost curve for a steel ground storage tank ("GST").

From the steel GST unit cost curve in Exhibit ____ (GCH-2), one should note the "inflection point" in the curve. The "inflection point" of the unit cost curve refers to the point at which the relative maximum economy of scale is achieved and beyond which the unit price remains nearly constant. In the case of the steel GSTs, the inflection point is at the 100,000 gallon tank. Therefore, to take advantage of the optimal economy of scale, a 100,000 gallon tank would be the threshold size necessary. This is not to say, however, that a tank of that size is appropriate in all cases -- only that it is the threshold size required to achieve the optimal economy of scale.

Exhibit ______ (GCH-3) contains a series of graphs which illustrate the appropriate margin reserve period needed to promote and preserve the economies of scale for certain of the facilities/ components analyzed in the Economies of Scale Evaluation, which is itself attached as Exhibit _____ (GCH-4). Note that the presentation of information on the illustrations in Exhibit _____ (GCH-3) is somewhat different from what was presented in Docket No. 950495-WS. Modifications were made so the presentation would be more condensed and simplified. As before, however, all of the underlying data comes from the Economy of Scale Evaluation.

For purposes of illustration and analysis here, I would group the facilities/components included in the Economies of Scale Evaluation in three categories: (1) facilities/components with a nature conducive to expressing economies in terms of growth in flow/volume over time, (2) lines (water lines and wastewater gravity and force mains) and (3) other components. Facilities/components in the first group are generally sized based on flow/volume requirements, so economies of scale can be examined with growth in flow/volume over a period of time. This group includes the following: Steel ground storage tanks, prestressed concrete ground storage tanks, pressure filters, gravity filters, contact stabilization wastewater treatment plants, extended aeration wastewater treatment plants, reverse osmosis water treatment plants, lime softening water treatment plants, blowers, pumps, and water wells. Lines have been segregated for analysis because of regulatory requirements, design considerations, economic features, etc. which are not conducive to expressing economies in terms of growth over time. The same is also true for components in the third group, which includes auxiliary generators, hydropneumatic tanks, and chlorination equipment. As I will explain below, the approach for demonstrating economies of scale for lines is somewhat different than that for facilities in the first group. Components in the third group are not addressed in Exhibit ______ (GCH-3) and should be considered 100% used and useful (and margin reserve not a consideration) for reasons I will explain below.

The illustrations in Exhibit _____ (GCH-3) are largely self explanatory. I will however make a few brief points to better relate their purpose. The Exhibit covers a sample of various facilities/ components in the first group referenced above. Each page of the Exhibit contains a number of panels as follows: (1) a graph showing growth in demand at a steady rate of 3% per year, (2) a timeline comparison of various phasing scenarios, (3) a graph depicting phasing intervals over time for the same scenarios, and (4) a graph identifying the investment savings associated with larger sizing and the margin reserve period necessary to insure that savings is captured. For example, the steel GST on page 1 of Exhibit ________ (GCH-3) requires a 15 year margin reserve to insure customers receive the benefit of, and utilities take advantage of, economies of scale. None of the illustrations in Exhibit ________ (GCH-3) for facilities/components in the first group reveal a margin reserve period less than 7 years as the duration necessary for insuring economies of scale savings.

Attached as Exhibit _____ (GCH-5) are present value charts, preceded by an explanation of those charts, which illustrate an important point about economies of scale. The charts show the present value for installing a steel GST (as an example) assuming the scenarios therein described. From these charts one can clearly see the illogical economic signal the Commission sends utilities by measuring used and useful and limiting margin reserve as it has in recent years. All things being equal, the most cost effective choice for the utility engineer is the choice with the lowest present value (both to the utility and the customer), but the Commission's used and useful and margin reserve practices act as a disincentive to economies of scale and corrupt the decision-making process. Without a change to margin reserve practices and assuming used and useful is unchanged, the Commission encourages a utility to install the smallest tank necessary so the utility may recover the greatest portion of its total investment. The present value tables reveal that the smallest GST necessary is not the most cost-effective choice. The Commission can correct this illogical economic signal and encourage economies of scale through an appropriate allowance for the margin reserve.

Q. **ARE THERE OTHER REASONS ECONOMIES OF SCALE SUPPORT THE FIVE YEAR MARGIN RESERVE?**

A. All of the arguments I have made above and those asserted by FWWA support an economic investment approach to margin reserve. The idea is to capture in margin reserve the cost of the economic investment needed to provide service during the margin reserve period.

The proposed rule refers to the margin reserve period as the "time period needed to install the next economically feasible increment of plant capacity that will preclude a deterioration in the quality of service." I believe that such language is appropriate. However, it stands to reason that if the time period for installing the next economically feasible increment of plant is considered, the costs should be as well.

SSU supports FWWA's rule proposal for margin reserve on water source and treatment and wastewater treatment and effluent disposal (other than reuse). The illustrations for the group one facilities/components in Exhibit ________(GCH-3) clearly support FWWA's proposal. FWWA's proposal is a step toward properly insuring economies of scale consideration in used and useful and will take the Commission one step closer to the threshold sizing approach for used and useful which the Commission should consider. Through that approach one directly analyzes the level of investment needed for the standard sized facilities required for providing service to customers through the margin reserve period. While that analysis may be more complicated, the margin reserve period is less critical because greater focus is placed on the level of investment required for a facility than on projections for demand.

There is a portion of required utility investment which the FWWA proposal for group one facilities/components does not fully capture in the margin reserve which a threshold approach would, including (1) saturation loss (the recognized phenomenon that not all capacity required will be utilized, e.g. not all lots will connect); (2) the project costs which are incurred regardless of facility size for planning, engineering, permitting and start-up operations (hereinafter referred to as "PEPO costs"); and (3) the material and installation costs for threshold facility sizing and the minimum facility sizing. The FWWA proposal as to lines (and pump stations) does, however, appropriately capture such costs.

Q. WHAT IS "SATURATION LOSS"?

A. Saturation loss is a well known and recognized phenomenon in development. A project may have 100 platted lots, but it is rare that the project has 100 utility customers. In a single development there are exceptions, although a utility has this phenomenon <u>compounded</u> from development to development for each one served. The phenomenon occurs due to any of the following reasons reminiscent of why the lot-count method is inappropriate:

(1) A lot may be unbuildable.

(2) Redevelopment for stormwater, roads or other reasons can use up lots.

(3) Utility facilities may encumber a few lots.

(4) A family may wish to locate their home on more than one lot.

(5) Zoning can change to affect lots.

(6) A lot could be environmentally encumbered (wetlands, vegetation, stormwater, pollution, etc.)

(7) Due to regulations (i.e. septic tank density agreements) lots may be unbuildable though the water lines are present.

(8) A community may wish to convert lots into parks, nature areas, etc.

(9) A lot may never sell.

(10) A lot may sell but never be built on, etc.

It is even less likely in larger more regional facilities to attain saturation or build-out of all lots, in fact the "saturation loss" increases. My work in bonding over $3 billion of public water and wastewater facilities in the Southeast, my work with both Moody's Standard & Poors and Fitch and my work in the Easterly Orange County $27 million "tri-party" bonds all have exposed me to the reality of this fact. Standard texts in Urban Structure, Urban Studies, and Planning and Decision Analysis reflect this concept. The amount can vary from facility to facility. Taking the example for the 100 lot subdivision possibly 10% of the lots would never become <u>customers</u> (they may be sold but will not result in customers) of the utility.

Q. WHAT ARE "PEPO" COSTS?

A. As indicated earlier, PEPO is the planning, engineering, permitting and operations start-up requirements of a project. PEPO costs will be incurred regardless of the size of the facility constructed. Typical PEPO costs are shown in the table in Exhibit ________ (GCH-6). From a cost standpoint, as a percent of construction cost facilities, a PEPO curve, also shown in Exhibit _____ (GCH-6) can be developed. Investment in PEPO costs primarily occurs prior to construction. Typically, PEPO costs for investor owned utilities generally from 10 to 25 percent.

Q. WHAT IS THRESHOLD SIZING?

A. Threshold sizing involves three factors:

(a) Standard sizes or manufacture for pipelines and plants.

(b) Minimum State/Local Regulatory Requirements (e.g. gravity sewers being 8-inch in diameter).

(c) Level of Service Requirements (such as minimum pressure, chlorination, back-up requirements, maintenance, etc.)

To illustrate, the standard size plant may be

20,000 gpd for a margin reserve period demand of 17.920 gpd. The cost for the remaining 2,080 gpd in this example should be allocated to the margin reserve as reasonably economically feasible and not adjusted as non-used and useful for the simple reason that the 20,000 gpd plant costs less than a custom 17.920 gpd plant. Also, for a utility which must serve a development the required pipe size may be 6-inch though an approximate 4.5-inch pipe may hydraulically suffice. The utility has no option to build a 4.5-inch pipe as 4.5-inch pipe is not a standard pipe size. The difference between a four (4) inch and six (6) inch may be about $2/foot or 15%. That 15% threshold extra cost should be reflected in used and useful. Exhibit ______ (GCH-7) contains a listing of standard facility and component sizes as well as a brief list of pertinent regulatory requirements which address facility and component sizing.

Q. **WHAT DO YOU MEAN BY SAYING NO "LESS OF A FACILITY" CAN BE USED?**

A. If you must serve a customer, and the smallest facility or component to serve the customer or set of customers is used, then nothing less would work. This amount can be determined and should be recognized as used and useful.

Q. **PLEASE EXPLAIN WHY YOU SUPPORT FOR THE FWWA'S POSITION ON LINES?**

A. As I indicated earlier, water lines and wastewater gravity and force mains must be constructed and designed to meet certain regulatory requirements. Where fireflow is required, for example, the minimum size water line permittable is 6 inches. Further, the utility is required to provide service to all customers in it service area, and, as Mr. Seidman states, there are economic considerations to consider for repiping areas. Similarly, for gravity lines the minimum size gravity sewer line is 8-inches. This is a requirement set forth in Rule 62-604.300(4)(b), F.A.C. In addition these lines are required to be laid at relatively steep slopes and have excess hydraulic capacity. The minimum line size is a threshold size established based on practical field experience. And for force mains the minimum allowable force main size is four inches and this is set forth in Rule 62-604.300(4)(b), F.A.C. In addition to being state requirements these minimum requirements are consistent with the Land Development Regulations of cities and counties throughout Florida.

Exhibit _____ (GCH-8) attached hereto contains several tables and charts comparing the capacity and costs for various line sizes and line types. In summary, this Exhibit illustrates the following points: (1) the cost of oversizing a line is substantially less than the cost of undersizing a line only to replace or run another line parallel to the undersized line; (2) the difference in the customer serving capacity of lines is significant from one standard line size to the next, while the cost difference is not as significant; and (3) the economies of scale associated with installing lines of a greater versus shorter linear distance is substantial.

I believe it will be in extraordinarily rare cases that the Commission may find an investor-owned utility in Florida which has installed lines of a size greater than required by and permittable under the pertinent regulations. Such situations would have to be examined case-by-case and cost efficiencies considered. However, SSU believes FWWA's proposed rule for lines (and sewage pump stations) is appropriate because of regulatory requirements, economic considerations, and, most importantly, the utility's service obligation.

Q. **WHAT IS THE PURPOSE OF THE INFORMATION FOR WATER LINES, WASTEWATER GRAVITY LINES, AND WASTEWATER FORCE MAINS IN EXHIBIT _____ (GCH-8)?**

A. If the Commission rejects FWWA's proposal as to lines (and sewage pump stations), the referenced information should serve as the basis for an alternative approval. The Exhibit shows the tremendous economies of scale for different line types -- economies which in large part arise from savings in installation and PEPO costs. These economies of scale should be considered in establishing margin reserve for lines if FWWA's proposal is rejected.

Q. **COULD YOU PLEASE ADDRESS THE THIRD GROUP OF FACILITIES EXAMINED IN THE ECONOMIES OF SCALE EVALUATION?**

A. Components in the third group are not addressed at in Exhibit ______ (GCH-3) and should be considered 100% used and useful (and margin reserve not a consideration). The economies of scale and standard sizing for auxiliary generators, hydropneumatic tanks, and chlorination equipment specifically are displayed in the Economy of Scale Evaluation, on pages 48, 62 and 47, respectfully, in Exhibit _______ (GCH-4). The Commission ruled that auxiliary generators and hydropneumatic tanks should be 100 % used and useful in SSU's last rate proceeding, Docket No. 950495-WS. Chlorination equipment should not be treated any differently because of economies of scale and threshold sizing considerations.

Q. **REGARDING THE PROPOSED RULE, DO YOU HAVE ANY RECOMMENDATIONS AS TO THE DEFINITION OF "MARGIN RESERVE"?**

A. Yes. Margin reserve is not only what is stated but also should include:

(1) variability in demand,

(2) long-term economic cost-effectiveness considerations,

(3) regulatory reserve capacity requirements (i.e., FDEP and WMD rules, regulations and practices),

(4) standard sizing of facilities,

(5) threshold costs and

(6) the concept of no less of a facility would be required.

The FWWA definition of Margin Reserve is appropriate. Margin reserve should provide the economic incentive to build facilities which can attain lower long-term rates over the useful life of the asset and to assure the quality of service to meet the varying demand conditions. This results in the lowest present value of all rates paid by the customer. Currently, with the practices of the Commission and the application of the present used and useful and margin reserve policies, the utility, which provides for the public health, safety and welfare, is not put in the position of being made-whole on a stand-alone basis.

Q. **DO YOU AGREE WITH THE COMMISSION PROPOSED RULE'S DEFINITION OF THE "MARGIN RESERVE PERIOD"?**

A. No. "Installation" refers solely to construction time. The total time necessary is that to plan and finance, plant, engineer/design, permit, construct and "shake-down" operate the facility improvement/ expansion.

In the public sector, without economic regulation, this period is shown in the utility element of the Comprehensive planning documents. A minimum of a 5-year planning period with the commensurate capital improvement element/funding is the Statewide practice. In my 20 years of Florida water and wastewater utility consulting engineering practice, all of the plans I have been associated with include a minimum term of 5 years and a few have gone out over forty (40) years. The necessary margin reserve period is <u>not</u> just the construction time the "PEPO" (planning, engineering, permitting and initial start-up operations) time period is missing.

Q. **IS EIGHTEEN MONTHS ADEQUATE TIME FOR PLANT EXPANSION?**

A. No. In most instances today, if a utility must construct additional capacity to keep ahead of the customer demands, it needs more than eighteen months to complete the process. This is especially true in some areas such as Lehigh where there is a fragile water supply and a relatively complex treatment process necessary to treat the water. Three years is more realistic. Attached as Exhibit _____ (GCH-9) is a step by step process for the addition of water treatment capacity. It should be noted that the attached list is not all inclusive and outlines only the major activities for the addition of water treatment plant. This outline assumes a relatively simple water treatment facility with no major delays in the permitting, design or construction processes. In a more complicated process, for example one involving an

R.O. facility with an injection well, the permitting and construction time would more than likely be extended by at least one year.

The basic steps for wastewater treatment plant expansion are extensive and similar to the water treatment plant list discussed previously. With wastewater plants, further delays can arise after construction. Since effluent quality standards must be met for all wastewater treatment plant additions as of the start-up date, additional time may be required to adjust treatment operations prior to a plant's becoming fully operational.

As I have stated earlier, in prior rate cases, the Commission has concluded that the margin reserve for treatment plant should only represent the time necessary to construct additional treatment plant. This theory assumes the utility has begun the construction phase as of the test year and that construction will come off without a hitch. In today's complex regulatory environment, I believe this presumption is incomplete, in error, and flawed. Moreover, this theory dictates that the utility be forever at the point of constructing an increment of capacity while it plans designs and permits the increment needed after the one under construction. The persuasive power of used and useful is such that the reality of utility decision making will mirror Commission theory. And it is not fair, safe, efficient, or economical for the Commission to promote this kind of reality.

Q. **THE COMMISSION'S PROPOSED RULE DOES NOT CREATE A SEPARATE USED AND USEFUL PROVISION FOR REUSE AS A MEANS OF EFFLUENT DISPOSAL. DO YOU AGREE WITH THIS?**

A. No. As I testified in Docket No. 950495-WS, reuse facilities should be considered 100% used and useful. Therefore, margin reserve should not be a consideration for reuse facilities. Sections 403.064(10) and 367.0817(3), Florida Statutes, require that reuse facilities be considered 100% used and useful. DEP, as evidenced by the letters contained in Mr. Harvey's Exhibits ________ (RMH-2) and (RAM-4) the DEP-Commission memorandum of understanding contained in Mr. Harvey's Exhibit __ (RMH-1) support this position. Moreover, if the Commission is to encourage reuse, it must consider reuse facilities 100% used and useful.

Despite SSU and DEP testimony to the contrary, in Docket No. 950495-WS, the Commission applied a used and useful percentage to those reuse facilities SSU claimed 100% used and useful. (Even though DEP's definition of reuse is broader, SSU only requested public access reuse facilities be considered 100% used and useful.) In so doing, the Commission treated SSU's investment in reuse facilities no differently than its investment in any other effluent disposal facilities and excluded from rate base approximately $4.6 million dollars of plant-in-service for public access reuse. One must therefore ask what the purpose of Sections 403.064(10) and 367.0817(3) is if reuse is treated no differently than other means of effluent disposal.

The Commission's decision in SSU's case will definitely have a far-reaching chilling effect on all investor-owned utilities contemplating reuse. It will render reuse economically infeasible in most cases because a utility not assured of recovering its costs for reuse will not be able to afford/finance reuse. As I have testified to previously, reuse is essential to conserving Florida's water resources and protecting Florida's environment. The Commission's recent action is clearly detrimental to these purposes. If the Commission desires to encourage reuse and advance the environmental and conservation benefits of reuse, the Commission should reverse itself by rule, as FWWA advocates. Further, the Commission's definition of reuse facilities should follow DEP's definition of reuse for consistency.

Q. **COULD YOU EXPLAIN THE SIGNIFICANCE OF DEP RULE 62-600.405 ON MARGIN RESERVE?**

A. Yes. DEP's rules concerning planning for wastewater facilities expansion dictate the extension of the margin reserve period beyond eighteen months for wastewater treatment facilities. DEP Rule 62-600.405, F.A.C., attached to my testimony as Exhibit _____ (GCH-10), requires a utility to provide timely planning, design and construction of plant expansions based on the schedule delineated in the rule. Essentially, this rule requires a utility providing wastewater service to submit annual capacity analysis reports to the DEP once a certain level of capacity is reached. These reports must analyze an existing facility and its capacity to provide service. Basically, the rule has established four triggers to determine when certain activities need to be commenced concerning the design, permitting and construction of additional wastewater treatment facilities. If the projected flows of the facility exceed the permitted capacity of the facility within 5 years of the date of the report, then the report must include a statement by a registered engineer that planning and preliminary design of a plant expansion has been initiated. When the projected flows are expected to exceed the capacity within 4 years, the report must include a statement from the registered engineer that plans and specifications for the expansion are being prepared. If the engineer determines that projected flows are going to exceed the capacity within 3 years, then a construction permit application must be submitted to the DEP within 30 days of such a determination. The final trigger is that if the capacity analysis report indicates that the projected flows are going to exceed the permitted capacity of the treatment facilities within 6 months, an operating permit application must be submitted by the utility along with the capacity analysis report.

Although the rule does not directly state that a utility must maintain capacity necessary to meet demand for the next 5 years, the clear intent of the rule is that capacity should be maintained for a 5-year window, especially if the utility does not wish to perpetually be in a permitting and expansion mode for every wastewater treatment plant it operates. The stated purpose of the rule is to provide for the "timely planning, design, and construction of wastewater facilities necessary to provide proper treatment and reuse or disposal ...." Clearly, the rule reflects DEP's recognition that the planning, design, and construction process takes five years.

This situation with wastewater treatment plant expansions appears to be an instance of DEP's requiring one thing -- reserve capacity for five years -- and the Commission's sending a contrary signal -- by limiting utilities to an 18 month margin reserve and by imputing CIAC. I can bring this disparity into focus by stating that if a utility filed a permit application in accordance with this DEP rule and suggested in the application that it would build capacity sufficient only to serve 18 months of growth beyond its present capacity, I have no doubt the application would be rejected.

Q. **IS IT PROPER TO CHARACTERIZE RULE 62-600-405, F.A.C., AS ESTABLISHING NOTHING MORE THAN INTERVALS**

FOR SUBMITTING A CAPACITY ANALYSIS REPORT?

A. No. The rule is applied by DEP to assure that at least a 5 year margin reserve of capacity exists or that the expansion process is underway. To interpret the rule as only a reporting requirement is to separate the words of the rule, which on the surface address reporting, from the rule's meaning, which focuses on performing the acts reported. Further, a shorter margin reserve period would place utilities in a position where the expansion activities for one interval and the next interval overlap, which makes no economic or regulatory sense whatsoever as I have already stated.

Q. DOES DEP HAVE IN PLACE A RULE FOR WATER FACILITIES SIMILAR TO RULE 62.600-405?

A. No. However, on recent submittals I have made to the DEP, adequate capacity has been an issue in the permit application process. Those reviewing water plant permit applications have asked with increased regularity if 5 years of water plant capacity is available or planned.

Q. DO THE COUNTIES AND CITIES WHICH YOU DO WORK FOR GENERALLY CONSTRUCT WASTEWATER TREATMENT PLANT IN INCREMENTS NEEDED TO MEET DEMAND OVER AT LEAST A 5-YEAR PERIOD?

A. Yes. A good number build for demand beyond five years. Their reasons for building for at least five years include all of those I've already mentioned, the rule requirements, prudent planning, environmental protection, and economies of scale. Local governments also consider growth management requirements. Although the Commission does not enforce growth management laws, I mention this because it relates to prudent planning. State planning requirements are such that public facilities, including utilities, must be in place concurrent with growth. In order to fulfill these requirements, local governments size their wastewater and their water facilities to meet planned changes in demand within their service areas over a five year, or longer, period.

Q. **DO THE COUNTIES AND CITIES WHICH YOU DO WORK FOR GENERALLY CONSTRUCT WATER TREATMENT PLANT IN INCREMENTS NEEDED TO MEET DEMAND OVER AT LEAST A 3-YEAR PERIOD?**

A. Yes, and frequently beyond, for the same reasons I have just mentioned.

Q. **ARE THERE ANY OTHER SOURCES OF INFORMATION YOU WOULD REFER THE COMMISSION TO IN MAKING ITS DECISION IN THIS MATTER?**

A. Yes. In both of the letters contained in Mr. Harvey's Exhibits _________ (RMH-2) and (RMH-4), specifically in the second comment on page 2 of Mr. Drew's letter and in the second paragraph of the first page of Mr. Harvey's letter, DEP's representatives state that the Commission's rules should allow a utility to recover investment for timely expenses for needed wastewater treatment facilities **consistent with** the rule which I have cited. I also note that in the May 12, 1995, draft rule written by the Commission staff, Mr. Harvey's Exhibit ______ (RMH-3), staff recognizes the need for a three year margin reserve for water treatment plant and a three year margin reserve for wastewater treatment. This same draft rule also states that utilities are encouraged to undertake planning that recognizes conservation, environmental protection, and economies of scale. While I agree with the three year margin reserve proposed for water treatment plant, a three year margin reserve for wastewater treatment plant would be in conflict DEP rules. For the reasons I have explained, I believe a five year margin reserve for wastewater treatment plant is appropriate.

Q. SHOULD CIAC BE IMPUTED ON MARGIN RESERVE AS THE

COMMISSION PROPOSES IN ITS RULE?

A. No. From an engineering standpoint, the imputation of CIAC on the margin reserve is incorrect because the margin reserve is a known and continuous obligation whereas the collection of CIAC is an unpredictable future event. The imputation of CIAC significantly undermines the stated purpose of the margin reserve and negatively impacts the goals of achieving proper planning, environmental preservation, and economies of scale for the benefit of the customers. I have reviewed instances where the CIAC imputed on the margin reserve has completely or substantially eliminated the margin reserve.

Q. **DO YOU HAVE ANYTHING FURTHER TO ADD?**

A. Yes. The cause-and-effect relationship at work with used and useful is simple. The Commission's used and useful practices of recent years, combined with no margin reserve, an insufficient margin reserve, or a margin reserve with CIAC imputed thereon provide utilities no incentive to take advantage of economies of scale and instead cause economic harm to those utilities who do. A utility company should not be asked to make investment of shareholder money when the recovery of and a return on a substantial portion of that money is virtually totally at risk. This is particularly true for regulated utilities as the rate of return to the shareholders is set by regulators, not the market, and does not increase to the extent which would be necessary to compensate for that risk. Thus, the economic message under the Commission's proposed rule is to build plant in small increments, ignore economies of scale, and bear inordinate risk for even threshold sizing.

Plant is not built to accommodate the need for service on a gallon-for-gallon and lot-for-lot basis. Used and useful should not treat utility investment as though plant can be so built.

Q. **DOES THIS CONCLUDE YOUR TESTIMONY?**

A. Yes.

GERALD C. HARTMAN, P.E.
PRESIDENT

HARTMAN & ASSOCIATES, INC.

EDUCATION	B.S., Duke University, 1975 M.S., Duke University, 1976
PROFESSIONAL REGISTRATION	Professional Engineer No. 27703, Florida Professional Engineer No. 12410, Maryland Professional Engineer No. 131184, Virginia Professional Engineer No. 15264, North Carolina Professional Engineer No. 38216, Pennsylvania Professional Engineer No. 17597, Georgia Professional Engineer No. 15389, South Carolina Professional Engineer No. 19422, Alabama Professional Engineer No. 28939, Arizona Professional Engineer No. 12717, Mississippi
PROFESSIONAL AFFILIATIONS	Diplomate - American Academy of Environmental Engineers American Society of Civil Engineers National Society of Professional Engineers Florida Engineering Society American Water Works Association Florida Pollution Control Association American Water Resources Association Water Pollution Control Federation Florida Water and Pollution Control Operators Association Florida Waterworks Association

QUALIFICATIONS SUMMARY

Mr. Hartman is an experienced environmental engineer with special expertise in water and wastewater systems. Mr. Hartman is a qualified expert witness in the areas of water supply and treatment, wastewater treatment and effluent disposal, utility system valuation and financing, facility siting, and utility creation/management/acquisition projects.

EXPERIENCE

Mr. Hartman's experience exclusively involves water, wastewater, solids, and utility valuation/financing projects, and expert testimony assignments.

Financial Reports

Mr. Hartman has been involved in over 100 capital charge, impact fee, and installation charge studies involving water, wastewater and fire service for various entities. He also has participated in over 100 user rate adjustment reports. Mr. Hartman assisted in the development of over 50 revenue bond issues, 10 short-term bank loan systems, 2 general obligation bonds, 8 construction grant programs, 10 capacity sale programs, and 4 privatization programs. Mr. Hartman has been involved in over $2 billion in utility financings for water and wastewater utilities.

Water and Wastewater Acquisition Valuations and Evaluations

Mr. Hartman has been involved in over 100 water and wastewater negotiations, valuations and evaluations, and has been a qualified expert witness by the courts with regard to water and wastewater negotiations, arbitrations, and condemnation cases. He has participated in the valuation of numerous major utility systems. His most recent experience in the 1987-96 period includes:

Year	Project	Party Represented
1996	Longwood Run Utility	Company
1996	Keystone Heights	City
1996	Keystone Club Estates	City
1996	Lakeview Villas	City
1996	Geneva Lakes	City
1996	Postmaster Village	City
1996	Tega Cay	County
1996	River Hills	County
1996	Consolidation Program Game Plan	Marion County
1996	Marion Oaks	Marion County (Ongoing)
1996	Marco Shores	Company (Ongoing)
1996	Marco Island	Company (Ongoing)
1996	Cayuga Water System	Authority
1996	Glendale Water System	Authority
1996	Lehigh Acres W & WW	Authority
1996	Lindrick Services Company	(Ongoing) Company
1996	Carolina Blythe Utility	Calabash
1996	Ocean Reef R.O. WTP's	NKLUA
1995	Sanibel Bayous	City of Sanibel
1995	Rotunda West Utilities	Investor
1995	Palm Coast Utility Corporation	ITT
1995	Sunshine State Parkway	Company
1995	Orange Grove Utilities, Inc.	Company (Ongoing)
1995	Georgia Utilities	(Ongoing) City of Peachtree City
1995	Beacon Hills Utilities	Company
1995	Woodmere Utilities	Company
1995	Springhill Utilities	Company
1995	Okeechobee Utility Authority	OUA
1995	Okeechobee Beach Water Association	OUA

Gerald C. Hartman, P.E., President (Continued)

Year	Project	Party Represented
1995	City of Okeechobee	OUA
1995	Mad Hatter Utilities, Inc.	Company
1994	Eastern Regional Water Treatment Plant	Owner
1994	GDU - Port St. Lucie Water and Wastewater	City of Port St. Lucie
1994	St. Lucie County Utilities	City of Port St. Lucie
1994	Marco Island/Marco Shores	Sun Bank
1994	Heater of Seabrook	Heater Utilities, Inc.
1994	Placid Lakes Utilities, Inc.	Company
1994	Ocean Reef Club Solid Waste System	ORCA
1994	Ocean Reef Club Wastewater System	ORCA
1994	South Bay Utilities, Inc.	Company
1994	Kensington Park Utilities, Inc.	Company
1993	River Park Water System	SSU
1993	Taylor Woodrow - Sarasota County	Taylor Woodrow
1993	Atlantic Utilities - Sarasota County	Company
1993	Alafaya Utilities, Inc.	Bank
1993	Anden Group Wastewater System	Company
1993	West Charlotte Utilities, Inc.	Englewood Water District
1993	Sanlando Utilities, Inc.	Investor
1993	Venice Gardens Utilities	Company
1992	Myakka Utilities, Inc.	City of North Port
1992	Kingsley Service Company	Clay County
1992	Mid Clay Utilities, Inc.	Clay County
1992	Clay Utilities, Inc.	Clay County
1992	RUD #1 - 4 Systems Review	Meadowoods/Kensington Park
1992	Martin Downs Utilities, Inc.	Martin County
1992	Fox Run Utility System	Martin County
1992	Leilani Heights	Martin County
1992	River Park Water and Sewer	SSU
1992	Central Florida Research Park	Barnett Bank
1992	Rolling Oaks Utility	Investor
1992	City of Palm Bay Utilities	PBUC
1992	South Bay Utilities, Inc.	Investor
1992	North Port - GDU Water and Sewer	City of North Port
1992	Palm Bay - GDU Water and Sewer	City of Palm Bay
1992	Sebastian - GDU Water and Sewer	City of Sebastian
1991	Sanibel - Sanibel Sewer System, Ltd.	City of Sanibel
1991	St. Augustine Shores - St. Johns County	SSU
1991	Remmington Forest - St. Johns County	SSU
1991	Palm Valley - St. Johns County	SSU
1991	Valrico Hills - Hillsborough County	SSU
1991	Hershel Heights - Hillsborough County	SSU
1991	Seaboard Utilities - Hillsborough County	UFUC
1991	Federal bankruptcy - Lehigh Acres	Topeka
1991	Meadowoods Utilities - Regional Utility District #1	Investor
1991	Kensington Park Utilities - Regional Utility District #1	Investor
1991	Industrial Park - Orange City	City of Orange City

Gerald C. Hartman, P.E., President (Continued)

Year	Project	Party Represented
1991	Country Village - Orange City	City of Orange City
1991	John Knox Village - Orange City	City of Orange City
1991	Land 'O Lakes - Orange City	City of Orange City
1990	Orange Osceola Utilities - Osceola County	Osceola County
1990	Morningside East and West - Osceola County	Osceola County
1990	Magnolia Valley Services, Inc. - New Port Richey	City of New Port Richey
1990	West Lakeland Industrial - City of Lakeland	City of Lakeland
1990	Highlands County Landfill	Owner
1990	Venice Gardens Utilities - Sarasota County	SSU
1990	South Hutchinson Services - St. Lucie County	SHS
1990	Indian River Utilities, Inc. - Edgewater	City of Edgewater
1990	Terra Mar Utility Company - Edgewater	City of Edgewater
1989	Seminole Utility Company - Winter Springs	Topeka
1989	North Hutchinson Services, Inc. - St. Lucie County	NHS
1989	Sugarmill Utility Company	Utilities Comm. City of New Smyrna Bch.
1989	Ocean Reef Club, Inc. ORCA	Company
1989	Prima Vista Utility Company - City of Ocoee	PVUC
1989	Deltona Utilities - Volusia County	SSU
1989	Poinciana Utilities, Inc. - Jack Parker Corporation	JPC
1989	Julington Creek	Investor
1989	Silver Springs Shores	Bank
1988	Eastside Water Company - Hillsborough County	Hillsborough County
1988	Twin County Utilities	Company
1988	Burnt Store Utilities	Company
1988	Deep Creek Utilities	Company
1988	North Beach Water Company - Indian River County	NBWC
1988	Bent Pine Utility Company - Indian River County	BPUC
1988	Country Club Village - SSU	CCV
1987	Sugarmill Utility Company - Florida Land Corporation	FLC
1987	North Orlando Water and Sewer Company - Winter Springs	NOWSCO
1987	Osceola Services Company - FCS (non-for-profit)	OSC
1987	Orange City Water Company - Orange City	City of Orange City
1987	West Volusia Utility Company - Orange City	City of Orange City
1987	Seacoast Utilities, Inc. - Florida Land Corporation	FLC

And numerous other water and wastewater utility valuations in the 1976-87 period.

<u>Facility Planning</u>

Mr. Hartman has been involved in over 50 water, wastewater and/or solid waste master plans, several interlocal negotiations and agreements, over 100 capital improvement programs, and numerous capital construction fund plans. He represented the American Society of Civil Engineers in the State Comprehensive Plan as a Policy Advisory Committee Member on the utility element, and participated in the preparation of Comprehensive Plans, Chapter 9J5, for more than 20 communities.

' **Gerald C. Hartman, P.E., President (Continued)**

Analyses and Design

Mr. Hartman has participated in over 50 computer-assisted hydraulic analyses of water and wastewater transmission systems including extended period simulations as well as hydraulic transient analyses. He was involved in 4 wastewater treatment investigations, 2 sludge pilot testing programs, 14 effluent disposal pilot programs and investigations, several energy efficiency analyses, several odor control studies, and other process evaluations for operations. Mr. Hartman participated in 4 value engineering investigations oriented toward obtaining the most cost-effective alternatives for regional and private programs. Mr. Hartman has been involved in the design of package WWTP's through AWT facilities and simple well and chlorination systems through reverse osmosis facilities. He has been involved in numerous water blending, trihalomethane, synthetic organic contaminant removal, secondary precipitation, corrosion control, and alum precipitation studies. Mr. Hartman has performed process evaluations for simple aeration facilities, surface water sedimentation facilities, water softening facilities, as well as reverse osmosis facilities. He was involved in water conservation programs, as well as distribution system evaluation programs. He participated in both sanitary sludge management and disposal studies and co-authored the book entitled "Sludge Management and Disposal for the Practicing Engineer." He also participated in numerous lime sludge thickening, management, and utilization/disposal investigations. Mr. Hartman has been involved in wellfield management studies, wellfield protection ordinances, wellfield siting, water resource evaluations, and water resource planning for several entities in sand aquifer, sand and gravel aquifer and limestone aquifer systems.

Utility Management Consulting

Mr. Hartman has been involved in utility transfers from public, not-for-profit, district, investor-owned, and other entities to cities, counties, not-for-profit corporations, districts, and private investors. He has been involved in staffing, budget preparation, asset classification, form and standards preparation, utility policies and procedures manuals/training, customer development programs, standard customer agreements, capacity sales, and other programs. Mr. Hartman has been involved in over 50 interlocal agreements with respect to service area, capacity, service, emergency interconnects, back-up or other interconnects, rates, charges, service conditions, ownership, bonding, and other matters. Additionally, Mr. Hartman has assisted in the formation of newly certificated utilities, newly created utility departments for cities and counties, new regional water supply authorities, new district utilities, and other utility formations.

PUBLICATIONS/PRESENTATIONS

Mr. Hartman has presented several training sessions and seminars for the American Water Works Association, the American Society of Civil Engineers, the Water Pollution Association, and the Water and Pollution Control Operators Association. He has presented and/or published numerous papers on water, wastewater and utility management topics including:

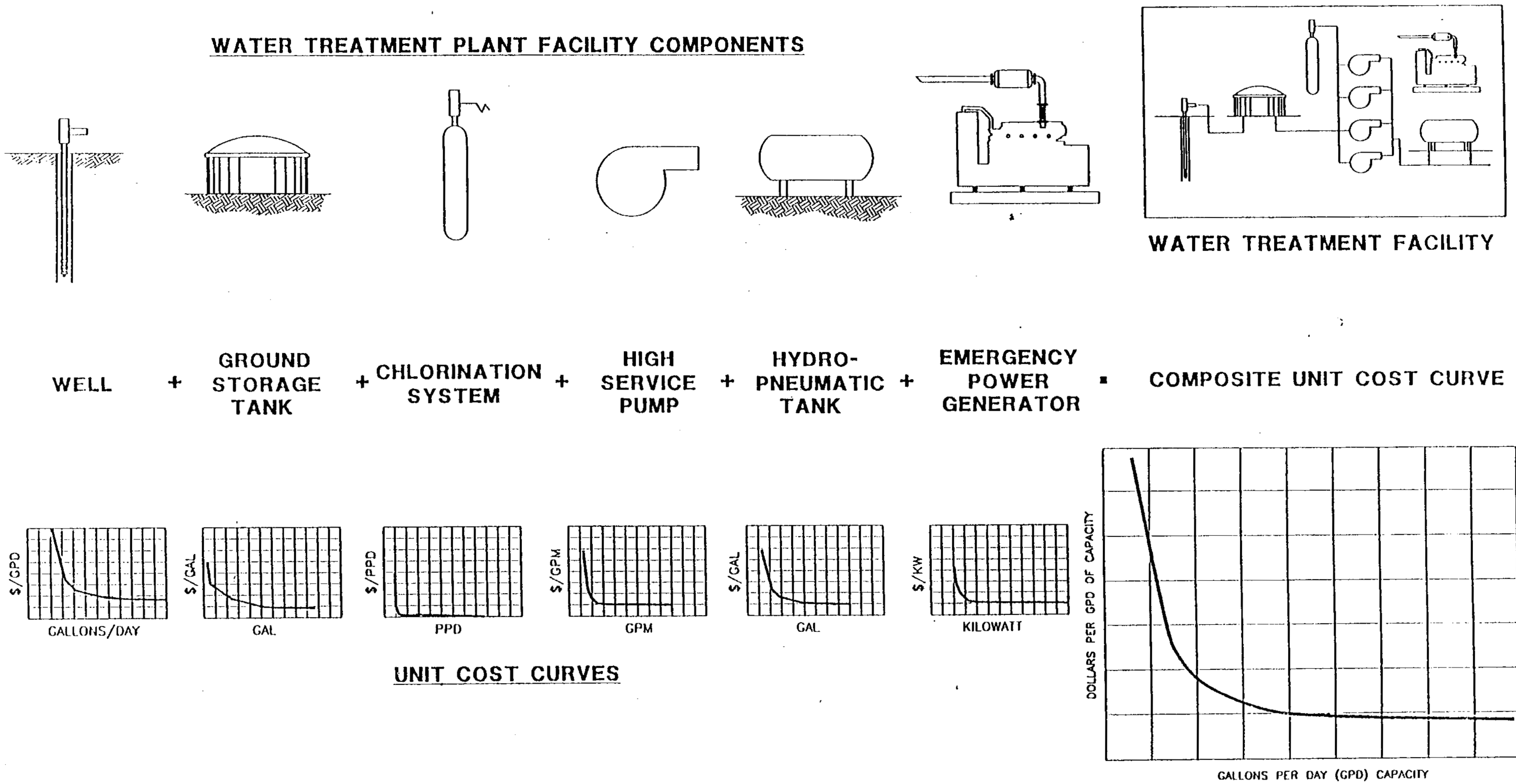
Hartman, G.C., Utility Management and Finance, (presently under contractual preparation with Lewis Publishing Company/CRC press).

Vesilind, P.A., Hartman, G.C., Skene, E.T.; Sludge Management and Disposal for the Practicing Engineer; Lewis Publishers Inc.; Chelsea, Michigan; 1986.

Hartman, G.C., and R. J. Ori, " Water and Wastewater Utility Acquisition," AWWA Specialty Conference, 1994.

Hartman, G.C. and R.C. Copeland, " Utility Acquisitions - Practices, Pitfalls and Management," AWWA Annual Meeting, 1995.

UNIT COST RELATIONSHIP OF FACILITY EQUALS THE SUM OF ITS COMPONENTS

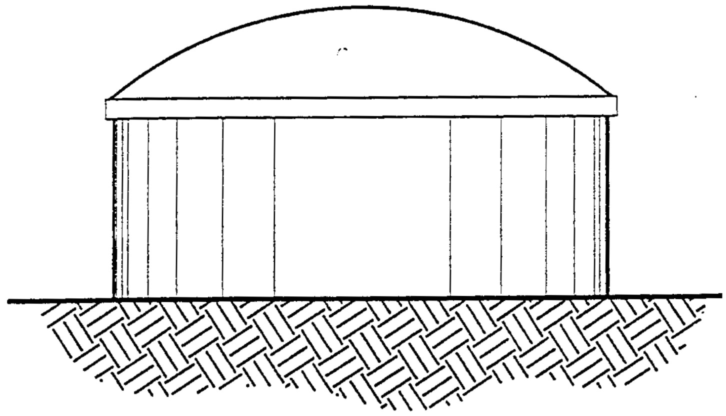


WATER TREATMENT FACILITY COMPOSITE UNIT COST CURVE

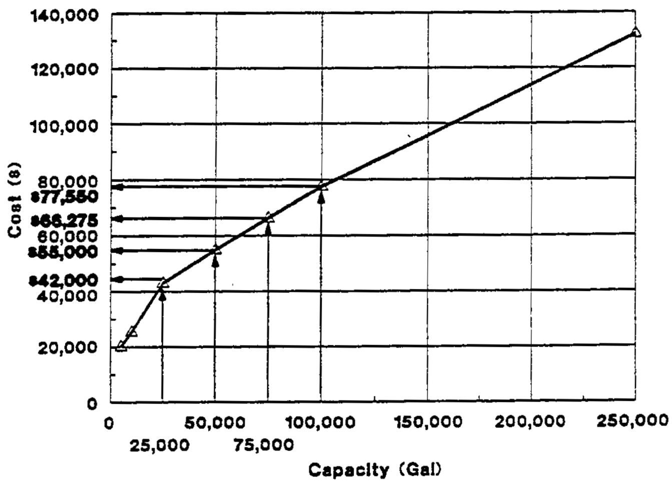
EXHIBIT (GCH-2)

PAGE 1 OF 2

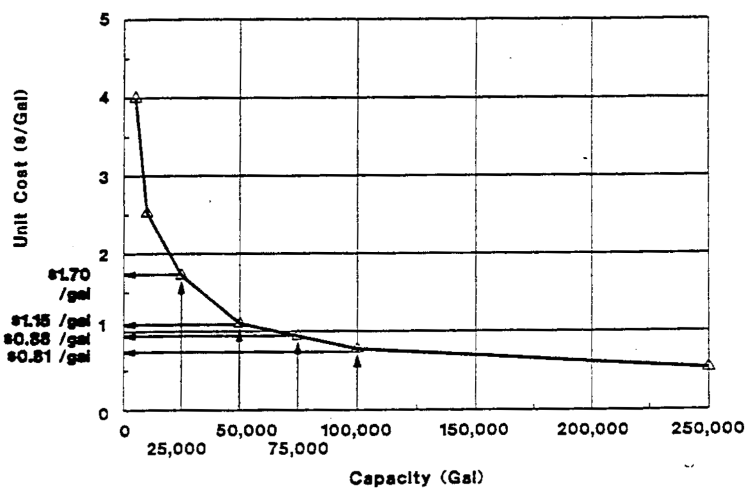
STEEL GROUND STORAGE TANK



COST



CAPACITY UNIT COST



Notes:

1) Complete steel tank, concrete foundation, roof, roof manway, gravity vent, bottom manway hatch, ladder & cage assembly, top manway platform, protective bolt caps, and installation costs are included in the manufacturers' quotations.

2) Includes 5% piping, 0% electrical, and 5% sitework costs.

3) Costs are based on June 1995, ENR Index = 5433.

STEEL GROUND STORAGE TANK COST CURVES

EXHIBIT (5CH-2)
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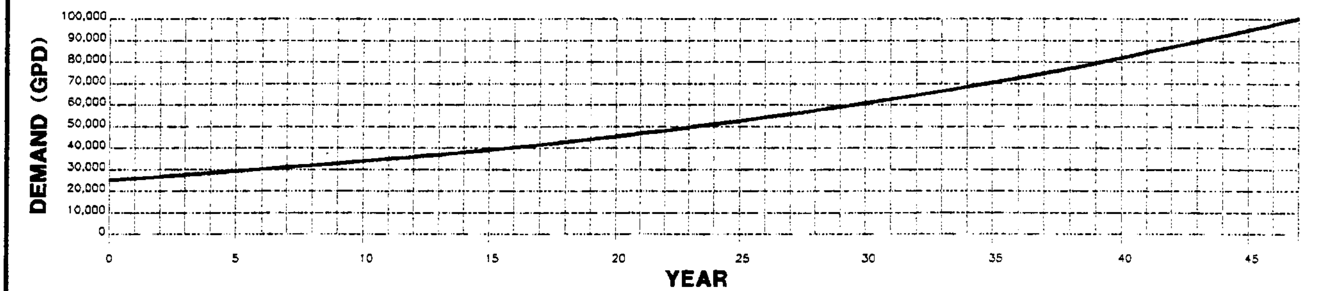
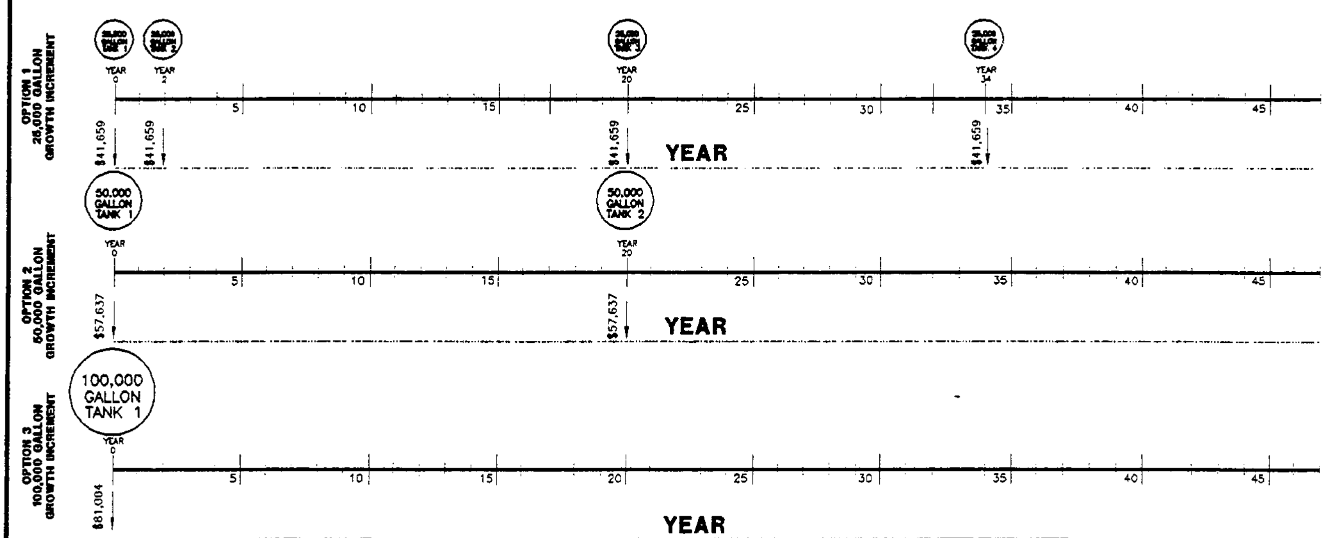
DEMAND (GPD)



FACILITY PHASING SCHEDULE AND CASH FLOW



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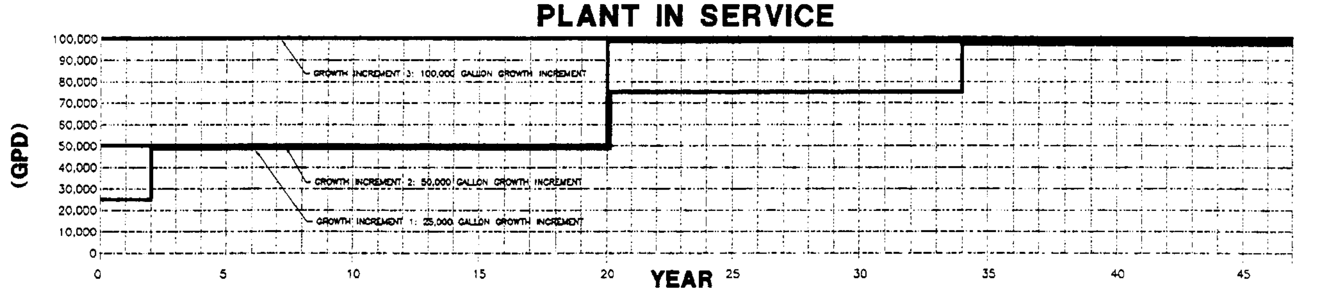

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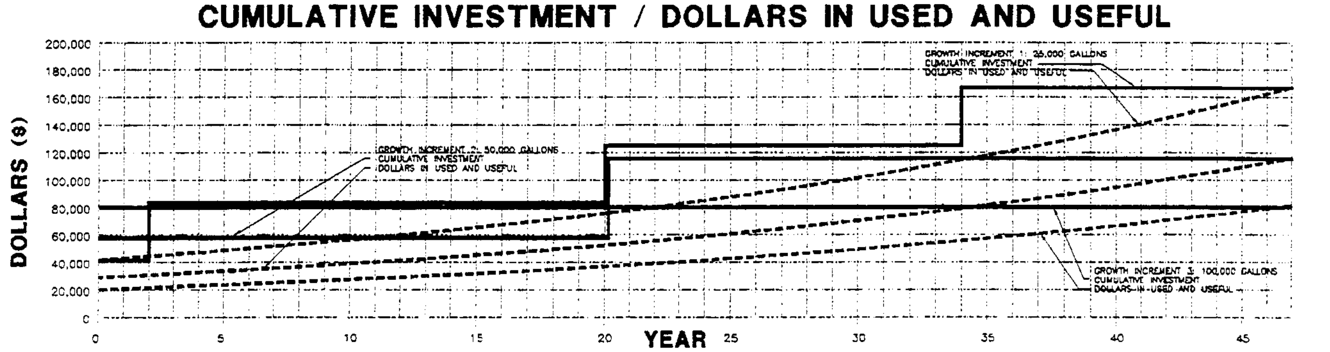

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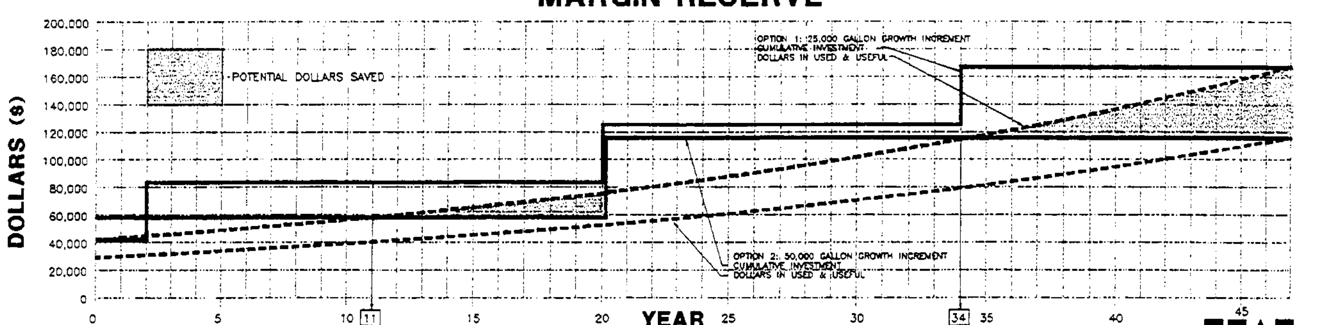
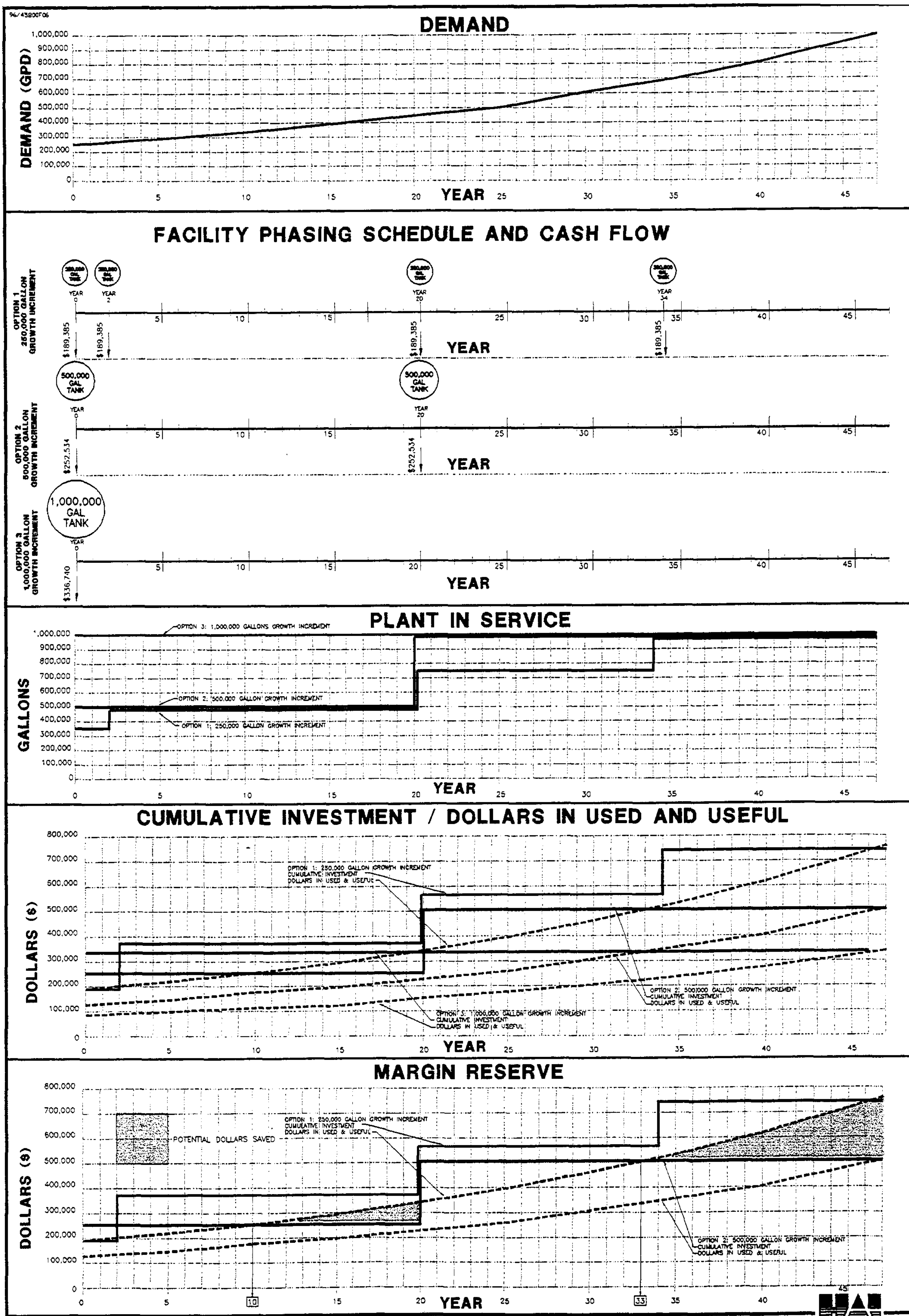


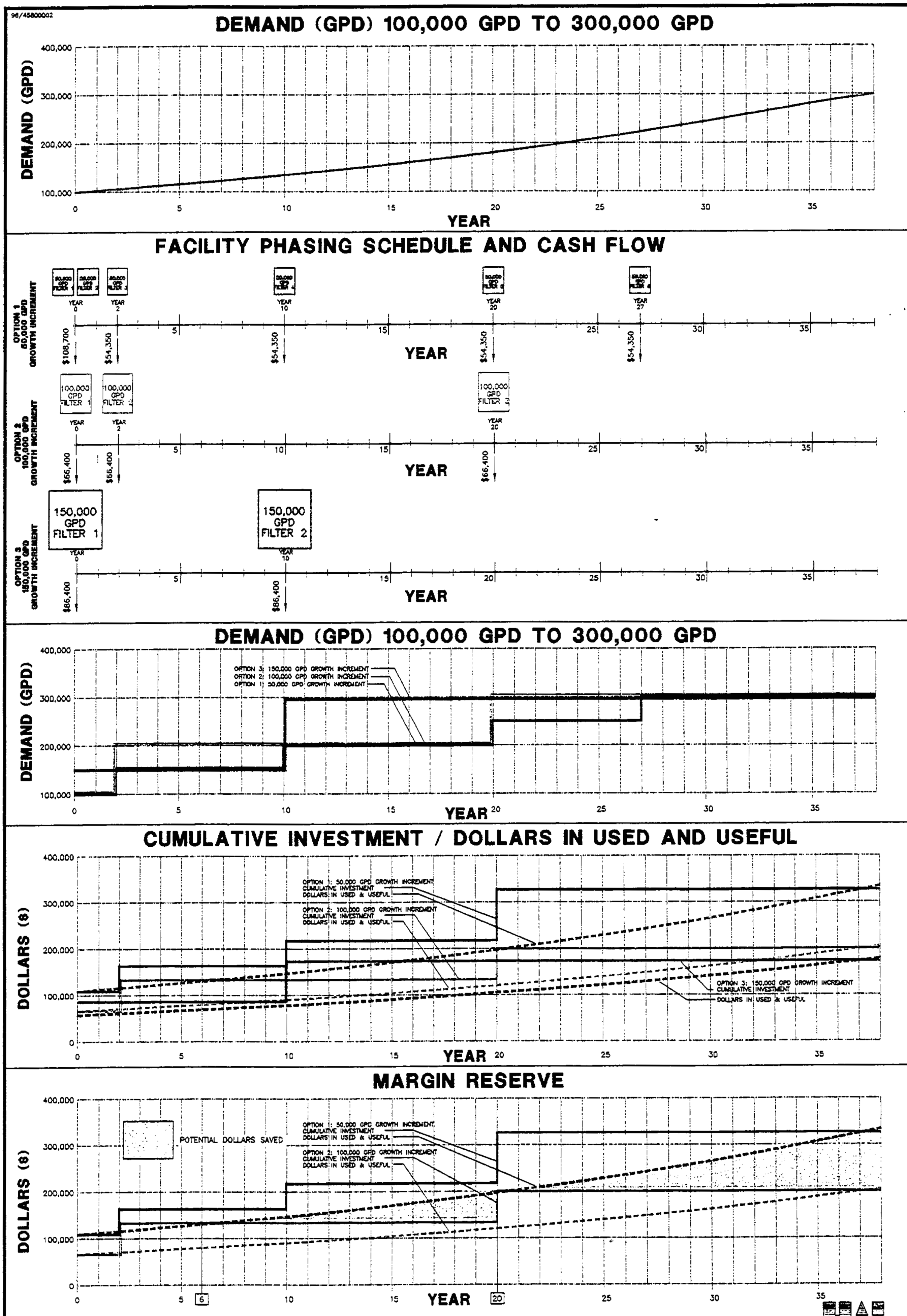
STEEL GROUND STORAGE TANKS SMALL SYSTEMS 25,000 - 100,000 GALLONS

EXHIBIT (GCH-3)
PAGE 2 OF 12



PRE-STRESSED CONCRETE GROUND STORAGE TANK - MEDIUM SYSTEMS 250,000 - 1,000,000 GALLONS

EXHIBIT (GCH-3)
PAGE 3 OF 12



TERTIARY GRAVITY FILTERS - SMALL SYSTEMS 100,000 GPD-300,000 GPD

EXHIBIT ____ (GH-3)

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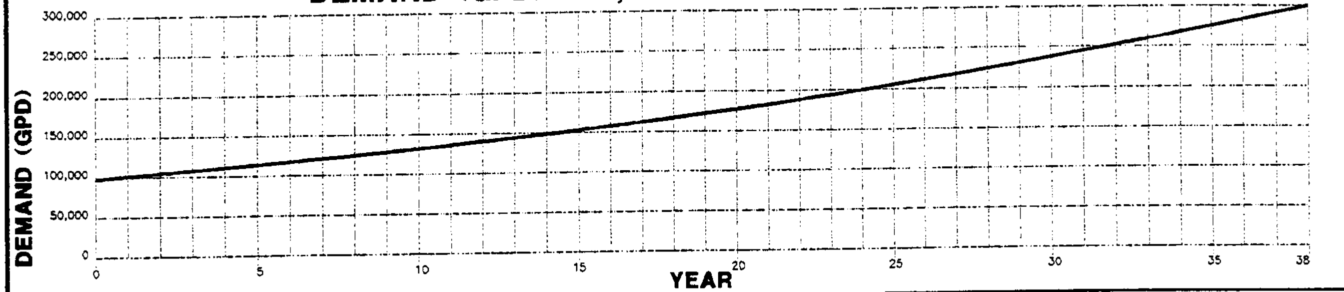
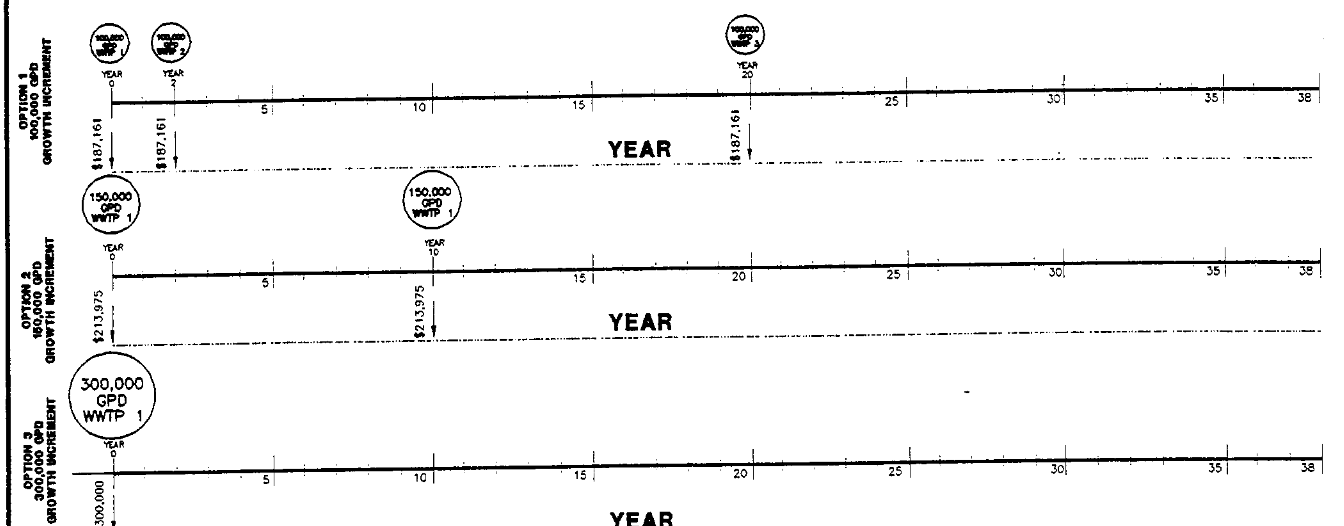
DEMAND (GPD) 100,000 GPD TO 300,000 GPD



FACILITY PHASING SCHEDULE AND CASH FLOW



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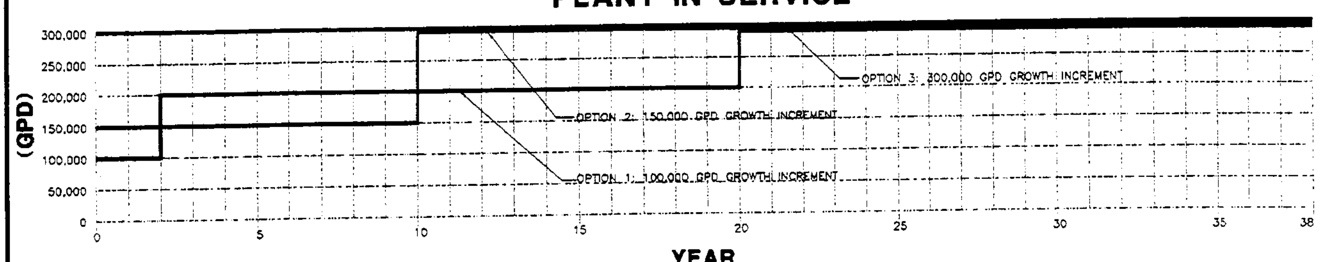

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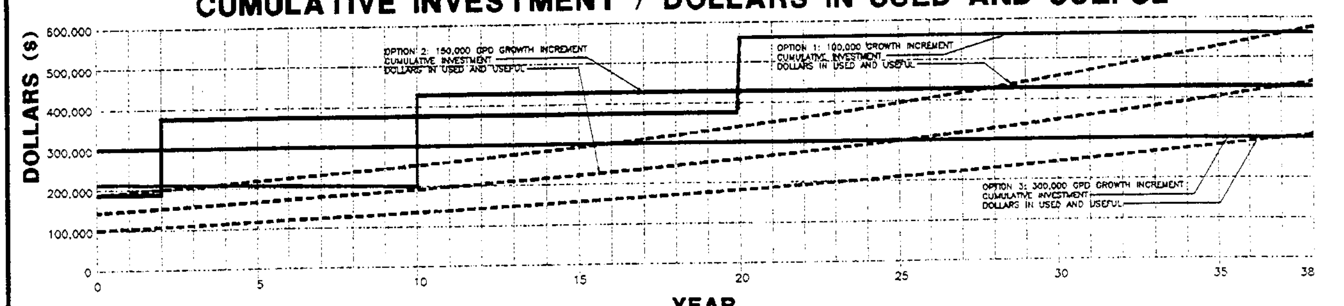

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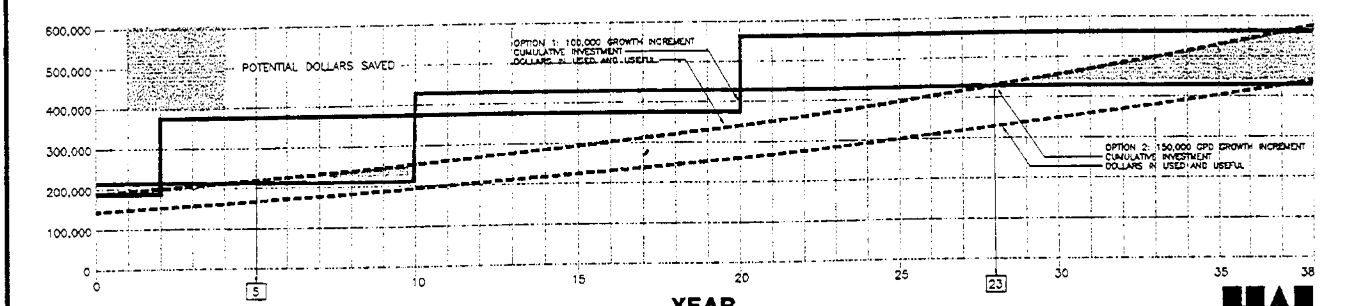

CONTACT STABILIZATION PACKAGE WWTP - SMALL SYSTEMS 100,000 GPD - 300,000 GPD

96/45800F04

EXHIBIT (GCH-3)

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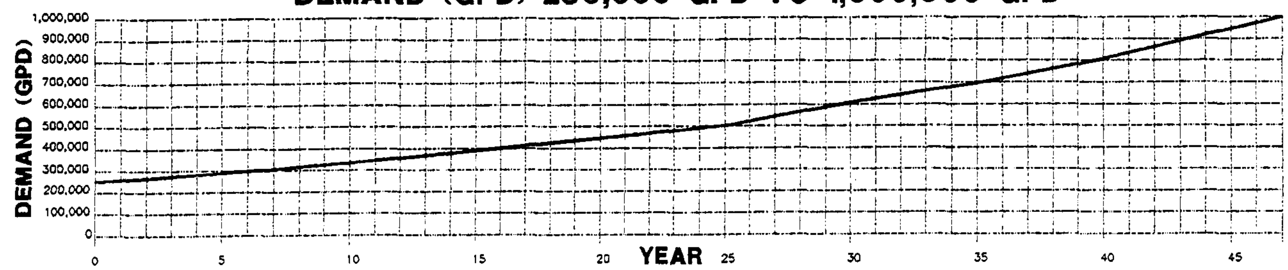
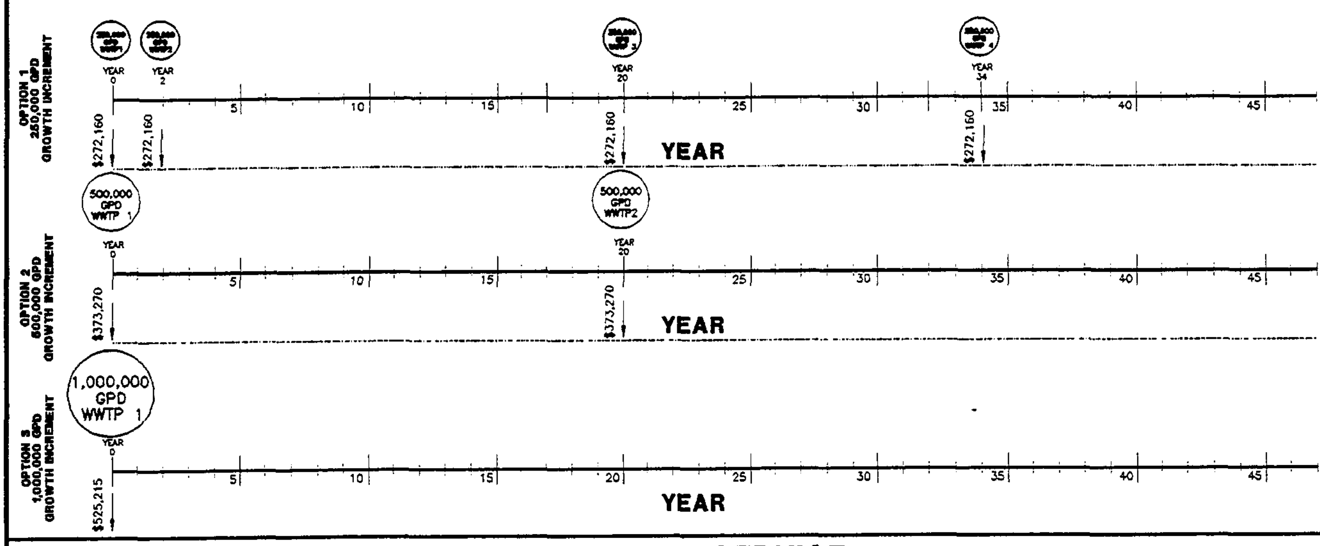
DEMAND (GPD) 250,000 GPD TO 1,000,000 GPD



FACILITY PHASING SCHEDULE AND CASH FLOW



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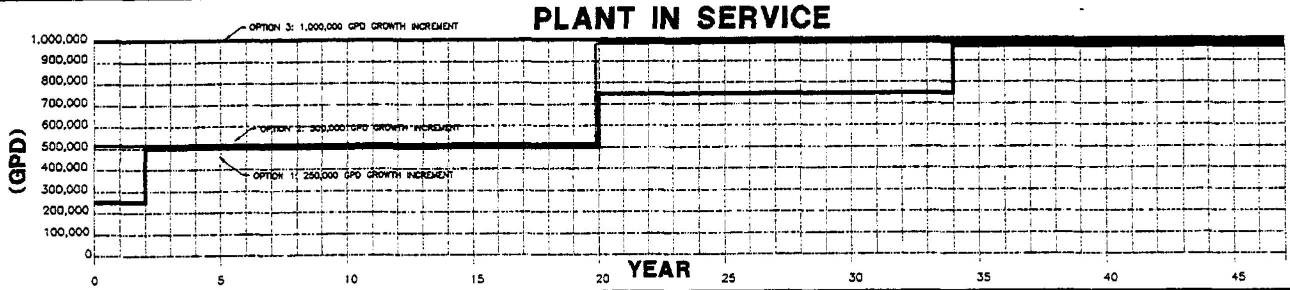
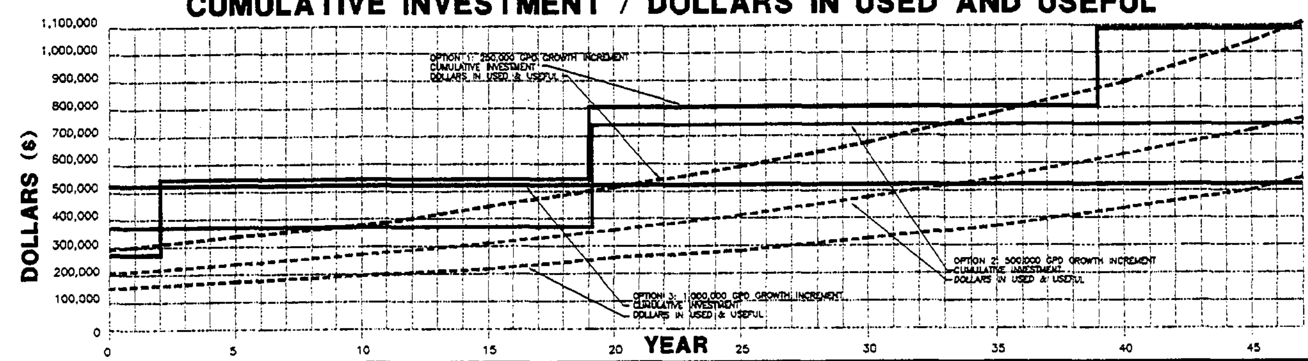


CUMULATIVE INVESTMENT / DOLLARS IN USED AND USEFUL



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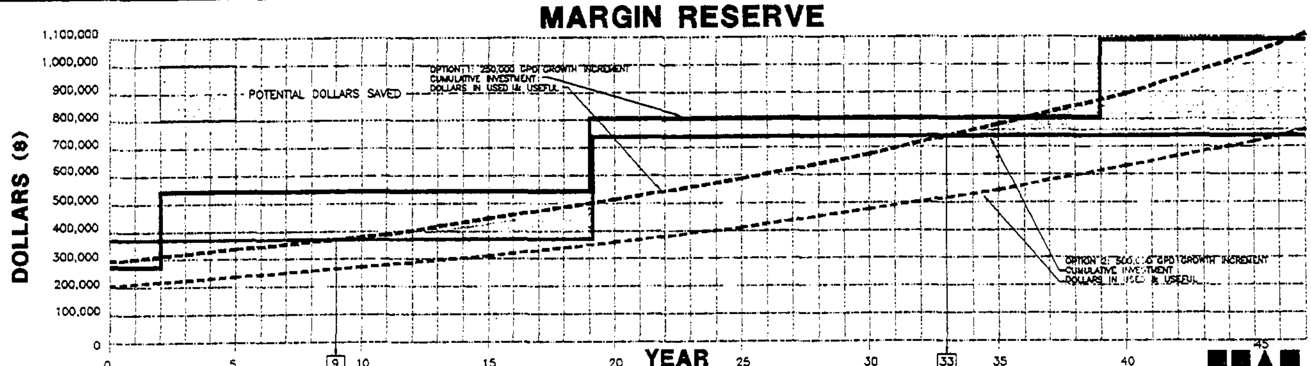
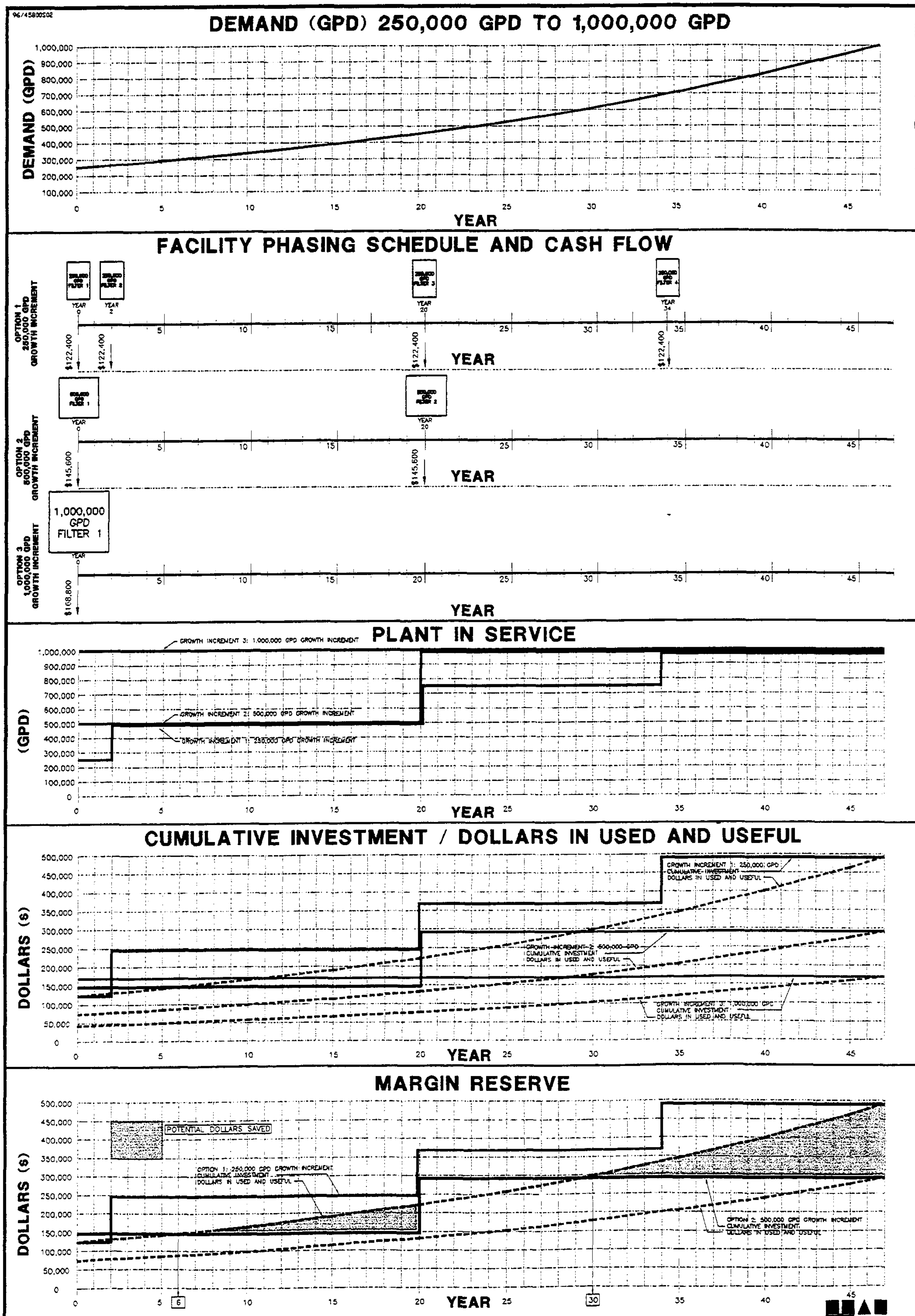


CONTACT STABILIZATION PACKAGE WWTP - MEDIUM SIZE SYSTEMS 250,000 GPD-1,000,000 GPD



TERTIARY FILTERS - TRAVELING BRIDGE MEDIUM SYSTEMS

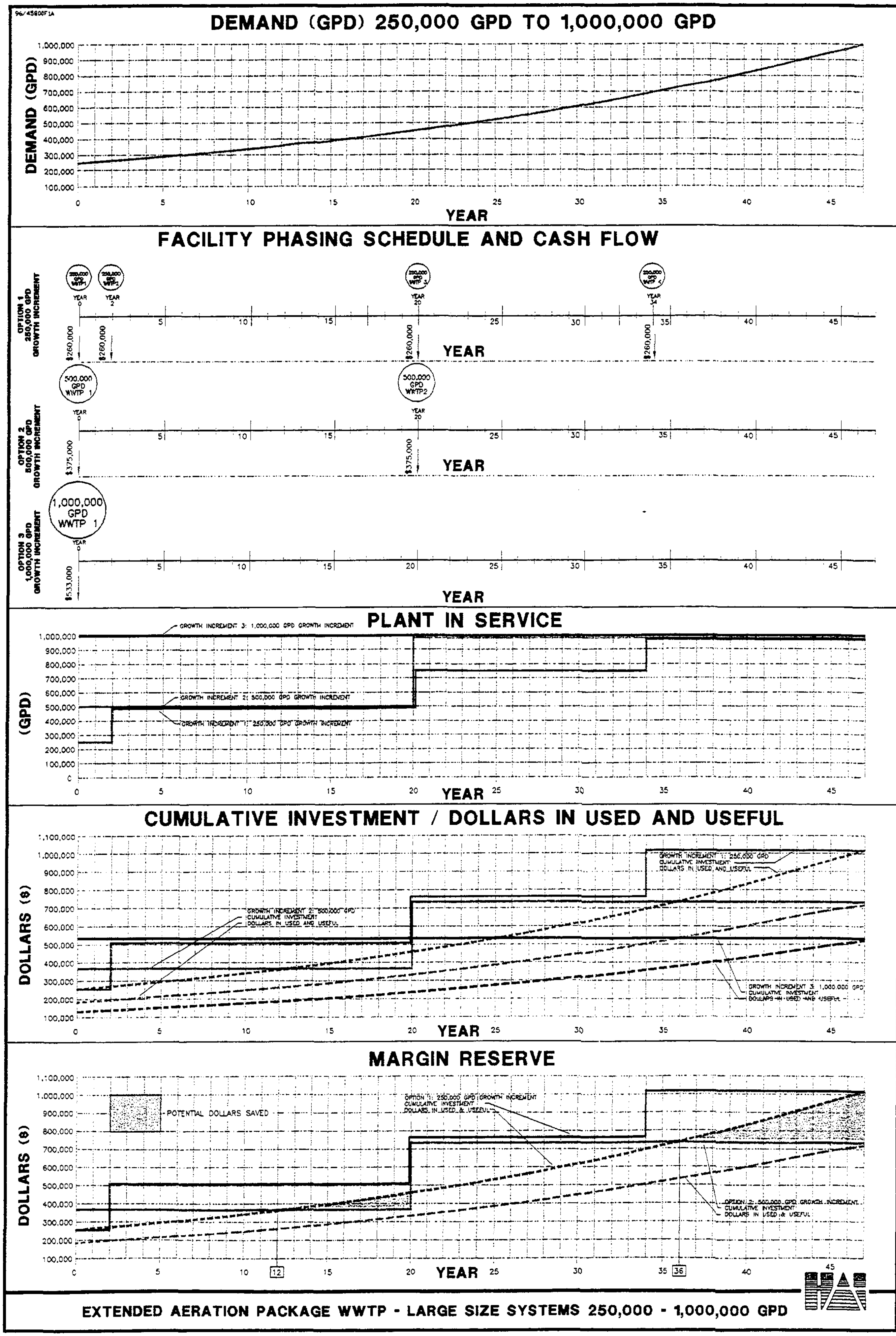


EXHIBIT 7 (GCH-3)
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EXHIBIT ___ (GCH-3)
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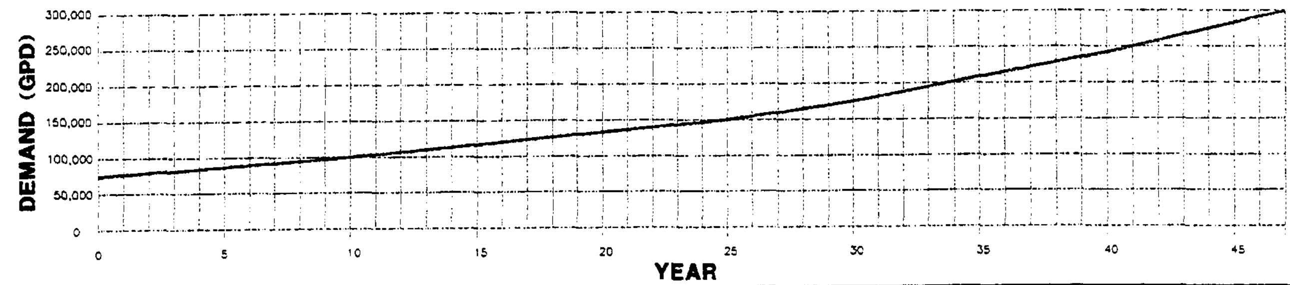
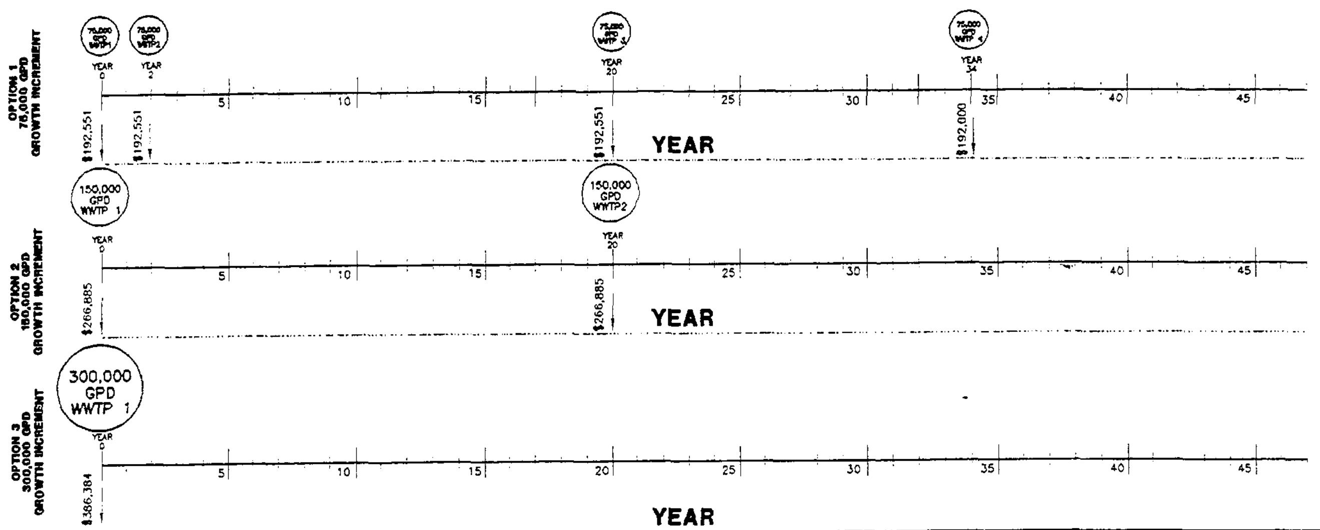
96/45800F03

DEMAND (GPD) 75,000 GPD TO 300,000 GPD



FACILITY PHASING SCHEDULE AND CASH FLOW



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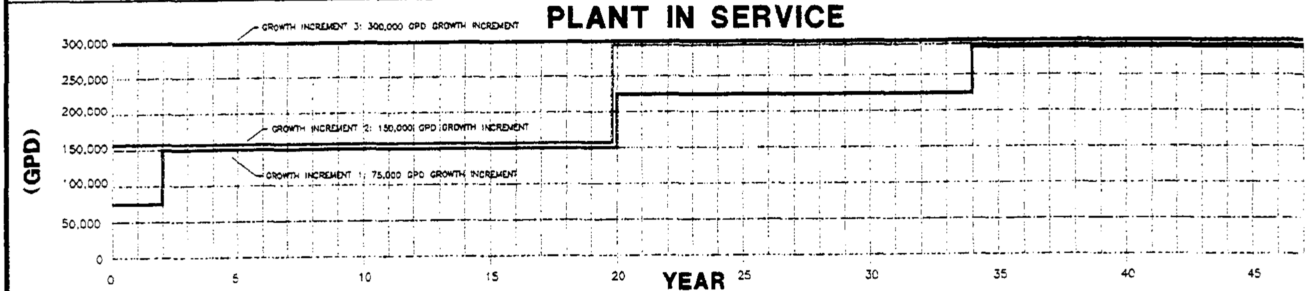

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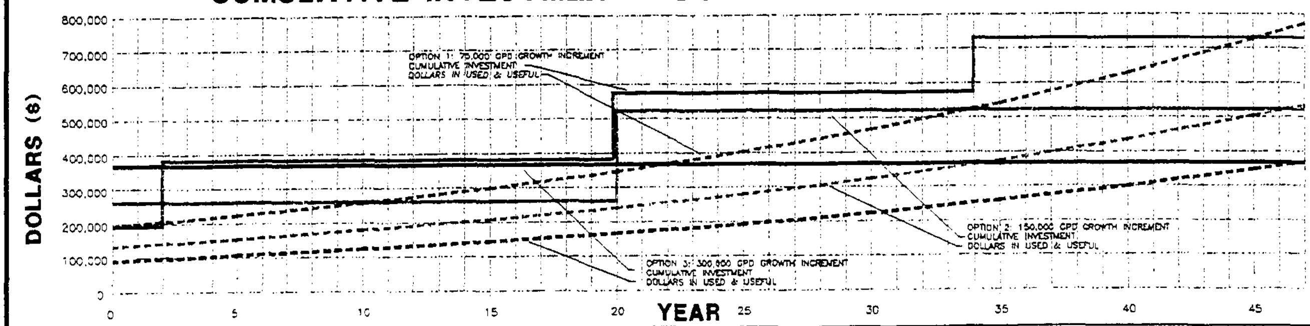

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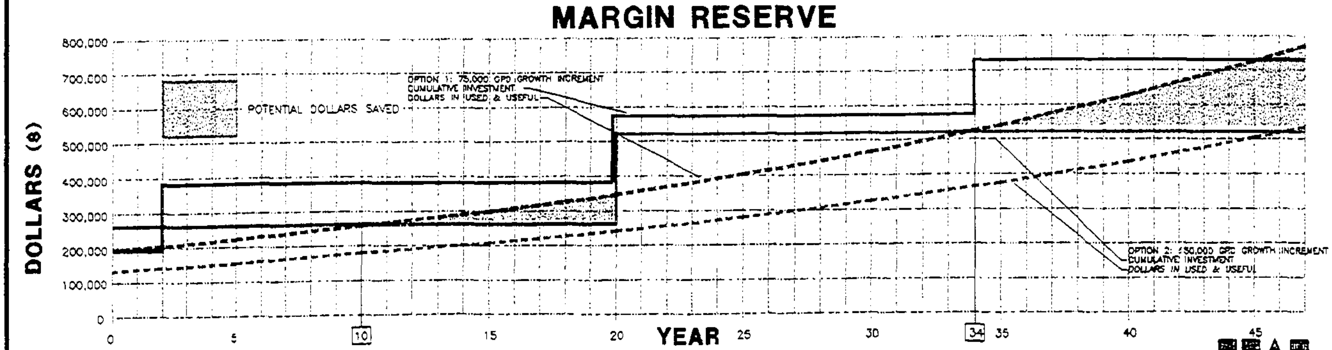

EXTENDED AERATION PACKAGE WWTP - MEDIUM SIZE SYSTEMS 75,000 GPD-300,000 GPD

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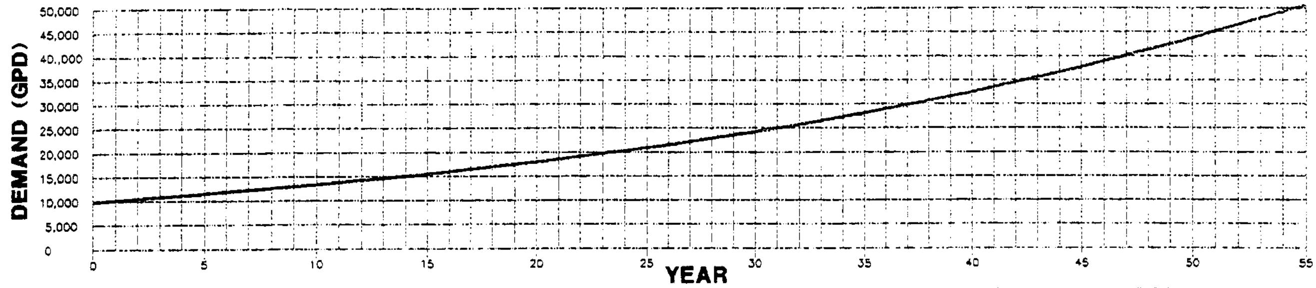
DEMAND (GPD) 10,000 GPD TO 50,000 GPD



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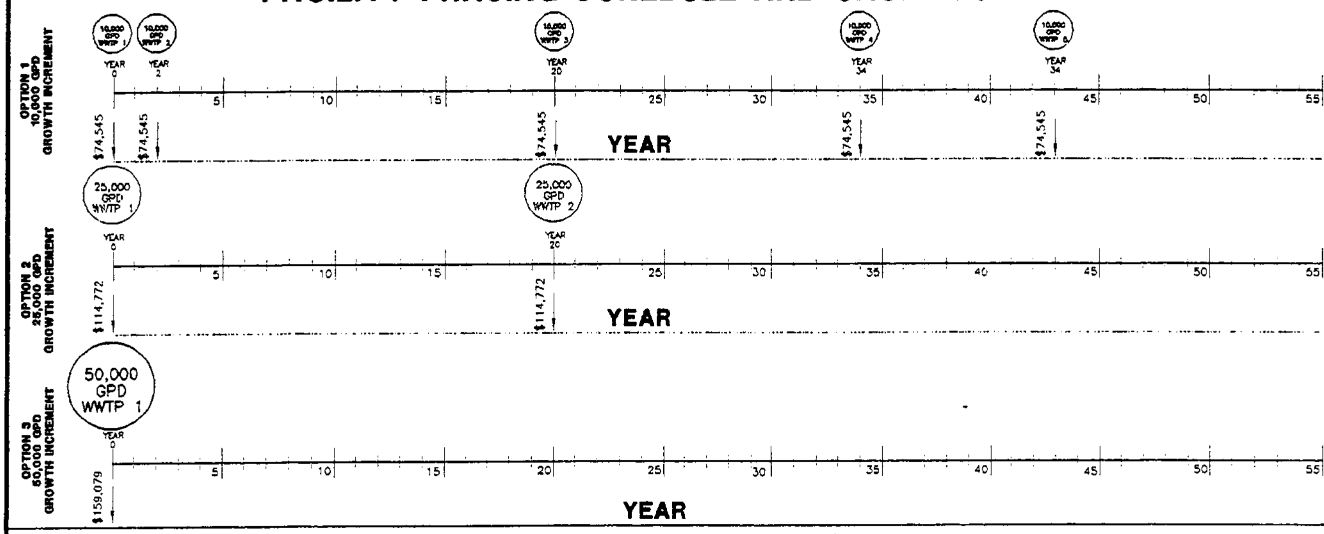

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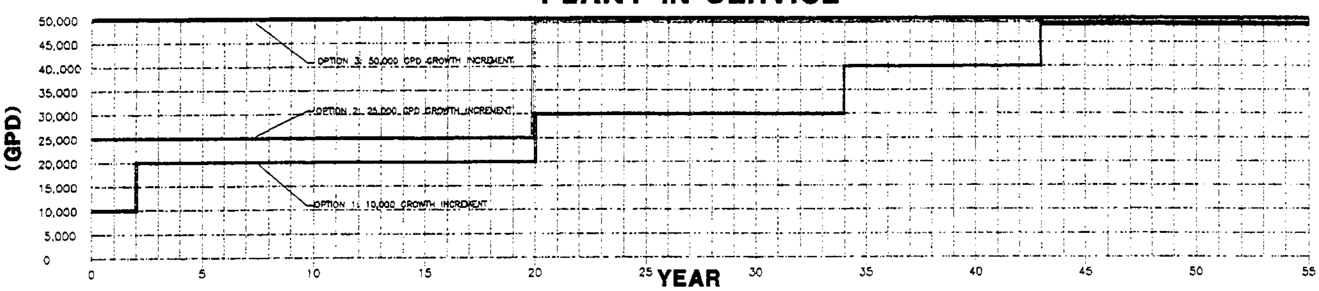

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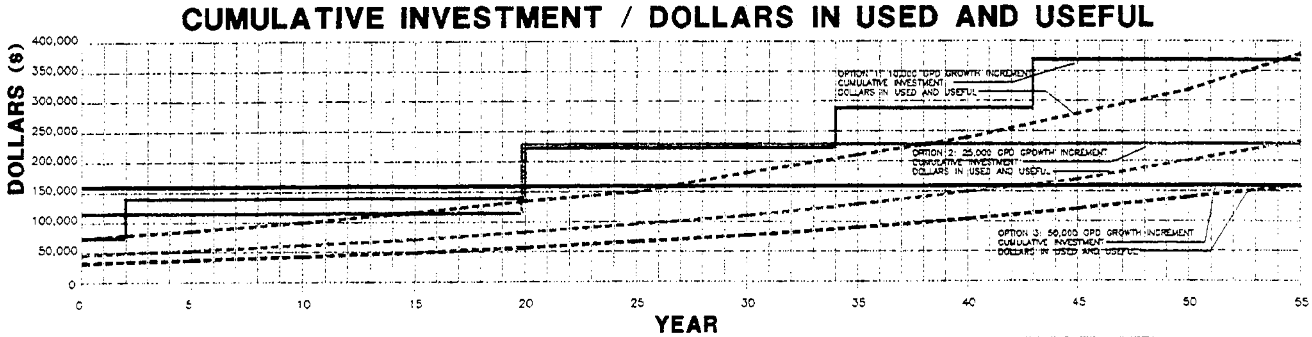

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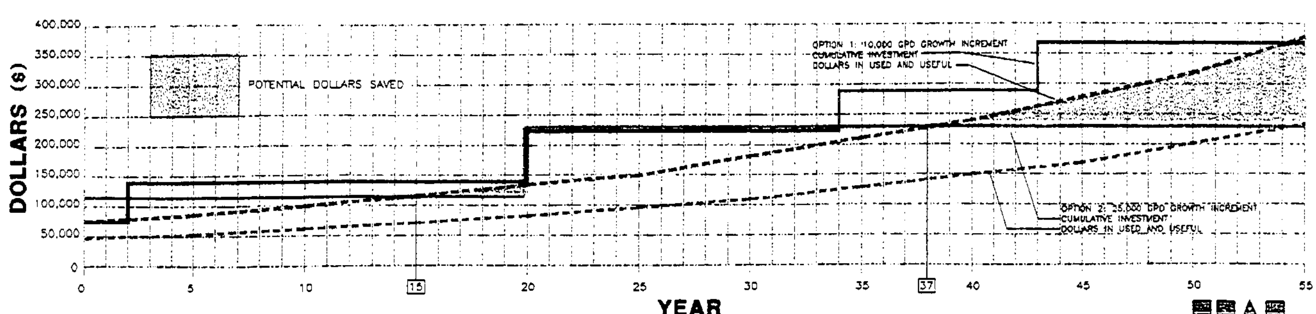

EXTENDED AERATION PACKAGE WWTP SMALL SYSTEMS 10,000 - 50,000 GPD

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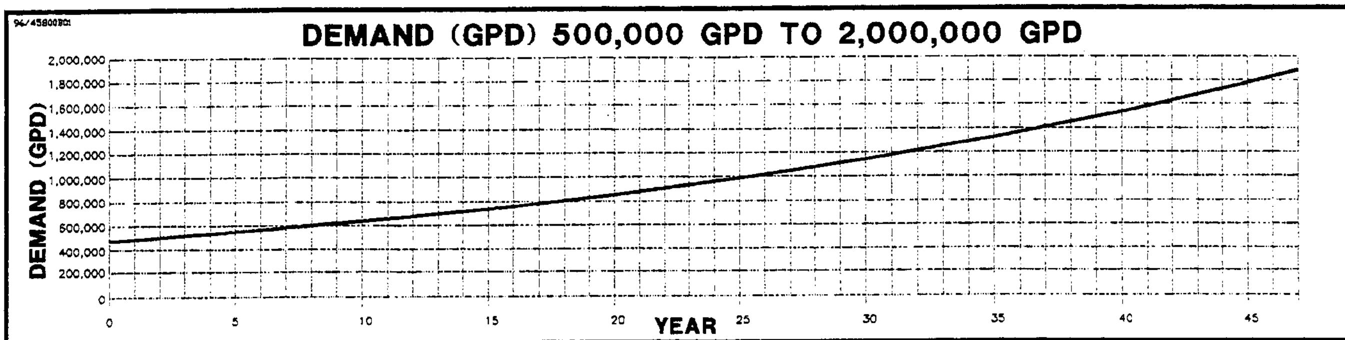
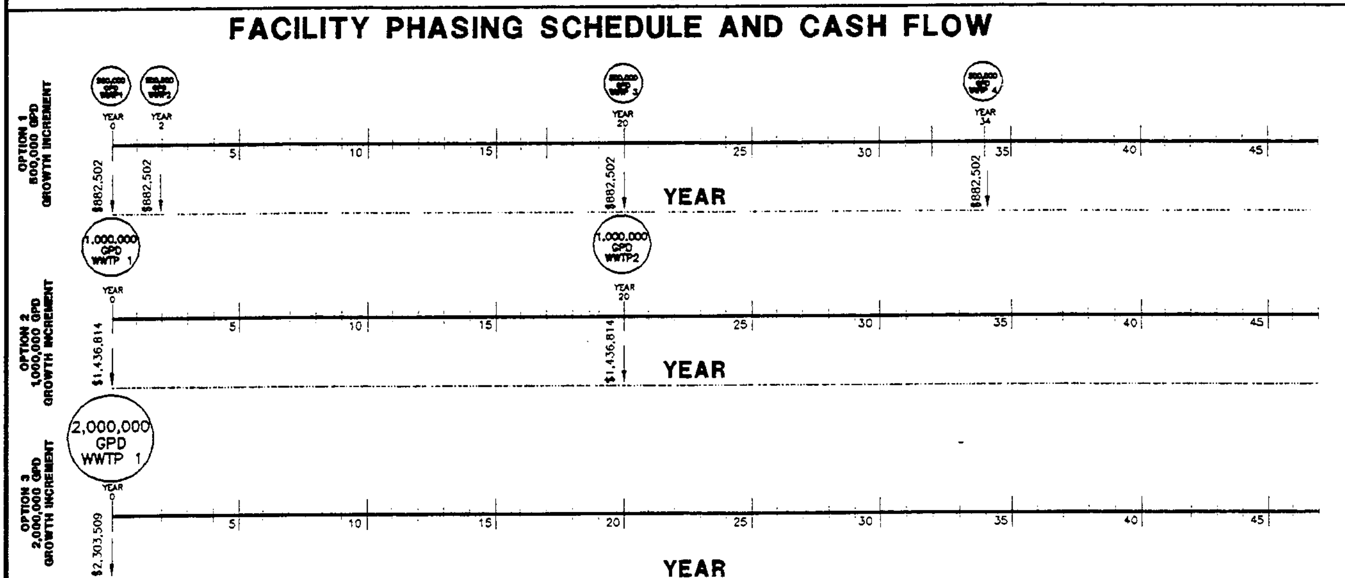
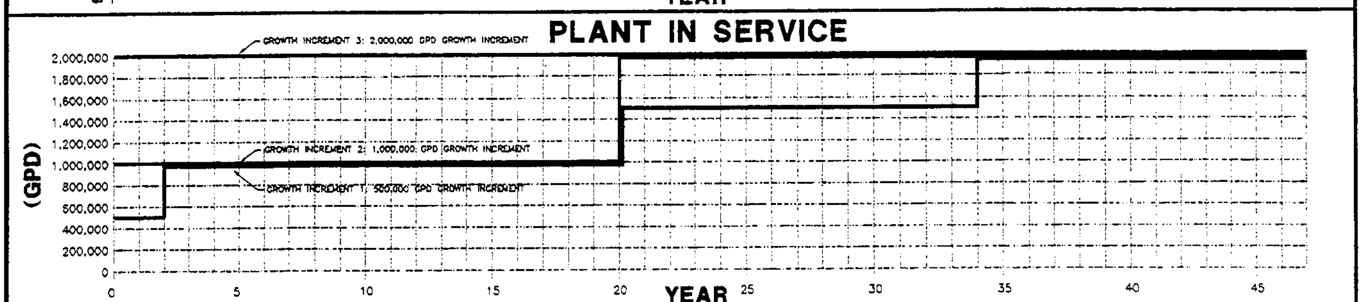
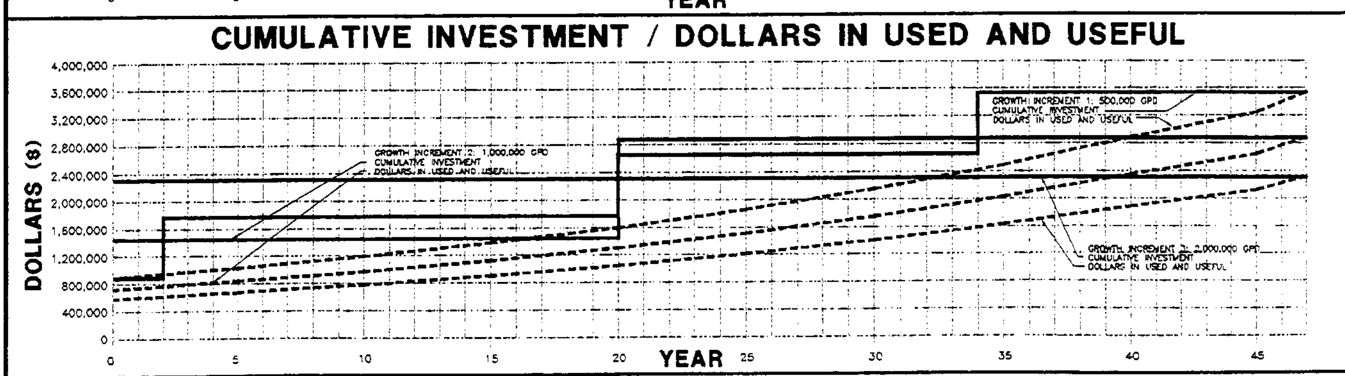
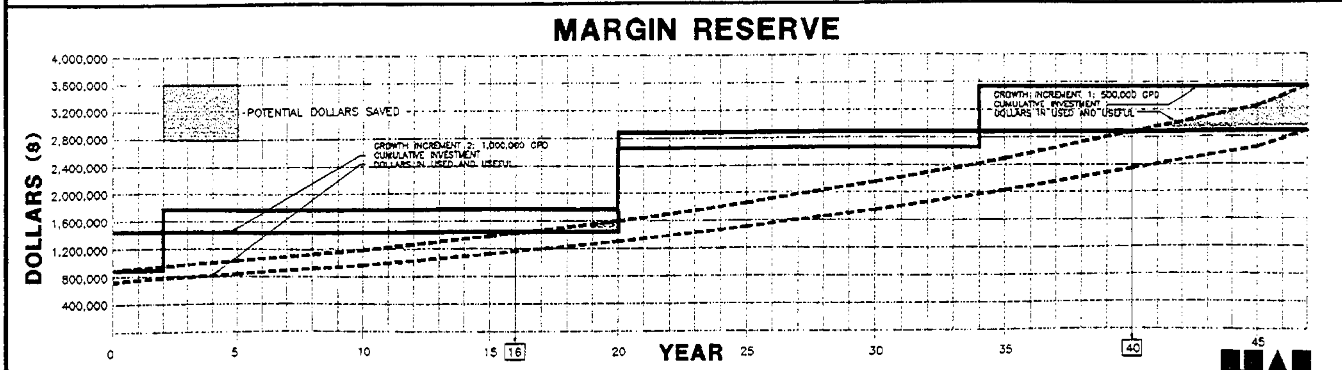


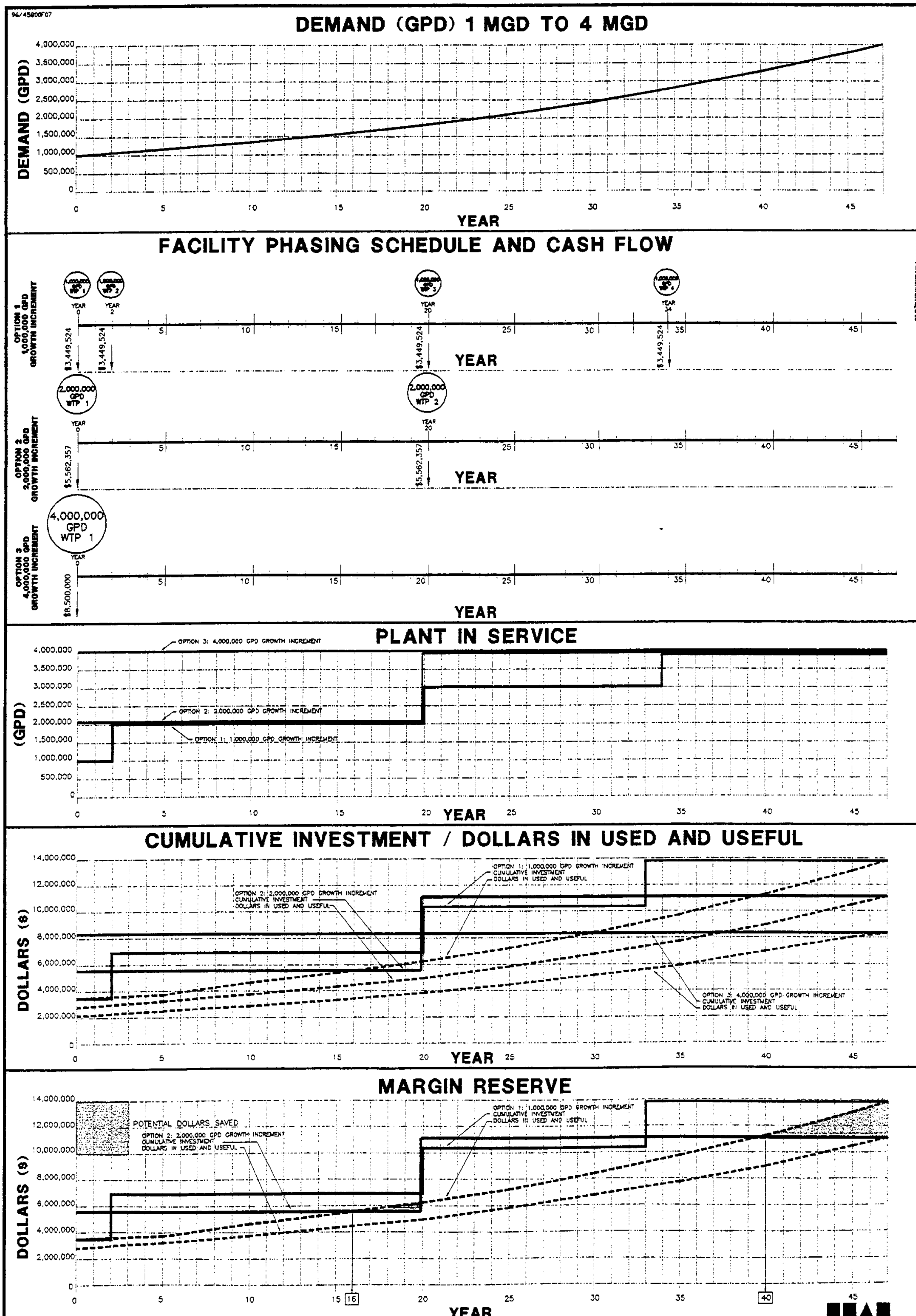








RO WTP - SMALL SYSTEMS 0.5 - 2.0 MGD



LIME SOFTENING WTP - MEDIUM SYSTEMS - 1-4 MGD

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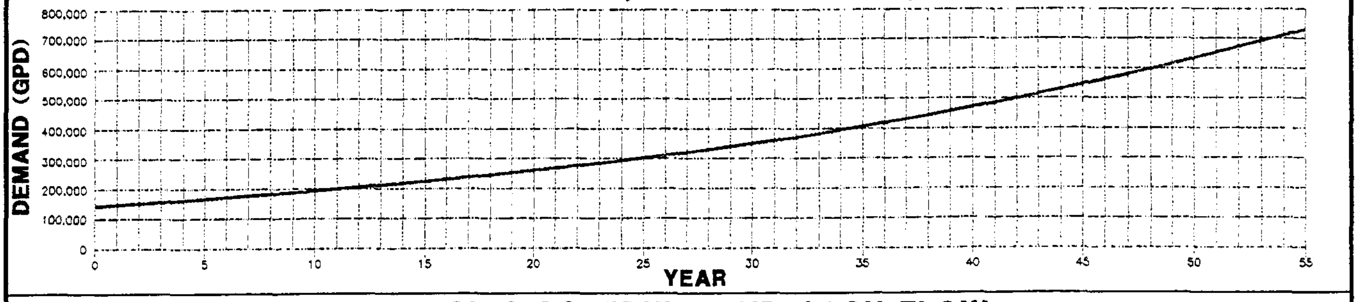
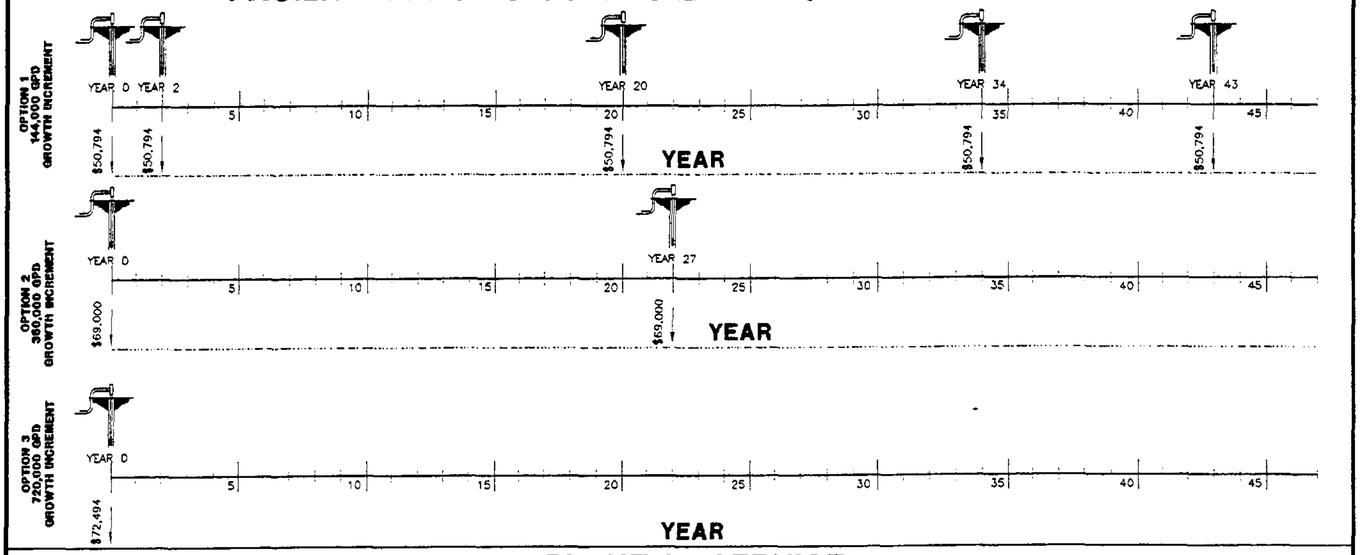
DEMAND (GPD) 144,000 GPD TO 720,000 GPD



FACILITY PHASING SCHEDULE AND CASH FLOW



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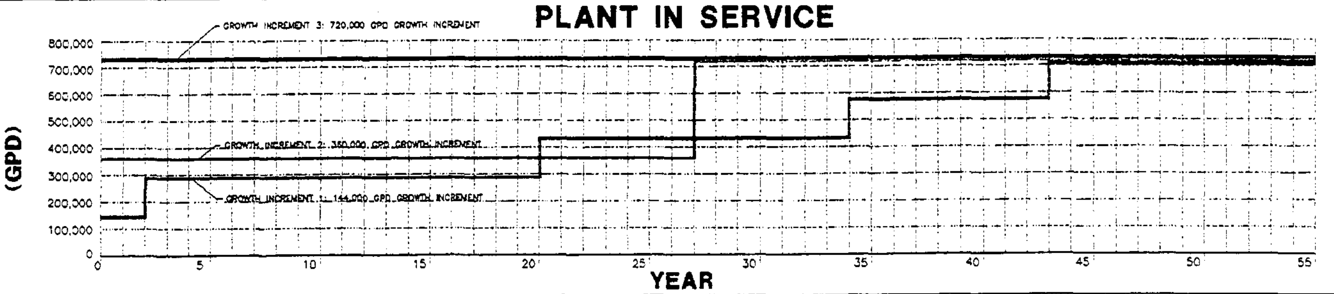

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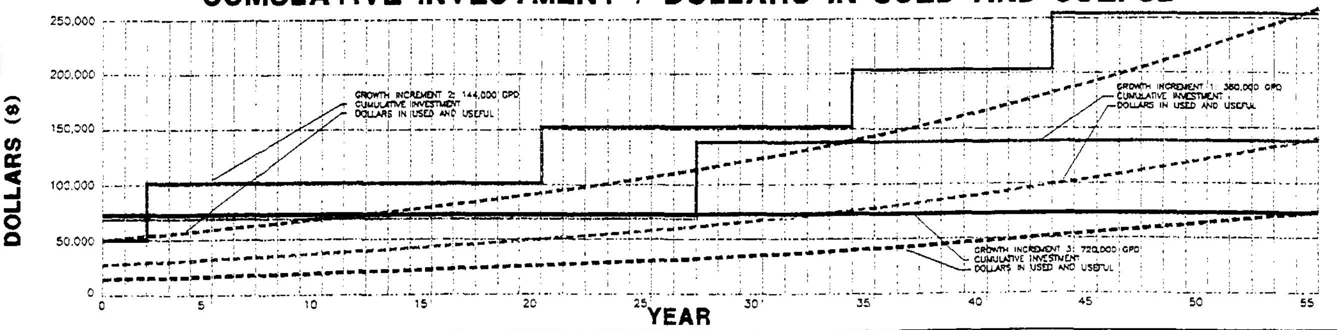

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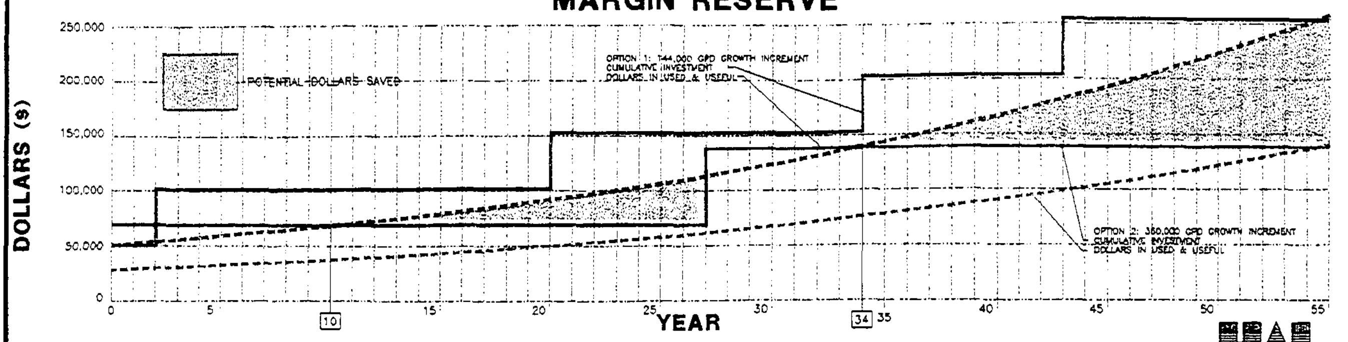

POTABLE WATER SUPPLY WELLS (250' DEEP) 144,000 GPD - 720,000 GPD

(GCH-4)

1 284

engineers, [illegible] & management [illegible]

ECONOMY OF SCALE EVALUATION

Prepared For

SSU
Southern States Utilities
1000 Color Place, Apopka, Florida, 32703, (407) 880-0058

FEBRUARY, 1996

HAI Project No. 95-145.00

HAI
HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants
ORLANDO • JACKSONVILLE • TALLAHASSEE • FT. MYERS

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SECTION 1

SECTION 1
INTRODUCTION

1.1 BACKGROUND

Individuals, companies, corporations, and institutions are all consumers. All purchase goods and services of others that are necessary to meet individual needs or supply materials and equipment necessary to produce a product that will be sold to others at a profit. In the case of the individual, consider a trip to the grocery store. The objective is to procure maximum food and supplies at the least cost. The way to optimize the purchase is by buying in bulk. In this way, a commodity is purchased for a lower unit price and the time before the next trip to the supermarket is maximized.

When a profit motive is involved, as is the case of a company or corporation, the market necessity of keeping operating costs low and profits high dictate that materials and goods be purchased at the lowest price possible. Most often, this is achieved by purchasing in bulk quantity. In this way, goods are procured at a lower unit price. Costs are thus kept low and/or profits are maximized, depending on market conditions.

Institutions, which provide services to the public, have an obligation to minimize costs and maximize services. Purchasing agents are usually astute at maximizing procurement of goods at a minimum price. This is accomplished through competitive bidding of bulk purchases.

This familiar everyday concept loosely known as "power buying" or "bulk purchases" is actually an economy of scale. An economy of scale exists when the unit cost decreases with size or amount purchased. In consumer products, economies of scale exist primarily due to manufacturer savings in packaging and handling. In many consumer situations, there exists an optimum point where the relative maximum economy of scale is achieved and beyond that point, the unit price of the product remains nearly constant. This would be known as an inflection point and it marks the range between the areas of increasing economy of scale and decreasing economy of scale. Provided one could use the commodity in a reasonable period of time, the most cost-effective purchase of the commodity would be made for the volume or quantity with the lowest unit price.

Economies of scale exist in the construction industry. For instance, a contractor who has just successfully bid two separate projects which utilize the same materials, such as blocks, will obtain a lower price by purchasing such material in a larger quantity and at a lower unit cost. Perhaps he made a calculated risk and won the projects with this strategy or will simply maximize his profit from the two projects. Economies of scale in construction are also maximized by elimination of "soft" costs. There are costs associated with engineering, permitting, contractor mobilization, building permit costs, etc. In the example above, if the two projects were within close proximity, the contractor would be able to bid lower mobilization costs for each project as a strategy for winning the jobs. If he won both projects, he would be moving men and material to essentially the same location, thus reducing his cost. If both projects were for the same owner, it would be to the owner's advantage to design, permit, bid, and construct the projects as a single project in which he would then certainly reap the financial benefits by obtaining an overall lower price for the same quantity of work performed.

The utility industry provides necessary services to the public. In order to meet the public need, it engages in the procurement of equipment, material, and construction services. Water and wastewater treatment, collection, and distribution systems consist of discrete components such as wells, tanks, pumps, etc., which, when combined together in proper proportion, serve the public need as a system with an overall reliable capacity. Upon the need for expansion of plant capacity, the utility must consider savings that would be derived through building fewer larger units rather than smaller multiple units. The prudent sizing and phasing of facilities allows the utility to provide cost-effective service to the public.

1.2 OBJECTIVE

The primary objective of this report is to demonstrate that economies of scale exist for the unit components that comprise water and wastewater facilities. In this light, more capacity can be obtained for a lower unit cost. The second objective is to demonstrate that there exists threshold sizes of unit components. This is the point where the increasing economy of scale ends and the decreasing economy of scale begins. In other words, threshold size is the minimum size component that should be considered due to its value on a cost per capacity basis. In the decreasing economy of scale range, the cost per capacity continues to decrease but at a much lower rate. Therefore, the minimum economic threshold size is the point at which the rate of change of the unit cost begins to decline.

The third objective is to demonstrate that economies of scale are achieved through savings in costs of engineering, mobilization, and permitting on projects in which there are not significant economies of scale in the materials.

1.3 SUMMARY AND CONCLUSIONS

Components and systems reviewed are classified as Wastewater Treatment Facilities, Water Treatment Facilities, and Wastewater Collection/Water Distribution. Economies of scale were found to exist on all unit components and systems. Table 1-1 presents the economic minimum threshold sizes for each component and system.

Such threshold sizes should not be construed or interpreted to mean that significant savings are not achieved above or greater than these values. They should be interpreted as the primary point at which the rate of change of the unit price begins to decrease. Thus, when considering system or component expansions, it is prudent to give serious consideration to construct or procure the component of the threshold size or larger.

The engineering economic considerations of the size of unit to construct are as follows:

- Initial demand of system
- Growth rate of system
- Projected build-out demand
- Useful life of the component
- Rules and Regulations
- Operational Considerations
- Interest rates and rate of inflation

If the initial or current demand of the system is less than the economic minimum threshold size, the selection of size must consider the build-out capacity of the facility and when it will be necessary to expand again, which can be computed using the growth rate. If the build-out demand is beyond the economic threshold size, it follows that phases of construction should be implemented in sizes to fully take advantage of the economy of scale offered.

TABLE 1-1

SOUTHERN STATES UTILITIES
ECONOMY OF SCALE

Treatment Component Threshold Sizes

	Component/System	Economic Minimum Threshold Size
	WASTEWATER TREATMENT FACILITY	
1)	Extended Aeration WWTP	0.25 MGD
2)	Contact Stabilization WWTP	0.5 MGD
3)	Pos. Displacement Blower	500 scfm
4)	Centrifugal Blower	2,000 scfm
5)	Tertiary Filters	0.25 MGD
6)	Generator	300 KW
	WATER TREATMENT FACILITY	
1)	Prestressed Concrete GST	600,000 gal.
2)	Steel Ground Storage Tank	100,000 gal.
3)	High Service Pumps	1,000 gpm
4)	Hydropneumatic Tank	10,000 gal
5)	250 ft. Deep Water Supply Well	1,440,000 gpd
6)	500 ft. Deep Water Supply Well	1,440,000 gpd

If build-out is less than the economic minimum size, it follows that it does not make sense to purchase capacity that is not needed. However, in smaller systems and units, there are the factors of operational flexibility and standard sizes to be considered. With small systems, it is often impossible to predict peak demands and loadings. In these cases, special consideration should be given to oversizing to standard sizes to ensure satisfactory service and for environmental protection.

SECTION 2

SECTION 2
METHODOLOGY

2.1 GENERAL

This section details the sources of information for this report; as well as, the method used to construct the unit cost curves.

2.2 SOURCES

In order to give a fair and accurate representation of the costs of constructing water and wastewater systems, information was obtained from many balancing sources. Previous curves were obtained from the United States Environmental Protection Agency (USEPA) and Culp/Wesner/Culp, an engineering firm. Also, quotes were obtained from Florida manufacturers and suppliers. Rounding out the information were bid tabulations from completed construction that took place in the State of Florida.

2.2.1 USEPA

Throughout the years, the United States Environmental Protection Agency (EPA) developed many reports involving the cost of the different components of water and wastewater collection, treatment, disposal, and distribution. The figures presented in these technical reports display the cost of the process versus the capacity (or size) of the component. The curves are typically accompanied by text which explains the function of the cost component and the assumptions made in determining the overall cost. The conversion of the overall cost to unit cost is accomplished by simply dividing the cost by the capacity of the component being studied.

The EPA references used for this study range in years from 1977 to 1984. Therefore, the cost must be updated in order to allow for a present day comparison. The EPA sources that were used are as follows:

(1) "State of the Art of Small Water Treatment Systems." U.S. Environmental Protection Agency, Office of Water Supply. Washington, D.C., August 1977.

(2) "The Cost Digest: Cost Summaries of Selected Environmental Control Technologies." U.S. Environmental Protection Agency. Washington, D.C., October 1984.

(3) "Construction Costs for Municipal Wastewater Treatment Plants: 1973-1978.: U.S. Environmental Protection Agency, Facility Requirements Division. Washington, D.C., April 1980.

(4) "Innovative and Alternative Technology Assessment Manual." U.S. Environmental Protection Agency, Office of Water Programs Operations. Washington, D.C., February 1980.

(5) "Costs of Wastewater Treatment by Land Application.: U.S. Environmental Protection Agency, Office of Water Program Operations. Washington, D.C., June 1975.

(6) "Construction Costs for Municipal Wastewater Conveyance Systems: 1973-1979." U.S. Environmental Protection Agency, Facility Requirements Division. Washington, D.C., January 1981.

(7) "Construction Cots for Municipal Wastewater Conveyance Systems: 1973-1977." U.S. Environmental Protection Agency. May 1978.

(8) "Report on Initial Investment Costs, Operation and Maintenance Costs, and Manpower Requirements for Conventional Wastewater Treatment Plants." U.S. Environmental Protection Agency, Water Quality Office. Black & Veatch, 1971.

2.2.2 Culp/Wesner/Culp

The engineering firm Culp/Wesner/Culp, based in Santa Ana, California, produced water treatment, transmission, and distribution cost reports for the United States Environmental Protection Agency. They also produced an independent water component cost summary. For each component, the overall cost versus capacity is illustrated along with the operation and maintenance costs. As with the EPA generated curves, the Culp/Wesner/Culp curves were adjusted using ENR indexes to the present day cost. Also, a detailed explanation of each component and the assumptions made to determine the cost are both included in each section. The Culp/Wesner/Culp sources that were used are as follows:

(1) "Estimating Water Treatment Costs, Volume 2, Cost Curves Applicable to 1 to 200 MGD Treatment Plants." Gumerman, R.C., et al. (Culp/Wesner/Culp) Santa Ana, CA, August 1979. (Produced for USEPA).

(2) "Estimating Water Treatment Costs, Volume 3, Cost Curves Applicable to 2,500 gpd to 1 MGD Treatment Plants." Hansen, S.P., et al. (Culp/Wesner/Culp) Santa Ana, CA, August 1979. (Produced for USEPA).

(3) "Small Water System Treatment Costs." Gumerman, R.C., et al. (Culp/Wesner/Culp) Santa Ana, CA, August 1986.

2.2.3 Manufacturers

In order to establish a contemporary cost for the components of water and wastewater systems, quotations from Florida Manufacturers and sales representatives were obtained for all the equipment included in this study. At least two manufacturers' quotes were obtained for each component and the overall cost for the component was taken as the average of the two. This allows the high, and low quotes to form a solid representation. The costs are uniform and comparable due to the usage of state sales representatives. These sales representatives and manufacturers who provided the information are as follows:

(1) Package Wastewater Treatment Plants

a. DAVCO, Davis Industries, Inc.
1828 Metcalf Avenue
Thomasville, Georgia

b. Sanitaire, via Moss/Kelley, Inc.
10100 West Sample Road
Coral Springs, Florida

(2) Blowers

a. Hoffman, via Jacobs Group
160 Scarlet Blvd.
Oldsmar, Florida 34677

b. Sutorbilt, via Jacobs Group
160 Scarlet Blvd.
Oldsmar, Florida 34677

(3) Wastewater Treatment Filters

a. DAVCO, Davis Industries, Inc.
1828 Metcalf Avenue
Thomasville, Georgia

b. Infilco-Degremont, via Moss/Kelley, Inc.
10100 West Sample Road
Coral Springs, Florida

(4) Chlorination Feed Systems

a. Capital Control, via Blankenship & Associates
3004 Konarwood Court
Oviedo, Florida

b. Wallace & Tiernan, via Heyward, Inc.
1865 North Semoran Boulevard
Winter Park, Florida

(5) Standby Generator Sets

a. Ringhaver Equipment Company
9901 Ringhaver Drive
Orlando, Florida 32824

b. Cummins Southeastern Power, Inc.
4820 North Orange Blossom Trail
Orlando, Florida 32810

(6) Ground Storage Tanks (Steel and Prestressed Concrete)

a. The Crom Corporation, Prestressed Composite Tanks
250 S.W. 36th Terrace
Gainesville, Florida

b. PRECON Corporation, Prestressed Concrete Tanks
115 S.W. 140th Terrace
Newberry, Florida

c. Florida Aquastore, Water & Wastewater Technologies
2650 North Military Trail
Boca Raton, Florida

(7) High Service Pumps

a. Worthington, via Barney's Pumps, Inc.
3907 Highway 98 South
Lakeland, Florida

b. Peerless Pump Company
811 North 50th Street
Tampa, Florida

(8) Hydropneumatic Tanks

a. Hydro-Air Systems, Inc.
P.O. Box 585654
Orlando, Florida

b. Modern Welding Company, Inc.
1801 Atlanta Avenue
Orlando, Florida

(9) Vertical Turbine Pumps

a. Peerless Pump Company
811 50th Street North
Tampa, Florida

b. Peabody-Floway, via Flanagan-Metcalf & Associates, Inc.
6708 Benjamer Road
Tampa, Florida

(10) Sewage Pump Stations (Precast items and Pumps)

a. Taylor Precast
P.O. Box 369
Deland, Florida 32721

b. Gorman Rupp Pumps, via Blankenship & associates
3004 Konarwood Court
Oviedo, Florida

c. Flygt Pumps, via Ellis K. Phelps & Company
2152 Sprint Boulevard
Apopka, Florida

(11) PVC and Ductile Iron Piping

a. B&H Sales, Inc.
11114 Satellite Boulevard
Orlando, Florida
PVC force main, water main, and gravity sewer.

b. CertainTeed
750 T.E. Suedesford Road
Valley Forge, PA., 19482
PVC force main, water main, and gravity sewer.

c. American Cast Iron Pipe Company
2301 Maitland Center Parkway
Maitland, Florida
DIP force main, water main, and gravity sewer.

d. Mitchell & Stark Construction Co., Inc.
Naples, Florida
Pipe pressure test, T.V. test, and disinfection.

2.2.4 Bid Tabulations

As a final source of information, bid tabulations from existing projects were gathered. The projects used in this analysis are all located in the State of Florida. The actual bids were obtained using "The Bid Reporter," which prints monthly Florida listings of projects to be constructed. Further information was obtained through the Hartman & Associates, Inc. project cost database. The HAI database contains bid tabulations, schedule of values and summary of work for numerous utility projects. Both sources contain project data for approximately the past five (5) to ten (10) years. Therefore, the prices, which are updated using the ENR construction costs index, present current indices of the cost of water and wastewater system components.

2.3 CURVE DESIGN SUMMARY

This section provides a detailed description of the method used to create the final unit cost curves for water and wastewater treatment systems. For water, curves are provided for the components of the collection, treatment, and distribution systems. The collection, treatment and disposal components were studied for wastewater systems.

2.3.1 Updating Process

The various sources of data utilized in this study, provided cost information at different time periods over the previous 25 years. In order for these values to be comparable, they were indexed. In other words, the costs must be updated to the time of this study, which is June, 1995. The costs are updated using established cost indexes. The two (2) indexes used during this study are the Engineering News Record (ENR) and The Handy-Whitman Index of Public Utility Construction Costs. In order to update the costs, original costs were multiplied by the ratio of the June, 1995 index number to the original index number. This cost updating method is shown below.

$$\text{June 1995 Cost} = \text{Original Cost} * \frac{\text{(June 1995 Index)}}{\text{(Original Index)}}$$

2.3.2 Design Considerations

To construct reliable cost curves, more than one (1) set of values were used for each component. However, these values are not comparable unless they involved the same design considerations. Therefore, the manufacturers and sales representatives were given the same criteria with which to evaluate the cost. Also, when the manufacturer's values were used in combination with the Environmental Protection Agency or Culp/Wesner/Culp curves, the manufacturer's values were adjusted to include the identical components as found in the source curves.

Some of the commonly added costs were electrical, piping, sitework, and installation. These components were adjusted by percentage on a case-by-case basis to reflect the different needs of the various components.

2.3.3 Finalization

Once the cost data was normalized, the values were compared and plotted. By plotting the values, the relationships of the cost values versus capacity are illustrated. So for a construction cost curve, which is the total cost for installation, the economy of scale is difficult to visualize. In order to see the economy of scale clearly, the cost curves were transformed into unit cost curves. These curves display the cost per unit on the y-axis and the capacity or other size measurement on the y-axis. For example, the unit cost curve involves cost in dollars per gallon ($/gal) versus gallon capacity for such components as: treatment plants, storage facilities, chlorine feed facilities, hydropneumatic tanks, water supply wells, etc. Other unit cost curve components are a follows:

- dollars per gpm ($/gpm) for pumps and pump stations
- dollars per lot ($/lot) for gravity sewers
- dollars per foot ($/Ft) for force and water mains
- dollars per scfm ($/scfm) for blowers

In this format, the graphs show that cost per unit capacity decreases with increased capacity.

SECTION 3

SECTION 3
ANALYSIS

3.1 THRESHOLD SIZING

This section discusses the reasons behind the design of water and wastewater systems with respect to sizing. The factors affecting the size of certain treatment systems are cost, regulations, and the health and safety of those served. There are plant capacities which are established minimums.

3.1.1 Inflection Points

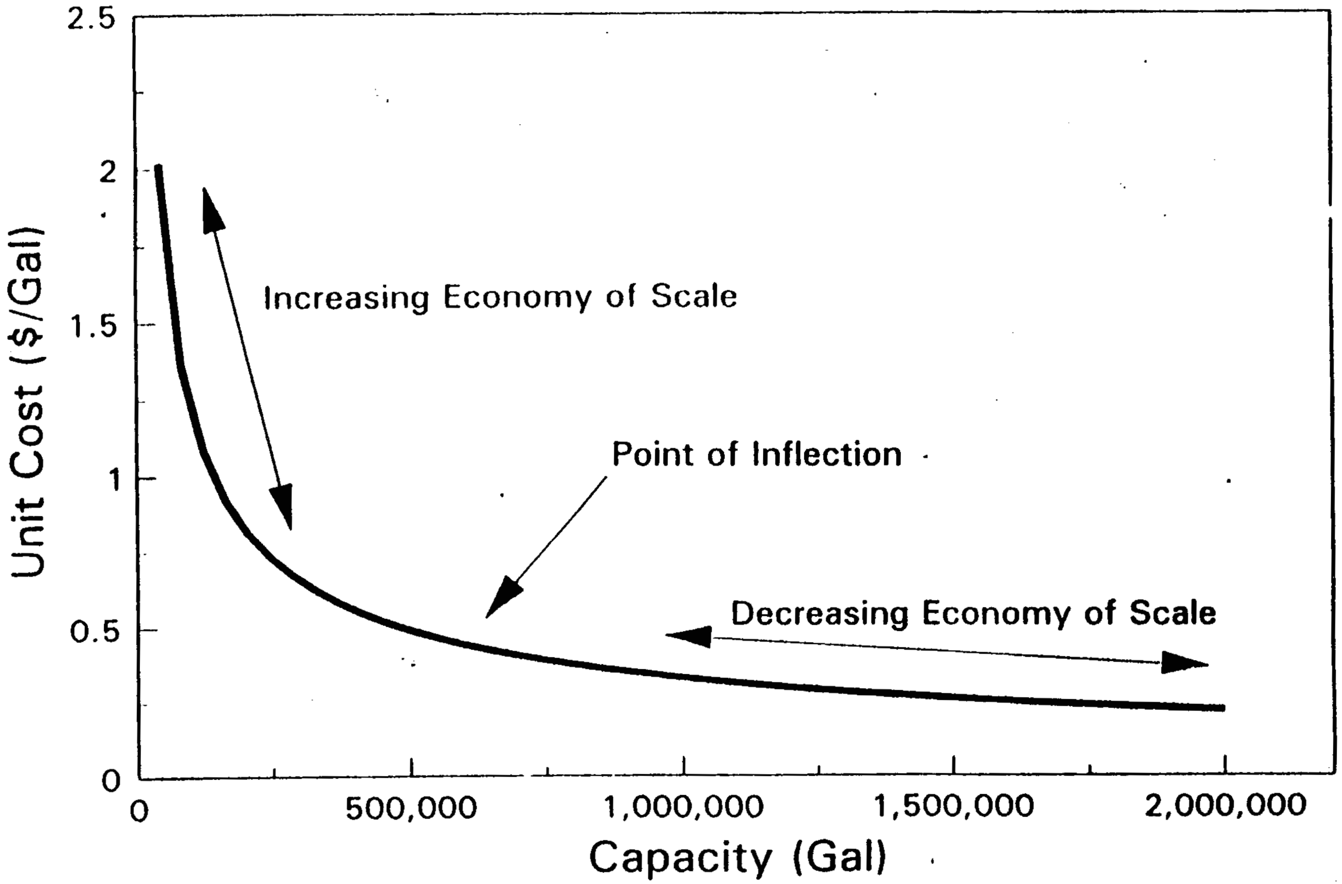
In the water and wastewater unit cost curves of this study, the economy of scale was apparent in all cases. However, the manner in which the economy of scale is displayed differs between two styles of graphical representation.

The first case, displayed in Figure 3-1, is best represented by the prestressed ground storage tank unit cost curve. The curve is basically an exponential type curve where the low capacity yields an extremely high unit cost and the high capacity has leveled out with a much lower unit cost. The beginning of the curve displays an increasing economy of scale. In other words, at the smaller capacities, the economy of scale is very large with each increase in capacity. The change in unit cost in this range is so significant that it makes it generally undesirable to design in this range to the left of the point of inflection. The point of inflection occurs when the slope of the curve begins to level out with respect to the X-axis. This is the point where the component design becomes economically feasible with respect to smaller and larger capacity options. Following the point of inflection, the economy of scale begins to decrease. Even though the economy of scale still exists in this range, the unit cost change between sizes is much less. However, the savings between capacities in this area of the curve remain very significant. This is a section of the curve where capacity options are not as obvious and the monetary savings should be balanced together with other factors.

The other type of unit cost curve, Figure 3-2, is well represented by the potable water well curve. In this curve, the unit cost appears to steadily decline with respect to the capacity plotted on the X-axis. The relationship, however, is identical to that of Figure 3-1. The differing factor is that

Ground Storage Tanks

Prestressed Concrete



Notes:
1) Costs include complete tank, concrete floor, prestressed wall, free-span concrete dome, aluminum interior and exterior ladders, vents, precast overflows, painting, and installation. These costs were obtained directly from manufacturers' quotes.
2) Includes 5% piping, 0% electrical, and 5% sitework.
3) Costs are based on the June 1995, ENR Index = 5433.

FIGURE 3-1

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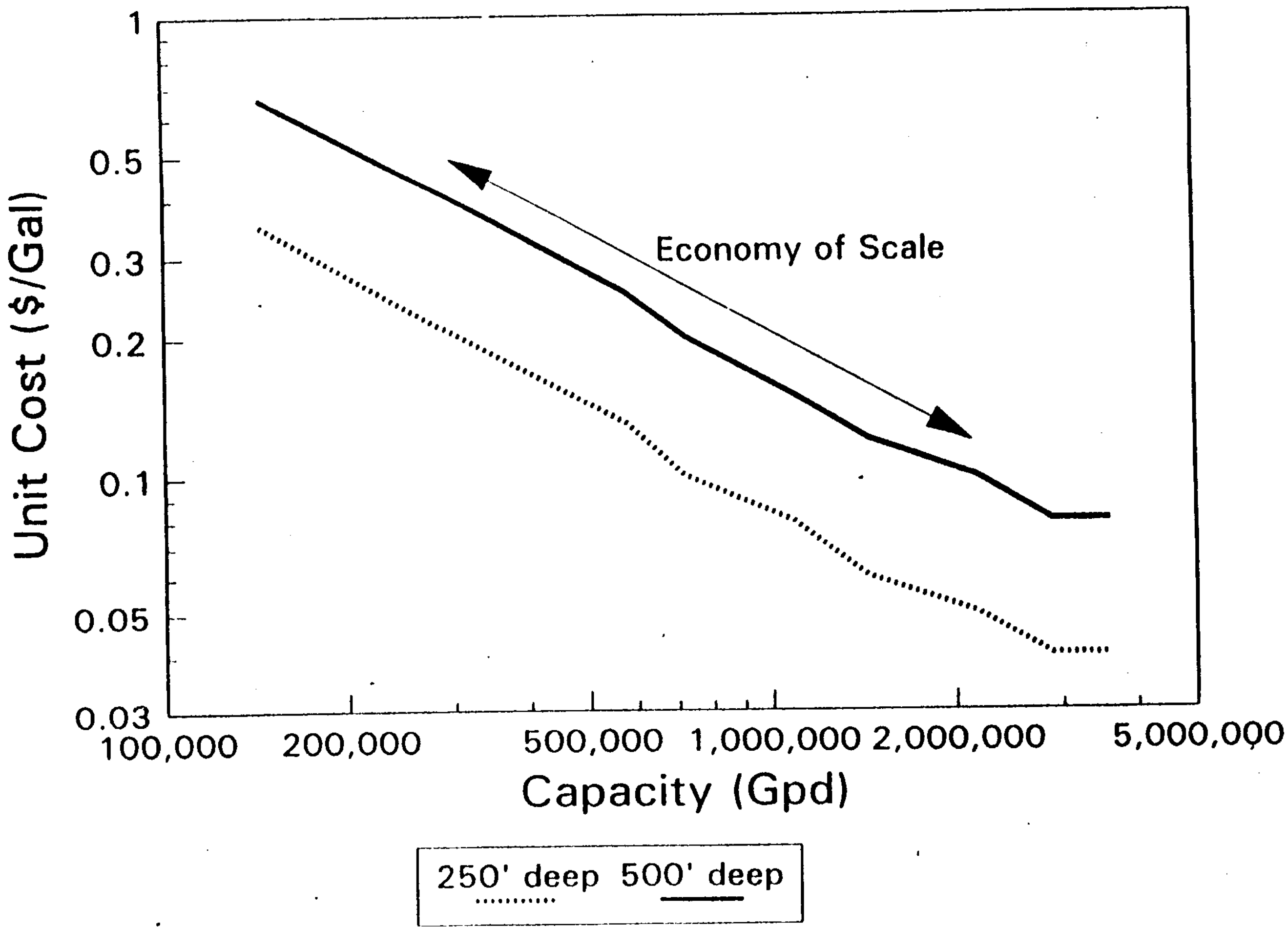
INCREASING AND DECREASING ECONOMIES OF SCALE

Potable Water Wells



Notes: 1) Vertical turbine pump, cement grout, black steel well and surface casing, well screen, and well development costs from manufacturers' quotes and bid tabulations.
2) Includes 10% electrical, 15% well head, and 30% labor.
3) Costs are based on the June 1995, ENR Index = 5433.

FIGURE 3-2

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ECONOMY OF SCALE ON LOGARITHMIC AXES

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the values in this curve are plotted on a logarithmic scale, due to the large capacity range. This unit cost curve presents the same economy of scale relationship as Figure 3-1 when plotted on a linear scale; however, determining individual values from the linear plots is more difficult. Therefore, to facilitate use of the graph, the data was plotted on a log-log axis.

3.1.2 Economic Minimum Threshold Sizes

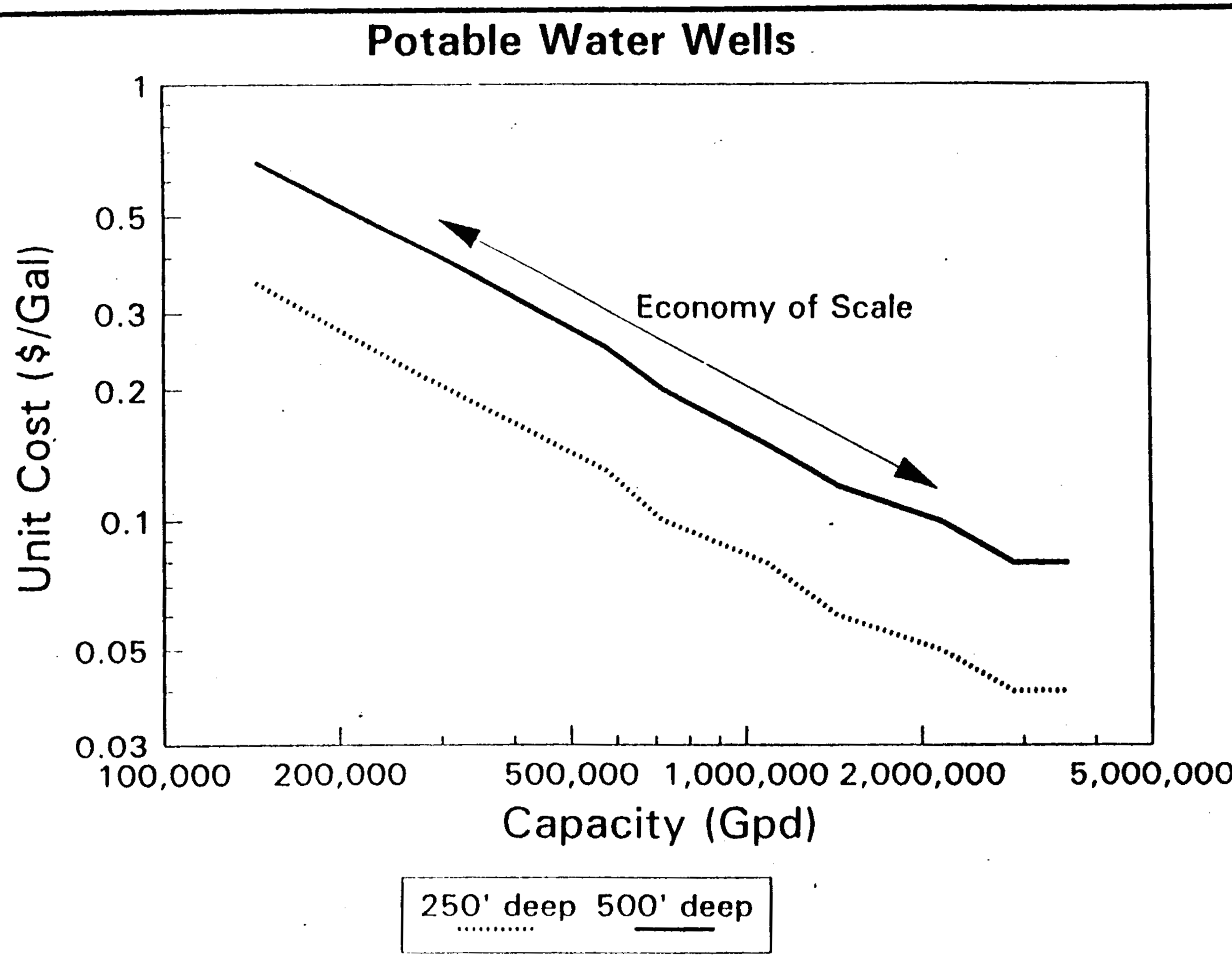
The economic minimum threshold sizes were determined mathematically. The second derivatives of the unit cost curve equations were plotted to determine the domain value at which the rate of change of the slope of the unit cost curve equals zero, or no change. The majority of curves were modeled using third order or higher polynomials. The solution of the second derivative is valid for the range considered and produces an inflection point. An example of the polynomial equation and the derivatives are as follows:

Polynomial equation:	$f(x)$	=	$a_1 + a_2 x + a_3 x^2 + a_4 x^3 + a_5 x^4$
First derivative:	$f'(x)$	=	$a_2 + 2a_3 x + 3a_4 x^2 + 4a_5 x^3$
Second derivative:	$f''(x)$	=	$2a_3 + 6a_4 x + 12a_5 x^2$

Some cost curves were modeled using power functions in which a plot of the second derivative does not cross the X-axis. The plot however is more pronounced and clearly indicates the inflection point. An example of the power function equation and its applicable derivatives are as follows

Power equation:	$f(x)$	=	$a_1 x^{b1}$
First derivative:	$f'(x$	=	$(b_1)(a_1)\, x^{b1-1}$
Second derivative:	$f''(x)$	=	$(a_1 b_1)(b_1-1)\, x^{b1-2}$

As an example, Figure 3-3 is a plot of the second derivative of the function for steel ground storage tanks. The plot crosses the X-axis at 100,000 gallons which indicates that the inflection point for rate of change of the unit cost occurs at 100,000 gallons. This point establishes the end of the domain for increasing economy of scale.



Notes: 1) Vertical turbine pump, cement grout, black steel well and surface casing, well screen, and well development costs from manufacturers' quotes and bid tabulations.
2) Includes 10% electrical, 15% well head, and 30% labor.
3) Costs are based on the June 1995, ENR Index = 5433.

FIGURE 3-2	**HARTMAN & ASSOCIATES, INC.** engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	**ECONOMY OF SCALE ON LOGARITHMIC AXES**

the values in this curve are plotted on a logarithmic scale, due to the large capacity range. This unit cost curve presents the same economy of scale relationship as Figure 3-1 when plotted on a linear scale; however, determining individual values from the linear plots is more difficult. Therefore, to facilitate use of the graph, the data was plotted on a log-log axis.

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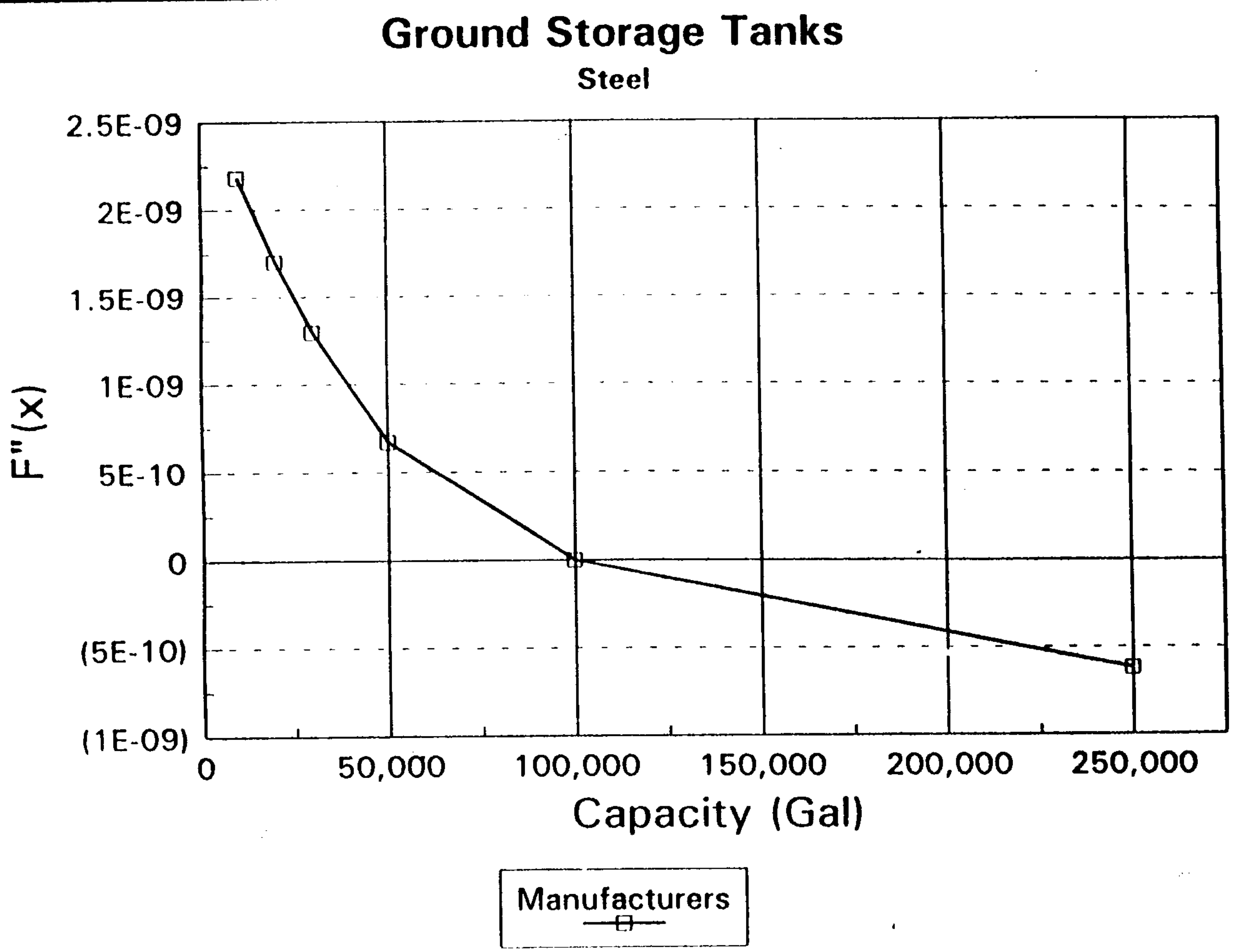
Power equation:	$f(x)$	=	$a_1 x^{b1}$
First derivative:	$f'(x$	=	$(b_1)(a_1)\, x^{b1-1}$
Second derivative:	$f''(x)$	=	$(a_1 b_1)(b_1-1)\, x^{b1-2}$

As an example, Figure 3-3 is a plot of the second derivative of the function for steel ground storage tanks. The plot crosses the X-axis at 100,000 gallons which indicates that the inflection point for rate of change of the unit cost occurs at 100,000 gallons. This point establishes the end of the domain for increasing economy of scale.



Notes: 1) Polynomial equation for the Steel GST's unit cost curve is the following: $f(x) = 3.565 + (-9.337E\text{-}5)X + (1.3717E\text{-}9)X^2 + (-1.0034E\text{-}14)X^3 + (3.5115E\text{-}20)X^4 + (-4.6878E\text{-}26)X^5$

2) The second derivitive of the Steel GST unit cost polynomial is as follows: $f''(x) = 2.743E\text{-}9 + (-6.02E\text{-}14)X + (42.138E\text{-}20)X^2 + (-93.756E\text{-}26)X^3$

FIGURE 3-3

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STEEL GST INFLECTION POINT

3.13 Curve Fitting

The curves determined to represent the manufacturers' and EPA cost curve data were generated with the use of either the Sigma Plot program by ©Jardel Scientific or the Hydrology and Water Quality Control course accompanied programs produced by ©John Wiley & Sons. The Sigma Plot program was used mainly to determine polynomial fits for the data, while the other program determined the equations for the data better represented by the power function equation. In all cases, the equations were determined to be the best fit for the given data.

3.1.4 Regulatory

For most instances, regulations do not affect the sizing of water and wastewater systems. Usually, the type of disposal or source of supply determine the stipulations on the plant type or size. However, there are occurrences where size regulates cost. The water supply wells must be double (one standby) above 150 connections, and over 150 connections necessitates an Auxiliary Power Supply.

SECTION 4

SECTION 4
WASTEWATER TREATMENT PLANT FACILITIES

4.1 EXTENDED AERATION PACKAGE WWTP

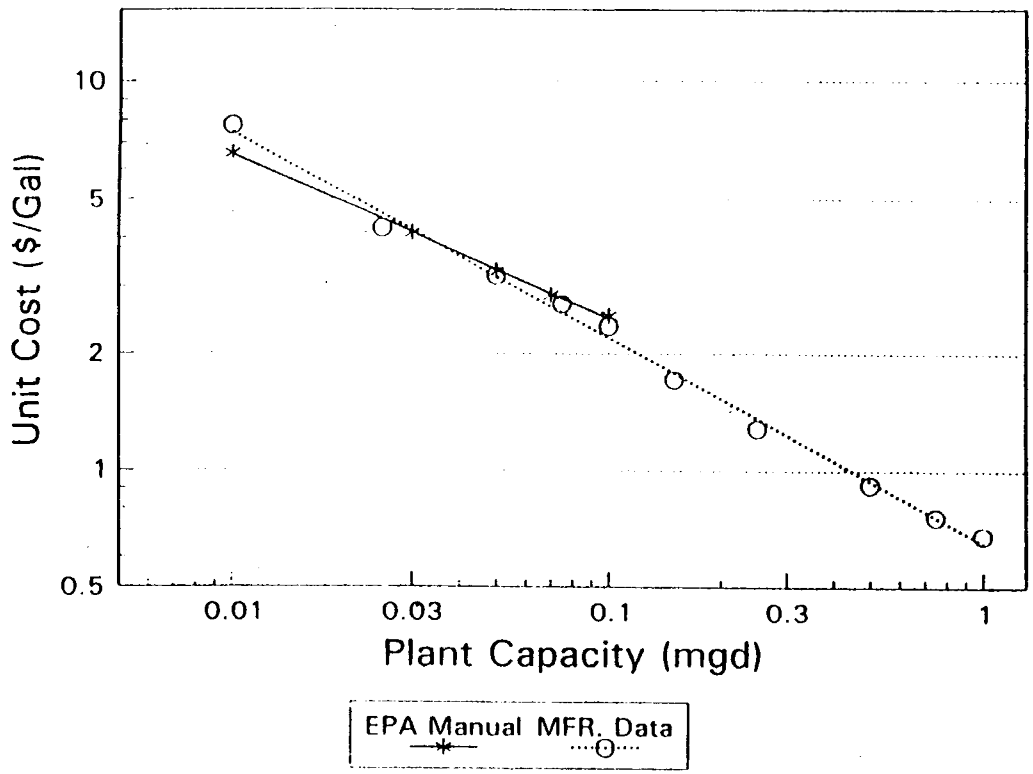
The extended aeration treatment process is a version of the activated sludge process in which the detention time is approximately 24 hours. The extended detention time will require a larger volume than most activated sludge processes, which in turn will raise the costs. The costs do; however, display an economy of scale over the entire range of capacities. The unit cost of the extended aeration package plants, Figure 4-1, is a display of dollars per gallon of capacity versus gallon per day capacity. In this form, the economy of scale will be visible if the unit cost decreases as the capacity increases.

The unit cost curve of the package extended aeration plant shows a considerable economy of scale from the 0.01 MGD to the 1.0 MGD limits of the graph. The unit cost steadily decreases in a straight line from approximately $7/gallon at 0.01 MGD to $0.7/gallon at 1.0 MGD. The straight line relationship of the unit cost translates into considerable savings with increased sizing.

The curves in Figure 4-2 represent the construction cost as a function of package extended aeration treatment plant capacity. By examining the costs as they are related to capacity, the economy is apparent. For instance, the cost of a 500,000 gallon per day package plant is approximately $465,000, and the cost of a 1,000,000 gallon per day package plant is approximately $710,000. Therefore, in order to expand a 500,000 gallon per day facility to a 1,000,000 gallon per day plant, the cost would be approximately $930,000. The design of the 1.0 MGD plant originally would have saved approximately $220,000 overall. The savings would be greater if contractor mobilization, engineering, and permitting costs were considered.

The unit cost and construction cost curves were developed using an Environmental Protection Agency cost curve and manufacturers' quotations. The quotes from the manufacturers included the tankage (ring steel with internal clarifier), concrete slabs, sitework, electrical, piping, blowers and installation. To normalize these quotes with the EPA curve, a chlorination feed system cost had to be added to the overall cost. The chlorination feed system cost was obtained through other manufacturers' quotations. From this point, the two (2) curves are equivalent and can be compared.

Package Extended Aeration WWTP



Notes: 1) Costs include materials, electrical, piping, blowers, grading, installation, chlorination feed system, and conc. slab.
2) Costs exclude land, engineering, fencing, paving, drainage lighting, and building facilities.
3) All costs obtained from manufacturers' quotes and EPA cost curve
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-1

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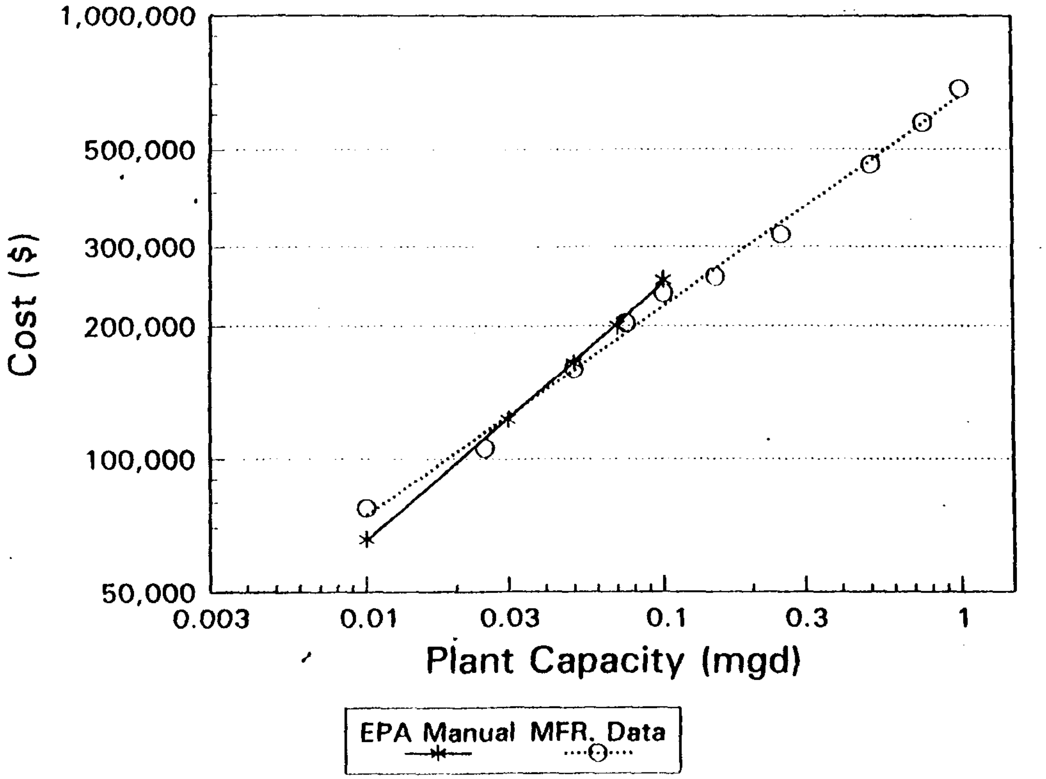
EXTENDED AERATION UNIT COST CURVE

Package Extended Aeration WWTP



Notes:
1) Costs include materials, electrical, piping, blowers, grading, installation, chlorination feed system, and conc. slab.
2) Costs exclude land, engineering, fencing, paving, drainage, lighting, and building facilities.
3) All costs obtained from manufacturers' quotes and EPA cost curves.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-2

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EXTENDED AERATION CONSTRUCTION COST CURVE

The extended aeration package treatment plant costs exclude the costs of land, engineering, paving, grading, drainage, lighting, fencing, and building facilities.

4.2 CONTACT STABILIZATION PACKAGE WWTP

The contact stabilization is a version of the activated sludge process that requires an average detention time of between 4 and 6 hours. When compared with the extended aeration process, the contact stabilization package plant will require less volume due to the considerable difference in detention time. Even though the overall cost differs, the economies of scale are still very evident in the contact stabilization package treatment plants. These costs versus capacity relationships are displayed on Figures 4-3 and 4-4, which are the unit cost and construction cost curves, receptively.

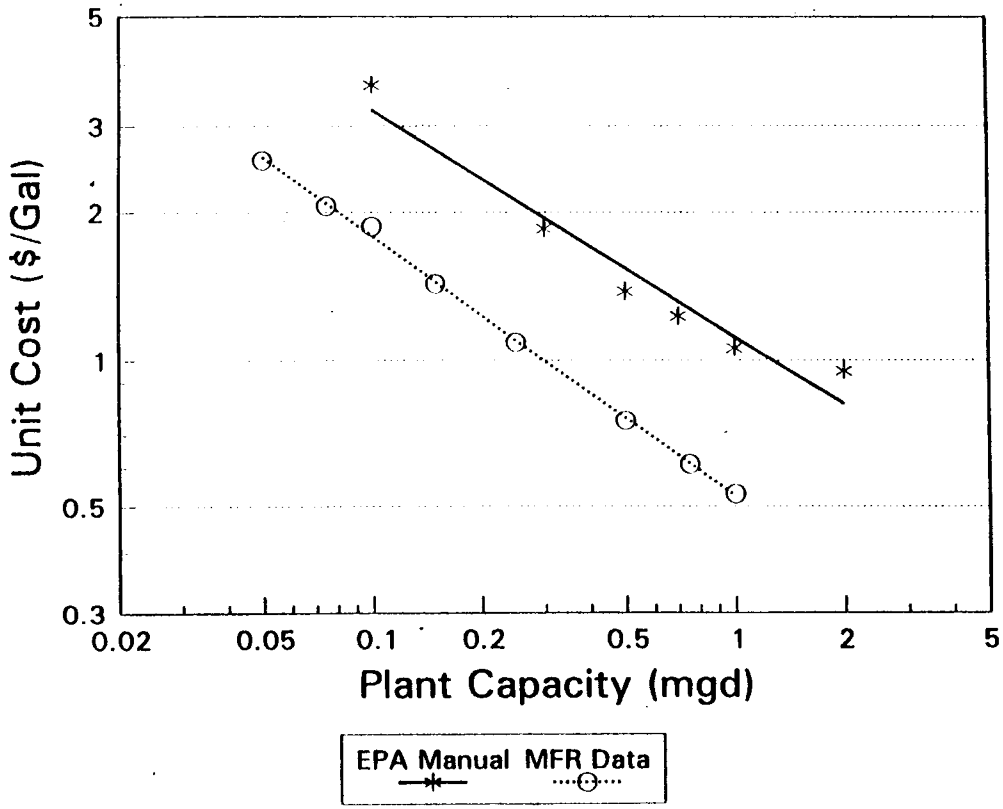
The unit cost curve, Figure 4-3, is a presentation of the relationship between the unit cost, dollars per gallon versus the capacity, gallons per day. From 0.05 MGD, the unit cost curve shows a solid economy of scale. Even though the values of the Environmental Protection Agency and the manufacturers are not identical, their relationship is identical. They both show a very similar economy of scale relationship that stretches from a little over $3/gallon to approximately $0.5/gallon.

The straight line decreasing aspect of the curve translates into considerable savings with the increase in design capacity. This relationship is further solidified when the capacities and unit costs are plotted on linear axes.

In Figure 4-4, the considerable savings in the sizing of package contact stabilization plants is noticeable. For instance, using the manufacturers' cost values, the cost to construct a 500,000 gallon per day contact stabilization plant would be approximately $375,000. On the other hand, the cost to build a 1,000,000 gallon per day treatment plant would be about $525,000. Therefore, the cost to build the smaller 500,000 gallon plant and then expand it by another 500,000 gallons would be $750,000. By comparing this cost to the $525,000 cost for the larger plant, a savings of $225,000 is realized for the addition of 500,000 gallons of capacity. This same trend is also represented by the EPA cost curve.

The unit cost and construction cost curves were created using values obtained from the Environmental Protection Agency and manufacturers' quotations. The manufacturers' costs

Package Contact Stabilization WWTP



Notes:
1) Costs include materials, electrical, piping, blowers, grading, installation, chlorination feed system, and conc. slab.
2) Costs exclude land, engineering, fencing, paving, drainage, lighting, and building facilities.
3) All costs obtained from manufacturers' quotes and EPA cost curves.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-3	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	CONTACT STABILIZATION UNIT COST CURVE

EXHIBIT ___
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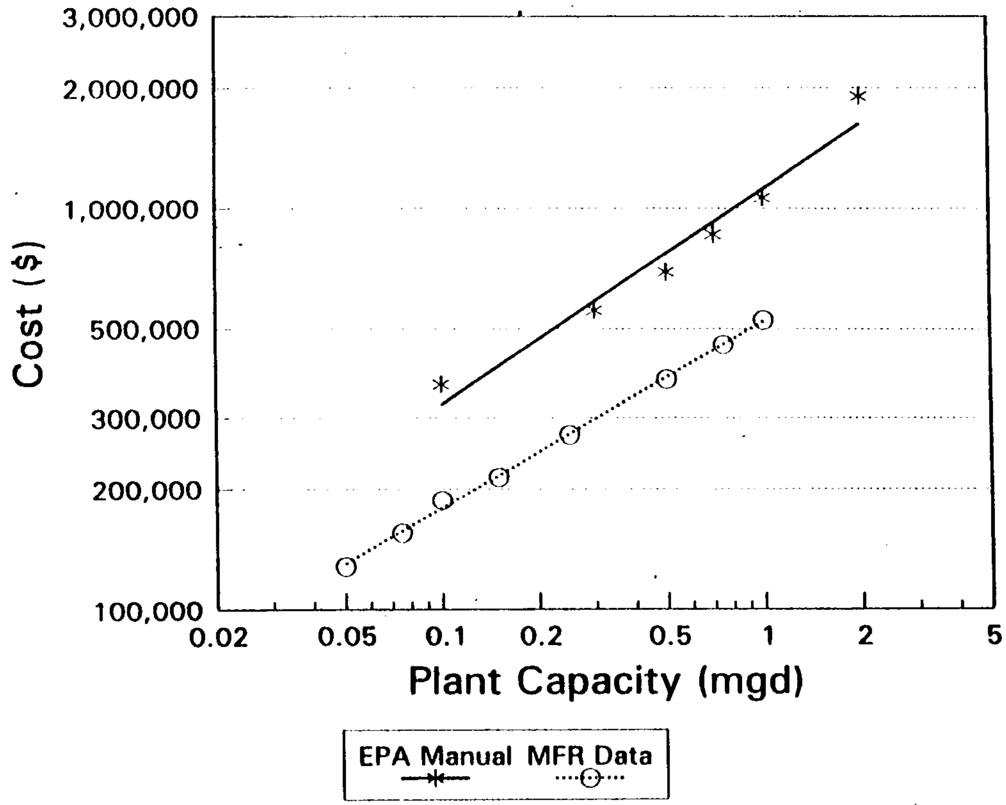
Package Contact Stabilization WWTP



Notes:
1) Costs include materials, electrical, piping, blowers, grading, installation, chlorination feed system, and conc. slab.
2) Costs exclude land, engineering, fencing, paving, drainage, lighting, and building facilities.
3) All costs obtained from manufacturers' quotes and EPA cost curves.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-4

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CONTACT STABILIZATION CONSTRUCTION COST CURVE

included the plant itself, concrete slabs, site work, electrical, piping, blowers, and installation. In order to be able to compare these values with the EPA cost curve, a chlorination feed system was added using other manufacturers' quotations.

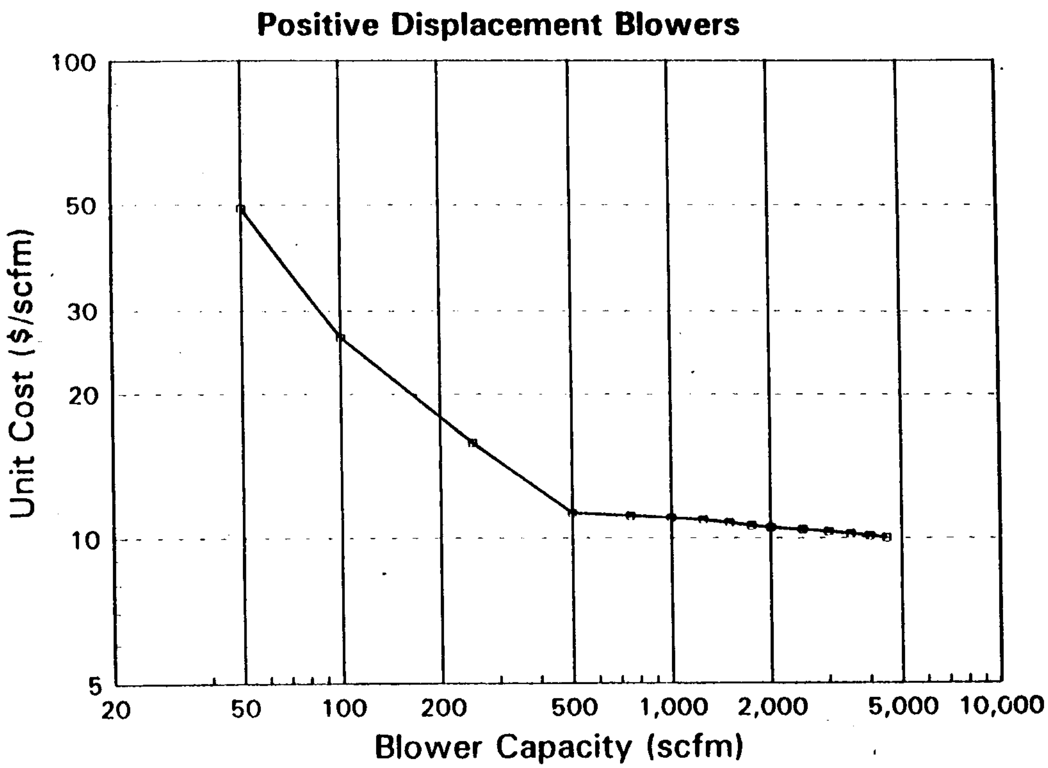
The package contact stabilization treatment plants costs exclude land, engineering, paving, grading, drainage, lighting, fencing, and building facilities.

4.3 BLOWERS

Blowers have an important role in supplying air to different parts of a treatment plant for process purposes and for airlifts in smaller facilities. Two common types of blowers used in the diffused air systems are centrifugal and positive displacement blowers.

The positive displacement blowers are more common in the lower standard cubic foot per minute (scfm) range than their centrifugal counterparts. As shown in Figure 4-5, the unit costs of the positive displacement blowers show an increasing economy of scale up to about 500 scfm. At this point, the economy of scale is decreasing. So the point of inflection lies at 500 scfm. To illustrate the benefit of designing a blower at 500 scfm or larger, the blower cost curve, Figure 4-6, will be used. The 500 scfm positive displacement blower costs approximately $5,500 and a 100 scfm blower costs about $2,750. Therefore, if the 100 scfm blower will need to be expanded to 500 scfm, the overall cost will easily exceed the original cost of the 500 scfm blower. By expanding with a 400 scfm blower, the total cost of the two (2) blowers is approximately $7,750, which is about $2,250 more expensive than one (1) 500 scfm blower.

For the centrifugal blowers, the higher capacity installations are more common. The range of blowers that are presented in the unit cost curve, Figure 4-7, are between 500 scfm and 4,500 scfm. The curve experiences an increasing economy of scale between 500 scfm and 2,000 scfm, where the point of inflection lies. However, the economy of scale does not decrease at a very rapid rate thereafter. Therefore, considerable economies of scale are apparent throughout the entire range. For instance, by using Figure 4-8, the blower cost curve, the economies of scale are detectable. A 2,000 scfm blower costs about $22,000, and a 4,000 scfm blower costs approximately $34,000. Therefore, one (1) 4,000 scfm blower is approximately $10,000 less than two (2) 2,000 scfm blowers.



Notes: 1) All costs obtained from manufacturer's quotes.
2) Costs include blower, TEFC motor, steel base, silencers, relief valve, pressure gauge, and check valve.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-5

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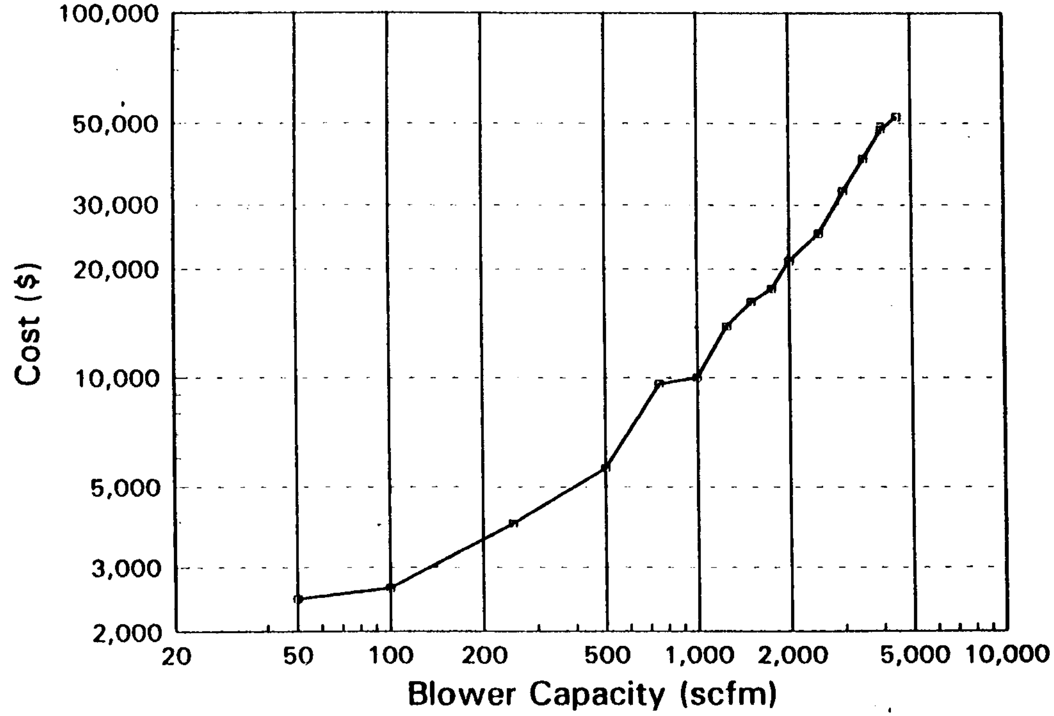
POSITIVE DISPLACEMENT BLOWER UNIT COST CURVE

Positive Displacement Blowers



Notes: 1) All costs obtained from manufacturer's quotes.
2) Costs include blower, TEFC motor, steel base, silencers, relief valve, pressure gauge, and check valve.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-6

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POSITIVE DISPLACEMENT BLOWER CONSTRUCTION COST CURVE

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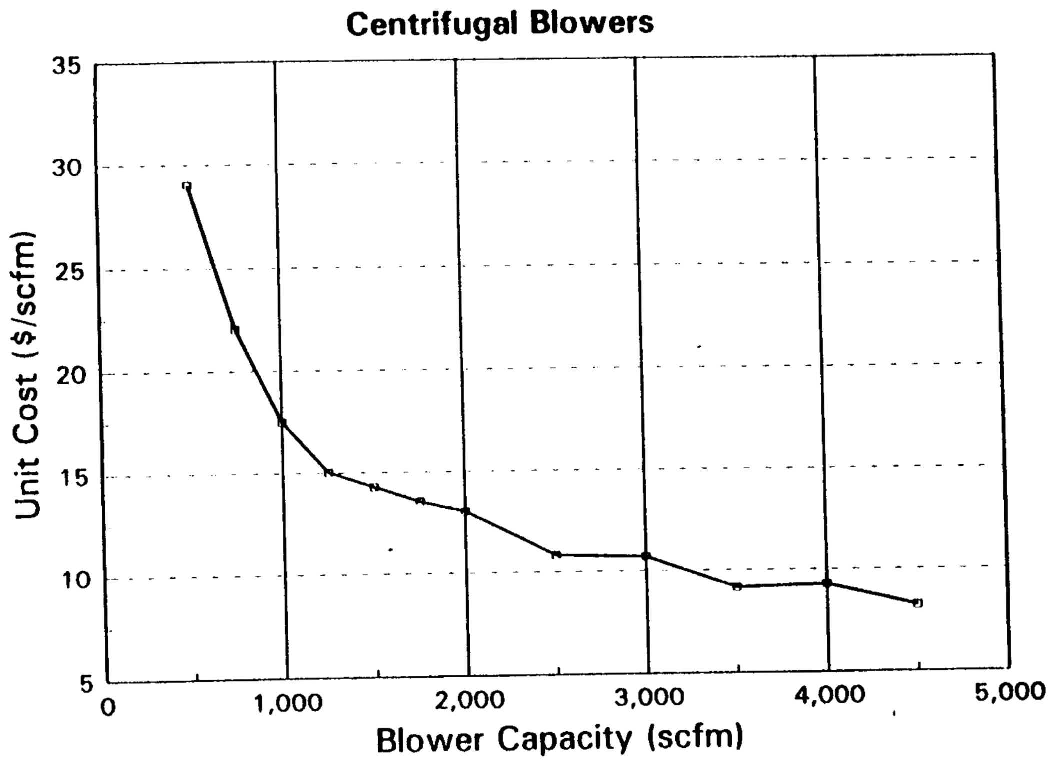

Notes: 1) All costs obtained from manufacturer's quotes.
2) Costs include a centrifugal blower and TEFC motor.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-7

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CENTRIFUGAL BLOWER UNIT COST CURVE

EXHIBIT (5-(H-4)

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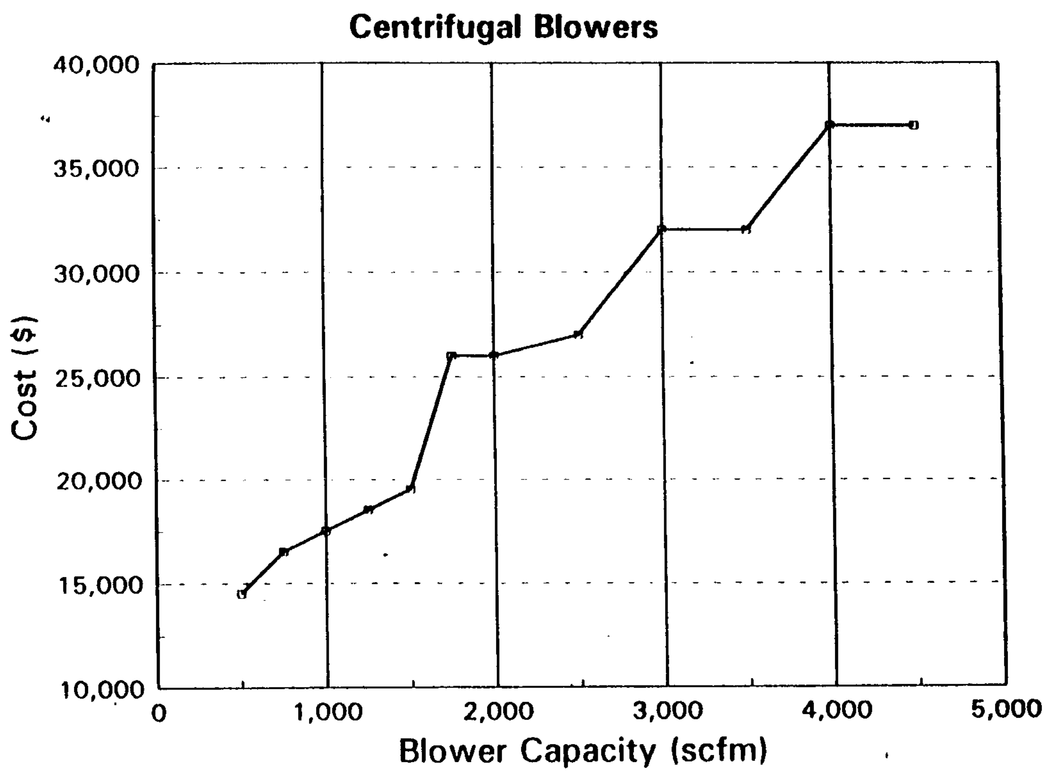

Notes: 1) All costs obtained from manufacturer's quotes.
2) Costs include blower and TEFC motor.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-8

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CENTRIFUGAL BLOWER CONSTRUCTION
COST CURVE

The unit cost and blower cost curves were created using manufacturers' cost quotations. The positive displacement blower includes the blower, TEFC motor, steel base, silencers, relief valve, pressure gauge, and check valve. The centrifugal blowers include only the blower and TEFC motor.

4.4 FILTERS

Filters are typically used for the tertiary treatment of wastewater. These filters help to remove the total suspended solids left in the effluent, and in so doing, allow the effluent to be available for reuse. The two (2) types of filters that were examined for this study were the standard gravity filter for flows less than 0.15 MGD, and traveling bridge filters for flows greater than 0.15 MGD.

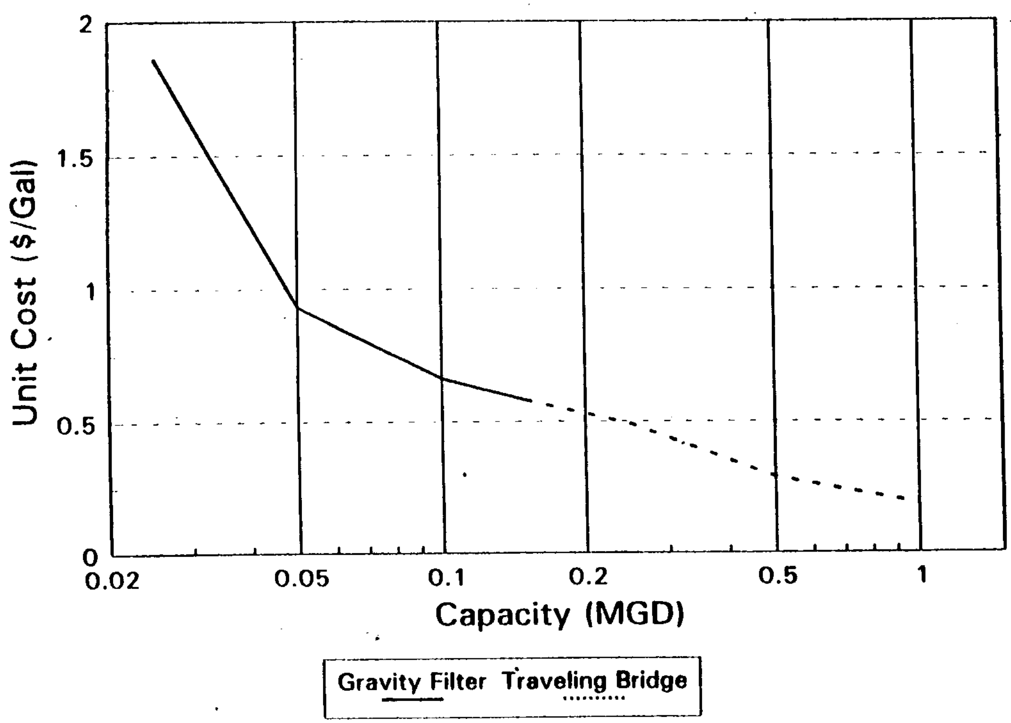
The unit cost curve, Figure 4-9, shows the unit cost, dollars per gallon, versus the capacity of wastewater treated, in million gallons per day (MGD). From 0.05 MGD to 1.0 MGD, the gravity and traveling bridge filters experience a considerable economy of scale. The gravity and traveling bridge filter combination experiences a threshold at about 0.25 MGD. As can shown from Figure 4-10, the economic savings with increased capacity are substantial. For $50,000 a gravity filter will be of the capacity to treat 50,000 gallons per day and $85,000 a gravity filter with 150,000 gallon per day treatment capacity can be purchased.

The unit cost and construction cost curves for the wastewater treatment filters were constructed using quotations of costs from manufacturers. The costs included the filter, media, 15 percent for piping, 15 percent for electrical, 5 percent for sitework, 5 percent for the concrete slab, and 20 percent for installation. These percentages were applied to the material subtotal and summed to determine the total cost.

4.5 CHLORINATION

The chlorination of wastewater is commonly accomplished using gas chlorinators. The gas is fed to the chlorinators from 150 pound or 1 ton storage cylinders. The size of the storage cylinders is dependent on the quantity of wastewater to be treated. Typically, at a dosage of 10 milligrams per liter, the 150 pound, storage cylinders are used at treatment plant flows of up to 1 MGD. This means that the 1 ton cylinders are used for flows above this point. The costs of the feed system fluctuates with the size of the storage cylinders.

Wastewater Treatment Filters



Notes:
1) Filter and media costs obtained from manufacturers' quotes.
2) Includes 15% piping, 15% electrical, 5% sitework, 20%installation, and 5% for the concrete slab.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-9

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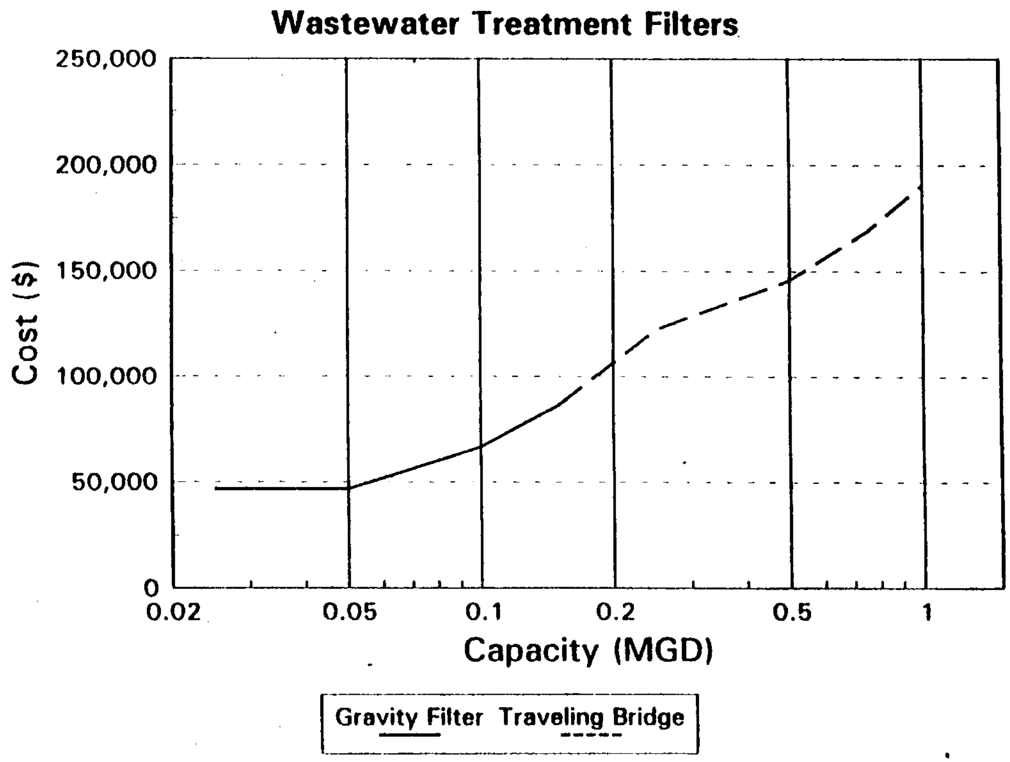
TERTIARY TREATMENT FILTER UNIT COST CURVE



Notes: 1) Filter and media costs obtained from manufacturers' quotes.
2) Includes 15% piping, 15% electrical, 5% sitework, 20% installation, and 5% for the concrete slab.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-10

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TERTIARY TREATMENT FILTER CONSTRUCTION COST CURVE

The unit cost curve, Figure 4-11, displays an economy of scale throughout the treatment capacities of 0.01 MGD to 5 MGD. This relationship is further emphasized when the components are plotted on linear axes. Where the storage cylinder sizes change, the costs slightly increase; however, the ton cylinder feed systems resume the continuous economy of scale. The overall cost, when compared with treatment plant cost, is a very low percentage. The larger capacity plants will have a much smaller unit cost for chlorine feed systems than the smaller capacity plants.

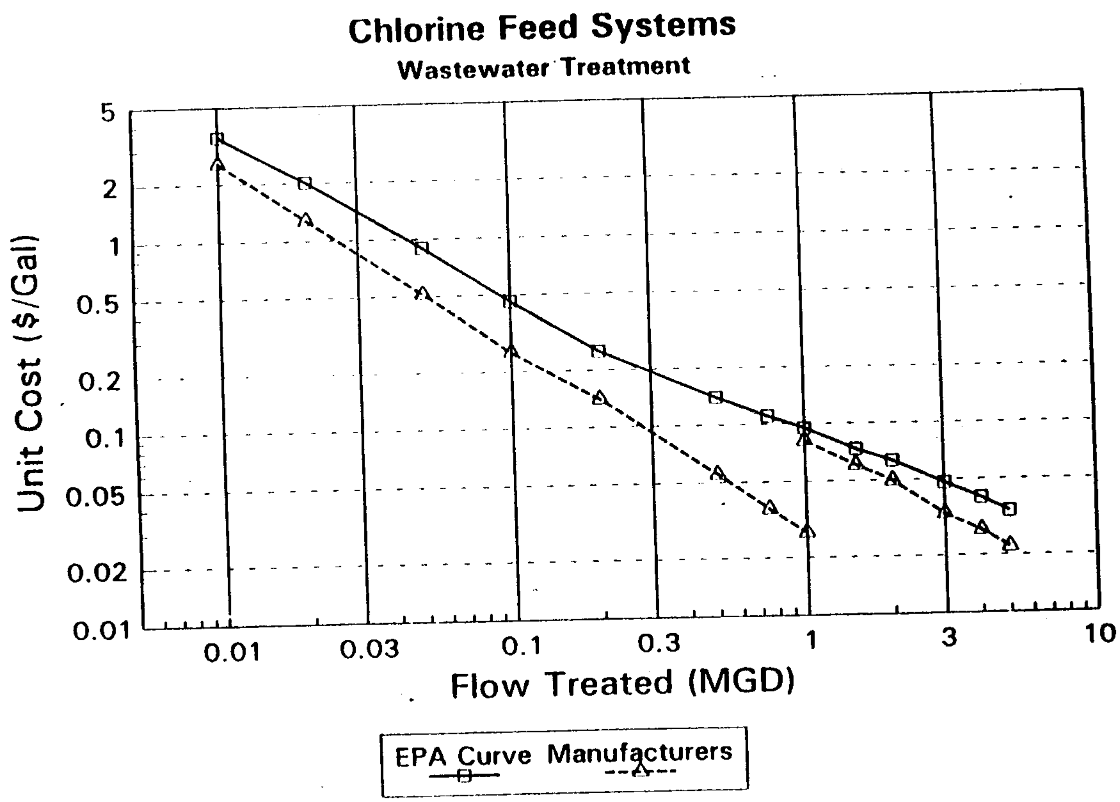
The chlorination feed equipment curve was constructed using manufacturers' quotations and EPA cost curves. Included in the cost of both size systems are dual chlorinators, dual scales, a gas detector, an alarm panel, a vacuum switch, booster pump, housing, hoists, 20% electrical, 15% piping, 20% installation, and no sitework.

4.6 STANDBY GENERATOR SETS

The standby generator sets are used for emergency power situations for water and wastewater facilities. The generator packages studied for the economy of scale project consisted of a packaged diesel electric unit with base, control/monitoring panel, and a unit mounted radiator cooling system. The generator prices do not include cost adjustments for land, engineering, installation, fencing, building facilities, and design contingencies.

In general, the cost curves of Figure 4-12 and 4-13, present a significant economy of scale relationship. Although the relationship is not readily apparent in the construction cost curve, Figure 4-13, the unit cost curve shows a drastic change in unit prices with increase Kilowatt (kW) capacity. The unit prices begin with $1,088/KW at 8 KW capacity and reach values ranging between $124/KW and $153/KW between 300 KW and 1,500 KW capacities. This relationship places an importance on the overdesign of electrical equipment. The underdesign of a standby generator is both detrimental to public health and safety and costly to the customer.

The graphical presentations were formulated using manufacturers' quotations for the various standard sizes of standby generator packages.



Notes: 1) Gas chlorination unit with 10 mg/l feed rate at capacity.
2) Dual chlorinators w/ switchover, dual scales, gas detector, alarm panel, vacuum switch, booster pump, housing, and hoists all are included in the manufacturers' quotations.
3) Includes 20% electrical, 15% piping, and 20% installation costs.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 4-11

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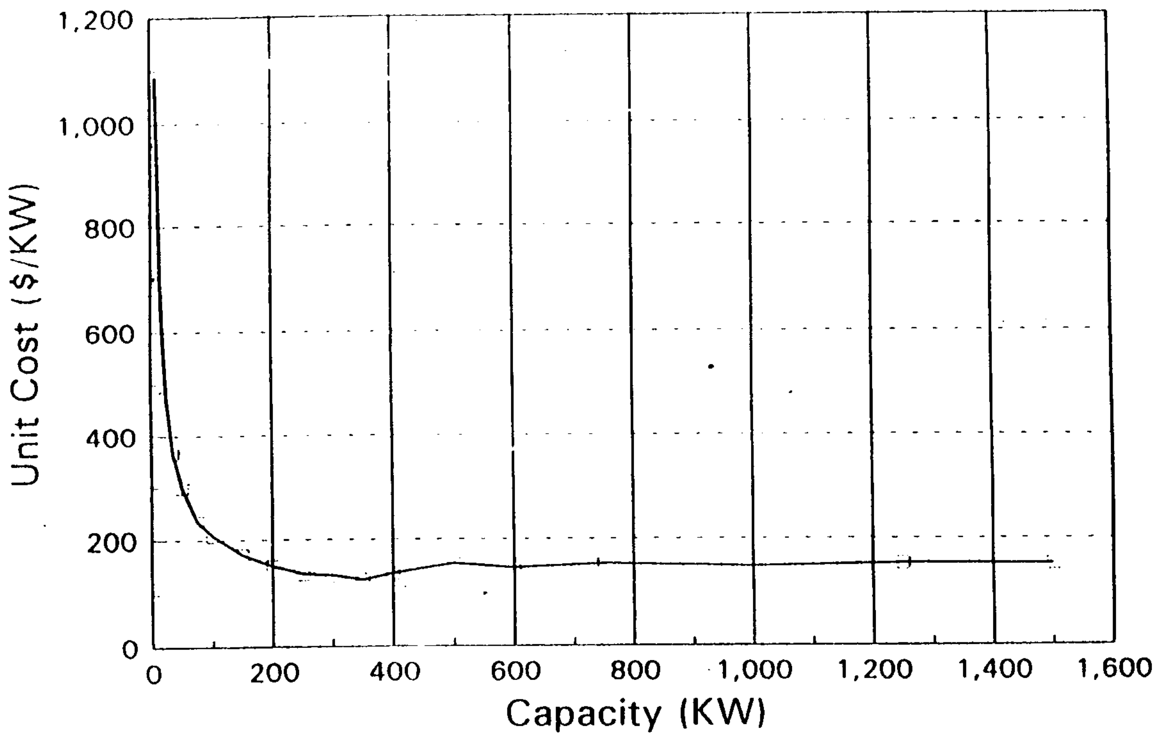
CHLORINE FEED SYSTEM UNIT COST CURVE

Standby Generator Sets

Diesel System



Notes: 1) Values obtained from manufacturer's quotations.

2) Costs include a packaged diesel electric set with base, a unit mounted radiator cooling system, and a control panel.

3) Costs are based on December 1995, ENR Index = 5471.

FIGURE 4-12

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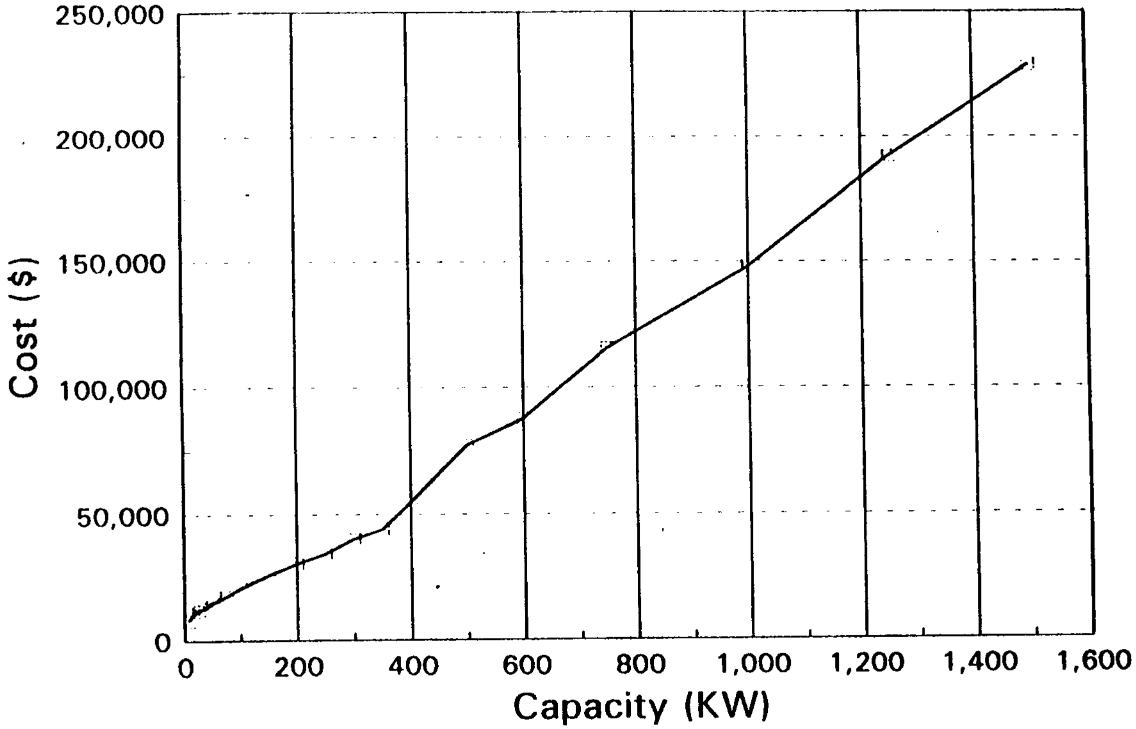
STANDBY GENERATOR UNIT
COST CURVE

Standby Generator Sets

Diesel System



Notes: 1) Values obtained from manufacturer's quotations.
2) Costs include a packaged diesel electric set with base, a unit mounted radiator cooling system, and a control panel.
3) Costs are based on December 1995, ENR Index = 5471.

FIGURE 4-13	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	STANDBY GENERATOR CONSTRUCTION COST CURVE

EXHIBIT (G-CH-4
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SECTION 5

SECTION 5
WATER TREATMENT PLANT FACILITIES

5-1 PRESTRESSED CONCRETE GROUND STORAGE TANKS

In the State of Florida, prestressed concrete ground storage tanks are most often above-ground. The ground storage tanks typically store water before pumping to the distribution system. Also, the storage tank is usually fitted with an aeration unit on top of the tank which is for the removal of hydrogen sulfide. For this study, the ground storage tanks will be designed as above and will be represented by a unit cost curve and a construction cost curve.

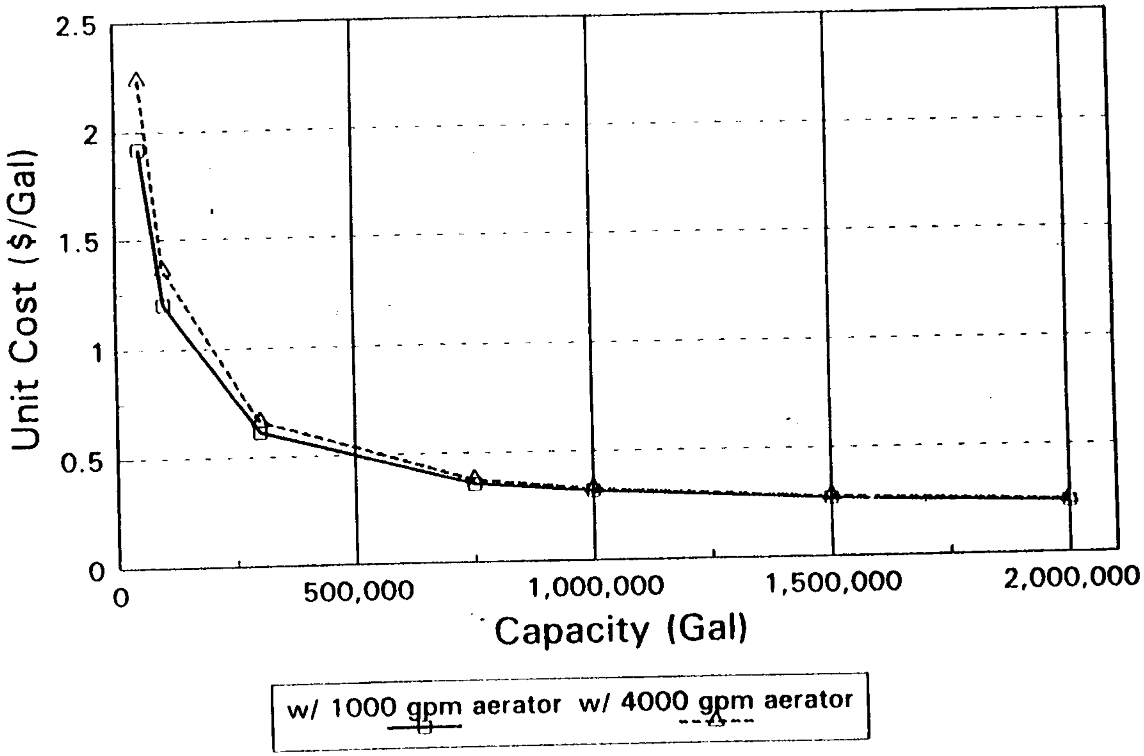
The unit cost curve, Figure 5-1, consists of a plot of the unit cost, dollars per gallon, of the ground storage tanks versus the capacity of the tank. The curve displays a strong economy of scale from the beginning to the end. The economy of scale is increasing between 50,000 gallons and 600,000 gallons. Therefore, if possible, the designer should avoid this area of the curve. The curve begins to flatten out and decrease after the inflection point, which lies at 600,000 gallons. Even though the economy of scale is decreasing up to 2,000,000 gallons, there still is a sizable cost savings between the two (2) design sizes.

To truly appreciate the continued savings even with the decreasing economy of scale, we must examine the construction cost curve, Figure 5-2. The cost to construct a 2,000,000 gallon facility is approximately $480,000, and the cost of a 1,000,000 gallon ground storage tank is about $320,000. Therefore, to build the 1 MG tank and then expand the storage capacity by 1,000,000 gallons, the total cost would be approximately $640,000. By designing for the future with the 2 MG prestressed concrete ground storage tank, the utility and customers would save $160,000 overall. As this shows, the savings are present in both increasing and decreasing states of economy of scale.

The unit cost and construction cost curves were produced from manufacturers' quotations. The prestressed concrete ground storage tanks include a concrete floor, prestressed wall, free-span concrete dome, aluminum interior and exterior ladders, vents, precast overflows, painting, an aeration unit, and installation. Then, 5% piping and 5% sitework costs were added to the total cost.

Ground Storage Tanks

Prestressed Concrete



Notes:
1) Prestressed concrete tank, concrete floor, prestressed wall, free-span concrete dome, aluminum interior and exterior ladders, vents, precast overflows, painting, aeration unit, and installation costs are included in the manufacturers' quotations.
2) Includes 5% piping, 0% electrical, and 5% sitework costs.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-1

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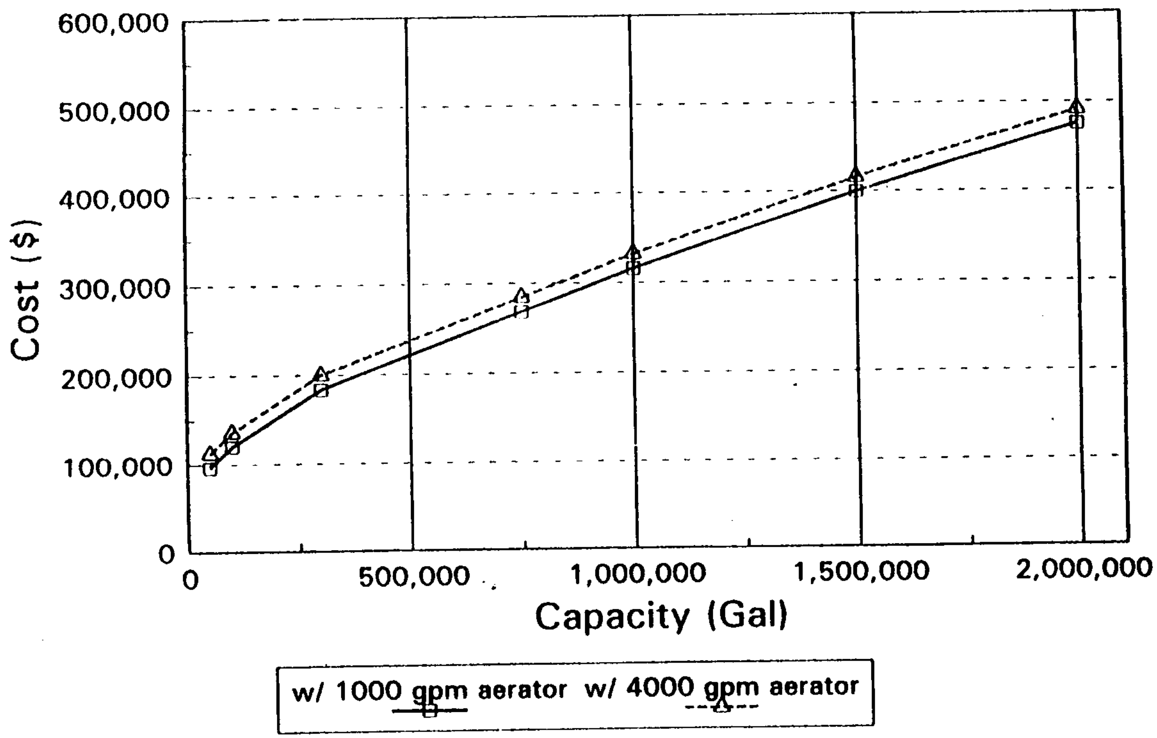
PRESTRESSED GST UNIT COST CURVE

Ground Storage Tanks

Prestressed Concrete



Notes:
1) Prestressed concrete tank, concrete floor, prestressed wall, free-span concrete dome, aluminum interior and exterior ladders, vents, precast overflows, painting, aeration unit, and installation costs are included in the manufacturers' quotations.
2) Includes 5% piping, 0% electrical, and 5% sitework costs.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-2	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	PRSTRESSED GST CONSTRUCTION COST CURVE

5.2 STEEL GROUND STORAGE TANKS

Steel ground storage tanks are typically found in the smaller capacity range (10,000 gallon to 250,000 gallon). In this size range they are able to compete with the prestressed concrete ground storage tanks. The installations of the steel tanks in Florida are commonly above-ground. These tanks are commonly used for the storage of raw or finished water intended for the distribution system, but they can also store effluent or reuse flows. In order to study the cost relationships of these tanks, the design must be uniform throughout. Therefore, the steel tanks are above-ground and not equipped with an aeration unit.

The unit cost curve, Figure 5-3, is very similar to the prestressed concrete ground storage tank with cost curve. There is a sharply increasing economy of scale in the small design capacity range, which lies between 10,000 and 100,000 gallons. The inflection point occurs at 50,000 gallons and thereafter the economy of scale begins to decrease. The decreasing economy of scale occurs between the 100,000 gallon and maximum 250,000 gallon capacity range. Since the unit cost is decreasing throughout the entire curve, the economy of scale is present through all sizes. This means that even though the economy of scale is decreasing in the larger sizes, there are still savings in the larger designs. The construction cost curve, Figure 5-4, shows these savings by plotting the total cost of the storage tank versus the capacity of the tank. For example, by taking the average of the two curves, the cost to construct a 250,000 gallon tank is approximately $145,000. The cost to construct a 150,000 gallon tank is about $108,000. Therefore, there is a savings of $50,000 by designing the tank for the larger capacity as opposed to expanding the steel ground storage tanks capacity by adding another 100,000 gallons of capacity.

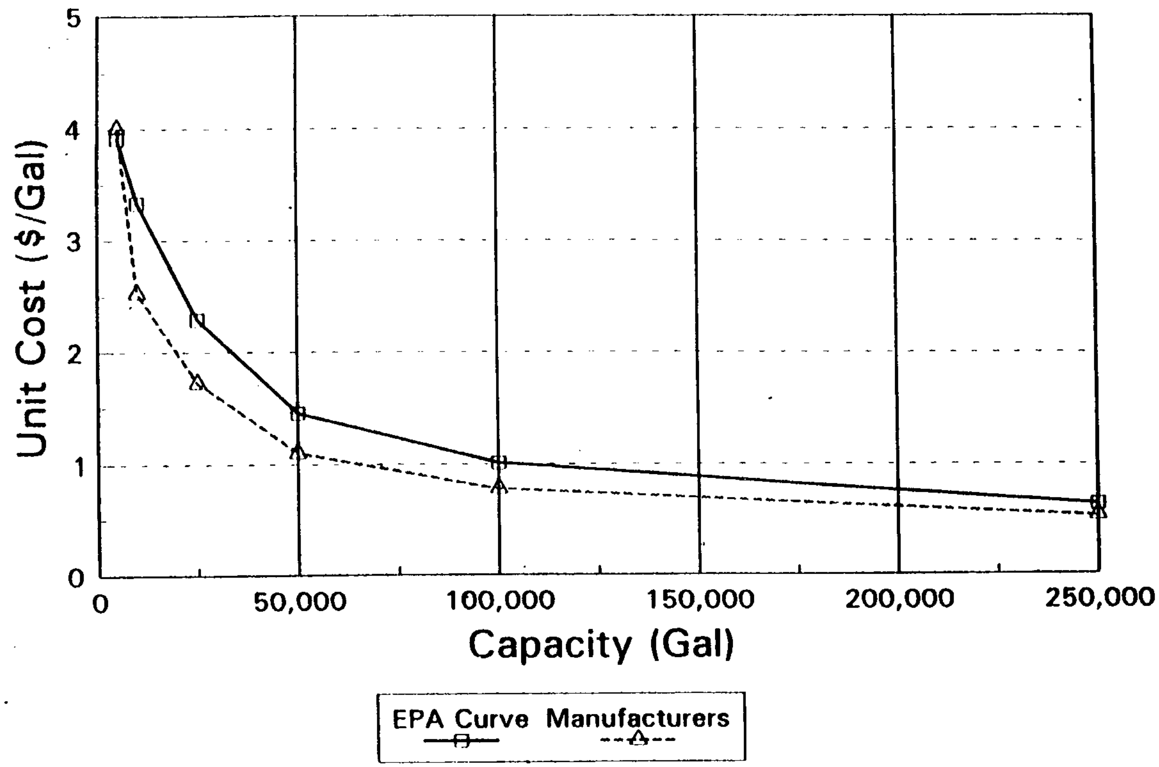
The cost curves for steel ground storage tanks were prepared with values obtained from EPA cost curves and manufacturers' quotes. In order to compare the two sources of costs, the quotes were modified to meet the same criteria as the Environmental Protection Agencies cost curves. The steel tank costs include the complete tank, concrete foundation, roof, roof manway, gravity vent, bottom manway hatch, ladder and cage assembly, top manway platform, protective bolt caps, installation, 5% sitework, and 5% piping.

5.3 CHLORINATION

The chlorination of raw water is commonly accomplished using gas chlorinators. The gas is fed to the chlorinators via 150 pound, or 1 ton storage cylinders. The size of the storage cylinders is

Ground Storage Tanks

Steel



Notes: 1) Complete steel tank, concrete foundation, roof, roof manway, gravity vent, bottom manway hatch, ladder & cage assembly, top manway platform, protective bolt caps, and installation costs are included in the manufacturers' quotations.
2) Includes 5% piping, 0% electrical, and 5% sitework costs.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-3	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	STEEL GST UNIT COST CURVE

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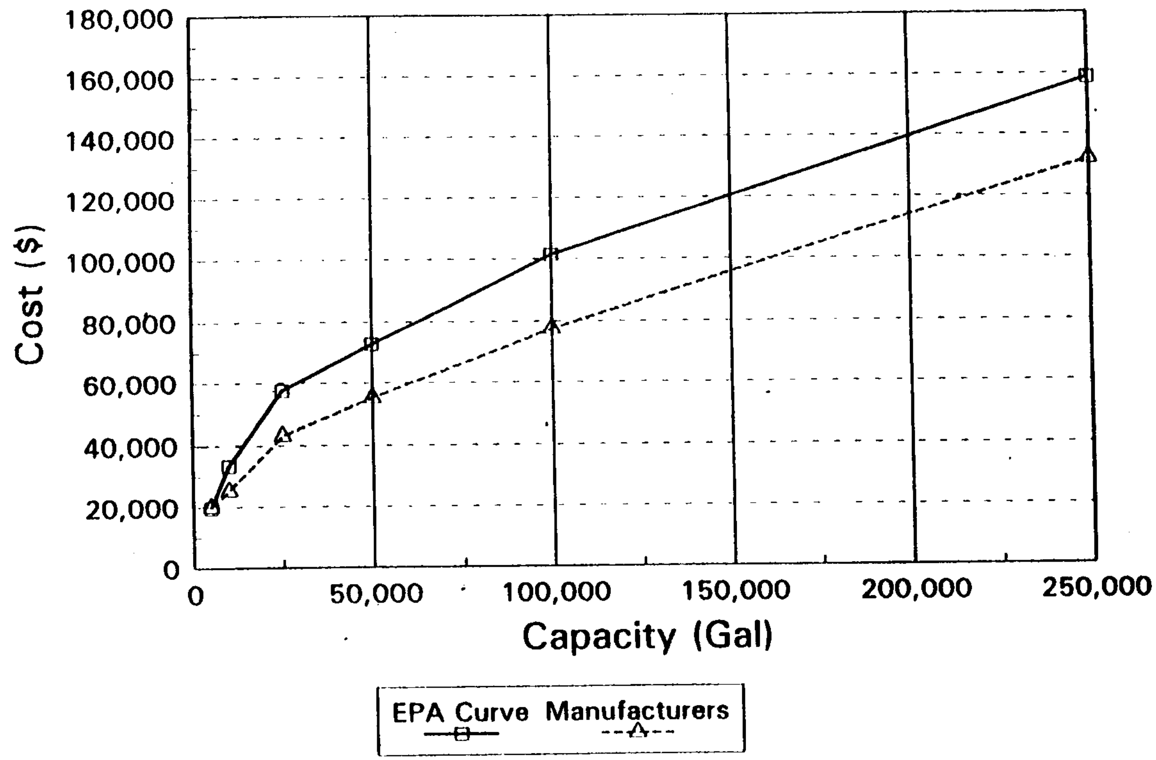
Ground Storage Tanks

Steel



Notes: 1) Complete steel tank, concrete foundation, roof, roof manway, gravity vent, bottom manway hatch, ladder & cage assembly, top manway platform, protective bolt caps, and installation costs are included in the manufacturers' quotations.

2) Includes 5% piping, 0% electrical, and 5% sitework costs.

3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-4

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STEEL GST CONSTRUCTION COST CURVE

EXHIBIT ____ (JCH-1)

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dependent on the quantity of raw water to be treated. Typically, at a dosage of 5 milligrams per liter, the 150 pound storage cylinders are used at treatment plant flows of up to 2 MGD. This means that the 1 ton cylinders are used for flows above this point. The costs of the feed system fluctuates with the size of the storage cylinders.

The unit cost curve, Figure 5-5, displays an economy of scale throughout the treatment capacities of 0.01 MGD to 5 MGD. This relationship is further solidified when the capacities and unit costs are plotted on linear axes. Where the storage cylinder sizes change, the costs slightly increase; however, the ton cylinder feed systems resume the continuous economy of scale. The overall cost, when compared with treatment plant capacity, is not much of a concern. The larger capacity plants will have a much smaller unit cost for chlorine feed systems than the smaller capacity plants.

The chlorination feed equipment curve was constructed using manufacturers' quotations and EPA cost curves. Included in the cost of both size systems are dual chlorinators, dual scales, a gas detector, an alarm panel, a vacuum switch, booster pump, housing, hoists, 20% electrical, 15% piping, 20% installation, and no sitework.

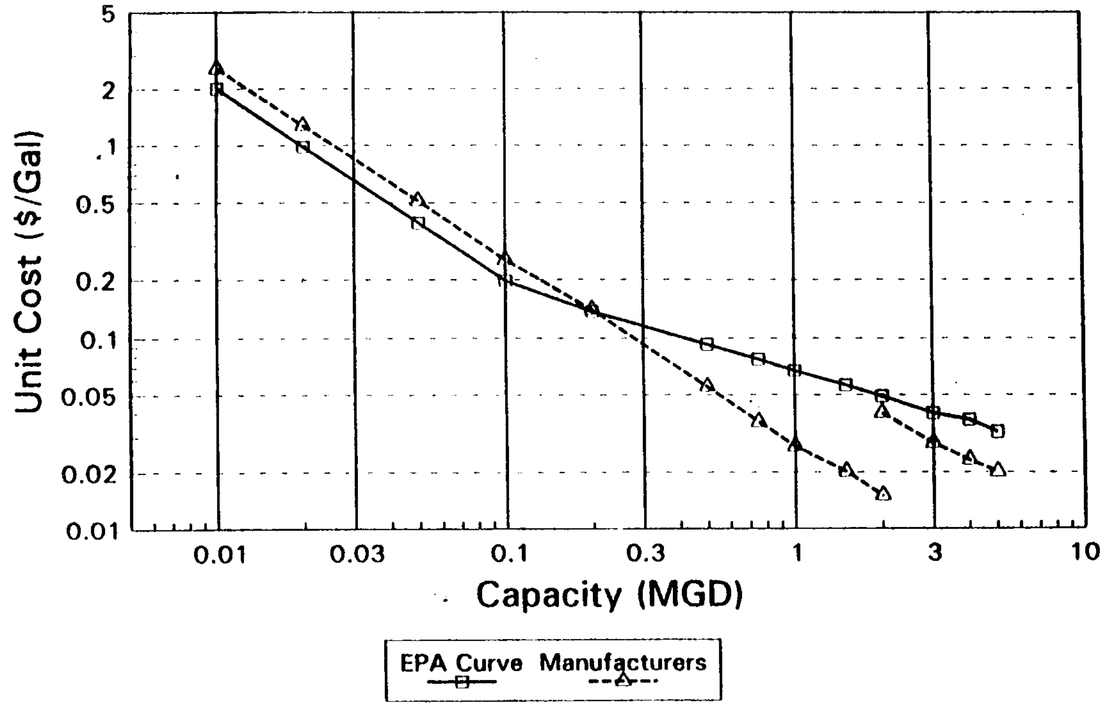
5.4 HIGH SERVICE PUMPS

High service pumps are commonly used in the water distribution system. The water is stored in a ground storage tank and then is distributed to the customers by a series of high-service pumps and water mains. In this study, the horizontal split-case pump was used to represent the typical high-service pumps. The pumps were plotted by their cost and unit cost versus capacity between 100 gpm and 5,000 gpm.

The unit cost curve, Figure 5-6, presents the pump cost in terms of dollars per gpm versus the gpm capacity of the pump. The smaller pumps, 100 gpm to 500 gpm, show an increasing economy of scale and the larger pumps, 1,000 gpm to 5,000 gpm, display a decreasing economy of scale. The transition of the unit cost curve is the inflection point which occurs around the 1,000 gpm pump. Therefore, 750 gpm pumps and larger are more economical in design than are the smaller pumps. For example, Figure 5-7 shows that a 5,000 gpm pump will cost approximately $30,000 and a 1,000 gpm pump will cost $9,000. The cost to upgrade the pump capacity by adding additional pumps will bring the total cost for 5,000 gpm of capacity to

Chlorine Feed Systems

Water Treatment



Notes: 1) Gas chlorination unit with 5 mg/l feed rate capacity.
2) Dual chlorinators w/ switchover, dual scales, gas detector, alarm panel, vacuum switch, booster pump, housing, and hoists are included in the manufacturers' quotations.
3) Includes 20% electrical, 15% piping, and 20% installation costs.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-5

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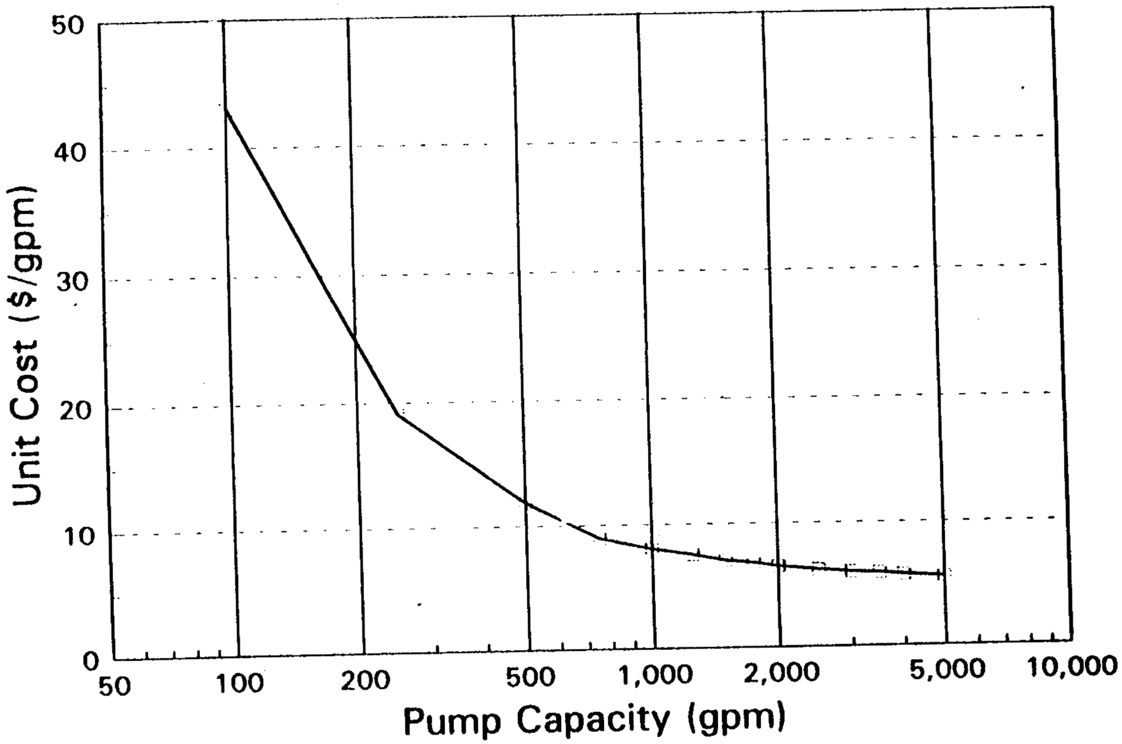
CHLORINE FEED SYSTEM UNIT COST CURVE

High-Service Pumps

Horizontal Split Case

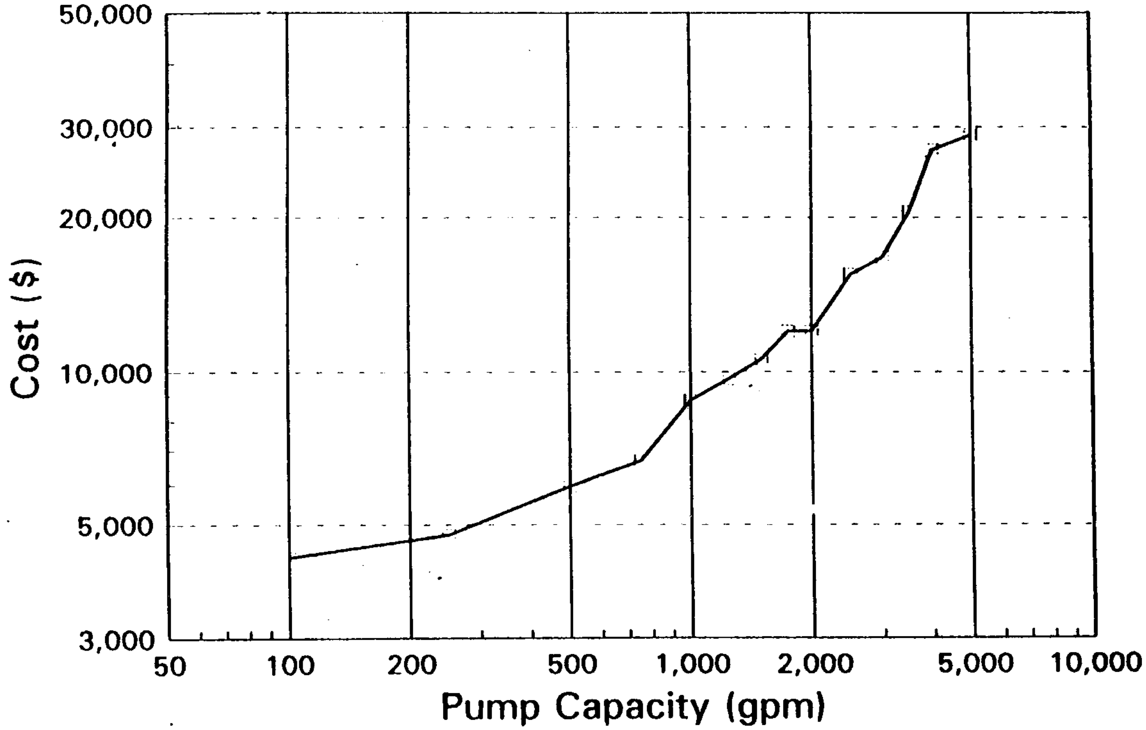


Notes:
1) All costs obtained from manufacturer's quotations include pumps, factory testing, and freight to jobsite.
2) Horizontal Split Case pumps and motors.
3) Pump head is 175 feet (76 psi).
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-6	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-[illegible] - FAX (407) 839-[illegible]	HIGH SERVICE PUMP UNIT COST CURVE

High-Service Pumps

Horizontal Split Case



Notes:
1) Values obtained from manufacturer's quotations include pumps, factory testing, and freight to jobsite.
2) Horizontal Split Case pumps and motors.
3) Pump head is 175 feet (76 psi).
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-7

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HIGH SERVICE PUMP CONSTRUCTION COST CURVE between $35,000 and $45,000. The overall saving would then be in the $10,000 range, which is considerable with horizontal split-case pumps.

The values for the construction cost and unit cost curves were quoted from manufacturers of horizontal split case pumps. The costs for the pumps include the pump, motor, factory testing, and freight to the jobsite. The pumps were sized using a head of 175 feet.

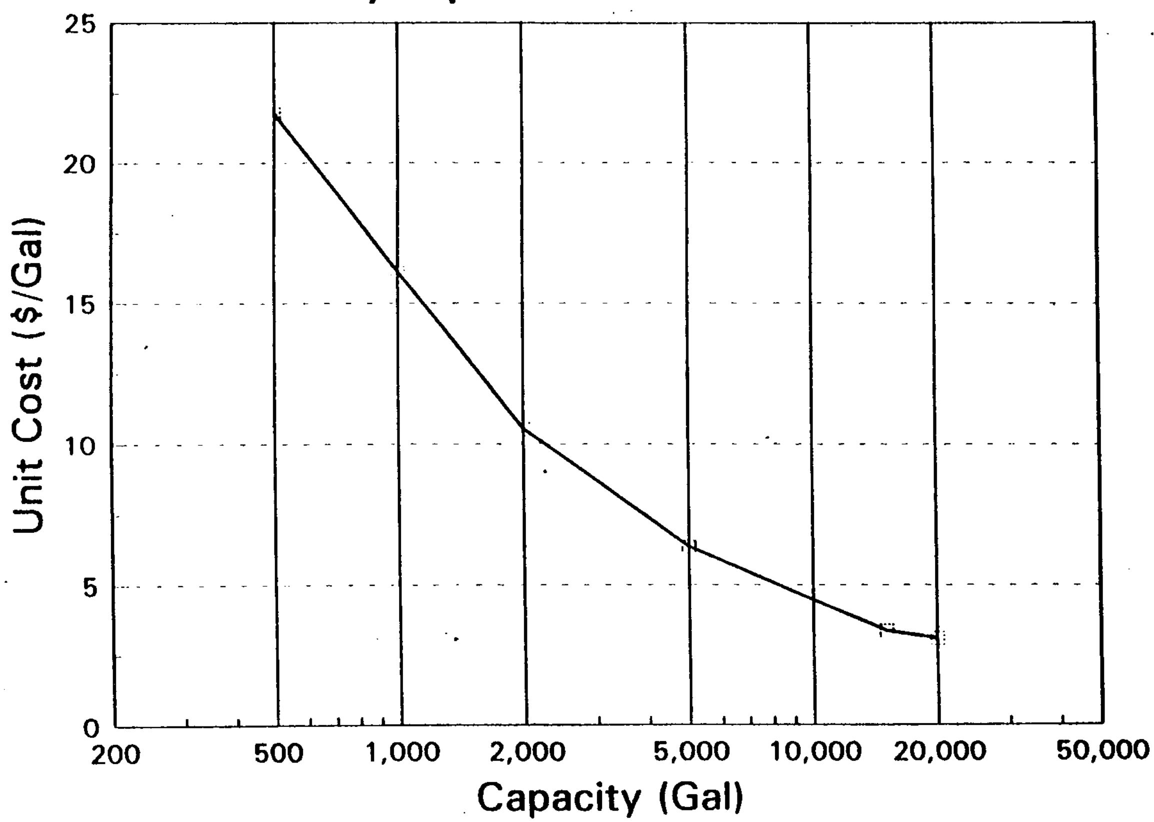
5-5 HYDROPNEUMATIC TANKS

Hydropneumatic tanks are an integral component in maintaining the required pressure of the water entering the distribution system. In this study, the hydropneumatic tanks are designed for a pressure rating of 100 pounds per square inch, and they are ASME rated. The tanks are the horizontal type cylinder tanks that are situated on a concrete base. The hydrotank system estimates are presented as both unit cost versus capacity and construction costs versus capacity.

The unit cost curve, Figure 5-8, is plot of the unit cost, dollars per gallon, versus capacity for hydropneumatic tanks between 500 gallons and 20,000 gallons. The curve shows an economy of scale that begins to slightly decrease near 10,000 gallons. Overall, there is considerable savings between each successive step of the design capacity. The unit cost curve virtually straight, which leaves the curve without a point of inflection. Without an inflection point, the curve possesses a strong economy of scale throughout the size range. The construction cost curve, Figure 5-9, strengthens this point. For example, the cost of a 500 gallon, 5,000 gallon, and 20,000 gallon hydropneumatic tank system is $11,000, $32,000, and $62,000, respectively. By adding to the 500 gallon tank to reach 5,000 gallon capacity, the cost would be considerably more than the original 5,000 gallon tank. For instance, adding a 500 gallon tank and then a 4,000 gallon tank to the existing 500 gallon tank, the total cost would be $52,000. This option is approximately $20,000 more than a 5,000 gallon tank would originally cost. This relationship also exists between the 5,000 gallon and 20,000 gallon tanks. In this case, the cost would be approximately $20,000 more to expand to 20,000 gallon capacity from 5,000 gallon capacity.

The unit cost and construction cost curves were formed using quotations from manufacturers. The quotes included the tank itself, an air volume control compressor, and a control panel. To these values, 15% piping, 20% electrical, 10% sitework, and 20% installation was added to determine the total cost of a hydropneumatic tank system.

Hydropneumatic Tanks



Notes:
1) Costs of the tank, air volume control compressor, and a control panel were included in the manufacturers' quotations.
2) 15% piping, 20% electrical, 20% installation, and 10% sitework were added to the quoted costs.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-8	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	HYDROPNEUMATIC TANK UNIT COST CURVE

EXHIBIT CCH-4
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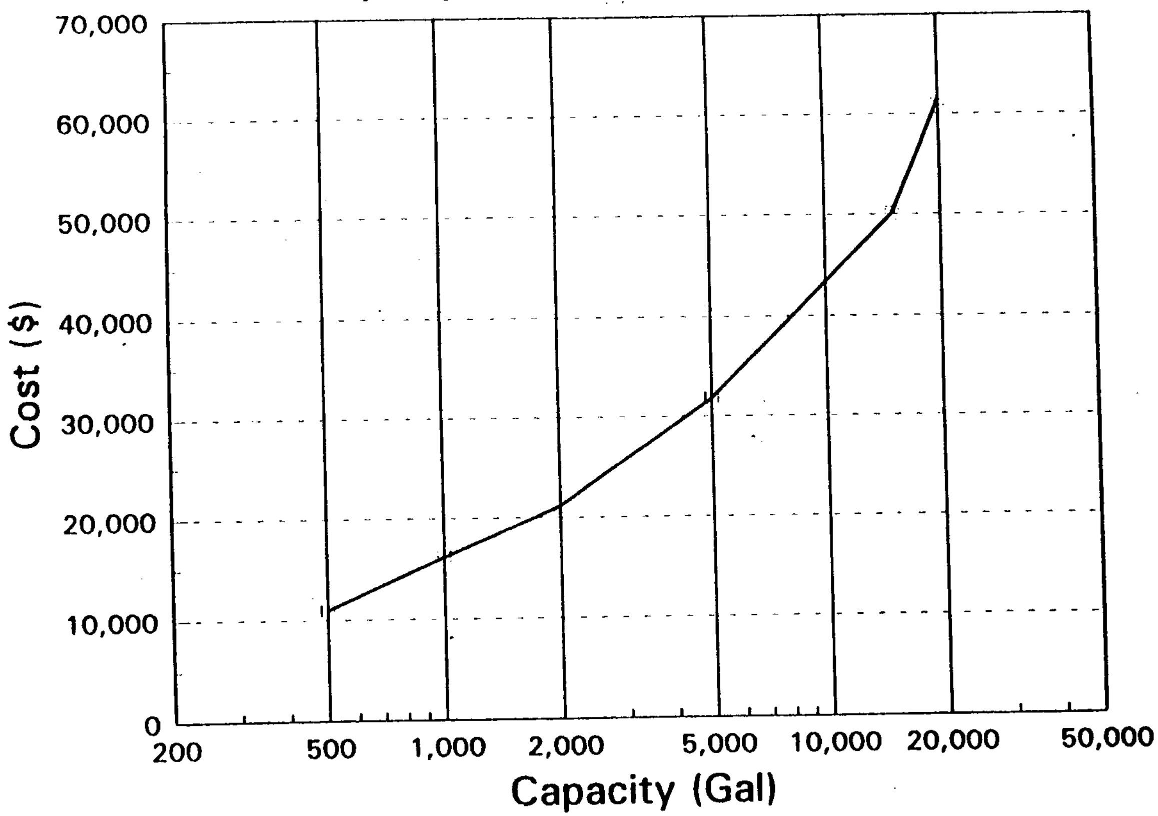
Hydropneumatic Tanks



Notes: 1) Costs of the tank, air volume control compressor, and a control panel were included in the manufacturers' quotations.
2) 15% piping, 20% electrical, 20% installation, and 10% sitework were added to the quoted costs.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-9

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HYDROPNEUMATIC TANK CONSTRUCTION COST CURVE

EXHIBIT ______ (JCH-4)
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5.6 WELLS

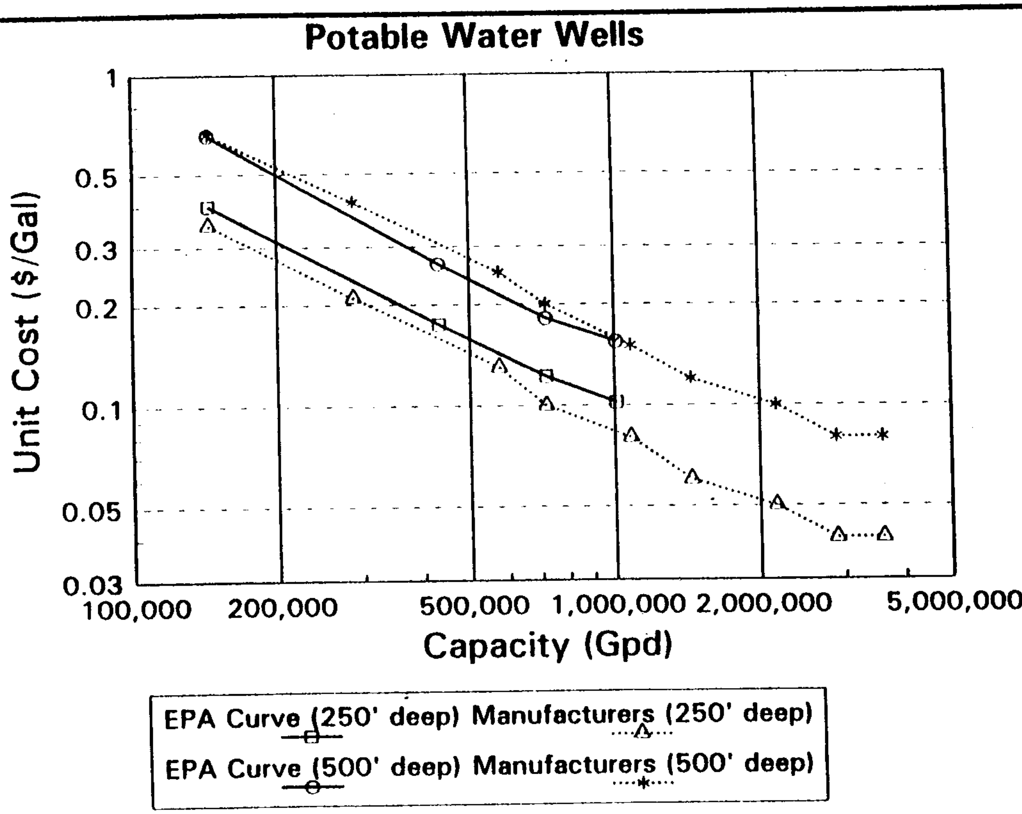
Depending on the site, raw water wells can vary tremendously in the depth required to produce a functional well. In this case, deep wells of approximately 250 feet and 500 feet in depth were considered appropriate. The pumps designed for these wells are vertical turbine pumps. The cost of the well system includes only the well components and is represented in the unit cost and construction cost curves.

The unit cost curve, Figure 5-10, is based on the daily pumping capacity of the well. In other words, the unit cost is presented as dollars per gallon and the capacity is in gallons per day. Both the 250 foot and 500 foot deep wells display considerable economies of scale throughout the capacity range of the curve. The unit costs begin between $0.4/gal and $0.7/gal at 144,000 gallons per day and ends around $0.04/gal to $0.08/gal at approximately 3,500,000 gallons per day. The savings are apparent throughout the well sizes when looking at the construction cost curve, Figure 5-11. A well pumping at 2,800,000 gallons per day costs about $115,000 to construct, while a 720,000 gallon per day costs about $75,000 to construct. The economy of scale is primarily due to contractor mobilization and economies of scale in casing pipe and pumps.

The unit cost and construction cost curves were developed with the values received from manufacturers' quotations, EPA cost curves, and previously completed project bid tabulations. All curves for supply wells include a vertical turbine pump, cement grout, black steel well and surface casing, well screen, well development, 10% for electrical, 15% for well head, and 30% for labor needed for construction.

5.7 LIME SOFTENING WTP

The Lime Softening-WTP cost curves, Figures 5-12 and 5-13, represent the costs associated with the treatment facilities needed to treat raw water with lime and recarbonate the treated water with gaseous carbon dioxide. The lime softening plant is characteristically the same as a conventional filtration plant; however, lime is substituted for other chemicals and the treated water will need to be recarbonated. The unit cost curve, Figure 5-12, and the construction cost curve, Figure 5-13, were produced using documented EPA cost information and includes the following cost considerations: raw water pumping equipment, chemical addition facilities, rapid mix/flocculation equipment, sedimentation basin, filtration units, disinfection equipment, finished water storage and pumping equipment, and sludge disposal facilities.



Notes: 1) Vertical turbine pump, cement grout, black steel well and surface casing, well screen, and well development costs from manufacturers' quotes and bid tabulations.

2) Includes 10% electrical, 15% for well head assembly, and 30% labor costs.

3) EPA cost curves contain all costs.

4) Costs are based on the June 1995, ENR Index = 5433.

FIGURE 5-10

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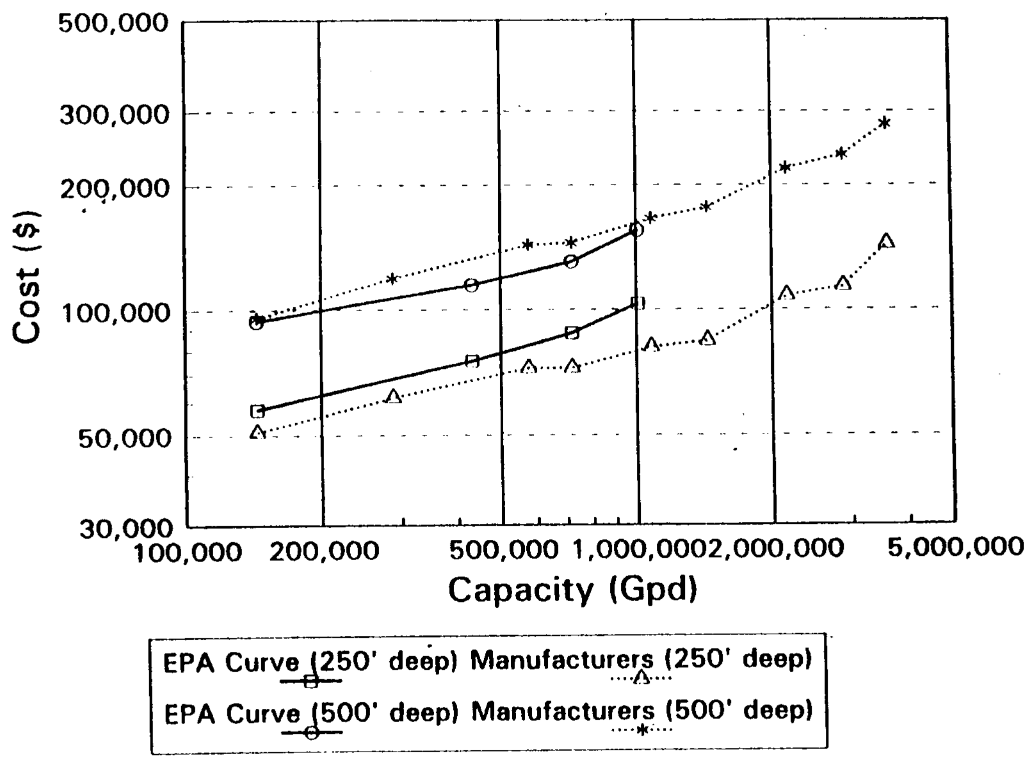
SUPPLY WELL UNIT COST CURVE

Potable Water Wells



Notes:
1) Vertical turbine pump, cement grout, black steel well and surface casing, well screen, and well development costs from manufacturers' quotes and bid tabulations.
2) Includes 10% electrical, 15% for well head assembly, and 30% labor costs.
3) EPA cost curves contain all costs.
4) Costs are based on the June 1995, ENR Index = 5433.

FIGURE 5-11

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SUPPLY WELL CONSTRUCTION COST CURVE

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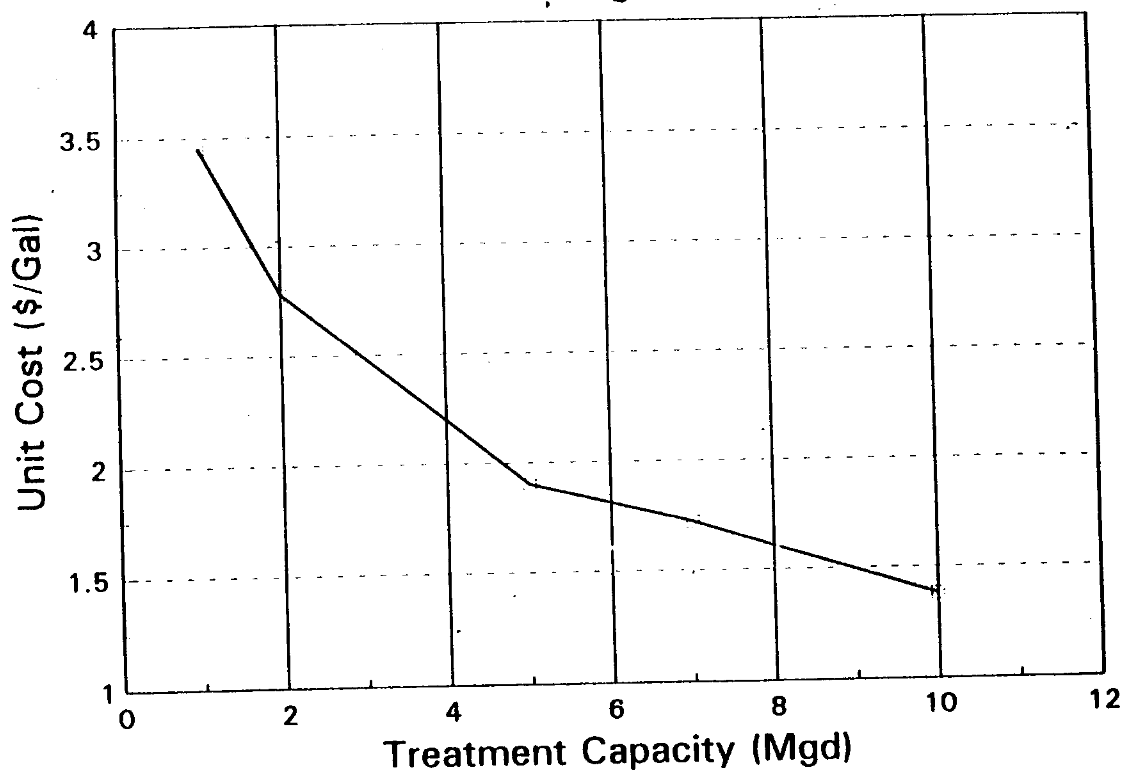
Lime Softening WTP



Notes: 1) Values obtained using EPA cost curves.
2) Costs include raw water influent pumping, chemical addition, rapid mix/ flocculation, sedimentation, filtration, disinfection, finished water storage, finished water pumping, and sludge disposal.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-12

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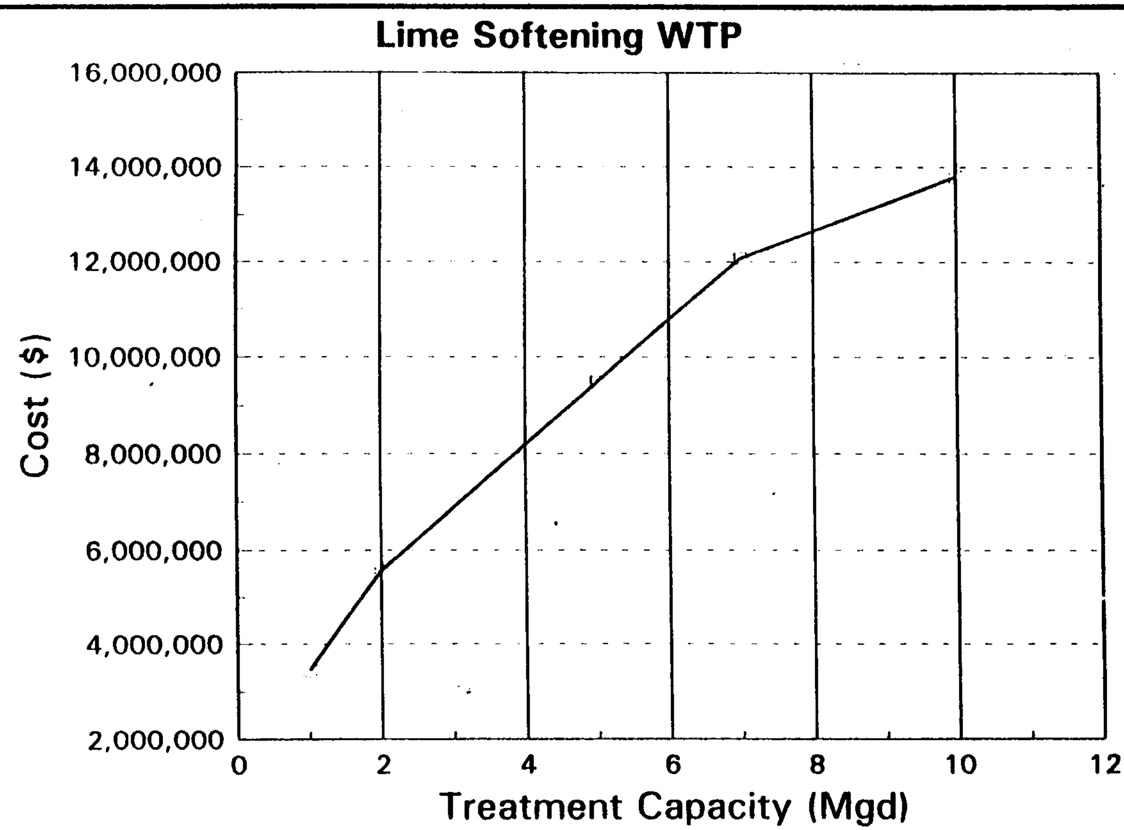
LIME SOFTENING WTP UNIT
COST CURVE



Notes: 1) Values obtained using EPA cost curves.
2) Costs include raw water influent pumping, chemical addition, rapid mix/ flocculation, sedimentation, filtration, disinfection, finished water storage, finished water pumping, and sludge disposal.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-13

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LIME SOFTENING WTP CONSTRUCTION COST CURVE

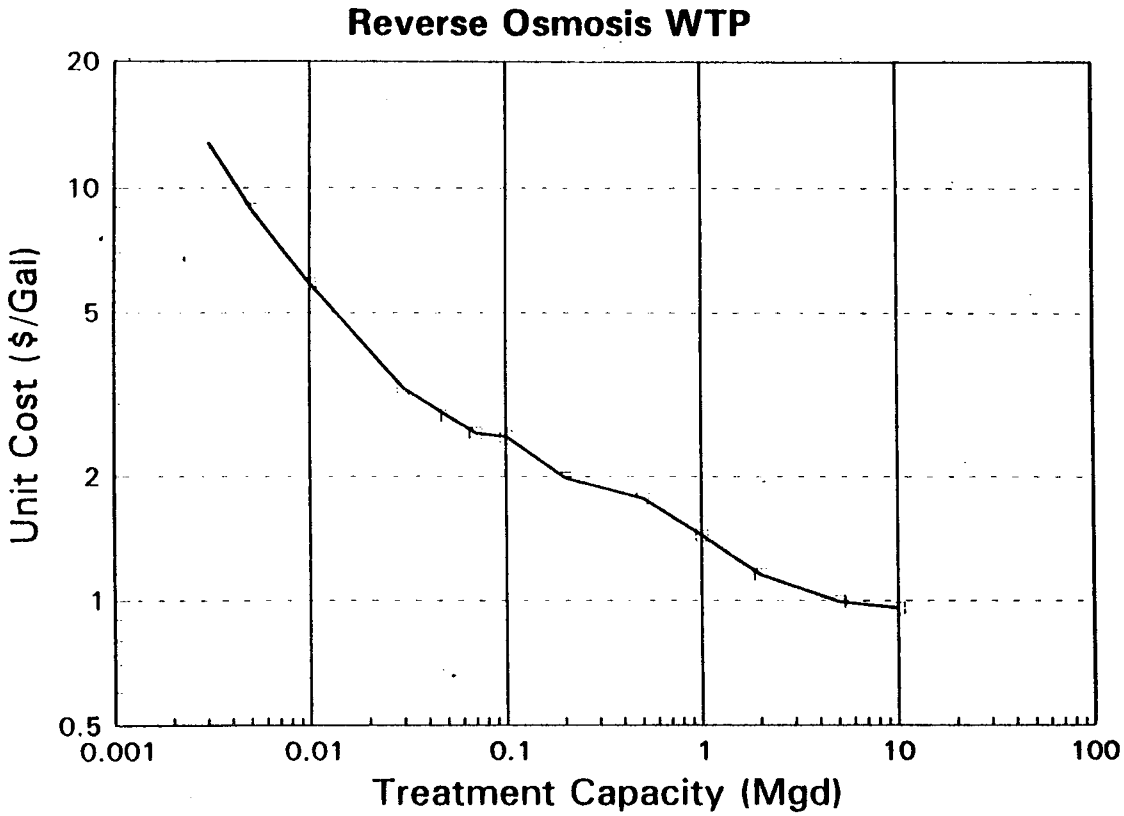
The Lime Softening WTP cost curves show a small economy of scale throughout the capacity ranges. The unit cost begins with approximately $3.5/gal at 1 MGD and ends with approximately $1.4/gal at 10 MGD. This shows that there is an economy of scale between these ranges of capacities.

The curves for Lime Softening Water Treatment Plants were constructed using information gathered from EPA cost curves.

5.8 REVERSE OSMOSIS WTP

The curves presented, Figure 5-14 and 5-15, in this Section were constructed using previous EPA cost curves and information contained in previous EPA reports. The treatment facilities that make up a Reverse Osmosis treatment plant and consequently, the cost curves contained in this report are as follows: reverse osmosis membrane elements and pressure vessels, flow meters, housing, structural steel, tanks, piping, valves, pumps, cartridge filters, acid and polyphosphate equipment, and cleaning equipment. The EPA cost curves have also added costs for contingencies, sitework, engineering and administration, and electrical.

The unit cost curve, Figure 5-14, shows a considerable economy of scale. The ranges of capacity begin with 0.003 MGD and end with 10 MGD. When plotted on a linear scale, the curve is more pronounced than the economy of scale curve shown in Figure 2-1. The unit cost is approximately $14/gal at 0.003 MGD and approximately $0.95/gal at 10 MGD.



Notes: 1) Values obtained using EPA cost curves.
2) Costs include housing, structural steel, tanks, piping, valves, pumps, reverse osmosis membrane elements and pressure vessels, flow meters, cartridge filters, acid and polyphosphate equipment, and cleaning equip.
3) The EPA cost curves have also added costs for contingencies, sitework, engineering & administration, and electrical.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-14

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REVERSE OSMOSIS UNIT
COST CURVE

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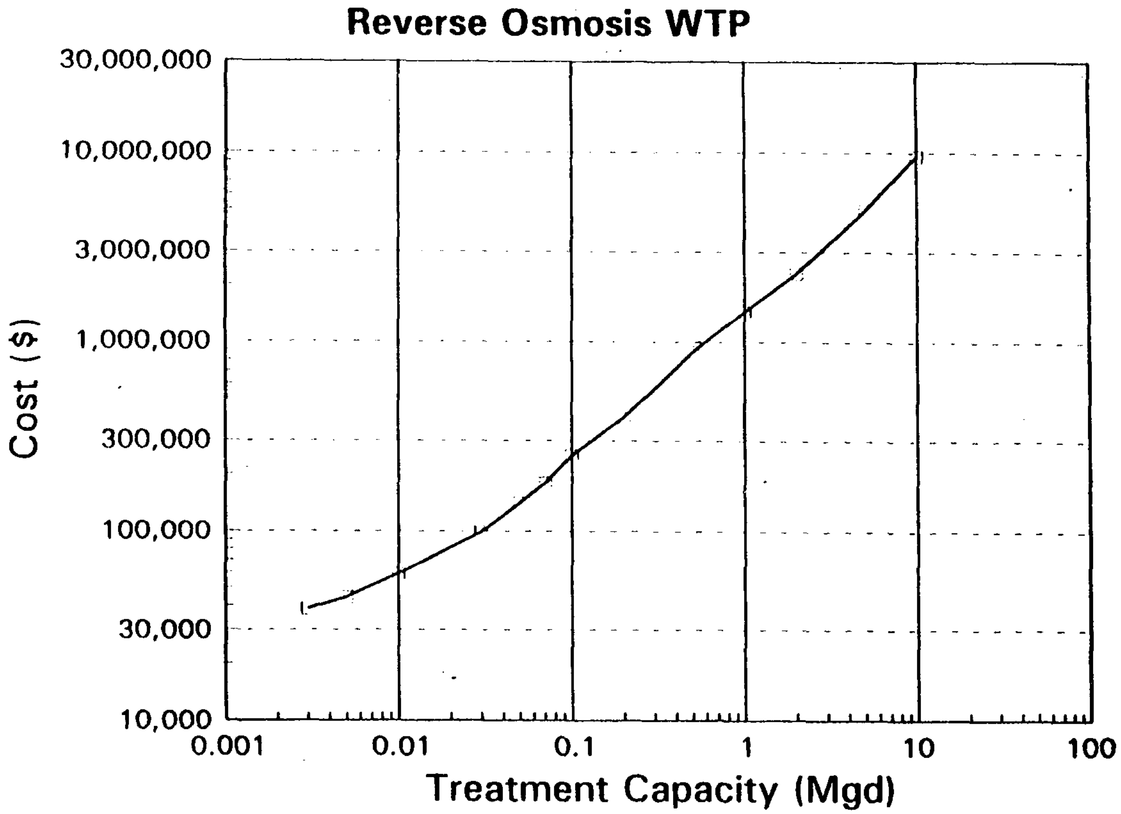

Notes: 1) Values obtained using EPA cost curves.
2) Costs include housing, structural steel, tanks, piping, valves, pumps, reverse osmosis membrane elements and pressure vessels, flow meters, cartridge filters, acid and polyphosphate equipment, and cleaning equip.
3) The EPA cost curves have also added costs for contingencies, sitework, engineering & administration, and electrical.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 5-15	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	REVERSE OSMOSIS CONSTRUCTION COST CURVE

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SECTION 6

SECTION 6
WASTEWATER COLLECTION/WATER DISTRIBUTION

6.1 GRAVITY SEWERS

The gravity sewer collection system consists of a series of PVC-SDR35 pipe, manholes, and sewage pump station. The cost analysis of this type of system must be done by looking at the number of services per section. The sections are defined by 400 foot lengths of pipe, as denoted in Figure 6-1. Since the lots are assumed to be 100 feet in width, there can only be four (4) lots on each side of the gravity line. For example, sewer installation A would include a beginning manhole, 400 feet of 8-inch PVC pipe, and a portion of the cost of the sewage pump station. The pump station cost for this example would be calculated by multiplying the total cost for the pump station by the ratio of the number of lots, in this case eight (8), over the total numbers of lots that a 100 gallon per minute pump station can serve, which is approximately 120. The total cost is attained by summing the costs of the gravity pipe, manholes, sewage pump station, permitting fee, line testing fee, mobilization, electrical, and installation.

The unit cost curve was produced by dividing the total cost of an installation by the number of lots that are serviced and then plotting this value versus the total number of lots. The design was carried all the way out to the 100 gallon per minute pump station capacity of 120 lots. The actual curve, Figure 6-2, shows that the gravity sewer installations experience an increasing economy of scale up to the inflection point, which is located at about 32 lots serviced. From this point, the economy of scale decreases all the way to the 120 lot endpoint. Therefore, the gravity sewer installations are much more economical on a large scale than they are when individual 400 foot sections are installed. This occurs due to the extra costs for permitting, mobilization, and engineering.

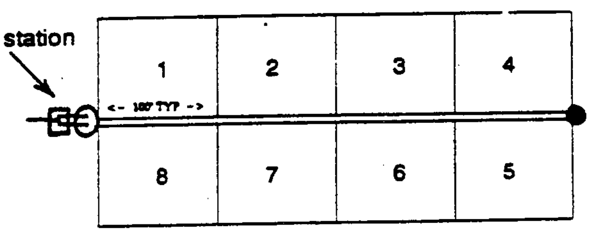
The unit cost curve for the gravity sewer installation was formed using the values obtained from manufacturers' quotations and bid tabulations from previously completed jobs.

6.2 SEWAGE PUMP STATIONS

The pump station configuration that was studied for this report is the submersible duplex pumps in a wet well with an adjoining valve box. The costs of these wastewater collection and

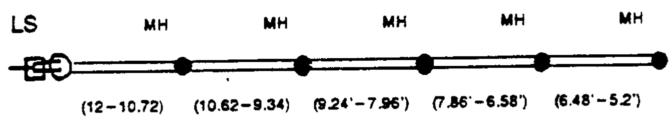
One Section (8 units)

400 lf 8" PVC-SDR 35 (10'-12'deep)



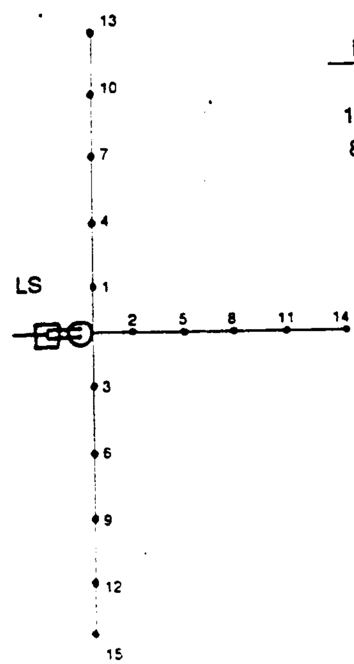
One Street (40 units)

** All pipe is 8" SDR 35 PVC (400' sections)



Whole Installation (120 units)

8" Gravity Sewer
10'-12' deep => 1782 lf
8'-10' deep => 1782 lf
6'-8' deep => 1689 lf
0'-6' deep => 750 lf



Depth	Manholes
10'-12'	1,2,3
8'-10'	4,5,6
6'-8'	7-12
0'-6'	13,14,15

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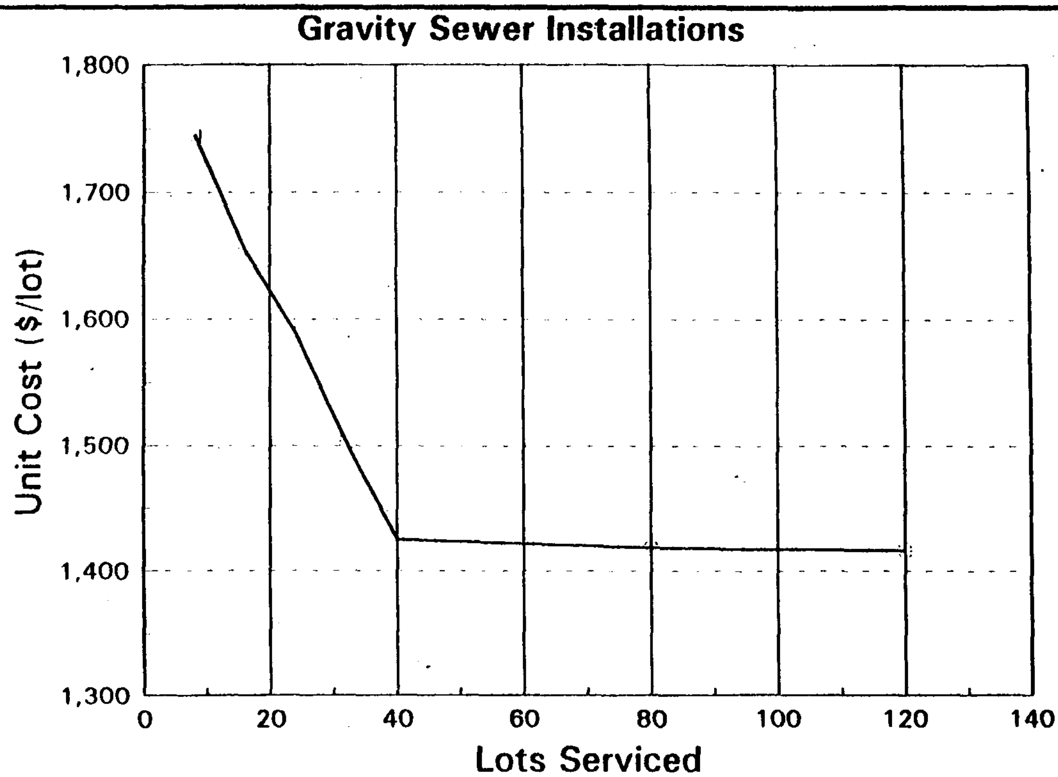
GRAVITY SEWER DESIGN

FIGURE 6-1



Notes:
1) Assumed 100 foot lots, 12 foot maximum pipe depth, and 120 lots served by a 100 gpm pump station.
2) Manufacturers' quotes and bid tabulations provided costs for precast manholes, pipe material, and the $1/ft line testing cost for low pressure air exfiltration.
3) Includes a $500 permitting fee, electrical, installation, and 10% for mobilization.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-2

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GRAVITY SEWER UNIT COST CURVE

transmission components is directly related to the amount of wastewater that is entering the wet well. The range of capacities of the pump stations are from 100 gallons per minute to 1,000 gallons per minute.

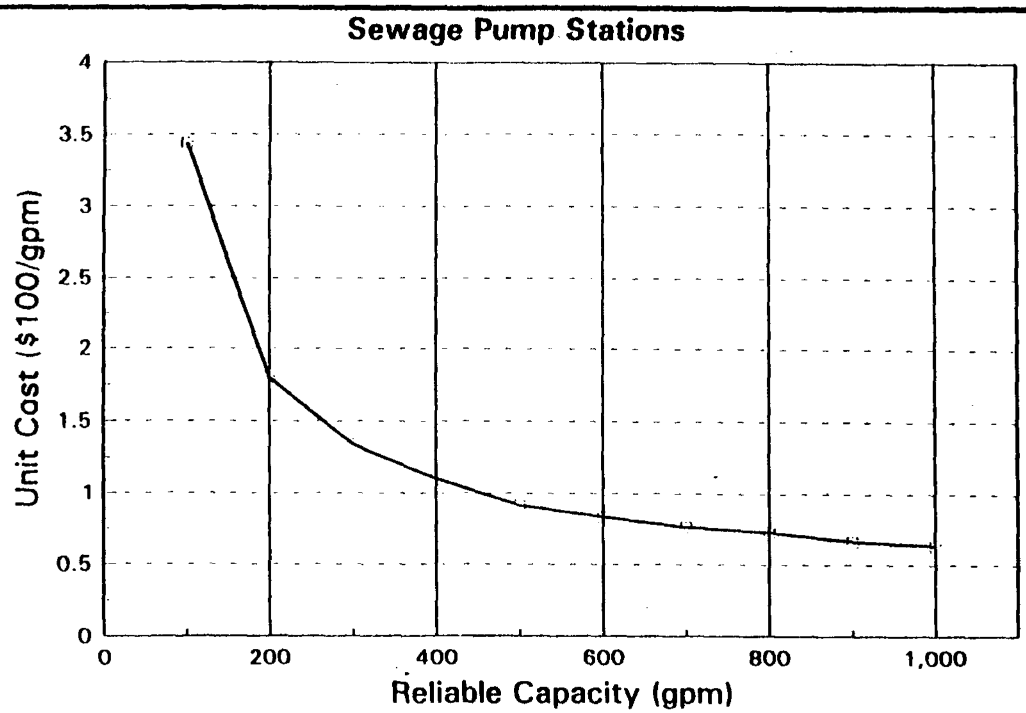
The unit cost curve, Figure 6-3, was produced by dividing the total cost of a submersible pump station by the capacity of the main pump and plotting this value, versus the capacity of the pump, in gallons per minute. This curve shows an increasing economy of scale between 100 gpm and 400 gpm. The inflection point lies around 400 gpm, and from 400 gpm to 1,000 gpm the economy of scale is slightly decreasing. Due to the unit cost relationship, the design of a pump station under 400 gpm should be avoided, if there are any possibilities for further expansion. After 400 gpm, there is still an economy of scale; however, it is not as significant. To show that there is still considerable savings after 400 gpm, we must study the construction cost curve, Figure 6-4. The cost of a 1,000 gpm duplex pump station is approximately $63,000, and the cost of a 500 gpm pump station is $46,000. Therefore, there is a $29,000 savings to build the 1,000 gpm pump station when compared to two (2) 500 gpm pump stations.

The unit cost and construction cost curves were produced using the quotations obtained from manufacturers. The cost includes two (2) equivalent submersible pumps, the precast wet well, precast valve box, piping, fittings, 20% for electrical, and installation, which includes excavating, backfilling, and dewatering. The pumps were designed to run on a 6-minute cycle time, which minimized wet well sizing.

6.3 FORCE MAINS

In the transmission of wastewater, force mains are used to convey wastewater from a sewage pump station directly to the treatment plant, another pump station, or a manhole. The force main materials that were studied in this project were the PVC (C900-DR25) and the Class 50 DIP with epoxy coating. These pipes are presented on unit cost curves as illustrated in Figure 6-5 and Figure 6-6.

The PVC force main unit cost curve, Figure 6-5, was produced for pipe sizes between 4-inches and 12-inches in diameter. The unit cost of the pipe is in dollars per linear foot and this is based on different lengths of pipe. In other words, there are three (3) different total lengths of pipe: 25,000 feet (large project), 2,500 feet (medium project) and 250 feet (small project). For these different lengths, manufacturers quoted the actual material prices per foot that would apply to



Notes: 1) Pump station design was based on a 6 minute cycle time, a peak factor of 3 to 4 respective of average flow, and a 3 ft high effective volume.
2) Costs include two (2) equal size pumps, precast wetwell, precast valve box, installation (excavating, backfilling, dewatering), piping, fittings, and 20% electrical.
3) Wet well sizes: 100-400 gpm => 6' diam., 500-600 gpm => 8' diam., 700-900 gpm => 10' diam., 1000 gpm => 12' diam.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-3

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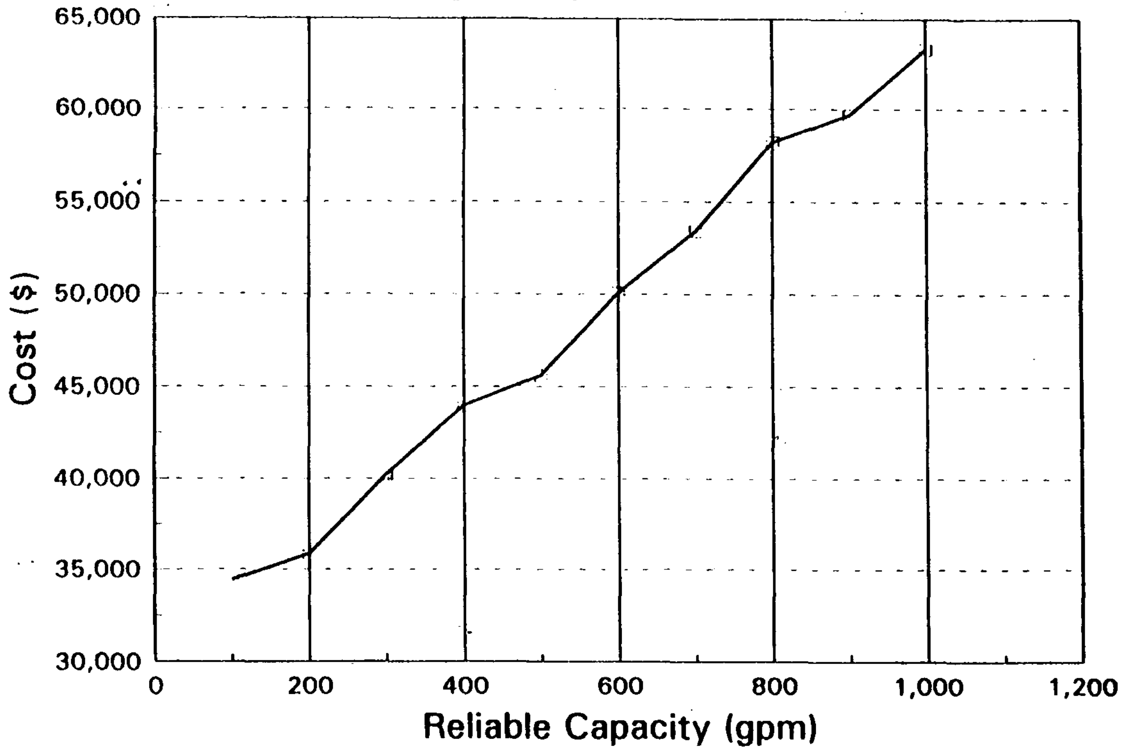
SEWAGE PUMP STATION UNIT COST CURVE

Sewage Pump Stations



Notes:
1) Pump station design was based on a 6 minute cycle time, peak factor of 3 to 4 respective of average flow, and a 3 ft high effective volume.
2) Costs include two (2) equal size pumps, precast wetwell, precast valve box, installation (excavating, backfilling, dewatering), piping, fittings, and 20% electrical.
3) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-4	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	SEWAGE PUMP STATION CONSTRUCTION COST CURVE

EXHIBIT ____ (SCH-4)
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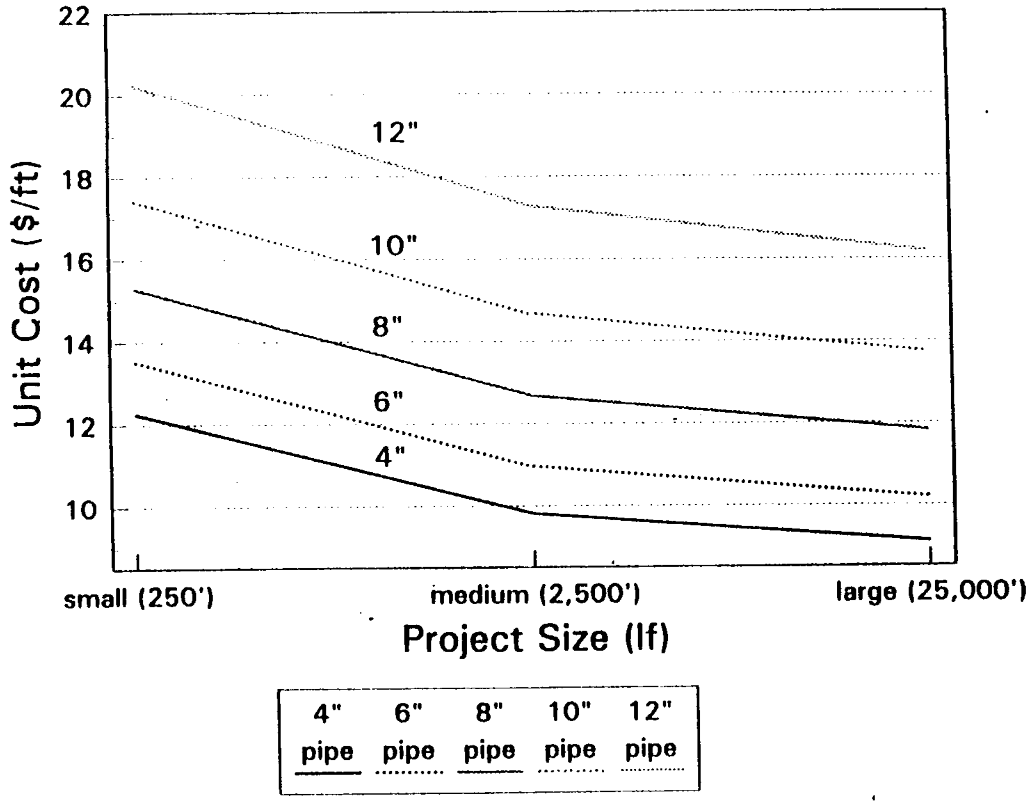
PVC (C900 - DR25) Force Main



Notes:
1) Material cost obtained from manufacturers' quotes.
2) Costs include $500 permitting, 10%-15% mobilization, $.25-$.75/ft for pressure testing, and $7/ft for excavating, backfilling, and compacting.
3) Costs exclude valves, fittings, and restoration work.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-5	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 East Pine Street - Suite 1000 - Orlando, FL 32801	PVC FORCE MAIN UNIT COST CURVE

EXHIBIT (5044-4)
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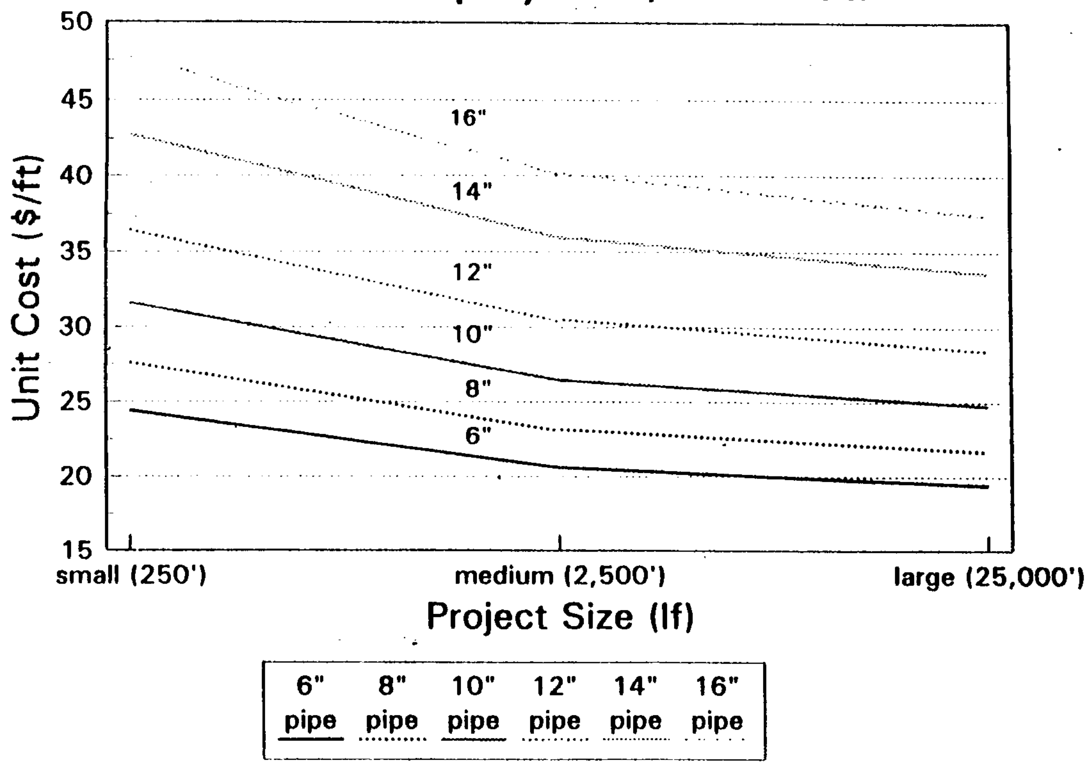
DIP (Class 50 - Epoxy Lined) Force Main



Notes:
1) Material cost obtained from manufacturers' quotes.
2) Costs include $500 permitting, 10%-15% mobilization, $.25-$.75/ft pressure testing, and $7/ft for excavating, backfilling, and compacting.
3) Costs exclude valves, fittings, and restoration work.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-6

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DIP FORCE MAIN UNIT COST CURVE

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each case. As the graph shows, it is apparent that the larger quantities of pipe receive the most economical unit costs for each of the pipe sizes that were examined.

The Class 50 DIP force main unit cost curve is very similar to the PVC force main unit cost curve. The DIP sizes range from 4-inches to 16-inches and the pipes are lined with an epoxy coating. The graph shows that on a dollar per linear foot basis, the DIP force main is the most economical when the project is of a large magnitude. This relationship is in agreement with the PVC force main unit costs. Therefore, regardless of the pipe material, one should consider the full design of a force main as a stronger option to the smaller separate installations.

Both the PVC and DIP unit cost curves are formed using values obtained from manufacturers' quotations. In order to present the costs as final installed costs, a permitting fee, mobilization, installation, and pressure testing values were added to the unit costs based on the size of the project.

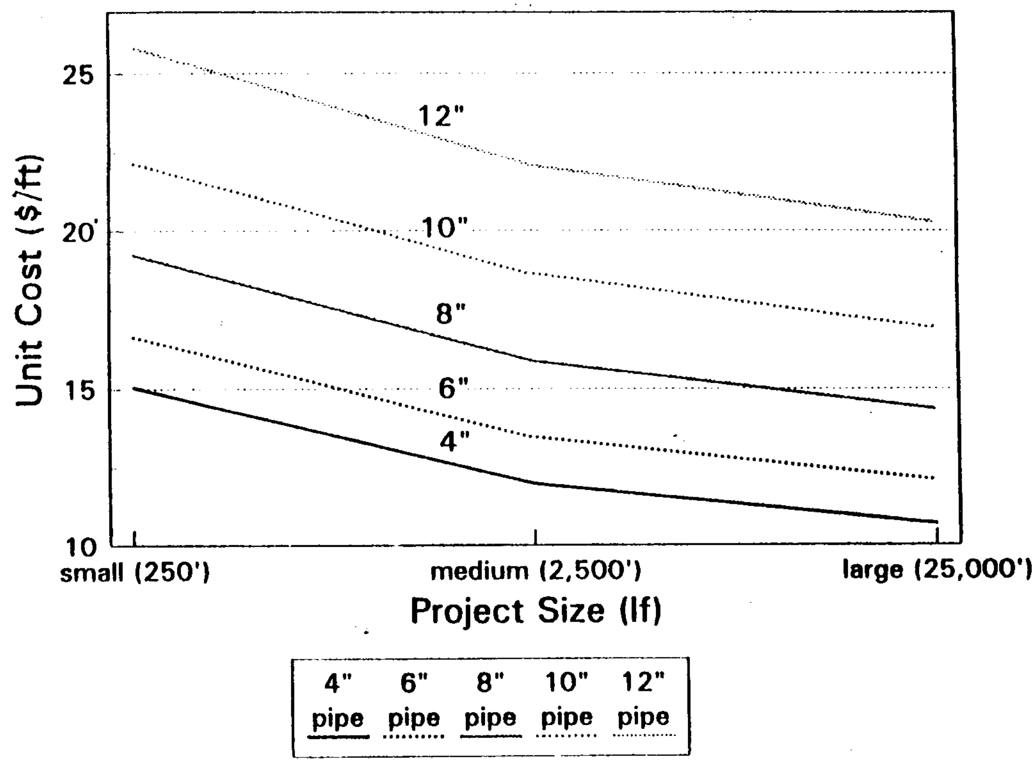
6.4 WATER MAINS

Typically, water mains will be made of either C900-DR18 PVC or Class 50 - cement lined DIP. In order to insure the safety and welfare of the customers, the water mains must be pressure tested and disinfected before they are put into use. For this study, PVC water mains from 4-inches to 12-inches in diameter and DIP water mains from 6-inches to 16-inches in diameter were studied to determine if an economy of scale existed.

The PVC C900-DR18 water main unit cost curve, Figure 6-7, shows the unit cost for three (3) different sized projects. The manufacturers were asked to give $/Ft prices for the pipe based on a small (250 ft), medium (2,500 ft), or large (25,000 ft) project. This footage represents the linear amount of certain diameter pipe to be installed in a certain project. As can be seen from the figure, the unit cost drops between $4/Ft and $5/Ft between the small and large projects for all the pipe sizes. Therefore, it is more economical to construct a single large scale project at one time than to construct many smaller projects.

In the other unit cost curve, Figure 6-8, the Class 50 - cement lined DIP also shows a significant economy of scale. For the DIP water main, the sizes ranged from 6-inches to 16-inches in diameter. For the 6-inch diameter water main, the unit cost dropped about $6.50/Ft between the small and large projects. For the 16-inch diameter water main, the unit cost declined by $12/Ft

PVC (C900 - DR18) Water Main



Notes:
1) Material cost obtained from manufacturers' quotes.
2) Costs include $500 permitting, 10%-15% mobilization, $1-$2/ft disinfection, $.25-$.75/ft for pressure testing, and $7/ft for excavating, backfilling, and compacting.
3) Costs exclude valves, fittings, and restoration work.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-7	HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants 201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801 TELEPHONE (407) 839-3955 - FAX (407) 839-3790	PVC WATER MAIN UNIT COST CURVE

EXHIBIT ____
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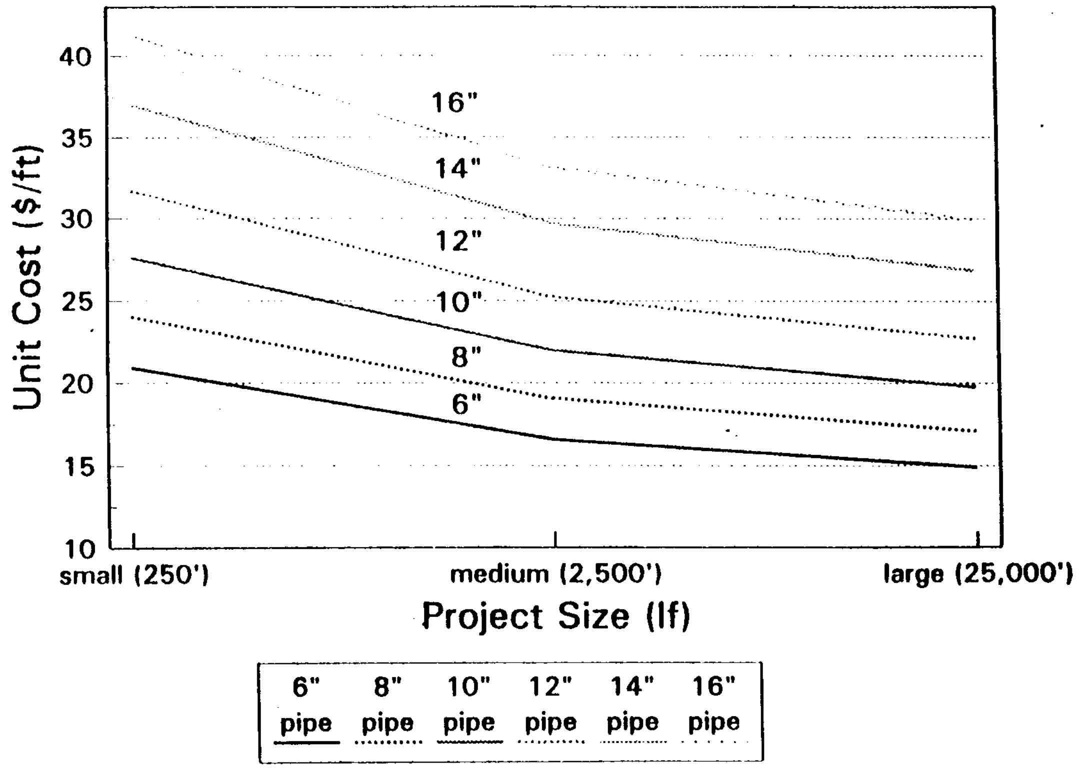
DIP (Class 50 - Cement Lined) Water Main



Notes:
1) Material cost obtained from manufacturer's quotes.
2) Costs include $500 permitting, 10%-15% mobilization, $1-$2/ft disinfection, $.25-$.75/ft for pressure testing, $7/ft for excavating, backfilling, and compacting.
3) Costs exclude valves, fittings, and restoration work.
4) Costs are based on June 1995, ENR Index = 5433.

FIGURE 6-8

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TELEPHONE (407) [illegible] - FAX (407) [illegible]

DIP WATER MAIN UNIT COST CURVE

between the small and large projects. Once again, the unit costs prove the existence of a strong economy of scale in the water mains. Therefore, to capture the economy of scale it is desirable to construct as much water main as possible.

The unit cost curves for the PVC and DIP water mains were constructed from values obtained from manufacturers' quotes. The unit cost includes the material cost, a $7/foot trenching cost, a permitting fee, mobilization, disinfection of water mains, and the pressure testing on the water mains.

APPENDIX A

Package Wastewater Treatment Plants
Unit Costs

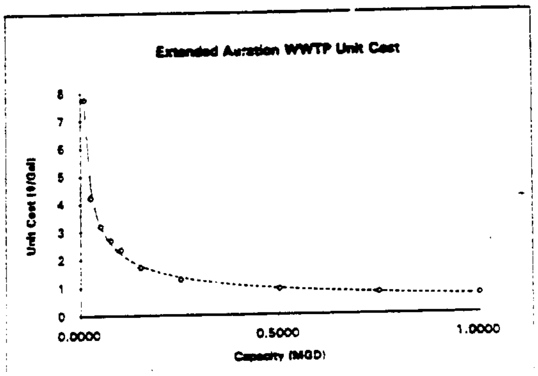
Capacity (MGD)	Davco Ext. Aer. ($)	Sanitaire Ext. Aer. ($)	Total Ext. Aeration Const. Cost ($)	Overall E.A. Cost w/ Chlor. ($)	Unit Cost ($/Gal)
0.01	50000	--	50000	77500	7.75
0.025	78000	--	78000	105500	4.22
0.05	135000	125495	130247.5	160248	3.205
0.075	185000	159630	172315	202315	2.6975
0.1	217000	184948	200974	235974	2.3597
0.15	210000	233535	221767.5	256768	1.7118
0.25	260000	309045	284522.5	319523	1.2781
0.5	375000	479368	427184	462184	0.9244
0.75	450000	622920	536460	571460	0.7619
1	533000	758860	645930	680930	0.6809

Notes: 1) Values include materials, electrical, piping, installation, blowers, grading, chlorination feed sys., and conc. slab; but exclude land, engineering, fencing, paving, drainage, lighting, and building facilities.
All costs obtained from manufacturer's quotes and EPA cost curves.
Costs are based on June 1995, ENR Index = 5433.

CURVE FORMULA (For any capacity on the curve)

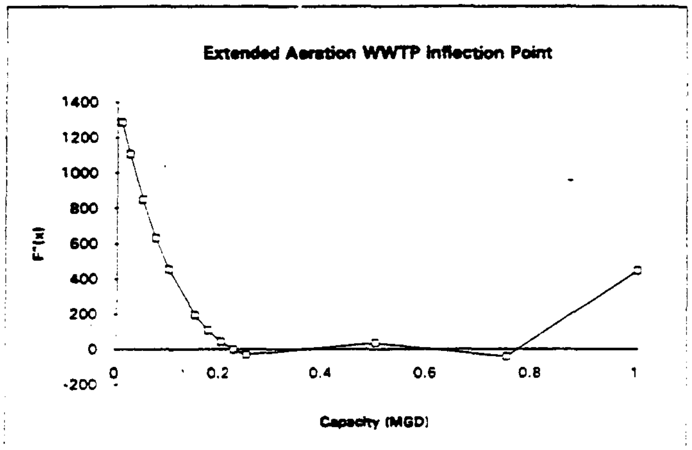
Y = (0.6521692)*X^(-0.5290282) **** See Example Below

Capacity (MGD)	Unit Cost ($/Gal)	Manuf. Unit Cost ($/Gal)
0.0100	7.45447	7.75
0.0250	4.59087	4.22
0.0400	3.58022	
0.0500	3.18157	3.20496
0.0650	2.76925	
0.0750	2.56735	2.69753
0.0900	2.33129	
0.1000	2.2049	2.35974
0.1150	2.04775	
0.1300	1.91915	
0.1500	1.77923	1.71179
0.1650	1.69174	
0.1800	1.61563	
0.1950	1.54865	
0.2100	1.48911	
0.2250	1.43573	
0.2400	1.38754	
0.2500	1.3579	1.27809
0.2650	1.31668	
0.2800	1.27888	
0.2950	1.24405	
0.3100	1.21184	
0.3250	1.18192	
0.3400	1.15404	
0.3550	1.12798	
0.3700	1.10355	
0.3850	1.0806	
0.4000	1.05897	
0.4150	1.03854	
0.4300	1.01922	
0.4450	1.00089	
0.4600	0.98349	
0.4750	0.96694	
0.4900	0.95116	
0.5000	0.94105	0.92437
0.5150	0.92645	
0.5300	0.91249	
0.5450	0.89911	
0.5600	0.88629	
0.5750	0.87398	
0.5900	0.86216	
0.6050	0.85078	
0.6200	0.83983	
0.6350	0.82927	
0.6500	0.8191	
0.6650	0.80927	
0.6800	0.79977	
0.6950	0.7906	
0.7100	0.78172	
0.7250	0.77312	
0.7400	0.76479	
0.7500	0.75938	0.76195
0.7650	0.75146	
0.7800	0.74378	
0.7950	0.73632	
0.8100	0.72908	
0.8250	0.72204	
0.8400	0.71519	
0.8550	0.70852	
0.8700	0.70203	
0.8850	0.69571	
0.9000	0.68955	
0.9150	0.68355	
0.9300	0.67769	
0.9450	0.67198	
0.9600	0.66641	
0.9750	0.66096	
1	0.65217	0.68093



EXTENDED AERATION WWTP INFLECTION POINT

Capacity (MGD)	F"(x)
0.01	1286.7
0.025	1107.93
0.05	847.924
0.075	631.193
0.1	453.15
0.15	195.964
0.175	108.824
0.2	44.38
0.225	-0.7796
0.25	-29.831
0.5	34.7526
0.75	-39.895
1	445.206



EXTENDED AERATION, MECHANICAL AND DIFFUSED AERATION — FACT SHEET 2.1.10

Description - Extended aeration is the "low rate" modification of the activated sludge process. The F/M loading is in the range of 0.05 to 0.15 lb BOD_5/d/lb MLVSS, and the detention time is about 24 hours. Primary clarification is rarely used. The extended aeration system operates in the endogenous respiration phase of the bacterial growth cycle, because of the low BOD_5 loading. The organisms are starved and forced to undergo partial auto-oxidation. Volatile compounds are driven off to a certain extent in the aeration process. Metals will also be partially removed, with accumulation in the sludge.

In the complete mix version of the extended aeration process, all portions of the aeration basin are essentially homogeneous, resulting in a uniform oxygen demand throughout the aeration tank. This condition can be accomplished fairly simply in a symmetrical (square or circular) basin with a single mechanical aerator or by diffused aeration. The raw wastewater and return sludge enter at a point (e.g., under a mechanical aerator) where they are quickly dispersed throughout the basin. In rectangular basins with mechanical aerators or diffused air, the incoming waste and return sludge are distributed along one side of the basin and the mixed liquor is withdrawn from the opposite side.

Common Modifications - Step aeration, contact stabilization, and plug flow regimes. Alum or ferric chloride is sometimes added to the aeration tank for phosphorus removal.

Technology Status - Extended aeration plants have evolved since the latter part of the 1940's. Pre-engineered, package plants have been widely utilized for this process.

Typical Equipment/No. of Mfrs. - Aerators/30; package treatment plants/21; air diffusers/19; compressors/44.

Applications - Commonly flows of less than 50,000 gal/d; emergency or temporary treatment needs; and biodegradable wastewater.

Limitations - High power costs, operation costs, and capital costs (for large permanent installations where the pre-engineered plants would not be appropriate).

Performance

BOD_5 Removal	85-95%
NH_4 - N Removed (Nitrification)	50-90%

Residuals Generated - Because of the low F/M loadings and long hydraulic detention times employed, excess sludge production for the extended aeration process (and the closely related oxidation ditch process) is the lowest of any of the activated sludge process alternatives, generally in the range of 0.15 to 0.3 lb excess total suspended solids/lb BOD_5 removed.

Design Criteria (39) - A partial listing of design criteria for the extended aeration modification of the activated sludge process is summarized as follows:

Volumetric loading, lb BOD_5/d/1,000 ft^3	5 to 10
MLSS, mg/l	3,000 to 6,000
F/M, lb BOD_5/d/lb MLVSS	0.05 to 0.15
Aeration detention time, hours (based on average daily flow)	18 to 36
Standard ft^3 air/lb BOD_5 applied	3,000 to 4,000
lb O_2/lb BOD_5 applied	2.0 to 2.5 (based on 1.5 lb O_2/lb BOD_5 removed + 4.6 lb O_2/lb NH_4-N removed)
Sludge retention time, days	20 to 40
Recycle ratio (R)	0.75 to 1.5
Volatile fraction of MLSS	0.6 to 0.7

Process Reliability - Good

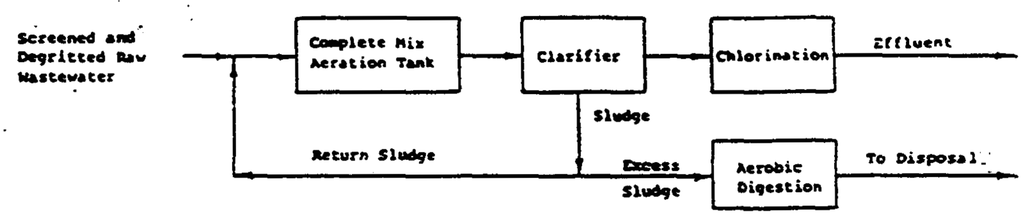
Environmental Impact - See Fact Sheet 2.1.1

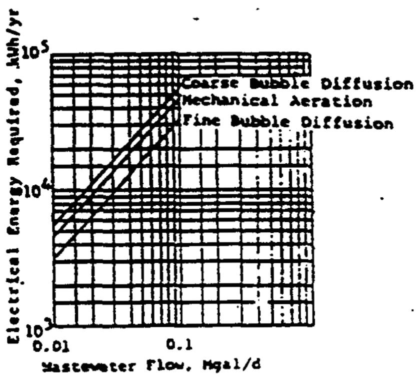
References - 23, 26, 31, 39

EXTENDED AERATION, MECHANICAL AND DIFFUSED AERATION

FACT SHEET 2.1.10

FLOW DIAGRAM -





ENERGY NOTES - Assumptions: The hydraulic head loss through the aeration tank is negligible. Sludge recycle and sludge wasting pumping energy are included.

Water Quality:	Influent (mg/l)	Effluent (mg/l)
BOD_5	210	20
Suspended Solids	230	20
NH_4-N	20	1

Oxygen Transfer Rate (wire to water) in wastewater for:
- Mechanical Aeration = 1.8 lb O_2/hph
- Diffused Aeration
  - Coarse Bubble Diffusion - 1.5 lb O_2/hph
  - Fine Bubble Diffusion = 2.5 lb O_2/hph

Oxygen Requirement:
- 1.5 lb O_2/lb BOD_5 removed plus 4.6 lb O_2/lb of NH_4-N removed

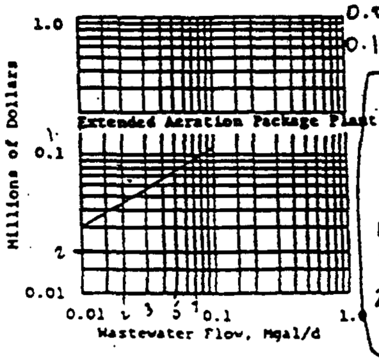
COSTS* - Assumptions: Construction cost includes comminutor, aeration basin, clarifier, chlorine contact chamber, aerobic digester, chlorine feed facility, building, fencing for extended aeration package plants between 0.01 and 0.1 Mgal/d. Detention time: 24 hours (based on average daily flow). ENR Index = 2475

Annual power costs based on coarse bubble diffuser.

update ratio = 5433 / 2475

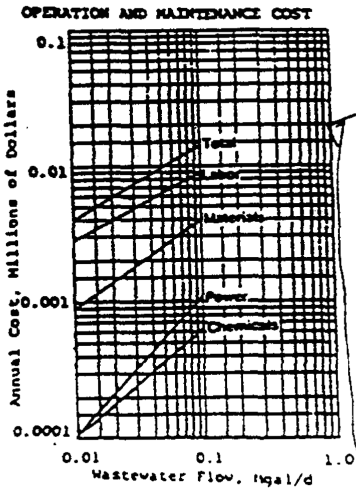
#'s	Cost
0.01	30,000
0.03	56,000
0.05	75,000
0.07	91,000
0.1	115,000

CONSTRUCTION COST



updated cost
65,855
122,928
164,636
199,759
252,442

OPERATION AND MAINTENANCE COST



unit cost
6.59
4.10
3.29
2.85
2.52

REFERENCES - 3, 4

*To convert construction cost to capital cost see Table A-2.

MOSS
KELLEY
INCORPORATED

FACSIMILE TRANSMISSION

IF TRANSMISSION WAS NOT PROPERLY RECEIVED, CALL (305) 755-2092

DATE: 7-6-95
FROM: J Kelley FAX NUMBER: (305 341-9370
TO: Jamie Walsh FAX NUMBER:
COMPANY: Hartman NUMBER OF PAGES: 2
REFERENCE: Package Plant Budget Pricing

I hope the attached is sufficient.
Sanitaire doesn't make the smaller plants.
Please call if you have any questions.

J Kelley

10100 W. SAMPLE RD., SUITE 408, CORAL SPRINGS, FL 33065 (305) 755-2092 FAX (305) 341-9370
2180 WEST S.R. 434, SUITE 1178, LONGWOOD, FL 32779 (407) 774-7200 FAX (407) 774-7209

SANITAIRE
[illegible] Ring Steel List Costs

	Extended Aeration		Contact Stabilization	
Capacity (gpd)	List Price ($)	Turn Key Install.	List Price ($)	Turn Key Install.
10,000	∅		∅	
25,000	∅		∅	
50,000	$82,000	$110,000	$75,000	$100,000
75,000	$100,000	$135,000	$81,000	$109,000
100,000	$115,000	$155,000	$96,000	$130,000
150,000	$142,000	$192,000	$109,000	$148,000
200,000	$185,000	$246,000	$148,000	$200,000
500,000	$268,000	$360,000	$215,000	$290,000
750,000	$325,000	$440,000	$260,000	$350,000
1,000,000	$385,000	$520,000	$308,000	$415,000

Blowers, concrete slab not included.

"SERVING THE WATER INDUSTRY SINCE 1926"

DAVCO

MEETING THE GROWING DEMAND FOR CLEAN WATER

1828 Metcalf Ave.
Thomasville, Georgia 31792
Phone 912-226-6733
Telefax No.
912-228-0312

FACSIMILE TRANSMITTAL SHEET

From: Tommy Tyson
Phone 941-646-7694
Fax. 941-644-6319

To: HAI - Jamie Wallace Re: Budget Estimates

Fax. number: 407-839-3790 Date: 7-2-95

Total number of pages including this page is: 2

REMARKS:

Budget estimates are for "DAVCO Standard" equipment delivered to central Florida. Davco std. is Aluminum grating and aluminum handrails. Also depending on size, duplex or triplex rotary positive blowers and controls are included. I have not included any accessories such as comminutor, flowmeter or telemetry equipment (or CL2 feed eq).
Turn key price includes slabs, grout for clarifier (if applicable) and installation and finish coating of equipment (if applicable). As we discussed these prices are for "conventional" single train, single clarifier units and will not meet FDEP Class I, II or III Regulations. Mainly on clarifier requirements (multiple units).
Filter prices include media. Coarse bubble diffusers for plants was utilized. Chain + sprocket drive w/shear pin overload protection.
* Making changes such as: Aluminum weir launders or stainless steel air headers and drop pipes, direct drive clarifier drive and so forth can add significantly to the prices I have given - Please Adjust accordingly.

FACTORY Built and Budget
Davco Ring Steel ~~List~~ Costs

Capacity (gpd)	Extended Aeration: Budget Price ($)	Extended Aeration: Turn Key Install.	Contact Stabilization: Budget Price ($)	Contact Stabilization: Turn Key Install.
10,000	36000	14000	N/A	N/A
25,000	60000	18000	N/A	N/A
50,000	110000	25000	65000	18000
75,000	150000	35000	100000	22000
100,000	175000	42000	125000	27000
150,000	140000	70000	120000	60000
250,000	175000	85000	155000	75000
500,000	250000	125000	215000	105000
750,000	300000	150000	250000	125000
1,000,000	358000	175000	280000	140000

FILTERS (NO INSTALLATION COSTS INCLUDED)

ES FILTER

0 to .05 MGD : 28000
> .05 ≤ .10 MGD : 40000
> .10 ≤ .15 MGD : 50000

AVELING
RIDGE FILTER

.25 MGD : 55000 or 2 @ .2 MGD : 107000
.50 MGD : 70000 or 2 @ .375 MGD : 135000
.75 MGD : 85000 or 2 @ .56 MGD : 145000
1.0 MGD : 98000 or 2 @ .75 MGD : 170000

APPENDIX B

Package Wastewater Treatment Plants
Unit Costs

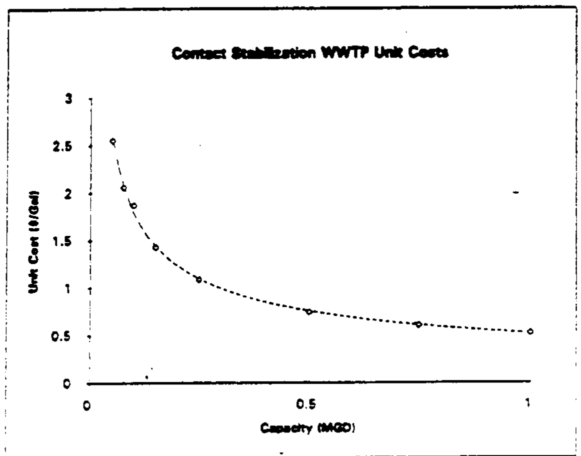
Capacity (MGD)	Davco Con. Stab. ($)	Sanitaire Con. Stab. ($)	Total Con. Stab. Const. Cost ($)	Overall Con. Stab. w/ Chlor. ($)	Unit Cost ($/Mgd)
0.010	--	--	--	--	
0.025	--	--	--	--	
0.050	83,000	112,350	97,675	127,675	2.5535
0.075	122,000	127,225	124,613	154,613	2.0615
0.100	152,000	152,321	152,161	187,161	1.8716
0.150	180,000	177,950	178,975	213,975	1.4265
0.250	230,000	244,320	237,160	272,160	1.0886
0.500	320,000	356,540	338,270	373,270	0.7465
0.750	375,000	466,160	420,580	455,580	0.6074
1.000	420,000	560,430	490,215	525,215	0.5252

Notes: 1) Values include materials, electrical, piping, installation, blowers, grading, chlorination feed sys., and conc. slab; but exclude land, engineering, fencing, paving, drainage, lighting, and building facilities.
All costs obtained from manufacturer's quotes and EPA cost curves.
Costs based on June 1995, ENR Index = 5433.

CURVE FORMULA (For any capacity on the curve)

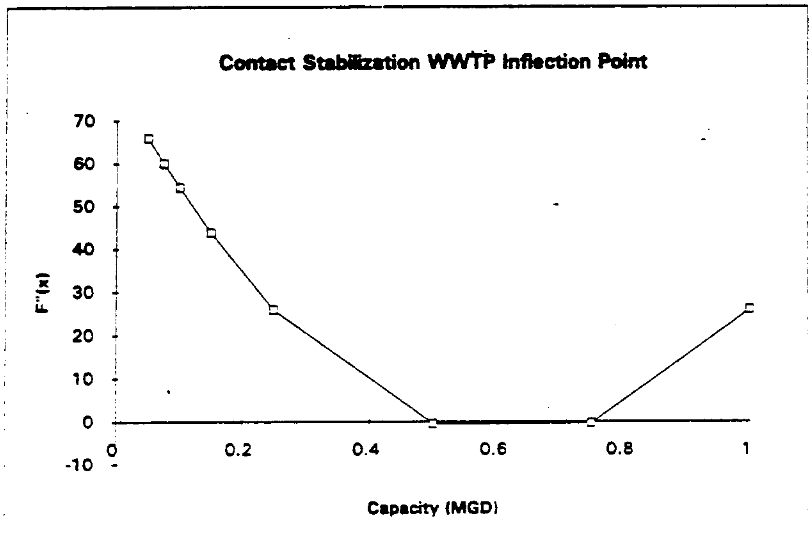
Y = (0.5249354)*X^(-0.5321867)

Capacity (MGD)	Cost ($)	Manuf. Cost ($)
0.05	2.58522	2.554
0.065	2.24832	
0.075	2.08345	2.062
0.09	1.89079	
0.1	1.78769	1.872
0.115	1.65955	
0.13	1.55472	
0.15	1.44072	1.427
0.165	1.36946	
0.18	1.30749	
0.195	1.25297	
0.21	1.20451	
0.225	1.16109	
0.24	1.12189	
0.25	1.09778	1.089
0.265	1.06426	
0.28	1.03353	
0.295	1.00522	
0.31	0.97903	
0.325	0.95472	
0.34	0.93207	
0.355	0.9109	
0.37	0.89105	
0.385	0.87241	
0.4	0.85484	
0.415	0.83825	
0.43	0.82256	
0.445	0.80769	
0.46	0.79356	
0.475	0.78013	
0.49	0.76733	
0.5	0.75912	0.747
0.515	0.74727	
0.53	0.73594	
0.545	0.72509	
0.56	0.71469	
0.575	0.70471	
0.59	0.69511	
0.605	0.68589	
0.62	0.67701	
0.635	0.66845	
0.65	0.66019	
0.665	0.65223	
0.68	0.64453	
0.695	0.63709	
0.71	0.62989	
0.725	0.62292	
0.74	0.61617	
0.75	0.61178	0.607
0.765	0.60537	
0.78	0.59914	
0.795	0.5931	
0.81	0.58723	
0.825	0.58152	
0.84	0.57597	
0.855	0.57057	
0.87	0.56532	
0.885	0.5602	
0.9	0.55521	
0.915	0.55035	
0.93	0.54561	
0.945	0.54098	
0.96	0.53646	
0.975	0.53206	
1	0.52494	0.525



CONTACT STABILIZATION WWTP INFLECTION POINT

Capacity (GPD)	F"(x)
0.05	65.9752
0.075	60.0467
0.1	54.3818
0.15	43.8428
0.25	25.9278
0.5	-0.4082
0.75	-0.3852
1	25.997



CONTACT STABILIZATION, DIFFUSED AERATION — FACT SHEET 2.1.8

Description - Contact stabilization is a modification of the activated sludge process (described more completely in Fact Sheet 2.1.1). In this modification, the adsorptive capacity of the floc is utilized in the contact tank to adsorb suspended, colloidal, and some dissolved organics. The hydraulic detention time in the contact tank is only 30 to 60 minutes (based on average daily flow). After the biological sludge is separated from the wastewater in the secondary clarifier, the concentrated sludge is separately aerated in the stabilization tank with a detention time of 2 to 6 hours (based on sludge recycle flow). The adsorbed organics undergo oxidation in the stabilization tank and are synthesized into microbial cells. If the detention time is long enough in the stabilization tank, endogenous respiration will occur, along with a concomitant decrease in excess biological sludge production. Following stabilization, the reaerated sludge is mixed with incoming wastewater in the contact tank and the cycle starts anew. Volatile compounds are driven off to a certain extent by aeration in the contact and stabilization tanks. Metals will also be partially removed, with accumulation in the sludge.

This process requires smaller total aeration volume than the conventional activated sludge process. It also can handle greater organic shock and toxic loadings because of the biological buffering capacity of the stabilization tank and the fact that at any given time the majority of the activated sludge is isolated from the main stream of the plant flow. Generally, the total aeration basin volume (contact plus stabilization basins) is only 50 - 75 percent of that required in the conventional activated sludge system. A description of diffused aeration techniques is presented in Fact Sheet 2.1.1.

Common Modifications - Used in a package treatment plant with clarification and chlorination facilities in one vessel. Other modifications include raw wastewater feed to aeration tank; flow equalization; integral aerobic digester.

Technology Status - Contact stabilization has evolved as an outgrowth of activated sludge technology since 1950 and seen common usage in package plants and some usage for on-site constructed plants.

Typical Equipment/No. of Mfrs. - Air diffusers/19; compressors/44; package treatment plants/21.

Applications - Wastewaters that have an appreciable amount of BOD_5 in the form of suspended and colloidal solids; upgrading of an existing, hydraulically overloaded conventional activated sludge plant; new installations, to take advantage of low aeration volume requirements; where the plant might be subject to shock organic or toxic loadings; where larger, more uniform flow conditions are anticipated (or if the flows to the plant have been equalized).

Limitations - It is unlikely that effluent standards can be met using contact stabilization in plants smaller than 50,000 gal/d without some prior flow equalization. Other limitations include operational complexity, high operating costs, high energy consumption and high diffuser maintenance. As the fraction of soluble BOD_5 in the influent wastewater increases, the required total aeration volume of the contact stabilization process approaches that of the conventional process.

Performance -

BOD_5 Removal	80 to 95 percent
NH_4-N Removal	10 to 20 percent

Residuals Generated - See Fact Sheet 2.1.1.

Design Criteria (39) - A partial listing of design criteria for the contact stabilization process is summarized as follows:

F/M, lb BOD_5/d/lb MLVSS	0.2 to 0.6
Volumetric loading, lb BOD_5/d/1,000 ft^3	30 to 50 (based on contact and stabilization volume)
MLSS, mg/l	1,000 to 2,500, contact tank; 4,000 to 10,000, stabilization tank
Aeration time, h	0.5 to 1.0, contact tank (based on average daily flow) 2 to 6, stabilization basin (based on sludge recycle flow)
Sludge retention time, days	5 to 10
Recycle ratio (R)	0.25 to 1.0
Std. ft^3 air/lb BOD_5 removed	800 to 2,100
lb O_2/lb BOD_5 removed	0.7 to 1.0
Volatile fraction of MLSS	0.6 to 0.8

Process Reliability - Requires close operator attention.

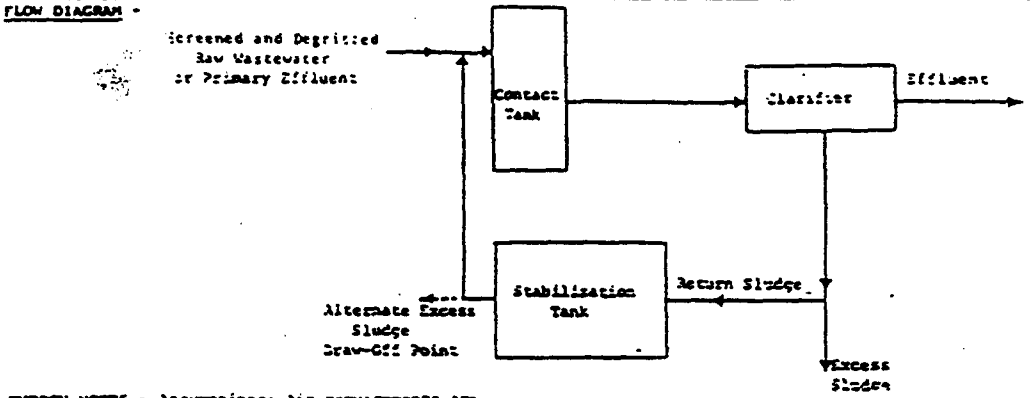
Environmental Impact - See Fact Sheet 2.1.1

References - 23, 26, 31, 39

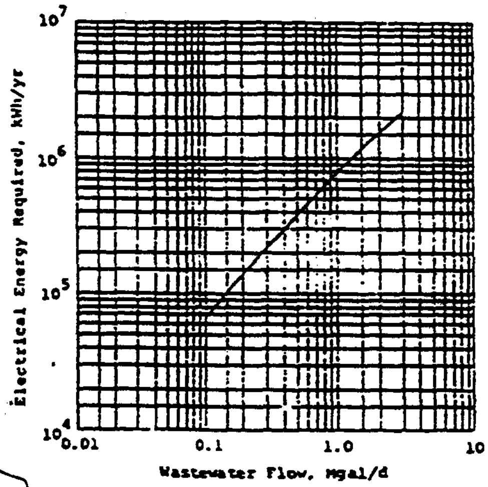
CONTACT STABILIZATION, DIFFUSED AERATION

FACT SHEET 2.1.8

FLOW DIAGRAM -



ENERGY NOTES - Assumptions: Air requirements are based on 2100 ft^3/lb BOD_5 removed (2 lb BOD_5/1000 gal/d). Positive displacement blowers with 100% standby are provided. Electricity = $.03/kWh. Includes energy requirements for entire package plant.



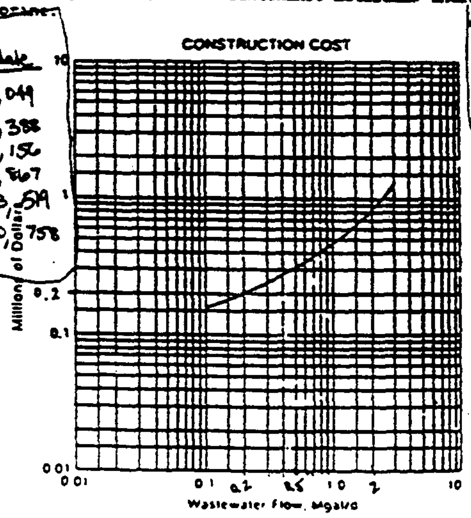
cost ratio = 5433 / 2401 =

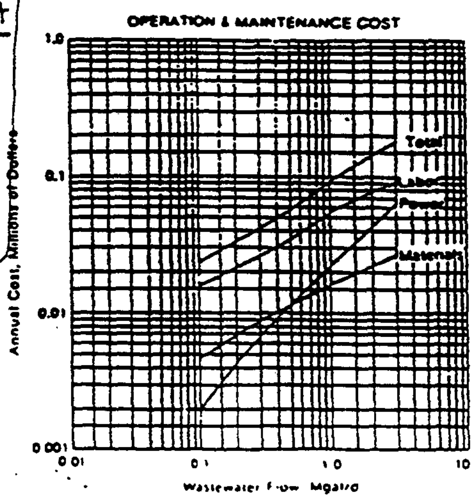
COSTS* - Assumptions: Costs are in 1976 dollars; ENR index = 2401.

1. Construction cost is for package plants and includes tankage and equipment in place for aeration chambers, chlorination equipment, clarification and sludge stabilization. Costs include concrete and yardwork, 15% contingency, electrical and instrumentation, and contractor's overhead and profit at 25% of equipment costs but exclude land, engineering, legal or financing during construction.

2. O&M costs are based on a labor rate of $9/h, including fringe benefits, with 7 d/wk staffing and electricity @ $.03/kWh. Maintenance materials include chlorine.

Size	Cost	update	unit cost
0.1	160,000	362,049	3.62
0.3	245,000	554,388	1.85
0.5	305,000	690,156	1.38
0.7	380,000	859,867	1.23
1.0	470,000	1,063,519	1.06
2.0	840,000	1,900,758	0.95





REFERENCE - 16

MOSS KELLEY INCORPORATED

FACSIMILE TRANSMISSION

IF TRANSMISSION WAS NOT PROPERLY RECEIVED, CALL (305) 755-2092

DATE: 7-6-95
FROM: J Kelley FAX NUMBER: (305 341-9370
TO: Jamie Walsh FAX NUMBER:
COMPANY: Hartman NUMBER OF PAGES: 2
REFERENCE: Package Plant Budget Pricing

I hope the attached is sufficient.
Sanitaire doesn't make the smaller plants.
Please call if you have any questions.

J Kelley

10100 W. SAMPLE RD., SUITE 408, CORAL SPRINGS, FL 33065 (305) 755-2092 FAX (305) 341-9370
(407) 774-7200 FAX (407) 774-7209

SANITAIRE

[illegible] Ring Steel List Costs

Capacity (gpd)	Extended Aeration List Price ($)	Extended Aeration Turn Key Install.	Contact Stabilization List Price ($)	Contact Stabilization Turn Key Install.
10,000	∅		∅	
25,000	∅		∅	
50,000	$82,000	$110,000	$75,000	$100,000
75,000	$100,000	$135,000	$81,000	$109,000
100,000	$115,000	$155,000	$96,000	$130,000
150,000	$142,000	$192,000	$109,000	$148,000
[illegible]0,000	$185,000	$24[illegible],000	$148,000	$200,000
[illegible]0,000	$268,000	$360,000	$215,000	$290,000
750,000	$325,000	$440,000	$260,000	$350,000
1,000,000	$385,000	$520,000	$308,000	$415,000

Blowers, concrete slab not included.

941 644 6319 P.01

"SERVING THE WATER INDUSTRY SINCE 19__"

DAVCO

MEETING THE GROWING DEMAND FOR CLEAN WATER

1828 Metcalf Ave.
Thomasville, Georgia 31792
Phone 912-226-5733
Telefax No.
912-228-0312

FACSIMILE TRANSMITTAL SHEET

From: Tommy Tyson
Phone 941-646-7694
Fax. 941-644-6319

To: HAI - Jamie Wallace Re: Budget Estimates

Fax. number: 407-839-3790 Date: 7-2-95

Total number of pages including this page is: 2

REMARKS:

Budget estimates are for "DAVCO standard" equipment delivered to central Florida. Davco std. is Aluminum grating and aluminum handrails. Also depending on size, duplex or triplex rotary positive blowers and controls are included. I have not included any accessories such as comminutor flowmeter or telemetry equipment (or CL2 feed eq).
Turn key price includes slabs, grout for clarifier (if applicable) and installation and finish coating of equipment (if applicable). As we discussed these prices are for "conventional" single train, single clarifier units and will not meet FDEP class I, II or III Regulations. Mainly on clarifier requirements (multiple units).
FILTER PRICES include media. Coarse bubble diffusers for plants was utilized. Chain + sprocket drive w/shear pin overload protection.

* Making changes such as: Aluminum weir launders or stainless steel Air headers and drop pipes, direct drive clarifier drive and so forth can add significantly to the prices I have given - Please adjust accordingly.

FACTORY Built and Davco Ring Steel ~~List~~ Budget Costs

	Extended Aeration		Contact Stabilization	
Capacity (gpd)	~~Budget~~ Price ($)	Turn Key Install.	~~Budget~~ Price ($)	Turn Key Install.
10,000	36000	14000	N/A	N/A
25,000	60000	18000	N/A	N/A
50,000	110000	25000	65000	18000
75,000	150000	35000	100000	22000
100,000	175000	42000	125000	27000
150,000	140000	70000	120000	60000
250,000	175000	85000	155000	75000
500,000	250000	125000	215000	105000
750,000	300000	150000	250000	125000
1,000,000	358000	175000	280000	140000

FILTERS (NO INSTALLATION COSTS INCLUDED)

TES FILTER

0 to .05 MGD : 28000
> .05 ≤ .10 MGD : 40000
> .10 ≤ .15 MGD : 50000

TRAVELING BRIDGE FILTER

.25 MGD : 55000 or 2 @ .2 MGD : 107000
.50 MGD : 70000 or 2 @ .375 MGD : 135000
.75 MGD : 85000 or 2 @ .56 MGD : 145000
1.0 MGD : 98000 or 2 @ .75 MGD : 170000

APPENDIX C

Sutorbilt
Positive Displacement Blowers
Construction Costs

Capacity @ 7 psig (scfm)	Motor Size (HP)	P.D. Blower Cost ($)	Blower Unit Cost ($/scfm)
50	5	2,450	49
100	5	2,625	26.25
250	15	3,950	15.8
500	25	5,625	11.25
750	40	9,600	12.8
1,000	50	10,000	10
1,250	60	13,850	11.08
1,500	75	16,225	10.81666667
1,750	75	17,675	10.1
2,000	100	21,000	10.5
2,500	125	25,000	10
3,000	150	32,500	10.83333333
3,500	200	40,000	11.42857143
4,000	200	48,000	12
4,500	200	52,000	11.55555556

NOTES:
1) All costs obtained from manufacturer's quotes.
2) Costs include blower, TEFC motor, steel base, silencers, relief valve, pressure gauge, and check valve.
3) Costs are based on June 1995, ENR Index = 5433.

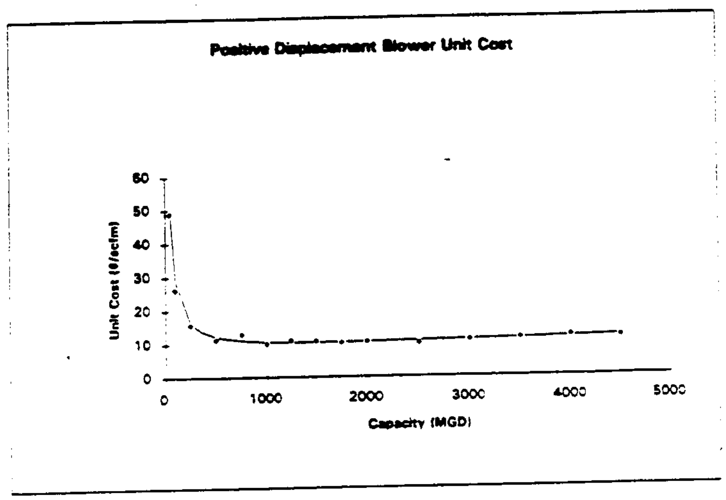
CURVE EQUATION:

$$Y = (2150.968) + (7.348993)X + (1.133403E\text{-}03)X^2 + (-5.4948E\text{-}08)X^3$$

*** For Unit costs, just divide the output by the blower capacity.

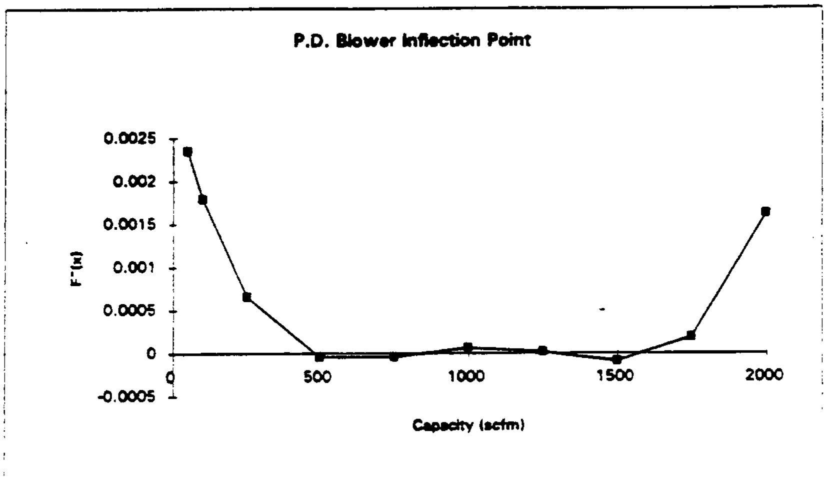
Capacity @ 7 psig (scfm)	P.D. Blower Cost ($)	Manuf. Blower Cost
50	50.42489	49
100	28.97146	26
250	16.23278	16
350	13.88458	
500	12.20389	11
600	11.5942	
750	11.03609	13
850	10.80324	
950	10.64031	
1000	10.57842	10
1100	10.48467	
1250	10.40066	11
1350	10.37225	
1500	10.35944	11
1600	10.36613	
1750	10.39329	10
1850	10.42041	
1950	10.45325	
2000	10.47149	11
2100	10.51109	
2200	10.55424	
2300	10.60035	
2400	10.6489	
2500	10.69946	10
2600	10.75169	
2700	10.80526	
2800	10.85993	
2900	10.91546	
3000	10.97166	10.83333
3100	11.02835	
3200	11.08539	
3300	11.14265	
3400	11.2	
3500	11.25735	11.42857
3600	11.31461	
3700	11.37169	
3800	11.42852	
3900	11.48504	
4000	11.54118	12
4100	11.5969	
4200	11.65214	
4300	11.70686	
4400	11.76103	
4500	11.8146	11.55556

Positive Displacement Blower Construction Cost Curve



POSITIVE DISPLACEMENT BLOWER INFLECTION POINT

Capacity (scfm)	F"(x)
50	0.00235
100	0.001796
250	0.000657
500	-4.4E-05
750	-4.2E-05
1000	6.29E-05
1250	1.64E-05
1500	-8.9E-05
1750	0.000184
2000	0.001623



Sutorbilt
Positive Displacement Blowers
Construction Costs

Capacity @ 7 psig (scfm)	Motor Size (HP)	P.D. Blower Complete Package Cost ($)
50	5	2,450
100	5	2,625
250	15	3,950
500	25	5,625
750	40	9,600
1,000	50	10,000
1,250	60	13,850
1,500	75	16,225
1,750	75	17,675
2.000	100	21,000
2,500	125	25,000
3,000	150	32,500
3,500	200	40,000
4,000	200	48,000
4,500	200	52,000

Hoffman
Centrifugal Blowers
Construction Costs

Capacity @ 7 psig (scfm)	Motor Size (HP)	Cent. Blower Cost ($)	Cent. Blower Unit Cost ($/scfm)
500	40	14,500	29
750	50	16,500	22
1,000	60	17,500	17.5
1,250	75	18,500	14.8
1,500	100	19,500	13
1,750	100	26,000	14.857143
2,000	100	26,000	13
2,500	125	27,000	10.8
3,000	150	32,000	10.666667
3,500	150	32,000	9.1428571
4,000	200	37,000	9.25
4,500	200	37,000	8.2222222

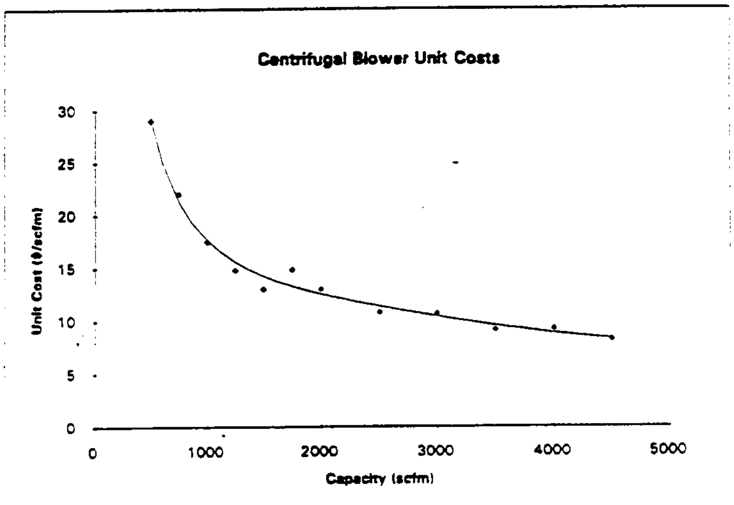
NOTES:
1) All costs obtained from manufacturer's quotes.
2) Costs include blower and TEFC motor.
3) Costs are based on June 1995, ENR Index = 5433.

CURVE EQUATION:

Y = (12737.73)+(1.53442)X+(4.666622E-03)X^2+(-1.435126E-06)X^3+(1.319283E-10)X^4

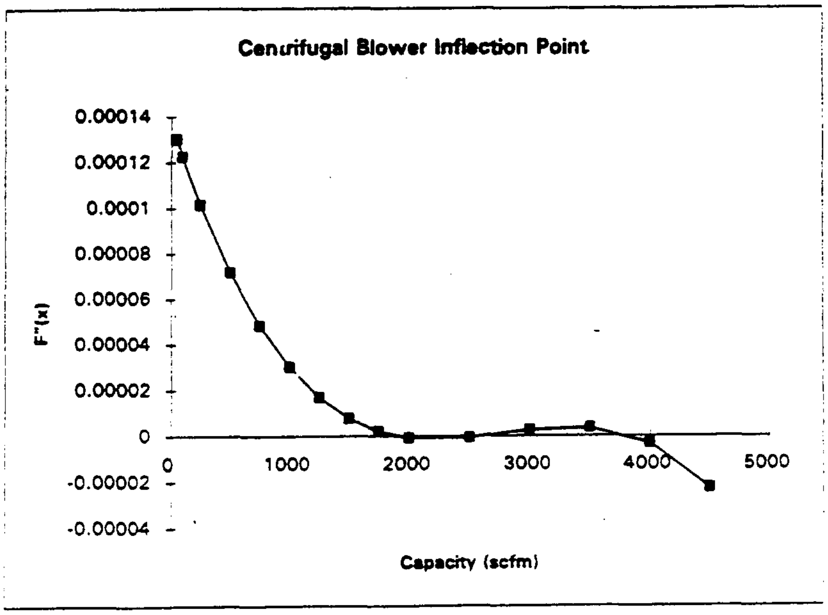
*** For Unit costs, just divide the output by the blower capacity.

Capacity @ 7 psig (scfm)	Cent. Blower Unit Cost ($/scfm))	Manuf. Blower Unit Cost
500	29.0009	29
600	25.07579	
750	21.26643	22
850	19.53076	
950	18.19376	
1000	17.63557	18
1100	16.68655	
1250	15.57317	15
1350	14.97879	
1500	14.2424	13
1600	13.82855	
1750	13.29169	15
1850	12.97653	
1950	12.68767	
2000	12.55145	13
2100	12.29279	
2200	12.04963	
2300	11.81915	
2400	11.59915	
2500	11.38791	11
2600	11.18408	
2700	10.98665	
2800	10.79485	
2900	10.60813	
3000	10.42613	10.66667
3100	10.24861	
3200	10.07549	
3300	9.906776	
3400	9.742579	
3500	9.583081	9.142857
3600	9.428531	
3700	9.27924	
3800	9.135568	
3900	8.997919	
4000	8.866736	9.25
4100	8.742496	
4200	8.625707	
4300	8.516901	
4400	8.416636	
4500	8.325491	8.222222



CENTRIFUGAL BLOWER INFLECTION POINT

Capacity (scfm)	F"(x)
50	0.00013
100	0.000123
250	0.000102
500	7.18E-05
750	4.82E-05
1000	3.01E-05
1250	1.69E-05
1500	7.77E-06
1750	2.13E-06
2000	-7E-07
2500	-6.4E-07
3000	2.58E-06
3500	3.59E-06
4000	-3E-06
4500	-2.3E-05



Hoffman
Centrifugal Blowers
Construction Costs

Capacity @ 7 psig (scfm)	Motor Size (HP)	Centrifugal Blower Complete Package Cost ($)
50	--	--
100	--	--
250	--	--
500	40	14,500
750	50	16,500
1,000	60	17,500
1,250	75	18,500
1,500	100	19,500
1,750	100	26,000
2,000	100	26,000
2,500	125	27,000
3,000	150	32,000
3,500	150	32,000
4,000	200	37,000
4,500	200	37,000

the JACOBS GROUP, inc.

160 SCARLET BOULEVARD • OLDSMAR, FLORIDA 34677 • (813) 854-5297 • FAX (813) 855-8821

FAX TRANSMITTAL SHEET

TO:	Jamey Wallace	FROM:	John Verscharen
COMPANY:	Hartman & Associates	DATE:	7-12-95
FAX NO.:	407-839-3790	PAGES (INCLUDING COVER):	4

SUBJECT: Blower Budget Estimates

MESSAGE: See rough blower budget estimates attached.

FORM 3/93

Hoffman Sutorbilt

Centrifugal & Positive Displacement Blower
List Cost

TEFC motor

Budget Price for Package as shown with | Budget Price for Filter Blower + Motor (TEFC only)

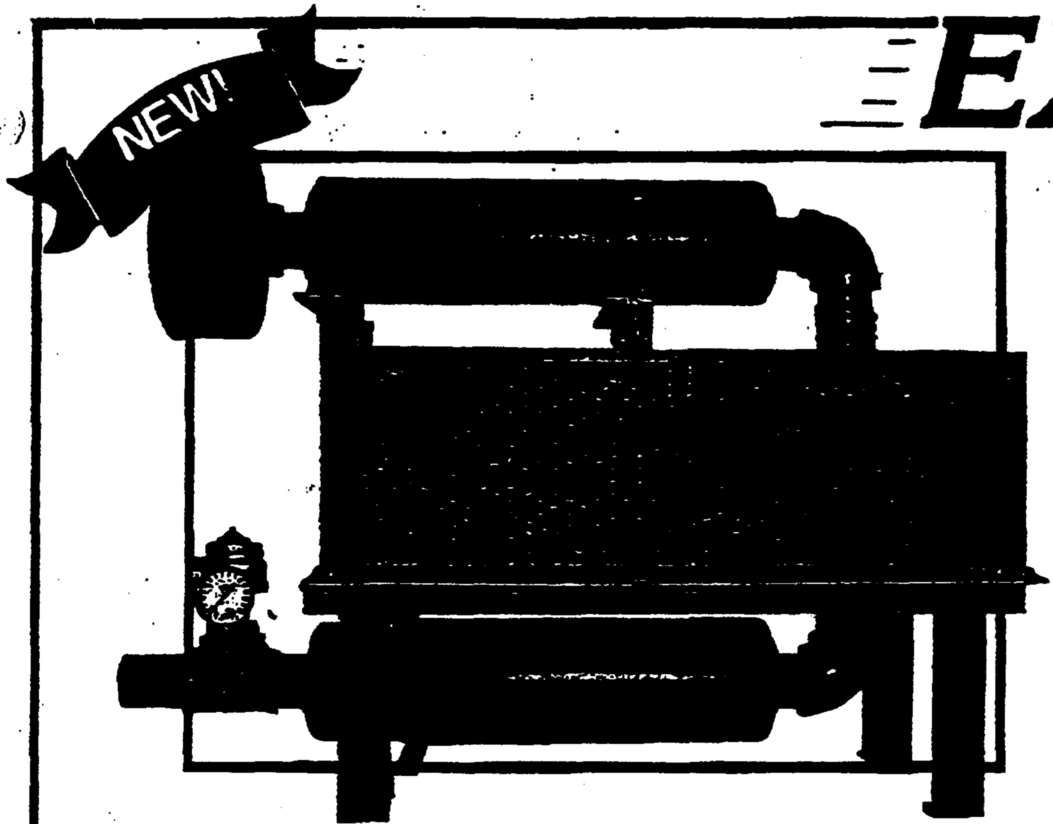
Capacity @ 7 psig (scfm)	Motor Size (HP)	Positive Displacement Complete Package Cost ($)		Centrifugal Complete Package Cost ($)
50	5	2450.00		N/A
100	5	2625.00		N/A
250	15	3950.00		N/A
500	25	5625.00	40	14,500.00
750	40	9600.00	50	16,500.00
1000	50	10,000.00	60	17,500.00
1250	60	13,850.00	75	18,500.00
1500	75	16,225.00	100	19,500.00
1750	75	17,675.00	100	26,000.00
2000	100	21,000.00	100	26,000.00
2500	125	25,000.00	125	27,000.00
3000	150	32,500.00	150	32,000.00
3500	200	40,000.00	150	32,000.00
4000	200	48,000.00	200	37,000.00
4500	200	52,000.00	200	37,000.00

Notes: (Any extra costs needed) 1) P.D.'s require B.V.'s
2) Centrifugal requires C.V.'s and B.V.'s

EXHIBIT (GCH-4)

PAGE 116 OF 284

EXP



Universal Blower Pac, Inc.

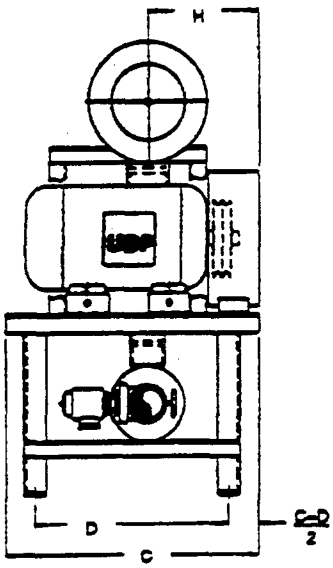
EXPRESS BLOWER PAC

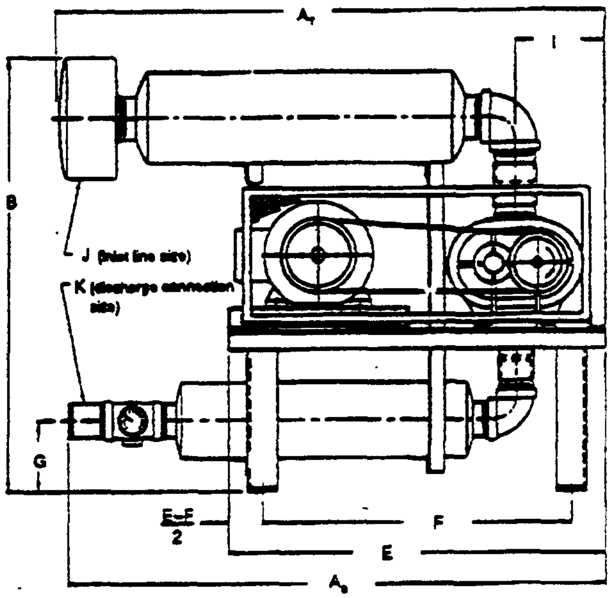
For more than a decade, you've counted on ***UNIVERSAL BLOWER PAC, INC.*** for quality and economy. With the ***EXP*** package, ***EXPRESS*** delivery is added to the same high standards without ***EXPRESS***-related charges. This standard, pre-engineered ***EXP*** unit has an ***EXPRESS*** delivery time of ten to twenty days with drawings available for ***EXPRESSING*** on the same day as purchase. ***EXP*** units feature ***EXPRESS*** installation since all parts are assembled as a complete package.

STANDARD *EXP* FEATURES

- Featuring Sutorbilt Blowers
- Heavy duty steel base
- Dual take-up motor rails
- High efficiency electric motor
- Premium absorptive & chamber/ absorptive silencers
- Dual silencer supports w/ holding straps
- V-belt drive 1.5 S.F.
- Tool gray machinery enamel paint
- Spring-loaded relief valve set at maximum blower pressure
- Pressure gauge w/ snubber & petcock protection
- Check valve w/ EPDM seal & stainless steel spring
- Rugged flex joints
- Inlet filter w/ weatherhood
- EZ access belt guard
- Completely assembled units

UNIVERSAL BLOWER PAC, INC. • 440 PARK 32 WEST DRIVE • NOBLESVILLE, IN 46060-9252 • 317-773-7256 • FAX 317-776-5086





BLOWER	A_T	A_B	B	C	D	E	F	G	H	I	J	K*	WEIGHT
2ML	**	33.5	35	24	17.5	40	33.5	10	10	8	1.5	1.25	300
2LL	**	46.5	34	24	17.5	40	33.5	8.5	10	8	2	2	300
3HL	**	39	60	24	17.5	40	33.5	8.5	10	8	2	1.5	400
3ML	**	46.5	62	24	17.5	40	33.5	8.5	10.5	8	2.5	2	400
3LL	**	56.5	73	24	17.5	40	33.5	8.5	12	8	3	2.5	450
4HL	**	47.5	64	34	26	50	41	9	14	9	2.5	2	550
4ML	**	57.5	75	34	26	50	41	10	14	9	3	2.5	650
4LL	**	61.5	82	34	26	50	41	8.5	15	9	3.5	3	750
5HL	**	59	76	34	26	50	41	10	14	10.5	3	2.5	900
5ML	**	62	84	34	26	50	41	8	15	10.5	3.5	3	1000
5LL	80	70.5	60	34	26	50	41	13.5	17	10.5	5	4	1200
6HL	**	64.5	87	34	26	50	41	9	14	12	3.5	3	1350
6ML	81	72	61	34	26	50	41	12	15	12	5	4	1600
6LL	75	65	85	38	28	60	48	13.5	19	15	6	6	1900
7HL	70	77	64	38	28	60	48	13	16	15	4	4	1650
7ML	75	85.5	82	38	28	60	48	17	18	15	6	5	2300
7LL	96	79	99	44	36.5	72	62.5	13.5	22	15	8	8	2900
8HL	84	75	70	44	36.5	72	62.5	14	20	15	5	4	2450
8ML	96	65	102	44	36.5	72	62.5	14.5	20	15	8	6	3400
8LL	97	79	110	44	36.5	72	62.5	17.5	22	15	10	8	4150

* 1"-5" are MPT, 6"-10" are 125/150 lb. ANSI flange.
** Inlet silencer is in vertical position.
All mounting holes are 5/8" diameter.
Dimensional tolerance to mounting holes is +/- 1/4".
Other dimensions are nominal, request certified drawing.

UNIVERSAL BLOWER PAC, INC.
440 PARK 32 WEST DRIVE
NOBLESVILLE, IN 46060-9252
Phone: 317/773-7256
Fax: 317/776-5086

EXHIBIT (GCH-
PAGE 118 OF 284

APPENDIX D

Davco
Wastewater Treatment Filters
Construction & Unit Costs

Capacity (GPD)	Type of Filter	Filter Cost ($)	Filter (1) Construction Cost ($)	Unit Cost ($/gal)
50,000	Gravity	29,000	46,400	0.928
100,000	Gravity	41,500	66,400	0.664
150,000	Gravity	54,000	86,400	0.576
250,000	Traveling Bridge	76,500	122,400	0.4896
500,000	Traveling Bridge	91,000	145,600	0.2912
750,000	Traveling Bridge	105,500	168,800	0.22506667
1,000,000	Traveling Bridge	119,000	190,400	0.1904

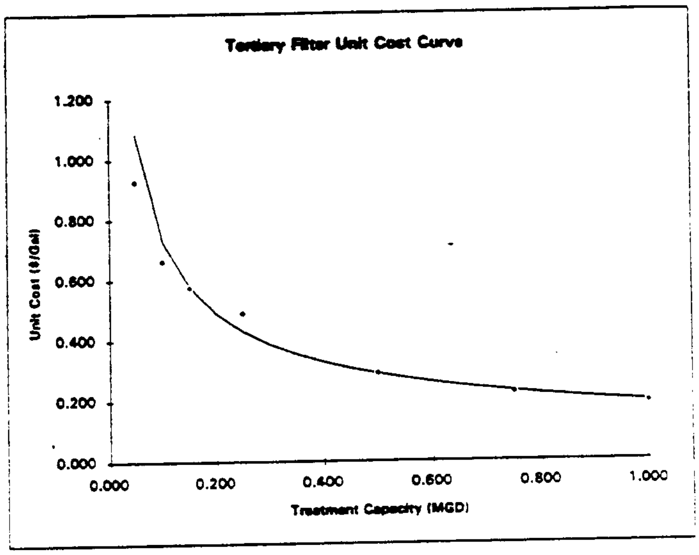
NOTES:

(1) Filter and media costs obtained from manufacturer's quotes.
(2) Costs include filter, media, 15% piping, 15% electrical, 5% sitework, 20% installation, and 5% for the concrete slab.
(3) Costs are based on June 1995, ENR Index = 5433.

CURVE EQUATION

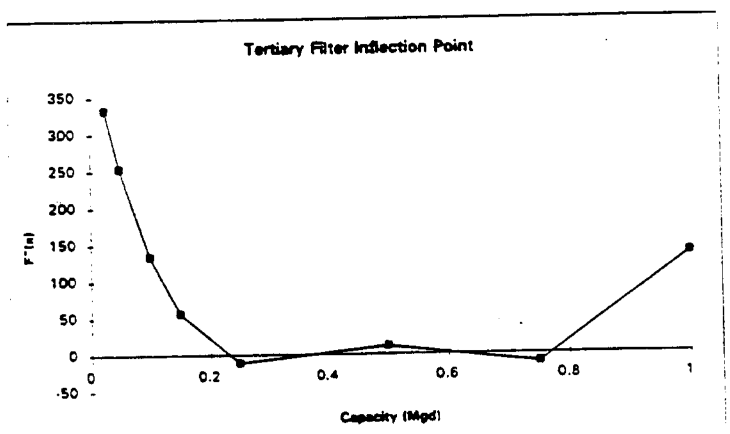
Y = (0.1940938)X^(-0.5751405)

Capacity (MGD)	Unit Cost ($/Gal)	Manuf. Unit Cost ($/Gal)
0.050	1.087	0.928
0.100	0.730	0.664
0.150	0.578	0.576
0.200	0.490	
0.250	0.431	0.490
0.300	0.388	
0.350	0.355	
0.400	0.329	
0.450	0.307	
0.500	0.289	0.291
0.550	0.274	
0.600	0.260	
0.650	0.249	
0.700	0.238	
0.750	0.229	0.225
0.800	0.221	
0.850	0.213	
0.900	0.206	
0.950	0.200	
1.000	0.194	0.190



TERTIARY FILTER INFLECTION POINT

Capacity (MGD)	F"(x)
0.025	332.944256
0.05	253.868194
0.1	134.067582
0.15	56.3672339
0.25	-10.894528
0.5	11.35955
0.75	-12.063528
1	136.3878



Davco
Wastewater Treatment Filters
Construction Costs

Capacity (GPD)	Type of Filter	Filter Cost ($)	Filter (1) Construction Cost ($)
50,000	Gravity	29,000	46,400
100,000	Gravity	41,500	66,400
150,000	Gravity	54,000	86,400
250,000	Traveling Bridge	76,500	122,400
500,000	Traveling Bridge	91,000	145,600
750,000	Traveling Bridge	105,500	168,800
1,000,000	Traveling Bridge	119,000	190,400

NOTES: (1) Values obtained from manufacturer's quotes.
(2) Costs include filter, media, 15% piping, 15% electrical, 5% sitework, 20% installation, and 5% for the concrete slab.

RECORD OF TELEPHONE COMMUNICATION

DATE: 10/19 TIME: 2:15

PROJECT NAME: SSU - Economy of Scale PROJECT NO.: 95-145.00

PARTY CALLING: Janey Wallace COMPANY: HAI

PARTY CONTACTED: Jim Kelley (Patty) COMPANY: Moss-Kelley

SUBJECT: Tertiary ~~treatment~~ filter ~~costs~~

TELEPHONE COMMUNICATION SUMMARY (Including Decisions & Commitments)

Package Gravity Filter 50,000 GPD → $30,000 } Freight to jobsite
100,000 GPD → $43,000 }
150,000 GPD → $58,000 }

ABW (Travelling Bridge)

6x16	0.25 MGD →	(Steel) $98,000		
9x20	0.5 MGD →	(S) $112,000	(Concrete) $92,000	
9x30	0.75 MGD →	(S) $126,000	(C) $101,000	
9x40	1.0 MGD →	(S) $140,000	(C) $110,000	

ACTION REQUIRED

HARTMAN & ASSOCIATES, INC.

engineers, hydrogeologists, scientists & management consultants

"SERVING THE WATER INDUSTRY SINCE 1956"

DAVCO

MEETING THE GROWING DEMAND FOR CLEAN WATER

1828 Metcalf Ave.
Thomasville, Georgia 31792
Phone 912-226-5733
Telefax No.
912-228-0312

FACSIMILE TRANSMITTAL SHEET

From: Tommy Tyson
Phone 941-646-7694
Fax. 941-644-6319

To: HAI - Jamie Wallace Re: Budget Estimates

Fax. number: 407-839-3790 Date: 7-2-95

Total number of pages including this page is: 2

REMARKS:

Budget estimates are for "DAVCO standard" equipment delivered to central Florida. Davco std. is Aluminum grating and aluminum handrails. Also depending on size, duplex or triplex rotary positive blowers and controls are included. I have not included any accessories such as comminutor, flowmeter or telemetry equipment (or CL2 feed eq).

Turn key price includes slabs, grout for clarifier (if applicable) and installation and finish coating of equipment (if applicable). As we discussed these prices are for "conventional" single train, single clarifier units and will not meet FDEP Class I, II or III Regulations. Mainly on clarifier Requirements (multiple units).

Filter prices include media. Coarse bubble diffusers for plants was utilized. Chain + sprocket drive w/shear pin overload protection.

* Making changes such as: Aluminum weir launders or stainless steel air headers and drop pipes, direct drive clarifier drive and so forth can add signifigantly to the prices I have given - Please adjust accordingly.

Factory Built and Davco Ring Steel ~~List~~ Budget Costs

	Extended Aeration		Contact Stabilization	
Capacity (gpd)	Budget Price ($)	Turn Key Install.	Budget Price ($)	Turn Key Install.
10,000	36000	14000	N/A	N/A
25,000	60000	18000	N/A	N/A
50,000	110000	25000	65000	18000
75,000	150000	35000	100000	22000
100,000	175000	42000	125000	27000
150,000	140000	70000	120000	60000
250,000	175000	85000	155000	75000
500,000	250000	125000	215000	105000
750,000	300000	150000	250000	125000
1,000,000	358000	175000	280000	140000

FILTERS (NO INSTALLATION COSTS INCLUDED)

TES FILTER
- 0 to .05 MGD : 28000
- > .05 ≤ .10 MGD : 40000
- > .10 ≤ .15 MGD : 50000

TRAVELING BRIDGE FILTER
- .25 MGD : 55000 or 2 @ .2 MGD = 107000
- .50 MGD : 70000 or 2 @ .375 MGD = 135000
- .75 MGD : 85000 or 2 @ .56 MGD = 145000
- 1.0 MGD : 98000 or 2 @ .75 MGD = 170000

APPENDIX E

Wastewater Treatment Systems
Chlorine Feed Systems
Unit Costs

Chlorine Feed Rate (lb/day)	System Type (150# or 1 ton)	Package Cost ($)	Treatment Capacity (Mgd)	Overall Construction Cost ($)	Unit Cost $
100	150 lb. (1)	16,400	0.01	25,420	2.54
200	150 lb.	17,600	0.50	27,280	0.05
500	1 Ton (2)	52,200	1.00	80,910	0.08
1,000	1 Ton	63,900	2.00	99,045	0.05
2,000	1 Ton	71,145	5.00	110,275	0.02

NOTES:

(1) The 150 lb facilities are equipped with a 25 square foot shelter.
(2) The Ton systems are equipped with a 400 square foot shelter which consists of a concrete base, steel supports, a fiberglass panel roof, and an overhead crane.
(3) Costs include dual chlorinators w/ switchover, dual scales, gas detector, alarm panel, vacuum switch, booster pump, housing, and hoists all are included in the manufacturer's quotes.
(4) Includes 20% electrical, 15% piping, and 20% installation costs.
(5) Costs are vased on June 1995, ENR Index = 5433.

Heyward INCORPORATED

1865 N. SEMORAN BOULEVARD
SUITE NO. 240
WINTER PARK, FLORIDA 32792
PHONE: (407) 679-1333
FAX: (407) 657-6880

July 5, 1995

Hartman & Associates, Inc.
201 East Pine St.
Suite 1000
Orlando, FL 32801

Attention: Jamey Wallace

Subject: Wallace & Tiernan Chlorination System

Dear Jamey:

In response to your request for an estimate for Wallace & Tiernan Chlorine Gas Vacuum Systems with manual chlorinators, injectors, gas handling fixtures, cylinder scales, booster pump, gas detector and miscellaneous safety items, pricing is as follows:

Chlorinator Model	Feed Rate Per Day	Gas Supply	Estimated Cost
V-500	100	150# Cylinder	$ 22,300
V-500	200	150# Cylinder	$ 23,200
V-500	500	Ton Cylinder	$ 25,600
V-2000	1000	Ton Cylinder	$ 41,800
V-2000	2000	Ton Cylinder	$ 44,900

For the 150# cylinder systems, I have included a standard 4x6 FRP building with appropriate fixtures and safety devices. For the ton cylinder units, a facility for handling ton cylinders will be required. Also, you will find the scales required for the 150# systems are included along with the ton cylinder scales to be mounted in your handling facility.

Jamey Wallace
July 5, 1995
Page 2

The above are basic equipment costs and can be utilized for basic estimates. Please advise if any additional peripheral equipment is required, such as chlorine analyzers or pH recorders.

I have included the two (2) basic chlorinator sales information bulletins and can elaborate on other equipment if you require. Thank you very much.

Kindest regards,

HEYWARD INCORPORATED - FOR
WALLACE & TIERNAN, INC.

Richard E. Neal

Richard E. Neal
Winter Park Office

REN/gl

Enclosure

20% Elect.
15% Pipe
10% ENG
10% Site work

* TON Chlorine Storage Bldg *

20'x20' concrete, fiberglass panels, overhead crane

(2/92) Concrete - 2200
structural steel - 10,000
Fiberglass - 7800
overhead crane - 3,500
Painting - 4,000

27,500

30,000

Capital Controls Chlorine Feed System
List Costs

Type: Gas Chlorination => Includes: Dual trunnions, Dual chlorinators, Auto Switch over, Ejector, Booster pump, FRP housing (150 lb system), Leak detector, etc.

	Chlorine Feed Rate (lb/day)	Type of System (150 lb cyl.) or (1 ton)	Package Cost ($)
	100 ①	150 #	$10,500 –
150	200 ①	150 #	12,000 –
150	②	TON	18,200 –
	500 ②	TON	18,800 –
TON	1000 ③	TON	26,000 –
TON	2000 ③	TON	37,380 –
TON			

Note: (Any extra costs needed).

① 100/200 PPD, 150 # CYL SYSTEMS INCLUDE: COMPLETE CHLORINATOR W/SWITCHOVER EJECTOR, GAS DETECTOR, DUAL SCALE, ALARM PANEL, VACUUM SWITCH, BOOSTER PUMP, 5'x5' FIBERGLASS SHELTER (2 CONTAINER MANIFOLD ON 200 PPD)

② 200/500 PPD, TON SYSTEMS INCLUDE: ALL OF ABOVE EXCEPT FIBERGLASS SHELTER BUT DUAL GAS DETECTORS, (2) TON SCALE, (2) PAIR TON STORAGE TRUNNIONS.

③ 1000/2000 PPD SYSTEMS INCLUDE: ALL OF ABOVE BUT (2) TWO TON MANIFOLD (1000 PPD) OR (2) 4-TON MANIFOLD (2000 PPD), WALL MOUNTED CHLORINATOR CABINET, (2) DUAL TON SCALES (1000 PPD) OR (2) 4-TON SCALES (2000 PPD), (4) PAIR STORAGE TRUNNIONS.

HARTMAN & ASSOCIATES, INC.	SH. NO.: 1	JOB NO.: 95-145.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JJW	DATE:
	CHECKED BY:	DATE:

Chlorination Curve! (wastewater)

Values. 1,000,000 Gallon / Day and less ⇒ 150 lb cylinders
>1,000,000 GPD ⇒ ton cylinders

MANUFACT INFO

10,000 ⇒ $2.54	1,000,000 ⇒ $0.081
20,000 ⇒ $1.27	1,500,000 ⇒ $0.06
50,000 ⇒ $0.51	2,000,000 ⇒ $0.0495
100,000 ⇒ $0.25	3,000,000 ⇒ $0.033
200,000 ⇒ $0.14	4,000,000 ⇒ $0.027
500,000 ⇒ $0.055	5,000,000 ⇒ $0.022
750,000 ⇒ $0.036	
1,000,000 ⇒ $0.027	

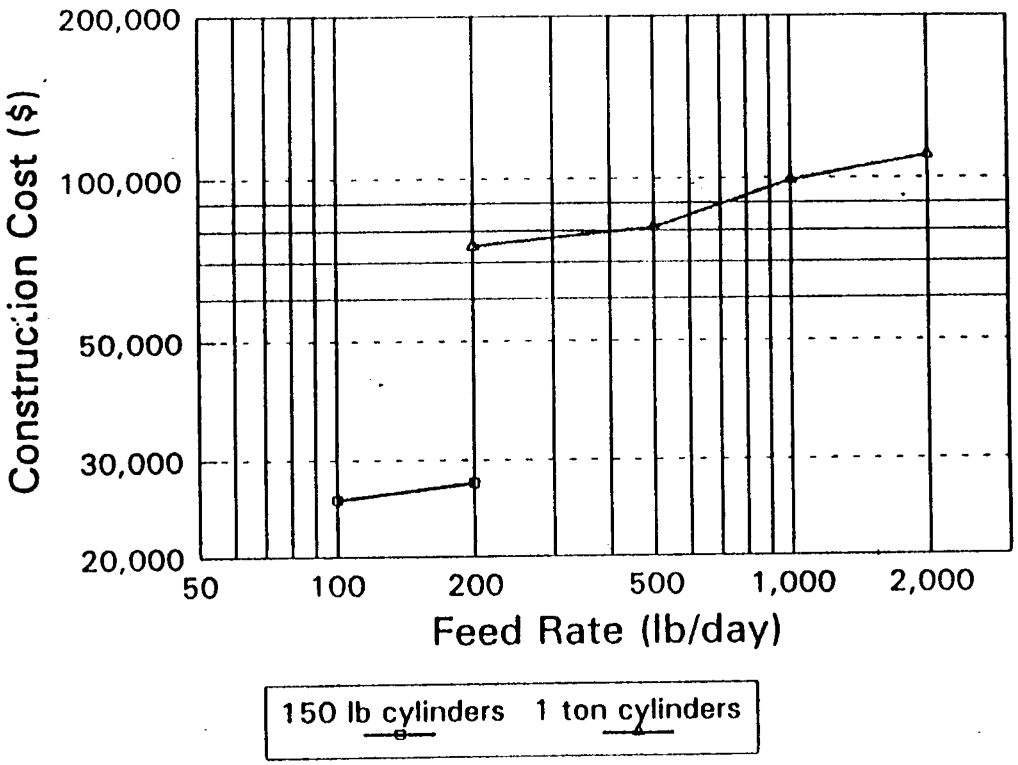
EPA INFO

10,000 ⇒ $3.5	1,500,000 ⇒ $0.073
20,000 ⇒ $2.0	2,000,000 ⇒ $0.063
50,000 ⇒ $0.90	3,000,000 ⇒ $0.048
100,000 ⇒ $0.46	4,000,000 ⇒ $0.04
200,000 ⇒ $0.25	5,000,000 ⇒ $0.034
500,000 ⇒ $0.14	
750,000 ⇒ $0.11	
1,000,000 ⇒ $0.095	

Notes: Same as before except
2nd Source is
EPA Wastewater Source E, pages 19-21.

GRAPH #4

Chlorine Feed Systems

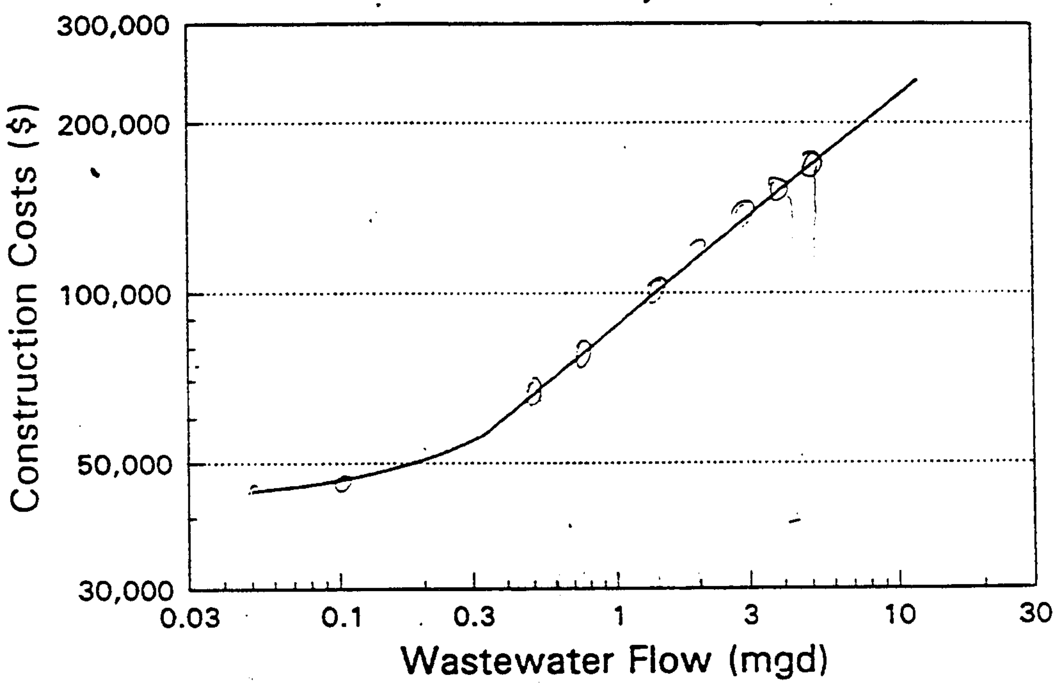


EXHIBIT

PAGE 131 OF 281

GRAPH #33

Chlorination Feed System



Note: Source E, Figure 10, pp. 19-21.

* Everything included.

Water Treatment Systems
Chlorine Feed Systems
Unit Costs

Chlorine Feed Rate (lb/day)	System Type (150# or 1 ton)	Package Cost ($)	Treatment Capacity (Mgd)	Overall Construction Cost ($)	Unit Cost $
100	150 lb. (1)	16,400	0.01	25,420	2.54
200	150 lb.	17,600	0.20	27,280	0.14
500	1 Ton (2)	52,200	2.00	80,910	0.04
1,000	1 Ton	63,900	4.00	99,045	0.02
2,000	1 Ton	71,145	5.00	110,275	0.02

NOTES:

(1) The 150 lb facilities are equipped with a 25 square foot shelter.
(2) The Ton systems are equipped with a 400 square foot shelter which consists of a concrete base, steel supports, a fiberglass panel roof, and an overhead crane.
(3) Costs include dual chlorinators w/ switchover, dual scales, gas detector, alarm panel, vacuum switch, booster pump, housing, and hoists all are included in the manufacturer's quotes.
(4) Includes 20% electrical, 15% piping, and 20% installation costs.
(5) Costs are vased on June 1995, ENR Index = 5433.

HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants	SH. NO.: 1	JOB NO.: 95-145.00
	MADE BY: JJW	DATE:
	CHECKED BY:	DATE:

Chlorination Curve (Water)

Values 2,000,000 Gallon/Day and less ⇒ 150 lb cylinders
> 2,000,000 Gallon/Day ⇒ ton cylinders

MANUFACT. INFO.

10,000 ⇒ $2.54	1,500,000 ⇒ $0.02
20,000 ⇒ $1.27	2,000,000 ⇒ $0.015
50,000 ⇒ $0.51	2,000,000 ⇒ $0.04
100,000 ⇒ $0.25	3,000,000 ⇒ $0.028
200,000 ⇒ $0.14	4,000,000 ⇒ $0.023
500,000 ⇒ $0.055	5,000,000 ⇒ $0.02
750,000 ⇒ $0.036	
1,000,000 ⇒ $0.027	

Values are based on Costs of System [illegible] Capacity of System

EPA INFO

10,000 ⇒ $2.0	1,000,000 ⇒ $0.067
20,000 ⇒ $0.98	1,500,000 ⇒ $0.056
50,000 ⇒ $0.392	2,000,000 ⇒ $0.049
100,000 ⇒ $0.196	3,000,000 ⇒ $0.04
200,000 ⇒ $0.137	4,000,000 ⇒ $0.037
500,000 ⇒ $0.0924	5,000,000 ⇒ $0.032
750,000 ⇒ $0.077	
1,000,000 ⇒ $0.067	

Notes: ① All values include sitework, piping, electrical, installation, and storage-feed facilities.

② Values obtained from Manufacturer's cost estimates and EPA Water Source 3, pages 13-14.

GRAPH #4

Chlorine Feed Systems

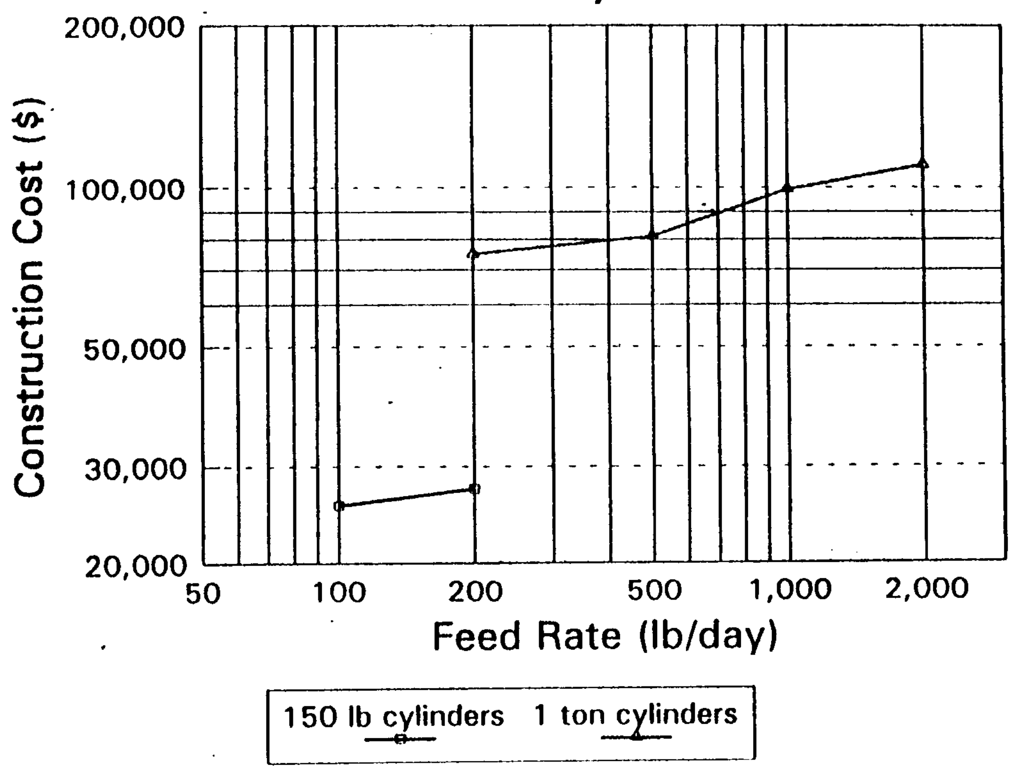


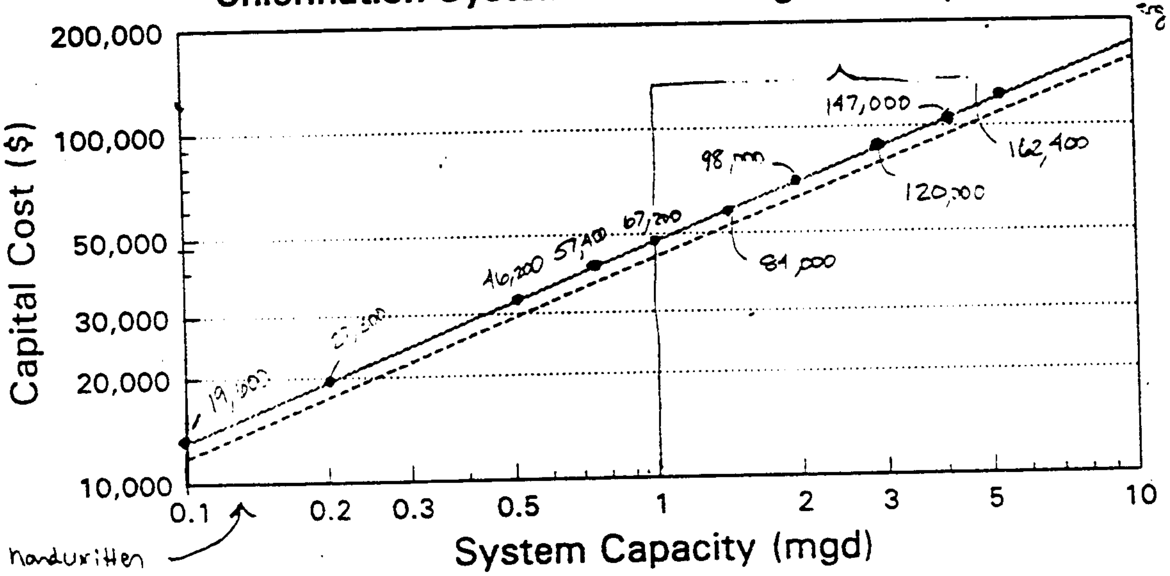
EXHIBIT F-H-4
PAGE 135 OF 284

18¢ = 43.6 ¢
200,000 ⇒ 14¢ = 33.9 ¢
500,000 ⇒ 9¢ = 21.8 ¢
1,000,000 ⇒ 7¢ = 16.9 ¢
2,000,000 ⇒ 5¢ = 12.1 ¢
5,000,000 ⇒ 3¢ = 7.3 ¢

DRINKING WATER

GRAPH #5

Chlorination System for Drinking Water (Adjust for Inst., site, eng.)



* All handwritten values are adjusted values.

ENR Index Handy Whitman

Note: Source B, Figure 2-6, pp. 13-14.

* For 100 lb/day + less ⇒ 150 lb cylinders + Feed houses
* > 100 lb/day ⇒ ton cylinders

Includes: ... chlorinator, injector pumps, housing, 30-day storage capacity included, piping,

* Below 0.1 mgd ⇒ \$7600 ⇒ \$13,071 ⇒ \$18,300 < 100,000 GPD

Add: Installation 30%, electrical 20%, site 0%, engineering 0%

APPENDIX F

Standby Generator Set
Construction Costs

Capacity (KW)	Ringhaver GenSet Cost ($)	Cummins GenSet Cost ($)	GenSet Cost ($)	GenSet Unit Cost ($/KW)
8	$8,800	$7,524	$8,162	$1,088.27
15	$9,550	$11,357	$10,454	$696.90
25	$11,000	$12,760	$11,880	$475.20
35	$12,000	$13,629	$12,815	$366.13
50	$13,700	$16,152	$14,926	$298.52
75	$15,400	$19,666	$17,533	$233.77
100	$19,000	$22,378	$20,689	$206.89
150	$22,400	$29,137	$25,769	$171.79
200	$24,400	$35,947	$30,174	$150.87
250	$27,300	$40,773	$34,037	$136.15
300	$33,500	$46,175	$39,838	$132.79
350	$36,000	$51,396	$43,698	$124.85
400	$42,200	$66,818	$54,509	$136.27
500	$60,500	$93,896	$77,198	$154.40
600	$72,600	$102,521	$87,561	$145.93
750	$95,000	$135,697	$115,349	$153.80
1,000	$130,000	$165,798	$147,899	$147.90
1,250	$168,000	$215,888	$191,944	$153.56
1,500	$192,000	$265,200	$228,600	$152.40

NOTES:

1) All costs obtained from manufacturer's quotes.
2) Costs include a packaged diesel electric set with base, a unit mounted radiator cooling system, and a control panel.
3) Costs are based on December 1995, ENR Index = 5471.

RINGHAVER EQUIPMENT COMPANY
POWER SYSTEMS DIVISION
9901 RINGHAVER DRIVE 32824
P.O. BOX 590206
ORLANDO, FLORIDA 32859-0206
PHONE# 407-855-6195
FAX# 407-438-0922

DATE: Jan. 29, 96	PAGE 1 OF 3
TO: Pete Haanshelt	FAX# 359-0748
COMPANY: EMI	
FROM: Bob Bohnert	EXT: 223

Pete -
Hopefully this is what you need for SU
If not, let me know
Bob

Ringhaver
CAT

January 29, 1996

EMI Consulting Specialties, Inc.
Mr. Pete Haanshelt
3301 Little Cypress Cove
Winter Park, FL 32792
FX# 359-0748

Subject: Standby Generator Set
Budgetary Pricing

Dear Pete:

The attached chart shows representative budget prices for unit sizes in our Caterpillar/Olympian and Caterpillar lines. The basic unit consists of a packaged diesel electric set with base, and unit mounted radiator cooling system and control/metering panel.

These are current prices, subject to change without notice. Please call if additional information is needed.

Very truly yours,

Bob Bohnert

Bob Bohnert
Sales Engineer

UNIT RATING (kW)	BUDGET PRICING
8	$6,800
12.5	$9,100
17.5	$10,000
25	$11,000
35	$12,000
50	$13,700
75	$15,400
100	$19,000
150	$22,400
200	$24,400
250	$27,300
300	$33,500
350	$36,000
400	$42,200
500	$60,500
600	$72,600
750	$95,000
1000	$130,000
1250	$168,000
1500	$192,000
1750	$262,000
2000	$294,000

EXHIBIT (CG-H-4)

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Generator Cost

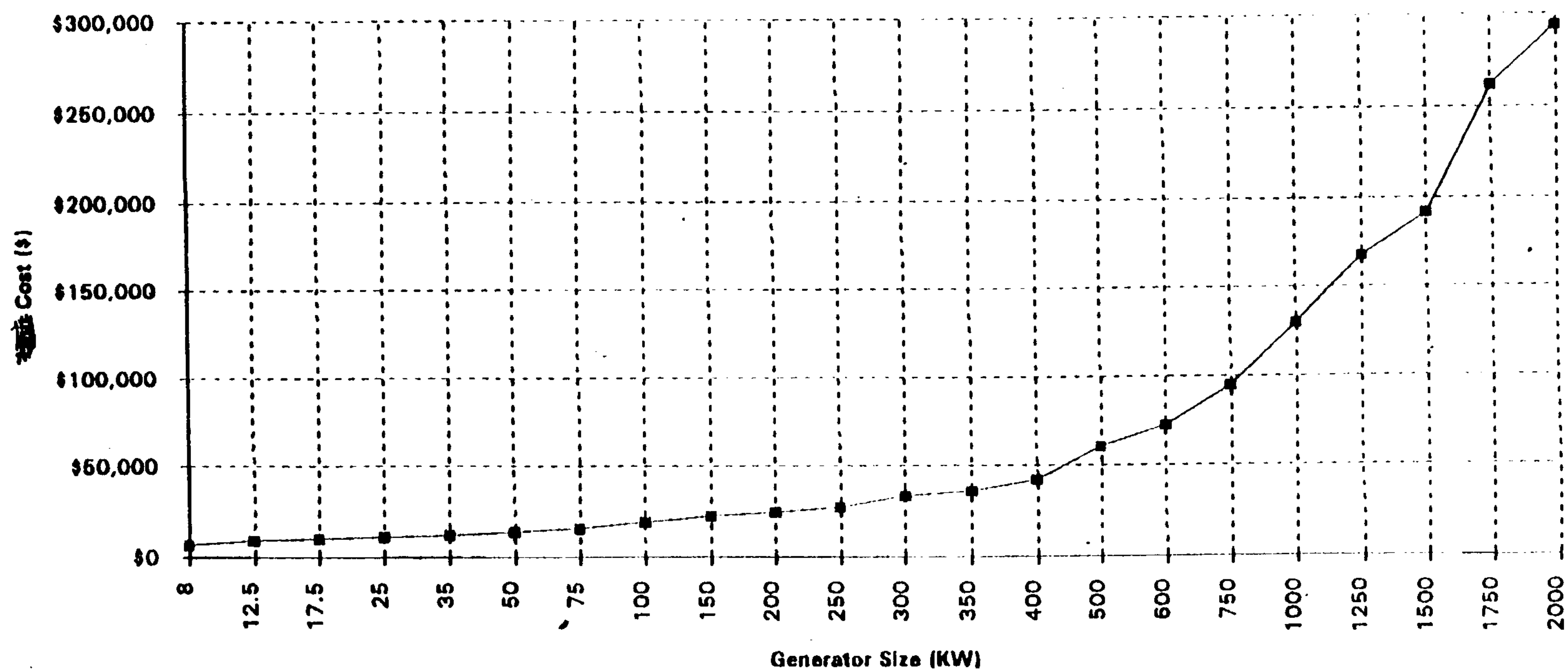
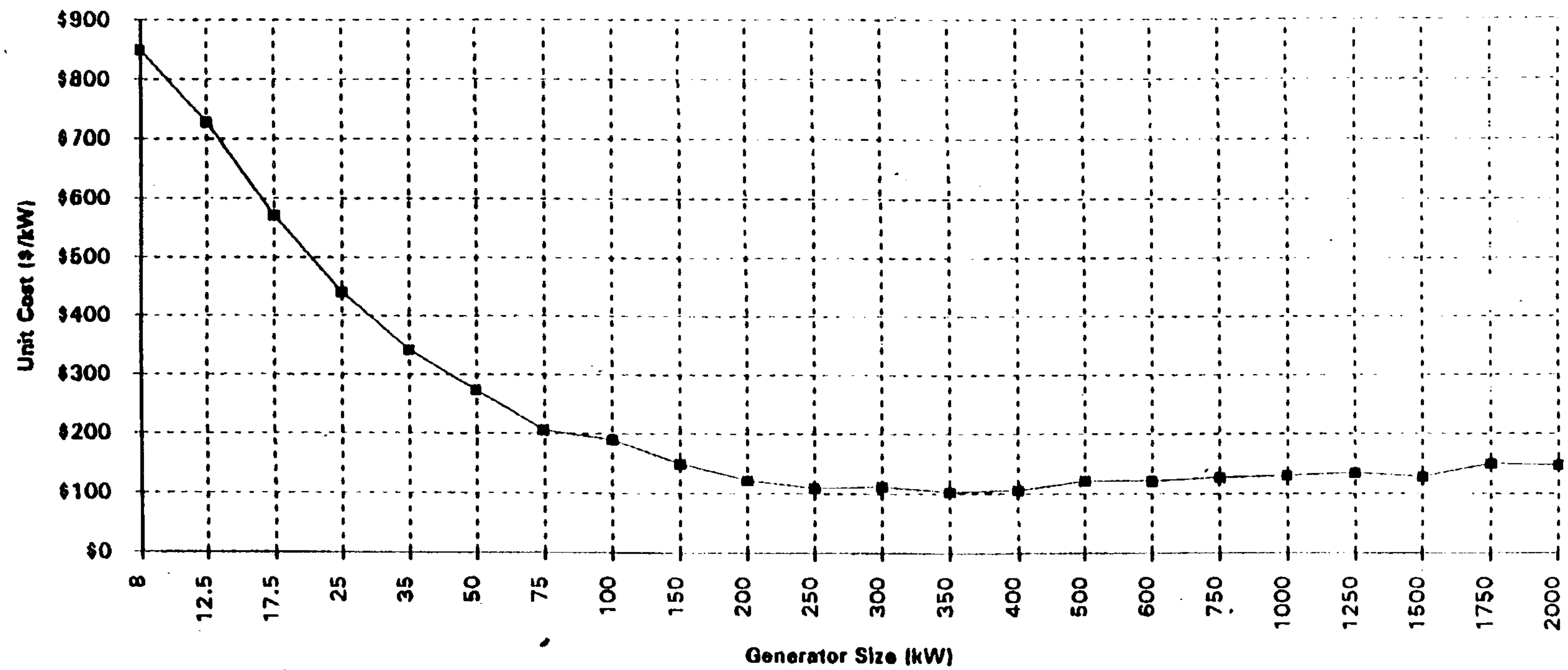


EXHIBIT ((-CA-4)

PAGE 142 OF 284

Generator Unit Cost



From: RICK COOPER To: PETE HOANSHELT Date: 1/31/96 Time: 21:30:20 Page 1 of 1

CUMMINS SOUTHEASTERN POWER INC.
4820 North Orange Blossom Trail
Orlando, Fla. 32810
(407) 298-2080 (Rick Cooper) FAX (407) 290-8727

FACSIMILE COVER LETTER

Date: 1/31/96

Company Name: EMI

FAX Number: 359-0748

Attention: PETE HOANSHELT

Subject: GENSET PRICING

Post-it™ Fax Note 7671	Date	# of pages ▶ 1
To James Wallace	From Pete Hoanshelt	
Co./Dept. HAS/ENV.	Co. EMI	
Phone #	Phone # 359-0797	
Fax #	Fax # 359-0748	

PER YOUR REQUEST:

KW	PRICING	KW	PRICING
7.5	7,524	15	11,357
20	11,773	25	12,760
35	13,629	40	14,640
50	16,152	80	19,668
100	22,378	150	28,137
200	35,947	250	40,773
300	46,175	350	51,398
400	66,818	500	93,896
600	102,521	750	135,697
1000	165,798	1250	215,888
1500	265,200		

USE THIS INFORMATION WITH DISCRETION

IF I CAN BE OF ANY HELP WITH SPEC WRITING OR GENSIZING CALL ME AT YOUR CONVENIENCE

regards;

Rick Cooper

Rick G. Cooper
Energy System Sales Manager 813-664-5831

REPLY NEEDED YES ___ NO ___ AS SOON AS POSSIBLE ___ AT YOUR CONVENIENCE ___

This transmission consists of ___ pages, including this cover letter. If you do not receive all of the pages please notify our office at: 298-2080 OR FAX 290-8727

APPENDIX G

Prestressed Concrete Ground Storage Tanks
Construction & Unit Costs

Volume (Gal)	Uninstalled (1) Tank Cost ($)	Installed (2) Tank Cost ($)	w/ 1000 gpm Aerator ($)	w/ 4000 gpm Aerator ($)	Overall Cost ($)	Overall Unit Cost ($/Gal)
50,000	70,900	77,990	96,034	112,188	104,111	2.08221
100,000	92,500	101,750	120,010	136,164	128,087	1.280865
300,000	149,540	164,494	183,324	199,478	191,401	0.638003
750,000	226,000	248,600	268,195	284,349	276,272	0.368362
1,000,000	268,200	295,020	315,037	331,191	323,114	0.323114
1,500,000	344,150	378,565	399,341	415,495	407,418	0.271612
2,000,000	412,500	453,750	475,210	491,364	483,287	0.241643

NOTES:

(1) Prestressed concrete tank, concrete floor, prestressed wall, free-span concrete dome, aluminum interior and exterior ladders, vents, precast overflows, painting, aeration unit, and installation costs are included in the manufacturer's quotations.

(2) Includes 5% piping, 0% electrical, and 5% sitework costs.

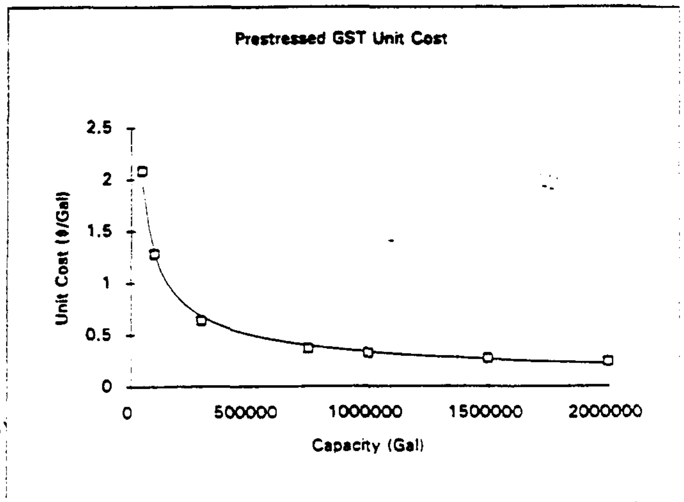
(3) Costs are based on June 1995, ENR Index = 5433.

UNIT COST CURVE & GRAPH

CURVE EQUATION:

Y = (1087.291)X^(-0.5848418)

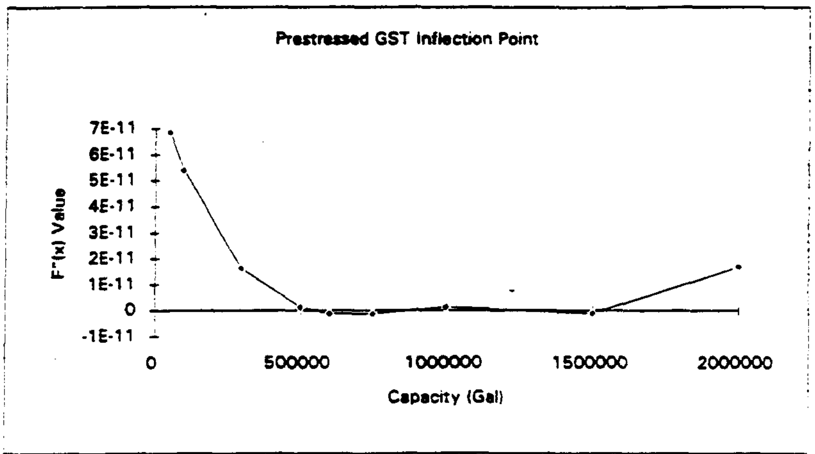
Capacity (MGD)	Cons. Cost ($)	Manuf. Cost ($)
50000	1.941743	2.08221
75000	1.531815	
100000	1.294604	1.280865
125000	1.136213	
150000	1.021295	
175000	0.93325	
200000	0.863141	
225000	0.805686	
250000	0.757539	
275000	0.716468	
300000	0.68092	0.638003
325000	0.64978	
350000	0.622219	
375000	0.597612	
400000	0.575476	
425000	0.555429	
450000	0.537169	
475000	0.520449	
500000	0.505068	
525000	0.49086	
550000	0.477685	
575000	0.465427	
600000	0.453985	
625000	0.443275	
650000	0.433223	
675000	0.423765	
700000	0.414847	
725000	0.40642	
750000	0.398441	0.368362
775000	0.390873	
800000	0.383683	
825000	0.376839	
850000	0.370317	
875000	0.364092	
900000	0.358143	
925000	0.352449	
950000	0.346995	
975000	0.341763	
1000000	0.33674	0.323114
1100000	0.318483	
1200000	0.302682	
1300000	0.288839	
1400000	0.276588	
1500000	0.26565	0.271612
1600000	0.25581	
1700000	0.246899	
1800000	0.238782	
1900000	0.231349	
2000000	0.224512	0.241643



INFLECTION POINT OF PRESTRESSED GST

Prestressed Concrete GST's

Capacity (GPD)	F"(x)
50000	6.86E-11
100000	5.41E-11
300000	1.64E-11
500000	1.32E-12
600000	-1.09E-12
750000	-1.26E-12
1000000	1.26E-12
1500000	-1.15E-12
2000000	1.68E-11



**** The y-axis values on the graphic are the same as f"(x) listed; however, you must choose the graphic window to see the values listed on the y-axis.

HARTMAN & ASSOCIATES, INC.	SH. NO.:	JOB NO.:
engineers, hydrogeologists, surveyors & management consultants	MADE BY:	DATE:
	CHECKED BY:	DATE:

~~Ground Storage Tanks:~~ (Concrete)

MANUFACT INFO

Volume	Cost ($) 1000 Aer	Cost ($) 4000 Aer	Ratio ($/Gal) 1000 Aer	Ratio ($/Gal) 4000 Aer
50,000 gal	$ 96,034	$ 112,188	$ 1.92	$ 2.24
100,000 gal	$ 120,010	$ 136,164	$ 1.20	$ 1.36
300,000 gal	$ 183,324	$ 199,478	$ 0.61	$ 0.66
750,000 gal	$ 268,195	$ 284,349	$ 0.36	$ 0.38
1,000,000 gal	$ 315,037	$ 331,191	$ 0.32	$ 0.33
1,500,000 gal	$ 399,341	$ 415,495	$ 0.27	$ 0.28
2,000,000 gal	$ 475,210	$ 491,364	$ 0.24	$ 0.25

Note: ① All values include tank materials, sitework, concrete base, painting, aeration components, electrical, and installation.

② Values obtained by averaging manufacturers cost estimates.

THE CROM CORPORATION

Prestressed Composite Tanks

Stephen W. Pavlik, President
R. Bruce Simpson
H.E. Puder
James A. Neff, P.E.
Lars Balck, Jr., P.E.
Charles S. Hanskat, P.E.
Samuel O. Sawyer, P.E.
Richard L. Bice, P.E.
James D. Copley, P.E.
Gerald C. Bevis, P.E.

June 13, 1995

FAX: 407-839-3790

Mr. Jamie Wallace
Hartman & Associates, Inc.
201 East Pine Street, Suite 1000
Orlando, FL 32801

Subject: Preliminary Prices for Ground Storage Reservoirs

Dear Jamie:

Thank you for your call and interest in prestressed concrete reservoirs. We are always pleased to work up an estimate for you. In confirming our telephone conversation we estimate the following:

300,000-Gallon Domed Reservoir 50'-0" ID x 20'-6" SWD	$145,000
750,000-Gallon Domed Reservoir 65'-0" ID x 30'-3" SWD	$218,000
1.0-MG Domed Reservoir 80'-0" ID x 26'-8" SWD	$255,000

1.5 mg 332,000
2 mg 392,000

June 13 1995

The above estimates are based on open shop labor conditions with construction beginning in 1995. If construction should take place later, escalate accordingly.

Our estimates are for our standard tank and includes the following:

- Complete structural tank with concrete floor, prestressed composite wall and free-span concrete dome.
- Standard accessories: aluminum interior ladder, aluminum exterior ladder, fiberglass hatch, fiberglass vent and precast concrete overflows. Painting the exterior surface with one coat of primer and two coats of latex paint.

Not included in the above estimates are the costs of site preparation, excavation, piping, backfilling, landscaping and disinfecting the tank.

250 S.W. 36TH TERRACE • GAINESVILLE, FLORIDA 32607-2889 • (904) 372-3436
FAX (904) 372-6209

Mr. Jamie Wallace
Hartman & Associates, Inc.

June 13, 1995
Page 2

Also per your request, to add a 1300 GPM aerator to the above tanks would be approximately $11,100 and for a 2600 GPM aerator, $17,300. Also please note that if we add aerators to the tanks, we usually paint the underside of the dome and approximately 2 feet down the wall. The additional cost for this would be approximately $15,000 per tank.

We hope this information is sufficient for you and if you need any additional information, please give us a call.

Sincerely,

THE CROM CORPORATION

Richard L. Bice, P.E.
Project Manager

RLB/pd

PRECON

PRECON CORPORATION

Prestressed Concrete Tanks

115 S.W. 140th Terrace
Newberry, Florida 32669
(904) 332-1200
Fax 332-1199

TO: JAMEY WALLACE
HARTMAN & ASSOC

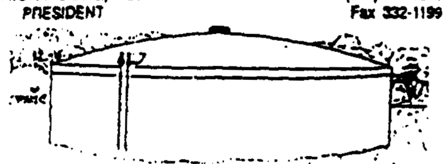
DATE: 6·22·95

PAGE 1 OF 3

FAX NO.: (407) 839-3790
T · 839-3955

FROM:

RICK MOORE, P.E.
PRESIDENT
(904) 332-1200
Fax 332-1199



PRECON CORPORATION
115 S. W. 140th TERRACE
NEWBERRY, FLORIDA 32669
PRESTRESSED CONCRETE TANKS
FOR WATER STORAGE
AND TREATMENT

SUBJECT: TYPICAL ESTIMATES

MESSAGE: CALL WITH QUESTIONS

THANKS FOR CALLING

PRECON
PRECON CORPORATION
Stressed Concrete Tanks
115 S.W. 140th Terrace
Newberry, Florida 32669
(904) 332-1200 (Fax) 332-1199

ESTIMATE PRICE
CIRCULAR PRESTRESSED TANK
WITH AERATOR

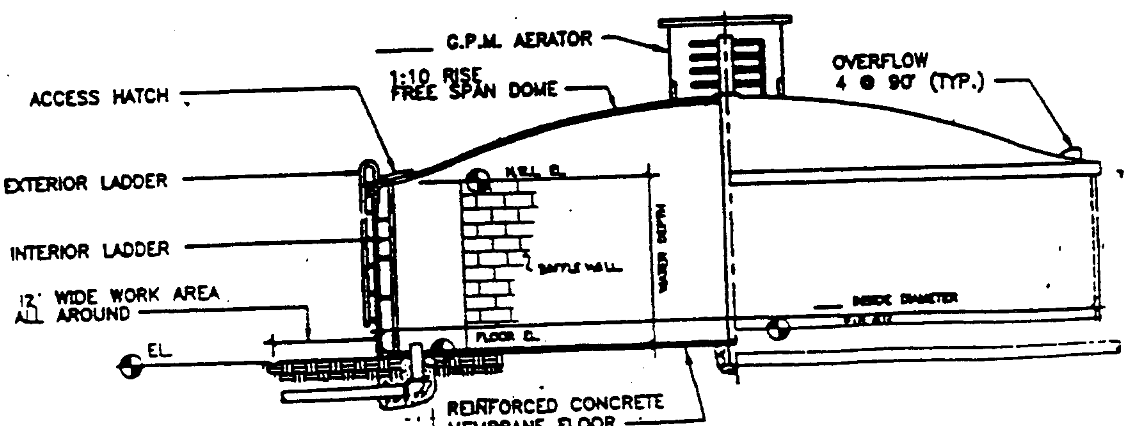
PROJECT DESCRIPTION:

Name:	TYPICAL	By:	RICK MOORE
Location:	CENTRAL FLORIDA	Date:	6.23.95
Tank Capacity (Gal.):	0.05MG 0.1MG 0.3MG		
Diameter (Ft.):	30'-0" 35'-0" 50'-0"		
Water Depth (Ft.):	9'-6" 13'-11" 20'-6"		
Aerator (GPM):			

ESTIMATE:

		0.05MG	0.1MG	0.3MG
Base Tank (incl accessories, ext paint):	$	70,000	91,000	151,000
Aerator SEE BELOW	:			
Bafflewall (concrete block) \$4.50/SQ. FT.	:	+($900)	$1500	$3080
Interior paint (dome, 2' down wall) ADD 2% TO TANK PRICE	:			
Pipe (estimate) ADD 10% TO TANK PRICE.	:			
Site Work (estimate) ADD 5% TO 10% TO TANK PRICE	:			
	:			
	:			
TOTAL	$			

AERATOR PRICING
1000 GPM. $10,000
2500 GPM $17,000
4000 GPM $28,000



SECTION --- ELEVATION

PRECON
PRECON CORPORATION
Prestressed Concrete Tanks
115 S.W. 140th Terrace
Newberry, Florida 32669
(904) 332-1200 (Fax) 332-1199

**ESTIMATE PRICE
CIRCULAR PRESTRESSED TANK**

PROJECT DESCRIPTION:

Name: Typical By: Rick Moore

Location: Central Florida. Date: 6.23.95

Tank Capacity (Gal.): 0.75MG 1MG 2MG

Diameter (Ft.): 65'-0" 80'-0" 100'-0"

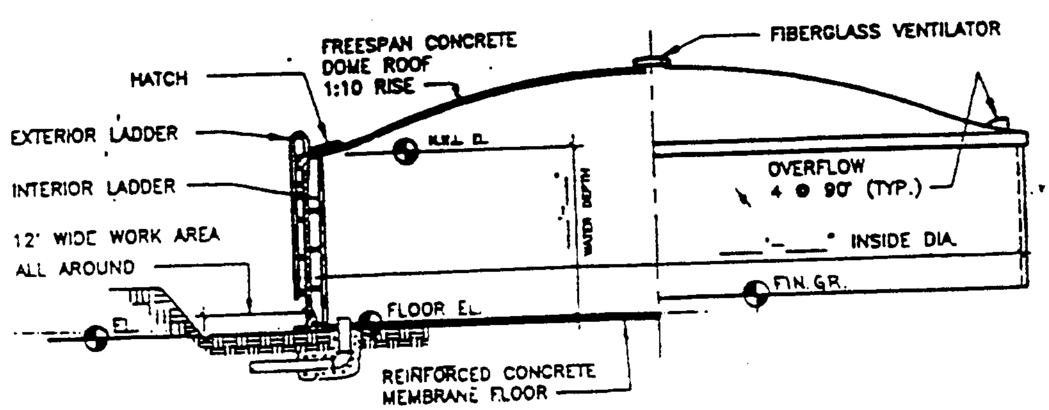
Water Depth (Ft.): 30'-3" 26'-8" 34'-1"

ESTIMATE:

		0.75MG	1MG	2MG
Base Tank (incl accessories, ext paint):	$	228,000	275,000	428,000
Pipe (estimate) (SEE NOTE BELOW)	:			
Site Work (estimate) USUALLY 5% TO 10% OF TANK PRICE.	:			
Baffle wall	:	+6000	+6400	$10,000
	:			
TOTAL	$			

for 1.5 MG $8,500

PIPE - WITH OUT AERATOR - 6% OF TANK PRICE.
- WITH AERATOR - 9% OF TANK PRICE.



SECTION --- ELEVATION

APPENDIX H

Steel Ground Storage Tanks

Construction & Unit Costs

Volume (Gal)	Manuf. Steel Tank Standard Cost ($)	Manuf. Steel Tank Installed Cost ($)	Overall Steel Tank Unit Cost ($/Gal)
10,000	23,000	25,300	2.53
20,000	37,000	40,700	2.035
30,000	40,000	44,000	1.4666667
50,000	50,000	55,000	1.1
100,000	70,500	77,550	0.7755
250,000	120,000	132,000	0.528

NOTES:

(1) Complete steel tank, concrete foundation, roof, roof manway, gravity vent, bottom manway hatch, ladder & cage assembly, top manway platform, protective bolt caps, and installation costs are included in the manufacturers' quotations.

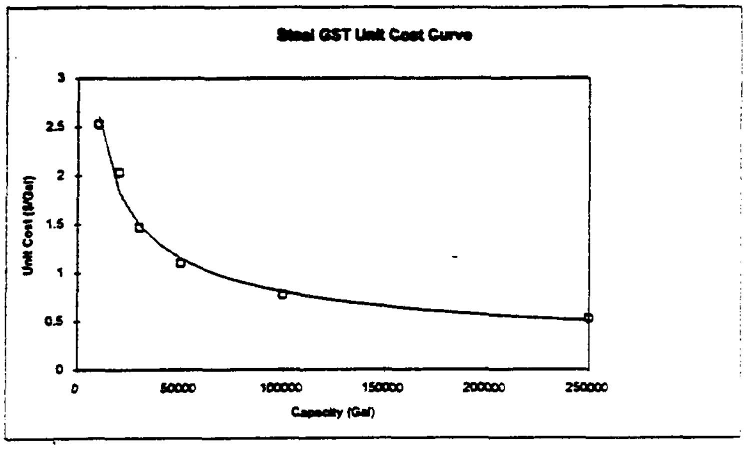
(2) Includes 5% piping, 0% electrical, and 5% sitework costs.

(3) Costs are based on June 1995, ENR Index = 5433.

CURVE EQUATION:

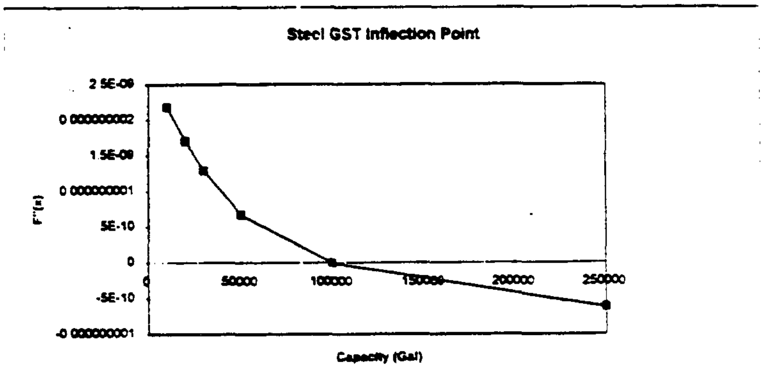
Y = (284.0798)X^(-0.5089866)

Capacity (MGD)	Cons. Cost ($)	Manuf. Cost ($)
10000	2.61513404	2.53
20000	1.83769621	2.035
30000	1.49501527	1.46666667
40000	1.2913783	
50000	1.15272998	1.1
60000	1.05057097	
70000	0.97129326	
80000	0.90747204	
90000	0.85466772	
100000	0.81004166	0.7755
110000	0.77168318	
120000	0.7382529	
130000	0.70878042	
140000	0.6825432	
150000	0.65899066	
160000	0.63769501	
170000	0.61831807	
180000	0.60058858	
190000	0.58428603	
200000	0.56922913	
210000	0.55526724	
220000	0.54227402	
230000	0.53014263	
240000	0.51878203	
250000	0.50811407	0.528



STEEL GST INFLECTION POINT

Capacity (Gal)	F"(x)
10000	2.1822E-09
20000	1.7001E-09
30000	1.2909E-09
50000	6.6926E-10
100000	-7.6E-13
250000	-6.2012E-10



HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants

SH. NO.:	JOB NO.:
MADE BY:	DATE:
CHECKED BY:	DATE:

Ground Storage Tanks (Steel)

Values include: sitework, conc., steel, elect., contingencies, inst.

EPA INFO

Capacity	Cost	Ratio ($/Gal)
5,000 gal	⇒ $19,564	⇒ $3.91
10,000 gal	⇒ $33,312	⇒ $3.33
25,000 gal	⇒ $57,370	⇒ $2.29
50,000 gal	⇒ $72,700	⇒ $1.45
100,000 gal	⇒ $101,125	⇒ $1.01
250,000 gal	⇒ $158,628	⇒ $0.63

MANUFACT INFO

Capacity	Cost	Ratio ($/Gal)
5000 gal	$20,000	$4.00
10,000 gal	$25,300	$2.53
25,000 gal	$43,000	$1.72
50,000 gal	$55,000	$1.10
100,000 gal	$77,550	$0.776
250,000 gal	$132,000	$0.528

* Note: ① All values include materials, sitework, concrete base, electrical, contingencies and installation.

③ Values obtained using manufactures cost data and water treatment component Source C, pages 412-415.

613 P01 JUN 21 '95 11:11

[redacted] 09:50 407 838 3780 HARTMAN ASSOC

Florida Aquastore Water Reservoirs

List Costs

Capacity (Gal)	Standard Tank w/ Concrete Floor	Model	Standard Tank w/ Glass Coated, Bolted Steel Floor (Conc
10,000	$ 23,000	1410	$ 25,000
20,000	$ 37,000	1419	$ 39,000
30,000	$ 40,000	1719	$ 42,200
50,000	$ 50,000	2024	$ 53,000
100,000	$ 70,500	3119	$ 77,500
250,000	$ 120,000 *	4224	$ 130,000

* with Temcor Dome

Notes: (Any variations or extra costs required)

Must Add for any tank piping/Nozzles, liquid level gauge, color selection, etc...

Std. tank includes concrete foundation, roof, roof manway, gravity vent, bottom manway hatch, exterior protective bolt caps, ladder + cage assembly, top manway platform, cobalt blue color. (Delivered + installed with tax)

~~Architect - 5%~~
~~Plumbing - 4%~~
~~Site Prep~~
~~Engineering - 10%~~

CLEARWELL STORAGE

Construction Costs

Product filtered water is commonly stored in a clearwell at the plant site which serves as a supplement to distribution system storage before high-service pumping. In many cases, filter backwash pumps also draw from the clearwell, eliminating the need for a separate sump. Clearwell storage may be either below ground in reinforced concrete structures, or above ground in steel tanks. Conceptual designs for below and above-ground level clearwells are shown in Table 171.

TABLE 171. CONCEPTUAL DESIGNS FOR CLEARWELL STORAGE

Below-Ground Concrete Clearwells				Ground-Level Steel Clearwells		
	Size, ft				Size, ft	
Capacity, gal	Length	Width	Depth	Capacity, gal	Diameter	Depth
5,000	8	8	10	1,000	5.7	5
10,000	11	11	12	5,000	8.5	12
50,000	18	18	20	10,000	12	12
100,000	26	26	20	25,000	15	20
500,000	58	58	20	100,000	23.5	32
				500,000	52	32
				1,000,000	74	32

Construction costs are shown in Table 172 for below-ground reinforced concrete clearwells and in Table 173 for ground-level steel clearwells. Costs for ground-level clearwells are based on field erected welded steel tanks designed to meet AWWA D100 for 18.93 m^3 (5,000 gal) and more, and on shop fabricated welded steel tanks for the 3.79 m^3 (1,000 gal) tank. Steel tanks are painted inside and out and are installed on a concrete ring wall with oiled sand cushion. Cathodic protection is included for tanks with capacities of 94.63 m^3 (25,000 gal) and larger. A typical ground-level storage reservoir is shown in Figure 166. Figure 167 presents the construction costs for both types of clearwells.

TABLE 172. CONSTRUCTION COST SUMMARY FOR BELOW-GROUND CONCRETE CLEARWELL STORAGE

Cost Category	Clearwell Capacity, gal				
	5,000	10,000	50,000	100,000	500,000
Excavation and Sitework	$ 3,300	$ 5,700	$16,500	$ 25,300	$ 75,400
Concrete	9,800	16,500	37,000	64,000	216,400
Steel	300	400	500	500	600
Electrical, Instrumentation	2,600	2,600	2,600	2,600	2,600
Subtotal	16,000	25,200	56,600	92,400	295,000
Design Contingencies	2,400	3,800	8,500	13,900	44,300
Total	$18,400	$29,000	$65,100	$106,300	$299,300

TABLE 173. CONSTRUCTION COST SUMMARY FOR GROUND-LEVEL STEEL CLEARWELLS

Cost Category	Clearwell Capacity, gal						
	1,000	5,000	10,000	25,000	100,000	500,000	1,000,000
Excavation and Sitework	$ 100	$ 100	$ 100	$ 100	$ 200	$ 400	$ 500
Concrete	3,100	5,300	6,600	8,400	11,400	25,700	37,100
Steel Tank	3,000	4,900	12,600	26,600	52,300	121,200	191,000
Electrical, Instrumentation	2,600	2,600	2,600	2,600	2,600	2,600	2,600
Subtotal	8,800	12,900	21,900	37,700	66,500	149,900	231,200
Design Contingencies	1,300	1,900	3,300	5,700	10,000	22,500	34,700
Total	$10,100	$14,800	$25,200	$43,400	$76,500	$172,400	$265,900

Notes: 1. Oiled sand cost is included in concrete category.
2. Cathodic protection cost is included in the steel tank category.

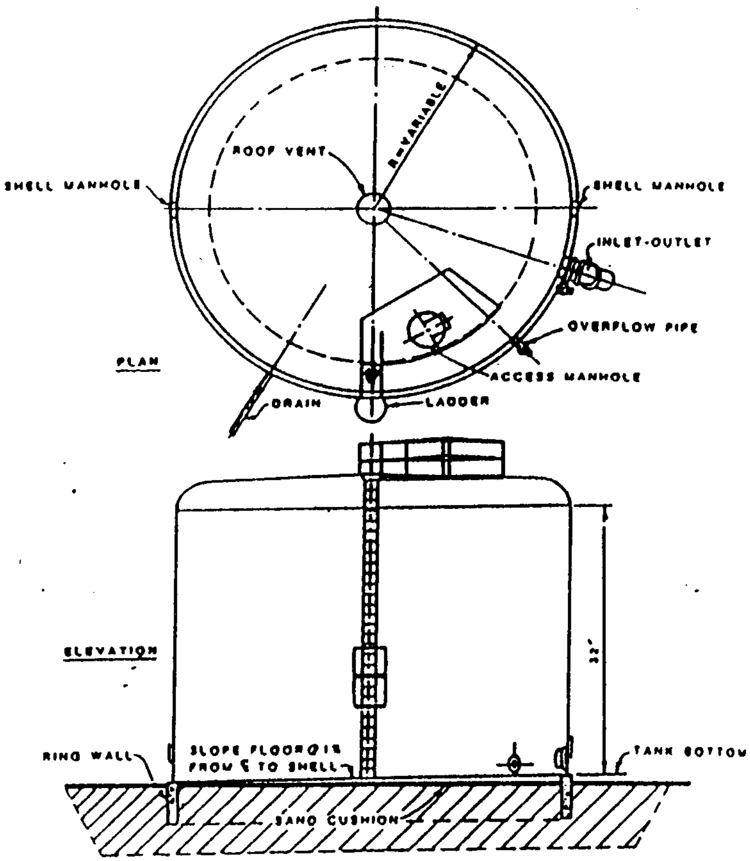


Figure 166. Typical ground-level steel clearwell.

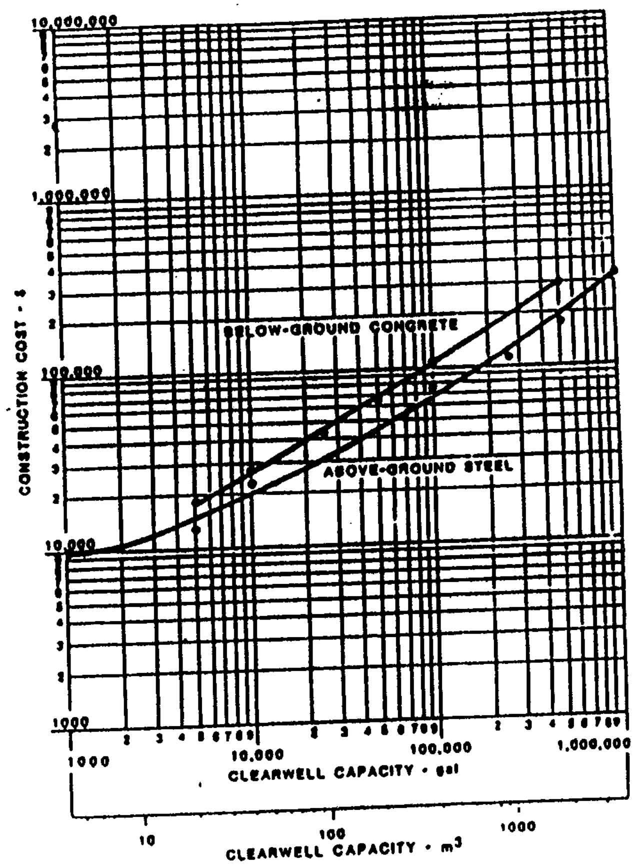


Figure 167. Construction cost for clearwell storage.

EXHIBIT (GCH-4)
PAGE 160 OF 284

APPENDIX I

High Service Pumps
Standard Horizontal Split Case Pumps
Package Costs

Capacity @ 175' of Head (gpm)	Motor Size (HP)	Worthing. Package Cost ($)	Peerless Package Cost ($)	Worthing. Const. Cost ($)	Peerless Const. Cost ($)	Overall Package Cost ($)	Overall Unit Cost ($/gpm)
100	20	4,300	--	4,300	--	4,300	43
250	25	4,600	4,925	4,600	4,925	4,763	19.05
500	40	5,700	6,185	5,700	6,185	5,943	11.885
750	50	6,000	7,350	6,000	7,350	6,675	8.9
1,000	60	8,000	--	8,000	--	8,000	8.7875
1,000	75	--	9,575	--	9,575	9,575	8.7875
1,250	75	8,600	10,800	8,600	10,800	9,700	7.76
1,500	100	9,500	11,650	9,500	11,650	10,575	7.05
1,750	125	10,800	13,150	10,800	13,150	11,975	6.8429
2,000	125	10,800	13,150	10,800	13,150	11,975	5.9875
2,500	150	14,700	16,200	14,700	16,200	15,450	6.18
3,000	200	15,600	17,800	15,600	17,800	16,700	5.5667
3,500	200	--	17,800	--	17,800	17,800	5.8571
3,500	250	23,200	--	23,200	--	23,200	5.8571
4,000	250	23,200	30,700	23,200	30,700	26,950	6.7375
5,000	300	24,600	33,200	24,600	33,200	28,900	5.78

Notes:
1) All costs obtained from manufacturers' quotations include pumps, factory testing, and freight to jobsite.
2) Horizontal Split Case pumps and motors.
3) Pump head is 175 feet (76 psi)
4) Costs are based on June 1995, ENR Index = 5433.

CURVE EQUATION:

$$Y = (3818.44) + (4.108873)X + (2.262538E\text{-}04)X^2$$

*** Const. Cost curve, divide by capacity for unit cost values.

Capacity @ 175' of Head (gpm)	Curve Unit Cost ($/gpm)	Manuf. Unit Cost ($/gpm)
100	42	43
150	30	
200	23	
250	19	19.05
300	17	
350	15	
400	14	
450	13	
500	12	11.885
600	11	
750	9	8.9
850	9	
950	8	
1,000	8	8.7875
1,250	7	7.76
1,500	7	7.05
1,750	7	6.84286
2,000	6	5.9875
2,250	6	
2,500	6	6.18
2,750	6	
3,000	6	5.56667
3,250	6	
3,500	6	5.85714
3,750	6	
4,000	6	6.7375
4,250	6	
4,500	6	
4,750	6	
5,000	6	5.78

High Service Pump Unit Cost Curve

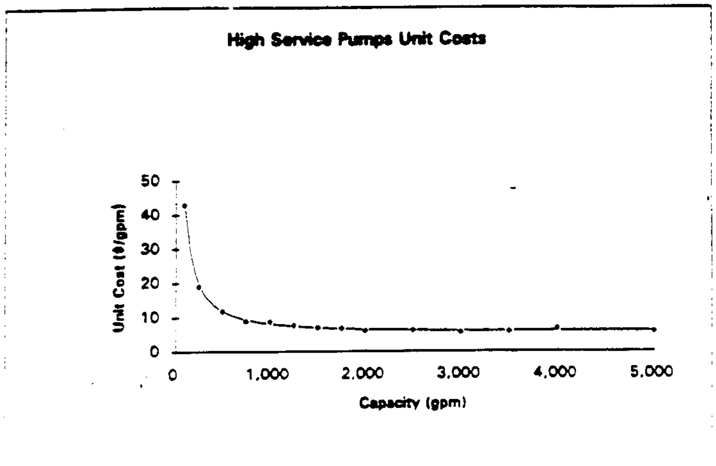
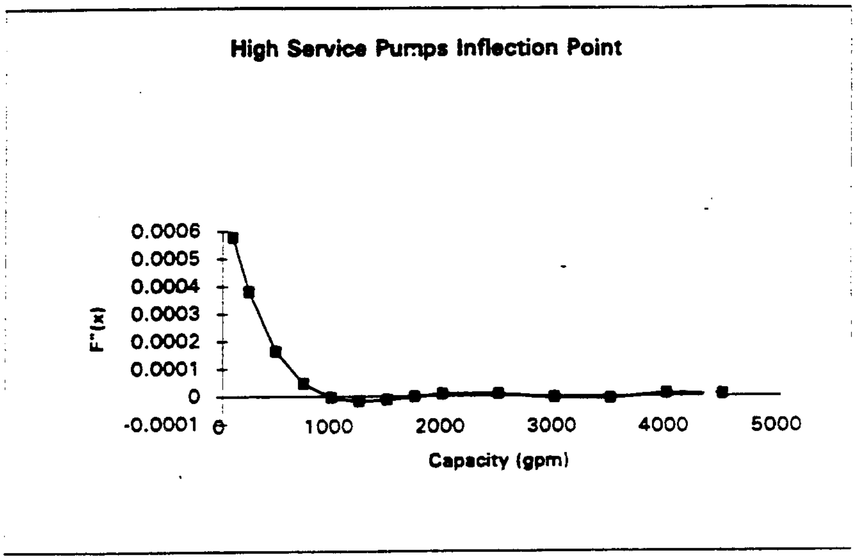


EXHIBIT (GCH-4)

PAGE 114 OF 284

HIGH SERVICE PUMP INFLECTION POINT

Capacity (gpm)	F"(x)
100	0.0006
250	0.0004
500	0.0002
750	5E-05
1000	-4E-06
1250	-2E-05
1500	-1E-05
1750	-1E-06
2000	8E-06
2500	8E-06
3000	-5E-06
3500	-8E-06
4000	1E-05
4500	7E-06



Peerless Pump Company

811 North 50th Street
Tampa, FL 33619

Fax Message

Number of pages including cover: 2

Phone:
Fax:

To:	HARTMAN & ASSOCIATES	*Date:*	07/07/95
Fax Number:	407-839-3790		
From:	JIM GOSSETT	*Copy to:*	

Subject: REQUEST FROM JAMEY WALLACE FOR VARIOUS PRICING.

I HAVE ENCLOSED PRICING THAT YOU ASKED FOR, SEE NOTES AS TO WHAT IS, AND WHAT ISN'T INCLUDED.

LET ME KNOW IF I CAN BE OF FURTHER SERVICE TO YOU.

Peerless High Service Pumps
List Costs

Type: Standard Horizontal Split Case

	Capacity @ 175' of Head ≈ 76 psi (gpm)		Motor Size (HP)	Package Cost ($)
*125 GPM @ 176' (PE-835)	100		10	$ 730.00
	250	2AE-11	25	4,925.00
	500	3AE-14	40	6,185.00
	750	5AE-14N	50	7,350.00
	1000	5AE-14	75	9,575.00
	1250	6AE-16G	75	10,800.00
	1500	6AE-16	100	11,650.00
	1750	6AE-14G	125	13,150.00
	2000	6AE-14G	125	13,150.00
	2500	8AE-15G	150	16,200.00
	3000	8AE-15	200	17,800.00
	3500	8AE-15	200	17,800.00
	4000	8AE-17	250	30,700.00
	5000	10AE-16	300	33,200.00

Note: (Any extra costs needed).

**** THESE COSTS INCLUDE A NON WITNESSED FACTORY TEST, AND FREIGHT TO JOBSITE, BUT NO TAXES, ELECTRICAL OR INSTALLATION.

BARNEY'S PUMPS INC.
FT. LAUDERDALE • JACKSONVILLE • LAKELAND

BARNEY'S PUMPS INC.
3907 HIGHWAY 98 SOUTH
P.O. BOX 3529
LAKELAND, FLORIDA 33802

PHONE : (813) 665-8500
FAX: (813) 666-3858

TO: JAMEY WALLACE

COMPANY: HARTMAN & ASSOC.

FROM:: DAVID THOMPSON

SUBJECT: WORTHINGTON HORIZONTAL SPLIT CASE PUMPS

SELECTIONS ATTACHED!

REGARDS

FAX NUMBER: (407) 839-3790

COVER PAGE PLUS 1 PAGES FOR A TOTAL OF 2 PAGE(S)

SIGNED: David Thompson

Worthington High Service Pumps
List Costs

Type: Standard Horizontal Split Case

Capacity @ 175' of Head ≈ 76 psi (gpm)	Motor Size (HP)	Package Cost ($)	PUMP
100	20	4,300	2.5LR10
250	25	4,600	2.5LR13
500	40	5,700	4LR14
750	50	6,000	4LR14
1000	60	8,000	5LR15
1250	75	8,600	5LR15
1500	100	9,500	5LR15
1750	125	10,800	6LR16
2000	125	10,800	6LR16
2500	150	14,700	6LR18
3000	200	15,600	6LR18
3500	250	23,200	8LR18S
4000	250	23,200	8LR18S
5000	300	24,600	8LR18S

Note: (Any extra costs needed).

APPENDIX J

Hydropneumatic Tank
Construction & Unit Costs

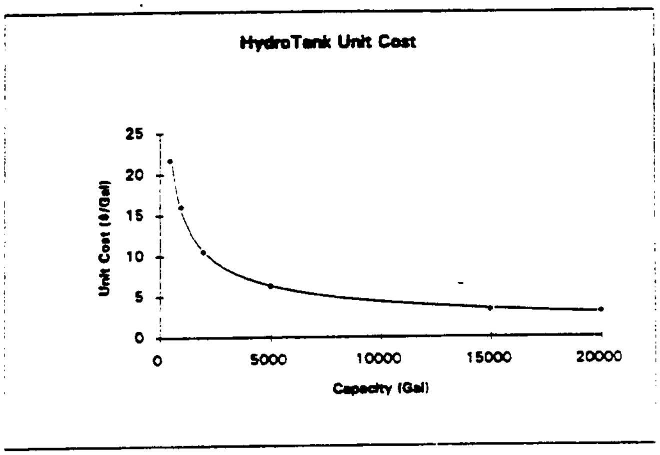
Capacity (Gal)	System Estimate ($)	Manufacturer Cost ($)	Manufacturer Unit Cost ($)
500	6,594	10,880	22
1,000	9,751	16,089	16
2,000	12,786	21,097	11
5,000	19,241	31,748	6
15,000	30,344	50,068	3
20,000	37,241	61,448	3

Notes: (1) Costs of the tank, air volume control compressor, and a control panel were included in the manufacturers' quotations.
(2) 15% piping, 20% electrical, 20% installation, and 10% sitework were added to the quoted costs.
(3) Costs are based on June 1995, ENR Index = 5433.

CURVE EQUATION:

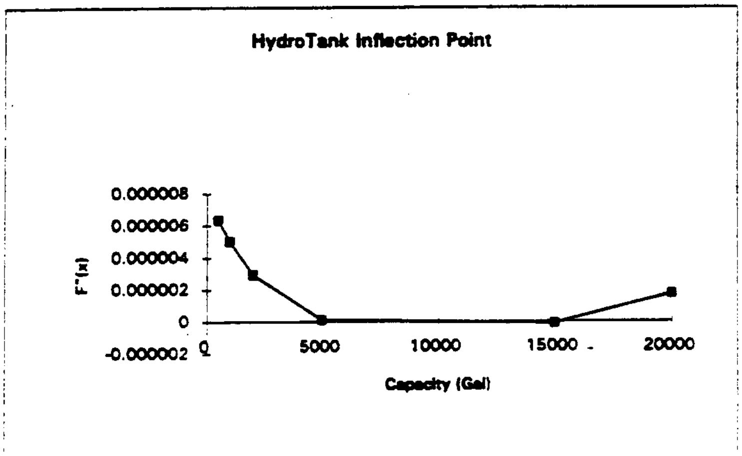
Y = (680.1492)X^(-0.5484723)

Capacity (Gal)	Curve Unit Cost ($/Gal)	Manuf. Unit Cost ($/Gal)
500	23	21.7602
600	20	
700	19	
800	17	
900	16	
1000	15	16.08915
1500	12	
2000	11	10.54845
2500	9	
3000	8	
3500	8	
4000	7	
4500	7	
5000	6	6.34953
6000	6	
7000	5	
8000	5	
9000	5	
10000	4	
11000	4	
12000	4	
13000	4	
14000	4	
15000	3	3.33784
16000	3	
17000	3	
18000	3	
19000	3	
20000	3	3.072383



HYDROTANK INFLECTION POINT

Capacity (gpm)	F"(x)
500	6.36E-06
1000	5.02E-06
2000	2.93E-06
5000	1.3E-07
15000	-1.2E-07
20000	1.74E-06



HYDRO-AIR SYSTEMS, INC.

P.O. Box 585654
Orlando, Fl 32858-5654
Phone or Fax (407)-352-1531

***** FAX TRANSMISSION *****

This transmission consists of 1 pages including this page, if you do not receive all pages please notify this office immediately.

DATE: June 27, 1995

TO: Hartman & Associates, Inc.

REF: Hydropneumatic Tank System Estimate

ATTN: Jamey Wallace

FROM: Ken Miller

Pursuant to your request we are pleased to offer the following for your consideration and approval. All systems include the Hydro-Tank, Air volume control compressor control panel and all accessories to provide an operable system. All systems are based on a maximum pressure of 100psi, potable water and do not include installation cost or applicable taxes. We will be happy to provide a detailed proposal on any of the six systems upon request. If we can be of further assistance please feel free to call me at any time.

CAPACITY GALLONS	SYSTEM ESTIMATE
500	$5,387.00
1,000	$9,102.00
2,000	$12,972.00
5,000	$21,982.00
15,000	$28,688.00
20,000	$36,482.00

Ken Miller

RECORD OF TELEPHONE COMMUNICATION

DATE: 10/19 TIME: 9:50

PROJECT NAME: SSU- Economy of Scale PROJECT NO.: 95-145.00

PARTY CALLING: Bob Black COMPANY: Modern Tanks

PARTY CONTACTED: James Wallace COMPANY: HAI

SUBJECT: Costs for Hydropneumatic Tanks

Modern Welding Company Incorporated

TELEPHONE COMMUNICATION SUMMARY (Including Decisions & Commitments)

+ extras (15% piping, 20% elect., 20% install., 10% site)

500 Gal	→ $4,800 + $3000	Compressor + Valves	= 7800 (1.65) = 12,870
1000 Gal	→ $6,400 + $4000		= 10,400 (1.65) = 17,160
2000 Gal	→ $8,600 + $4000		= 12,600 (1.65) = 20,790
5000 Gal	→ $12,500 + $4000		= 16,500 (1.65) = 27,225
16,000 Gal	→ $27,000 + $5000		= 32,000 (1.65) = 52,800
20,000 Gal	→ $33,000 + 5000		= 38,000 (1.65) = 62,700

ACTION REQUIRED

c.c.

HARTMAN & ASSOCIATES, INC.

engineers, hydrogeologists, scientists & management consultants

EXHIBIT (GCH-4)
PAGE 175 OF 284

APPENDIX K

Potable Water Supply Wells

Construction Costs

Capacity (Gpd)	Manuf. 250' deep Const. Cost ($)	Manuf. 250' deep Unit Cost ($/Gal)	Manuf. 500' deep Const. Cost ($)	Manuf. 500' deep Unit Cost ($/Gal)
144,000	50,794	0.353	95,573	0.664
288,000	61,582	0.214	118,753	0.412
576,000	72,416	0.126	143,026	0.248
720,000	72,494	0.101	144,731	0.201
1,080,000	81,468	0.075	165,253	0.153
1,440,000	84,413	0.059	175,948	0.122
2,160,000	107,648	0.050	219,108	0.101
2,880,000	113,538	0.039	236,174	0.082
3,600,000	143,298	0.040	278,582	0.077

NOTES:

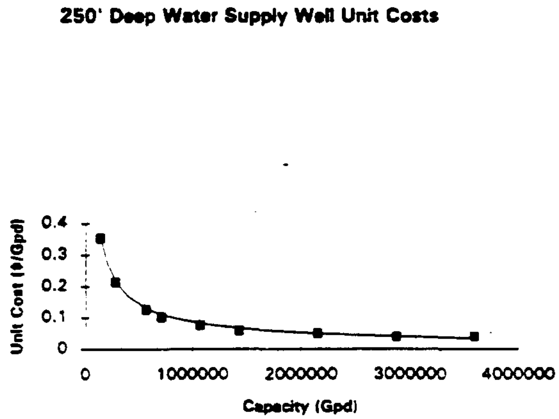
(1) Vertical turbine pump, cement grout, black steel well and surface casing, well screen, and well development costs from manufacturers' quotes and bid tabulations.
(2) Includes 10% electrical, 15% for well head assembly, and 30% labor costs.
(3) Costs are based on June 1995, ENR Index = 5433.

CURVE EQUATION:

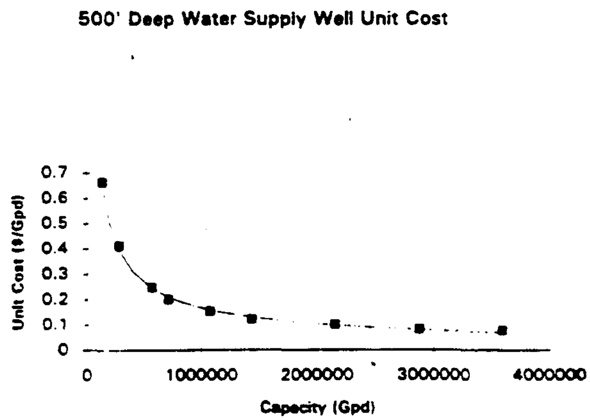
(250' deep) Y = (1780.326)X^(-0.7180454)

(500' deep) Y = (2064.79)X^(-0.6817897)

Capacity (GPD)	250' Curve Cost ($/Gal)	250' Manuf. Cost ($/Gal)
144000	0.352014923	0.35
200000	0.278047715	
288000	0.213997092	0.21
400000	0.169030909	
576000	0.130093221	0.13
600000	0.126335269	
720000	0.110832946	0.10
850000	0.098380166	
1080000	0.082837572	0.08
1200000	0.076801801	
1440000	0.067377621	0.06
1750000	0.058575335	
2160000	0.050358659	0.05
2500000	0.045340692	
2880000	0.040960238	0.04
3000000	0.039777035	
3600000	0.034896083	0.04



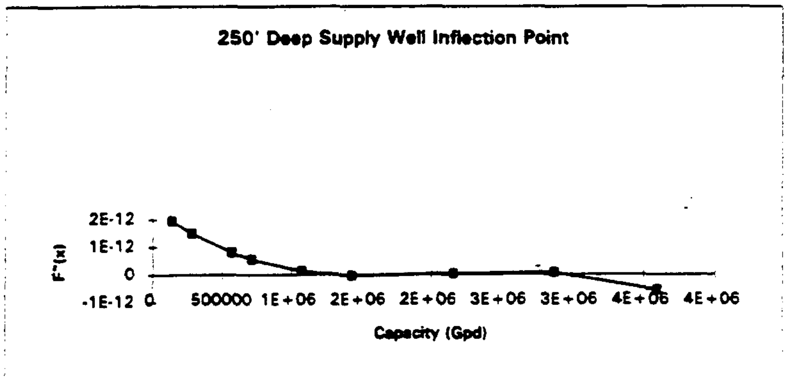
Capacity (GPD)	500' Curve Cost ($/Gal)	500' Manuf. Cost ($/Gal)
144000	0.62799686	0.66
200000	0.501982108	
288000	0.39148788	0.41
400000	0.31293136	
576000	0.244050202	0.25
600000	0.237351445	
720000	0.20960755	0.20
850000	0.187179868	
1080000	0.158982644	0.15
1200000	0.147962864	
1440000	0.130667557	0.12
1750000	0.114402852	
2160000	0.099108423	0.10
2500000	0.089706991	
2880000	0.081457039	0.08
3000000	0.079221184	
3600000	0.069961059	0.08



WATER SUPPLY WELL INFLECTION POINTS (250' & 500')

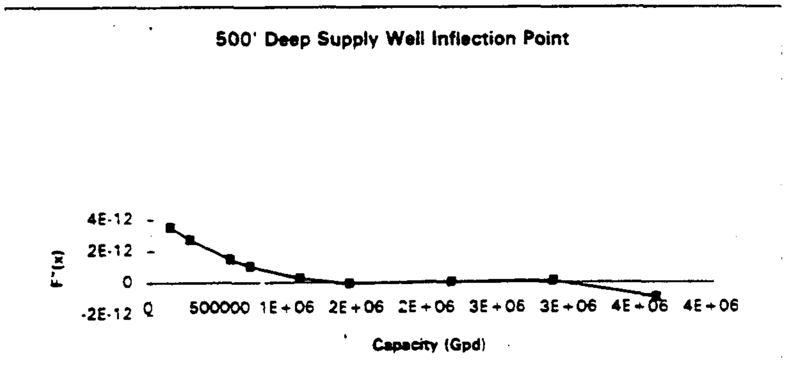
Potable Water Wells (250' deep)

Capacity (gpd)	F"(x)
144000	1.9547E-12
288000	1.50714E-12
576000	8.13596E-13
720000	5.56933E-13
1080000	1.35295E-13
1440000	-3.8732E-14
2160000	2.25217E-14
2880000	7.36539E-14
3600000	-5.5238E-13



Potable Water Wells (500' deep)

Capacity (gpd)	F"(x)
144000	3.52E-12
288000	2.72E-12
576000	1.49E-12
720000	1.03E-12
1080000	2.73E-13
1440000	-5.2E-14
2160000	3.11E-14
2880000	1.29E-13
3600000	-9.1E-13



**** The y-axis values are the same as those listed in the table; however, they are too small to show up on this graph. Just click on the graph to see a larger version with the values.

* *

Capacity (Gpd)	Design Cost	(15%) Well Head	(30%) Labor	(10%) Electrical	Total	Unit Cost ($/Gal)
144,000	32,770	4,916	9,831	3,277	$50,794	0.35
288,000	39,730	5,960	11,919	3,973	$61,582	0.21
576,000	46,720	7,008	14,016	4,672	$72,416	0.13
720,000	46,770	7,016	14,031	4,677	$72,494	0.10
1,080,000	52,560	7,884	15,768	5,256	$81,468	0.08
1,440,000	54,460	8,169	16,338	5,446	$84,413	0.06
2,160,000	69,450	10,418	20,835	6,945	$107,648	0.05
2,880,000	73,250	10,988	21,975	7,325	$113,538	0.04
3,600,000	92,450	13,868	27,735	9,245	$143,298	0.04
144,000	61,660	9,249	18,498	6,166	$95,573	0.66
288,000	76,615	11,492	22,985	7,662	$118,753	0.41
576,000	92,275	13,841	27,583	9,228	$143,026	0.25
720,000	93,375	14,006	28,013	9,338	$144,731	0.20
1,080,000	106,615	15,992	31,985	10,662	$165,253	0.15
1,440,000	113,515	17,027	34,055	11,352	$175,948	0.12
2,160,000	141,360	21,204	42,408	14,136	$219,108	0.10
2,880,000	152,370	22,856	45,711	15,237	$236,174	0.08
3,600,000	179,730	26,960	53,919	17,973	$278,582	0.08

Final
Well
Costs

Design Well Costs

Adders: (surface casing, well casing, well screen, boring, [redacted] cement grout, well development, [redacted])

Flow	Cost	W/200' column	Casing	Cost	Surface Casing	Cost	Grout	Cost
100	11,000	4,870	6"	3,760	10"	1,650	4 yd³	2,000
200	12,500	5,480	10"	4,950	16"	2,300	6 yd³	3,000
400	14,200	6,020	12"	6,000	18"	2,500	10 yd³	5,000
500	14,700	6,020	12"	6,000	18"	2,500	10 yd³	5,000
750	18,700	7,810	12"	6,000	18"	2,500	10 yd³	5,000
1000	20,600	7,810	12"	6,000	18"	2,500	10 yd³	5,000
1500	29,500	10,250	16"	6,900	20"	3,300	12 yd³	6,000
2000	33,300	10,250	16"	6,900	20"	3,300	12 yd³	6,000
2500	46,000	13,450	18"	7,500	24"	3,750	15 yd³	7,500
		W/ 400' column						
100	14,300	14,610	6"	9,375	10"	4,125	10 yd³	5,000
200	17,300	16,110	10"	12,375	16"	5,750	15 yd³	7,500
400	20,200	19,500	12"	15,000	18"	6,250	25 yd³	12,500
500	21,300	19,500	12"	15,000	18"	6,250	25 yd³	12,500
750	28,900	25,140	12"	15,000	18"	6,250	25 yd³	12,500
1000	35,800	25,140	12"	15,000	18"	6,250	25 yd³	12,500
1500	48,600	32,010	16"	17,250	20"	8,250	30 yd³	15,000
2000	57,000	34,620	16"	17,250	20"	8,250	30 yd³	15,000
2500	68,000	43,230	18"	18,750	24"	9,375	38 yd³	19,000

HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants

SH. NO: 1 JOB NO: 95-145.00
MADE BY: JJW DATE:
CHECKED BY: DATE:

Design Well Costs

Adders (surface casing, well casing, well screen, boring, cement grout, well development)

Flow	Well Screen	Cost	Drill/ Bore	Cost	Well Development (6 hrs.)
100	6"	3,500	6" (\$15)	\$3,750	6,000
200	10"	5,500	10" (\$17.5)	\$4,375	6,000
400	12"	6,550	12" (\$20)	\$5,000	6,000
500	12"	6,550	12" (\$20)	\$5,000	6,000
750	12"	6,550	12" (20)	\$5000	6,000
1000	12"	6,550	12" (\$20)	\$5,000	6,000
1500	16"	7,500	16" (\$25)	\$6,250	6,000
2000	16"	7,500	16" (\$25)	\$6,250	6,000
2500	18"	8,250	18" (\$27.5)	\$6,875	6,000
100	6"	5,250	6" (\$15)	\$7,500	9000
200	10"	8,250	10" (\$17.5)	\$8,750	9000
400	12"	9,825	12" (\$20)	\$10,000	9000
500	12"	9,825	12" (\$20)	\$10,000	9,000
750	12"	9,825	12" (\$20)	\$10,000	9,000
1000	12"	9,825	12" (\$20)	\$10,000	9,000
1500	16"	11,250	16" (\$25)	\$12,500	9000
2000	16"	11,250	16" (\$25)	\$12,500	9,000
2500	18"	12,375	18" (\$27.5)	\$13,750	9,000

Included in installation

HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants

SH. NO: 2 JOB NO: 95-145.00
MADE BY: JJW DATE:
CHECKED BY: DATE:

EXHIBIT ______

EXHIBIT (GCH-4)

PAGE 182 OF 284

Well Design

Design Parameters

	Column	Casing	OD casing	Enclosure
100 GPM	4" column ⇒	6" casing ⇒	10" OD casing	40 ft²
200 GPM	5-6" column ⇒	10" casing ⇒	16" OD casing	50 ft²
400 gpm	6" column ⇒	12" casing ⇒	18" OD casing	70 ft²
500 gpm	6" column ⇒	12" casing ⇒	18" OD casing	80 ft²
750 gpm	8" column ⇒	12" casing ⇒	18" OD casing	100 ft²
1000 gpm	8" column ⇒	12" casing ⇒	18" OD casing	120 ft²
1500 gpm	10" column ⇒	16" casing ⇒	20" OD casing	150 ft²
2000 gpm	10" column ⇒	16" casing ⇒	20" OD casing	~~175~~ ft²
2500 gpm	12" column ⇒	18" casing ⇒	24" OD casing	200 ft²

for 250' wells

OD casing Depth ⇒ 50' Screen-perf. pipe ⇒ 50'

ID casing Depth ⇒ 150'

Grout ⇒ 50'

Drilled-Bore ⇒ 250'

for 500' wells

O.D. casing Depth ⇒ 125' Screen-perf. pipe ⇒ 75'

ID. casing Depth ⇒ 375'

Grout ⇒ 125'

Drilled-Bore ⇒ 500'

FLANAGAN-METCALF & ASSOCIATES, INC.

WATER AND WASTEWATER EQUIPMENT

6708 BENJAMIN RD. SUITE 300 TAMPA, FL 33634
PHONE (813) 884-2663 FAX (813) 884-1898

FAX MESSAGE TO:

NAME: JAMEY WALLACE

FROM: MIKE BITTING

COMPANY: HARTMAN & ASSOC

DATE: 8/16/95

FAX NO.: 407 839 3790

TOTAL NUMBER OF PAGES: 2

SUBJECT: FLOWAY VERTICAL TURBINE BUDGET PRICES

THE ATTACHED PRICES INCLUDE TEFC PREMIUM EFF MOTORS, 1770 RPM, 100' OF COLUMN SIZED PER AWWA STANDARDS, FREIGHT & START-UP SERVICE.

PLEASE CALL IF YOU HAVE ANY QUESTIONS.

• NEED 200' OF COLUMN FOR 25 [illegible]
• NEED 450' " " " 5 [illegible]

$/FT FOR COLUMN PIPE BASED ON DIAMETER

VALERIE: COST FILE FOR WELL INFO

EXHIBIT (GCH-4)

HARTMAN & ASSOCIATES, INC.

engineers, hydrogeologists, surveyors & management consultants

SH. NO.:	JOB NO.:
MADE BY:	DATE:
CHECKED BY:	DATE:

FAX	DATE 8/10	PAGES 1	FROM MIKE [illegible]
TO Jamey Wallace			CO. FLANAGAN-METCALF
CO. Hartman & Assoc			DEPT 813-884-2882
FAX # 407 839 3955			FAX # 813-884-1898

MESSAGE

Peabody - Floway

Vertical Turbine Pump Costs

Flow (GPM)	Head (psi)	Motor Size (HP)	Cost ($)	Column Adder Per 10' Length
100	130	15	$11,000	$487
250	130	25	12,500	548
400	130	50	14,200	602
500	130	50	14,700	602
750	130	75	18,700	781
1000	130	100	20,600	781
1500	130	150	29,500	1025
2000	130	200	33,300	1025
2500	130	250	46,000	1345
100	250	25	$14,300	487
200	250	50	17,300	548
400	250	100	20,200	650
500	250	100	21,300	650
750	250	150	28,900	838
1000	250	200	35,800	838
1500	250	300	48,600	1067
2000	250	400	57,000	1154
2500	250	500	68,000	1441

NOTES: (Any Extra Costs provided or needed).

Peerless Pump Company
811 50th Street No. • Tampa, FL 33619
Tampa Sales Office
Phone (813) 247-1521 • Fax (813) 247-4342

HARTMAN & ASSOCIATES, INC.
201 EAST PINE STREET--SUITE 1000
ORLANDO, FL 32801

ATTEN: JAMEY WALLACE

RE: PRICING ON VERTICAL TURBINE PUMPS:

GPM	TDH	H.P. REQ.	$
100	130	7.50	7,225.00
200	130	10	8,500.00
400	130	20	9,400.00
500	130	25	9,100.00
750	130	40	11,000.00
1000	130	40	11,000.00
1500	130	75	14,000.00
2000	130	100	17,000.00
2500	130	100	21,500.00

JAMEY, I HAVE INCLUDED FREIGHT TO JOBSITE, BUT NO ELECTRICAL, OR INSTALLATION, OR FITTINGS OTHER THAN THE PUMP ARE INCLUDED.

SINCERELY,

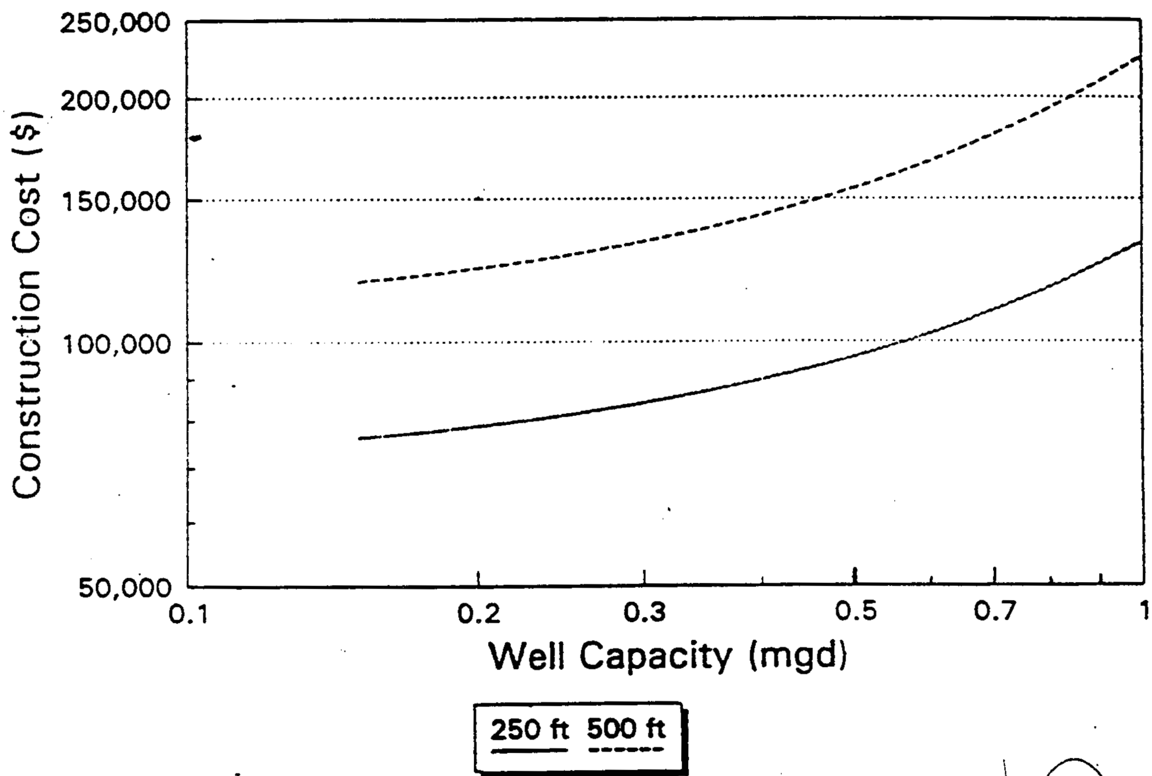
Jim Gossett

JIM GOSSETT
SALES ENGINEER
PEERLESS PUMP CO.

Wells -

Pumps, pipes, electrical, Contingencies, installation, excavation, housing

GRAPH #9



Note: Source C, Figure 147, and pages 374-381.

Some Comments

WATER WELLS

Introduction

Water wells are drilled by the cable tool, hydraulic rotary or reverse rotary methods, with hydraulic rotary currently the most common method. Construction of these types of water wells is covered by "American Water Works Association Standard for Deep Wells, AWWA A100-66" and by "Manual of Water Well Construction Practices, EPA-570/9-75-001."[1,2]

Construction of water wells by the hydraulic rotary method takes place in the following sequence:

1. Install protective casing and grout in place for sanitary seal.
2. Drill 15.2 to 30.5 cm (6 to 12 in) diameter pilot hole.
3. Electric log pilot hole to help determine location of water bearing formations.
4. Ream hole to required diameter and depth.
5. Install blank and perforated casing or well screen.
6. Place gravel pack and grout seals.
7. Develop well by pumping and bailing.
8. Conduct pumping test to verify capacity before permanent pump is installed.
9. Install pump and construct enclosure.

Conceptual design criteria for wells are shown in Table 154 and a cross-section for a typical well is shown in Figure 146.

TABLE 154. CONCEPTUAL DESIGNS FOR WATER WELLS

Well Capacity, gal/day	Well Capacity, gal/min	Casing Diameter, in	Well Depth, ft	Pump Motor Size, hp	Enclosure, sq ft
144,000	100	8	250	10	40
			500	20	
432,000	300	10	250	25	60
			500	50	
720,000	500	12	250	40	80
			500	75	
1,008,000	700	16	250	50	100
			500	100	

Notes: 1. Maximum pumping depth 50-100 ft less than well depth.
2. Enclosure has a 10 ft height.

Construction Costs

Construction costs were developed for water well construction by the hydraulic rotary method, as outlined in the previous section. The protective casing and grout was installed to a depth of 7.62 m (25 ft). Casing is blank and perforated copper bearing steel, with gravel packing and grout seals. After construction, the well is developed by bailing and pumping to remove drilling mud, silt and fine sand. The completed well is then test pumped until the water has sufficient clarity for potable use. This often requires pumping for up to 60 hours.

The permanent pump is the oil lubricated, deep-well turbine type and the electric motor is 220/440 volt. A submersible type pump at somewhat reduced cost could be used in some cases, particularly for shallow, small capacity wells. Pump motor sizes and casing diameter used in the cost development are shown in Table 154.

The electrical cost includes all work required at the well but does not include providing service to the site. Costs include a valve and totalizing flow meter on the discharge, but no other piping or equipment. An enclosure is provided over the motor, totalizing meter, and valve.

Construction costs are summarized in Table 155 and presented in Figure 147 for wells capable of producing 545, 1,635, 2,725, and 3,815 m³/d (144,000, 432,000, 720,000 and 1,008,000 gpd) from wells 76.2 and 152.4 m (250 and 500 ft) deep.

Operation and Maintenance Requirements and Costs

Electricity requirements are based on continuous operation of the motor, at a pumping head 15.24 m (50 ft) less than the well depth. No energy is included for the housing, as it was assumed that heating and ventilation are unnecessary, and that lighting requirements are minimal. Many wells do not operate continuously and in these cases the energy requirements will be reduced according to the actual load factor. Material requirements are based on necessary lubricants and other routine maintenance items and servicing the pump and motor once in five years. Labor requirements are based on daily visits for inspection and routine maintenance. Labor and material required to remove and service the pump and motor once every five years are included in the average annual values.

Operation and maintenance requirements and costs are summarized in Table 156 and presented in Figures 148 and 149.

References

1. "AWWA Standard for Deep Wells," AWWA A100-66, January 23, 1966, American Water Works Association, 2 Park Avenue, New York, N. Y. 10016

2. "Manual of Water Well Construction Practices," EPA-570/9-75-001, U.S. Environmental Protection Agency, Office of Water Supply, Washington, D.C.

TABLE 155. CONSTRUCTION COST SUMMARY FOR WATER WELLS

Cost Category	100 GPM 144,000 gpd Well Depth 250 ft	100 GPM 144,000 gpd Well Depth 500 ft	432,000 gpd Well Depth 250 ft	432,000 gpd Well Depth 500 ft	720,000 gpd Well Depth 250 ft	720,000 gpd Well Depth 500 ft	700 GPM 1,008,000 gpd Well Depth 250 ft	700 GPM 1,008,000 gpd Well Depth 500 ft
Excavation & Sitework	$ 1,100	$ 1,100	$ 1,600	$ 1,600	$ 2,100	$ 2,100	$ 2,700	$ 2,700
Manufactured Equipment	10,300	13,400	15,500	18,500	18,500	21,600	21,600	25,800
Concrete	1,600	2,900	1,800	3,100	2,000	3,200	2,100	40,900
Labor	17,300	33,200	49,000	36,200	20,800	39,300	22,500	42,400
Pipe & Valves	5,600	10,300	7,500	13,300	9,200	16,100	12,900	23,000
Electrical, Instrumentation	7,700	10,100	11,600	13,900	13,900	16,200	16,200	19,300
Housing	3,400	3,400	4,700	4,700	6,100	6,100	10,100	10,100
Subtotal	47,000	74,400	61,700	91,300	72,600	104,600	88,100	164,200
Design Contingencies	7,100	11,200	9,300	13,700	10,900	15,700	13,200	24,600
Total	$54,100	$85,600	$71,000	$105,000	$83,500	$120,300	$101,300	$188,800

Subtract out

July 1995

EPA #'s

w/o labor, housing, cont.

	250'	500'	250'	500'
100 GPM	26,300	37,800	34,766	49,968
300 GPM	38,000	50,400	50,232	66,624
500 GPM	45,700	59,200	60,411	78,257
700 GPM	55,500	74,890	73,366	98,997

w/o housing & Des. cont.

	250'	500'
100 GPM	57,635	93,855
300 GPM	75,348	114,477
500 GPM	87,906	130,207
700 GPM	103,108	155,046

TABLE 156. OPERATION AND MAINTENANCE SUMMARY FOR WATER WELLS

Well Capacity, gpd	Energy, kwh/yr Building	Energy, kwh/yr Process	Energy, kwh/yr Total	Maintenance Material, $/yr	Labor, hr/yr	Total Cost, $/yr
Well Depth - 250 ft						
144,000	--	44,100	44,100	1,300	450	9,300
432,000	--	132,000	132,000	1,800	500	16,600
720,000	--	220,200	220,200	2,300	550	23,800
1,008,000	--	308,300	308,300	2,700	600	30,900
Well Depth - 500 ft						
144,000	--	99,700	99,100	1,800	500	14,300
432,000	--	297,300	297,300	2,500	550	29,400
720,000	--	495,600	495,600	2,800	600	44,100
1,008,000	--	693,700	693,700	3,300	650	59,000

Notes: 1. Total cost is based on $0.07/kwh of electrical energy and $11.00/hour of labor.
2. Pumping heads are 200 ft for the 250 ft deep well, and 450 ft for the 500 ft deep well.
3. Pumping is continuous, 24 hours/day, 365 days/year.

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EXHIBIT (L-H-7

80'/FT²

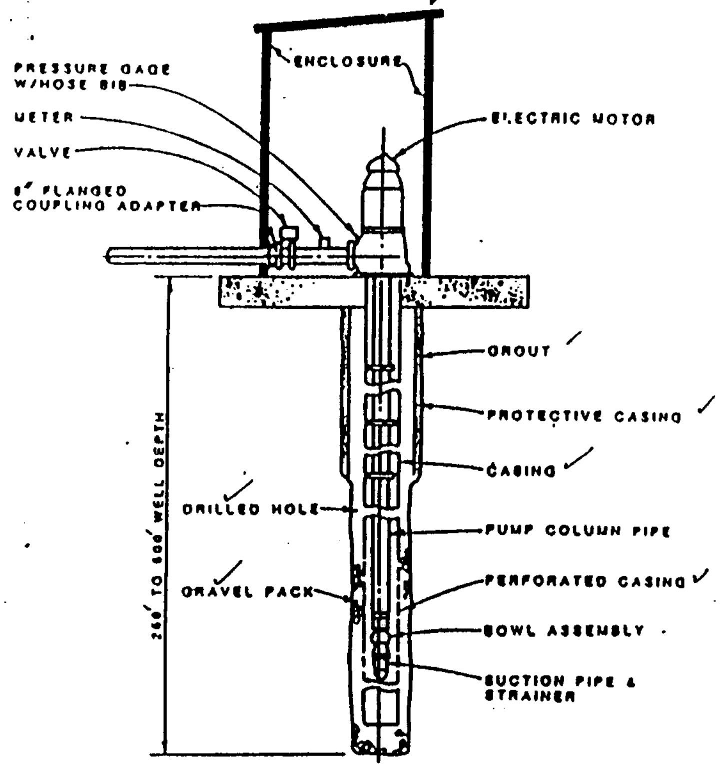


Figure 146. Typical water well.

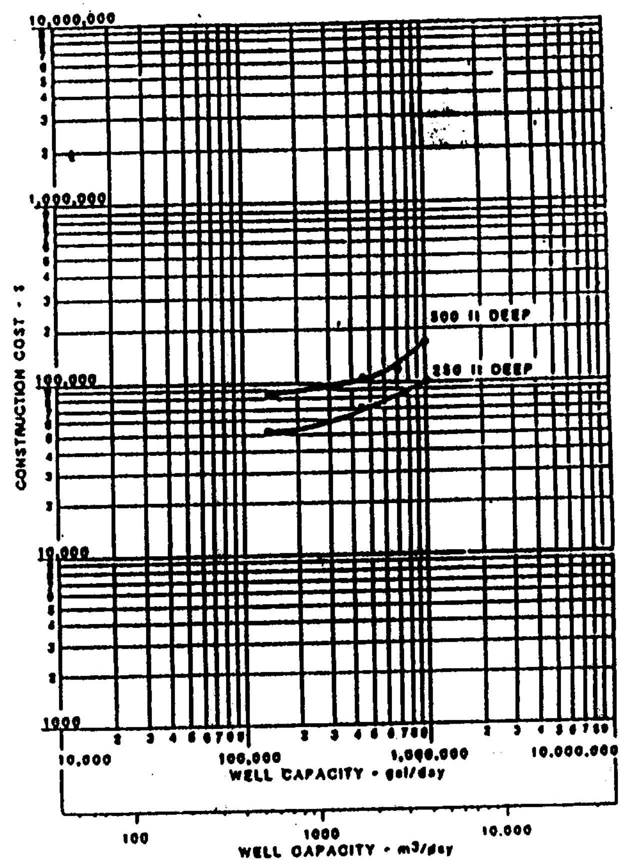


Figure 147. Construction cost for water wells.

EXHIBIT LL-H-4
PAGE 189 OF 224

APPENDIX L

Lime Softening WTP

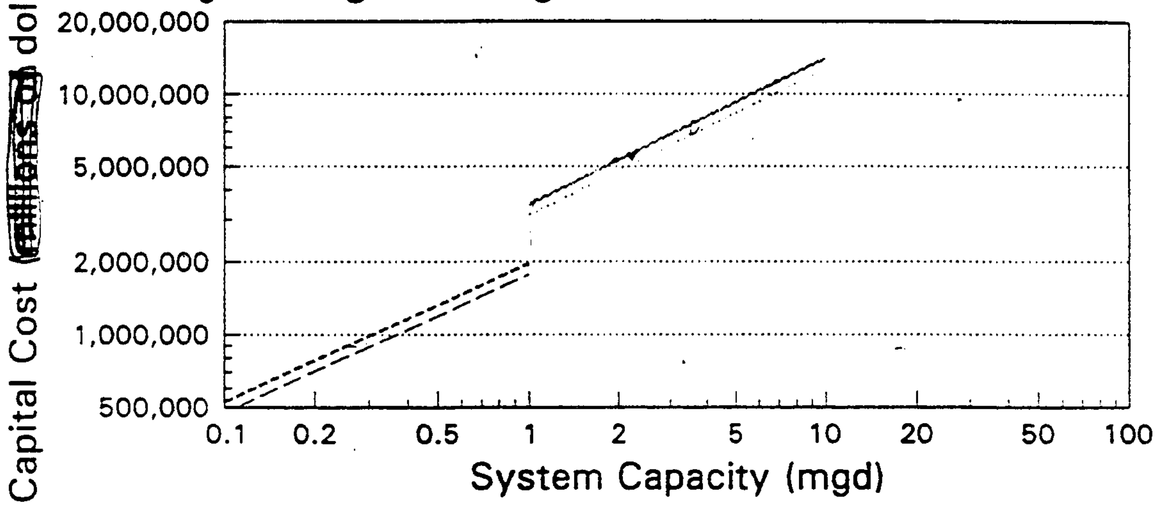
Construction & Unit Costs

Treatment Capacity (Mgd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cons. Cost ($)	Current Unit Cost ($/Gal)
1	2,000,000	3,150	5,433	3,449,524	3.45
2	3,225,000	3,150	5,433	5,562,357	2.78
5	5,500,000	3,150	5,433	9,486,190	1.90
7	7,000,000	3,150	5,433	12,073,333	1.72
10	8,000,000	3,150	5,433	13,798,095	1.38

NOTES:
(1) Values obtained using EPA cost curves.
(2) Costs include raw water influent pumping, chemical addition, rapid mix/ flocculation, sedimentation, filtration, disinfection, finished water storage, finished water pumping, and sludge disposal.
(3) Costs are based on June 1995, ENR Index = 5433.

GRAPH #4

Lime Softening & Packaged Conventional Treatment



Lime Softening Plant	Packaged Conventional Plant
L. S. (Handy Whitman)	P. C. (Handy Whitman)

Note: Source B, Figure 2-2, pp. 11-12.

Cost Summaries of Selected Env. Technologies

GRAPH #3
Hydrated Lime Chemical Feed (Fig. 23)

Treatment Capacity (Mgd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
200 mg/l							
0.3	24,000	2494	5433	52,282	158	319	48,456
0.5	24,000	2494	5433	52,282	158	319	48,456
0.7	25,000	2494	5433	54,461	158	319	50,475
1.0	29,000	2494	5433	63,174	158	319	58,551
1.3	35,000	2494	5433	76,245	158	319	70,665
100mg/l							
0.3	15,000	2494	5433	32,676	158	319	30,285
0.5	15,000	2494	5433	32,676	158	319	30,285
0.7	16,000	2494	5433	34,855	158	319	32,304
1.0	22,000	2494	5433	47,925	158	319	44,418
1.3	24,000	2494	5433	52,282	158	319	48,456
50 mg/l							
0.3	15,000	2494	5433	32,676	158	319	30,285
0.5	15,000	2494	5433	32,676	158	319	30,285
0.7	15,000	2494	5433	32,676	158	319	30,285
1.0	15,000	2494	5433	32,676	158	319	30,285
1.3	15,000	2494	5433	32,676	158	319	30,285

GRAPH #4
Lime Softening & Packaged Conventional (Fig. 2-2)

Treatment Capacity (Mgd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
--- Lime Softening ---							
0.1	0	3150	5433	0	205	319	0
0.5	0	3150	5433	0	205	319	0
1.0	2,000,000	3150	5433	3,449,524	205	319	3,112,195
5.0	5,500,000	3150	5433	9,486,190	205	319	8,558,537
10.0	8,000,000	3150	5433	13,798,095	205	319	12,448,780
--- Packaged Conventional Plant ---							
0.1	300,000	3150	5433	517,429	205	319	466,829
0.5	800,000	3150	5433	1,379,810	205	319	1,244,878
1.0	1,100,000	3150	5433	1,897,238	205	319	1,711,707
5.0	0	3150	5433	0	205	319	0
10.0	0	3150	5433	0	205	319	0

discharge to a municipal sewer or hauled to a landfill for disposal. Clarified water then flows to the filter unit.

The filters consist of one or more steel or concrete vessels containing granular materials such as graded sands, anthracite, and garnet. Solids are strained from the water as it passes through the filters. When the pressure drop through the filters becomes great enough due to accumulated solids, a backwash stream of filtered water passes through the units in reverse flow to clean the solids from the filter bed. The spent backwash stream is sent to a sewer. Backwashing is intermittent; the backwash cycle depends on the character and concentration of solids in the water, as well as on filter design parameters such as application rate and filter medium particle size.

Filtered water is disinfected with chlorine and stored. From storage it is pumped to the water supply distribution system.

Direct Filtration (2,4,5)

A direct filtration plant is essentially the same as the conventional filtration plant shown in Figure 2-1 except the sedimentation step is deleted.

Direct filtration is applicable to any drinking water supply where suspended solids levels are sufficiently low to result in a reasonable backwash cycle on the filter units. Unlike conventional filtration plants, there is an upper limit to the influent suspended solids concentration that can be tolerated. This upper limit must be determined by testing. Above such a level, conventional treatment procedures or sedimentation prior to filtration are required.

Lime Softening (2,4,5)

The major features of a lime softening plant are also essentially the same as those for a conventional filtration plant, except that lime is substituted for other chemicals and a recarbonation step is added after sedimentation. A lime softening plant is typically used to treat raw water with a higher concentration of dissolved minerals, such as calcium and magnesium, than can be treated in a conventional or direct filtration plant. In the context of the Safe Drinking Water Act, a lime softening plant can also be expected to achieve a greater removal of toxic mineral substances. For example, a lime softening plant operating in a pH range of 8.5 to 11 can reduce cadmium concentrations from 0.5 mg/l to 0.01 mg/l. To achieve the same cadmium concentration in the treated effluent, a conventional filtration plant using alum or iron salts can only accommodate a cadmium concentration up to 0.1 mg/l of cadmium in the raw water (2). The choice of overall treatment process therefore depends on individual raw water characteristics.

Lime can be added directly to the influent raw water as a solid, or as a pre-mixed water slurry. If a slurry is used, the solid lime is usually purchased and the slurry prepared on-site. Details of lime feed systems are described elsewhere (6, 7).

Recarbonation is the addition of gaseous carbon dioxide (CO_2) to the lime-treated water to neutralize excess alkalinity resulting from lime addition. Gaseous CO_2 may be obtained from liquid CO_2 stored onsite, submerged burners, or stack gas compressed through a sparger system. The choice of carbonation method depends on site specific considerations.

2.1.2 Design Basis and Costs (2,4,5)

The design basis in this report for conventional filtration plant costs includes the following major process modules and design parameters:

- Raw water pumping.
- Chemical addition.
- Rapid mix/Flocculation.
- Sedimentation.
- Filtration.
- Disinfection.
- Finished water storage.
- Finished water pumping.
- Sludge disposal.

As stated in the process descriptions, there is no sedimentation step in direct filtration. The filtration directly follows the rapid mix and flocculation step. The chemical feed system consists of chemical storage and metering pump facilities. The rapid mix tank and flocculation vessel is one vessel partitioned into separate sections. Filtration units are gravity flow steel or concrete vessels. The clear well is a concrete storage basin. System design parameters depend on raw water quality and the finished water quality required.

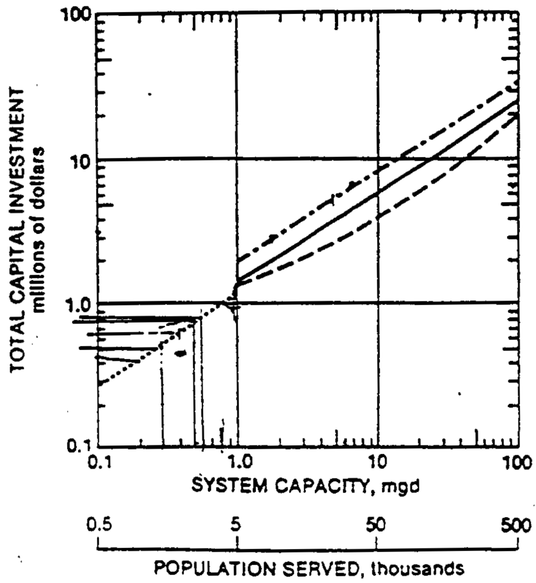
The major process modules for the lime softening plant are very similar to those for conventional filtration, except for modifications to the chemical feed system and addition of recarbonation equipment. Recarbonation basins are reinforced concrete, and submerged natural gas burners are used for the CO_2 source in the system considered here based on the configuration and costs in Reference 2.

The plant cases represented here include chlorine disinfection, the usual procedure in conventional plants. Alternative disinfectants such as chlorine dioxide, ozone, or ammonia added with chlorine can also be used. The disinfection systems for each of these alternatives are discussed in Section 2.2

Total capital investment for conventional filtration, direct filtration, and lime softening is presented in Figure 2-2. Net annual operating expenses are shown in Figure 2-3. Figure 2-4 shows corresponding unit annualized costs.

Figure 2-2. Filtration plants for drinking water treatment - Total capital investment (March, 1980 dollars).

Conventional Filtration Plant
Direct Filtration Plant
Lime Softening Plant
Packaged Conventional Plant



· LIME SOFTENING

· PACKAGED CONVENTIONAL

...nking water treatment ... (March, 1980 dollars).

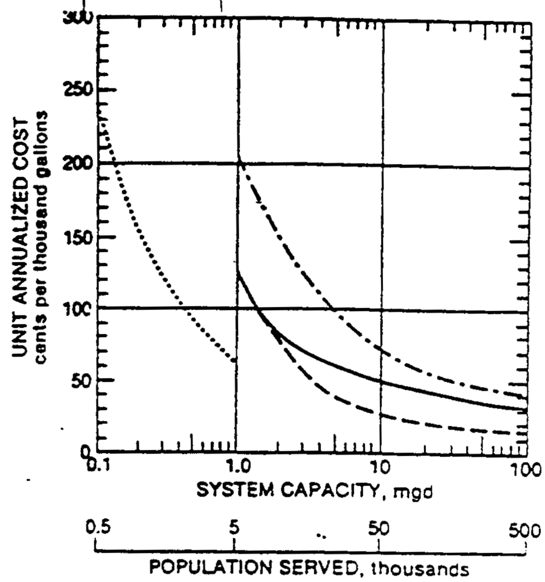
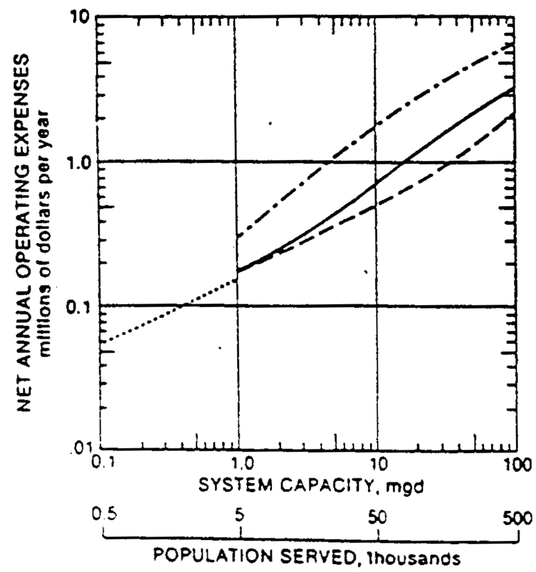


Figure 2-3. Filtration plants for drinking water treatment - Net annual operating expenses (March, 1980 dollars).

Conventional Filtration Plant
Direct Filtration Plant
Lime Softening Plant
Packaged Conventional Plant



Also provided in the figures are costs for packaged conventional filtration plants which can be used for small treatment systems (5). These plants would have the same unit processes as their larger field-constructed counterparts but would be primarily shop fabricated and brought to the field for final installation.

2.1.3 Major Variables Affecting Costs

For any of the filtration plants discussed here, the large number of process steps and associated variables result in many possible combinations of equipment sizes and specifications. These factors largely depend on site specific requirements with raw water quality the primary variable. A complete analysis of the cost impacts of changes in design is beyond the scope of this report. However, examination of the cost profile for capital investment reveals that the greatest portion of the investment is in the filter portion of the plant. Therefore, changes in design requirements for the filters have a very large impact on total plant capital costs. For lime softening plants lime dosage is an important variable. Also, as can be seen from the figures, costs for shop fabricated packaged plants are less than for field constructed plants of similar size. Operating expenses, specifically electricity costs for pumping, are affected by frequency of backwashing in the filtration unit which

APPENDIX M

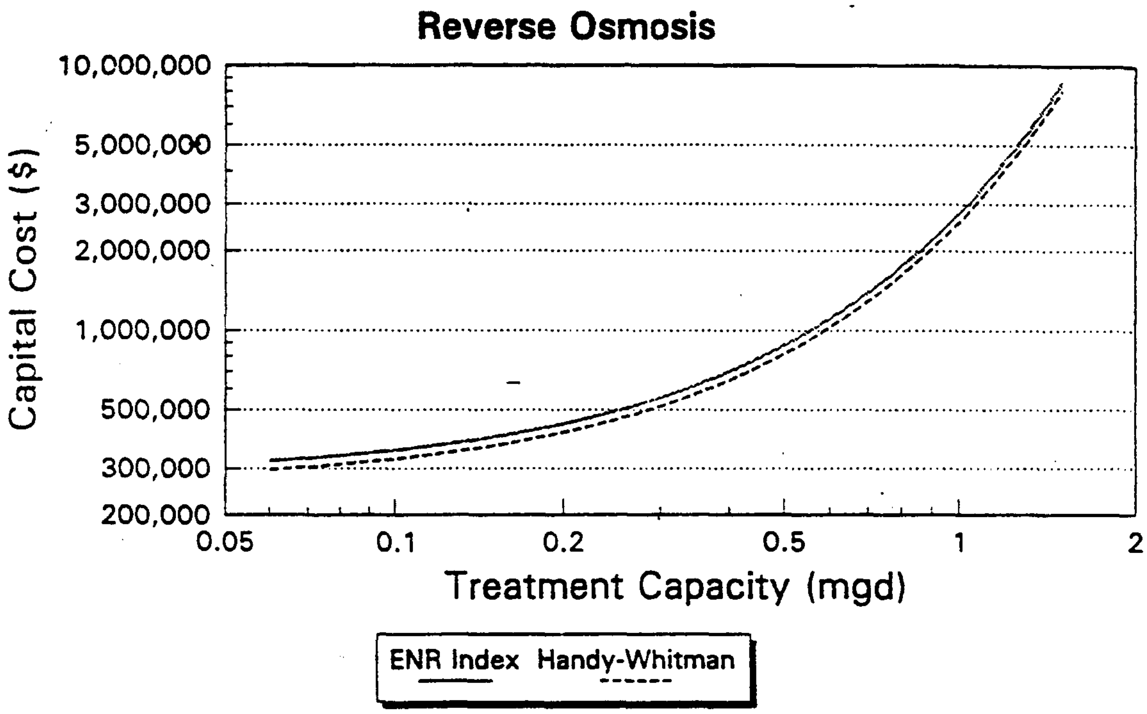
Reverse Osmosis WTP

Construction & Unit Costs

Treatment Capacity (Mgd)	Graph #1 Const. Cost ($)	Graph #8 Const. Cost ($)	Graph #11 Const. Cost ($)	Graph #4 Const. Cost ($)	Overall Const. Cost ($)	Overall Unit Cost ($/Gal)
0.003		51,333		25,731	38,532	12.844
0.005		58,667		29,961	44,314	8.863
0.01		73,333		44,061	58,697	5.870
0.03		105,111		91,647	98,379	3.279
0.05		140,963		139,232	140,098	2.802
0.07		174,167		182,235	178,201	2.546
0.10	282,658	220,000		246,740	249,799	2.498
0.20	423,987	366,667		396,547	395,734	1.979
0.50	1,059,968	794,444		793,094	882,502	1.765
1.00		1,588,889	1,382,105	1,339,448	1,436,814	1.437
2.00			2,303,509		2,303,509	1.152
5.00			4,961,404		4,961,404	0.992
10.00			9,568,421		9,568,421	0.957

NOTES:
(1) Values obtained using EPA cost curves.
(2) Costs include housing, structural steel, tanks, piping, valves, pumps, revese osmosis membrane elements and pressure vessels, flow meters, cartridge filters, acid and polyphosphate equipment, and cleaning equipment.
(3) The EPA cost curves have also added costs for contingencies, sitework, engineering & administration, and electrical.
(4) Costs are based on June 1995, ENR Index = 5433.

GRAPH #1



Note: Source A, Figure 19, page VI-11.

State of the Art of Small WTP's

GRAPH #1
Reverse Osmosis (Fig. 19)

Treatment Capacity (Mgd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
0.07	125,000	2494	5433	272,304	158	319	252,373
0.1	140,000	2494	5433	304,980	158	319	282,658
0.3	280,000	2494	5433	609,960	158	319	565,316
0.5	525,000	2494	5433	1,143,675	158	319	1,059,968
1.0	1,500,000	2494	5433	3,267,642	158	319	3,028,481
1.5	3,250,000	2494	5433	7,079,892	158	319	6,561,709

GRAPH #2
Reverse Osmosis Enclosure (Fig. 20)

Treatment Capacity (Mgd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
0.07	7,000	2494	5433	15,249	158	319	14,133
0.1	8,000	2494	5433	17,427	158	319	16,152
0.3	19,000	2494	5433	41,390	158	319	38,361
0.5	29,000	2494	5433	63,174	158	319	58,551
0.7	40,000	2494	5433	87,137	158	319	80,759
1.0	58,000	2494	5433	126,349	158	319	117,101

A. CAPITAL COSTS

Cost curves were developed for treatment processes judged applicable to small water treatment systems. These curves relate capital costs to quantities of water treated and to population served. Estimates of complete water treatment plants or additions to existing plants may be developed on the basis of these relationships.

Yard piping, fencing (where applicable), and sitework have been included in the curve for each unit process. When adding unit process costs together some of these items may overlap; this may cause the total cost to exceed actual plant costs by 10 to 25 per cent.

Cost data, developed specifically for this report, are based on information from various manufacturers and on the experience and judgment of the investigators. Preliminary designs and engineering cost estimates were developed for each unit process at various low rates. Estimates of construction costs are representative of average price levels as of January, 1977. The Engineering News Record Building Cost Index of that date had a value of 1489.

Included in the capital costs are necessary construction costs, a contingency amount and engineering, legal and administration fees. A cost for fencing is provided for mechanical aeration, diffused aeration, rapid mix, flocculation, sedimentation, ozone contact chamber and waste disposal (lagoons). For each of the other treatment methods an enclosure is recommended and separate cost curves are provided.

Capital costs for unit proceses, package plants and enclosures are developed as follows:

(1) Construction cost – included are necessary costs for equipment, materials, installation, freight and start-up.

(2) Sitework – estimated as 10 per cent of the construction cost.

(3) Electrical – estimated as 20 per cent of the construction cost.

Graph & 1r2

m. Electrodialysis. The electrodialysis capital cost curve was developed for a complete multiple-stage electrodialysis system. Costs were obtained for standard units as rated by the manufacturer for operation with a raw water TDS concentration of 1500 to 4000 mg/l. For these electrodialysis units, predicted per cent water recovery ranges from 65 to 85 and predicted per cent TDS removal ranges from 82 to 96. Local water quality may change the rated capacity of these units.

Electrodialysis capital costs include costs for the following equipment and materials: skid-mounted reverse polarity electrodialysis unit with membrane stacks, rectifiers, low pressure feed pump, brine recirculation pump, chemical cleaning equipment, cartridge filters, necessary valves, piping and automatic controls. Refer to Figure 17 for the electrodialysis capital cost curve. The enclosure capital cost curve for electrodialysis is shown on Figure 18.

n. Reverse Osmosis. The reverse osmosis capital cost curve was developed for a complete reverse osmosis treatment system. Costs obtained were for standard units as rated by the manufacturer for operation with a feed of 1500 mg/l NaCl at 400 psi, 25°C (77°F), and 75 per cent conversion. Local water quality may change the rated capacity of these units.

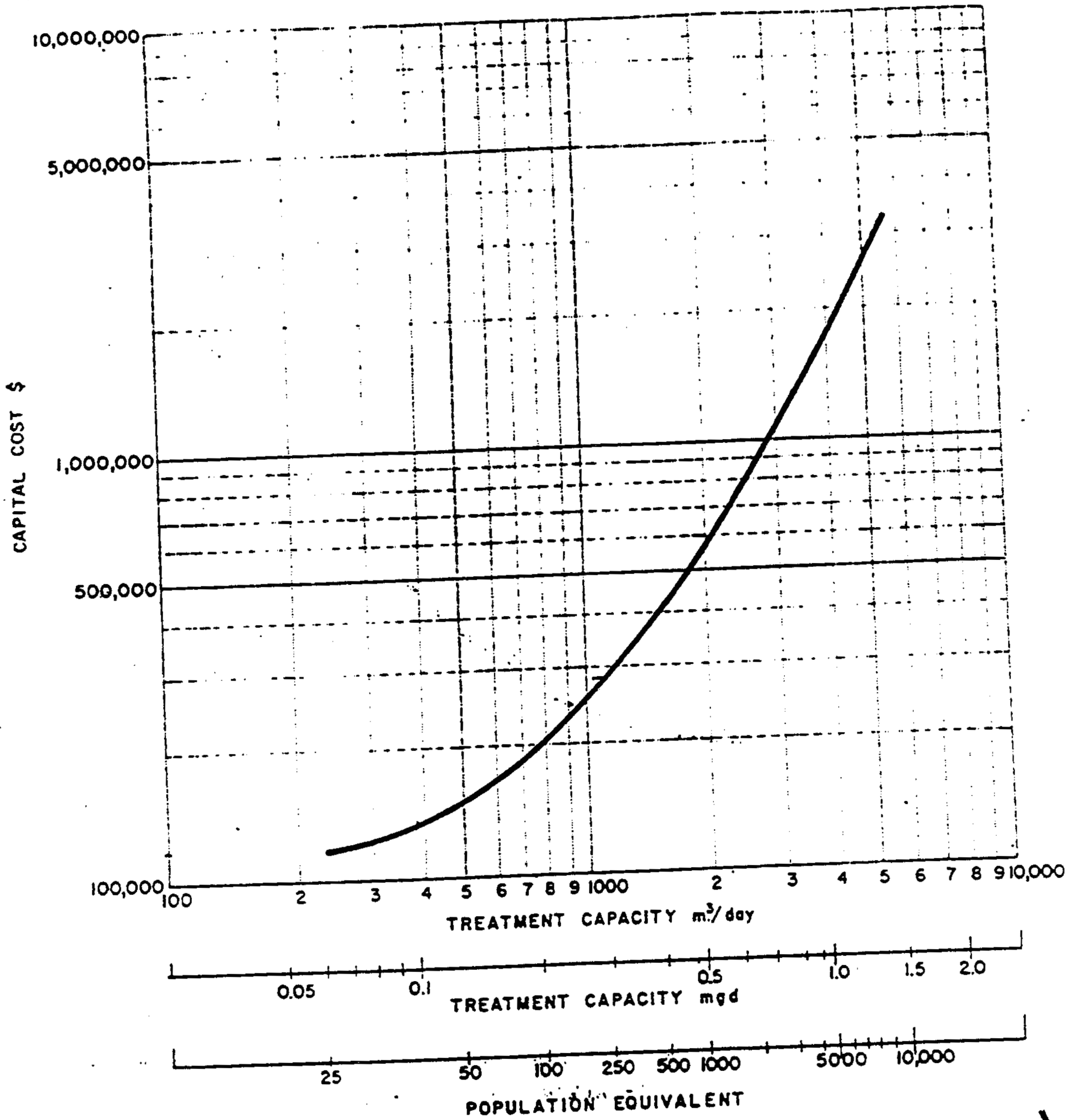
Capital costs for reverse osmosis include costs for the following equipment and materials: skid-mounted, membrane-type reverse osmosis unit with hollow fine fiber membranes, high pressure pumps, cartridge filters, acid and polyphosphate feeding equipment, necessary valves, piping and automatic controls. Refer to Figure 19 for the reverse osmosis capital cost curve. Presented on Figure 20 is a capital cost curve for an enclosure for this unit process.

o. Chemical Feed. Capital costs have been determined for the following chemical feed systems:

(1) powdered activated carbon.

(2) coagulants.

(3) hydrated lime.



Graph 1

UNIT PROCESS COST CURVE INCLUDES:

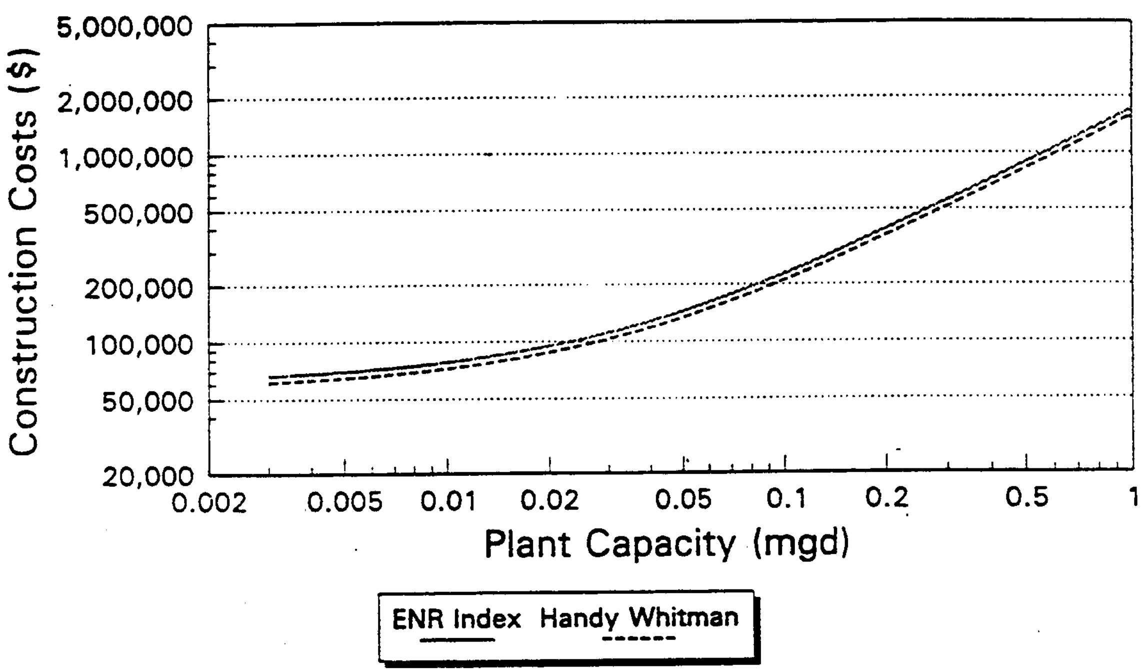
- CONTINGENCIES
- ENGINEERING & ADMINISTRATION
- SITEWORK
- ELECTRICAL
- MEMBRANE TYPE REVERSE OSMOSIS SYSTEM

REVERSE OSMOSIS
CAPITAL COST

FIGURE 19

Graph #8

Reverse Osmosis



Note: Source C, Figure 37, pp. 111-121.

Small Water System Treatment Costs

GRAPH #7
Package Lime Softening Plants (Fig. 12)

Treatment Capacity (gpd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
20,000	86,000	4110	5433	113,683	261	319	105,111
40,000	95,000	4110	5433	125,580	261	319	116,111
70,000	100,000	4110	5433	132,190	261	319	122,222
100,000	115,000	4110	5433	152,018	261	319	140,556
200,000	140,000	4110	5433	185,066	261	319	171,111
500,000	190,000	4110	5433	251,161	261	319	232,222
1,000,000	290,000	4110	5433	383,350	261	319	354,444

GRAPH #8
Reverse Osmosis (Fig. 37)

Treatment Capacity (gpd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
3,000	42,000	4110	5433	55,520	261	319	51,333
5,000	48,000	4110	5433	63,451	261	319	58,667
10,000	60,000	4110	5433	79,314	261	319	73,333
30,000	86,000	4110	5433	113,683	261	319	105,111
60,000	130,000	4110	5433	171,847	261	319	158,889
100,000	180,000	4110	5433	237,942	261	319	220,000
200,000	300,000	4110	5433	396,569	261	319	366,667
500,000	650,000	4110	5433	859,234	261	319	794,444
1,000,000	1,300,000	4110	5433	1,718,467	261	319	1,588,889

EXHIBIT (5) H-7
PAGE 204 OF 284

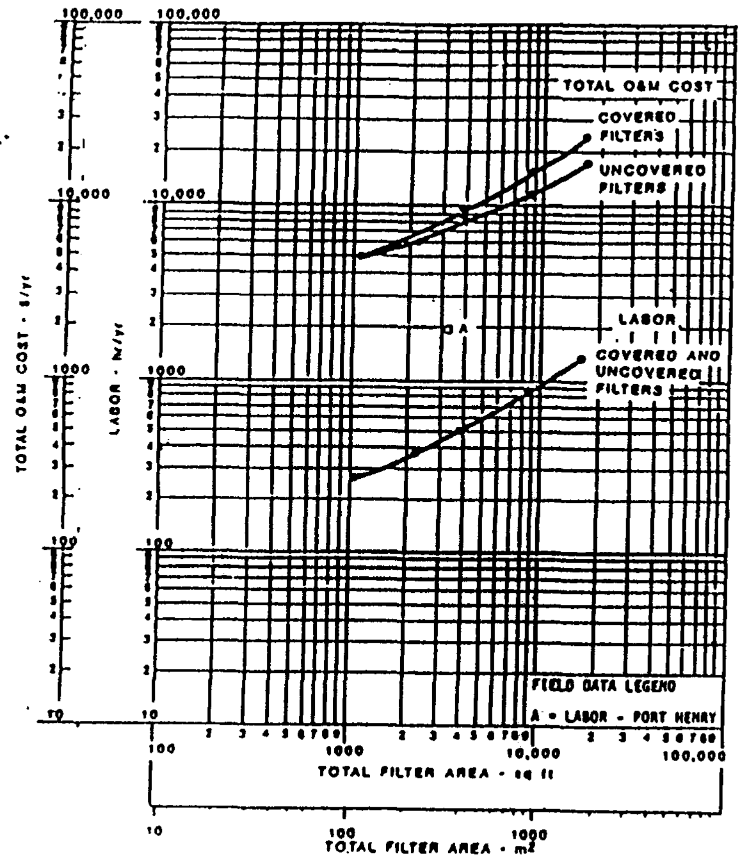


Figure 35. Operation and maintenance requirements for covered and uncovered slow sand filters - labor and total O&M cost.

REVERSE OSMOSIS

Introduction

Reverse osmosis utilizes semi-permeable membranes to remove a high percentage of almost all inorganic ions, turbidity, bacteria, and viruses. Most organic matter is also removed, with the exception of many halogenated and low-molecular-weight compounds.

There are differences between different membrane types in their ability to handle variations in pH, turbidity, and chlorine. The cellulose acetate membranes generally require the feedwater pH to be between 5 and 6 to minimize hydrolysis of the membrane. Polyamide type membranes are damaged by exposure to chlorine. The two most commonly used membrane configurations are hollow fine fiber and spiral wound. The spiral wound element has a higher tolerance for suspended solids and is less susceptible to fouling than the hollow fine fiber element.

The efficiency of the membrane elements in reverse osmosis systems may be impaired by scaling (because of slightly soluble or insoluble compounds) or by fouling (because of the deposition of colloidal or suspended materials). Because of the possibility of scaling and/or fouling, a very important consideration in the design of reverse osmosis systems is the provision of adequate pretreatment to protect the membrane from excessive scaling and fouling and to avoid frequent cleaning requirements. In the development of cost data for reverse osmosis, adequate pretreatment was assumed to precede the reverse osmosis process, but costs for pretreatment facilities such as chemical clarification and filtration are not included.

Brine disposal can also be a major cost consideration. Potential disposal methods include sewer discharge, evaporation ponds, ocean disposal and well injection. Brine disposal facilities and costs are not included in the reverse osmosis systems presented in this section. A separate section is included in this report for brine disposal.

Advances in membrane technology have led to the development of membranes which are capable of operating at low pressures, about 14.06 kg/cm² (200 psi), in contrast to high pressure membranes which operate at 28.12 kg/cm² (400 psi) or more. Advantageously, low pressure membranes result in a substantial savings in process electrical energy. There may be disadvantages to the use of low pressure membranes however. Disadvantages relative to high pressure membranes include lower percentage removal of many contaminants[1], lower allowable feed water TDS or lower percent water recovery, and membrane technology which is still developing.

In the following discussion, low pressure refers to systems operated at 14.06 kg/cm² (200 psi) and high pressure to systems operated at 28.12 kg/cm² (400 psi).

Impact of Raw Water Quality on Treatment Cost

Pretreatment Cost--
Pretreatment chemicals customarily utilized are sodium hexametaphosphate and sulfuric acid, with quantities required being highly variable, depending upon raw water quality. Another important parameter is silica, which may necessitate pretreatment for its removal. Costs for pretreatment chemicals and for silica pretreatment are not included in the following cost data.

Reverse osmosis units may be used for TDS removal, as well as the removal of individual contaminants addressed in the Interim Primary Drinking Water Regulations. The following paragraphs discuss the impact of raw water TDS, as well as individual contaminants in the raw water, upon treatment cost.

Total Dissolved Solids--
Feed water concentrations above 5,000 mg/L can lead to excessively high brine concentrations (>20,000 mg/L), which will generally result in a decrease in product water quality. To prevent this brine concentration buildup, it is necessary to lower the percentage of product water recovery. Lower product water recovery does not require a major change in the reverse osmosis unit, but does necessitate pumping larger quantities of feed water to the reverse osmosis unit. A revision in piping between the pressure vessels may also be required to change vessels to parallel operation, rather than operating some in series. This increases capital cost only slightly, due to the need for larger feed water pumps, but can create a large increase in electrical consumption and pretreatment chemicals, due to the larger quantity of water passed through the reverse osmosis units. A single pass unit will normally have a rejection of over 85% of feed water TDS. If a higher salt rejection is required, a high rejection membrane can be used, or the system can be operated at lower water recovery.

Individual Contaminants--
Little work has been conducted to determine the impact of varying feed concentrations of individual contaminants upon their percentage removal or the cost of removal. A recent publication by Huxstep[1] on work at Charlotte Harbor, Florida, indicated that arsenic (III), arsenic (V), fluoride, and nitrate percentage rejections were all independent of the feed concentrations. These contaminants were each added by spiking a natural groundwater of known concentration. High pressure membranes removed significantly higher percentages of these four components than did low pressure membranes.

Construction Costs

Construction cost data was developed for single stage (only one pass through the membrane) treatment systems which are capable of treating TDS concentrations up to about 2,000 mg/L for low pressure membranes and 10,000 mg/L for high pressure membranes. An operating pressure of 14.06 kg/cm² (200 psi) was utilized for low pressure membranes, and 28.12 kg/cm² (400 psi) for high pressure membranes. Construction costs are comparable for high and low pressure systems.

The temperature of the feedwater was assumed to be between 18.3° and 29.4°C (65° and 85°F), and the pH of the feedwater was assumed to be adjusted using acid injection to about 5.5 to 6.0 before the reverse osmosis process. The acid injection will prolong the life of a cellulose acetate membrane, but the primary function is to prevent calcium carbonate scale formation in the system. A degasifier following reverse osmosis will remove dissolved gases such as carbon dioxide and hydrogen sulfide from the product water, and will reduce neutralization requirements.

At TDS concentrations up to 5,000 mg/L, the assumed water recoveries for different flow ranges are as follows:

Feed Water Flow Range	Water Recovery (%)
2,500 - 10,000 gpd	40
10,000 - 50,000 gpd	50
50,000 - 100,000 gpd	65
100,000 gpd - 1.0 mgd	75

At concentrations above 5,000 mg/L, the percent recovery should be decreased in order to maintain a brine concentration less than 20,000 mg/L, which is necessary to limit osmotic pressure on the brine side of the membrane as well as to maintain quality of the product water. Salt rejections of over 85% should be achieved under these operating conditions. To maintain 20,000 mg/L in the brine, the following percent water recoveries are necessary:

TDS Concentration	Water Recovery (%)
5,000 mg/L	75
6,000 mg/L	70
7,000 mg/L	65
8,000 mg/L	60
9,000 mg/L	55
10,000 mg/L	50

It may be assumed that the capital cost of reverse osmosis treatment remains essentially unchanged as the TDS increases up to 10,000 mg/L, although the water recovery is decreased. This does increase the capacity (and therefore the capital cost) of the feedwater pumps, but this would increase the overall reverse osmosis system cost less than 5 percent. Thus, no separate cost data is presented for systems treating TDS concentrations greater than 5,000 mg/L. The largest effect is on O&M costs since the energy and pretreatment costs would increase in proportion to the increase in flow rate.

Commercial reverse osmosis systems are available from numerous manufacturers as either complete skid-mounted units or custom systems. For sizes ranging from 9.47 m³/d (2,500 gpd) up to between 378.5-946.3 m³/d (100,000-250,000 gpd), skid-mounted systems are generally used. Above 946.3 m³/d (250,000 gpd), either skid-mounted or custom systems are used. An advantage of using multiple standard systems above 946.3 m³/d (250,000 gpd), is the reliability provided by having several systems in case one unit needs to be shut down for repairs. This cost analysis used skid-mounted units, or multiples of such units, for all size ranges.

Components taken into account in the construction cost estimates include housing, structural steel and miscellaneous metalwork, tanks, piping, valves, high pressure feed water pumps, reverse osmosis membrane elements and pressure vessels, flowmeters, cartridge filters, acid and polyphosphate feed equipment, cleaning equipment, caustic feed equipment, and a degasifier. The cost data are based on the use of either spiral-wound or hollow fine-fiber reverse osmosis membranes. Membrane materials can be cellulose acetate, polyamide, or thin film composite. A layout of a typical small system reverse osmosis system is shown in Figure 36.

Brine disposal costs and product water pumping costs are not included in the estimates. Construction cost estimates are presented in Table 46 and also in Figure 37.

Operation and Maintenance Requirements and Costs

Process electrical energy is required for the feed water pumps, pre- and post-treatment chemical feed pumps, and the degasifier. The combined feed water pump/motor efficiency increases as flow increases. The feed water pump/motor efficiencies which were used in the calculations were: 40% up to 37.85 m^3/d (10,000 gpd) plant capacity, 50% up to 378.5 m^3/d (100,000 gpd) plant capacity, and 60% over 378.5 m^3/d (100,000 gpd) plant capacity. Energy requirements used for the chemical feed pumps and degasifier were 10% of the high pressure pump energy for plant capacities less than 189.3 m^3/d (50,000 gpd), and 5% for plant capacities over 189.3 m^3/d (50,000 gpd).

Process energy varies with the percent water recovery. As discussed under Construction Costs, higher percent water recoveries are typically used as system size increases, resulting in lower process energy requirements per unit of water produced. However, as TDS increases above 5,000 mg/L, lower percent water recoveries are necessary to maintain a reasonable brine concentration and to prevent deterioration of product water quality. Process electrical data has been developed for feed water TDS concentrations of 2,000 mg/L for low pressure systems and 5,000, 8,000, and 10,000 mg/L for high pressure systems.

Electrical energy for building lighting, heating, and ventilating was calculated based on an estimated floor area required for complete housing of the reverse osmosis equipment, with the exception of the degasifier, which is located outside. A building energy requirement of 209.8 $kwh/m^2/y$ (19.5 kwh/sq ft/yr) was used for lighting, heating, and ventilation. This requirement is based upon a lighting use factor of three hours per day.

The largest maintenance material requirement is for membrane replacement; a membrane life of three years was used in the cost estimates. Other maintenance material requirements are for replacement of cartridge filters, for membrane cleaning chemicals, and for materials needed for periodic repair of pumps, motors, and electrical control equipment. Costs for pretreatment chemicals, such as acid and polyphosphate, and post-treatment chemicals, such as caustic, are not included in the maintenance material estimates, but they

TABLE 46. CONSTRUCTION COST SUMMARY FOR REVERSE OSMOSIS SYSTEMS

Cost Category	Plant Capacity, gpd					
	2,500	10,000	50,000	100,000	500,000	1,000,000
Manufactured Equipment	$20,300	$30,000	$ 69,600	$123,000	$454,800	$ 877,400
Labor	800	1,200	1,500	2,800	7,500	14,600
Electrical, Instrumentation	3,200	4,600	10,700	18,700	45,900	62,100
Housing	11,900	13,900	16,400	18,500	38,400	52,500
Subtotal	36,200	49,700	98,200	163,000	546,600	1,006,600
Design Contingencies	5,400	7,500	14,700	24,500	82,000	151,000
Total	$41,600	$57,200	$112,900	$187,500	$628,600	$1,157,600

Notes: 1. Housing requirements from smallest plant capacity to largest are 140, 170, 210, 250, 800, and 1,500 sq ft. Ceiling height in buildings is 14 ft.
2. Costs are valid for feed water TDS concentrations up to 10,000 mg/L. However, percentage recovery of feed water decreases above 5,000 mg/L TDS.

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are discussed in the following section. Maintenance material costs increase slightly as the percent recovery drops, due to increased pumping to the reverse osmosis unit.

Labor requirements are for cleaning and replacing membranes, rep acing cartridge filters, maintaining the high pressure and other pumps, preparing treatment chemicals and determining proper dosages, maintaining chemical feed equipment, and monitoring performance of the reverse osmosis membranes. Membrane cleaning was assumed to occur monthly. In estimating labor requirements, a minimum of about one hr/day of labor was assumed for the smallest plant.

Operation and maintenance requirements are summarized in Table 47 for low pressure systems and in Table 48 for high pressure systems, and are illustrated for both high and low pressure systems in Figures 38 and 39.

TABLE 47. OPERATION AND MAINTENANCE SUMMARY FOR LOW PRESSURE REVERSE OSMOSIS SYSTEMS

Average Plant Flow Rate, gpd	Energy, kwh/yr Building	Process	Total	Maintenance Material, $/yr	Labor, hr/yr	Total Cost, $/yr
2,500	2,800	9,900	12,700	500	340	6,100
10,000	3,300	26,300	29,600	1,700	360	7,800
50,000	4,100	100,100	104,200	8,000	480	20,600
100,000	4,900	180,400	185,300	14,600	610	34,300
500,000	15,600	853,200	868,800	67,100	870	137,500
1,000,000	29,300	1,606,000	1,635,300	117,900	1,130	244,800

Note: Total cost is based on $0/07/kwh of electrical energy and $11.00/hour of labor.

Typical Chemical Requirements and Costs

The principal chemicals required in small reverse osmosis systems are sodium hexametaphosphate for control of scaling and fouling, sulfuric acid for pH adjustment prior to treatment, and sodium hydroxide to increase the pH following treatment. The required cost for each chemical is a function of the dosage, the unit cost of the chemical and the percent water recovery. Using the percentage of water recovery discussed previously in the text, and the following dosages and unit chemical costs, the annual chemical costs in Table 49 were calculated.

Chemical	Dosage	Unit Cost
Sodium Hexametaphosphate	6 mg/L	$1.10/lb
Sulfuric Acid	75 mg/L	$0.08/lb
Sodium Hydroxide	15 mg/L	$0.17/lb

TABLE 48. OPERATION AND MAINTENANCE SUMMARY FOR REVERSE OSMOSIS SYSTEMS

Average Plant Flow Rate, gpd	Energy, kwh/yr Building	Processs	Total	Maintenance Material, $/yr	Labor, hr/yr	Total Cost, $/yr
Feed Water TDS Concentrations Up to 5,000 mg/L						
2,500	2,800	18,000	20,800	500	340	5,700
10,000	3,300	48,200	51,500	1,700	360	9,300
50,000	4,100	191,100	195,200	8,000	480	27,000
100,000	4,900	344,400	349,300	14,600	610	45,800
500,000	15,600	1,629,000	1,644,600	67,100	870	191,800
1,000,000	29,300	3,066,000	3,095,300	117,900	1,130	347,000
Feed Water TDS Concentrations = 8,000 mg/L						
2,500	2,800	18,000	20,800	500	340	5,700
10,000	3,300	48,200	51,500	1,700	360	9,300
50,000	4,100	191,100	195,200	8,000	480	27,000
100,000	4,900	373,000	377,900	14,900	630	48,300
500,000	15,600	2,036,200	2,051,800	70,200	940	224,200
1,000,000	29,300	3,832,500	3,861,800	122,900	1,220	406,700
Feed Water TDS Concentrations = 10,000 mg/L						
2,500	2,800	18,000	20,800	500	340	5,700
10,000	3,300	48,200	51,500	1,700	360	9,300
50,000	4,100	191,100	195,200	8,000	480	27,000
100,000	4,900	447,700	452,600	15,500	680	54,700
500,000	15,600	2,443,500	2,45[illegible],100	73,200	1,020	256,600
1,100,000	29,300	4,599,000	4,628,300	127,700	1,310	466,100

Note: Total cost is based on $0.07/kwh of electrical energy and $11.00/hour of labor.

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TABLE 49. TYPICAL CHEMICAL COSTS FOR REVERSE OSMOSIS SYSTEMS

Average Plant Flow Rate, gpd	Sodium Hexametaphosphate, $/yr	Sulfuric Acid, $/yr	Sodium Hydroxide, $/yr	Total Chemical Cost, $/yr
Feed Water TDS Concentrations Up to 5,000 mg/L				
2,500	130	120	50	300
10,000	500	460	200	1,160
50,000	2,000	1,830	780	4,610
100,000	3,100	2,800	1,200	7,100
500,000	13,400	12,200	5,200	30,800
1,000,000	26,800	24,300	10,300	61,400
Feed Water TDS Concentrations = 8,000 mg/L				
2,500	130	120	50	300
10,000	500	460	200	1,160
50,000	2,000	1,830	780	4,610
100,000	3,400	3,000	1,300	7,700
500,000	16,800	15,200	6,500	38,500
1,000,000	33,500	30,400	12,900	76,800
Feed Water Concentrations = 10,000 mg/L				
2,500	130	120	50	300
10,000	500	460	200	1,160
50,000	2,000	1,830	780	4,610
100,000	4,000	3,700	1,600	9,300
500,000	20,100	18,300	7,800	46,200
1,000,000	40,200	36,500	15,500	92,200

Note: Chemical dosages and costs used in this table were:
Sodium Hexametaphosphate - 6 mg/L; $1.10/lb
Sulfuric Acid - 75 mg/L; $0.08/lb
Sodium Hydroxide - 15 mg/L; $0.17/lb

The required chemical dosages will vary widely between water supplies, and laboratory or pilot plant testing should be used to determine requirements. Additionally, the cost of chemicals will be a function of the geographical area and the quantity of chemical purchased.

Field Data Collection

Operating data on reverse osmosis treatment systems were collected at the Charlotte Harbor Water Association, Harbor Heights, Florida, and the Bryn Mawr Water Company, Vero Beach, Florida. The Charlotte Harbor plant has two treatment modules which operate at 27.4 kg/cm² (390 psi) and have a combined

treatment capacity of 1,136 m³/d (0.3 mgd) and one low pressure unit which operates at 16.5 kg/cm² (235 psi) and has a treatment capacity of 568 m³/d (0.15 mgd). The total operating flow rate of both the high and low pressure units is 1,120 m³/d (0.296 mgd). The TDS concentration in the raw water supply was not obtained during the field sampling.

The Bryn Mawr plant at Vero Beach has an installed capacity of 454 m³/d (0.12 mgd) and an operating flow rate of 163 m³/d (0.043 mgd). The operating pressure is 28.1 kg/cm² (400 psi). The TDS in the raw water supply was not noted during collection of field data.

A comparison of field operating data and information from Figures 38 and 39 is shown following:

	Charlotte Harbor		Vero Beach	
	Field Data	Data From Figures 38 and 39	Field Data	Data From Figures 38 and 39
Electrical Energy, kwh/hr				
Process	-	750,000	-	160,000
Building	-	14,000	-	4,000
Total	788,200	764,000	218,800	164,000
Maintenance Material, $/yr	10,400	38,000	890	6,000
Labor, hr/yr	5,140	800	640	480

Maintenance material requirements are low at both plants because replacement of membranes has not been necessary at either plant. However, Figure 38 data include a cost for membrane replacement every three years. The large difference in labor requirement at Charlotte Harbor is believed to be the result of an inappropriate division of labor between the treatment plant and the water distribution system.

References

1. Huxstep, M.R., "Inorganic Contaminant Removal From Drinking Water By Reverse Osmosis," EPA Report 600/S2-81-115, October, 1981.

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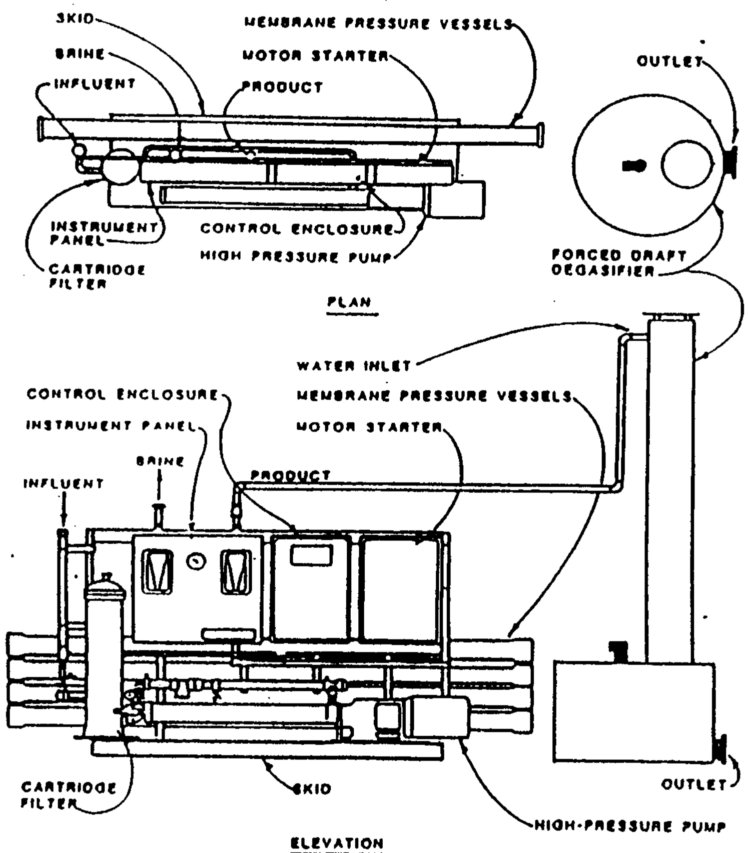

Figure 36. Typical-skid mounted reverse osmosis installation

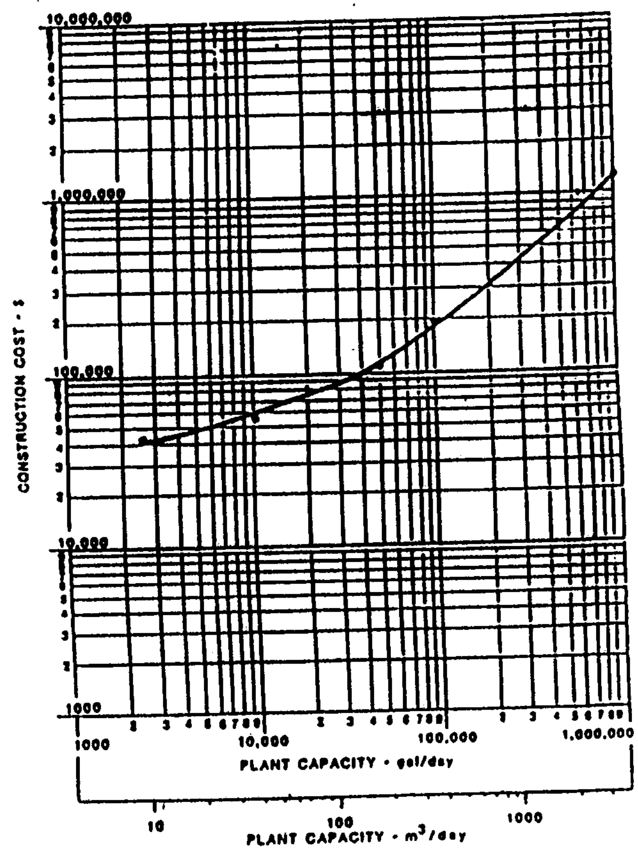

Figure 37. Construction cost for reverse osmosis system

EXHIBIT ______
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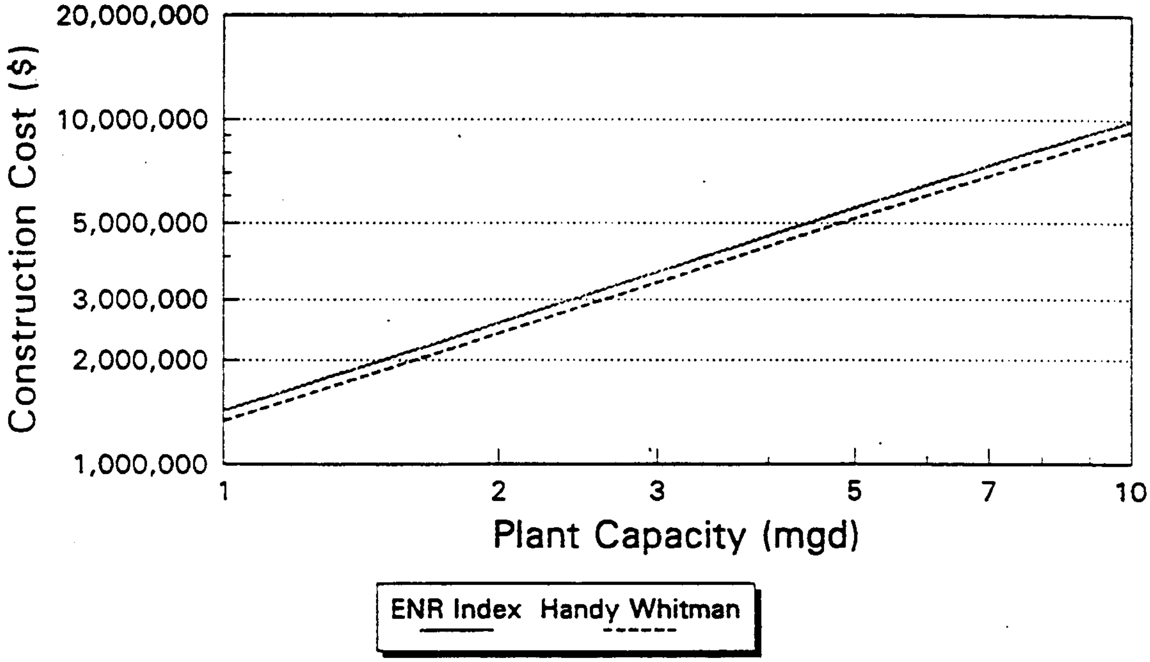
Graph #11

Reverse Osmosis



Note: Source D, Figure 113, pp. 246-250.

Estimating Water Treatment Costs - Vol. 2

GRAPH #11
Reverse Osmosis (Fig. 113)

Treatment Capacity (mgd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
1	780,000	2851	5433	1,486,405	171	303	1,382,105
2	1,300,000	2851	5433	2,477,341	171	303	2,303,509
5	2,800,000	2851	5433	5,335,812	171	303	4,961,404
10	5,400,000	2851	5433	10,290,495	171	303	9,568,421

GRAPH #12
Raw Water Pumping Facilities (Fig. 201)

Treatment Capacity (mgd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
30 Feet TDH							
1	20,000	2851	5433	38,113	171	303	35,439
2	25,000	2851	5433	47,641	171	303	44,298
5	37,000	2851	5433	70,509	171	303	65,561
10	55,000	2851	5433	104,811	171	303	97,456
20	86,000	2851	5433	163,886	171	303	152,386
50	180,000	2851	5433	343,016	171	303	318,947
100	325,000	2851	5433	619,335	171	303	575,877
100 Feet TDH							
1	26,000	2851	5433	49,547	171	303	46,070
2	31,000	2851	5433	59,075	171	303	54,930
5	49,000	2851	5433	93,377	171	303	86,825
10	74,000	2851	5433	141,018	171	303	131,123
20	125,000	2851	5433	238,206	171	303	221,491
50	250,000	2851	5433	476,412	171	303	442,982
100	490,000	2851	5433	933,767	171	303	868,246

EPA - Estimating WTP costs
1-200 MGD

Culp + Culp
Cost Curves

SECTION 4

COST CURVES

CONSTRUCTION COST CURVES

The construction cost curves were developed using equipment cost data supplied by manufacturers, cost data from actual plant construction, unit takeoffs from actual and conceptual designs, and published data. When unit cost takeoffs were used to determine costs from actual and conceptual designs, estimating techniques from Richardson Engineering Services Process Plant Construction Estimating Standards,[19] Mean's Building Construction Cost Data,[20] and the Dodge Guide for Estimating Public Works Construction Costs[21] were often utilized. An example illustrating how costs were determined using unit cost takeoffs from an actual design for a reinforced concrete wall (similar to a wall for a clarifier or a filter structure) is presented in Appendix C. The cost curves that were developed were then checked and verified by a second engineering consulting firm, Zurheide-Herrmann, Inc., using an approach similar to that a general contractor would utilize in determining his construction bid. Every attempt has been made to present the conceptual designs and assumptions that were incorporated into the curves. Adjustment of the curves may be necessary to reflect site-specific conditions, geographic or local conditions, or the need for standby power. The curves should be particularly useful for estimating the relative economics of alternative treatment systems and in the preliminary evaluation of general cost level to be expected for a proposed project. The curves contained in this report are based on October 1978 costs.

The construction cost was developed by determining and then aggregating the cost of the following eight principal components: (1) Excavation and site work; (2) manufactured equipment; (3) concrete; (4) steel, (5) labor; (6) pipe and valves; (7) electrical equipment and instrumentation; and (8) housing. These eight categories were utilized primarily to facilitate accurate cost updating, which is discussed in a subsequent section of this chapter. The division will also be helpful where costs are being adjusted for site-specific, geographic and other special conditions. The eight categories include the following general items:

<u>Excavation and Site Work.</u> This category includes work related only to the applicable process and does not include any general site work such as sidewalks, roads, driveways, or landscaping.

<u>Manufactured Equipment</u>. This category includes estimated purchase cost of pumps, drives, process equipment, specific purpose controls, and other items that are factory made and sold with equipment.

Concrete. This category includes the delivered cost of ready mix concrete and concrete-forming materials.

Steel. This category includes reinforced steel for concrete and miscellaneous steel not included under manufactured equipment.

Labor. The labor associated with installing manufactured equipment, and piping and valves, constructing concrete forms, and placing concrete and reinforcing steel are included here.

Pipe and Valves. Cast iron pipe, steel pipe, valves, and fittings have been combined into a single category. The purchase price of pipe, valves, fittings, and associated support devices are included within this category.

Electrical Equipment and Instrumentation. The cost of process electrical equipment, wiring, and general instrumentation associated with the process equipment is included in this category.

Housing. In lieu of segregating building costs into several components, this category represents all material and labor costs associated with the building, including heating, ventilating, air conditioning, lighting, normal convenience outlets, and the slab and foundation.

The subtotal of the costs of these eight categories includes the cost of material and equipment purchase and installation, and subcontractor's overhead and profit. To this subtotal, a 15-percent allowance has been added to cover miscellaneous items not included in the cost takeoff as well as contingency items. Experience at many water treatment facilities has indicated that this 15-percent allowance is reasonable. Although blanket application of this 15-percent allowance may result in some minor inequity between processes, these are generally balanced out during the combination of costs for individual processes into a treatment system.

The construction cost for each unit process is presented as a function of the most applicable design parameter for the process. For example, construction costs for package gravity filter plants are plotted versus capacity in gallons per minute, whereas ozone generation system costs are presented versus pounds per day of feed capacity. Use of such key design parameters allows the curves to be utilized with greater flexibility than if all costs were plotted versus flow.

The construction costs shown in the curves are not the final capital cost for the unit process. The construction cost curves do not include costs for special site work, general contractor overhead and profit, engineering, or land, legal, fiscal, and administrative work and interest during construction. These cost items are all more directly related to the total cost of a project rather than the cost of the individual unit processes. They are therefore most appropriately added following cost summation of the individual unit processes, if more than one unit process is required. The examples presented in a subsequent section of this volume illustrate the recommended method for the addition of these costs to the construction cost.

Construction costs are presented for wash water storage tanks in Table 91 and Figure 112.

REVERSE OSMOSIS

Construction Cost

Reverse osmosis utilizes membranes to remove a high percentage of almost all inorganic ions, turbidity, bacteria, and viruses. Most organic matter is also removed, with the exception of several materials, including most halogenated and low molecular weight compounds.

Commercial units are available in sizes up to about 5,000 gpd for the membrane elements and up to 30,000 gpd for the reverse osmosis modules (pressure vessels). Therefore, large-scale plants would be composed of many small, parallel modules. Components taken into account in the construction cost estimates include housing, structural steel and miscellaneous metalwork, tanks, piping, valves, pumps, reverse osmosis membrane elements and pressure vessels, flow meters, cartridge filters, acid and polyphosphate feed equipment, and cleaning equipment. The cost curves are based on the use of either spiral-wound or hollow fine-fiber reverse osmosis membranes.

The efficiency of the membrane elements in reverse osmosis systems may be impaired by scaling because of slightly soluble or insoluble compounds, or by fouling as a result of the deposition of colloidal or suspended materials. Because of this, a very important consideration in the design of a reverse osmosis system is the provision of adequate pretreatment to protect the membrane from excessive scaling and fouling and to avoid frequent cleaning requirements. In the development of the cost curves, adequate pretreatment was assumed to precede the reverse osmosis process, and costs for pretreatment are not included in the estimates.

The construction cost curve applies to waters with a total dissolved solids (TDS) concentration ranging up to about 10,000 mg/l. Other considerations, such as calcium sulfate and silica concentrations and also the desired water recovery, affect costs more than the influent TDS concentration. The temperature of the feedwater is assumed to be between 65° and 95°F, and the pH of the feedwater is adjusted to about 5.5 to 6.0 before the reverse osmosis process. A single-pass treatment system (only one pass through the membrane) is assumed, with an operating pressure of 400 to 450 psi. The assumed water recoveries for different flow ranges are as follows:

Flow Range (mgd):	Water Recovery (%)
1 - 10	.80
10 - 200	.85

Brine disposal costs are not included in the estimates.

Construction costs are presented in Table 92 and also in Figure 113.

Table 92

Construction Cost for

Reverse Osmosis

Cost Category	Plant Capacity (mgd) 1.0	10	100	200
Manufactured Equipment	$474,210	$ 3,456,480	$29,174,260	$56,438,930
Labor	70,420	346,850	2,312,340	2,837,870
Electrical and Instrumentation	65,740	486,270	3,635,690	6,947,480
Housing	64,260	462,650	2,409,660	4,176,740
SUBTOTAL	674,630	4,754,250	37,531,950	70,401,020
Miscellaneous and Contingency	101,190	713,140	5,629,790	10,560,150
TOTAL	775,820	5,467,390	43,161,740	80,961,170

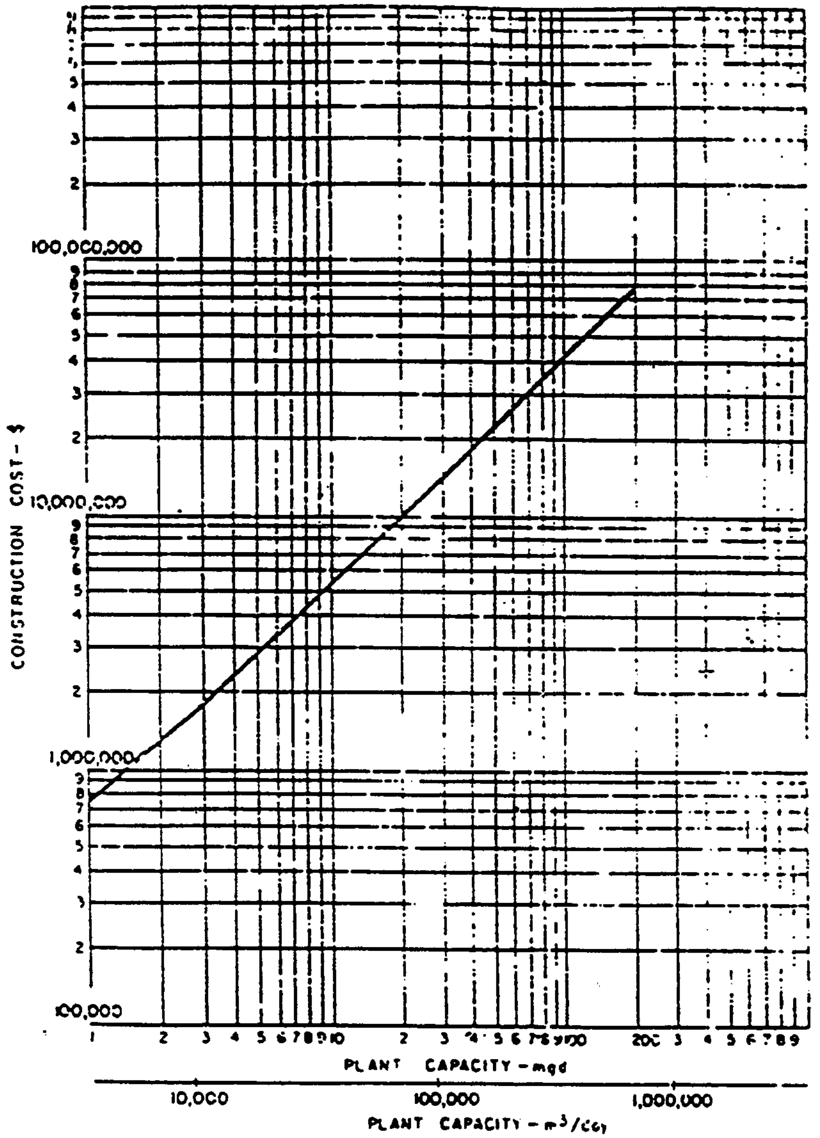
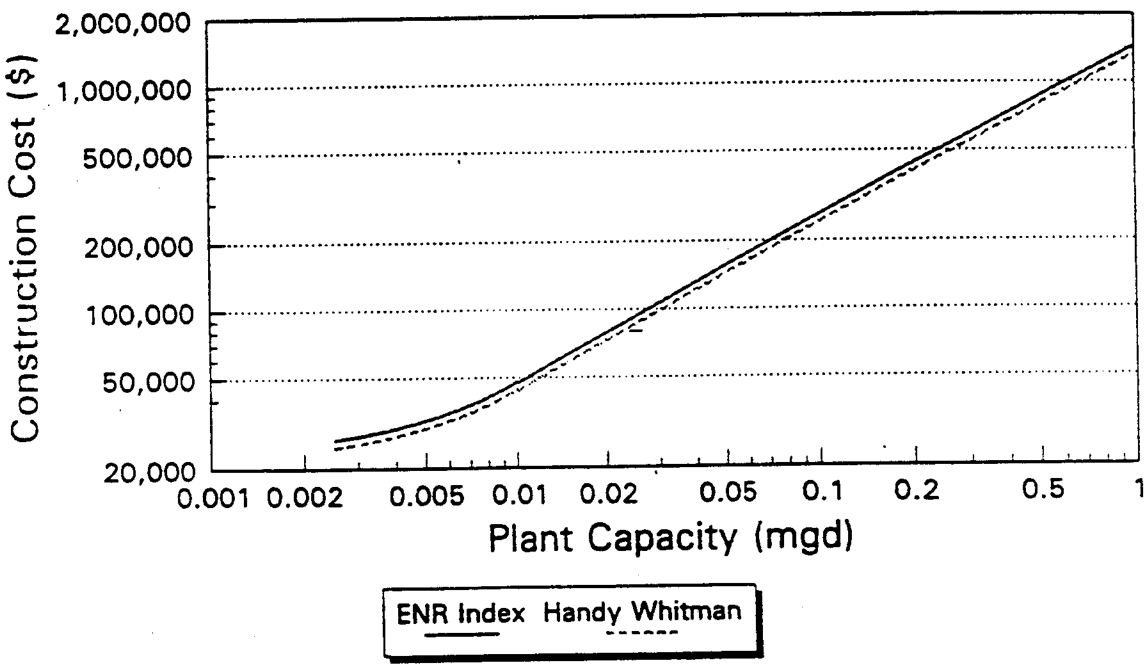


Figure 113. Construction cost for reverse osmosis.

GRAPH #15

Reverse Osmosis



Note: Source E, Figure 35, pp. 88, 92-95.

Estimating Water Treatment Costs - Vol. 3

GRAPH #15
Reverse Osmosis (Fig. 35)

Treatment Capacity (gpd)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
2,500	14,000	2851	5433	26,679	181	319	24,674
5,000	17,000	2851	5433	32,396	181	319	29,961
7,000	20,000	2851	5433	38,113	181	319	35,249
10,000	25,000	2851	5433	47,641	181	319	44,061
50,000	79,000	2851	5433	150,546	181	319	139,232
100,000	140,000	2851	5433	266,791	181	319	246,740
200,000	225,000	2851	5433	428,771	181	319	396,547
500,000	450,000	2851	5433	857,541	181	319	793,094
1,000,000	760,000	2851	5433	1,448,292	181	319	1,339,448

GRAPH #16
Package High-Service Pump Stations (Fig. 53)

Treatment Capacity (gpm)	Const. Cost ($)	ENR Index	June 1995 ENR Index	Current Cost ($)	Handy Whitman	Current Handy Whitman	Current Cost ($)
30	12,500	2851	5433	23,821	155	259	20,887
50	13,000	2851	5433	24,773	155	259	21,723
70	14,000	2851	5433	26,679	155	259	23,394
100	14,500	2851	5433	27,632	155	259	24,229
200	16,000	2851	5433	30,490	155	259	26,735
500	18,000	2851	5433	34,302	155	259	30,077
1,000	20,000	2851	5433	38,113	155	259	33,419

was assumed, with only occasional shutdown to clean cells and replace weak ultraviolet lamps. Building energy is for heating, lighting, and ventilation.

Maintenance materials are related to the replacement cost of the ultraviolet lamps, which are generally replaced after operating continuously for about 8,000 hr.

Labor requirements are related to occasional cleaning of the quartz sleeves and periodic replacement of the ultraviolet lights.

Operation and maintenance requirements are summarized in Table 38 and also presented in Figures 33 and 34.

REVERSE OSMOSIS

Construction Cost

Reverse osmosis utilizes membranes to remove a high percentage of almost all inorganic ions, turbidity, bacteria, and viruses. Most organic matter is also removed, with the exception of several materials, including most halogenated and low-molecular-weight compounds.

Construction costs were developed for complete reverse osmosis plants in the size ranges from 2,500 gpd to 1 mgd. Commercial units are available in sizes up to about 5,000 gpd for the membrane elements and up to 30,000 gpd for the reverse osmosis modules (pressure vessels). Therefore, large-scale plants are composed of many smaller, parallel modules. Components taken into account in the construction cost estimates include housing, structural steel and miscellaneous metalwork, tanks, piping, valves, pumps, reverse osmosis membrane elements and pressure vessels, flow meters, cartridge filters, acid and polyphosphate feed equipment, and also cleaning equipment. The cost curves are based on the use of either spiral-wound or hollow fine-fiber reverse osmosis membranes.

The efficiency of the membrane elements in reverse osmosis systems may be impaired by scaling (because of slightly soluble or insoluble compounds) or by fouling (because of the deposition of colloidal or suspended materials). Because of this possibility, a very important consideration in the design of a reverse osmosis system is the provision of adequate pretreatment to protect the membrane from excessive scaling and fouling and to avoid frequent cleaning requirements. In the development of the cost curves, adequate pretreatment was assumed to precede the reverse osmosis process, but costs for pretreatment are not included in the estimates.

The construction cost curve applies to waters with a total dissolved solids (TDS) concentration ranging up to about 10,000 mg/l. Other considerations, such as calcium sulfate and silica concentrations and also the desired water recovery, affect cost more than the influent TDS concentration. The temperature of the feedwater is assumed to be between 65° and 95° F, and the pH of the feedwater is adjusted to about 5.5 to 6.0 before the reverse osmosis process. A single-pass treatment system (only one pass through the membrane) is assumed, with an operating pressure of 400 to 450 psi. The assumed water recoveries for different flow ranges are as follows:

Flow Range	Water Recovery (%)
2,500 - 10,000 gpd	60
10,000 - 100,000 gpd	70
100,000 gpd - 1.0 mgd	75

Brine disposal costs are not included in the estimates. Construction cost estimates are presented in Table 39 and also in Figure 35.

Operation and Maintenance Cost

Electrical energy usage is included for the high-pressure feedwater pumps, based on an operating pressure of 450 psi and on the water recoveries listed in the construction cost write-up. For other pumps and chemical feed equipment, an energy usage of 10 percent of the usage for the high-pressure pumps was assumed. Electrical energy for lighting, heating, and ventilating was calculated, based on an estimated floor area required for complete housing of the reverse osmosis equipment.

The largest maintenance material requirement is for membrane replacement; a membrane life of 3 years was used in the cost estimates. Other maintenance material requirements are for replacement of cartridge filters, for membrane cleaning chemicals, and for materials needed for periodic repair of pumps, motors, and electrical control equipment. Costs for pretreatment chemicals, such as acid and polyphosphate, are not included in the estimates. The chemicals utilized and the dosages required will show great variability between different water supplies and should be determined from pilot plant testing.

Labor requirements are for cleaning and replacing membranes, replacing cartridge filters, maintaining the high-pressure and other pumps, preparing treatment chemicals and determining proper dosages, maintaining chemical feed equipment, and monitoring performance of the reverse osmosis membranes. Membrane cleaning was assumed to occur monthly. In estimating labor requirements, a minimum of about 1.5 hr/day of labor was assumed for the smallest plant.

Operation and maintenance requirements are summarized in Table 40 and illustrated in Figures 36 and 37.

PRESSURE ION EXCHANGE SOFTENING

Construction Cost

Cation exchange resins can be utilized for the removal of hardness, barium, trivalent chromium, lead, manganese, mercury, and radium. Construction costs were developed for pressure ion exchange softening systems using the conceptual information presented in Table 41. The contact vessels were fabricated steel, with a baked phenolic lining added after fabrication and constructed for 100 psi working pressure. The depth of resin was 6 ft,

Table 39

Construction Cost for

Reverse Osmosis

Cost Category	Plant Capacity (gpd) 2,500	10,000	100,000	1,000,000
Manufactured Equipment	$ 3,710	$11,140	$81,050	$ 474,210
Labor	770	2,210	16,080	70,420
Electrical and Instrumentation	4,190	4,710	10,680	65,740
Housing	2,680	4,070	6,430	64,260
SUBTOTAL	11,350	22,130	114,240	674,630
Miscellaneous and Contingency	1,700	3,320	17,140	101,190
TOTAL	13,050	25,450	131,380	775,820

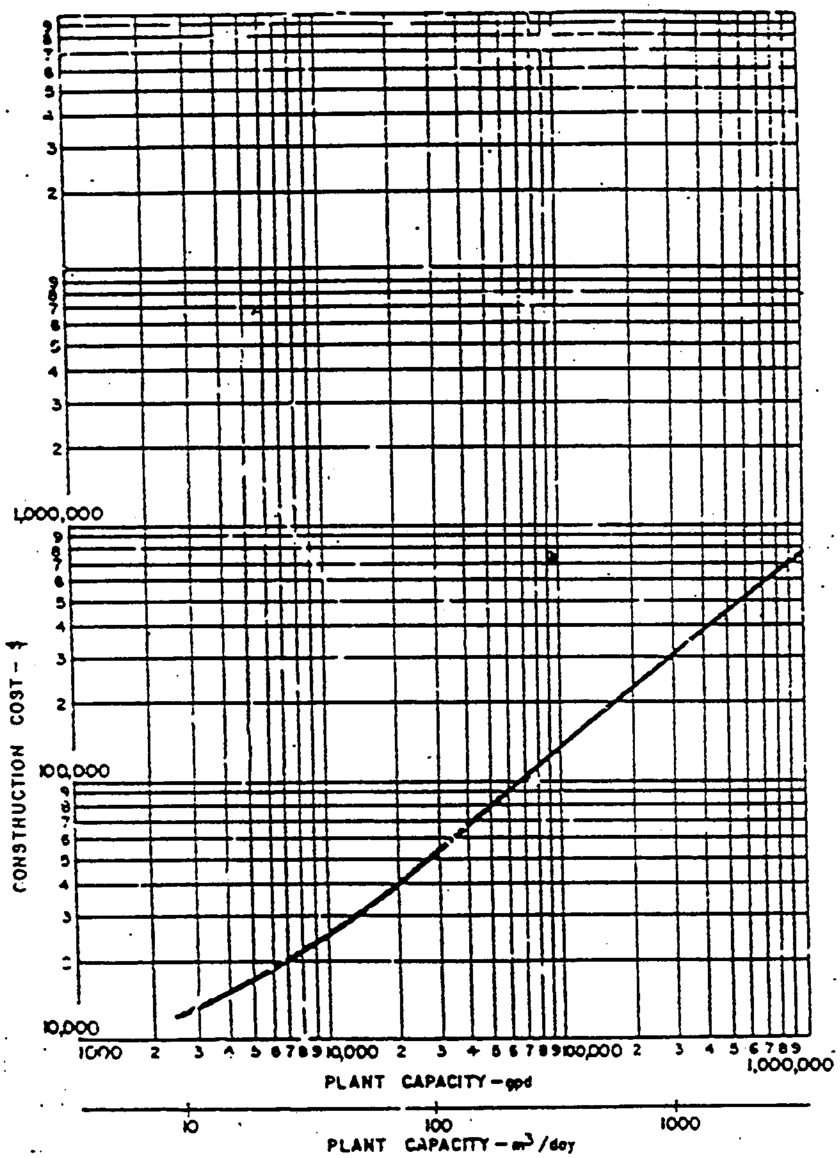
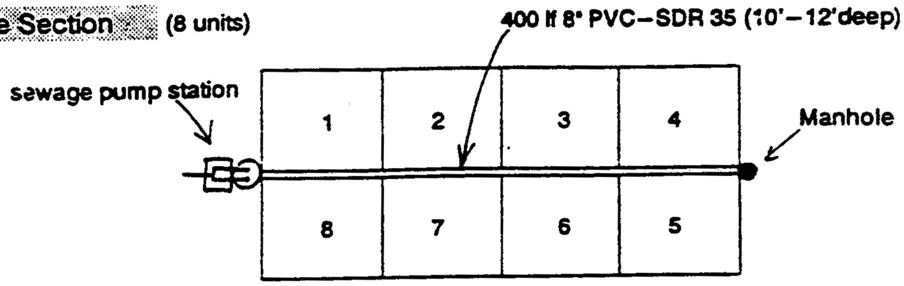


Figure 35. Construction cost for reverse osmosis.

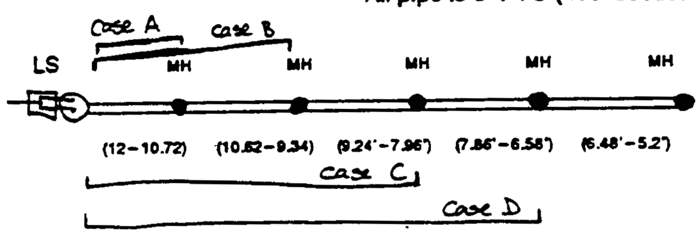
APPENDIX N

One Section (8 units)



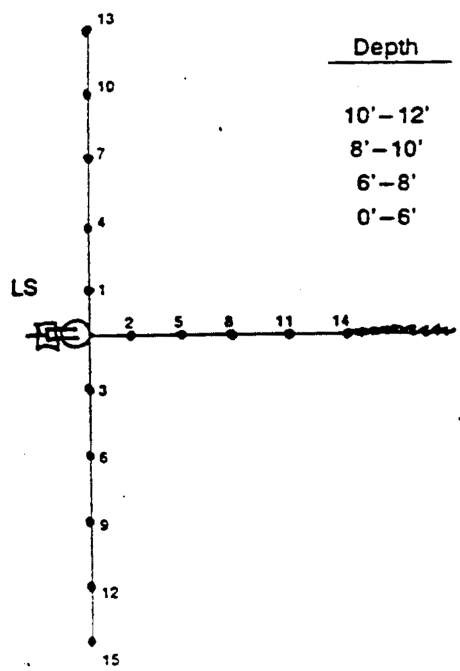
One Street (40 units)

** All pipe is 8" PVC (400' sections)



Whole Installation (120 units)

8" Gravity Sewer
10'–12' deep => 1782 lf
8'–10' deep => 1782 lf
6'–8' deep => 1689 lf
0'–6' deep => 750 lf



Depth	Manholes
10'–12'	1,2,3
8'–10'	4,5,6
6'–8'	7–12
0'–6'	13,14,15

Case E

Gravity Sewer Costs

① 8" Gravity Sewer (SDR 35 – PVC)

- 0-6' ⇒ $9.25/ft
- 6-8' ⇒ $12.00/ft
- 8-10' ⇒ $16.00/ft
- 10-12' ⇒ $18.50/ft

② Full Installation Adders

- a) Mobilization ≈ 10%
- b) Testing ≈ $1/ft
- c) Permitting ≈ $500

③ Manholes * (Installed Cost using Bid Tabs & precast manufacturers values)

- 0-6' ⇒ $1300/ea.
- 6-8' ⇒ $1550/ea.
- 8-10' ⇒ $1800/ea.
- 10-12' ⇒ $2100/ea.

Cost Calculations

CASE A

manhole ⇒		= $2100
pump station ⇒	(34,411.2)(8/120)	= $ 2,294.08
400' 8" sewer ⇒	(400)(18.5)	= $7,400
400' Testing ⇒	(400)($1)	= $400
Permitting ⇒		= $500
Mobilization ⇒	(12,694)(0.1)	= $ 1269.41

TOTAL ⇒ $13,963.50

units / lots = 8 lots

UNIT COST ⇒ $/LOT = $\boxed{\$1,745.44}$

HARTMAN & ASSOCIATES, INC.	SH. NO.: 3	JOB NO.: 95-145.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JSW	DATE: 10/1/95
	CHECKED BY:	DATE:

Cost Calculations

Case B

Cost (\$)

Manholes ⇒ (10-12') \$2100 → \$3,900
(8-10') \$1800

pump station ⇒ (34,411.2)(16/120) → \$4,588.16

8" gravity sewer ⇒ (10-12') \$10,989 → \$14,285
(8-10') \$3,296

800' Testing ⇒ (800)(\$1/ft) = \$800

Permitting ⇒ = \$500

Mobilization ⇒ (24,073.16) (0.1) = \$2,407.32

TOTAL \$26,480.5

units / lots = 16 lots

UNIT COST ⇒ \$/lot = $\boxed{\$1,655.03}$

HARTMAN & ASSOCIATES, INC.	SH. NO: 4	JOB NO: 95-145.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JJW	DATE: 10/1/95
	CHECKED BY:	DATE:

Cost Calculations

Case C

			Cost ($)
Manholes ⇒	(10-12') $2100 (8-10') $1800 (6-8') $1550	=	$5,450
pump station ⇒	(34,411.2) (24/120)	=	$6,882.24
8" gravity sewer ⇒	(10-12') $10,989 (8-10') $9,504 (6-8') $144	=	$20,637
1200' Testing ⇒	(1200)($1/ft)	=	$1,200
Permitting ⇒		=	$500
Mobilization ⇒	(34,669.24) (0.1)	=	$3466.92

TOTAL $38,136.16

units / lots = 24 lots

UNIT COST ⇒ $/lot = $1,589.01

HARTMAN & ASSOCIATES, INC. engineers, hydrogeologists, surveyors & management consultants	SH. NO.: 5	JOB NO.: 95-145.00
	MADE BY: JJW	DATE: 10/1/95
	CHECKED BY:	DATE:

Cost Calculations

Case D

			Cost ($)
Manholes ⇒	(10-12') $2100 (8-10') $1800 (6-8') $3100	=	$7,000
1 pump station ⇒	(34,411.20)(32/120)	=	$9,176.32
8" gravity sewer ⇒	(10-12') $10,989 (8-10') $9,504 (6-8') $4,944	=	$25,437
1600' Testing ⇒	(1600)($1/ft)	=	$1600
Permitting ⇒			$500
Mobilization ⇒	(43,713.32)(0.1)	=	$4,371.33

TOTAL $48,085

lots/units = 32 lots

UNIT COST = $/lot = $\boxed{\$1502.65}$

HARTMAN & ASSOCIATES, INC.	SH. NO.: 6	JOB NO.: 95-145.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JJW	DATE: 10/1/95
	CHECKED BY:	DATE:

Case E Cost

Cost ($)

Manholes ⇒ (10-12') ($2100)(3) = $6300
(8-10') ($1800)(3) $5400
(6-8') ($1550)(6) $9300
(0-6') ($1300)(3) $3900 = $24,900

Pump Station ⇒ 34,411.20 $34,411.20

8" gravity sewer ⇒ (10-12') (1782)(18.50) =
(8-10') (1782)(16.00) =
(6-8') (1689)(12) =
(0-6') (750)(9.25) = $88,684.50

6000' Testing ⇒ (6000)($1/ft) = $6000

Permitting ⇒ = $500

Mobilization ⇒ (154,495.7)(0.1) = $15,449.57

TOTAL = $169,945.27

lots/units = 120 lots

UNIT COST = $1416.21

80 units ⇒ $1418.50

40 units ⇒ $1425.05

RECORD OF TELEPHONE COMMUNICATION

DATE: 9/8/95 TIME: 9:30

PROJECT NAME: SSU - Economy of Scale PROJECT NO.: 95-145.00

PARTY CALLING: Janey Wallace COMPANY: HAI

PARTY CONTACTED: Scott Edwards COMPANY: Taylor Precast

SUBJECT: Manhole Costs 4' diameter Susan Pope
Todd Phillips

TELEPHONE COMMUNICATION SUMMARY (Including Decisions & Commitments)

Depth	$	
		* 8" Wall thickness *
0-6	$578	
6-8	$698	
8-10	$836	
10-12	$950	* No Economies of Scale *
12-14	$1076	

ACTION REQUIRED

HARTMAN & ASSOCIATES, INC.

engineers, hydrogeologists, scientists & management consultants

RECORD OF TELEPHONE COMMUNICATION

DATE: 9/7/95 TIME: 3:40

PROJECT NAME: SSU - Economy of Scale PROJECT NO.: 95-145.00

PARTY CALLING: JJW COMPANY: HAI

PARTY CONTACTED: Brian Penner COMPANY: Mitchell & Stark

SUBJECT: Pipe install. costs (813) 597-2165

TELEPHONE COMMUNICATION SUMMARY (Including Decisions & Commitments)

Pressure testing (W+F.M.) Avg. 50¢/ft small job → 75¢/ft
large job → 25¢/ft

Disinfection (W.M.) Avg. $1/ft small job → $2/ft
$1.50 ≈ large job → $1/ft

Gravity Sewer — T.V. Test $1.00/ft

ACTION REQUIRED

HARTMAN & ASSOCIATES, INC.

engineers, hydrogeologists, scientists & management consultants

SANITARY SEWER 9/19/94

	SIZE	DESCRIPTION	PROJECT	QUANTITY	UNIT	UNIT PRICE	BIDDER	YEAR
FITTINGS	8"	90 DEG. BEND	2	4	EA	$285.00	MEYER	1994
	8" X 22	1/2" BEND	2	1	EA	$275.00	MEYER	1994
		D.I. (MISC. FITTINGS)	1	20.5	TN	$5,000.00	MEYER	1988
		FITTINGS (OFF SITE)	2	1	LS	$1,300.00	BRIAR	1994
	16" X 6"	D.I. CROSS FITTINGS	1	2	EA	$1,080.00	MEYER	1988
	20" X 6"	D.I. CROSS FITTINGS	1	2	EA	$1,400.00	MEYER	1988
	24" X 6"	D.I. CROSS FITTINGS	1	3	EA	$1,710.00	MEYER	1988
	30" X 6"	D.I. CROSS FITTINGS	1	2	EA	$3,110.00	MEYER	1988
	8" X 6"	WYE WITH 45 DEG. BEND	2	58	EA	$37.00	MEYER	1994
	10" X 6"	WYE WITH 45 DEG. BEND	2	19	EA	$80.00	MEYER	1994
	6" X 4"	DOUBLE WYE	2	56	EA	$28.00	MEYER	1994
	4"	PLUG	2	112	EA	$2.60	MEYER	1994
	6"	PLUG	2	83	EA	$4.70	MEYER	1994
DUCTILE IRON PIPE	8"	DIP (RESTRAINED)	2	120	LF	$48.00	MEYER	1994
	10"	DIP (12'-14' CUT)	2	20	LF	$38.00	BRIAR	1994
	10"	DIP (10'-12' CUT)	2	20	LF	$35.75	MEYER	1994
	8"	DIP FM	3	80	LF	$37.00	JMHC	1994
	10"	DIP FM		150	LF	$24.15	ESTERSON	1986
	10"	DIP FM	3	40	LF	$49.50	JMHC	1994
	12"	DIP FM		455	LF	$28.26	ESTERSON	1986
	8"	DIP FM		180	LF	$20.89	ESTERSON	1986
	8"	DIP FM (0'-6' CUT)		18	LF	$18.00	HUBBARD	1990
	8"	DIP FM (0'-6' CUT)		18	LF	$19.70	GOPHER	1990
	8"	DIP FM (0'-6' CUT)		18	LF	$20.00	WITHERINGTON	1990
	8"	DIP (0'-6' CUT)		18	LF	$26.80	B & D	1990
	8"	DIP (6'-8' CUT)		20	LF	$1,500.00	X-RDS	1988
	8"	DIP (8'-10' CUT)		36	LF	$28.15	B & D	1990
	8"	DIP FM (8'-10' CUT)		36	LF	$20.00	HUBBARD	1990
	8"	DIP FM (8'-10' CUT)		36	LF	$21.95	GOPHER	1990
	8"	DIP FM (8'-10' CUT)		36	LF	$22.00	WITHERINGTON	1990
	16"	DIP FM (CL 50)	1	3250	LF	$31.20	MEYER	1988
	16"	DIP FM (CL 50)	1	3250	LF	$30.00	MEYER	1988
	16"	DIP FM (CL 50)	1	250	LF	$43.15	MEYER	1988
	20"	DIP FM (CL 50)	1	250	LF	$55.90	MEYER	1988
	20"	DIP FM (CL 50)	1	3265	LF	$37.00	MEYER	1988
	20"	DIP FM (CL 50)	1	3265	LF	$40.20	MEYER	1988
	24"	DIP FM (CL 50)	1	5645	LF	$48.90	MEYER	1988
	24"	DIP FM (CL 50)	1	5645	LF	$45.00	MEYER	1988
	24"	DIP FM (CL 50)	1	410	LF	$64.30	MEYER	1988
	30"	DIP FM (CL 50)	1	425	LF	$87.00	MEYER	1988
	30"	DIP FM (CL 50)	1	5600	LF	$60.00	MEYER	1988
PVC PIPE	8"	PVC (0'-6' CUT)		338	LF	$8.50	X-RDS	1988
	8"	PVC (0'-6' CUT)		707	LF	$6.80	HUBBARD	1990
	8"	PVC (0'-6' CUT)		707	LF	$7.70	GOPHER	1990
	8"	PVC (0'-6' CUT)		707	LF	$7.00	WITHERINGTON	1990
	8"	PVC (0'-6' CUT)		707	LF	$11.70	B & D	1990
	8"	PVC (0'-6' CUT)	2	2906	LF	$10.00	MEYER	1994
	8"	PVC (0'-6' CUT)	2	2950	LF	$8.00	BRIAR	1994
	8"	PVC/DI (0'-6' CUT)	7	30	LF	$13.00	SOUTHWEST	1994
	8"	PVC/DI (0'-6' CUT)	7	30	LF	$13.75	ROCKET	1994
	8"	PVC/DI (0'-6' CUT)	7	30	LF	$14.00	MUSTANG	1994
	8"	PVC (6'-8' CUT)		1055	LF	$7.90	HUBBARD	1990
	8"	PVC (6'-8' CUT)		1055	LF	$8.75	GOPHER	1990
	8"	PVC (6'-8' CUT)		1055	LF	$8.50	WITHERINGTON	1990
	8"	PVC (6'-8' CUT)		648	LF	$14.50	X-RDS	1988
	8"	PVC (6'-8' CUT)		1055	LF	$12.35	B & D	1990
	8"	PVC (6'-8' CUT)	2	243	LF	$9.12	BRIAR	1994
	8"	PVC (6'-8' CUT)	2	700	LF	$8.60	BRIAR	1994
	8"	PVC (6'-8' CUT)	2	601	LF	$11.50	MEYER	1994
	8"	PVC/DI (6'-8' CUT)	7	635	LF	$15.00	SOUTHWEST	1994
	8"	PVC/DI (6'-8' CUT)	7	635	LF	$21.00	ROCKET	1994
	8"	PVC/DI (6'-8' CUT)	7	635	LF	$18.00	MUSTANG	1994

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Gravi

SANITARY SEWER 9/19/94

SIZE	DESCRIPTION	PROJECT	QUANTITY	UNIT	UNIT PRICE	BIDDER	YEAR
8"	PVC (8'-10' CUT)		675	LF	$9.37	HUBBARD	1990
8"	PVC (8'-10' CUT)		675	LF	$9.95	GOPHER	1990
8"	PVC (8'-10' CUT)		675	LF	$9.00	WITHERINGTON	1990
8"	PVC (8'-10' CUT)		675	LF	$13.05	B & D	1990
8"	PVC (8'-10' CUT)	2	1480	LF	$8.90	BRIAR	1994
8"	PVC (8'-10' CUT)	2	800	LF	$9.25	JMHC	1994
8"	PVC (8'-10' CUT)	2	1513	LF	$14.00	MEYER	1994
8"	PVC/DI (8'-10' CUT)	7	390	LF	$20.00	SOUTHWEST	1994
8"	PVC/DI (8'-10' CUT)	7	390	LF	$24.00	ROCKET	1994
8"	PVC/DI (8'-10' CUT)	7	390	LF	$25.00	MUSTANG	1994
8"	PVC (10'-12' CUT)		317	LF	$11.26	HUBBARD	1990
8"	PVC (10'-12' CUT)		317	LF	$12.45	GOPHER	1990
8"	PVC (10'-12' CUT)		317	LF	$11.00	WITHERINGTON	1990
8"	PVC (10'-12' CUT)		317	LF	$14.90	B & D	1990
8"	PVC (10'-12' CUT)	2	20	LF	$9.75	JMHC	1994
8"	PVC (12'-14' CUT)		418	LF	$13.25	HUBBARD	1990
8"	PVC (12'-14' CUT)		418	LF	$15.45	GOPHER	1990
8"	PVC (12'-14' CUT)		418	LF	$13.00	WITHERINGTON	1990
8"	PVC (12'-14' CUT)		418	LF	$16.05	B & D	1990
8"	PVC/DI (12'-14' CUT)	7	183	LF	$30.00	SOUTHWEST	1994
8"	PVC/DI (12'-14' CUT)	7	183	LF	$31.00	ROCKET	1994
8"	PVC/DI (12'-14' CUT)	7	183	LF	$45.00	MUSTANG	1994
8"	PVC (14'-16' CUT)		166	LF	$16.35	HUBBARD	1990
8"	PVC (14'-16' CUT)		166	LF	$16.35	HUBBARD	1990
8"	PVC (14'-16' CUT)		166	LF	$15.00	WITHERINGTON	1990
8"	PVC (14'-16' CUT)		166	LF	$17.50	B & D	1990
8"	PVC (16'-18' CUT)		357	LF	$21.80	HUBBARD	1990
8"	PVC (16'-18' CUT)		357	LF	$19.95	GOPHER	1990
8"	PVC (16'-18' CUT)		357	LF	$17.00	WITHERINGTON	1990
8"	PVC (16'-18' CUT)		357	LF	$19.35	B & D	1990
4"	PVC FM		20	LF	$10.00	HENSON	1986
4"	PVC FM	7	675	LF	$6.00	SOUTHWEST	1994
4"	PVC FM	7	675	LF	$7.50	ROCKET	1994
4"	PVC FM	7	675	LF	$10.00	MUSTANG	1994
6"	PVC FM		20	LF	$10.00	ESTERSON	1986
6"	PVC FM	5	198	LF	$10.00	JENKINS	1993
6"	PVC FM	1	1125	LF	$17.60	MEYER	1988
8"	PVC FM		3425	LF	$9.00	HENSON	1986
8"	PVC FM	2	7050	LF	$6.50	MEYER	1994
8"	PVC FM	3	1360	LF	$8.00	JMHC	1994
8"	PVC FM (ON SITE)	2	3730	LF	$7.40	BRIAR	1994
8"	PVC FM (ON SITE)	2	3720	LF	$8.00	JMHC	1994
8"	PVC FM (OFF SITE)	2	3060	LF	$7.64	BRIAR	1994
8"	PVC FM (OFF SITE)	2	3180	LF	$8.00	JMHC	1994
10"	PVC FM		1950	LF	$10.56	HENSON	1986
10"	PVC FM	3	244	LF	$15.00	JMHC	1994
12"	PVC FM		2975	LF	$12.00	ESTERSON	1986
4"	PVC SERVICE LATERAL		350	LF	$5.30	X-RDS	1988
6"	PVC SERVICE LATERAL		1986	LF	$12.45	B & D	1990
6"	PVC SERVICE LATERAL		1986	LF	$10.16	GOPHER	1990
6"	PVC SERVICE LATERAL		1986	LF	$5.00	WITHERINGTON	1990
6"	PVC SERVICE LATERAL		1986	LF	$7.80	HUBBARD	1990
6"	PVC SERVICE LATERAL		535	LF	$8.10	VANNICE	1990
6"	DOUBLE SERVICE LATERALS	2	77	EA	$326.62	BRIAR	1994
6"	DOUBLE SERVICE LATERALS	2	60	EA	$275.00	JMHC	1994
6"	DOUBLE SERVICE LATERALS	3	50	LF	$265.00	JMHC	1994
6"	DOUBLE SERVICE LATERALS	7	18	EA	$275.00	SOUTHWEST	1994
6"	DOUBLE SERVICE LATERALS	7	18	EA	$310.00	ROCKET	1994
6"	DOUBLE SERVICE LATERALS	7	18	EA	$450.00	MUSTANG	1994
6"	SINGLE SERVICE LATERALS	2	3	EA	$301.67	BRIAR	1994
6"	SINGLE SERVICE LATERALS	2	1	EA	$245.00	JMHC	1994
6"	SINGLE SERVICE LATERALS	3	14	EA	$245.00	JMHC	1994
6"	SINGLE SERVICE LATERALS	7	5	EA	$225.00	SOUTHWEST	1994
6"	SINGLE SERVICE LATERALS	7	5	EA	$280.00	ROCKET	1994
6"	SINGLE SERVICE LATERALS	7	5	EA	$350.00	MUSTANG	1994

Gravity

Grav.

PVC PIPE

APPENDIX O

HARTMAN & ASSOCIATES, INC.	SH. NO.: 1	JOB NO.: 95-145.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JJW	DATE: 10/1/95
	CHECKED BY:	DATE:

Calculations (L.S. flow)

① 100 gpm ⇒ 144,000 gpd (÷ 4) = 36,000 gpd (ADF)
36,000 gpd / 300 gpd/unit = $\boxed{\text{120 units}}$

② 200 gpm ⇒ 288,000 gpd (÷ 4) = 72,000 gpd (ADF)
72,000 gpd / 300 gpd/unit = $\boxed{\text{240 units}}$

③ 300 gpm ⇒ 432,000 gpd (÷ 3.5) = 123,429 gpd (ADF)
123,429 gpd / 300 gpd/unit = $\boxed{\text{411 units}}$

④ 400 gpm ⇒ 576,000 gpd (÷ 3.5) = 164,571 gpd (ADF)
164,571 gpd / 300 gpd/unit = $\boxed{\text{549 units}}$

⑤ 500 gpm ⇒ 720,000 gpd (÷ 3.5) = 205,715 gpd (ADF)
205,715 gpd / 300 gpd/unit = $\boxed{\text{686 units}}$

⑥ 600 gpm ⇒ 864,000 gpd (÷ 3.5) = 246,857 gpd (ADF)
246,857 gpd / 300 gpd/unit = $\boxed{\text{823 units}}$

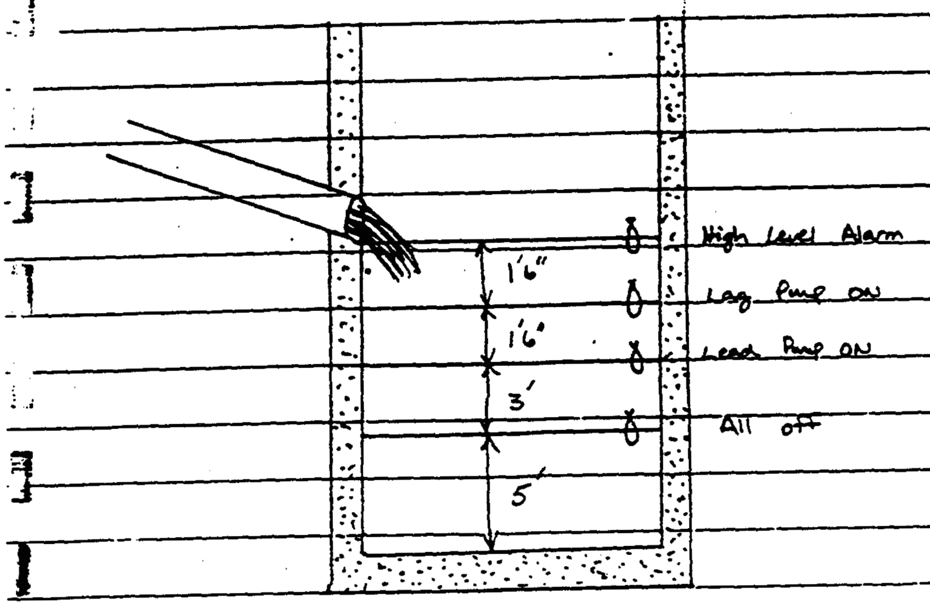
⑦ 700 gpm ⇒ 1,008,000 gpd (÷ 3) = 336,000 gpd (ADF)
336,000 gpd / 300 gpd/unit = $\boxed{\text{1120 units}}$

⑧ 800 gpm ⇒ 1,152,000 gpd (÷ 3) = 384,000 (ADF)
384,000 gpd / 300 gpd/unit = $\boxed{\text{1280 units}}$

⑨ 900 gpm ⇒ 1,296,000 gpd (÷ 3) = 432,000 gpd (ADF)
432,000 gpd / 300 gpd/unit = $\boxed{\text{1440 units}}$

⑩ 1000 gpm ⇒ 1,440,000 gpd (÷ 3) = 480,000 gpd (ADF)
480,000 gpd / 300 gpd/unit = $\boxed{\text{1600 units}}$

Sewage Pump Station Design



① 100 Gpm Pump ⇒ $\forall = QT/4 = (100\text{gpm})(6\text{min})/4 = 150 \text{ gal}$

$\forall = 150 \text{ gal} = 20.05 \text{ ft}^3$

6' ø well $h = \frac{\forall}{\pi R^2} = \frac{(20.05 \text{ ft}^3)}{\pi (3\text{ft})^2} = 1.06 \text{ ft}$

$\boxed{\text{6' Diameter Well}}$

② 200 Gpm Pump ⇒ $\forall = QT/4 = \frac{(200\text{gpm})(6\text{m})}{4} = 300 \text{ gal}$

$\forall = 40.1 \text{ ft}^3$

6' ø well $h = \frac{\forall}{\pi R^2} = \frac{(40.1 \text{ ft}^3)}{\pi (3\text{ft})^2} = 1.42 \text{ ft}$

$\boxed{\text{6' Diameter Well}}$

Sewage Pump Station Design

③ 300 gpm pump $\Rightarrow$ $V = QT/4 = \frac{(300gpm)(6m)}{4} = 450 gal$

$V = 60.16\ ft^3$

6' Diam well $h = \frac{(60.16\ ft^3)}{\pi(3ft)^2} = 2.13\ ft$

6' Diameter Well

④ 400 gpm pump $\Rightarrow$ $V = QT/4 = \frac{400gpm(6m)}{4} = 600\ gal$

$V = 80.21\ ft^3$

6' Diam. Well

$h = \frac{(80.21\ ft^3)}{\pi(3ft)^2} = 2.84\ ft$

6' Diameter Well

⑤ 500 gpm pump $\Rightarrow$ $V = QT/4 = \frac{(500gpm)(6min)}{4} = 750\ gal$

$V = 100.27\ ft^3$

8' Diam Well

$h = \frac{(100.27\ ft^3)}{\pi(4ft)^2} = 1.99\ ft$

8' Diameter Well

Sewage Pump Station Design

⑥ 600 gpm pump ⇒ $\forall = QT/4 = \frac{(600\text{gpm})(6\text{min})}{4} = 900 \text{ gal}$

$\forall = 120.32 \text{ ft}^3$

8' ø well

$h = \frac{(120.32 \text{ ft}^3)}{\pi (4\text{ft})^2} = \underline{\underline{2.39 \text{ ft}}}$

8' Diameter Well

⑦ 700 gpm pump ⇒ $\forall = QT/4 = \frac{(700 \text{ gpm})(6\text{min})}{4} = 1050 \text{ gal}$

$\forall = 140.4 \text{ ft}^3$

8' ø well

$h = \frac{(140.4 \text{ ft}^3)}{\pi (4\text{ft})^2} = \underline{\underline{2.79 \text{ ft}}}$

10' ø well

$h = \frac{(140.4 \text{ ft}^3)}{\pi (5\text{ft})^2} = \underline{\underline{1.79 \text{ ft}}}$

10' Diameter Well

⑧ 800 gpm pump ⇒ $\forall = QT/4 = \frac{(800 \text{ gpm})(6\text{min})}{4} = 1200 \text{ gal}$

$\forall = 160.4 \text{ ft}^3$

10' ø well

$h = \frac{(160.4 \text{ ft}^3)}{\pi (5\text{ft})^2} = 2.04 \text{ ft}$

10' Diameter Well

Sewage Pump Station Design

(9) 900 gpm pump ⇒ $V = QT/4 = \frac{(900\,gpm)(6\,min)}{4} = 1350\ gal$

$V = 180.48\ ft^3$

10' ø well [redacted] $h = \frac{(180.48\ ft^3)}{\pi(5ft)^2} = \underline{\underline{2.30\ ft}}$

$\boxed{\text{10' Diameter Well}}$

(10) 1000 gpm pump ⇒ $V = QT/4 = \frac{(1000\,gpm)(6\,min)}{4} = 1500\ gal$

$V = 200.5\ ft^3$

10' ø well [redacted] $h = \frac{(200.5\ ft^3)}{\pi\ (5ft)^2} = \underline{2.55\ ft}$

12' ø well $h = (200.5\ ft^3) / \pi (6ft)^2 = \underline{1.77\ ft}$

$\boxed{\text{12' Diameter Well}}$

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 1 Submersible

Installed 1995 Depth (ft): 15 Diameter (ft): 6

Precast Well

Wet Well(ft)	15.00	$125/FT	COST=	$1,875
Top Slab(cy)	0.70	$450/cy	COST=	$314
Base Slab(cy)	3.11	$450/cy	COST=	$1,398

Excavation

Surface Diameter (ft)	(2*Depth)+10ft+Dia.=	"SD"=	46
Surface Area (ft)	((3.1415)*("SD")^2)/4=	"SA"=	1662
Base Diameter (ft)	Dia+10ft=	"BD"=	16
Base Area (ft)	((3.1415)*("BD")^2)/4=	"BA"=	201.1
Volume (cy)	(1/3*("SA")*(Depth+"BD")-1/3*("BA")("BD"))/27=	"Vol"=	596
	$1.25/cy	COST=	$745
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27=	"BK"=	533
	$1.25/cy	COST=	$667

Dewatering

Circumference	2* (3.1415)(("SD"+2)/2f 150.8		
	$75/LF	COST=	$11,310

Valve Box:

Length(ft)	5		
Width(ft)	5		
Walls	8"		
Base Slab (ft)	25		
Top Slab	Aluminum Hatch	COST=	$1,440

TOTAL STRUCTURAL COST= $17,748.87

Pumps: 2 **Motors:** 2
Horsepower 5 5
GPM 100
Manufacturer Flyght/ABS
Model No.

TOTAL PUMP COST= $11,200.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST= $2,800.00

Piping/Fittings/Equipment:

TOTAL EQUIPMENT COST= $2,662.33

4" Plug Valve (2)
4" Check Valve (2)
4" connector
Emergency pump out
4" DI piping

TOTAL LIFT STATION COST= $34,411.20

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 2 Submersible

Installed 1995 Depth (ft): 16 Diameter (ft): 6

Precast Well

Wet Well(ft)	16.00	$125/FT	COST=	$2,000
Top Slab(cy)	0.70	$450/cy	COST=	$314
Base Slab(cy)	3.11	$450/cy	COST=	$1,398

Excavation

Surface Diameter (ft)	(2*Depth) + 10ft + Dia. =	"SD" =	48
Surface Area (ft)	((3.1415)*("SD")^2)/4 =	"SA" =	1810
Base Diameter (ft)	Dia + 10ft =	"BD" =	16
Base Area (ft)	((3.1415)*("BD")^2)/4 =	"BA" =	201.1
Volume (cy)	(1/3*("SA")*(Depth + "BD")-1/3*("BA")("BD"))/27 =	"Vol" =	675
	$1.25/cy	COST=	$844
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27 =	"BK" =	608
	$1.25/cy	COST=	$760

Dewatering

Circumference 2* (3.1415)(("SD" + 2)/2f 157.1

$75/LF COST= $11,781

Valve Box:

Length(ft) 5
Width(ft) 5
Walls 8"
Base Slab (ft) 25
Top Slab Aluminum Hatch COST= $1,440

TOTAL STRUCTURAL COST= $18,537.00

Pumps: 2 **Motors:** 2
Horsepower 6 5
GPM 200
Manufacturer Flyght/ABS
Model No. **TOTAL PUMP COST=** $11,600.00

Controls/Electrical: Estimated at 20% of Total Package Cost
TOTAL CONTROL COST= $2,900.00

Piping/Fittings/Equipment: **TOTAL EQUIPMENT COST=** $2,780.55
4" Plug Valve (2)
4" Check Valve (2) **TOTAL LIFT STATION COST=** $35,817.55
4" connector
Emergency pump out
4" DI piping

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 3 Submersible

Installed 1995 Depth (ft): 18 Diameter (ft): 6

Precast Well

Wet Well(ft)	18.00	$125/FT	COST=	$2,250
Top Slab(cy)	0.70	$450/cy	COST=	$314
Base Slab(cy)	3.11	$450/cy	COST=	$1,398

Excavation

Surface Diameter (ft)	(2*Depth)+10ft+Dia.=	"SD"=	52
Surface Area (ft)	((3.1415)*("SD")^2)/4=	"SA"=	2124
Base Diameter (ft)	Dia+10ft=	"BD"=	16
Base Area (ft)	((3.1415)*("BD")^2)/4=	"BA"=	201.1
Volume (cy)	(1/3*("SA")*(Depth+"BD")-1/3*("BA")("BD"))/27=	"Vol"=	852
	$1.25/cy	COST=	$1,065
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27=	"BK"=	776
	$1.25/cy	COST=	$970

Dewatering

Circumference 2* (3.1415)(("SD"+2)/2f 169.6

$75/LF COST= $12,723

Valve Box:

Length(ft)	5	
Width(ft)	5	
Walls	8"	
Base Slab (ft)	25	
Top Slab	Aluminum Hatch	COST= $1,440

TOTAL STRUCTURAL COST= $20,160.38

Pumps: 2 **Motors:** 2

Horsepower 9 5

GPM 300

Manufacturer Flyght/ABS

Model No. **TOTAL PUMP COST=** $12,800.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST= $3,200.00

Piping/Fittings/Equipment: **TOTAL EQUIPMENT COST=** $4,032.08

6" Plug Valve (2)

6" Check Valve (2) **TOTAL LIFT STATION COST=** $40,192.46

6" connector

Emergency pump out

6" DI piping

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 4 Submersible

Installed 1995 Depth (ft): 20 Diameter (ft): 6

Precast Well

Wet Well(ft)	20.00	$125/FT	COST=	$2,500
Top Slab(cy)	0.70	$450/cy	COST=	$314
Base Slab(cy)	3.11	$450/cy	COST=	$1,398

Excavation

Surface Diameter (ft)	(2*Depth)+10ft+Dia.=	"SD"=	56
Surface Area (ft)	((3.1415)*("SD")^2)/4=	"SA"=	2463
Base Diameter (ft)	Dia+10ft=	"BD"=	16
Base Area (ft)	((3.1415)*("BD")^2)/4=	"BA"=	201.1
Volume (cy)	(1/3*("SA")*(Depth+"BD")-1/3*("BA")("BD"))/27=	"Vol"=	1055
	$1.25/cy	COST=	$1,319
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27=	"BK"=	971
	$1.25/cy	COST=	$1,214

Dewatering

Circumference	2* (3.1415)(("SD"+2)/2f 182.2		
	$75/LF	COST=	$13,666

Valve Box:

Length(ft)	5		
Width(ft)	5		
Walls	8"		
Base Slab (ft)	25		
Top Slab	Aluminum Hatch	COST=	$1,440

TOTAL STRUCTURAL COST= $21,850.47

Pumps: 2 **Motors:** 2
Horsepower 12 5
GPM 400
Manufacturer Flyght/ABS
Model No.

TOTAL PUMP COST= $14,200.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST= $3,550.00

Piping/Fittings/Equipment:

TOTAL EQUIPMENT COST= $4,370.09

- 6" Plug Valve (2)
- 6" Check Valve (2)
- 6" connector
- Emergency pump out
- 6" DI piping

TOTAL LIFT STATION COST= $43,970.57

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 5 Submersible

Installed 1995 Depth (ft): 18 Diameter (ft): 8

Precast Well

Wet Well(ft)	18.00	$125/FT	COST=	$2,250
Top Slab(cy)	1.24	$450/cy	COST=	$559
Base Slab(cy)	4.42	$450/cy	COST=	$1,991

Excavation

Surface Diameter (ft)	(2*Depth) + 10ft + Dia. =	"SD" =	54
Surface Area (ft)	((3.1415)*("SD")^2)/4 =	"SA" =	2290
Base Diameter (ft)	Dia + 10ft =	"BD" =	18
Base Area (ft)	((3.1415)*("BD")^2)/4 =	"BA" =	254.5
Volume (cy)	(1/3*("SA")*(Depth + "BD")-1/3*("BA")("BD"))/27 =	"Vol" =	961
	$1.25/cy	COST=	$1,202
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27 =	"BK" =	827
	$1.25/cy	COST=	$1,034

Dewatering

Circumference	2* (3.1415)(("SD" + 2)/2f 175.9		
	$75/LF	COST=	$13,195

Valve Box:

Length(ft)	5		
Width(ft)	5		
Walls	8"		
Base Slab (ft)	25		
Top Slab	Aluminum Hatch	COST=	$1,440

TOTAL STRUCTURAL COST= $21,670.09

Pumps: 2
Horsepower 13.5
GPM 500
Manufacturer Flyght/ABS
Model No.

Motors: 2
5

TOTAL PUMP COST = $14,800.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST = $3,700.00

Piping/Fittings/Equipment:

TOTAL EQUIPMENT COST = $5,417.52

8" Plug Valve (2)
8" Check Valve (2)
8" connector
Emergency pump out
8" DI piping

TOTAL LIFT STATION COST = $45,587.61

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 6 Submersible

Installed 1995 Depth (ft): 20 Diameter (ft): 8

Precast Well

Wet Well(ft)	20.00	$125/FT	COST=	$2,500
Top Slab(cy)	1.24	$450/cy	COST=	$559
Base Slab(cy)	4.42	$450/cy	COST=	$1,991

Excavation

Surface Diameter (ft)	(2*Depth) + 10ft + Dia. =	"SD" =	58
Surface Area (ft)	((3.1415)*("SD")^2)/4 =	"SA" =	2642
Base Diameter (ft)	Dia + 10ft =	"BD" =	18
Base Area (ft)	((3.1415)*("BD")^2)/4 =	"BA" =	254.5
Volume (cy)	(1/3*("SA")*(Depth + "BD")-1/3*("BA")("BD"))/27 =	"Vol" =	1183
	$1.25/cy	COST=	$1,479
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27 =	"BK" =	1034
	$1.25/cy	COST=	$1,293

Dewatering

Circumference	2* (3.1415)(("SD" + 2)/2f 188.5		
	$75/LF	COST=	$14,137

Valve Box:

Length(ft)	5		
Width(ft)	5		
Walls	8"		
Base Slab (ft)	25		
Top Slab	Aluminum Hatch	COST=	$1,440

TOTAL STRUCTURAL COST= $23,398.00

Pumps: 2
Horsepower 17.5
GPM 600
Manufacturer Flyght/ABS
Model No.

Motors: 2
5

TOTAL PUMP COST = $16,640.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST = $4,160.00

Piping/Fittings/Equipment:

TOTAL EQUIPMENT COST = $5,849.50

8" Plug Valve (2)
8" Check Valve (2)
8" connector
Emergency pump out
8" DI piping

TOTAL LIFT STATION COST = $50,047.50

Sheet No.	Job No. 95-146.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 7 Submersible

Installed 1995 Depth (ft): 20 Diameter (ft): 10

Precast Well

Wet Well(ft)	20.00	$125/FT	COST=	$2,500
Top Slab(cy)	1.94	$450/cy	COST=	$873
Base Slab(cy)	5.98	$450/cy	COST=	$2,689

Excavation

Surface Diameter (ft)	(2*Depth) + 10ft + Dia. =	"SD" =	60
Surface Area (ft)	((3.1415)*("SD")^2)/4 =	"SA" =	2827
Base Diameter (ft)	Dia + 10ft =	"BD" =	20
Base Area (ft)	((3.1415)*("BD")^2)/4 =	"BA" =	314.2
Volume (cy)	(1/3*("SA")*(Depth + "BD")-1/3*("BA")("BD"))/27 =	"Vol" =	1319
	$1.25/cy	COST=	$1,648
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27 =	"BK" =	1086
	$1.25/cy	COST=	$1,357

Dewatering

Circumference	2* (3.1415)(("SD" + 2)/2* 194.8		
	$75/LF	COST=	$14,608

Valve Box:

Length(ft)	5		
Width(ft)	5		
Walls	8"		
Base Slab (ft)	25		
Top Slab	Aluminum Hatch	COST=	$1,440

TOTAL STRUCTURAL COST= $25,116.18

Pumps: 2
Horsepower 20.5
GPM 700
Manufacturer Flyght/ABS
Model No.

Motors: 2
5

TOTAL PUMP COST= $17,600.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST= $4,400.00

Piping/Fittings/Equipment:

TOTAL EQUIPMENT COST= $6,279.04

8" Plug Valve (2)
8" Check Valve (2)
8" connector
Emergency pump out
8" DI piping

TOTAL LIFT STATION COST= $53,395.22

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 8 Submersible

Installed 1995 Depth (ft): 20 Diameter (ft): 10

Precast Well

Wet Well(ft)	20.00	$125/FT	COST=	$2,500
Top Slab(cy)	1.94	$450/cy	COST=	$873
Base Slab(cy)	5.98	$450/cy	COST=	$2,689

Excavation

Surface Diameter (ft)	(2*Depth)+10ft+Dia.=	"SD"=	60
Surface Area (ft)	((3.1415)*("SD")^2)/4=	"SA"=	2827
Base Diameter (ft)	Dia+10ft=	"BD"=	20
Base Area (ft)	((3.1415)*("BD")^2)/4=	"BA"=	314.2
Volume (cy)	(1/3*("SA")*(Depth+"BD")-1/3*("BA")("BD"))/27=	"Vol"=	1319
	$1.25/cy	COST=	$1,648
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27=	"BK"=	1086
	$1.25/cy	COST=	$1,357

Dewatering

Circumference	2* (3.1415)(("SD"+2)/2f 194.8		
	$75/LF	COST=	$14,608

Valve Box:

Length(ft)	5		
Width(ft)	5		
Walls	8"		
Base Slab (ft)	25		
Top Slab	Aluminum Hatch	COST=	$1,440

TOTAL STRUCTURAL COST= $25,116.18

Pumps:	2	**Motors:**	2
Horsepower	21		5
GPM	800		
Manufacturer	Flyght/ABS		
Model No.			

TOTAL PUMP COST= $18,400.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST= $4,600.00

Piping/Fittings/Equipment:

TOTAL EQUIPMENT COST= $10,046.47

10" Plug Valve (2)
10" Check Valve (2)
10" connector
Emergency pump out
10" DI piping

TOTAL LIFT STATION COST= $58,162.65

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 9 Submersible

Installed 1995	Depth (ft): 20	Diameter (ft): 10		
Precast Well				
Wet Well(ft) 20.00	$125/FT		COST= $2,500	
Top Slab(cy) 1.94	$450/cy		COST= $873	
Base Slab(cy) 5.98	$450/cy		COST= $2,689	
Excavation				
Surface Diameter (ft)	(2*Depth) + 10ft + Dia. =		"SD" =	60
Surface Area (ft)	((3.1415)*("SD")^2)/4 =		"SA" =	2827
Base Diameter (ft)	Dia + 10ft =		"BD" =	20
Base Area (ft)	((3.1415)*("BD")^2)/4 =		"BA" =	314.2
Volume (cy)	(1/3*("SA")*(Depth + "BD")-1/3*("BA")("BD"))/27 =		"Vol" =	1319
	$1.25/cy		COST=	$1,648
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27 =		"BK" =	1086
	$1.25/cy		COST=	$1,357
Dewatering				
Circumference	2* (3.1415)(("SD" + 2)/2f 194.8			
	$75/LF		COST=	$14,608
Valve Box:	Length(ft) 5			
	Width(ft) 5			
	Walls 8"			
	Base Slab (ft) 25			
	Top Slab Aluminum Hatch		COST=	$1,440
	TOTAL STRUCTURAL COST=			$25,116.18

Pumps: 2
Horsepower 27.5
GPM 900
Manufacturer Flyght/ABS
Model No.

Motors: 2
5

TOTAL PUMP COST = $19,600.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST = $4,900.00

Piping/Fittings/Equipment:

TOTAL EQUIPMENT COST = $10,046.47

10" Plug Valve (2)
10" Check Valve (2)
10" connector
Emergency pump out
10" DI piping

TOTAL LIFT STATION COST = $59,662.65

Sheet No.	Job No. 95-145.00	
Made By	JJW	Date: 8/14/95
Checked By		Date:

Station No. 10 Submersible

Installed 1995 Depth (ft): 20 Diameter (ft): 12

Precast Well

Wet Well(ft)	20.00	$125/FT	COST=	$2,500
Top Slab(cy)	2.79	$450/cy	COST=	$1,257
Base Slab(cy)	7.76	$450/cy	COST=	$3,492

Excavation

Surface Diameter (ft)	(2*Depth) + 10ft + Dia. =	"SD" =	62
Surface Area (ft)	((3.1415)*("SD")^2)/4 =	"SA" =	3019
Base Diameter (ft)	Dia + 10ft =	"BD" =	22
Base Area (ft)	((3.1415)*("BD")^2)/4 =	"BA" =	380.1
Volume (cy)	(1/3*("SA")*(Depth + "BD")-1/3*("BA")("BD"))/27 =	"Vol" =	1462
	$1.25/cy	COST=	$1,828
Backfill(cy)	"Vol"-((3.1415)(Dia.)^2(Depth))/27 =	"BK" =	1127
	$1.25/cy	COST=	$1,409

Dewatering

Circumference	2* (3.1415)(("SD" + 2)/2f 201.1		
	$75/LF	COST=	$15,080

Valve Box:

Length(ft)	5		
Width(ft)	5		
Walls	8"		
Base Slab (ft)	25		
Top Slab	Aluminum Hatch	COST=	$1,440

TOTAL STRUCTURAL COST= $27,005.01

Pumps:	2	Motors:	2
Horsepower	30		5
GPM	1000		
Manufacturer	Flyght/ABS		
Model No.		TOTAL PUMP COST=	$20,400.00

Controls/Electrical: Estimated at 20% of Total Package Cost

TOTAL CONTROL COST= $5,100.00

Piping/Fittings/Equipment: TOTAL EQUIPMENT COST= $10,802.00

10" Plug Valve (2)
10" Check Valve (2)
10" connector
Emergency pump out
10" DI piping

TOTAL LIFT STATION COST= $63,307.02

Directory: C:\AUS
Filename: PRECAST.WK3
Date: 30-Mar-95
Time: 10:02 AM

PRECAST WETWELL INSTALLED COST SUMMARY

Material Cost

Diameter (feet)	4	6	8	10	12
Cost ($/ft of depth)	$65	$125	$175	$300	$375
Base	$645	$1,045	$1,825	$2,821	$3,605
Top	$125	$225	$500	$1,000	$1,400

Installation Adder @ 30%

Diameter (feet)	4	6	8	10	12
Cost ($/ft of depth)	$20	$38	$53	$90	$113
Base	$194	$314	$548	$846	$1,082
Top	$38	$68	$150	$300	$420

Total Installed Cost

Diameter (feet)	4	6	8	10	12
Cost ($/ft of depth)	$85	$163	$228	$390	$488
Base	$839	$1,359	$2,373	$3,667	$4,687
Top	$163	$293	$650	$1,300	$1,820

Base

Nominal Diameter (ft)	Actual Diameter (ft)	Thickness (ft)	Actual Area (sq.ft.)	Quantity of Concrete (cu.ft.)	Quantity of Concrete (cu.yd.)	Item Cost @ $275 cu.yd. ($)
4	7.33	1.50	42	63	2	$645
6	9.33	1.50	68	103	4	$1,045
8	12.33	1.50	119	179	7	$1,825
10	15.33	1.50	185	277	10	$2,821
12	17.33	1.50	236	354	13	$3,605

Top

Nominal Diameter (ft)	Actual Diameter (ft)	Thickness (ft)	Actual Area (sq.ft.)	Quantity of Concrete (cu.ft.)	Quantity of Concrete (cu.yd.)	Item Cost @ $275 cu.yd. ($)
4	5.33	0.67	22	15	1	$152
6	7.33	0.67	42	28	1	$287
8	9.33	0.67	68	46	2	$465
10	11.33	1.00	101	101	4	$1,027
12	13.33	1.00	140	140	5	$1,422

ELLIS K. PHELPS & COMPANY

2152 Sprint Boulevard
Apopka, Florida 32703

Phone: (407) 880-2900
FAX: (407) 880-2962

To: Hartman & Associates
Bobby Wyatt
407-839-3790 (Fax)

From: Juan Citarella

Reference #	Reference HP	Package Estimate	Current Flygt Pump
3825-1	9.4	$21,000	CP 3127
3825-1	5	$18,000	CP 3102
?	5	$18,000	CP 3102
5443A	7.5	$21,000	CP 3127
80-200/3085	2.5	$16,000	CP 3085
C-3082	3	$16,000	CP 3085
C-3101	2.5	$16,000	CP 3085
3085	3	$16,000	CP 3085
3085	1.5	$16,000	CP 3085
C-3101	5	$18,000	CP 3102
C-3101	10	$21,000	CP 3127
3126	9.4	$21,000	CP 3127
?	2	$16,000	CP 3085
CP 3127	9.4	$21,000	CP 3127
CP 3127	10	$21,000	CP 3127
CP 3127	9.5	$21,000	CP 3127
CP 3152	20	$26,000	CP 3152
3085.181	2.3	$16,000	CP 3085
3085	2	$16,000	CP 3085

Note: Package estimates include (2) Flygt submersible pumps, accessories, control panel, and access covers.

Thank you for your inquiry!

ex. 100gpm

$$BHP = \frac{(Q)(TDH)(S.G.)}{3960\ (eff.)} = \frac{(100\ gpm)(60\ ft)(1)}{(3960)(0.5)} = 3.03$$

ABS
A company in the Cardo Group

ABS • *Scanpump*
Lawrence Pump & Engine

MEMO ABS FLORIDA BRANCH

TO: HARTMAN & ASSOCIATES **DATE:** 3/18/95

ATTN: BOBBY WYATT

FROM: COLIN MARTIN

SUBJECT: YOUR FAX INQUIRY 3/2/95
CITY OF PORT ST.LUCIE REPLACEMENT COSTS

Mr. Wyatt,
In response to your subject inquiry I would like to offer the following pricing for the pump models you requested. I have indicated the old pump model number as well as the new current model number. Please note that the pricing is per pump with accessories. For a typical duplex station multiply price by two. Controls are priced seperately.
The CP3127 model no. is a Flygt, equal to the 8 HP ABS model.

OLD MODEL	HP	NEW MODEL	PRICE EACH UNIT WITH ACCESSORIES
AF15-4-4	2	AFP1040M15/4-11.60-4"	$2,380.00
AF22-4-4	3	AFP1040M22/4-11.60-4"	2,550.00
AF40-4-4	6	AFP1042M46/4-21.60-4"	2,990.00
AF60-4-4	8	AFP1046M70/4-22.60-4"	3,300.00
AF90-4-4	12	AFP1046M90/4-22.60-4"	3,400.00

DUPLEX CONTROLS PER ST.LUCIE SPECS HP	PRICE EACH DUPLEX CONTROL W/FLOATS
2 or 3	$4,700.00
6	4,800.00
8 or 10	5,000.00
12 or 15	5,300.00

Pricing is for budgetary usage only. Taxes are not included. Freight and startup are included.

Should you have any questions or require additional information, please do not hesitate to contact me.

Regards,

Colin Martin

To: Rusty Nelson

From: Bobby Wyatt

Page 2 of 2

Date: June 2, 1995

Gorman Rupp

Lift station pump package (pump, guide rails, controls, floats, etc.)

MODEL	HP	PACKAGE ($)
T4A3-B (Duplex)	20 hp	$65,570 —
T4A3-B (Duplex)	15 hp	65,152 —
T4A3-B (Duplex)	5 hp	64,156 —
T4A3-B (Duplex)	7.5 hp	64,356 —
T4A3-B (Duplex)	10 hp	64,571 —
T3A3-B (Duplex)	7.5 hp	63,026 —
T6A3-B (Duplex)	15 hp	68,407 —

ALL THESE STATIONS ARE BELOW GROUND, DRY PIT DESIGN SO GUIDE RAILS ARE NOT USED. THESE PRICES INCLUDE BUBBLER LEVEL CONTROLS, IF FLOATS ARE USED, PLEASE DEDUCT $1,363 — FROM EACH OF THE ABOVE PRICES.

STATIONS ARE PRICED AS A PACKAGE SO I CAN NOT GIVE INDIVIDUAL COMPONENT PRICES. HOWEVER, BELOW ARE LISTED APPROXIMATE CONTROL PANEL PRICES WHICH ARE INCLUDED IN THE ABOVE PRICES. ALL STATIONS ASSUMED TO BE 460 VOLT.

5 HP	-	$5,409 —
7.5 HP	-	5,408 —
10 HP	-	5,408 —
15 HP	-	5,686 —
20 HP	-	5,702 —

PLEASE CALL IF YOU HAVE QUESTIONS.

THANKS,

RUSTY NELSON

BWW/dt/MS/pumps.bww

DATE: 3/7/95 TIME: 2:30 pm

PROJECT NAME: City of Port St. Lucie PROJECT NO.: 94-354.12

PARTY CALLING: Scott Edwards COMPANY: Taylor Precast 1-800-342-7099

PARTY CONTACTED: Bobby Wyatt COMPANY: HAI

SUBJECT: Replacement costs for city of Port St. Lucie, and Wetwell Replacement costs

TELEPHONE COMMUNICATION SUMMARY (Including Decisions & Commitments)

Following costs were given by Mr. Edwards:

Manholes: Depth	$	Wetwells Diameter	$/ft		Bases/top (8)
0-6	500	4'	65	w/paint	125
6-8	615	6'	125		225
8-10	725	8'	175		500
10-12	875	10'	300		1000
12-15	995	12'	375		1400
15+	1125				

ACTION REQUIRED

C.C.

HARTMAN & ASSOCIATES, INC.

engineers, hydrogeologists, scientists & management consultants

APPENDIX P

Piping Costs

PVC (C900 – DR 25) Force Main

Size (in)	Small Job (250') ($/ft)	Med. Job (2,500') ($/ft)	Large Job (25,000') ($/ft)
4"	12.25	9.80	9.10
6"	13.51	10.97	10.22
8"	15.28	12.68	11.82
10"	17.42	14.68	13.74
12"	20.23	17.29	16.19
	--- PVC (C905 – DR 25) ---		
16"	27.08	23,76	22.26

Notes:
1) Values obtained using manufacturer's quotes.
2) Costs include $500 permitting, 10%–15% mobilization, $7/ft installation, and $.25–$.75 per foot pressure testing.
3) Costs exclude valves, fittings, and restoration work.

Piping Costs

DIP (Class 50 – Epoxy Lined) Force Main

Size (in)	Small Job (250') ($/ft)	Med. Job (2,500') ($/ft)	Large Job (25,000') ($/ft)
4"	24.39	20.57	19.39
6"	27.58	23.13	21.71
8"	31.58	26.44	24.75
10"	36.41	30.49	28.50
12"	42.76	35.93	33.59
16"	47.75	40.13	37.47

Notes:
1) Values obtained using manufacturer's quotes.
2) Costs include $500 permitting, 10%–15% mobilization, $7/ft installation, and $.25–$.75 per foot pressure testing.
3) Costs exclude valves, fittings, and restoration work.

HARTMAN & ASSOCIATES, INC.	SH. NO.: 1	JOB NO.: 95-~~4~~95.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JJW	DATE:
	CHECKED BY:	DATE:

~~Pipe Costs~~

* Includes pressure testing (trench & back fill) + Disinf. (for w.m.)

Add $500 permit plus mobil. plus percentage 3 plus $7/ft Trenching & backfill

① PVC (C900 - DR 25) Force Main

	15% Small job ~~250~~ 250' ($/Ft)		12% Med. job ~~2500~~ 2500 ($/Ft)		10% large job 25,000' ($/Ft)	
4"	1.91	12.25	1.57	9.80	1.25	9.10
6"	3.01	13.51	2.62	10.97	2.27	10.22
8"	4.55	15.28	4.14	12.68	3.73	11.82
10"	6.41	17.42	5.93	15.68	5.47	13.74
12"	8.85	20.23	8.26	17.29	7.70	16.19
* (C905 - DR25)						
16"	14.81	27.08	14.04	23.76	13.22	22.26

MOBILIZATION 10-15
PERMITS $500
Installation $7/Ft
$7/FT TRENCH & BACKFILL

② PVC (C900 - DR18) Water Main

	Small job		med. job		large) job	
4"	4.34	[redacted] 15.04	3.51	11.97	2.69	10.68
6"	5.74	16.65	4.84	13.46	4.00	12.12
8"	7.98	19.23	6.99	15.81	6.04	14.36
10"	10.52	22.15	9.47	18.65	8.41	16.97
12"	13.71	25.82	12.53	22.07	11.42	20.28

③ PVC - (SDR 35) Gravity line

$1/Ft T.V. Test

	small	medium	large
8"	2.32	2.26	2.22

HARTMAN & ASSOCIATES, INC.	SH. NO.: 2	JOB NO.: 95-145.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JJW	DATE:
	CHECKED BY:	DATE:

Pipe Costs

* Includes pressure testing

(4) DIP (Fastite Cement Lined Class 50) Force Main

	small job 250' ~~150'~~ ($/ft)	med. job 250' ~~1,500'~~ ($/ft)	large job 25,000' ($/ft)	Epoxy lining
6"	[15] 7.69 18.84	[13] 6.28 15.07	[11] 5.61 13.89	5.50
8"	[24] 10.40 22.01	[19] 8.50 17.56	[14] 7.65 16.14	5.57
10"	[33] 13.50 25.58	[24] 11.07 20.44	[16] 10.03 18.75	6.00
12"	[25] 17.05 29.66	[23] 14.02 23.74	[19] 12.75 21.75	6.75
14"	21.70 35.01	17.98 28.18	16.47 25.84	7.75
16"	[35] 25.39 39.25	[33] 21.06 31.63	[29] 19.32 28.97	8.50
20"	[52] 33.17 48.20	[49] 27.55 38.90	[46] 25.34 35.59	9.25
24"	41.65 [redacted]	34.62	31.90	11.40
30"	55.57	51.02	43.23	15.50

(5) DIP (Restrained Joint Class 50) Force Main

	small job	med. job	large job	Epoxy lining
6"	11.94 23.78	10.53 19.83	9.86 18.57	5.50
8"	15.28 27.62	13.38 23.03	12.52 21.49	5.57
10"	19.56 32.54	17.14 27.24	16.09 25.42	6.00
12"	24.30 38.00	21.27 31.86	20.00 29.72	6.75
14"	32.01 46.86	28.29 39.72	26.78 37.18	7.75
16"	38.21 53.99	33.18 45.97	32.13 43.06	8.50
20"	50.17	44.55	42.34	9.25
24"	64.15	57.12	54.40	11.40
30"	85.57	76.65	73.23	15.50

* Add
$1/ft for water main on a big job.
$1.50/ft for water main on a medium job.
$2.00/ft for water main on a small job.

Also force mains must be epoxy lin

RECORD OF TELEPHONE COMMUNICATION

DATE: 9/7/95 TIME: 3:40

PROJECT NAME: SSU- Economy of Scale PROJECT NO.: 95-145.00

PARTY CALLING: JJW COMPANY: HAI

PARTY CONTACTED: Brian Penner COMPANY: Mitchell & Stark

SUBJECT: Pipe install. costs (813) 597-2165

TELEPHONE COMMUNICATION SUMMARY (Including Decisions & Commitments)

* Pressure testing (W+F.M.) Avg. 50¢/ft small job → 75¢/ft
  large job → 25¢/ft

Disinfection (W.M.) Avg. \$1/ft small job → \$2/ft
\$1.50 ≈ large job → \$1/ft

* Gravity Sewer – T.V. Test \$1.00/ft

ACTION REQUIRED

B H
SALES

FLORIDA DISTRIBUTION CENTERS
11114 SATELLITE BLVD., ORLANDO, FL 32837 (407) 855-8510
1101 WEST 17TH STREET, RIVIERA BEACH, FL 33404 (407) [illegible]
6761 26TH COURT, EAST, SARASOTA, FL 34243 (813) 756-[illegible]
3884-A PROSPECT AVENUE, NAPLES, FL 33942 (813) 434-[illegible]

COVER SHEET

TO: Janey Wallace - Hartman & Assoc.

FROM: Ed M.

DATE: 9-1

OF PAGES SENT (INC. COVER SHEET) 5

IF YOU DID NOT RECEIVE TOTAL # OF PAGES PLEASE CALL 407-855-8510 / 800-531-6998 / FAX # 407-240-1901 AND NOTIFY US IMMEDIATELY.

MESSAGES: Pipe estimates for your economy of scale projections.

Thx
Ed

SENDING FAX TO #

PVC – C900 DR 25

Force Mains (Green)

Size (in.)	Cost 150 ft. ($/LF)	Cost 1,500 ft. ($/LF)	Cost 25,000 ft. ($/LF)
4"	1.26	1.15	1.04
6"	2.36	2.21	2.11
8"	3.99	3.86	3.71
10"	5.89	5.71	5.53
12"	8.59	8.26	7.99
-- C905 DR 25 --			
16"	14.22	13.89	13.39

HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants
201 EAST PINE STREET • SUITE 1000 • ORLANDO, FL 32801
TELEPHONE (407) 839-3955 • FAX (407) 839-3790
FAX (ADMIN./UTILITY ENG./HYDRO.) • (407) 839-3790
FAX (CIVIL ENG./SURVEY/FINANCE) • (407) 481-8447

From Jim Glunton Contractors

FACSIMILE TRANSMITTAL

TO: ~~John Gulkins~~ FROM: Jamey Wallace

DATE: 9/1/95

RE: Costs for PVC piping - Economy of Scale

WE ARE SENDING YOU 5 PAGES, INCLUDING THIS COVER SHEET.
THESE PAGES ARE BEING TRANSMITTED AS INDICATED BELOW:

- ☐ AS REQUESTED
- ☐ FOR YOUR USE
- ☒ FOR YOUR COMMENTS
- ☐ FOR YOUR APPROVAL

HARD COPY:

- ☐ WILL BE SENT VIA REGULAR MAIL
- ☐ WILL BE SENT VIA OVERNIGHT MAIL
- ☒ WILL BE SENT BY FACSIMILE ONLY

MESSAGE:

John, what I'm looking for are costs based on linear footage of the Job, As we both know there typically is a considerable savings for a much larger job than for a smaller job based on the circumstances. Therefore, if maybe you could quote the prices as three (3) different jobs one w/ 150' lengths, one - 1,500', one 25,000'. That way we could see the savings. Your help & professional opinion would be greatly appreciated. Thanks, JJW

IF THERE ARE QUESTIONS OR PROBLEMS WITH THIS TRANSMITTAL,
PLEASE CALL (407) 839-3955

PVC – C900 DR 25

Force Mains

Size (in.)	Cost 150 ft. ($/LF)	Cost 1,500 ft. ($/LF)	Cost 25,000 ft. ($/LF)
4"	1.05	.88	.85
6"	2.15	2.02	1.93
8"	3.60	3.41	3.25
10"	5.42	5.15	4.90
12"	7.61	7.25	6.80
-- C905 DR 25 --			
16"	13.90	13.18	12.55

AMERICAN CAST IRON PIPE COMPANY

2301 MAITLAND CENTER PARKWAY, SUITE 430
MAITLAND, FLORIDA 32751
PHONE (407) 660-8786 FAX (407) 660-1851

DATE: 8/1/95
fax 407 839-3790

NO. OF PAGES 4
(including this page)

TO: JANCY WALLACE - HARTMAN & ASSOC

FROM: Jerry Su[illegible]

SUBJECT: ESTIMATING PRICES
SOUTHERN STATES UTILITIES

ATTACHED ARE 3 PRICE LISTS FOR SMALL, MED. & LARGE JOBS. NOTE THE PRICE DIFFERENCES IN CLASS 50, BUT ALSO NOTICE THE SAVINGS IN PRESSURE CLASS PIPE 150, 200 & 250 IN SIZES 14" THRU 30".

RJ = RESTRAINED JOINT PIPE

POLYBOND or CTG = PER FOOT ADDERS TO ALL PRICES SHOWN.

Jerry

LARGE

American Cast Iron Pipe Company

Ductile Iron Pipe Price Sheet

Pricing Calculations

FASTITE CEMENT LINED PER FT ESTIMATING PRICES

	Class 50	Class 51	Class 52	Class 53	Class 150	Class 200	Class 250	Class300	Class 350	R. J. 50	R. J. 51	R. J. 350	R. J. 300	R. J. 250	R. J. 200	R. J. 150		POLYBOND or CTE
3"	N/A	4.72	5.23	5.73					4.71	N/A	N/A	N/A					3"	N/A
4"	N/A	5.17	5.78	6.31					5.10	N/A	9.17	9.10					4"	5.25
6"	5.36	5.93	6.50	7.07					5.33	9.61	10.18	9.58					6"	5.50
8"	7.40	8.14	8.90	9.64					6.96	12.27	13.01	11.84					8"	5.57
10"	9.78	10.73	11.65	12.58					8.99	15.84	16.79	15.05					10"	6.00
12"	12.50	13.61	14.72	15.83					11.54	19.75	20.86	18.79					12"	6.75
14"	16.22	17.56	18.91	20.26			14.33	14.93	15.28	26.53	27.88	25.59	25.25	24.64			14"	7.75
16"	19.07	20.61	22.14	23.65			17.42	18.05	18.95	31.88	33.42	31.77	30.86	30.23			16'	8.50
18"	22.02	23.74	25.47	27.20			20.20	21.45	22.46	36.64	38.37	37.08	36.08	34.82			18"	9.00
20"	25.09	27.01	28.93	30.85			23.53	25.09	26.35	42.09	44.01	43.35	42.09	40.53			20"	9.25
24"	31.65	33.95	36.26	38.33		28.72	31.45	33.26	35.54	54.15	56.43	58.04	55.76	53.95	51.22		24"	11.40
30"	42.98	47.05	51.13	55.20	37.63	41.71	45.80	48.86	52.88	72.98	77.05	82.88	78.86	75.80	71.71	67.63	30"	15.50
36"	59.31	64.85	70.35	75.85	53.27	57.71	63.26	67.70	73.23	100.25	105.78	114.16	108.64	104.20	98.65	94.21	36"	18.00
42"	73.23	80.94	89.84	97.58	66.06	73.79	80.28	86.90	95.38	121.54	129.25	143.89	135.21	128.59	122.10	114.37	42"	22.50
48"	99.09	109.40	119.72	129.97	92.63	101.51	110.39	119.24	128.06	158.78	169.09	187.75	178.93	170.07	161.19	152.31	48"	28.00
54"	133.08	147.92	162.80	177.57	122.33	135.44	148.49	161.53	174.57	204.58	219.42	246.07	233.03	219.99	206.94	193.83	54"	34.00
60"					161.39	176.67	191.88	209.25	224.39					299.38	284.17	268.89	60"	
64"					174.62	193.34	217.00	230.56	246.79					324.50	305.84	287.12	64"	

MEDIUM

American Cast Iron Pipe Company

Ductile Iron Pipe Price Sheet

Pricing Calculations

FASTITE CEMENT LINED PER FT ESTIMATING PRICES

	Class 50	Class 51	Class 52	Class 53	Class 150	Class 200	Class 250	Class300	Class 350	R. J. 50	R. J. 51	R. J. 350	R. J. 300	R. J. 250	R. J. 200	R. J. 150		POLYBOND or CTE
3"	N/A	4.96	5.49	6.01					4.94	N/A	N/A	N/A					3"	N/A
4"	N/A	5.46	6.11	6.67					5.38	N/A	9.46	9.38					4"	5.25
6"	5.78	6.40	7.01	7.63					5.74	10.03	10.65	9.99					6"	5.50
8"	8.00	8.80	9.63	10.42					7.51	12.88	13.67	12.39					8"	5.57
10"	10.57	11.60	12.60	13.60					9.69	16.64	17.67	15.76					10"	6.00
12"	13.52	14.72	15.92	17.12					12.45	20.77	21.97	19.70					12"	6.75
14"	17.48	18.93	20.38	21.84			15.39	16.07	16.45	27.79	29.23	26.76	26.39	25.71			14"	7.75
16"	20.56	22.22	23.87	25.50			18.72	19.43	20.42	33.37	35.03	33.23	32.24	31.53			16"	8.50
18"	23.74	25.60	27.46	29.33			21.70	23.09	24.19	38.36	40.22	38.81	37.72	36.33			18"	9.00
20"	27.05	29.12	31.19	33.26			25.31	27.02	28.38	44.05	46.12	45.38	44.02	42.31			20"	9.25
24"	34.12	36.60	39.09	41.34		30.86	33.83	35.82	38.29	56.62	59.10	60.79	58.32	56.53	53.36		24"	11.40
30"	46.15	50.52	54.89	59.27	40.39	44.77	49.16	52.45	56.76	76.15	80.53	86.76	82.45	79.16	74.77	70.39	30"	15.90
36"	63.49	69.48	75.43	81.38	56.96	61.76	67.77	73.56	78.54	104.43	110.42	119.47	113.50	108.70	102.70	97.90	36"	18.00
42"	78.53	86.86	96.40	104.76	70.77	79.12	86.15	93.28	102.59	126.84	135.18	150.90	141.59	134.45	127.43	119.08	42"	22.50
48"	103.65	116.80	127.95	139.03	98.63	108.23	117.83	127.40	136.93	165.34	176.48	196.62	187.09	177.52	167.92	158.32	48"	28.00
54"	141.44	157.36	173.32	189.16	129.88	143.94	157.92	171.91	183.90	212.94	228.86	237.40	243.41	229.42	215.44	201.38	54"	34.00
60"					161.39	176.67	191.88	209.25	224.39					299.38	284.17	268.89	60"	
64"					174.62	193.34	212.00	230.36	246.79					324.50	305.84	287.12	64"	

Small

American Cast Iron Pipe Company

Ductile Iron Pipe Price Sheet

Pricing Calculations

PASTITE CEMENT LINED PER FT ESTIMATING PRICES

	Class 50	Class 51	Class 52	Class 53	Class 150	Class 200	Class 250	Class300	Class 350	R. J. 50	R. J. 51	R. J. 350	R. J. 300	R. J. 250	R. J. 200	R. J. 150
3"	N/A	5.60	6.20	6.79					5.57	N/A	N/A	N/A				
4"	N/A	6.27	7.02	7.65					6.15	N/A	10.27	10.15				
6"	6.94	7.68	8.42	9.15					6.87	11.19	11.93	11.12				
8"	9.65	10.61	11.61	12.58					9.02	14.53	15.49	13.90				
10"	12.75	13.99	15.20	16.40					11.63	18.81	20.06	17.69				
12"	16.30	17.75	19.19	20.64					14.94	23.35	25.00	22.19				
14"	20.95	22.69	24.43	26.16			18.32	19.20	19.67	31.26	33.00	29.98	29.51	28.63		
16"	24.64	26.63	28.61	30.56			22.28	23.21	24.42	37.46	39.44	37.24	36.02	35.09		
18"	28.45	30.68	32.91	35.15			25.83	27.58	28.93	43.07	45.31	43.55	42.21	40.45		
20"	32.42	34.90	37.38	39.86			30.19	32.31	33.94	49.42	51.90	50.94	49.31	47.19		
24"	40.90	43.87	46.85	49.79		36.72	40.36	42.85	45.80	63.40	66.37	68.30	65.35	62.86	99.22	
30"	54.82	60.01	65.21	70.41	47.96	53.17	58.37	62.28	67.40	84.82	90.01	97.40	92.28	88.37	83.17	77.96
36"	80.60	86.59	92.53	98.47	73.88	78.69	84.71	89.51	95.31	121.53	127.32	136.45	130.45	125.68	119.63	114.82
42"	95.36	103.88	115.87	124.41	87.90	96.25	103.26	110.76	122.15	143.87	152.19	170.47	159.07	151.57	144.56	136.21
48"	139.64	150.82	162.02	173.11	132.89	142.48	152.07	161.66	171.19	199.35	210.51	230.88	221.34	211.76	202.17	192.58
54"	175.70	191.61	207.57	223.42	164.12	178.18	192.17	206.17	220.16	247.20	263.11	291.66	277.67	263.67	249.68	235.62
60"					229.87	245.19	260.38	277.75	292.88					347.88	352.69	337.37
64"					241.22	260.20	279.06	297.79	314.15					391.56	372.70	353.72

	POLYBOND or CTB
3"	N/A
4"	5.25
6"	5.50
8"	5.57
10"	6.00
12"	6.75
14"	7.75
16"	8.50
18"	9.00
20"	9.25
24"	11.40
30"	15.50
36"	18.00
42"	22.50
48"	28.00
54"	34.00
60"	
64"	

APPENDIX Q

Piping Costs

PVC (C900 – DR 18) Water Main

Size (in)	Small Job (250') ($/ft)	Med. Job (2,500') ($/ft)	Large Job (25,000') ($/ft)
4"	15.04	11.97	10.68
6"	16.65	13.46	12.12
8"	19.23	15.87	14.36
10"	22.15	18.65	16.97
12"	25.82	22.07	20.28

Notes:
1) Values obtained using manufacturer's quotes.
2) Costs include $500 permitting, 10%–15% mobilization, $7/ft installation, $1–$2 per foot disinfection and $.25–$.75 per foot pressure testing.
3) Costs exclude valves, fittings, and restoration work.

Piping Costs

DIP (Class 50 – Cement Lined) Water Main

Size (in)	Small Job (250') ($/ft)	Med. Job (2,500') ($/ft)	Large Job (25,000') ($/ft)
6"	20.89	16.57	14.89
8"	24.01	19.06	17.14
10"	27.58	21.94	19.75
12"	31.66	25.24	22.75
14"	37.01	29.68	26.84
16"	41.25	33.13	29.97

Notes:
1) Values obtained using manufacturer's quotes.
2) Costs include $500 permitting, 10%–15% mobilization, $7/ft installation, $1–$2 per foot disinfection and $.25–$.75 per foot pressure testing.
3) Costs exclude valves, fittings, and restoration work.

HARTMAN & ASSOCIATES, INC.	SH. NO.: 1	JOB NO.: 95-~~8~~45.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JJW	DATE:
	CHECKED BY:	DATE:

~~Pipe Costs~~

* Includes ^trench & backfill^ pressure testing + Disinf. (for w.m.)

Add $500 permit plus mobil. 3 - percentages plus $7/ft Trench & backfill

① PVC (C900 – DR 25) - Force Main

	15% Small job ~~___~~ 250′ ($/Ft)		12% Med. job ~~___~~ 2500′ ($/Ft)		10% large job 25,000′ ($/Ft)	
4″	1.91	12.25	1.57	9.80	1.25	9.10
6″	3.01	13.51	2.62	10.97	2.27	10.22
8″	4.55	15.28	4.14	12.68	3.73	11.82
10″	6.41	17.42	5.93	14.68	5.47	13.74
12″	8.85	20.23	8.26	17.29	7.70	16.18
* (C905 – DR25)						
16″	14.81	27.08	14.04	23.76	13.22	22.26

~~MOBILIZATION~~ 10-15 ~~PERMITS~~ $500 ~~Installation~~ $7/ft

$7/ft Trench & BACKFILL

② PVC (C900 – DR18) Water Main

	Small job		med. job		large job	
4″	4.34	15.04 [redacted]	3.51	11.97	2.69	10.68
6″	5.74	16.65	4.84	13.46	4.00	12.12
8″	7.98	19.23	6.99	15.87	6.04	14.36
10″	10.52	22.15	9.47	18.65	8.41	16.97
12″	13.71	25.82	12.53	22.07	11.42	20.28

③ PVC - (SDR 35) Gravity [redacted] line

	small	medium	large
8″	2.33	2.26	2.22

$1/Ft T.V. Test

HARTMAN & ASSOCIATES, INC.	SH. NO.: 2	JOB NO.: 95-145.00
engineers, hydrogeologists, surveyors & management consultants	MADE BY: JJW	DATE:
	CHECKED BY:	DATE:

Pipe Costs

* Includes pressure testing

(4) DIP (Fastite Cement Lined Class 50) Force Main

Adder for W.M.

	small job 250' ~~150'~~ ($/ft)	med. job 2500 ~~1,500'~~ ($/ft)	large job 25,000' ($/ft)	Epoxy lining 1
6"	[15] 7.69 18.89	[13] 6.28 15.07	[11] 5.61 13.89	5.50
8"	[24] 10.40 22.01	[19] 8.50 17.56	[14] 7.65 16.14	5.57
10"	[33] 13.50 25.58	[24] 11.07 20.44	[16] 10.03 18.75	6.00
12"	[25] 17.05 29.66	[23] 14.02 23.74	[19] 12.75 21.75	6.75
14"	21.70 35.01	17.98 28.18	16.47 25.84	7.75
16"	[35] 25.39 39.25	[33] 21.06 31.63	[29] 19.32 28.97	8.50
20"	[52] 33.17 48.20	[49] 27.55 38.90	[46] 25.34 35.59	9.25
24"	41.65 [redacted]	34.62	31.90	11.40
30"	55.57	51.02	43.23	15.50

(5) DIP (Restrained Joint Class 50) Force Main

	small job	med. job	large job	Epoxy lining
6"	11.94 23.78	10.53 19.83	9.86 18.57	5.50
8"	15.28 27.62	13.38 23.03	12.52 21.49	5.57
10"	19.56 32.54	17.14 27.24	16.09 25.42	6.00
12"	24.30 38.00	21.27 31.86	20.00 29.72	6.75
14"	32.01 46.86	28.29 39.72	26.78 37.18	7.75
16"	38.21 53.99	33.187 45.97	32.13 43.06	8.50
20"	50.17	44.55	42.34	9.25
24"	64.15	57.12	54.40	11.40
30"	85.57	76.65	73.23	15.50

* Add $1/ft for water main on a big job.
$1.50/ft for water main on a medium job.
$2.00/ft for water main on a small job.

Also force mains must be epoxy lin[ed]

RECORD OF TELEPHONE COMMUNICATION

DATE: 9/7/95 TIME: 3:40

PROJECT NAME: SSU - Economy of Scale PROJECT NO.: 95-145.00

PARTY CALLING: JJW COMPANY: HAI

PARTY CONTACTED: Brian Penner COMPANY: Mitchell & Stark

SUBJECT: Pipe install. costs (813) 597-2165

TELEPHONE COMMUNICATION SUMMARY (Including Decisions & Commitments)

Pressure testing (W+F.M.) Avg. 50¢/ft small job → 75¢/ft
large job → 25¢/ft

Disinfection (W.M.) Avg. \$1/ft small job → \$2/ft
\$1.50 ≈ large job → \$1/ft

Gravity Sewer - T.V. Test \$1.00/ft

ACTION REQUIRED

C.

HARTMAN & ASSOCIATES, INC.

engineers, hydrogeologists, scientists & management consultants

B H SALES

FLORIDA DISTRIBUTION CENTERS

11114 SATELLITE BLVD., ORLANDO, FL 32837 (407) 855-8510
1101 WEST 17TH STREET, RIVIERA BEACH, FL 33404 (407) 848-4896
6761 26TH COURT EAST, SARASOTA, FL 34243 (813) 756-8765
3884-A PROSPECT AVENUE, NAPLES, FL 33942 (813) 434-8666

COVER SHEET

TO: Janey Wallace - Hartman & Assoc.

FROM: Ed M.

DATE: 9-1

OF PAGES SENT (INC. COVER SHEET) 5

IF YOU DID NOT RECEIVE TOTAL # OF PAGES PLEASE CALL 407-855-8510 / 800-531-6998 / FAX # 407-240-1901 AND NOTIFY US IMMEDIATELY.

MESSAGES: Pipe estimates for your economy of scale projections.

Thx

Ed

SENDING FAX TO #

PVC – C900 DR 18 — (Blue)

Water Mains

Size (in.)	Cost 150 ft. ($/LF)	Cost 1,500 ft. ($/LF)	Cost 25,000 ft. ($/LF)
4"	1.66	1.57	1.48
6"	3.12	2.98	2.89
8"	5.48	5.23	5.06
10"	8.04	7.84	7.56
12"	11.41	11.06	10.81

Paint

Eng

HARTMAN & ASSOCIATES, INC.
engineers, hydrogeologists, surveyors & management consultants
201 EAST PINE STREET - SUITE 1000 - ORLANDO, FL 32801
TELEPHONE (407) 839-3955 - FAX (407) 839-3790
FAX (ADMIN./UTILITY ENG./HYDRO.) - (407) 839-3790
FAX (CIVIL ENG./SURVEY/FINANCE) - (407) 481-8447

From Jim Gunter Ogaraited

FACSIMILE TRANSMITTAL

~~TO: John Gilkins~~ **FROM:** Jamey Wallace

DATE: 9/1/95

RE: Costs for PVC piping - Economy of Scale

WE ARE SENDING YOU 5 PAGES, INCLUDING THIS COVER SHEET.
THESE PAGES ARE BEING TRANSMITTED AS INDICATED BELOW:

- ☐ AS REQUESTED
- ☐ FOR YOUR USE
- ☒ FOR YOUR COMMENTS
- ☐ FOR YOUR APPROVAL

HARD COPY:

- ☐ WILL BE SENT VIA REGULAR MAIL
- ☐ WILL BE SENT VIA OVERNIGHT MAIL
- ☒ WILL BE SENT BY FACSIMILE ONLY

MESSAGE:

John, what I'm looking for are costs based on linear footage of the Job, As we both know there typically is a considerable savings for a much larger job than for a smaller job based on the circumstances. Therefore, if maybe you could quote the prices as three (3) different jobs one w/ 150' lengths, one - 1,500', one 25,000'. That way we could see the savings. Your help & professional opinion would be greatly appreciated. Thanks, JJW

IF THERE ARE QUESTIONS OR PROBLEMS WITH THIS TRANSMITTAL,
PLEASE CALL (407) 839-3955

PVC – C900 DR 18

Water Mains

Size (in.)	Cost 150 ft. ($/LF)	Cost 1,500 ft. ($/LF)	Cost 25,000 ft. ($/LF)
4"	1.52	1.45	1.39
6"	2.85	2.70	2.60
8"	4.98	4.75	4.52
10"	7.50	7.10	6.76
12"	10.50	10.00	9.53

4 HR Test @ [illegible]

Pressure Test
Disinfect
[illegible]
1.00

AMERICAN CAST IRON PIPE COMPANY

2301 MAITLAND CENTER PARKWAY, SUITE 430
MAITLAND, FLORIDA 32751
PHONE (407) 660-8786 FAX (407) 660-1851

DATE: 8/1/95
fax 407 839-3790

NO. OF PAGES 4
(including this page)

TO: JANCY WALLACE - HARTMAN & ASSOC

FROM: Jerry Sevam

SUBJECT: ESTIMATING PRICES
SOUTHERN STATES UTILITIES

ATTACHED ARE 3 PRICE LISTS FOR SMALL, MED. & LARGE JOBS. NOTE THE PRICE DIFFERENCES IN CLASS 50, BUT ALSO NOTICE THE SAVINGS IN PRESSURE CLASS PIPE 150, 200 & 250 IN SIZES 14" THRU 30".

RJ = RESTRAINED JOINT PIPE

POLYBOND OR CTG = PER FOOT ADDERS TO ALL PRICES SHOWN.

Jerry

LARGE

American Cast Iron Pipe Company

Ductile Iron Pipe Price Sheet

Pricing Calculations

FASTITE CEMENT LINED PER FT ESTIMATING PRICES

	Class 50	Class 51	Class 52	Class 53	Class 150	Class 200	Class 250	Class300	Class 350	R. J. 50	R. J. 51	R. J. 350	R. J. 300	R. J. 250	R. J. 200	R. J. 150		POLYBOND or CTE
3"	N/A	4.72	5.23	5.73					4.71	N/A	N/A	N/A					3"	N/A
4"	N/A	5.17	5.78	6.31					5.10	N/A	9.17	9.10					4"	5.25
6"	5.36	5.93	6.50	7.07					5.33	9.61	10.18	9.58					6"	5.50
8"	7.40	8.14	8.90	9.64					6.96	12.27	13.01	11.84					8"	5.57
10"	9.78	10.73	11.63	12.58					8.99	15.84	16.79	15.05					10"	6.00
12"	12.50	13.61	14.72	15.83					11.54	19.75	20.86	18.79					12"	6.75
14"	16.22	17.56	18.91	20.26			14.33	14.93	15.28	26.53	27.88	25.59	25.25	24.64			14"	7.75
16"	19.07	20.61	22.14	23.65			17.42	18.05	18.95	31.88	33.42	31.77	30.86	30.23			16'	8.50
18"	22.02	23.74	25.47	27.20			20.20	21.45	22.46	36.64	38.37	37.08	36.08	34.82			18"	9.00
20"	25.09	27.01	28.93	30.85			23.53	25.09	26.35	42.09	44.01	43.35	42.09	40.53			20"	9.25
24"	31.65	33.95	36.26	38.53		28.72	31.45	33.26	35.54	54.15	56.43	58.04	55.76	53.95	51.22		24"	11.40
30"	42.98	47.05	51.13	55.20	37.63	41.71	45.80	48.86	52.88	72.98	77.05	82.88	78.86	75.80	71.71	67.63	30"	15.50
36"	59.31	64.85	70.35	75.85	53.27	57.71	63.26	67.70	73.23	100.25	105.78	114.16	108.64	104.20	98.65	94.21	36"	18.00
42"	73.23	80.94	89.84	97.58	66.06	73.79	80.28	86.90	95.38	121.54	129.25	143.89	135.21	128.59	122.10	114.37	42"	22.50
48"	99.09	109.40	119.72	129.97	92.63	101.51	110.39	119.24	128.06	158.70	169.09	187.75	178.93	170.07	161.19	152.31	48"	28.00
54"	133.08	147.92	162.80	177.57	122.33	135.44	148.49	161.53	174.57	204.58	219.42	246.07	233.03	219.99	206.94	193.83	54"	34.00
60"					161.39	176.67	191.88	209.25	224.39					299.38	284.17	268.89	60"	
64"					174.62	193.34	212.00	230.56	246.79					324.50	305.84	287.12	64"	

EXHIBIT (H-4)

PAGE 282 OF 284

MEDIUM

American Cast Iron Pipe Company

Ductile Iron Pipe Price Sheet

Pricing Calculations

FASTITE CEMENT LINED PER FT ESTIMATING PRICES

	Class 50	Class 51	Class 52	Class 53	Class 150	Class 200	Class 250	Class300	Class 350	R.J. 50	R.J. 51	R.J. 350	R.J. 300	R.J. 250	R.J. 200	R.J. 150		POLYBOND or CTE
3"	N/A	4.96	5.49	6.01					4.94	N/A	N/A	N/A					3"	N/A
4"	N/A	5.46	6.11	6.67					5.38	N/A	9.46	9.38					4"	5.25
6"	5.78	6.40	7.01	7.63					5.74	10.03	10.65	9.99					6"	5.50
8"	8.00	8.80	9.63	10.42					7.51	12.88	13.67	12.39					8"	5.57
10"	10.57	11.60	12.60	13.60					9.69	16.64	17.67	15.76					10"	6.00
12"	13.52	14.72	15.92	17.12					12.45	20.77	21.97	19.70					12"	6.75
14"	17.48	18.93	20.38	21.84			15.39	16.07	16.45	27.79	29.25	26.76	26.39	25.71			14"	7.75
16"	20.56	22.22	23.87	25.30			18.72	19.43	20.42	33.37	35.03	33.23	32.24	31.53			16"	8.50
18"	23.74	25.60	27.46	29.33			21.70	23.09	24.19	38.36	40.22	38.81	37.72	36.33			18"	9.00
20"	27.05	29.12	31.19	33.26			25.31	27.02	28.38	44.05	46.12	45.38	44.02	42.31			20"	9.25
24"	34.12	36.60	39.09	41.54		30.86	33.83	35.82	38.29	56.62	59.10	60.79	58.32	56.53	53.36		24"	11.40
30"	46.15	50.52	54.89	59.27	40.39	44.77	49.16	52.45	56.76	76.15	80.52	86.76	82.45	79.16	74.77	70.39	30"	15.50
36"	63.49	69.48	75.43	81.38	56.96	61.76	67.77	71.56	78.54	104.43	110.42	119.47	113.50	108.70	102.70	97.90	36"	18.00
42"	78.53	86.86	96.40	104.76	70.77	79.12	86.13	93.28	102.59	126.84	135.18	150.90	141.59	134.45	127.43	119.08	42"	22.50
48"	103.65	116.80	127.95	139.03	98.63	108.23	117.83	127.40	136.93	165.34	176.48	196.62	187.09	177.52	167.92	158.32	48"	28.00
54"	141.44	157.36	173.32	189.16	129.88	143.94	157.92	171.91	185.90	212.94	228.86	257.40	243.41	229.42	215.44	201.38	54"	34.00
60"					161.39	176.67	191.88	209.25	224.39					299.38	284.17	268.89	60"	
64"					174.62	193.34	212.00	230.56	246.79					324.50	305.84	287.12	64"	

SMALL

American Cast Iron Pipe Company

Ductile Iron Pipe Price Sheet

Pricing Calculations

FASTITE CEMENT LINED PER FT ESTIMATING PRICES

	Class 50	Class 51	Class 52	Class 53	Class 150	Class 200	Class 250	Class300	Class 350	R.J. 50	R.J. 51	R.J. 350	R.J. 300	R.J. 250	R.J. 200	R.J. 150		POLYBOND or CTB
3"	N/A	5.60	6.20	6.79					5.37	N/A	N/A	N/A					3"	N/A
4"	N/A	6.27	7.02	7.65					6.15	N/A	10.27	10.15					4"	5.25
6"	6.94	7.68	8.42	9.15					6.87	11.19	11.93	11.12					6"	5.50
8"	9.65	10.61	11.61	12.58					9.02	14.53	15.49	13.90					8"	5.57
10"	12.75	13.99	15.20	16.40					11.63	18.81	20.06	17.69					10"	6.00
12"	16.30	17.75	19.19	20.64					14.94	23.35	23.00	22.19					12"	6.75
14"	20.95	22.69	24.43	26.16			18.32	19.20	19.67	31.26	33.00	29.98	29.51	28.63			14"	7.75
16"	24.64	26.63	28.61	30.56			22.28	23.21	24.42	37.46	39.44	37.24	36.02	35.09			16"	8.50
18"	28.43	30.68	32.91	35.15			25.83	27.58	28.93	43.07	45.31	43.53	42.21	40.45			18"	9.00
20"	32.42	34.90	37.38	39.86			30.19	32.31	33.94	49.42	51.90	50.94	49.31	47.19			20"	9.25
24"	40.90	43.87	46.85	49.79		36.72	40.36	42.85	45.80	63.40	66.37	68.30	65.35	62.86	99.22		24"	11.40
30"	54.82	60.01	65.21	70.41	47.96	53.17	58.37	62.28	67.40	84.82	90.01	97.40	92.28	88.37	83.17	77.96	30"	15.50
36"	80.60	86.59	92.53	98.47	73.88	78.69	84.71	89.51	95.31	121.53	127.52	136.45	130.45	125.65	119.63	114.82	36"	18.00
42"	95.36	103.88	115.87	124.41	87.90	96.25	103.26	110.76	122.15	143.87	152.19	170.47	159.07	151.57	144.56	136.21	42"	22.50
48"	139.66	150.82	162.02	173.11	132.89	142.48	152.07	161.66	171.19	199.35	210.51	230.88	221.34	211.76	202.17	192.58	48"	28.00
54"	175.70	191.61	207.57	223.42	164.12	178.18	192.17	206.17	220.16	247.20	263.11	291.66	277.67	263.67	249.68	235.62	54"	34.00
60"					229.87	245.19	260.38	277.73	292.88					367.88	352.69	337.37	60"	
64"					241.22	260.20	279.06	297.79	31[illegible].15					391.56	372.70	353.72	64"	

COMMENTARY ON PRESENT WORTH COSTS OF EXPANSIONS UNDER VARYING GROWTH AND ECONOMIC CONDITIONS

SUMMARY

THE FOLLOWING THREE PAGES OF FIGURES ILLUSTRATE THE PRESENT WORTH COSTS OF TANK EXPANSIONS ASSUMING DIFFERENT GROWTH RATES UNDER VARIOUS ECONOMIC CONDITIONS. EACH PAGE REFLECTS A DIFFERENT GROWTH RATE, 1%, 3% AND 5%, RESPECTIVELY. PRESENT WORTH VALUES ARE LISTED ACROSS THE BOTTOM OF EACH OF THE THREE FIGURES DISPLAYED ON A PAGE. THE PRESENT WORTH VALUES REPRESENT THE TOTAL COST TO THE UTILITY IN TODAY'S DOLLARS FOR INSTALLING STORAGE TANKS ONLY OF THE SIZE SHOWN IN THE ROW ABOVE PRESENT WORTH AND ASSUMING (1) THE ECONOMIC CONDITIONS OF THE TWO PRECEDING ROWS, AND (2) THE PHASING PARAMETERS AT THE TOP OF THE FIGURE, SUCH AS THE PROGRESSION FROM 25,000 GPD TO 100,000 GPD ON THE TOP FIGURE OF EACH PAGE. PRESENT WORTH VALUES VARY FROM ONE PAGE TO THE NEXT BECAUSE THE GROWTH RATES SPECIFIC TO EACH PAGE DICTATE THE TIMING OF THE TANK INSTALLATIONS. THE TANK PHASING OPTION WITH THE LOWEST TOTAL PRESENT WORTH ASSUMING THE CONDITIONS ABOVE IS ENCLOSED IN A BOX.

CONCLUSION

IN ALL CASES THE SMALLEST TANK ALTERNATIVE PRODUCES THE HIGHEST PRESENT WORTH COST.

PHASE: 0 GPD TO 100,000 GPD — LEFT OF INFLECTION POINT

INFLATION RATE (%)	DISCOUNT RATE (%)	TANK SIZE 25 (1000 GALS.)	TANK SIZE 50 (1000 GALS.)	TANK SIZE 100 (1000 GALS.)
0.00	5	$93,265	$64,044	$90,302
0.00	7	$85,121	$59,499	$83,894
0.00	9	$80,541	$57,268	$80,747
2.45	5	$114,997	$77,146	$108,776
2.45	7	$96,631	$66,018	$93,085
2.45	9	$87,090	$60,553	$85,380
5.00	5	x	x	x
5.00	7	$123,463	$82,363	$116,132
5.00	9	$101,277	$68,791	$96,995

PHASE: 50,000 GPD TO 150,000 GPD — TRANSITION

INFLATION RATE (%)	DISCOUNT RATE (%)	TANK SIZE 50 (1000 GALS.)	TANK SIZE 75 (1000 GALS.)	TANK SIZE 100 (1000 GALS.)
0.00	5	$122,134	$88,071	$90,302
0.00	7	$111,469	$77,119	$83,894
0.00	9	$105,469	$71,740	$80,747
2.45	5	$150,591	$119,648	$108,776
2.45	7	$126,541	$92,829	$93,085
2.45	9	$114,047	$79,958	$85,380
5.00	5	x	x	x
5.00	7	$161,676	$132,220	$116,132
5.00	9	$132,625	$99,510	$96,995

PHASE: 100,000 GPD TO 500,000 GPD — RIGHT OF INFLECTION POINT

INFLATION RATE (%)	DISCOUNT RATE (%)	TANK SIZE 100 (1000 GALS.)	TANK SIZE 250 (1000 GALS.)
0.00	5	$172,209	$153,706
0.00	7	$157,171	$142,799
0.00	9	$148,711	$137,442
2.45	5	$212,333	$185,151
2.45	7	$178,423	$158,443
2.45	9	$160,806	$145,327
5.00	5	x	x
5.00	7	$227,963	$197,672
5.00	9	$187,002	$165,098

(Values are TOTAL PRESENT WORTH ($).)

EXHIBIT GCH-6 | 1% SYSTEM GROWTH RATE - PHASED EXPANSION OF STEEL GROUND STORAGE TANK

EXHIBIT GCH-5

PAGE 3 OF 5

PHASE: [illegible]00 GPD TO 100,000 GPD — LEFT OF INFLECTION POINT

Tank size (1000 gals.) and total present worth ($):

Inflation Rate (%)	Discount Rate (%)	25	50	100
0.00	5	$138,481	$101,489	$90,302
0.00	7	$118,321	$87,767	$83,894
0.00	9	$105,656	$79,461	$80,747
2.45	5	$186,275	$136,012	$108,776
2.45	7	$146,283	$106,951	$93,085
2.45	9	$123,415	$91,178	$85,380
5.00	5	x	x	x
5.00	7	$203,915	$149,289	$116,132
5.00	9	$156,737	$114,386	$96,995

PHASE: 50,000 GPD TO 150,000 GPD — TRANSITION

Tank size (1000 gals.) and total present worth ($):

Inflation Rate (%)	Discount Rate (%)	50	75	100
0.00	5	$159,579	$137,640	$143,100
0.00	7	$139,736	$122,816	$123,752
0.00	9	$127,662	$113,858	$112,040
2.45	5	$209,457	$175,170	$191,777
2.45	7	$167,474	$143,568	$150,801
2.45	9	$144,672	$126,490	$128,561
5.00	5	x	x	x
5.00	7	$228,602	$189,560	$210,498
5.00	9	$178,221	$151,652	$161,284

PHASE: 100,000 GPD TO 500,000 GPD — RIGHT OF INFLECTION POINT

Tank size (1000 gals.) and total present worth ($):

Inflation Rate (%)	Discount Rate (%)	100	250
0.00	5	$225,006	$217,200
0.00	7	$197,028	$190,642
0.00	9	$180,003	$173,681
2.45	5	$295,334	$276,439
2.45	7	$236,138	$227,229
2.45	9	$203,988	$197,429
5.00	5	x	x
5.00	7	$322,329	$297,134
5.00	9	$251,291	$240,436

EXHIBIT GCH-6

5% SYSTEM GROWTH RATE - PHASED EXPANSION OF STEEL GROUND STORAGE TANK

EXHIBIT GCH-5

PAGE 4 OF 5

PHASE: 25,000 GPD TO 100,000 GPD — LEFT OF INFLECTION POINT

INFLATION RATE (%)	DISCOUNT RATE (%)	TANK SIZE (1000 GALS.): 25 — TOTAL PRESENT WORTH ($)	50	100
0.00	5	$116,411	**$84,773**	$90,302
0.00	7	$99,713	**$73,713**	$83,894
0.00	9	$89,971	**$67,081**	$80,747
2.45	5	$158,056	$110,783	**$108,776**
2.45	7	$123,093	**$89,082**	$93,085
2.45	9	$103,826	**$76,478**	$85,380
5.00	5	×	×	×
5.00	7	$173,583	$120,075	**$116,132**
5.00	9	$132,152	**$94,829**	$96,995

PHASE: 50,000 GPD TO 150,000 GPD — TRANSITION

INFLATION RATE (%)	DISCOUNT RATE (%)	TANK SIZE (1000 GALS.): 50 — TOTAL PRESENT WORTH ($)	75	100
0.00	5	$134,660	**$117,860**	$119,530
0.00	7	$121,752	$105,388	**$103,935**
0.00	9	$113,374	$97,003	**$94,585**
2.45	5	$163,144	**$144,791**	$156,204
2.45	7	$139,504	**$122,469**	$125,605
2.45	9	$125,066	$108,628	**$107,834**
5.00	5	×	×	×
5.00	7	$173,038	**$154,127**	$169,305
5.00	9	$145,867	**$128,494**	$133,709

PHASE: 100,000 GPD TO 500,000 GPD — RIGHT OF INFLECTION POINT

INFLATION RATE (%)	DISCOUNT RATE (%)	TANK SIZE (1000 GALS.): 100 — TOTAL PRESENT WORTH ($)	250
0.00	5	$225,011	**$189,062**
0.00	7	$188,702	**$164,042**
0.00	9	$168,254	**$150,327**
2.45	5	$319,505	**$253,116**
2.45	7	$239,858	**$199,279**
2.45	9	$197,521	**$170,095**
5.00	5	×	×
5.00	7	$355,655	**$276,981**
5.00	9	$260,208	**$213,200**

EXHIBIT GCH-6

3% SYSTEM GROWTH RATE - PHASED EXPANSION OF STEEL GROUND STORAGE TANK

EXHIBIT GCH-5

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SSU MARGIN RESERVE

PEPO Table

Net Construction Cost ($)	Planning & Engineering (1) (%)	Engineering Survey (%)	Permitting (%)	Operations (%)	Total (2) Percentage (%)
$100,000	11.63%	3.00%	3.00%	1.00%	18.63%
$200,000	10.25%	2.64%	2.64%	0.88%	16.42%
$500,000	8.52%	2.20%	2.20%	0.73%	13.65%
$1,000,000	7.53%	1.94%	1.94%	0.65%	12.06%
$5,000,000	6.42%	1.66%	1.66%	0.55%	10.28%
$10,000,000	6.03%	1.56%	1.56%	0.52%	9.66%

Notes:

(1) The basic services (planning & engineering) are based on Figure 1, from "Consulting Engineering" by the American Society of Civil Engineers. Figure 1 is a representation of the basic services for above-average complexity projects, which include: water and wastewater treatment plants, water distribution lines under 16" diameter, and sanitary sewer lines under 24" diameter.

(2) The total percentage represents a percentage of the construction cost that must be added to the construction cost in order to obtain the total project cost.

PEPO Curve
(Based on Table 5)

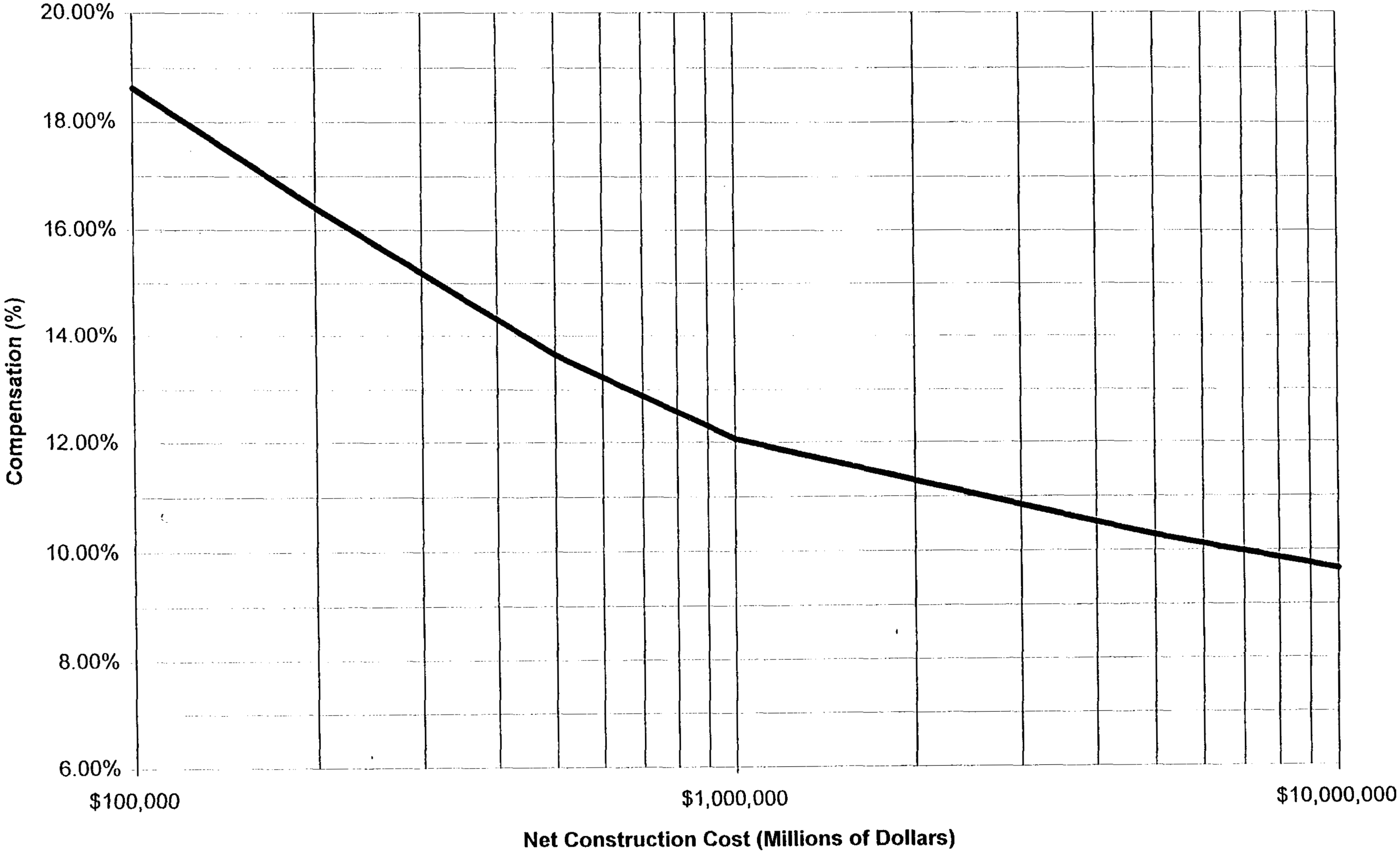

EXHIBIT GCH-6
PAGE 2 OF 2

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SSU MARGIN RESERVE

Manufacturer's Standard Sizes

Description	Standard Sizes
1) Prestressed Concrete Ground Storage Tank	0.1 MG, 0.2 MG, 0.25 MG, 0.3 MG, 0.4 MG, 0.5 MG, 0.6 MG, 0.75 MG, 1.0 MG, 1.25 MG, 1.5 MG, and 2.0 MG.
2) Steel Ground Storage Tank	0.016 MG, 0.022 MG, 0.024 MG, 0.027 MG, 0.031 MG, 0.032 MG, 0.033 MG, 0.037 MG, 0.039 MG, 0.043 MG, 0.047 MG, 0.053 MG, 0.054 MG, 0.064 MG, 0.071 MG, 0.074 MG, 0.081 MG, 0.088 MG, 0.105 MG, 0.107 MG, 0.114 MG, 0.122 MG, 0.132 MG, 0.149 MG, 0.151 MG, 0.158 MG, 0.183 MG, 0.185 MG, 0.199 MG, 0.218 MG, 0.22 MG, 0.246 MG, 0.256 MG, 0.286 MG, 0.294 MG, 0.326 MG, 0.341 MG, 0.355 MG, 0.421 MG, 0.423 MG, 0.428 MG, 0.491 MG, 0.53 MG, 0.553 MG, 0.567 MG, 0.632 MG, 0.685 MG, 0.691 MG, 0.734 MG, 0.744 MG, 0.816 MG, 0.874 MG, 0.906 MG, 0.921 MG, 0.948 MG, 1.099 MG, 1.1122 MG, 1.1147 MG, 1.338 MG, and 1.42 MG.
3) Extended Aeration Package Wastewater Treatment Plant a) Modular Concrete b) Cylindrical (Tubular) c) Ring Steel	a) 0.0033MGD, 0.005 MGD, 0.0083 MGD, 0.01 MGD, 0.015 MGD, 0.02 MGD, 0.025 MGD, 0.03 MGD, 0.035 MGD, and 0.04 MGD. b) 0.014 MGD, 0.015 MGD, 0.016 MGD, 0.017 MGD, 0.018 MGD, 0.019 MGD, 0.02 MGD, 0.022 MGD, 0.024 MGD, 0.025 MGD, 0.026 MGD, 0.028 MGD, 0.03 MGD, 0.035 MGD, 0.04 MGD, 0.045 MGD, 0.05 MGD, 0.055 MGD, 0.06 MGD, 0.07 MGD. c) 0.05 MGD, 0.075 MGD, 0.1 MGD, 0.125 MGD, 0.15 MGD, 0.175 MGD, 0.2 MGD, 0.25 MGD, 0.3 MGD, 0.4 MGD, 0.5 MGD, 0.625 MGD, and 0.75 MGD.
4) Contact Stabilization Package Wastewater Treatment Plant a) Cylindrical (Tubular) b) Ring Steel	a) 0.03 MGD, 0.035 MGD, 0.04 MGD, 0.045 MGD, 0.05 MGD, 0.055 MGD, 0.06 MGD, 0.07 MGD, 0.075 MGD, 0.08 MGD, 0.09 MGD, and 0.1 MGD. b) 0.05 MGD, 0.075 MGD, 0.1 MGD, 0.125 MGD, 0.15 MGD, 0.175 MGD, 0.2 MGD, 0.25 MGD, 0.3 MGD, 0.4 MGD, 0.5 MGD, 0.625 MGD, 0.75 MGD, 1.0 MGD, 1.25 MGD, 1.5 MGD, 1.75 MGD, and 2.0 MGD.
5) Hydropneumatic Tanks	1,000 Gal., 2,000 Gal., 5,000 Gal., 7,500 Gal., 10,000 Gal., 15,000 Gal., and 20,000 Gal.

SSU MARGIN RESERVE

Manufacturer's Standard Sizes (Cont.)

Description	Standard Sizes
6) Auxiliary Power Generators	7.5 KW, 12.5 KW, 15 KW, 17.5 KW, 20 KW, 25 KW, 35 KW, 50 KW, 75 KW, 100 KW, 150 KW, 200 KW, 250 KW, 300 KW, 350 KW, 400 KW, 500 KW, 600 KW, 750 KW, 1000 KW, 1250 KW, 1500 KW, 1750 KW, and 2000 KW.
7) Clarifiers (Pre-engineered)	30 foot, 35', 40', 45', 50' 55', 60', 65', 70', 75', 80', 85', 90'. 95', 100'. and 104 feet in diameter.
8) Tertiary Filters a) TES Gravity Filter b) Traveling Bridge	a) 0.01 MGD, 0.02 MGD, 0.03 MGD, 0.04 MGD, 0.05 MGD, 0.06 MGD, 0.07 MGD, 0.08 MGD, 0.09 MGD, 0.1 MGD, 0.11 MGD, 0.12 MGD, 0.15 MGD, 0.175 MGD, 0.2 MGD, and 0.22 MGD. b) 0.2 MGD, 0.25 MGD, 0.3 MGD, 0.35 MGD, 0.4 MGD, 0.5 MGD, 0.6 MGD, 0.7 MGD, 0.8 MGD, 0.9 MGD, 1.0 MGD, 1.25 MGD, 1.5 MGD, 1.75 MGD, and 2.0 MGD
9) Ductile Iron Pipe (DIP) Water Mains and Force Mains (2)	4-inch, 6", 8", 10", 12", 14", 16", 18", 20", and 24" diameter.
10) Polyvinyl Chloride Pipe (PVC) DR18 Water Mains and DR25 Force Mains (2)	4-inch, 6", 8", 10", 12", 14", 16", 18", 20", and 24" diameter.
11) Polyvinyl Chloride Pipe (PVC) SDR 35 Gravity Sewer	4-inch, 6", 8", 10", 12", 15", 18", 21", 24", and 27" diameter.
12) Elevated Storage Tank a) Pedestal Spheres b) Hydropillar (Wineglass c) Hydropillar	a) 0.05 MG, 0.06 MG, 0.075 MG, 0.1 MG, 0.125 MG, 0.15 MG, and 0.2 MG. b) 0.1 MG, 0.15 MG, 0.2 MG, 0.25 MG, 0.3 MG, and 0.4 MG. c) 0.2 MG, 0.25 MG, 0.3 MG, 0.4 MG, 0.5 MG, 0.75 MG, 1.0 MG, 1.5 MG, 2.0 MG, 2.5 MG, and 3.0 MG.

Notes:

(1) The standard sizes for the water and wastewater components listed above were determined through discussions with product representatives and product catalogs.

(2) The 14-inch and 18-inch diameter pipes listed in the water mains and force mains standard sizes usually require very long delivery times due to lack of demand.

SSU MARGIN RESERVE

Threshold Sizing -- State/Local Requirements and Level of Service

No. Description of Requirements

Piping

1 A 6-inch diameter pipe is the smallest allowable water main, where fire flow is required. In some cases, an 8-inch diameter water main may be required to provide fire flow and required pressure within the main. These requirements are outlined in the "Recommended Standards For Water Works" (1992), as referenced by 62-555.330 (3), F.A.C.

2 The minimum allowable force main size shall be 4-inches in diameter. This requirement is set forth by the "Recommended Standards For Wastewater Facilities" (1990), as referenced by 62-604.300 (4) (b), F.A.C.

3 No public gravity sewer shall be less than 8-inches in diameter. The service laterals can be 4 or 6-inches individually, but the main gravity sewer main must be 8-inches in diameter. This requirement is found in the "Recommended Standards For Wastewater Facilities" (1990), as referenced by 62-604.300 (4) (b), F.A.C.

Wastewater Treatment Plants

4 In order for a wastewater treatment plant to provide reclaimed water for public access areas, a wastewater treatment facility must have a design flow of no less than 0.1 MGD and the facility must meet Class I reliability criteria, as stated in 62-610.451 (1) and 62-610.462 (1). The Class I requirements are as follows:

(1) A backup bar screen shall be provided (backup may be designed for manual cleaning).
(2) A backup pump shall be provided for each set of pumps which performs the same function.
(3) If comminution of the total wastewater flow is provide, then an overflow bypass with an installed manually- or mechanically cleaned bar screen shall be provided.
(4) The backup sedimentation basins should have a design flow capacity of at least 50% of the total design flow of the largest unit.
(5) For final and chemical sedimentation basins, trickling filters, filters and activated carbon columns, there shall be a sufficient number of units of a size, such that with the largest unit out of service, the remaining units shall have a design flow capacity of at least 75% of the total design flow of the largest unit.
(6) At least two (2) equal volume aeration basins must be provided.
(7) There shall be a sufficient number of aeration blowers or mechanical aerators to enable the design oxygen transfer with the largest unit out of service.
(8) The air diffusion system for each aeration basin shall be designed such that the largest section of diffusers can be isolated without measurably impairing the oxygen transfer capability of the system.
(9) At least two (2) chemical flash mixing basins must be provided or a backup means for adding and mixing chemicals, separate from the basin, shall be provided.
(10) At least two (2) flocculation basins must be provided.
(11) With the largest basin out of service, there shall be a sufficient number of units of size to provide 50% of the total design flow of the largest unit.

SSU MARGIN RESERVE

Threshold Sizing -- State/Local Requirements and Level of Service (Cont.)

No. Description of Requirements

Wastewater Treatment Plants (Cont.)

5 "Unless otherwise stated, new, expanded, or modified wastewater treatment and domestic wastewater treatment and domestic residuals treatment, handling, and dewatering facilities shall be designed to provide Class III reliability as described in Rule 62-600.300 (4) (l), F.A.C." This rule references the U.S. EPA "Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability-MCD-05." The Class III requirements are as follows:

(1) A backup bar screen shall be provided (backup may be designed for manual cleaning).
(2) A backup pump shall be provided for each set of pumps which performs the same function.
(3) If comminution of the total wastewater flow is provide, then an overflow bypass with an installed manually- or mechanically cleaned bar screen shall be provided.
(4) There shall be at least two (2) sedimentation basins.
(5) There shall be at least two (2) blowers or mechanical aerators available for service.
(6) The air diffusion system for each aeration basin shall be designed such that the largest section of diffusers can be isolated without measurably impairing the oxygen transfer capability of the system.
(7) With the largest disinfection contact basin out of service, there shall be a sufficient number of units to provide 50% of the total design flow of the largest unit.

Water Treatment Plants

6 The number of drinking water supply wells required for a water treatment and distribution system is set forth in 62-555.315 (1), F.A.C. This rule requires a minimum of two (2) drinking water supply wells for all community water systems that will serve 350 or more persons or have more than 150 connections.

7 The auxiliary power requirements of a public water system are detailed in 62-555.320 (6) (a), F.A.C. Community systems that serve 350 or more persons, or have 150 or more service connections, shall provide auxiliary power for operation of the source, treatment units and pumps at a rate equal to one-half maximum daily flow. This requirement can be met by connection to at least two independent power lines, interconnection to another public water system, or an in-place auxiliary power source equipped with an automatic start-up device.

WATER MAINS

Ultimate Buildout Cost Comparison

Description of Pipe Comparison

Comparison of a 6-inch diameter PVC (DR 18) water main installations on the basis of ultimate buildout demand. For this analysis, an initial demand requiring 250 linear feet of 6-inch water main, an intermediate demand of 2,500 ft., and an ultimate buildout of 25,000 ft. are utilized. The total cost for the piping options at these various stages are as follows:

A) Comparison of 250 ft to 2,500 ft buildout.

250 feet of 6-inch diameter WM installed as a single project	=>	$5,327.77
2,500 feet of 6-inch diameter WM installed in 250' increments	=>	$53,277.71
2,500 feet of 6-inch diameter WM installed as a single project	=>	$40,653.49
Total Cost Savings	=>	$12,624.22

B) Comparison of 250 ft to 25,000 ft buildout.

250 feet of 6-inch diameter WM installed as a single project	=>	$5,327.77
25,000 feet of 6-inch diameter WM installed in 250' increments	=>	$532,777.11
25,000 feet of 6-inch diameter WM installed as a single project	=>	$349,172.89
Total Cost Savings	=>	$183,604.22

C) Comparison of 2,500 ft to 25,000 ft buildout.

2,500 feet of 6-inch diameter WM installed as a single project	=>	$40,653.49
25,000 feet of 6-inch diameter WM installed in 2,500' increments	=>	$406,534.93
25,000 feet of 6-inch diameter WM installed as a single project	=>	$349,172.89
Total Cost Savings	=>	$57,362.04

Notes:

1) Unit costs used to calculate project cost are based on values from HAI's Economy of Scale Report. The project cost values also include adjustments for planning & engineering, engineering survey, permitting, and operations.

SSU MARGIN RESERVE

Water Mains Cost Per ERC

Pipe Diameter (in.)	Unit Cost ($/lf) (1)	Pipe Flow Capacity (gpm) (2)	No. ERC's Served (3)	Unit Cost per ERC ($/lf per ERC)
2	$6.00	19	1	$6.00
4	$13.50	116	24	$0.56
6	$15.25	338	110	$0.139
8	$17.50	721	436	$0.040
10	$20.00	1,225	1,307	$0.0153
12	$23.00	1,762	2,381	$0.0097
16	$32.00	2,327	3,511	$0.0091
20	$40.50	4,191	7,239	$0.0056

Notes:

(1) The unit cost is based on manufacturers' material cost and open country installation.

(2) The water main flow capacity was determined using the criteria head loss <10ft/1000ft for < 16" dia. pipe and head loss <3ft/1000ft for pipe 16" dia. and greater. The flow is determined using Q=VA with the above limiting criteria (which are provided from AWWA).

(3) The number of Equivalent Residential Conections (ERC's) served by the ultimate capacity of the pipe is determined using the "Community Water Systems Source Book" by Joseph S. Ameen. Using Table XXI, the maximum instatneous flow per residence is used in conjuntion with the range of number of residences served to determine the correct range for each pipe size.

(4) The total pipe cost is determined using 100' width residential lots.

SSU MARGIN RESERVE

Water Main Unit Cost and Available Services

Pipe Diameter (inches)	Unit Cost ($/LF) (1)	Services (2)
2	$6.00	1
	$7.50	23
4	$13.50	24
	$1.75	86
6	$15.25	110
	$2.25	326
8	$17.50	436

[ ] => Incremental Costs and Services

Notes:
(1) The unit cost is based on manufacturers' material cost and open country installation.
(2) The number of Equivalent Residential Conections (ERC's) served by the ultimate capacity of the pipe is determined using the "Community Water Systems Source Book" by Joseph S. Ameen. Using Table XXI, the maximum instatneous flow per residence is used in conjuntion with the range of number of residences served to determine the correct range for each pipe size.
(3) The water main flow capacity was determined using the criteria head loss <10ft/1000ft for < 16" dia. pipe and head loss <3ft/1000ft for pipe 16" dia. and greater. The flow is determined using Q=VA with the above limiting criteria (which are provided from AWWA).
(4) The total pipe cost is determined using 100' width residential lots.

FORCE MAINS

Ultimate Buildout Cost Comparison

No. Description of Pipe Comparison

1) Comparison of a 4-inch diameter PVC (DR 25) force main with a 6-inch diameter PVC (DR 25) force main, where the ultimate need will necessitate a 6-inch diameter force main comparison is based on the required length and quantity of 4-inch force main. The total cost of the piping options are as follows:

4-inch FM => 5,280 ft. serving 267 customers	=>	$63,108.89
Parallel with one (1) 4-inch FM => 5,280 ft. serving 534 customers	=>	$126,217.77
-OR-		
Install 6-inch FM => 5,280 ft. serving 645 customers	=>	$70,805.35
Total Cost Savings	=>	$55,412.42

2) Comparison of a 4-inch diameter PVC (DR 25) force main with a 8-inch diameter PVC (DR 25) force main, where the ultimate need will necessitate a 8-inch diameter force main comparison is based on the required length and quantity of 4-inch force main. The total cost of the piping options are as follows:

4-inch FM => 5,280 ft. serving 267 customers	=>	$63,108.89
Parallel with three 4-inch FM's => 5,280 ft. each, 1,068 customers	=>	$252,435.54
-OR-		
Install 8-inch FM => 5,280 ft. serving 1,224 customers	=>	$81,551.98
Total Cost Savings	=>	$170,883.56

3) Comparison of a 6-inch diameter PVC (DR 25) force main with a 8-inch diameter PVC (DR 25) force main, where the ultimate need will necessitate a 8-inch diameter force main comparison is based on the required length and quantity of 6-inch force main. The total cost of the piping options are as follows:

6-inch FM => 5,280 ft. serving 645 customers	=>	$70,805.35
Parallel with one (1) 6-inch FM => 5,280 ft. serving 1,290 customers	=>	$141,610.69
-OR-		
Install 8-inch FM => 5,280 ft. serving 1,224 customers	=>	$81,551.98
Total Cost Savings	=>	$60,058.72

Notes:

1) Unit costs used to calculate project cost are based on values from HAI's Economy of Scale Report. The project cost values also include adjustments for planning & engineering, engineering survey, permitting, and operations.

SSU MARGIN RESERVE

Force Mains Cost Per ERC

Pipe Diameter (in.)	Unit Cost ($/lf) (1)	Pipe Flow Capacity (gpm) (2)	No. ERC's Served (3)	Cost per ERC
4	$10.00	196	267	$0.0375
6	$11.25	441	645	$0.0174
8	$13.00	783	1,213	$0.0107
10	$15.00	1,224	1,994	$0.0075
12	$17.50	1,762	3,009	$0.0058
14	$23.50	2,399	4,274	$0.0055
16	$27.50	3,133	5,806	$0.0047

Notes:

(1) The unit cost is based on manufacturers' material cost and open country installation.

(2) The force main flow capacity was determined using 5 fps flow velocity and the relationship Q(gpd) = VA.

(3) The amount of Equivalent Residential Conections (ERC's) served by the ultimate capacity of the pipe is determined using 270 gpd/ERC. Also, the peak factor was determined using an average of 2.5 persons/ERC and the equation P.F.=(18+P^1.2)/(4+P^1/2) where P is population in thousands.

SSU MARGIN RESERVE

Force Main Unit Cost and Available Services

Pipe Diameter (inches)	Unit Cost ($/LF) (1)	Services (2)
4	$10.00	267
	$1.25	378
6	$11.25	645
	$1.75	568
8	$13.00	1,213
	$2.00	781
10	$15.00	1,994
	$2.50	1,015
12	$17.50	3,009

=> Incremental Cost and Service

Notes:
(1) The unit cost is based on manufacturers' material cost and open country installation.
(2) The amount of Equivalent Residential Conections (ERC's) served by the ultimate capacity of the pipe is determined using 270 gpd/ERC. Also, the peak factor was determined using an average of 2.5 persons/ERC and the equation P.F.=(18+P^1.2)/(4+P^1/2), where P is population in thousands.
(3) The force main flow capacity was determined using 5 fps flow velocity and the relationship Q(gpd) = VA.

GRAVITY SEWER

Ultimate Buildout Cost Comparison

Description of Pipe Comparison

Comparison of a 8-inch diameter PVC (SDR 35) gravity sewer installations on the basis of ultimate buildout demand. For this analysis, an initial demand requiring 400 linear feet (or 8 ERC's based on 100' lot widths), an intermediate demand of 2,000 ft. (40 ERC's), and an ultimate demand of 8,000 ft. (160 ERC's). The total costs of these piping options are as follows:

A) Comparison of individual 400 ft sections to 2,000 ft buildout.

400' of 8" Gravity, 1 MH, and 1 LS installed as a single project	=>	$59,010.65
2,000' Gravity, 5 MH's, and 1 LS installed in 400' increments	=>	$102,990.39
2,000' Gravity, 5 MH's, and 1 LS installed as a single project	=>	$97,330.20
Total Cost Savings	=>	$5,660.19

B) Comparison of 400 ft to 8,000 ft buildout.

400' of 8" Gravity, 1 MH, and 1 LS installed as a single project	=>	$59,010.65
8,000' Gravity, 21 MH's, and 1 LS installed in 400' increments	=>	$279,673.76
8,000' Gravity, 21 MH's, and 1 LS installed as a single project	=>	$250,591.07
Total Cost Savings	=>	$29,082.69

C) Comparison of 2,000 ft to 8,000 ft buildout.

2,000' of 8" Gravity, 5 MH's, and 1 LS installed as a single project	=>	$97,330.20
8,000' Gravity, 21 MH's, and 1 LS installed in 2,000' increments	=>	$259,275.55
8,000' Gravity, 21 MH's, and 1 LS installed as a single project	=>	$250,591.07
Total Cost Savings	=>	$8,684.48

Notes:
1) Unit costs used to calculate project cost are based on values from HAI's Economy of Scale Report. The project cost values also include adjustments for planning & engineering, engineering survey, permitting, and operations.
2) The 8-inch gravity sewer costs are based on depth of cut, which for an 8-inch diameter PVC gravity sewer line is approximately 0.32 ft/1,000 ft.
3) The cost of manholes and a lift station is included with each of the above scenarios.

SSU MARGIN RESERVE

Gravity Sewer Cost Per ERC

Pipe Diameter (in.)	Unit Cost ($/lf) (1)	Pipe Flow Capacity (gpm) (2)	No. ERC's Served (3)	Cost per ERC
8	$12.28	344	493	$0.0249
10	$14.71	522	776	$0.0190
12	$16.91	752	1,159	$0.0146
15	$20.99	1,126	1,816	$0.0116
18	$24.00	1,637	2,768	$0.0087

Notes:
(1) The unit cost includes material cost and installation of 0-8 ft. in depth.
(2) The sanitary sewer flow capacity was determined using Manning's Equation (V=(1.49*R^2/3*S^1/2)/n) and the relationship Q(gpd) = VA.
(3) The amount of Equivalent Residential Conections (ERC's) served by the ultimate capacity of the pipe is determined using 270 gpd/ERC. Also, the peak factor was determined using 2.5 persons/ERC and the equation P.F.=(18+P^1/2)/(4+P^1/2).

SSU MARGIN RESERVE

Gravity Sewer Unit Cost and Available Services

Pipe Diameter (inches)	Unit Cost ($/LF) (1)	Services (2)
8	$12.28	493
	$2.43	283
10	$14.71	776
	$2.20	383
12	$16.91	1,159
	$4.08	657
15	$20.99	1,816
	$3.01	952
18	$24.00	2,768

[ ] = Incremental Cost and Service

Notes:
(1) The unit cost includes material cost and installation of 0-8 ft. in depth.
(2) The amount of Equivalent Residential Conections (ERC's) served by the ultimate capacity of the pipe is determined using 270 gpd/ERC. Also, the peak factor was determined using 2.5 persons/ERC and the equation P.F.=(18+P^1/2)/(4+P^1/2).
(3) The sanitary sewer flow capacity was determined using Manning's Equation (V=(1.49*R^2/3*S^1/2)/n) and the relationship Q(gpd) = VA.

STEPS REQUIRED FOR WATER PLANT EXPANSION

1. In house review of records, capacity, customer commitments, etc. and the determination of the abilities and manpower to complete the work.
2. Depending on the project's scope, a request for a proposal, review of qualifications and selection of an outside consultant may be undertaken.
3. Determination of the needed capacity increase to meet the demands of the current and future customers via a planning document.
4. Study of the various raw water supply alternatives and the required treatment facilities, as applicable.
5. Selection of the raw water supply and treatment alternatives and selection of plant sites, as applicable, so as to ensure the highest quality product for the lowest customer price.
6. Determination of the source of supply and the sizing of treatment facilities taking into account economies of scale and used and useful considerations.
7. Preliminary planning level engineering estimate of planning, design permitting, construction and start up costs including overhead expenses, capitalized interest, etc.
8. If applicable, study of financing alternatives and determination of lowest cost financing alternatives.
9. If applicable, preliminary approval of financing alternative by financial

institution, local government, etc.

10. Consumptive Use Permit (CUP) application preparation with supporting documentation.

11. Water Management District (WMD) review and request for additional information.

12. Complete request for additional information.

13. WMD review and staff report.

14. WMD Board approval, noticing and CUP issuance.

15. Design wells and local government approval of wells.

16. Bidding, evaluation and award of well drilling contract.

17. Confirming funding for the well drilling contract.

18. Well construction and testing.

19. Water sampling and analysis.

20. Determination of water quality and its applicability to the treatment process. At this point, project redesign may be necessary causing significant delays.

21. Water treatment facilities design completion.

22. Application for DEP construction permit.

23. DEP review and request of additional information.

24. Complete request for additional information.

25. DEP review and notice of intent.

26. DEP construction permit noticing and permit issuance if no objections.

27. Local government approvals: local jurisdictional agency's review and

permitting of construction; local zoning agency's review and approval of any requested zoning changes; and local planning agency's review for consistency with planning documents.

28. Final design completion and preparation of bidding documents.
29. Bidding, evaluation and award of construction contract.
30. Confirming funding for construction contract.
31. Water treatment plant construction and disinfection.
32. Substantial completion inspection and certification.
33. Punch list determination and completion of items.
34. Start up, operator training and operation and maintenance manual review.
35. Final walk through and inspection and completion of final punch list items.
36. Final payment to contractor and project close-out.
37. Final DEP certification and preparation of as built drawings.

2. The preliminary design report does not provide reasonable assurances that the proposed wastewater facility technology will function as intended at the design capacity requested by the permittee.

(c) When the permit includes the treatment facilities and reuse or disposal systems, different permitted capacities may be established for the treatment, reuse, and disposal systems.

(4) Sampling Points

(a) Provisions shall be made in the design for easy access points for the purpose of obtaining representative influent and effluent samples. These access points shall be dry points which can be reached safely.

(b) Provisions for flow measurements shall be in accordance with Chapter 62–601, F.A.C.

Specific Authority: 403.061, 403.087, F.S.
Law Implemented: 403.021, 403.061, 403.062, 403.086, 403.087, 403.088, F.S.
History: New 11–27–89, Amended 1–30–91, 6–8–93, Formerly 17–600.400.

62–600.405 Planning for Wastewater Facilities Expansion.

(1) The permittee shall provide for the timely planning, design, and construction of wastewater facilities necessary to provide proper treatment and reuse or disposal of domestic wastewater and management of domestic wastewater residuals.

(2) The permittee shall routinely compare flows being treated at the wastewater facilities with the permitted capacities of the treatment, residuals, reuse, and disposal facilities.

(3) When the three–month average daily flow for the most recent three consecutive months exceeds 50 percent of the permitted capacity of the treatment plant or reuse and disposal systems, the permittee shall submit to the Department a capacity analysis report.

(4) The initial capacity analysis report shall be submitted according to the following:

(a) For new or expanded wastewater facilities for which the Department received a complete construction permit application after July 1, 1991, the initial capacity analysis report shall be submitted within 180 days after the last day of the last month in the three–month period referenced in Rule 62–600.405(3), F.A.C.

(b) For wastewater facilities for which the Department received a complete construction permit application on or before July 1, 1991, the initial capacity analysis report shall be submitted when the next application for a permit to construct or operate wastewater facilities is submitted to the Department unless:

1. The three–month average daily flow for any three consecutive months during the period July 1, 1990, to June 30, 1991, exceeds 90 percent of the permitted

capacity. In such cases, the initial capacity analysis report shall be submitted to the Department no later than January 1, 1992.

2. The three–month average daily flow for any three consecutive months during the period July 1, 1990, to June 30, 1991, exceeds 75 percent of the permitted capacity. In such cases, the initial capacity analysis report shall be submitted to the Department no later than July 1, 1992.

(c) In no case shall the initial capacity analysis report be required to be submitted before July 1, 1991, or before the three–month average daily flow exceeds 50 percent of the permitted capacity of the treatment plant or reuse or disposal systems, as described in Rule 62–600.405(3), F.A.C.

(5) The permittee shall submit updated capacity analysis reports to the Department according to the following:

(a) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will not be equaled or exceeded for at least 10 years, an updated capacity analysis report shall be submitted to the Department at five–year intervals or at each time the permittee applies for an operation permit or renewal of an operation permit, whichever occurs first.

(b) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next 10 years, an updated capacity analysis shall be submitted to the Department annually.

(6) The capacity analysis report or an update of the capacity analysis report shall evaluate the capacity of the plant and contain data showing the permitted capacity; monthly average daily flows, three–month average daily flows, and annual average daily flows for the past 10 years or for the length of time the facility has been in operation, whichever is less; seasonal variations in flow; flow projections based on local population growth rates and water usage rates for at least the next 10 years; an estimate of the time required for the three–month average daily flow to reach the permitted capacity; recommendations for expansions; and a detailed schedule showing dates for planning, design, permit application submittal, start of construction, and placing new or expanded facilities into operation. The report shall update the flow–related and loading information contained in the preliminary design report submitted as part of the most recent permit application for the wastewater facilities pursuant to Rules 62–600.710 and 62–600.715, F.A.C.

(7) The capacity analysis report shall be signed by the permittee and shall be signed and sealed by a professional engineer registered in Florida.

(8) Documentation of timely planning, design, and construction of needed expansions shall be submitted according to the following schedule:

(a) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next five years, the report shall include a statement, signed and sealed by a professional engineer registered in Florida, that planning and preliminary design of the necessary expansion have been initiated.

(b) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next four years, the report shall include a statement, signed and sealed by an engineer registered in Florida, that plans and specifications for the necessary expansion are being prepared.

(c) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next three years, the permittee shall submit a complete construction permit application to the Department within 30 days of submittal of the initial capacity analysis report or the update of the capacity analysis report.

(d) If the initial capacity analysis report or an update of the capacity analysis report documents that the permitted capacity will be equaled or exceeded within the next six months, the permittee shall submit to the Department an application for an operation permit for the expanded facility. The operation permit application shall be submitted no later than the submittal of the initial capacity analysis report or the update of the capacity analysis report.

(9) If requested by the permittee, and if justified in the initial capacity analysis report or an update to the capacity analysis report based on design and construction schedules, population growth rates, flow projections, and the timing of new connections to the sewerage system such that adequate capacity will be available at the wastewater facility, the Secretary or Secretary's designee shall adjust the schedule specified in Rule 62–600.405(8), F.A.C.

Specific Authority: 403.061, 403.087, F.S.
Law Implemented: 403.021, 403.061, 403.086, 403.087, 403.088, 403.0881, [1] 403.101, F.S.
History: New 1–30–91, Formerly 17–600.405.

62–600.410 Operation and Maintenance Requirements.

(1) All domestic wastewater treatment plants shall be operated and maintained in accordance with the applicable provisions of this chapter and so as to attain, at a minimum, the reclaimed water or effluent quality required by the operational criteria specified in this chapter, and to meet the appropriate domestic wastewater residuals management criteria specified in Chapters 62–2, 62–7, 62–640, and 62–701, F.A.C.

(2) All reuse and land application systems shall be operated and maintained in accordance with the applicable provisions of this chapter and the provisions of Chapter 62–610, F.A.C.

(3) All underground injection effluent disposal systems shall be operated and maintained in accordance with the applicable provisions of this chapter and the provisions of Chapter [8] 62–28, F.A.C.

(4) Wetlands application systems shall be operated and maintained in accordance with the applicable provisions of this chapter and the provisions of Chapter 62–611, F.A.C.

DIRECT TESTIMONY OF HUGH GOWER

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

ON BEHALF OF

SOUTHERN STATES UTILITIES, INC.

DOCKET NO. 960258-WS

Q. PLEASE STATE YOUR NAME, OCCUPATION AND ADDRESS.

A. My name is Hugh Gower, and I am self-employed. My address is 195 Edgemere Way South, Naples, Florida 34105. I also provide consulting services to utilities and others on financial and operating matters. I also provide expert testimony on topics related to public utility economics and rate regulation in cases before public service commissions and courts.

Q. PLEASE STATE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I hold a bachelor of science degree in accounting and economics from the University of Florida, and I am, or have been, registered as a certified public accountant in Florida, Georgia, and several other states. I am a member of the American Institute of Certified Public Accountants and other professional organizations. I engaged in the practice of public accounting continuously for more than 30 years with Arthur Andersen & Co. with whom I was a partner prior to retirement.

Q. PLEASE DESCRIBE THE FIRM OF ARTHUR ANDERSEN & CO. AND YOUR PARTICULAR EXPERIENCE.

A. Arthur Andersen is among the largest international firms of independent public accountants and serves as auditors for a major share of the electric, gas and telephone, as well as a large number of the other utilities operating in the United States. In addition to audits of financial statements, the firm performs tax work and designs and installs accounting systems for businesses of all types. The firm also provides expert testimony in connection with public utility rate applications before federal and state regulatory authorities on a variety of accounting, financial and rate-making topics.

I was a partner in the Utilities and Telecommunications Division of the Atlanta office of Arthur Andersen & Co., which serves as the concentration office for the firm's regulated industries practice in the southeastern United States. This area of the practice includes work for electric, gas, telephone, water and sewer utilities, motor carriers and airlines. I served as the southeastern area director of this practice for 17 years. I have had responsibility for supervising the work performed for Arthur Andersen & Co. clients, the training of firm personnel, and administrative matters. I have also had direct responsibility for the work done by the firm for numerous clients in this area of the practice.

Q. **PLEASE DESCRIBE THE NATURE OF THE WORK YOU HAVE PERFORMED WITH ARTHUR ANDERSEN & CO.**

A. By far, the greatest portion of my work has been devoted to the public utilities industries, but I also have substantial experience with other industries. I performed independent audits of public utilities, as a result of which Arthur Andersen & Co. issued reports on the financial statements of such companies, and I participated in and supervised work in connection with audits of various statements, schedules and other data required either annually or in connection with rate applications before federal or state regulatory authorities. I have also supervised work in connection with the issuance of billions of dollars of securities by public utilities. I also participated in the development of accounting and management information systems as well as operating systems designed to promote close control over utility resources, such as materials, fuel and construction costs. In addition, I directed the preparation of financial forecasts or projections, conducted reviews of financial forecasts and directed the development of financial forecasting models.

I participated in management audits, the purpose of which was to assess whether management systems and procedures promote economy and efficiency of operations. I have directed depreciation studies which, based on the analysis of utility plant investments, retirement experience, salvage and cost of removal, developed equitable depreciation rates with which to effect capital recovery during the service lives of the properties. I also developed plans which were accepted by regulators as equitably assigning the future costs of spent nuclear fuel disposal, nuclear plant decommissioning and fossil plant dismantlement costs to customers receiving service, considering the effects of inflation, the time value of money and other variables.

I have directed revenue requirement studies involving the analysis of rate base, operating revenues and expenses as well as the analysis of specific transactions or alternative rate-making treatment of various cost-of-service components. I have also directed studies to determine the proper assignment of cost of service between customer classes, regulatory jurisdictions or between regulated and unregulated operations. I participated in the preparation of Arthur Andersen & Co.'s position statements on utility accounting and rate matters which were under consideration by legislative bodies and regulatory agencies. I was a representative of the American Institute of Certified Public Accountants on the Telecommunications Industry Advisory Group ("TIAG") to the Federal Communications Commission in connection with its adoption of its new Uniform System of Accounts (Part 32). In this connection, I chaired the Auditing and Regulatory Subcommittee of TIAG which dealt with issues regarding compliance with generally accepted accounting principles ("GAAP") when regulatory rate-setting practices are based upon methods other than GAAP.

Q. **WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A. The purpose of my testimony is to support the position of Southern States Utilities, Inc. ("SSU") in this rulemaking proceeding that the Commission should not impute anticipated potential post-test period collections of contributions-in-aid-of-construction ("CIAC") as a reduction of rate base in rate setting proceedings.

The Commission has historically made such imputations as an offset to the amount of plant investment designated "Margin Reserve" allowed in rate base in numerous water and sewer rate cases. The Commission now proposes to adopt that practice as Rule 25-30.431(7). My testimony will show:

- that utilities are entitled to a return on the capital which finances margin reserve plant until that capital is recovered;
- that imputing anticipated future CIAC collection against margin reserve plant denies investors that opportunity;
- that imputing anticipated future CIAC collections by the Commission is inconsistent with its treatment of other utilities in whose cases no imputation of future capital recovery is made; and
- that assigning current customers the cost of carrying the unrecovered investor-supplied capital which financed the investment in margin reserve plant is appropriate.

Q. **WHY IS IT PROPER AND FAIR RATEMAKING TO INCLUDE (MARGIN RESERVE) PLANT INVESTMENTS IN RATE BASE WITHOUT OFFSET FOR FUTURE CIAC COLLECTIONS?**

A. It is well-established that investors in utilities are entitled to both recovery of and return on the capital they provide. In the case of investments in utility plant, capital recovery has historically been effected through inclusion of depreciation (or amortization) provisions in cost of service in a rational, predictable manner over a period of years. Investors' capital which requires a return is measured by the amount of undepreciated plant investment and inclusion of this amount -- plant, less accumulated depreciation times rate of return -- in cost of service provides investors the opportunity to recover this as well.

Q. **HAVE YOU PREPARED AN EXHIBIT TO ILLUSTRATE CAPITAL RECOVERY THROUGH DEPRECIATION?**

A. Yes, Exhibit ___(HAG-1) shows this in Figure A. This hypothetical exhibit assumes a $10,000 plant investment depreciated on a straight-line basis over five years. At the beginning of the period, unrecovered investor capital is $10,000. This is reduced annually by ratable provisions for depreciation included in cost of service. Each year, accumulated provisions for depreciation ("accumulated capital recovery") reduce the original capital investment until it has been fully recovered.

Over the five year useful life, the average unrecovered investor capital is $5,000. In other words, on average over the 5 year useful life, investors would be entitled to a return on the $5,000 unrecovered invested capital (although, of course, this amount is different each year).

Q. **WHEN CUSTOMERS PAY CIAC CHARGES THERE IS NO INVESTOR-SUPPLIED CAPITAL WHICH CARRIES A RETURN REQUIREMENT, IS THERE?**

A. Yes, there is. Before customers pay CIAC charges, investors first supply the capital to construct new plant capacity and continue to finance that plant investment until it is recovered through CIAC charges. In other words, just as with depreciation provisions included in cost of service, CIAC charges are the vehicle by which the <u>recovery of</u> investors' capital is effected. Until the capital previously provided by investors is recovered by collection of CIAC charges, any unrecovered capital investment requires a return. Neither depreciation nor CIAC charges provide <u>return on</u> investor's capital.

Although the pattern of capital recovery which results from CIAC charges is different than when capital recovery is handled through depreciation, the investor capital which requires a return is measured by the amount of plant investment in excess of CIAC collections at any point in time, or over a period of time.

In most cases, it takes a period of several years to recover applicable plant investments through CIAC charges. Until the capital financing such investments is recovered by CIAC charge collections, such capital is entitled to a return and should be included in rate base without imputation of offsetting future CIAC collections so that investors will have that opportunity.

Q. **DOES YOUR EXHIBIT _____ (HAG-1) SHOW HOW UNRECOVERED INVESTOR-SUPPLIED CAPITAL WHICH REQUIRES A RETURN EXISTS WHEN PLANT COSTS ARE RECOVERED THROUGH CIAC (OR SERVICE AVAILABILITY CHARGES) INSTEAD OF DEPRECIATION?**

A. Yes. Figure B on Exhibit ___(HAG-1) illustrates this as well. This hypothetical assumes a $10,000 investment is recovered over five years. The amount recovered is not ratable and varies from year to year. Based on the original $10,000 invested and the assumed CIAC charges, the average unrecovered investor capital is $7,500. In other words, on average over the five year period, this is the amount on which investors would be entitled to a return.

Q. **WILL THE FAILURE TO IMPUTE CIAC CHARGES ANTICIPATED TO BE COLLECTED OVER THE PERIOD COVERED BY THE MARGIN RESERVE RESULT IN OVER-EARNING BY THE UTILITY?**

A. No, it will not. Rates will still be set on the basis of a test period thoroughly examined by the Commission in a rate proceeding to provide assurance that revenues, expenses, capital invested and all other elements of cost of service will be representative of future conditions for which rates will be set. A properly constructed rate base will show the amount of investor-supplied capital outstanding during the test period on which investors are entitled to a return. Allowance of a return on such a rate base provides only the correct return and does not cause over-earnings. In fact, in the cases I'm aware of, in periods following rate cases, the actual realized returns have been less than the authorized return.

On the other hand, the imputation of CIAC charges anticipated to be collected beyond the end of the test period is bound to prevent the utility from realizing its required return, at least on the capital which finances the margin reserve plant capacity.

Q. WHY IS THAT TRUE?

A. Imputation of CIAC charges anticipated to be collected in future periods beyond the end of the test period is the financial equivalent of assuming that plant investments whose capital recovery is to be effected through depreciation is already fully depreciated. Obviously, rate base constructed in this manner is less than the actual unrecovered capital devoted to utility operations and it means there is no financial basis (cost less accumulated depreciation) upon which a return could be provided in the cost of service calculation. In simple terms, a rate of return times zero equals zero.

The fact that unrecovered investor-supplied capital exists regardless of whether capital recovery is provided through depreciation provisions or collection of CIAC charges is clearly illustrated on my Exhibit ___(HAG-1). It is no more appropriate to assume that plant capacity investments not yet recovered through CIAC charges have already been fully recovered than it is to assume that accumulated depreciation accruals equal to 20% of the related plant cost are instead equal to 100% of the plant cost.

Q. CAN YOU DEMONSTRATE THIS WITH AN EXHIBIT?

A. Yes, Exhibit _____ (HAG-2) utilizes a condensed balance sheet of a hypothetical utility over a 10-year period to illustrate the financial effect of imputing post-test period CIAC collections as a reduction of rate base.

This exhibit clearly demonstrates that the practice of imputing post-test period CIAC collections as a reduction of rate base denies investors the opportunity to earn a fair return on invested capital.

Q. WHAT ASSUMPTIONS DID YOU MAKE IN CONSTRUCTING EXHIBIT _____ (HAG-2)?

A. Lines 1 through 10 of Exhibit _____ (HAG-2) show the condensed balance sheet of a hypothetical utility which experiences growth in plant investment similar to many utilities with service areas in Florida. The utility collects CIAC from its customers after making investments in plant.

Utility plant and CIAC are depreciated (or amortized) over a 33-year average service life.

The hypothetical utility's capital structure consists of 50% debt and 50% equity. The weighted cost of capital (and the authorized return) is 10%.

Q. WHAT IS "AVERAGE CAPITAL" SHOWN ON LINE 11?

A. Line 11 shows the average investor-supplied capital which supports the net investment in utility plant and working capital for each of the years 2 through 9, calculated on the simple average of the beginning and end of year amounts.

This is the amount of capital upon which investors would be entitled the opportunity to earn a fair return.

Q. **HOW WAS RATE BASE SHOWN ON LINES 12 THROUGH 18 CONSTRUCTED?**

A. Rate base was constructed using the balance sheet method employed by the FPSC. In that connection, I assumed that all accounts shown on the balance sheet are utility-related.

In addition, line 16 shows the imputation of the average increase in CIAC collections for two subsequent years (the assumed margin reserve period).

Q. **PLEASE EXPLAIN LINES 19 AND 29.**

A. Line 19 shows the required return calculated by applying the 10% weighted cost of capital to the average capital (line 11) for each year.

Line 20 shows the return which would be provided by a Commission decision which applies the authorized return to the total rate base (line 18).

Q. WHY IS THE RETURN PROVIDED (LINE 20) LESS THAN THE RETURN REQUIRED (LINE 19)?

A. It is because of the erroneous construction of rate base. A properly constructed rate base would equal the amount of capital invested in utility operations and, with the application of the cost of capital, provide investors the opportunity to earn the required fair return.

Because rate base in this example -- and many actual Commission cases -- has been improperly reduced by imputing post-test period CIAC collections (line 16), it does not equal the amount of capital invested and investors are denied the opportunity to earn the required fair return.

Q. WOULD DIFFERENT GROWTH ASSUMPTIONS AFFECT THE CONCLUSIONS DRAWN FROM YOUR HYPOTHETICAL ILLUSTRATION?

A. No, the assumption related to growth in plant investment could have just easily been "no growth" or "declining" plant investments and the illustration would just as clearly demonstrate that reducing rate base for post-test period CIAC collections results in a rate base which is lower than the actual amount of investor-supplied capital. Any time this occurs, investors are improperly denied the opportunity to earn a fair return.

Q. **WON'T POST-TEST PERIOD CIAC COLLECTIONS FROM NEW CUSTOMER CONNECTIONS DECREASE THE AMOUNT OF INVESTOR-SUPPLIED CAPITAL SUPPORTING UTILITY OPERATIONS AND CAUSE OVER-EARNINGS IN THE FUTURE?**

A. No, in the normal case, it won't. But, the Commission's traditional (and the proposed rule's) method for imputation is certain to produce under-earnings by how it erroneously assumes investment recovery. Several facts show this assumption is invalid.

First, the Commission must understand post-test period CIAC collections for the margin reserve period do not equal the amount obtained by multiplying margin reserve ERC's times the service availability charges. This is due, in part, to the fact that a portion of the margin reserve is needed to meet increased demands of present customers, which generate no CIAC collections. Second, while new customer connections do result in future CIAC collections, it does not follow that a reduction in rate base is the consequence. Anticipation of future rate base reductions assumes that the amount of needed margin reserve plant decreases when new customers connect to the system, but this is not the case. When a portion of margin reserve plant held ready to meet customers' demands is "committed" to serving new customers who connect to the system, it <u>does not</u> decrease the amount of needed margin reserve plant. On the contrary, the amount of margin reserve plant previously available but committed to serving new customers would need to be replaced, all other things being equal.

Q. HOW WOULD THE MARGIN RESERVE PLANT BE REPLACED?

A. An equivalent amount of plant either completed, but held for future use or under construction would become "used and useful" as margin reserve plant. Therefore, new customer connections and related CIAC collections will cause neither a reduction in rate base nor over earnings in the future. As the unit cost of new plant increases for a variety of reasons, the investment in rate base tends to be even higher.

Q. ISN'T "MARGIN RESERVE" PLANT CAPACITY AVAILABLE TO SERVE FUTURE CUSTOMERS EXCLUSIVELY?

A. No. The margin reserve capacity is available to serve both increases in consumption by existing customers as well as for any new customers. All utilities obligated to serve the public, must have capacity to meet future increases in the needs of both present and future customers. Present customers benefit when the utility serving them has capacity to meet demands from new customers without overloading existing facilities and degrading the service to existing customers.

The association of margin reserve with only new customers connecting to the system appears to be a common misconception probably due to the margin reserve calculation being based on increased consumption expressed as "Equivalent Residential Connections (ERC's")."

Imputation of future anticipated CIAC collections against margin reserve plant investments as done in a number of previous cases, improperly insulates present customers completely from any responsibility whatsoever for return on investor capital which finances that plant. This treatment is vividly inconsistent with the Commission's treatment of electric, gas or telephone companies whose plant has the capacity to serve future increases in sales.

Q. **HOW IS THE IMPUTATION OF ANTICIPATED FUTURE CIAC COLLECTIONS FOR WATER AND WASTEWATER UTILITIES**

INCONSISTENT WITH THE TREATMENT OF OTHER UTILITIES BY THE COMMISSION?

A. As my testimony has previously shown, whether capital recovery is provided through CIAC collections or depreciation provisions, it occurs over a period of time measured in years. In no case of which I am aware has this (or any other) commission imputed additional accumulated depreciation to electric, gas or telephone utilities because actual plant investments in service had the capacity to -- and likely would in the future -- serve more customers or increased sales to existing customers.

Q. **IF THE COMMISSION AGREES THAT CIAC COLLECTIONS SHOULD NOT BE IMPUTED ON MARGIN RESERVE PLANT, DOES THIS SHIFT THE CAPITAL RECOVERY BURDEN TO PRESENT CUSTOMERS?**

A. No. Present customers would have responsibility <u>only for return on capital</u> which finances the margin reserve plant <u>until that capital is recovered</u>. This is perfectly appropriate since having that capacity available provides benefits to current customers and investors are entitled to a return currently.

Q. **WHY ARE INVESTORS ENTITLED TO A RETURN ON MARGIN**

RESERVE PLANT CURRENTLY?

A. Aside from the obvious -- that the plant is "in-service" and does benefit current customers -- is the fact that the risk of capital recovery through CIAC charges remains on investors. History shows that not all potential new customers materialize and pay CIAC charges.

This risk is heightened by the fact that the needed return on invested capital for a period, if not then recovered, cannot be recaptured in the future. Fairness dictates that prudent investments made to meet public service obligations have a reasonable opportunity to earn a fair return. This opportunity would be provided by including margin reserve plant investments in rate base without imputation of anticipated future CIAC collections.

Q. ARE THERE ANY OTHER INAPPROPRIATE ASSUMPTIONS MADE IN APPLYING THE ADJUSTMENT TO REDUCE RATE BASE FOR THE IMPUTATION OF CIAC ANTICIPATED TO BE COLLECTED AFTER THE END OF THE TEST PERIOD?

A. Yes. The way this adjustment has been applied in other cases carries an implicit assumption that the CIAC funds collected have not been, or will not be, reinvested in the utility operations.

Q. PLEASE EXPLAIN.

A. Based on data from prior cases, it appears that the CIAC imputation adjustment was based upon the service availability charges times the number of ERC's implicit in the margin reserve plant investment. These amounts -- up to the limit of the net margin reserve plant -- increased accumulated actual CIAC collections offset against the plant component of rate base. No accounting for the use of the funds which the assumed CIAC collection would provide was reflected in the CIAC imputation adjustment. The failure to account for the use of the assumed CIAC collections implies that the funds were not, or will not be, reinvested in the utility operations.

Q. **WHY IS THIS AN INAPPROPRIATE ASSUMPTION?**

A. In the case of utilities with which I am familiar, CIAC funds collected have been included with other corporate funds and used to pay for operating expenses, plant construction costs, or for other normal uses in carrying on the utility business. Since the Commission employs the balance sheet method to construct other components of rate base, fairness and consistency suggest that if a CIAC imputation is made, it should account for the <u>entire transaction</u> in a manner which correctly reflects the actual practices of the utility.

Q. **DOESN'T THE INCLUSION OF THE ALLOWANCE FOR FUNDS PRUDENTLY INVESTED ("AFPI") IN COLLECTIONS FROM FUTURE CUSTOMERS PROVIDE A RETURN ON UNRECOVERED INVESTOR-SUPPLIED CAPITAL FINANCING MARGIN RESERVE PLANT?**

A. No, as Commission orders state, the AFPI charge is designed to allow investors to recover a fair rate of return on prudently constructed plant facilities excluded from rate base as "not being used and useful." Hence, AFPI charges -- when and if collected -- provide no return on margin reserve plant which is "used and useful."

Q. **IS IT PROPER TO IMPUTE ONE-HALF OF ANTICIPATED POST-TEST YEAR CIAC COLLECTIONS ON THE MARGIN RESERVE AS THE COMMISSION HAS DONE IN SSU'S RATE CASE (DOCKET NO. 950495-WS) AND IN PALM COAST UTILITY CORPORATION'S CASE (DOCKET NO. 951056-WS)?**

A. No, it is not. The assumption underlying a one-half imputation provision is the same as that for the imputation of all margin reserve period CIAC collections as of the end of the test year. For the reasons I have explained above, such an assumption is erroneous and deprives the utility an opportunity to earn a fair return on invested capital until that capital is recovered. That imputation is improper is even recognized by the Commission staff as evidenced by Mr. Marshall Willis' comments on the issue at the Special Agenda on SSU's rate case. The averaging approach taken by the Commission in the referenced cases merely reduces the degree of improper capital deprivation and should be rejected in this proceeding.

Q. **PLEASE SUMMARIZE YOUR TESTIMONY.**

A. The inclusion of a utility's investment in margin reserve plant without imputation of anticipated future CIAC collections in rate base is necessary and appropriate to provide investors an opportunity to earn a return on their capital until it is recovered.

It is appropriate that investors receive the return on capital currently in view of the inherent risks not compensated for by AFPI charges.

It is also appropriate that current customers provide this return through rates since they receive benefits from the margin reserve plant.

Finally, inclusion of margin reserve plant without imputation of anticipated future CIAC collections is necessary so that a water and sewer utility's investors will be treated fairly in regard to capital recovery as are investors in electric, gas or telephone utilities.

Q. **WHAT IS YOUR RECOMMENDATION TO THE COMMISSION REGARDING ITS PROPOSED RULE?**

A. I recommend the Commission not adopt its proposed Rule 25-30.431(7) and adopt instead the Florida Waterworks Associations' proposed Rule 25-30.431(7), which does not authorize imputation of post-test year CIAC collections on margin reserve.

Q. **DOES THIS CONCLUDE YOUR TESTIMONY?**

A. Yes.

EXHIBIT (HAG-1)

PAGE 1 OF 1

SOUTHERN STATES UTILITIES
ILLUSTRATION OF CAPITAL RECOVERY

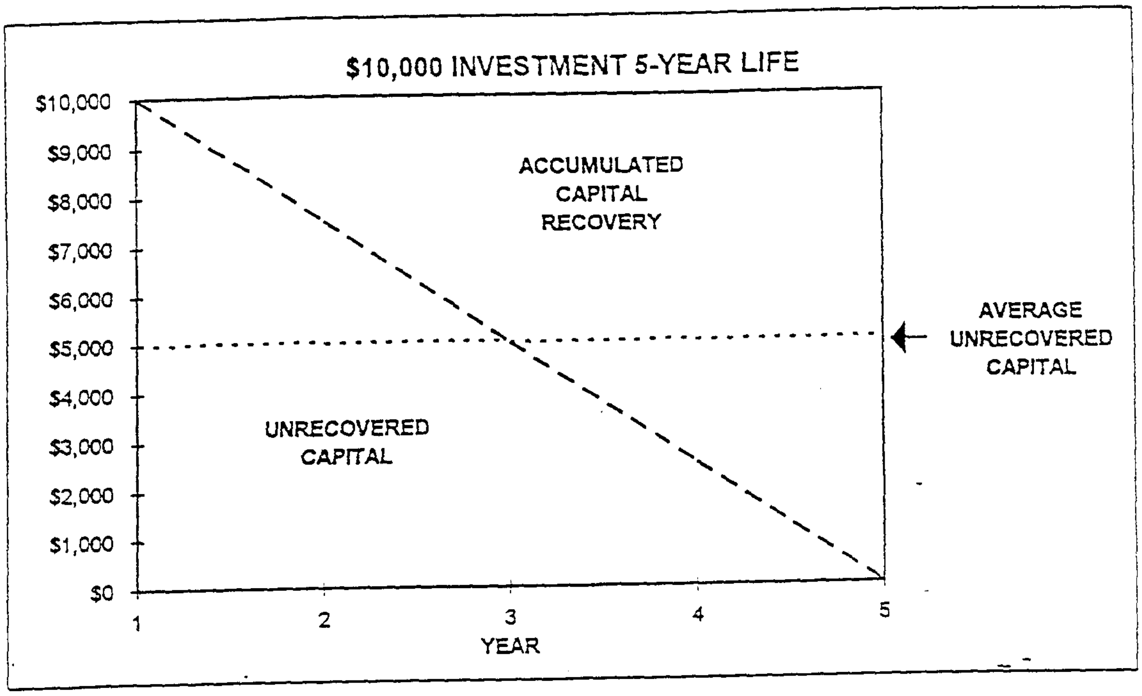

FIGURE A

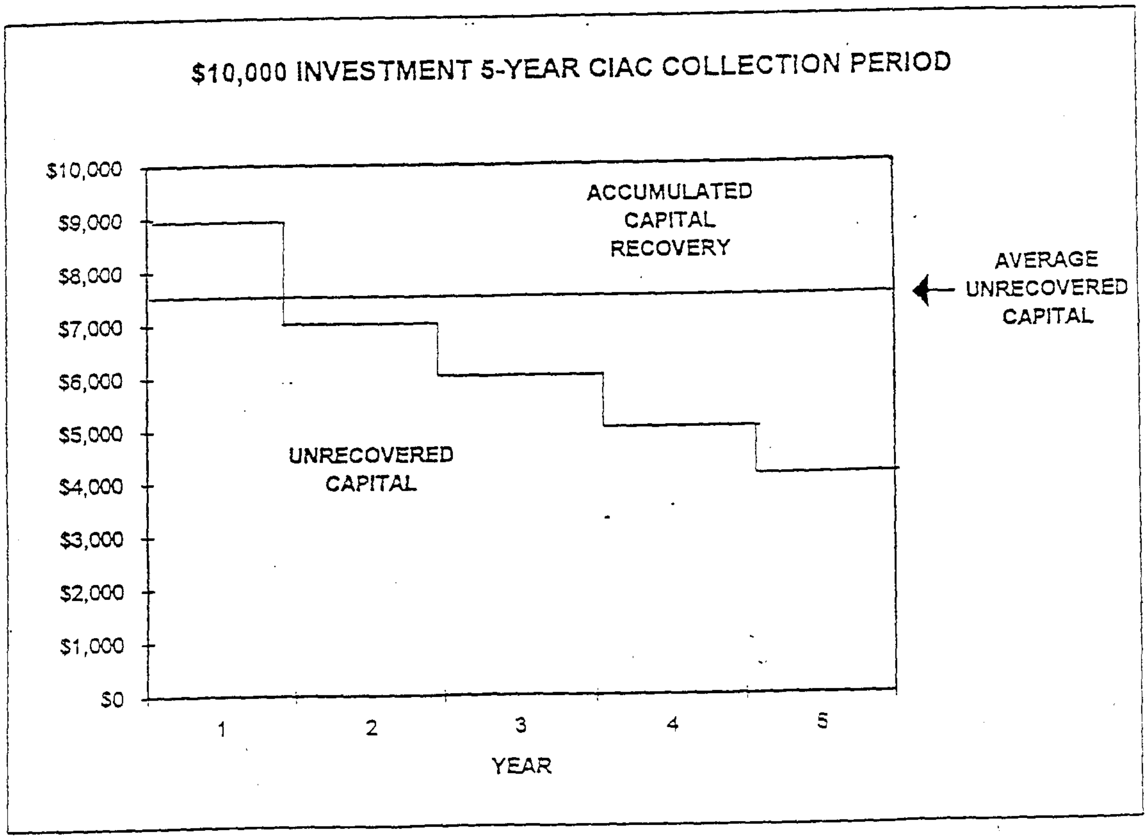

FIGURE B

SOUTHERN STATES UTILITIES, INC.
ILLUSTRATION OF RATEMAKING TREATMENT OF
MARGIN RESERVE AND CONTRIBUTIONS-IN-AID OF CONSTRUCTION

Line No.	DESCRIPTION	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
	BALANCE SHEET										
1	UTILITY PLANT	$ 100,000	$ 120,000	$ 140,000	$ 160,000	$ 180,000	$ 200,000	$ 220,000	$ 240,000	$ 260,000	$ 280,000
2	ACCUMULATED DEPRECIATION	(30,000)	(33,300)	(37,200)	(41,700)	(46,800)	(52,500)	(58,800)	(65,700)	(73,200)	(81,300)
3	CURRENT ASSETS	10,000	12,000	14,000	16,000	18,000	20,000	22,000	24,000	26,000	28,000
4	CONTRIBUTIONS-IN-AID	(30,000)	(36,000)	(42,000)	(48,000)	(54,000)	(60,000)	(66,000)	(72,000)	(78,000)	(84,000)
5	ACCUMULATED AMORTIZATION	10,000	10,990	12,160	13,510	15,040	16,750	18,640	20,710	22,960	25,390
6		$ 60,000	$ 73,690	$ 86,960	$ 99,810	$ 112,240	$ 124,250	$ 135,840	$ 147,010	$ 157,760	$ 168,090
7	CURRENT LIABILITIES	$ 4,000	$ 4,800	$ 5,600	$ 6,400	$ 7,200	$ 8,000	$ 8,800	$ 9,600	$ 10,400	$ 11,200
8	DEBT CAPITAL	28,000	34,445	40,680	46,705	52,520	58,125	63,520	68,705	73,680	78,445
9	EQUITY CAPITAL	28,000	34,445	40,680	46,705	52,520	58,125	63,520	68,705	73,680	78,445
10		$ 60,000	$ 73,690	$ 86,960	$ 99,810	$ 112,240	$ 124,250	$ 135,840	$ 147,010	$ 157,760	$ 168,090
11	AVERAGE CAPITAL		62,445	75,125	87,385	99,225	110,645	121,645	132,235	142,385	152,125
	AVERAGE RATE BASE										
12	UTILITY PLANT		$ 110,000	$ 130,000	$ 150,000	$ 170,000	$ 190,000	$ 210,000	$ 230,000	$ 250,000	$ 270,000
13	ACCUMULATED DEPRECIATION		(31,650)	(35,250)	(39,450)	(44,250)	(49,650)	(55,650)	(62,250)	(69,450)	(77,250)
14	CONTRIBUTIONS-IN-AID		(33,000)	(39,000)	(45,000)	(51,000)	(57,000)	(63,000)	(69,000)	(75,000)	(81,000)
15	ACCUMULATED AMORTIZATION		10,495	11,575	12,835	14,275	15,895	17,695	19,675	21,835	24,175
16	IMPUTED CONTRIBUTIONS-IN-AID		(6,000)	(6,000)	(6,000)	(6,000)	(6,000)	(6,000)	(6,000)	(6,000)	(6,000)
17	WORKING CAPITAL		6,600	7,800	9,000	10,200	11,400	12,600	13,800	15,000	16,200
18			$ 56,445	$ 69,125	$ 81,385	$ 93,225	$ 104,645	$ 115,645	$ 126,225	$ 136,385	$ 146,125
19	RETURN REQUIRED		$ 6,245	$ 7,513	$ 8,739	$ 9,923	$ 11,065	$ 12,165	$ 13,224	$ 14,239	$ 15,213
20	RETURN PROVIDED		$ 5,645	$ 6,913	$ 8,139	$ 9,323	$ 10,465	$ 11,565	$ 12,623	$ 13,639	$ 14,613

EXHIBIT (HAG-2)
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Appeals

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FLORIDA PUBLIC SERVICE COMM.
DIVISION OF APPEALS

TESTIMONY OF RICHARD M. HARVEY, P.E.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

ON BEHALF OF

SOUTHERN STATES UTILITIES, INC.

DOCKET NO. 960258-WS

DOCUMENT NUMBER-DATE
11196 OCT 18 96
FPSC-RECORDS/REPORTING

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Richard M. Harvey. My business address is Kimley-Horn and Associates, Inc., 2700 Blair Stone Road, Suite D, Tallahassee, FL 32301.

Q. COULD YOU BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND AND YOUR PROFESSIONAL QUALIFICATIONS?

A. I have a Bachelor of Science degree in Zoology from the University of Florida, a Bachelor of Science degree in Civil Engineering from Florida State University, and a Master of Science degree in Environmental Engineering from the University of Florida. I am a registered Professional Engineer in the State of Florida, and I am currently a member of the American Water Works Association. Throughout my career I have been a member of a number of professional organizations which focus on water and wastewater utility issues, including the Water Pollution Control Federation (now known as the Water Environment Federation) and the North American Lake Management Society.

Q. PLEASE DESCRIBE YOUR EMPLOYMENT EXPERIENCE RELATING TO WATER AND WASTEWATER UTILITY SERVICE.

A. From 1972 until 1976, I worked for the Florida Department of Pollution Control. The Florida Department of Pollution Control became the Florida

Department of Environmental Regulation by act of the Legislature in 1975. My primary job responsibilities during that period included the administration of a program charged with developing river basin water quality management plans for all thirteen basins in Florida and providing technical support to the municipal wastewater facilities planning/construction grants program for the state. These two programs were designed not just to fund wastewater facility construction, but to identify the treatment levels the facilities had to meet to protect water quality and the most cost-effective ways to achieve those treatment levels as well.

From 1976 to 1985, I worked for the United States Environmental Protection Agency ("EPA") Region IV office in Atlanta, Georgia. While employed by EPA, one of the jobs I held was Chief of the Alabama/Georgia 201 Facilities Planning Section. That Section was responsible for coordinating the development of "Facilities Plans" for municipal wastewater utilities in Alabama and Georgia. The Facilities Plans were planning documents which evaluated and recommended cost-effective collection, treatment, and disposal options for the municipal wastewater facilities.

From 1988 to 1991, I served as Deputy Director of the Water Facilities Division of the Florida Department of Environmental Regulation ("DER"). The Water Facilities Division was and still is, responsible for a number of important water resources and water facility programs, including the domestic wastewater program, the drinking water program, the National Pollutant Discharge Elimination System ("NPDES") program, the state revolving loan fund program, and the Underground Injection Control ("UIC") program. Essentially, the Water Facilities Division is responsible for administering all state and delegated federal regulatory programs for over 11,000 domestic wastewater and drinking water treatment facilities in Florida -- the vast majority of which are privately owned and operated. From 1991 until the end of 1995, I served as Director of the Water Facilities Division at DER, which became the Department of Environmental Protection ("DEP") in 1994.

From December 1995 until the present, I have been employed by Kimley-Horn and Associates, Inc. as Director of Water Resources. In that capacity, I provide consulting services on permitting related issues for both publicly and privately owned domestic wastewater and drinking water treatment facilities.

Q. **WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A. The purpose of my testimony is to comment upon Staff's proposed rules which would establish 18 month margin reserves for water and wastewater treatment plants and 12 month margin reserves for water and wastewater distribution and collection lines, respectively.

Q. **WHAT COMMENTS DO YOU HAVE CONCERNING THE STAFF PROPOSED RULE ON MARGIN RESERVE?**

A. In Docket No. 950495-WS, the recent Southern States rate proceeding, Commission Staff witness Shafer made a number of statements concerning the role of the Commission in relation to the role of environmental agencies, such as DEP and the water management districts. For example, Mr. Shafer stated that the Commission is obligated to provide utilities the opportunity to generate funds necessary to meet environmental standards and he alleged that the Commission always has recognized the importance of providing adequate financial coverage for utilities to meet those standards even though the Commission itself does not set those standards. Mr. Shafer also discussed the Commission's function in assisting environmental agencies to facilitate compliance with the requirements of those agencies. Mr. Shafer mentioned that cooperation between the Commission and the environmental agencies would reduce regulatory inefficiency and allow utilities to achieve environmental compliance. I agree with Mr. Shafer, cooperation between the Commission and the environmental agencies is highly desirable and the Commission should be obligated to provide utilities the funds necessary for environmental compliance -- the question is, has the Commission lived up to that obligation? After participating in the recent rate proceeding and witnessing the Commission's rulings, I am convinced that the Commission is neither encouraging investor-owned utility compliance with environmental/public health requirements nor promoting resource protection.

Q. **COULD YOU EXPLAIN WHY YOU FEEL THAT WAY?**

A. Yes. I agree that the Commission must formulate economic regulation practices and policies which encourage and advance environmental compliance, the protection of public health, environmental preservation, proper facility design and economies of scale. These goals are consistent with the goals of Florida's environmental regulators whose primary responsibility it is to protect the public health and the environment. The type of economic regulation practiced by the Commission as typified by the Southern States proceeding does little to promote these ends and is deleterious to the environment, the utility, the customers, and the citizens of the state at large. The used and useful conventions reflected in the proposed rule do not parallel design and regulatory requirements, and, therefore, operate as a direct financial **disincentive** for regulatory compliance and environmental protection. Such a disincentive endangers the public health and the environment. Furthermore, as a matter of principle, I think it is fundamentally unfair for one or more agencies of the state to require compliance with a certain level of service, and public health and environmental standards and for the Commission's enabling statute and its rules to require the same, but for the Commission to disallow the full costs of such compliance.

Staff witness Shafer mentioned the goal of resource protection and how the Commission could help to achieve that goal. It seems to me that the most conspicuous mechanism for the Commission to achieve the goal of resource protection is the used and useful mechanism. Used and useful dictates on what level of investment a utility under Commission regulation may earn. Therefore, it has a direct influence on a utility's action or inaction regarding compliance and a direct influence on what type and size of water and wastewater facilities a utility constructs. Neither the Commission nor the environmental agencies can expect a utility to achieve meaningful compliance with environmental requirements and protect the public health and preserve the environment if the utilities which the Commission regulates do not have a meaningful opportunity to recover the costs associated with compliance, protection, and preservation. The proposed rule would not provide such a meaningful opportunity.

It is my testimony that the Commission must in this case and in all cases, in Mr. Shafer's words, "provide the utility with the opportunity to generate the funds necessary to meet environmental, health, and safety standards," and "reduce confusion on the part of utilities and allow utilities flexibility in the way that they achieve compliance with each agency." However, in my observation, the Commission's used and useful actions have reflected a rates-driven resistance which is inconsistent with environmental and public health goals of the regulatory agencies and creates uncertainty and confusion as to what level of compliance investment the utilities will be able to recover in rates.

Q. **ON WHAT DO YOU BASE THIS OBSERVATION?**

A. In the Southern States proceeding, Staff recommended that a 36-month margin reserve be used for wastewater treatment plant based at least in part on the DEP's capacity analysis rule 62-600.405. When Staff's recommendation was brought up at the Commission's agenda conference, the following discussion resulted between PSC Staff member Crouch and Commissioner Kiesling:

> MR. CROUCH: In the case of 36 months, we would allow them enough growth, enough expansion to handle 36 months, three years of customer growth. ... We would convert that to gallons or to ERCs and figure that in the equation for used and

useful.

COMMISSIONER KIESLING: And I'm trying to figure out how I can conceptually understand what the impact on revenue requirement is of that extended margin reserve for wastewater treatment plant and effluent disposal.

MR. WILLIS: Commissioner, I understand what you are asking, and that is going to take us a while to calculate. we don't have it separately calculated back to the 18 months, and it's going to be a difference between the 18 and the 36.

COMMISSIONER KIESLING: So it's going to double as to wastewater?

MR. WILLIS: It's going to double as far as wastewater goes, as far as the margin would go.

COMMISSIONER KIESLING: Right.

MR. WILLIS: The problem we are having is there is so many used and usefuls dealing with wastewater plants that this would apply to it is going to take us a while to go back and calculate that difference, but we can do it; it's just going to take a while to do.

COMMISSIONER KIESLING: Can you give me a ball park? I mean is it going to raise the revenue requirement two percent, five percent, the total wastewater revenue requirement? I mean I just need some ball park.

MR. WILLIS: If you give me a second, I might be able to do that.

COMMISSIONER KIESLING: I mean because I understand -- Okay. I understand where DEP is on this. I also have a great concern about how much current customers ought to be paying to take care of future growth, and that's a big concern for me. So unless I can understand at least what the, conceptually what the impact is of this change --

I believe this portion of the transcript establishes that the rate impact is driving the Commission's used and useful determinations. I further believe that this reality creates a much higher likelihood that utilities regulated by the Commission in this fashion will operate at all times as close to maximum capacity as possible. This result is contrary to and inconsistent with the efforts by Florida's environmental regulators to ensure proper planning and reduce the risk of wastewater treatment plant overflows, insufficiently treated water and similar hazardous conditions.

There is equal cause for concern from Commissioner Deason's comments which would focus the margin reserve period on the "construction" period of time, as the Public Counsel advocated. First, I point out that limiting the margin reserve period to the time it takes to construct additional facilities ignores the real issue, which is, what should the capacity be of the plant to be constructed or already constructed. The time necessary to construct the facilities has nothing to do with the capacity -- and bears no relation to what should be the primary reasons for the existence of the margin reserve -- to protect the public health and the environment by ensuring adequate capacity is available. The 18 month margin reserve for wastewater treatment plant is inadequate for the purpose, particularly when considered together with the Commission's use of the annual average daily flow to such plants to calculate used and useful. No reputable engineer would ever design a plant with capacity to meet only the average annual daily flow. To be 100% used and useful the plant would have to maintain flows every day of the year at 100% of capacity. This is not only impossible, it also flies in the face of the attempts by environmental regulators to ensure that this situation does not occur because overflows would be inevitable. Third, Commissioner Deason referred to "construction lead times." Certainly, such lead times must include the time to design, permit, bid out, contract as well as construct the facilities.

Q. **DO YOU HAVE ANY EXPERIENCE CONCERNING THE USED AND USEFUL CONCEPT IN ADDITION TO THAT YOU GAINED BY PARTICIPATING IN THE SOUTHERN STATES PROCEEDING?**

A. Until a few years ago, I was personally not even familiar with the concept of used and useful despite my many years of experience in the water and wastewater industry. It was only when the Water Facilities Division began hearing complaints from some utilities about their inability to recover the costs associated with reuse projects identified in their legislatively mandated reuse feasibility studies that it was brought to my attention. It had always been my belief, and the belief of the other engineers at DER/DEP, that privately owned utilities, having little to no access to public funds, would and must prudently spend the money they had available to maintain and expand their facilities and, at the same time, take advantage of economies of scale wherever possible. After all, constructing and maintaining these water and wastewater facilities is a capital intensive proposition.

Upon hearing the utilities' complaints, I asked my staff to meet with the Commission staff so we could obtain a better understanding of the used and useful concept. We had several meetings, some of which I attended. Eventually, the Commission and DER came to agree to a Memorandum of Understanding, which I will refer to as the MOU, which set forth various cooperative efforts and responsibilities. I thought the MOU was a very positive step, even though in the process of negotiating the MOU there appeared to be a certain measure of resistance to the rates impacts of DER's goals of protecting the public health and the environment. With regard to DER's reuse concern, the MOU reinforced the law at the time. The MOU states,

> As noted in Section 403.064(6), F.S., and pursuant to Chapter 367, the PSC shall allow utilities which implement reuse projects to recover the full cost of such facilities through their rate structures.

For ease in reference and identification, a copy of the MOU is attached to my testimony as Exhibit ___ (RMH-1).

At about the same time as the MOU was being worked out, the Commission staff was working on proposed rules which addressed used and useful on a broad scale. These proposed rules were discussed at various meetings between Commission staff and DER employees under my supervision. When drafts of the used and useful rules were completed, the Commission staff sought DER's comments on the rules. Attached to my testimony as Exhibit _____ (RMH-2) are two letters from DER to the Commission staff commenting on the proposed rules as they existed at the time. The first letter, dated July 30, 1992, is from me to Mr. Charles Hill, and the second, dated July 14, 1993, is from one of my former Bureau Chiefs at DEP, Richard Drew, to Mr. John Williams. Both letters, emphasize, among other things, that the proposed rules should be written so all facilities necessary for reuse be considered 100% used and useful and so the Commission's used and useful policies parallel the requirements of Rule 17-600.405, Florida Administrative Code, which has since be renumbered as Rule 62-600.405. This rule addresses planning for wastewater facility expansions. Sometime after these letters were sent, the Commission decided to postpone consideration of the proposed used and useful rules.

After the MOU was signed, DEP included PSC staff members on the Reuse Coordinating Committee, consisting of representatives from DER/DEP, the five water management districts, and, now, Commission staff. When Commission staff contacted DER/DEP staff for input on the used and useful rules still being worked on, we provided input.

By a letter from Mr. Charles Hill dated May

15, 1995, to Ms. Elsa Potts and Mr. Van Hoofnagle, Section Administrators under my supervision as Division Director, the Commission staff transmitted to DEP for comment staff's latest draft of the proposed used and useful rules. A copy of the letter and the draft rules is attached as Exhibit _____ (RMH-3). I note from this Exhibit that the Commission staff did not change any of its previous drafts to adequately address the reuse question and it refused DEP's repeated recommendations concerning Rule 62-600.405. On June 29, 1995, I wrote a letter to Mr. John Williams of the Commission staff commenting on the draft rules. A copy of this letter is attached as Exhibit _____ (RMH-4). In the letter, I emphasized that the used and useful rules should and must separately identify reuse facilities and declare those facilities to be 100% used and useful. I also stressed that the margin reserve component for used and useful should be at least five years for both water and wastewater facilities, the latter being consistent with Rule 62-600.405. On July 12 and 13, 1995, the Commission staff held a public workshop to discuss the staff's May 10, 1995, draft used and useful rules. I directed persons under my supervision to participate in the workshop on behalf of DEP. Representatives from DEP, the water and wastewater industry, Commission staff, and Public Counsel were present. From the reports of my people and the transcript of the workshop, the Commission staff was, again, not receptive to the above two recommendations in my letter. On February 20, 1996, DEP Secretary Wetherall wrote Commission Chairman Clark emphasizing the need for cooperation between agencies on the used and useful rules. A copy of this letter is attached as Exhibit _____ (RMH-5).

I do not understand why, after three years and several law changes which solidify the issue, the used and useful status of reuse facilities can even be considered subject to debate. Further, during the time the used and useful rules were being discussed, the Commission has more than once rejected the assertion that Rule 62-600.405 mandates at least a five-year margin reserve for wastewater treatment plants, contrary to DEP's recommendations.

In consideration of the above, and in consideration of the comments I read in the transcript from a Commission agenda conference at which a reuse project plan for Aloha Utilities was considered, I think a rates-driven resistance to environmental and public health protection and environmental preservation is present.

Q. WHAT ARE THE DANGERS OF A RATES-DRIVEN RESISTANCE TO PROTECTING THE ENVIRONMENT AND PUBLIC HEALTH?

A. Mr. Shafer seemed to acknowledge the dangers in the Southern States proceeding. If a utility does not have sufficient earnings to comply with regulatory requirements, the utility cannot comply. It is that simple. Depending on the utility's situation, the environmental and public health impacts of noncompliance may be devastating and not easily, if ever, reversed.

The Commission must understand that since regulatory compliance is an expensive proposition and is becoming even more expensive, facts disputed by nobody with knowledge of the industry, the risk to the public health and the environment can be measured by the financial viability of the utilities who bear the ultimate responsibility for protecting the environment and public health. A utility "on the edge" financially is a utility "on the edge" as far as the environment and public health are concerned. Focusing again on used and useful, I will make my point this way. If the Commission's used and useful practices do not provide an incentive for utilities to promote environmental compliance and preservation and protect the public health, the utilities cannot function in a way which achieves those goals.

Let me offer some examples of the dangers I have referred to. First is the example of the Miami-Dade wastewater collection, treatment, and disposal system. Exhibit ________ (RMH-6) is an article from the Engineering News Record describing the circumstances of the case. Since the situation arose while I was at DEP, I am personally familiar with the pertinent facts. For many years, the Miami-Dade sewer rates failed to generate adequate revenues to properly operate and maintain the sewer system. As a result, and not unexpectedly, major problems developed in the wastewater system. Eventually, thousands of sewer overflows and numerous pipe and pump station failures occurred which resulted in, among other things, street intersections being periodically flooded with thousands of gallons of raw sewage and raw sewage spilling into the Miami River and other bodies of water. In order to correct the problems, Miami-

Dade is spending over $1.1 billion to rehabilitate its facilities, the largest wastewater collection and treatment system in the Southeast. To generate the revenues needed to fund the rehabilitation, monthly water and sewer bills have more than doubled, with no end in sight. The point of this example is that the financial disaster, the environmental disaster, and the public health hazard could have been avoided in the first place had Miami-Dade not insisted on keeping rates as low as the public wanted the rates and instead charged rates sufficient to operate and maintain the system in an environmentally sound manner.

The contamination of the Apalachicola Bay also illustrates the impact of ignoring environmental and public health concerns in rate setting. The City of Apalachicola is located at the mouth of the Apalachicola River, which flows into Apalachicola Bay. The Apalachicola Bay is a Class II water body and was one of Florida's last remaining water bodies approved for shellfish harvesting. The City's wastewater utility rates did not generate revenues sufficient for the City to adequately operate and maintain its existing wastewater collection, treatment, and disposal system or to design, construct, and install additional facilities. The latter aspect was of particular concern because had the City's rates generated adequate revenue, the City may have provided central wastewater service to areas served by malfunctioning septic tanks. Over time the City's facilities deteriorated and continued to malfunction. Downstream water quality problems became significant. Shellfish harvesting was halted. To help correct the environmental and public health problems in and around the Bay, the State of Florida, through Legislatively approved grants and, more recently, a loan exceeding $4 million, will financially assist the City with its wastewater problems so the water quality issues can be avoided in the future. Again, all of this may have been avoided if proper consideration been given to the environment and the public health in rate-setting.

Q. **WHY ARE THESE MATTERS IMPORTANT TO THIS RULEMAKING?**

A. DEP's recommendations on the used and useful considerations of the Commission are stated in the letters I referred to and the MOU. DEP's recommendations were offered, not in support of the utility industry, not in support of utility customers, but in support of environmental preservation, protecting the public health, and consistency with the statutes, rules, regulations, and permits which DEP enforces. The margin reserve used and useful rule proposals offered by the Staff are contrary to those DEP recommendations and, therefore, will put investor owned utilities at risk of regulatory noncompliance and potentially put the environment and public health at risk.

Q. **SOME WOULD SAY THAT THE DEP AND ITS RULES ARE MADE WITHOUT CONSIDERATION OF THEIR IMPACT ON RATES. DO YOU AGREE?**

A. No. Contrary to the impression some people unfortunately have, DEP is not an extremist, fringe environmental advocacy group. DEP is an agency of the State of Florida, charged by the Florida Legislature with enforcing statutes of the Legislature's creation and rules which the Legislature has authorized DEP to implement. Contrary to another impression some people unfortunately have, DEP does in fact consider the financial impacts of its regulations. Like every state agency, DEP is required by law to study those impacts before it passes a rule. There is little point to the Legislature and DEP making public interest determinations regarding issues of public health and environmental impact if the Commission takes counteractive measures such as those advocated by the intervenors. I believe the most significant disparity between the DEP and water management districts environmental and public health policies and the Commission's economic policies is that the Commission is focused on short term rate minimization. As I explained earlier, this focus on keeping rates as low as possible creates significant risks to the public health and the environment as demonstrated in the Miami and Apalachicola examples.

Q. **WHAT DO YOU BELIEVE WOULD BE THE RAMIFICATIONS OF ADOPTION OF STAFF'S PROPOSED RULES FOR MARGIN RESERVE AND CIAC IMPUTATION?**

A. I believe the results would be the sort of perpetual capacity crises mentioned in the DEP letters and referred to by Mr. Hartman, who also is commenting in this proceeding. With the capacity crises comes: 1) compliance problems, 2) service problems, 3) increased risk of environmentally harmful conditions, 4) increased risk to the public health and 5) higher costs to customers in the long run. The Commission would place utilities in the position of having to constantly catch up to capacity and reliability requirements because the utilities have no economic incentive to plan ahead. This will almost inevitably lead to service and compliance issues, such as insufficient water pressure, connection moratoria, lack of sufficient disposal facilities, improper discharge of wastewater, and insufficient wastewater treatment to name a few. Building plants in increments sized to meet short-term demand, and only as that demand becomes immediate, costs the utility and the customers more in the long run. The economies of scale referenced in the DEP letters and supported by the economies of scale evaluation Mr. Hartman sponsors in this proceeding are not encouraged under the proposed rules and, given the recent ratemaking treatment of utilities by the Commission concerning used and useful conventions, I do not believe it would be fair to suggest that utilities should be expected to run the risk of building for economies only to have short term rate minimization considerations cause such economies to be ignored in future rate proceedings.

Q. **CAN YOU ADDRESS HOW DEP RULES ADDRESS THE PURPOSE AND NEED OF A MARGIN RESERVE?**

A. Yes. While the term "margin reserve" is not specifically used in the DEP rules, the concept is most conspicuously embodied in Rule 62-600.405, which is entitled "Planning for Wastewater Facilities Expansion." A copy of this rule is attached as Exhibit _______ (RMH-7). This rule states,

> The permittee **shall** provide for the timely planning, design, and construction of wastewater facilities necessary to provide proper treatment and reuse or disposal of domestic wastewater.

The rule then goes on to establish a schedule of expansion activities when certain conditions exist, as I will discuss later. The purpose/goal of the rule is to insure that utilities have adequate facilities for the proper collection, treatment and reuse or disposal of wastewater flows and thereby avoid exposure to the environmental and health hazards of improper wastewater discharges which result when facilities are inadequate. Much was made in the Southern States proceeding by the appearance of the term "reserve capacity" in the rule as opposed to the term "margin reserve". DEP witness Sowerby, who authored the DEP correspondence, testified that he intended "reserve capacity" to be synonymous with margin reserve in the context of the DEP comments. I agree with Mr. Sowerby that that was DEP's intent, and my intent at the time I was in charge of the Water Facilities Department. I view attempts by anyone to capitalize on semantic differences at this time to be disingenuous. When this rule was being developed under my supervision in 1991, DEP and all those participating in the rule-making process recognized that to plan, permit, design, and construct wastewater treatment facilities routinely takes a significant period of time. Because of this, and in order to ensure the proper protection of the public health and the environment, a process was developed in the rule to make certain that utilities began the expansion process for treatment facilities when five years or less of reserve capacity was available. In recognition of how long it takes to go through the expansion process, DEP wanted to make certain that utilities started the process early enough so adequate treatment plant capacity would be available when that capacity was needed, again, with the goal of avoiding improper discharges attributable to capacity deficiencies.

What this means is that if a wastewater facility does not have at least five years of available capacity, the utility **must** have begun the expansion process.

I think it important to understand that expansion is the subject of the rule. The difficulty and impact of each step in the expansion process will vary from case to case, as DEP and the rule recognize. The construction step of the expansion process may be long or short, expensive or inexpensive, in relation to the other steps. For instance, the Town of Jupiter recently spent over $600,000 just to get a discharge permit for one of its facilities, and the Pace Water Board has spent the last three years trying to identify an acceptable disposal option for its excess (that which cannot be reused) reclaimed water. Nonetheless, the expansion requirements of the rule must be met within the times prescribed.

DEP's existing rules address drinking water facility sizing and planning in that those rules establish design standards and level of service requirements. The existing drinking water rules do not have a provision which parallels Rule 62-600.405. However, as mentioned in my June 29, 1995, letter, Exhibit ________ (RMH-4), DEP has recognized the need for a drinking water facilities rule similar to Rule 62-600.405 and has for more than a year been working on one. I note that Exhibit _____ (RMH-4) states that DEP recommends at least a five year margin reserve for water facilities. Many of the reasons justifying a five-year margin reserve for wastewater facilities apply to water facilities as well. The search for a suitable well site and obtaining a consumptive use permit, for example, can very often take a considerable period of time.

Q. **IN THE PAST, WITNESSES FOR PUBLIC COUNSEL HAVE SUGGESTED THAT THE FIVE YEAR TIME FRAME IN THE RULE IS MAINLY USED AS THE INTERVAL FOR SUBMITTING A CAPACITY ANALYSIS REPORT ("CAR") AND THAT THE COMMISSION SHOULD NOT TRANSLATE THAT FIVE YEAR TIME FRAME AS THE ACTUAL TIME REQUIRED FOR NEW PLANT EXPANSIONS. DO YOU AGREE?**

A. No. Such an interpretation is flatly incorrect. The rule prescribes actions that are to be taken to insure that facility expansions are completed in a timely manner. The rule mandates actions the permittee must take depending on how much time the CAR indicates is remaining before the facility capacity is exceeded. If the CAR indicates less than five years of capacity are left, the permittee must take appropriate actions to expand the facility. Specifically, if less than five years of capacity remain, the CAR has to include a statement, signed and sealed by a professional engineer that planning and preliminary design of the necessary expansion have been initiated. If less than four years of capacity remain, the CAR must include a signed and sealed statement that plans and specifications for the necessary expansion have been prepared. If less than three years remain, a complete construction permit application must be submitted. And if less than six months remain, an application for an operating permit for the newly expanded facility must be submitted. So clearly, once a CAR identifies that less than five years of capacity remain, the rule prescribes a process to follow to insure the facility expansion is completed in a timely manner (always less than five years).

Witnesses for Public Counsel have interpreted the rule in such a way as to suggest that utilities are discouraged from plant expansion until the last possible moment. That is precisely the situation the rule was designed to avoid. If the Commission accepts the proposed rule or any margin reserve period for wastewater treatment facilities less than five years, the Commission will defeat the purpose of the rule and disregard the cost-effective resolution to the environmental and public health issues.

Q. **WHY IS THAT?**

A. For all of the reasons DEP representatives have already explained to the Commission staff in person and in writing and as I and Mr. Hartman have already informed the Commission.

Exhibit _______ (RMH-4) provided comment on staff's proposed three year margin reserve for wastewater plant on the premise that the margin reserve should only reflect a period for construction time. As Mr. Hill acknowledged in his letter included in Exhibit _______ (RMH-3), this premise was motivated by the Commission staff's concern with rate levels. On page 6 of Exhibit _____ (RMH-4), DEP refuses the Commission staff's proposal of a three year margin reserve for wastewater treatment plants, as well as water treatment plants, as follows (bold type in original):

BY SPECIFYING THAT "USED AND USEFUL" INCLUDE NO MORE THAN A THREE-YEAR RESERVE CAPACITY FOR WATER AND WASTEWATER TREATMENT FACILITIES, THE PSC WILL BE ENCOURAGING UTILITIES TO BUILD THESE FACILITIES IN THREE-YEAR STAGES. AND BY ENCOURAGING UTILITIES TO BUILD WATER AND WASTEWATER TREATMENT FACILITIES IN THREE-YEAR STAGES, THE PSC WILL BE ENCOURAGING UTILITIES TO <u>IGNORE</u> ECONOMIES OF SCALE AND LONG-TERM ECONOMIC BENEFITS TO THEIR CUSTOMERS, WHICH IS EXACTLY THE OPPOSITE OF WHAT THE PSC WANTS TO ENCOURAGE. (THE PSC'S PROPOSED RULE 25-30.432(3) STATES, "UTILITIES ARE ENCOURAGED TO UNDERTAKE PLANNING THAT RECOGNIZES CONSERVATION, ENVIRONMENTAL PROTECTION, ECONOMIES OF SCALE, AND [THAT] WHICH IS ECONOMICALLY BENEFICIAL TO ITS CUSTOMERS OVER THE LONG TERM.")

FURTHERMORE, BY RECOGNIZING ONLY A THREE-YEAR RESERVE CAPACITY,

THE PSC WILL BE PUTTING UTILITIES IN AN AWKWARD POSITION. THE DEP'S EXISTING RULE 62-600.405 REQUIRES UTILITIES TO BEGIN PLANNING AND DESIGNING THE EXPANSION OF WASTEWATER TREATMENT FACILITIES WHEN THERE IS FIVE YEARS OR LESS OF RESERVE CAPACITY AT THE FACILITIES. (NOTE THAT WE INTEND TO IMPLEMENT A SIMILAR RULE FOR COMMUNITY DRINKING WATER TREATMENT FACILITIES.) YET, UTILITIES WILL HAVE TO CONSTRUCT WATER AND WASTEWATER TREATMENT FACILITIES IN NO MORE THAN THREE-YEAR STAGES IF THEY WANT TO RECOVER THE FULL COST OF THE FACILITIES. THUS, UTILITIES THAT WANT TO RECOVER THE FULL COST OF THEIR WATER AND WASTEWATER TREATMENT FACILITIES WILL HAVE TO BE CONTINUOUSLY PLANNING AND DESIGNING THE NEXT THREE-YEAR EXPANSION OF THESE FACILITIES <u>EVEN WHILE THEY ARE CONSTRUCTING THE PRESENT THREE-YEAR EXPANSION OF THESE FACILITIES</u>.

WE STRONGLY RECOMMEND THAT THE PSC ALLOW AT LEAST A FIVE-YEAR RESERVE CAPACITY FOR WATER AND WASTEWATER TREATMENT FACILITIES. ALTHOUGH A FIVE-YEAR RESERVE CAPACITY MAY STILL <u>NOT</u> FULLY ENCOURAGE USE OF ECONOMIES OF SCALE, IT WILL MAKE THE PSC'S "USED AND USEFUL" RULE SOMEWHAT CONSISTENT WITH THE DEP'S RULE 62-600.405. (UTILITIES THAT WANT TO RECOVER THE FULL COST OF THEIR WASTEWATER TREATMENT FACILITIES WILL HAVE TO BEGIN PLANNING AND DESIGNING THE NEXT FIVE-YEAR EXPANSION OF THESE FACILITIES ONLY AFTER THEY HAVE COMPLETED CONSTRUCTING THE PRESENT FIVE-YEAR EXPANSION OF THESE FACILITIES.) IF THE PSC TRULY WANTS TO ENCOURAGE UTILITIES TO TAKE ADVANTAGE OF ECONOMIES OF SCALE, THE PSC SHOULD CONSIDER ALLOWING AT LEAST A TEN-YEAR RESERVE CAPACITY FOR WATER AND WASTEWATER TREATMENT FACILITIES. GUIDELINES DEVELOPED

> UNDER THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S OLD CONSTRUCTION GRANTS PROGRAM FOR WASTEWATER TREATMENT FACILITIES RECOMMENDED CONSTRUCTING WASTEWATER TREATMENT FACILITIES IN NO LESS THAN TEN-YEAR STAGES.

This correspondence exemplifies all of the things I have talked about so far. DEP recommended a margin reserve consistent with the rules it implemented to protect the public health and the environment and consistent with DEP's expertise in water and wastewater facilities. As PSC staff member Shafer, Mr. Hartman, and Secretary Wetherall all agree, economic regulatory policies must be consistent with environmental goals so the environmental goals can be attained. Yet, now Staff proposes a rule which would reduce the margin reserve from the 36 months indicated in Staff's prior rule proposal, to only 18 months. We look forward to hearing from Staff's experts as to the engineering or other basis for their about face concerning the appropriate margin reserve. It appears certain that Staff's experts are retracting from their prior position solely in recognition of the Commission's rate-driven resistance to the 36 month margin reserve period which not only serves to defeat environmental and public health goals, but which is not in the least bit cost-effective. As illustrated by the Miami-Dade and Apalachicola examples, overdue capital investment can be extraordinarily costly, and as explained in detail by Mr. Hartman in his comments, a margin reserve of five years is needed for the utility to take even modest advantage of economies of scale.

Q. **DOES THAT CONCLUDE YOUR TESTIMONY?**

A. Yes, it does.

MEMORANDUM OF UNDERSTANDING

FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

AND

FLORIDA PUBLIC SERVICE COMMISSION

The Florida Department of Environmental Regulation (DER) and the Florida Public Service Commission (PSC) recognize that water conservation and reuse of reclaimed water are key elements of Florida's long-term water management strategy. It is our joint goal and high priority to ensure that Florida water and wastewater utilities provide safe and efficient treatment and use of water and wastewater. This memorandum of understanding (MOU) formally establishes the policies and procedures to be followed by the DER and PSC to promote and encourage water conservation and reuse, and safe and efficient water supply and wastewater management services.

BACKGROUND

Water Supply

The Federal Safe Drinking Water Act requires certain monitoring, testing, treatment, and reporting to ensure the quality of potable waters. The Florida Safe Drinking Water Act, contained in Chapter 403, Florida Statute (F.S.), outlines the basic requirements for Florida's water supply program. Chapters 17-550, 17-551, 17-555, and 17-560, Florida Administrative Code (F.A.C.), contain specific requirements governing water supply in Florida. The PSC's responsibilities for regulation of private water supply utilities are outlined in Chapter 367, F.S.

Wastewater Management

The Federal Clean Water Act requires effective treatment and management of wastewater in order to protect the nation's ground water and surface water resources. Florida's wastewater management and environmental control programs are contained in Chapter 403, F.S. Specific regulations governing domestic wastewater management are contained in Chapters 17-600, 17-601, 17-602, 17-604, 17-610, 17-611, 17-640, and 17-650, F.A.C. The PSC's responsibilities for regulation of private wastewater utilities are outlined in Chapter 367, F.S.

Reuse of Reclaimed Water

The encouragement and promotion of water conservation and reuse of reclaimed water are established as state objectives in Section 403.064(1), F.S.

The DER has developed and implemented a comprehensive reuse program designed to meet those objectives. This reuse program includes:

1. Comprehensive rules governing the reuse of reclaimed water (Chapter 17-610, F.A.C);

2. A mandatory reuse program;

3. An Antidegradation Policy;

4. The Indian River Lagoon System and Basin Act; and

5. Requirements for evaluation of reuse feasibility.

Section 403.064, F.S., requires that after January 1, 1992, all applicants for permits to construct or operate a domestic wastewater treatment facility in a critical water supply problem area evaluate the cost and benefits of reusing reclaimed water as part of their application for the permit.

The Antidegradation Policy is contained in Chapter 17-4, F.A.C., "Permits," and Chapter 17-302, F.A.C., "Surface Water Quality Standards." These rules require an applicant for a new or expanded discharge to surface waters to demonstrate that the discharge is clearly in the public interest. As part of this public interest test, the applicant must evaluate the feasibility of reuse of reclaimed water. If reuse is economically and technologically reasonable, it will be preferred over the surface water discharge.

The Indian River Lagoon System and Basin Act, which is contained in Chapter 90-262, Laws of Florida, provides increased protection to the Indian River Lagoon System. Section 3 of the Act requires the owner of an existing sewage treatment facility within the Indian River Lagoon Basin to investigate the feasibility of using reclaimed water for beneficial purposes. These reuse feasibility studies were to be completed before July 1, 1992.

OBJECTIVES

The common objectives, as they relate to domestic water supply and wastewater management facilities subject to regulation by the DER and the PSC, are as follows:

1. To monitor water supply systems to ensure that safe and reliable water is produced and delivered in accordance with applicable rules and drinking water standards;

2. To monitor domestic wastewater systems to ensure the safe and efficient collection, treatment, and reuse or disposal of wastewater and residuals;

3. To encourage and promote water conservation and reuse of reclaimed water;

4. To foster conservation and to reduce the withdrawal of ground and surface water through employment of conservation-promoting rate structures, reuse of reclaimed water, and consumer education programs.

PSC RESPONSIBILITIES

The following presents the general description of the roles and responsibilities of the PSC related to water supply, water conservation, wastewater management, and reuse of reclaimed water. The PSC's jurisdiction is limited to economic regulation of investor-owned utilities and is effective in only some of the counties in Florida. The PSC will offer assistance to the extent provided by law and agency priority and workload. The PSC agrees to adopt and implement policies and procedures necessary to administer these duties.

Water Supply

1. When appropriate, arrange for joint public meetings with customers to ensure that customers are aware of the need for water supply system improvement projects, and the potential impacts the projects will have on service rates.

2. Inform the DER of the PSC public meetings with customers and hearings in which water supply projects will be discussed.

3. Review proposed rate structures for private utilities within PSC jurisdiction.

4. Provide assistance in review of water conservation rate structures within PSC jurisdiction.

5. Monitor abandonment and bankruptcy proceedings for private water utilities within PSC jurisdiction. Inform the DER of pending abandonment and bankruptcy cases.

6. If an applicant for a DER permit challenges the interpretation of Section 367.031, F.S., the PSC agrees to provide legal and technical support to the DER in any related administrative hearings or legal proceedings.

Wastewater Management

1. When appropriate, arrange for joint public meetings with customers to ensure that customers are aware of the need for wastewater management system improvement projects, and the potential impacts the projects will have on service rates.

2. Inform the DER of the PSC public meetings with customers and hearings in which wastewater management projects will be discussed.

3. Review proposed rate structures for private wastewater management utilities within PSC jurisdiction.

4. Monitor abandonment and bankruptcy proceedings for private wastewater utilities within PSC jurisdiction. Inform the DER of pending abandonment and bankruptcy cases.

5. If an applicant for a DER permit challenges the interpretation of Section 367.031, F.S., the PSC agrees to provide legal and technical support to the DER in any related administrative hearings or legal proceedings.

6. The DER has adopted rules requiring utilities to perform timely planning, design, and construction of expanded facilities to ensure that sufficient wastewater treatment, disposal, and reuse capacity is available. In light of DER rules, the PSC agrees to evaluate capacity constraints imposed by statute and rules on private utilities within PSC jurisdiction, by PSC's application of the "used and useful" concept. If justified, this evaluation shall include assessment of possible need for statutory or rule revisions.

Reuse

1. When appropriate, arrange for joint public meetings with customers to ensure that customers are made aware of the need for reuse system improvement projects, and the potential impacts the projects will have on service rates.

2. Inform the DER of the PSC public meetings with customers and hearings in which reuse of reclaimed water will be discussed.

3. Provide feasibility analyses of the financial impacts, if any, of reuse system projects on both the customers and the wastewater utilities within PSC jurisdiction.

4. Within 10 days of receipt of a reuse feasibility study, the PSC staff shall review the document for completeness of the financial aspects and shall notify the DER whether or not the document is complete and whether or not the PSC will be able to conduct a complete review. If the PSC staff determines that it will be able to review the document, the PSC staff shall provide comments and recommendations to the DER within 30 days of receipt of the complete document.

5. Participate in appropriate DER hearings in which the feasibility of reuse will be discussed.

6. Review proposed rate structures for reuse projects for private utilities within PSC jurisdiction. As noted in Section 403.064(6), F.S., and pursuant to Chapter 367, F.S., the PSC shall allow utilities which implement reuse projects to recover the full cost of such facilities through their rate structures.

7. Assist the water management districts in review of reuse feasibility studies associated with the mandatory reuse program in Chapter 17-40, F.A.C., and other reuse-related activities of the water management districts in the counties within PSC jurisdiction. A separate MOU between the water management districts and the PSC governs these activities.

DER RESPONSIBILITIES

The following is a general description of the roles and responsibilities of the DER related to potable water supply, water conservation, wastewater management, and reuse of reclaimed water. The DER agrees to adopt and implement policies and procedures necessary to administer these duties.

<u>Water Supply</u>

1. Review applications for construction of potable water supply systems.

2. Monitor compliance of potable water supply systems with applicable rules and drinking water standards.

3. Notify the PSC of impending abandonment or bankruptcy cases involving water utilities and assist the PSC in such cases, as needed.

4. For utilities subject to Chapter 367, F.S., the DER shall verify the existence of a certificate of authorization or order indicating exempt status from the PSC before issuance of a construction permit for a new water system.

<u>Wastewater Management</u>

1. Review applications for construction and operation of domestic wastewater facilities.

2. Monitor compliance of domestic wastewater management facilities with applicable rules and effluent discharge limitations.

3. Monitor water quality in the State's ground waters and surface waters.

4. Notify the PSC of impending abandonment or bankruptcy cases involving wastewater utilities and assist the PSC in such cases, as needed.

5. For utilities subject to Chapter 367, F.S., the DER shall verify the existence of a certificate of authorization or order indicating exempt status from the PSC before issuance of a construction permit for a new wastewater facility.

<u>Reuse</u>

1. Administer the State's reuse program.

2. Review reuse feasibility studies required by Section 403.064, F.S., the Antidegradation Policy, or the Indian River Lagoon System and Basin Act.

3. Within five working days after receipt of a reuse feasibility study required by Section 403:064, F.S., the Antidegradation Policy, or the Indian River Lagoon System and Basin Act, the DER shall provide a copy of the reuse feasibility study to the PSC. This applies only to feasibility studies produced by private utilities located within counties regulated by the PSC.

4. Final determinations on the adequacy of reuse feasibility studies will be made by the DER. Comments and recommendations made by the PSC on the financial aspects of these reuse feasibility studies will be considered by the DER.

5. Participate in appropriate PSC public meetings with customers and hearings in which reuse issues raised by the DER are to be discussed. This may include, but is not limited to, expert witness testimony.

PROJECT COORDINATION

Water Supply

1. The PSC will designate a Water Supply Project Manager.

2. The DER's Drinking Water Section Administrator will serve as the DER's Water Supply Project Manager.

3. Exchange of information between the DER and the PSC shall be through the designated Water Supply Project Managers. Copies of pertinent correspondence related to water supply and water conservation issues shall be sent to the appropriate agency's Water Supply Project Manager.

Wastewater Management

1. The PSC will designate a Wastewater Management Project Manager.

2. The DER's Domestic Wastewater Section Administrator will serve as the DER's Wastewater Management Project Manager.

3. Exchange of information between the DER and the PSC shall be through the designated Wastewater Management Project Managers. Copies of pertinent correspondence related to wastewater management issues shall be sent to the appropriate agency's Wastewater Management Project Manager.

Reuse

1. The PSC will designate a Reuse Project Manager. All reuse feasibility studies provided to the PSC by the DER will be directed to this Project Manager.

2. The DER's Reuse Coordinator will serve as the DER's Reuse Project Manager for purposes of this agreement.

3. Reuse feasibility studies to be submitted to the PSC will be submitted over the signature of the DER Reuse Coordinator or over the signature of one of the six Water Facilities Administrators located in the DER district offices.

4. The DER Reuse Coordinator shall be copied on any correspondence between the PSC's Project Manager and the DER's Water Facilities Administrators regarding reuse feasibility studies.

5. Whenever a potential conflict regarding a specific project is identified, each agency will examine the alternative solutions available and then meet to discuss the issues involved and attempt to reach an agreement before announcing a position. If an agreement cannot be reached after due deliberations, several positions may be advocated. Such disagreements, if any, will not obviate this MOU.

6. Exchange of information between the DER and the PSC shall be through the designated Reuse Project Managers. Copies of pertinent correspondence between an agency and other parties concerning a reuse project shall be sent to the Reuse Project Manager of each agency until project completion.

Overall Coordination

The designated Water Supply, Wastewater Management, and Reuse Project Managers from the DER and the PSC shall meet as necessary, but at least annually, with the Director of the Water and Wastewater Division of the PSC and the Director of the Division of Water Facilities of the DER. The meetings will address and review progress on the water supply, wastewater management, and reuse programs in Florida and attempt to resolve any issues which may be identified by the staffs.

AMENDMENTS

This MOU may be amended by mutual agreement of the DER and PSC. It shall remain in effect until it is dissolved by mutual agreement among the agencies or terminated by an agency after giving written notice 30 days in advance to the other agency.

EFFECTIVE DATE AND SIGNATURES

This MOU will become effective after being signed by both parties.

Thomas M. Beard, Chairman
Florida Public Service
Commission

Date

Carol M. Browner, Secretary
Department of Environmental
Regulation

Mar 20, 92
Date

EXHIBIT (RMH-2)

PAGE 1 OF 6

Florida Department of
Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

July 14, 1993

RECEIVED

JUL 16 1993

Florida Public Service Commission
Division of Water and Wastewater

Mr. John Williams, Chief
Bureau of Certification
Florida Public Service Commission
101 East Gaines Street
Tallahassee, Florida 32399-0850

Dear Mr. Williams:

Thank you for the opportunity to review the draft version of Rule 25-30.432, Florida Administrative Code (F.A.C.), "Used and Useful in Rate Case Proceedings." This version was hand-delivered on June 18 by Patti Daniel. We commented on a previous draft of this rule by letter dated July 30, 1992. It appears that many of our previous comments were not incorporated into this version. Our general and specific comments on the wastewater portions are enclosed.

If you have any questions about our comments, please contact Elsa Potts, P.E., Administrator, Domestic Wastewater Section, at the letterhead address or at 904/488-4524.

Sincerely,

Richard D. Drew, Chief
Bureau of Water Facilities
Planning and Regulation

RDD/ra/btm

Enclosure

cc: Patti Daniel

Rule 25-30.432, F.A.C.
Used and Useful in Rate Case Proceedings

General Comments

1. Section 403.064(6), Florida Statutes, states "Pursuant to Chapter 367, the Florida Public Service Commission shall allow entities which implement reuse projects to recover the full cost of such facilities through their rate structure." The intent of this statutory provision was that the full cost of capital investments be included in the cost recoverable through a rate structure. In essence, the entire cost of a reuse project should be considered used and useful. We recommend that Chapter 25-30, F.A.C., include this provision.

2. A significant wastewater management problem in Florida involves overloaded wastewater treatment facilities. Rule 17-600.405, F.A.C., (copy attached) is a pollution prevention measure designed to ensure that the permittees conduct the planning necessary to allow for timely expansion of the wastewater facilities. This rule contains requirements for capacity analysis reports. The capacity analysis report is a detailed assessment of flow projections as they relate to future needs for expansion of domestic wastewater facilities. Time frames are established in the rule for submittal of the initial capacity analysis report, as well as for updates of the report and for the planning design, and construction of expanded facilities. This rule became effective in 1991 and has been well received by the regulated public, as well as the utilities. We believe that Chapter 25-30, F.A.C., should allow utilities to recover investment for timely expansion of needed wastewater treatment facilities consistent with our rule requirements.

Specific Comments

1. Rule 25-30.432(3)(a), F.A.C. - Design and construction requirements for collection systems and transmission facilities are contained in Chapter 17-604, F.A.C. We suggest including this chapter as a reference.

2. Rule 25-30.432(4), F.A.C. - The statement "To encourage long-term planning and least cost system design, the Commission, at at minimum, shall consider as used and useful the level of investment that would have been required had the utility designed and constructed the system to serve only its existing customer base" is unclear. This statement doesn't seem to promote long-term planning. Suggest deletion of "To encourage long-term planning and least cost system design."

3. Rule 25-30.432(5)(a)4, F.A.C. - The margin reserve for treatment facilities is 12 percent of the permitted or actual ERC capacity, whichever is greater. The previous draft we reviewed contained a 20 percent margin reserve. We agree that there is a need to balance a utilities' incentive for making plant investment and planning for future needs with some type of mechanism to control imprudent investments in order to protect existing ratepayers. How was the 12 percent derived? Have other mechanisms to achieve this balance been explored?

4. Rules 25-30.432(5)(a)4 b and c, F.A.C. - It is suggested that definitions for "off-site" and "on-site" be included in the rule.

5. Rule 25-30.432(5)(a)4 e, F.A.C. - The relationship between "available capacity" and the used and useful default formulas is unclear. How were the 500 percent and five-year customer base derived?

6. Rules 25-30.432(5)(d)1 and 2, F.A.C. - The Environmental Protection Agency (EPA) used the following standard in the Construction Grants program to determine if a system would be subject to further I/I analysis: 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 ground water. 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. The PSC could consider this criteria as an alternative to the 500 gpd/inch/diameter/mile allowance for infiltration and 7 percent of treated flows allowance for inflow.

7. Rule 25-30.432(5)(d)1, F.A.C. - The rule states that a utility "has little control over inflow" and allows inflow of "7 percent of treated flows." There are numerous methods for correction of inflow sources, including manhole raising, manhole cover replacement, cross connection plugging, and drain disconnection. A utility should discover the locations of inflow, determine legitimacy and assign responsibility for cost-effective correction. How was the 7 percent of treated flows allowance for inflow derived?

8. Rule 25-30.432(5)(e), F.A.C. - It is suggested that analysis for "inflow" be added to this section. Cost effective correction of inflow should be encouraged.

9. Rule 25-30.432(6)(d) 3 and 4, F.A.C. - The basis of design of a WWTP can be stated in various ways including, annual average daily flow, maximum monthly average daily flow, or three-month average daily flow. It appears that only "Maximum Month Flow" is considered.

10. Rule 25-30.432(7)(h), F.A.C. - Firm reliable capacity is defined as the capacity of a treatment plant component in which "at least the largest unit is assumed to be out of service." Would a treatment plant with one aeration basin, without regard to design or permit capacity, be considered 100 percent used and useful because of no firm reliable capacity in the used and useful default formula? You could consider the use of the EPA technical bulletin entitled "Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability" referenced in Rule 17-600.300(4)(1), F.A.C., for reliability criteria.

EXHIBIT RMH-2

PAGE 4 OF 6

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

July 30, 1992

Carol M. Browner, Secretary

Mr. Charles H. Hill, Director
Division of Water and Wastewater
Florida Public Service Commission
101 East Gaines Street
Tallahassee, Florida 32399-0873

Dear Mr. Hill:

Thank you for the opportunity to review the draft version of Rule 25-30.432, Florida Administrative Code (F.A.C.), Used and Useful in rate case proceedings. Our specific comments are enclosed, but I would like to highlight two of our major concerns.

Section 403.064(6), Florida Statutes, states "Pursuant to Chapter 367, the Florida Public Service Commission shall allow entities which implement reuse projects to recover the full cost of such facilities through their rate structure." The intent of this statutory provision was that the full cost of capital investments be included in the costs recoverable through a rate structure. In essence, the entire cost of a reuse project should be considered used and useful. We recommend that Chapter 25-30, F.A.C., include this provision.

A significant wastewater management problem in Florida involves overloaded wastewater treatment facilities. Rule 17-600.405, F.A.C., (copy enclosed) is a pollution prevention measure designed to ensure that the permittees conduct the planning necessary to allow for timely expansion of the wastewater facilities. This rule contains requirements for capacity analysis reports. The capacity analysis report is a detailed assessment of flow projections as they relate to future needs for expansion of domestic wastewater facilities. Timeframes are established in the rule for submittal of the initial capacity analysis report as well as for updates of the report and for the planning design, and construction of expanded facilities. This rule became effective in 1991 and has been well received by the regulated public, as well as the utilities. We believe that Chapter 25-30, F.A.C., should allow utilities to recover investment for timely expansion of needed wastewater treatment facilities consistent with our rule requirements.

If you have any questions about our comments, please contact Robert Heilman, P.E., Chief, Bureau of Water Facilities Planning and Regulation, at the letterhead address or at 904/487-0563.

Sincerely,

Richard M. Harvey
Director
Division of Water Facilities

RMH/ra/btm

Enclosures

Rule 25-30.432, F.A.C.

Used and Useful in Rate Case Proceedings

Specific Comments

1. Rule 25-30.432(3)(a), F.A.C. - Design and construction requirements for collection systems and transmission facilities are contained in Chapter 17-604, F.A.C. We suggest including this chapter as a reference.

2. Rule 25-30.432(4), F.A.C. - The statement that to "encourage long-term planning and least cost system design, the Commission, at a minimum, shall consider as used and useful the level of investment that would have been required had the utility designed and constructed the system to serve only its existing customer base" is unclear. This statement doesn't seem to promote long-term planning.

3. Rule 25-30.432(5), F.A.C. - The definition of ERC demand, as that used for design/permitting <u>and</u> actual historical demand, is unclear. When would each apply?

4. Rule 25-30.432(5)(a)4, F.A.C. - Here margin reserve for treatment facilities is 20 percent of the permitted or actual ERC capacity, whichever is greater. We agree that there is a need to balance a utilities' incentive for making plant investments and planning for future needs with some type of mechanism to control imprudent investments in order to protect existing ratepayers. How was the 20 percent derived? Have other mechanisms to achieve this balance been explored?

5. Rule 25-30.432(5)(a)4 ii and iii, F.A.C. - It is suggested that definitions for "off-site" and "on-site" be included in the rule.

6. Rule 25-30.432(5)(d)1, F.A.C. - The rule states that a utility "has little control over inflow." There are numerous methods for correction of inflow sources including, manhole raising, manhole cover replacement, cross connection plugging, and drain disconnection. A utility should discover the locations of inflow, determine legitimacy and assign responsibility for cost-effective correction.

7. Rule 25-30.432(5)(d)2, F.A.C. - The EPA used the following standard in the Construction Grants program to determine if a system would be subject to further I/I analysis: 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. You may want to consider this as an alternative to the Water Pollution Control Federation Manual of Practice No. 9.

8. Rule 25-30.432(5)(e), F.A.C. - It is suggested to add "inflow" in the first sentence of this section. Cost effective correction of inflow should be encouraged.

9. Rule 25-30.432(5)(f)2 ii, F.A.C. - We suggest that Number "2" be defined as the same time period as that used for Number "1" (capacity of the plant) in order for the formula to be consistent. The basis of design of a WWTP can be stated in various ways including, annual average daily flow, maximum monthly average daily flow, or three-month average daily flow. Also, we suggest that excessive "inflow" in Number "4" be added.

EXHIBIT (RMH-3)

PAGE 1 OF 24

State of Florida

Commissioners:
SUSAN F. CLARK, CHAIRMAN
J. TERRY DEASON
JULIA L. JOHNSON
DIANE K. KIESLING
JOE GARCIA

DIVISION OF WATER & WASTEWATER
CHARLES HILL
DIRECTOR
(904) 488-8482

Public Service Commission

May 15, 1995

Ms. Elsa A. Potts
P.E. Administrator
Wastewater Section
Department of Environmental Protection
Twin Towers Office Building
Tallahassee, Florida

Mr. Van Hoofnagle
P.E. Administrator
Drinking Water Section
Department of Environmental Protection
Twin Towers Office Building
Tallahassee, Florida

VIA HAND DELIVERY

Re: Proposed Rulemaking, 25-30.432 F.A.C.

Dear Ms. Potts and Mr. Hoofnagle:

Enclosed is a revised version of the draft rules regarding used and useful adjustments in rate proceedings. Your input at the March meeting was very helpful, and you will note changes in the revised draft reflecting your comments. There are a few areas in which the staff engineers deviated from your suggestions, and these areas will be specifically addressed. It is staff's current goal to send this draft of the rules to all of the water and wastewater utilities under our jurisdiction as well as to the Office of Public Counsel, each Water Management District, and other parties who have expressed interest. Along with the draft will be a notice of workshop which would cover two days. As you suggested, we intend to cover water issues on one day and address wastewater issues on the next. It appears that the first two-day workshop will be held in July.

The items with which this rule draft differs from your recommendations are as follows. In asking for historical, reliable data, staff has kept the minimum of five years time frame, rather than change it to a longer time period. However, language has been added such that if the utility has a Capacity Analysis Report filed with DEP, a copy of such report should be part of its rate filing.

A question was raised at the March meeting as to the options for determining a utility's projected growth; staff has kept the linear regression language as this is a simple, straightforward approach and achieves the level of accuracy needed for this particular projection.

For the "construction factors" for each margin reserve category, the following has been done. Staff has maintained the 3 year construction factor for the wastewater treatment and disposal but changed the water construction factor to mirror the wastewater factor as DEP's envisioned rules would do. The construction factor for lines has been kept as 1 year. Staff is concerned with asking the current customers of a utility to subsidize future growth for longer than the 3 years DEP states is necessary to construct new plant.

Infiltration and inflow definitions have been moved to the appropriate place. With respect to determining excessive infiltration, staff has maintained the language for 500 gpd/inch diameter/mile of pipe in order to assess infiltration with respect to lines rather than on a per capita basis. With respect to inflow, staff intends to review a utility's inflow problems on a case-by-case basis. Your comments that a utility has more control over inflow was a consideration in making this change.

With respect to the actual formulas, staff has incorporated the suggested changes with one exception. The high service pumping formulas have not been separated into two formulas which would depend on the storage type and location. Your point is well taken with this respect; however, for simplicity, the original formula has been maintained.

The time frame for determining a utility's maximum day demand or the wastewater "customer demand" has been kept to 5 years rather than change it to the past 12 months. It has been our experience that peak days have occurred prior to the past 12 months, and this allows the utility the opportunity to use such data. We would not want a situation where a utility is experiencing lower and lower peak days (perhaps due to conservation) so that the peak day from the recent 12 months is less than what the utility experienced, say, three years ago. The utility could conceivably receive a lower used and useful percentage based on this criteria.

Lastly, this draft includes the charts we obtained from Mr. Sowerby regarding instantaneous demands. It shows a smaller instantaneous demand than what the Ameen "Source Book..." provided. This will likely be an issue at workshop.

In addition to those changes, staff has changed the wording from "average annual daily demand" to "maximum day demand" for the definitions on emergency storage and equalization volume.

Please review the revised draft and be prepared to bring your comments or concerns to the workshops. If you have questions regarding the rule revisions, please contact Karen Amaya at (904) 488-8482. Again, thank you for your help and suggestions.

Sincerely,

Charles H. Hill
Director

CHH:ka
Enclosure

cc: John Sowerby, Richard Addison, Richard Drew (DEP)

B. Lowe, J. Williams, J. Chase, R. Crouch, K. Amaya, J. Starling, S. Rieger, R. Von Fossen, N. Walker, L. Jaber, S. Edmonds (PSC)

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25-30.432 Used and Useful in Rate Case Proceedings.

(1) Definitions - the following definitions apply to Rule 25-30.432, F.A.C., for determining used and useful water and wastewater facilities.

(a) Economies of scale - The decrease in unit cost of water or wastewater plant that typically occurs with an increase in system capacity. Economies of scale can be defined either in the context of total system capacity or changes in a single component of the system.

(b) Effluent Disposal Facilities - this includes, but is not limited to, the transmission lines, percolation and evaporation ponds, sprayfields, irrigation systems, effluent pumping equipment, and deep wells utilized in the disposal of effluent or reclaimed water, as required to meet applicable federal, state and local requirements.

(c) Emergency Storage - that storage required by a water system to meet the emergency-like demands of the customers. Typically, Emergency Storage is made available when it is more cost effective to provide the storage and pumping facilities than to add redundancy to the system for emergency conditions. The quantity of Emergency Storage need is a function of the duration of the emergency condition and is assumed to be approximately one half of the maximum day demand.

(d) Equalization Volume - the quantity of storage in a water system necessary to meet the customers' greatest demands which are beyond the throughput capacity of the source of supply or water treatment

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equipment. The Equalization Volume is assumed to be approximately one-quarter of the maximum daily demand.

(e) Equivalent Residential Connection (ERC) - 350 gpd per ERC for water and 280 gpd per ERC for wastewater.

(f) Fire Flow Requirement - as defined in 25-30.432(5)(b), F.A.C.

(g) Firm Reliable Capacity - the capacity of a particular component of a water facility in which at least the largest unit is assumed to be out of service. If the used and useful category contains several components, the Firm Reliable Capacity is assumed to be the limiting component in that category with the largest unit out of service. If there is only one component, then that component's capacity becomes the Firm Reliable Capacity. For finished water storage, the Firm Reliable Capacity excludes any unusable or dead storage (10% of ground storage capacity).

(h) Infiltration - refers to those extraneous flows (usually from groundwater sources) that enter the wastewater system through openings in pipes that may be caused by normal deterioration, corrosion, or damage from ground movement or structural overload.

(i) Inflow - refers to extraneous flows from sources other than infiltration, such as surface water run-off into manholes or from unauthorized connections to surface water sources.

(j) Instantaneous Demand - the greatest demand that a water system attains. It is typically used only as a design criteria for small water

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systems with no storage and a small distribution system that does not have the ability to absorb these instantaneous demands through depressurization of the distributions system. The charts in Rule 25-30.432(7), F.A.C., shall be used to determine the instantaneous demand unless specific quantitative information indicates greater demands.

(k) Large Water System - a system that has a firm reliable capacity of 1 million gallons per day or greater. Staffing shall be as mandated in Rule 62-699, F.A.C.

(l) Margin Reserve - as defined in 25-30.432(5)(a), F.A.C.

(m) Maximum Day Demand - the maximum daily demand that a water system attained during the past 5 years of time, exclusive of emergency or fire flow events.

(n) Other Wastewater Facilities - this includes, but is not limited to, disinfection units, emergency generators, auxiliary engines, customer service laterals, laboratory equipment, utility office and other general plant and equipment used in the operation of a wastewater system. Specifically excluded from this definition are a wastewater system's pumping stations and collection mains (both gravity and force).

(o) Other Water Facilities - this includes, but is not limited to, hydropneumatic tanks, disinfection facilities, emergency generators, auxiliary engines, customer service lines and meters, laboratory equipment, utility office and other general plant used in the operation of a water system. Specifically excluded from this definition are a water

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system's transmission and distribution lines.

(p) Peak Hour Demand - the greatest demand attained by a water system over a sustained period of 60 minutes. Typical design criteria for a Peak Hour Demand of 2 times the maximum day demand or 1.1 gpm per ERC can be used if historical flow data is not available.

(q) Small Water System - a system that has a firm reliable capacity of less than 1 million gallons per day. Staffing shall be as mandated in Rule 62-699, F.A.C.

(r) Unaccounted for water - all water produced or purchased by a water utility that is neither sold, metered nor accounted for in the records of the utility. Water, other than that sold, that shall be accounted for includes, but is not limited to, water for plant operations, line flushing, hydrant testing, hydrant use, sewer cleaning, and street cleaning.

(s) Wastewater Customer Demand - the wastewater flows which match the utility's specified time frame in its Department of Environmental Protection (DEP) permit -- annual average daily flow, the three month average daily flow, or the maximum month average daily flow.

(t) Wastewater Permitted Capacity - the established design capacity of a wastewater facility in its DEP permit and the specified time frame (annual average daily flow, maximum monthly average daily flow, three-month average daily flow).

(u) Wastewater Treatment Equipment - this includes, but is not

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limited to, the influent structure, pretreatment facilities, pumps, aerators, clarification tanks, filters, digestors, and chlorine contact equipment.

(2) The utility's investment, prudently incurred, in meeting its statutory obligations to provide safe, efficient and sufficient service, shall be considered used and useful.

(3) Utilities are encouraged to undertake planning that recognizes conservation, environmental protection, economies of scale, and which is economically beneficial to its customers over the long term.

(4) In determining those portions of water and wastewater systems that are used and useful in serving the public, the Commission shall consider:

(a) the design and construction requirements set forth in Chapters 62-532, 62-555, 62-600, 62-601, 62-604, 62-620 and 62-640, F.A.C.

(b) the investment in land acquired or facilities constructed or to be constructed in the public interest within a reasonable time in the future;

(c) the prudence of the investment, taking into consideration such factors as the treatment process, water storage capacity, economies of scale, the historical and projected rate of growth in customers and demand, regulatory requirements, including those requiring plant redundancies, seasonal demand characteristics, residential and commercial mix, and the configuration of the service area.

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(5) For the purpose of calculating used and useful, the following specific factors shall apply. When applying these factors, references to demand shall mean the demand per connection (in ERCs) used for design or permitting, or the actual historical demand per connection if such data has been shown by the utility to be accurate and reliable.

(a) Margin Reserve

1. The Commission recognizes that for a utility to meet its statutory responsibility, it must have sufficient capacity and investment to meet the existing and changing demands of present customers and the demands of potential customers within a reasonable time. The investment needed to meet the demands of potential customers and the changing demands of existing customers is defined as margin reserve. Margin reserve is recognized as a component of used and useful rate base. The Commission shall include an allowance for margin reserve if requested by the utility.

2. In determining the allowable investment in margin reserve, the Commission shall consider, but not be limited to, the functions of each component of plant, regulatory lag, the rate of growth in customers and demand, and the time needed to construct plant (the "construction factor").

3. As a part of its rate filing, the utility shall submit historical, reliable data for a minimum of four years, if available, preceding the test year and including the test year for the year-end number of customers by class and meter size; the annual sales by class;

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the annual treated or pumped flows for the system; and system peak day flows for each year. The utility's most recent wastewater capacity analysis report, if any, filed with DEP shall also be submitted as part of the rate filing.

4. Unless otherwise justified, margin reserve shall be calculated by applying linear regression to the utility's five years historical growth data (in ERCs) so that a projected growth can be determined and then multiplying that growth by the appropriate construction factor.

a. Water source and treatment facilities and wastewater treatment and disposal facilities: the calculated growth (in ERCs) multiplied by the following construction factors:

(i) water source, treatment facilities, and each water system component have a construction factor of 3 years;

(ii) wastewater treatment and disposal facilities have a construction factor of 3 years;

b. Margin reserve for transmission and distribution lines and pumping stations and collection mains shall be the calculated growth multiplied by a construction factor of 1 year.

(b) Fire Flow

1. Fire flow shall be considered in used and useful default formulas for storage and high service pumping for any utility that requests that fire flow be a consideration in its system requirements. If the Commission determines that a utility can provide fire flow in a more

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economical manner than through storage and high service pumping, it may allow fire flow to be considered in used and useful calculations for components other than storage and high service pumping. However, any utility that receives an allowance for fire flow in used and useful calculations shall maintain the ability to provide adequate, reliable fire flow at all times in the future, unless it meets the requirements in 25-30.432(5)(b)2 for adding fire flow capacity. For a utility meeting the requirements in 25-30.432(5)(b)2 for adding fire flow capacity, once the ability to provide adequate, reliable fire flow has been achieved, such ability shall be maintained from that point on. If a utility has previously received fire flow consideration in used and useful calculations but fails to maintain adequate, reliable capacity for fire fighting (e.g. sells fire flow capacity), then the Commission may reduce the utility's rate of return by up to 50 basis points until adequate fire protection is once again maintained.

2. An allowance for fire flow shall be included in used and useful calculations up to the capacity of the appropriate component. If a utility cannot provide adequate, reliable fire flow and is requesting an allowance for fire flow in used and useful calculations, the Commission shall require the utility to take the steps necessary to provide such fire flow capacity. In doing so, the Commission shall set a reasonable timetable for compliance and may later reduce rates for that portion associated with allowed fire flow capacity if such requirements are not

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met within the specified timetable.

3. When fire flow requirements are set by a governmental authority, those requirements shall be the basis for determining the fire flow component of used and useful. In such cases, as part of its rate filing, the utility shall identify and file with the Commission a copy of the applicable governmental fire flow requirements. In all other cases, unless specific support is provided, the Commission shall consider a minimum fire flow demand to be 500 gallons per minute (gpm) for single family and 1,500 gpm for multiple family and commercial areas for a duration of 2 hours for needed fire flows up to 2500 gpm, and 3 hours for needed fire flows of 3000 and 3500 gpm. Such requirements shall be satisfied without causing deterioration of water pressure below 20 pounds per square inch (psi).

4. Inasmuch as Rule 25-30.432(5)(b) deviates from prior Commission practice whereby an allowance for fire flow capacity in composite used and useful plant calculations was considered, the impact on those utilities affected by a future reduction to used and useful percentages for source of supply and/or treatment plant due to such deviation from prior practice regarding fire flow allowance shall be considered on a case by case basis.

(c) Unaccounted for Water

1. To recognize conservation of water as a fundamental and proper concern of water system operation, water utilities are encouraged to

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exercise good operational and economic management toward preventing depletion and wasteful use of this important natural resource. Good modern water utility practice dictates that, wherever possible, all customer services and plant output and plant uses be metered and reasonable records be kept.

2. The Commission recognizes that some uses of water are readily measurable and others are not. Each utility is encouraged to establish procedures to measure or estimate the quantity of water used but not sold, by cause, and to maintain documentation for those measurements and estimates.

3. The Commission shall consider the amount of unaccounted for water in determining used and useful plant percentages and shall allow the American Water Works Association's (AWWA Manual M-8) design level of leakage (2-3 percent plus the standard 10 percent for a maximum of 12.5 percent) without further explanation. The Commission may impute revenues or reduce purchased power and chemical expenses where inadequate explanation is given for unaccounted for water in excess of this amount.

(d) Infiltration and Inflow

1. The impact of infiltration and inflow on wastewater treatment and collection systems shall be considered in determining both the appropriate level of operation and maintenance expenses and used and useful plant percentages.

2. The Commission recognizes as reasonable the Infiltration

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Specification Allowances set forth in Water Pollution Control Federation (WPCF) Manual of Practice No. 9. Absent sufficient justification to the contrary, excess infiltration is defined as flows in excess of 500 gallons per day (gpd) per inch diameter of pipe per mile (gpd/in. diam./mile) for all gravity lines, including service laterals. Excessive inflow will be determined on a case-by-case basis if warranted.

(e) Cost/benefit Analysis - The Commission may order a utility to perform a cost/benefit analysis to determine the amount of water losses or wastewater infiltration and inflow that may be economically eliminated. If the cost/benefit analysis is ordered by the Commission in the course of evaluating a rate application, the actual or estimated prudent cost of the analysis shall be recovered through the revenues authorized in that rate proceeding, and the cost shall be amortized over five years. If the analysis is ordered outside of a formal rate proceeding, the utility may request the cost be recovered through a limited proceeding pursuant to section 367.0822, F.S.

(f) Used and Useful Analysis

1. As a part of its rate filing, each utility shall provide a determination of the used and useful percentage for each primary plant account along with the supporting formulas and documentation.

2. In lieu of presenting evidence in support of used and useful percentages, the utility may elect to use the default formulas in Rule 25-30.432(6), F.A.C., for calculating used and useful percentages for water

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supply, treatment, pumping and storage equipment, and wastewater treatment and effluent disposal equipment. Documentation in support of requested used and useful percentages for a water utility's transmission and distribution lines and a wastewater utility's pumping stations and collection mains (both gravity and force) shall be presented by the utility.

(6) Used and useful default formulas. The appropriate units to be used are included with each default formula. Because of the unique nature of a water system's transmission and distribution lines and a wastewater system's pumping stations and collection mains (both gravity and force), the default formulas presented here do not address these items; however, as stated in Rule 25-30.432(5)(f)2. the utility shall present documentation in support of requested used and useful percentages for these items.

(a) Small water systems (less than 1 million gallons per day (MGD) firm reliable capacity).

1. Small water systems with adequate reliable finished water storage capacity to meet the local fire flow ordinances and to meet the peak hour demand of its customers shall use the following formulas:

a. Water source of supply:

(Maximum Day Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpd)

b. Water treatment equipment:

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(Maximum Day Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpd)

c. Finished water storage:

(Equalization Volume + Fire Flow Requirement + Emergency Storage + Margin Reserve)/Firm Reliable Capacity (gallons)

d. Water high service pumping:

(Instantaneous Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

or, if the utility chooses:

(Maximum Day Demand + Fire Flow Requirement + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

e. Other water facilities: 100 percent used and useful

2. Small water systems with no storage facilities other than hydropneumatic tanks or with insufficient storage capacity to meet the local fire flow ordinances and to meet the instantaneous demand of its customers shall use the following formulas:

a. Water source of supply:

(Instantaneous Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

or, if the utility can show it is the most economical way to provide fire flow:

(Maximum Day Demand + Fire Flow Requirement + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

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b. Water treatment equipment:

(Instantaneous Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

or, if the utility can show it is the most economical way to provide fire flow:

(Maximum Day Demand + Fire Flow Requirement + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

c. Finished water storage: 100 percent used and useful (gallons)

d. Water high service pumping:

(Instantaneous Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

or, if the utility chooses:

(Maximum Day Demand + Fire Flow Requirement + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

e. Other water facilities: 100 percent used and useful

(b) Large water systems (1 MGD or greater firm reliable capacity):

1. Large water systems with adequate reliable finished water storage capacity to meet the local fire flow ordinances and to meet the peak hour demand of its customers shall use the following formulas:

a. Water source of supply:

(Maximum Day Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpd)

b. Water Treatment Equipment:

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(Maximum Day Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpd)

c. Finished water storage:

(Equalization Volume + Fire Flow Requirement + Emergency Storage + Margin Reserve)/Firm Reliable Capacity (gallons)

d. Water high service pumping:

(Peak Hour Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

or, if the utility chooses:

Maximum Day Demand + Fire Flow Requirement + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

e. Other water facilities: 100 percent used and useful

2. Large water systems with no storage facilities other than hydropneumatic tanks or with insufficient storage capacity to meet the local fire flow ordinances and to meet the peak hour demand of its customers shall use the following formulas:

a. Water source of supply:

(Peak Hour Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

or, if the utility can show it is the most economical way to provide fire flow:

(Maximum Day Demand + Fire Flow Requirement + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

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b. Water treatment equipment:

(Peak Hour Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

or, if the utility can show it is the most economical way to provide fire flow:

(Maximum Day Demand + Fire Flow Requirement + Margin Reserve-Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

c. Finished water storage: 100 percent used and useful (gallons)

d. Water high service pumping:

(Peak Hour Demand + Margin Reserve - Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

or, if the utility chooses:

(Maximum Day Demand + Fire Flow Requirement + Margin Reserve-Excessive Unaccounted For Water)/Firm Reliable Capacity (gpm)

e. Other water facilities: 100 percent used and useful

(d) Wastewater systems:

1. Wastewater treatment equipment:

(Wastewater Customer Demand + Margin Reserve - Excessive Infiltration and Inflow)/Permitted Capacity (gpd)

2. Effluent disposal facilities:

(Wastewater Customer Demand + Margin Reserve - Excessive Infiltration and Inflow)/Permitted Capacity (gpd)

3. Other wastewater facilities: 100 percent used and useful

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(7) Unless specific quantitative information indicates greater demands, a water system's Instantaneous Demand, for purposes of determining used and useful, will be calculated from the following charts which are from the U.S. Environmental Protection Agency Manual "Small Water Systems Serving The Public".

[chart]

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Interim Publication of Manuscript
JULY 1978

EXHIBIT (RMH3)

manual

SMALL WATER SYSTEMS SERVING THE PUBLIC

correlated with

NATIONAL DRINKING WATER REGULATIONS

CONFERENCE OF STATE SANITARY ENGINEERS

FRANK R. LIGUORI, PE, Technical Writer

in cooperation with

OFFICE OF DRINKING WATER

U.S. ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C., 20460

An example showing the method of using the tables and curves follows:

Example: Assume a 40 unit motel with a small coffee shop and small swimming pool. Water pressure assumed at 40 psi. Air conditioners are air cooled and require no water.

DATA TABULATION

Fixture	Fixture Value at 35 psi (Table 3-2)	No. of Fixtures in Use	Total Fixture Value
Water closets, tank	3	47	141
Urinals, wall	12	2	24
Lavatory: 3/8-in. connection	2	40	80
Lavatory: 1/2-in. connection	4	4	16
Bathtubs	8	40	320
Drinking Fountains	2	1	2
Kitchen sink, 3/4-in.	7	1	7
Dishwasher, 3/4-in.	10	1	10
Wash sink	4	1	4
Hose, 50 ft., 5/8-in.	9	3	27
Swimming pool	15 (estimated)	1	15
Service sink: 1/2-in.	3	1	3
			649

Combined Fixture Value - 649

From Figure 3-1, probably peak demand based on 35 psi = 55 gpm

From Table 3-3, adjusted multiplication factor for 40 psi delivery pressure = 1.07

Adjusted (probably) peak demand = 55 x 1.07 = 59 gpm

Demand loads for lawn sprinkling systems or other special uses must be added as appropriate.

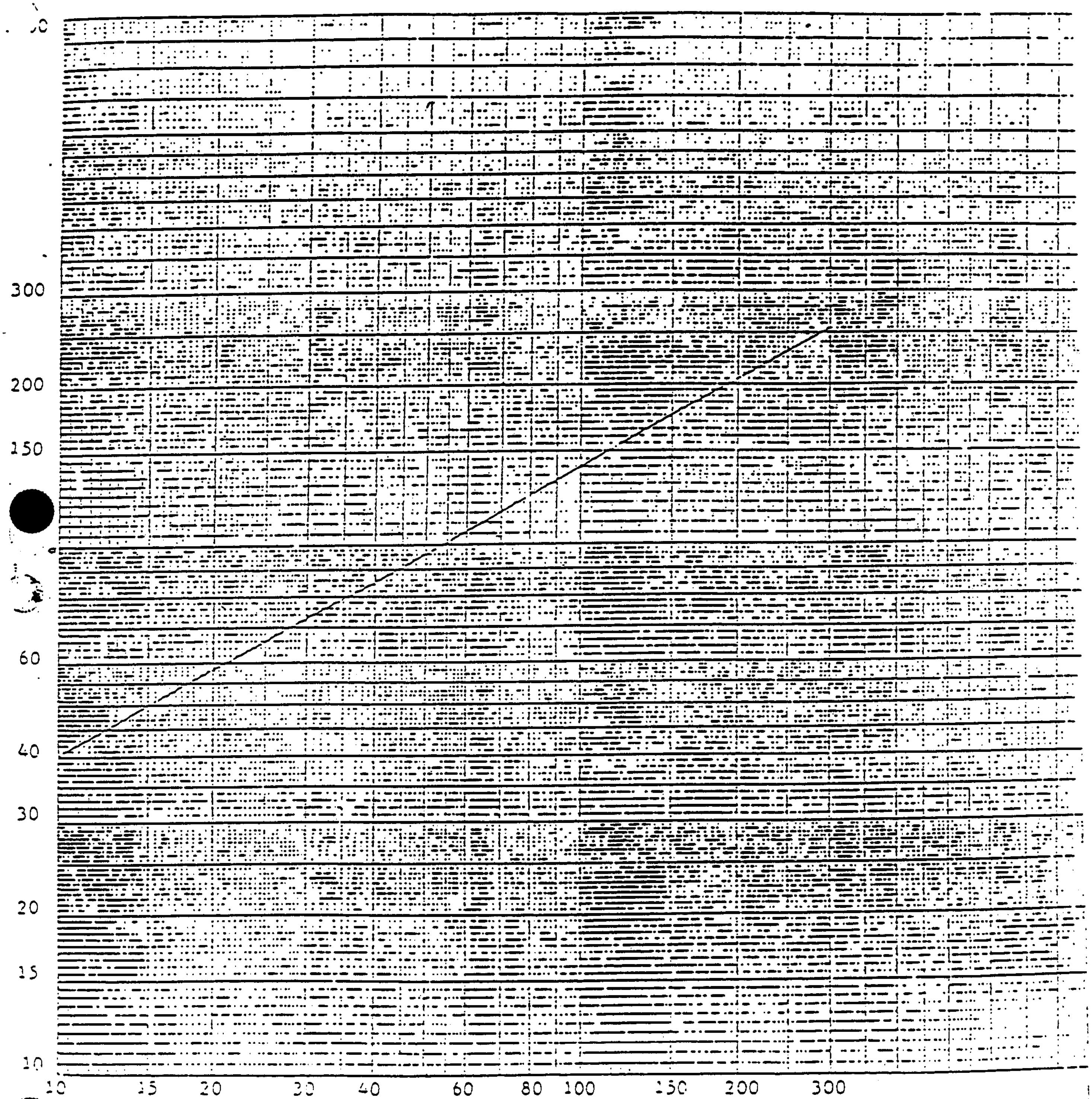
Peak Demand for Residential Communities and Mobile Home Parks

Figures 3-3 and 3-4, which follow, are curves developed from experience showing the instantaneous (peak) demands for various sizes of typical residential communities and mobile home parks.

FIGURE 3-3

INSTANTANEOUS DEMAND FOR RESIDENTIAL COMMUNITY WATER SYSTEMS

(Number of Connections vs Gallons Per Minute)

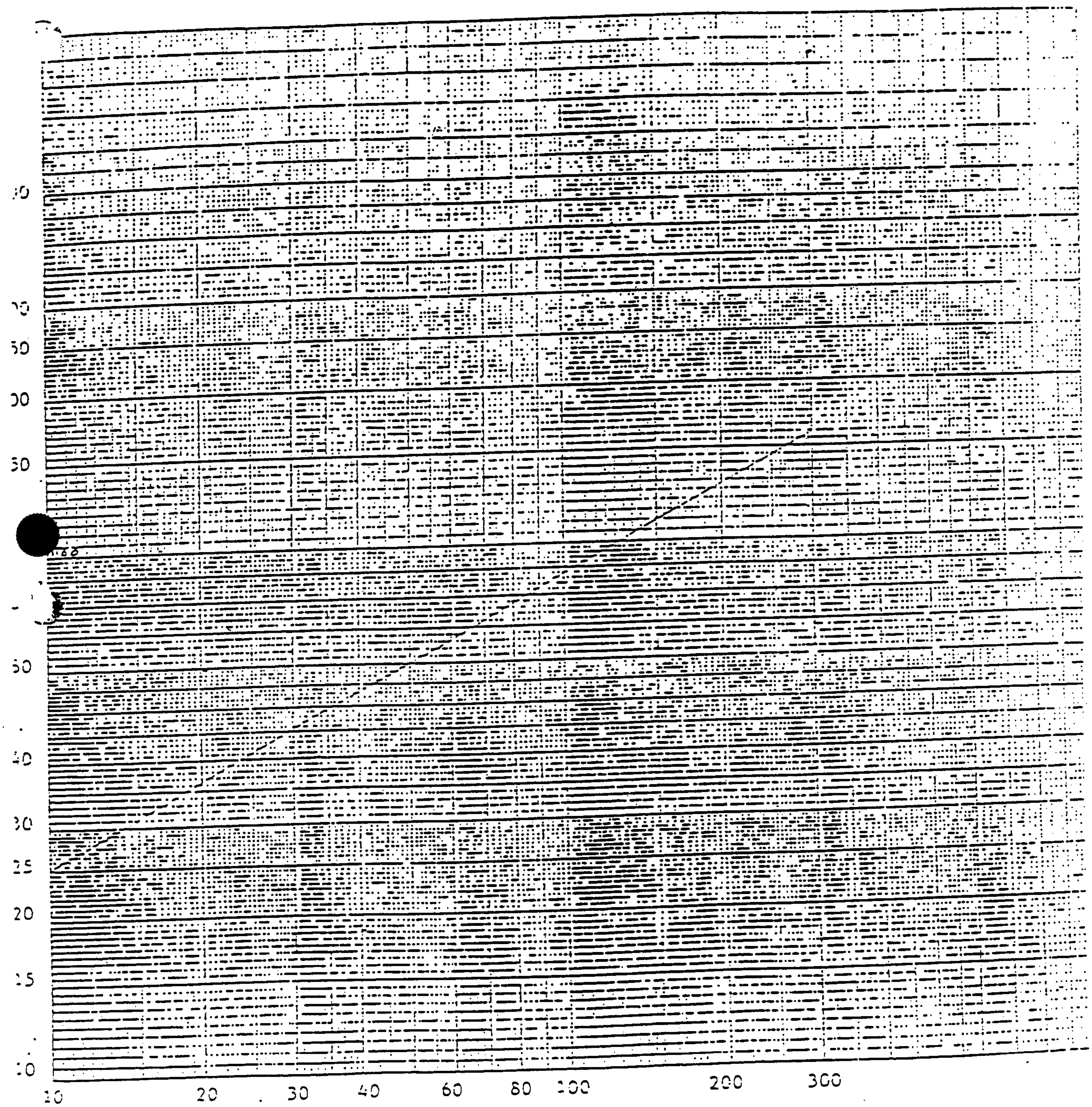


Number of Connections

Source: Standards and Criteria for Design and Construction of Public Water Supply Systems to Serve Residential Communities; Division of Health Services - Sanitary Eng. Section, State of North Carolina, 1974

PEAK DEMAND FOR MOBILE HOME PARK WATER SYSTEMS

(Number of Connections vs Gallons Per Minute)



Number of Connections

Source: Standards and Criteria for Design and Construction of Public Water Supply Systems to Serve Residential Communities; Division of Health Services-Sanitary Engineering Section, State of North Carolina, 1974

EXHIBIT (RMH-4)

PAGE 1 OF 8

Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

June 29, 1995

RECEIVED
JUL 03 1995
Florida Public Service Commission
Division of Water and Wastewate

Mr. John Williams
Chief
Bureau of Policy Development and
Industry Structures
Division of Water and Wastewater
Public Service Commission
2540 Shumard Oak Boulevard
Tallahassee, Florida 32399-0850

Dear Mr. Williams:

We have reviewed the Commission's May 12 draft rule regarding "used and useful" in rate case proceedings. Our comments concerning this draft rule are enclosed.

As you can see, we have a substantial number of comments. We consider two of these comments--Comments 18 and 19--to be especially significant. As stated in Comment 18, we strongly recommend that the Commission recognize at least a five-year reserve capacity when calculating the "used and useful" percentage of water and wastewater treatment facilities. By recognizing only a three-year reserve capacity, the Commission will be discouraging utilities from taking advantage of economies of scale and from providing long-term economic benefits to their customers. Additionally, utilities that want to recover the full cost of their treatment facilities and that try to comply with our rules will be put in an awkward position if the Commission recognizes only a three-year reserve capacity. Such utilities will have to construct their treatment facilities in three-year stages, but our existing wastewater rules and future drinking water rules will require utilities to begin planning and designing the expansion of treatment facilities when there is five years or less of reserve capacity at the facilities. Thus, such utilities will have to be continuously planning and designing the next three-year expansion of their treatment facilities even while they are constructing the present three-year expansion of the facilities.

As noted in Comment 19, we recommend that the Commission consider reclaimed water reuse facilities to be 100 percent "used and useful." We believe that this is clearly required by Section 403.064(6) of the Florida Statutes.

If you have any questions about the attached comments, please call John Sowerby, P.E., in the Drinking Water Section at 487-1762 or Richard Addison, P.E., in the Domestic Wastewater Section at 488-4524.

Sincerely,

Mark Latch

for Richard M. Harvey
Director
Division of Water Facilities

RMH/dgw/js
Enclosure

cc/enc.: Richard Drew
Mary E.S. Williams
Van R. Hoofnagle, P.E.
Elsa A. Potts, P.E.

THE DEPARTMENT OF ENVIRONMENTAL PROTECTION'S (DEP's) COMMENTS ON THE PUBLIC SERVICE COMMISSION'S (PSC's) MAY 12, 1995, DRAFT RULE REGARDING "USED AND USEFUL" IN RATE CASE PROCEEDINGS

1. PAGE 1, LINES 2 THROUGH 4: We recommend that the PSC add to Rule 25-30.432(1) definitions of the following terms: "finished water storage," "pumping stations and collection mains," "transmission and distribution lines," "wastewater customer demand," "water high service pumping," "water source of supply," and "water treatment equipment." Is "wastewater customer demand" intended to mean the maximum average daily flow to a wastewater system over the same time frame as that associated with the permitted capacity (one year, one month, or three months) based on data for the past five years? Is it the PSC's intent to include booster pumping stations under "other water facilities," "transmission and distribution lines," or "water high service pumping"? Is it the PSC's intent to include booster disinfection facilities under "other water facilities," "transmission and distribution lines," or "water treatment equipment"?

2. PAGE 1, LINES 9 THROUGH 13: We recommend that the PSC exclude reclaimed water reuse facilities from the definition of "effluent disposal facilities" and that the PSC provide a separate definition for "reclaimed water reuse facilities." See Comment 19 for more details.

3. PAGE 1, LINES 18 THROUGH 20: The quantity of emergency storage needed is indeed a function of the duration of the emergency condition. Sometimes an emergency storage volume sufficient to last for several days may be necessary. Therefore, we recommend that the PSC revise the last sentence in Rule 25-30.432(1)(c) to read, "The quantity of Emergency Storage needed is a function of the duration of the emergency condition and, unless otherwise justified, is assumed to be ~~approximately~~ one half of the maximum day demand."

4. PAGE 2, LINES 1 AND 2: We recommend that the PSC revise the last sentence in Rule 25-30.432(1)(d) to read, "Unless otherwise justified, t~~T~~he Equalization Volume is assumed to be ~~approximately~~ one quarter of the maximum daily demand."

5. PAGE 2, LINES 3 AND 4: We recommend that the PSC clarify that the demand/flow rates of 350 gpd per ERC for water and 280 gpd per ERC for wastewater are annual average daily demand/flow rates.

6. PAGE 2, LINES 3 AND 4; AND PAGE 6, LINES 2 THROUGH 5: Rule 25-30.432(1)(e) defines ERC as a demand of 350 gpd for water and a flow of 280 gpd for wastewater. However, the second sentence in Rule 25-30.432(5) seems to be saying that ERC means the demand/flow per connection used for design/permitting or the historical demand/flow per connection if such data has been shown by the utility to be accurate and reliable. We recommend that the PSC resolve this apparent conflict between rules.

7. PAGE 2, LINES 12 THROUGH 14: We recommend that the PSC revise the last sentence in Rule 25-30.432(1)(g) to read, "For finished water storage, the Firm Reliable Capacity excludes any unusable or dead storage (which, unless justified otherwise, is assumed to be 10% of ground storage capacity)."

8. PAGE 3, LINES 3 THROUGH 5; PAGE 4, LINES 3 THROUGH 5; AND PAGE 17, LINES 1 THROUGH 6: There is an apparent conflict between the instantaneous demand charts in Rule 25-30.432(7) and the design criteria for peak hour demand in Rule 25-30.432(1)(p). For example, the instantaneous demand charts show that the instantaneous demand for 300 residential connections is 255 gpm or 0.85 gpm per connection, which is less than the specified design criteria of 1.1 gpm per ERC for peak hour demand. We recommend that the PSC resolve this apparent conflict between rules.

9. PAGE 3, LINES 6 THROUGH 8; PAGE 4, LINES 6 THROUGH 8; PAGE 12, LINES 15 AND 16; AND PAGE 14, LINE 16: For the purpose of the PSC's "used and useful" rule, small water systems are systems that can not absorb instantaneous demands through depressurization of their distribution systems, and large water systems are systems that can absorb instantaneous demands through depressurization of their distribution systems. Given this, we question the appropriateness of using a system capacity of 1 MGD as the dividing point between small and large water systems. Perhaps a system capacity of 0.25 to 0.5 MGD would be a more appropriate dividing point. Or perhaps the dividing point should be based on the design number of ERCs to be served, in which case perhaps 200 to 300 ERCs would be an appropriate dividing point.

10. PAGE 3, LINES 13 THROUGH 16; AND PAGE 4, LINE 23, THROUGH PAGE 5, LINE 3: There appears to be a conflict between the definition of "other wastewater facilities" and the definition of "wastewater treatment equipment." Rule 25-30.432(1)(n) states that "other wastewater facilities" includes disinfection units, while Rule 25-30.432(1)(u) states that "wastewater treatment equipment" includes chlorine contact equipment. We recommend that the PSC resolve this apparent conflict between rules.

11. PAGE 3, LINES 19 THROUGH 23: Rule 25-30.432(1)(o) states that disinfection facilities are included under "other water facilities," but one would think that disinfection facilities should be included under "water treatment equipment." We recommend clarification.

12. PAGE 4, LINES 3 THROUGH 5: We recommend that the PSC revise the last sentence in Rule 25-30.432(1)(p) to read, "Typical design criteria for a Peak Hour Demand of 2 times the maximum day demand or 1.0 ~~1.1~~ gpm per ERC can be used if historical flow data is not available." (Maximum day demand is typically two times annual average day demand, and the PSC is

considering peak hour demand to be equal to two times maximum day demand and is considering annual average day demand per ERC to be equal to 350 gpd. Therefore, peak hour demand per ERC would typically be 2 x 2 x 350 gpd = 1400 gpd or 1.0 gpm.)

13. PAGE 4, LINES 19 THROUGH 22: The DEP's Rule 62-600.200(62) defines "permitted capacity" as "the treatment (emphasis added) capacity for which a plant is approved (emphasis added) by Department permit expressed in units of mgd." Consequently, we recommend that the PSC revise its definition of "wastewater permitted capacity" to read, "the approved treatment ~~established-design~~ capacity of a wastewater facility in its DEP permit and..."

14. PAGE 4, LINE 23, THROUGH PAGE 5, LINE 3: The DEP's Rule 62-600.200(87) defines "treatment plant" as "any plant or other works used for the purpose of treating, stabilizing or holding wastes." Thus, we recommend that the PSC revise its definition of "wastewater treatment equipment" to read, "this includes works used for the purpose of treating, stabilizing, or holding wastewater, residuals, or effluent~~, but is not limited to, the influent structure, pretreatment facilities, pumps, aerators, clarification tanks, filters, digests, and chlorine contact equipment~~."

15. PAGE 5, LINES 13 AND 14: Please include Chapters 62-610 and 62-611 in the list of design and construction requirements for water and wastewater facilities. Also, we recommend that the PSC delete Chapter 62-601 from this list because Chapter 62-601 deals only with wastewater treatment plant monitoring requirements.

16. PAGE 6, LINES 15 THROUGH 19: We recommend that the PSC revise Rule 25-30.432(5)(a)2 to read, "In determining the allowable investment in margin reserve, the Commission shall consider, but not be limited to, the functions of each component of plant, regulatory lag, the rate of growth in customers and demand, and the time needed to plan, design, and construct plant (the 'construction factor')." See Comment 18 for more details.

17. PAGE 6, LINE 20, THROUGH PAGE 7, LINE 2: The type of flow data that is requested as part of rate filings appears to be appropriate for water systems only. We recommend that the PSC revise Rule 25-30.432(5)(a)3 to clearly indicate what type of flow data must be submitted for water systems and what type of flow data must be submitted for wastewater systems. Maximum day flows should be submitted for water systems; and either annual average daily flows, maximum month average daily flows, or three-month average daily flows, whichever flow is associated with the permitted capacity, should be submitted for wastewater systems.

18. PAGE 7, LINES 5 THROUGH 15: BY SPECIFYING THAT "USED AND USEFUL" INCLUDES NO MORE THAN A THREE-YEAR RESERVE CAPACITY FOR WATER AND WASTEWATER TREATMENT FACILITIES, THE PSC WILL

BE ENCOURAGING UTILITIES TO BUILD THESE FACILITIES IN THREE-YEAR STAGES. AND BY ENCOURAGING UTILITIES TO BUILD WATER AND WASTEWATER TREATMENT FACILITIES IN THREE-YEAR STAGES, THE PSC WILL BE ENCOURAGING UTILITIES TO IGNORE ECONOMIES OF SCALE AND LONG-TERM ECONOMIC BENEFITS TO THEIR CUSTOMERS, WHICH IS EXACTLY THE OPPOSITE OF WHAT THE PSC WANTS TO ENCOURAGE. (THE PSC'S PROPOSED RULE 25-30.432(3) STATES, "UTILITIES ARE ENCOURAGED TO UNDERTAKE PLANNING THAT RECOGNIZES CONSERVATION, ENVIRONMENTAL PROTECTION, ECONOMIES OF SCALE, AND [THAT] WHICH IS ECONOMICALLY BENEFICIAL TO ITS CUSTOMERS OVER THE LONG TERM.")

FURTHERMORE, BY RECOGNIZING ONLY A THREE-YEAR RESERVE CAPACITY, THE PSC WILL BE PUTTING UTILITIES IN AN AWKWARD POSITION. THE DEP'S EXISTING RULE 62-600.405 REQUIRES UTILITIES TO BEGIN PLANNING AND DESIGNING THE EXPANSION OF WASTEWATER TREATMENT FACILITIES WHEN THERE IS FIVE YEARS OR LESS OF RESERVE CAPACITY AT THE FACILITIES. (NOTE THAT WE INTEND TO IMPLEMENT A SIMILAR RULE FOR COMMUNITY DRINKING WATER TREATMENT FACILITIES.) YET, UTILITIES WILL HAVE TO CONSTRUCT WATER AND WASTEWATER TREATMENT FACILITIES IN NO MORE THAN THREE-YEAR STAGES IF THEY WANT TO RECOVER THE FULL COST OF THE FACILITIES. THUS, UTILITIES THAT WANT TO RECOVER THE FULL COST OF THEIR WATER AND WASTEWATER TREATMENT FACILITIES WILL HAVE TO BE CONTINUOUSLY PLANNING AND DESIGNING THE NEXT THREE-YEAR EXPANSION OF THESE FACILITIES <u>EVEN WHILE THEY ARE CONSTRUCTING THE PRESENT THREE-YEAR EXPANSION OF THESE FACILITIES</u>.

WE STRONGLY RECOMMEND THAT THE PSC ALLOW AT LEAST A FIVE-YEAR RESERVE CAPACITY FOR WATER AND WASTEWATER TREATMENT FACILITIES. ALTHOUGH ALLOWING A FIVE-YEAR RESERVE CAPACITY MAY STILL <u>NOT</u> FULLY ENCOURAGE USE OF ECONOMIES OF SCALE, IT WILL MAKE THE PSC'S "USED AND USEFUL" RULE SOMEWHAT CONSISTENT WITH THE DEP'S RULE 62-600.405. (UTILITIES THAT WANT TO RECOVER THE FULL COST OF THEIR WASTEWATER TREATMENT FACILITIES WILL HAVE TO BEGIN PLANNING AND DESIGNING THE NEXT FIVE-YEAR EXPANSION OF THESE FACILITIES ONLY AFTER THEY HAVE COMPLETED CONSTRUCTING THE PRESENT FIVE-YEAR EXPANSION OF THESE FACILITIES.) IF THE PSC TRULY WANTS TO ENCOURAGE UTILITIES TO TAKE ADVANTAGE OF ECONOMIES OF SCALE, THE PSC SHOULD CONSIDER ALLOWING AT LEAST A TEN-YEAR RESERVE CAPACITY FOR WATER AND WASTEWATER TREATMENT FACILITIES. GUIDELINES DEVELOPED UNDER THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S OLD CONSTRUCTION GRANTS PROGRAM FOR WASTEWATER TREATMENT FACILITIES RECOMMENDED CONSTRUCTING WASTEWATER TREATMENT FACILITIES IN NO LESS THAN TEN-YEAR STAGES.

19. PAGE 7, LINES 14 AND 15; AND PAGE 16, LINES 20 THROUGH 22: SECTION 403.064(6) OF THE FLORIDA STATUTES STATES, "PURSUANT TO CHAPTER 367, THE FLORIDA PUBLIC SERVICE COMMISSION SHALL ALLOW ENTITIES WHICH IMPLEMENT REUSE PROJECTS TO RECOVER THE FULL COST OF SUCH FACILITIES THROUGH THEIR RATE STRUCTURE." THEREFORE, THE PSC'S "USED AND USEFUL" RULE SHOULD INDICATE THAT RECLAIMED WATER REUSE FACILITIES ARE 100 PERCENT "USED AND USEFUL."

20. PAGE 7, LINES 10 AND 14: The word "effluent" should be inserted before the words "disposal facilities."

21. PAGE 7, LINES 16 THROUGH 18: It is unclear how "the calculated growth rate multiplied by a construction factor of one year" is to be applied when determining "used and useful" percentages for transmission and distribution lines and pumping stations and collection mains. (Typically, water mains and sewers are designed for a ten- to 50-year period, and pumping facilities are designed for a ten- to 20-year period. Thus, recognizing only a one-year reserve capacity for these facilities would be totally unreasonable.) We recommend that the PSC clarify Rule 25-30.432(5)(a)4.b. (Per our discussions with the PSC staff, we understand that transmission and distribution lines and pumping stations and collection mains will be considered 100 percent "used and useful" as long as it can be documented that these facilities are necessary to provide service to customers during the next one-year period.)

22. PAGE 9, LINES 6 THROUGH 11: We recommend that the PSC indicate in Rule 25-30.432(5)(b)3 the basis for the third sentence in this rule, which reads, "In all other cases, unless specific support is provided, the Commission shall consider a minimum fire flow demand to be 500 gallons per minute (gpm) for single family and 1,500 gpm for multiple family and commercial areas for a duration of 2 hours for needed fire flows up to 2500 gpm, and 3 hours for needed fire flows of 3000 and 3500 gpm." These flows and durations appear to be too low.

23. PAGE 10, LINE 23, THROUGH PAGE 11, LINE 5: How will actual infiltration rates be determined and verified for rate case proceedings if infiltration/inflow studies or sewer system evaluation surveys are not available?

24. PAGE 12, LINE 15, THROUGH PAGE 14, LINE 15: The PSC has provided default formulas for small water systems with adequate finished water storage capacity to meet peak hour demand, and the PSC has provided default formulas for small water systems with insufficient finished water storage capacity to meet instantaneous demand. It appears that the PSC needs to provide default formulas for small water systems with adequate finished water storage capacity to meet instantaneous demand but insufficient finished water storage capacity to meet peak hour demand.

25. PAGE 13, LINES 6 THROUGH 11; AND PAGE 15, LINES 6 THROUGH 11: In Rules 25-30.432(6)(a)1.d and 25-30.432(6)(b)1.d, the set of default formulas for "water high service pumping" is appropriate only if the high-service pumps are located after, or downstream from, finished water storage. This set of formulas is <u>not</u> appropriate for, and will grossly overestimate the "used and useful" percentage of, high-service pumps that are located before, or upstream from, finished water storage. The appropriate default formula for high-service pumps that are located before, or upstream from,

finished water storage is as follows: (Maximum Day Demand + Margin Reserve - Excessive Unaccounted for Water)/(Firm Reliable Capacity). We strongly recommend that the PSC revise Rules 25-30.432(6)(a)1.d and 25-30.432(6)(b)1.d to specify one set of default formulas for "water high service pumping" located downstream from finished water storage and another default formula for "water high service pumping" located upstream from finished water storage.

EXHIBIT CMH-5

PAGE 1 OF 2

Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

February 20, 1996

Commissioner Susan F. Clark
Chairperson
Public Service Commission
2540 Shumard Oak Blvd.
Tallahassee, Florida 32399-0850

Dear Commissioner Clark:

As you are aware, our agencies share regulatory responsibilities for many private water and wastewater utilities throughout the state. It has long been the practice of the Department of Environmental Protection to require advance planning and design for expansions and improvements identified as necessary through our various capacity analysis reviews.

Staff from both our agencies have been working together over the last several years to achieve enhanced understanding of the basis and application of our respective regulations and policies. This cooperative relationship was memorialized in the Memorandum of Agreement focusing on reuse which was signed in 1992, and continues with recurrent staff work groups which are designed to address common issues. The most recent topic under active discussion has been the proposed Used and Useful rule, and we have submitted comments to you as recently as June 29, 1995. The Department supports and encourages you to continue your efforts to finalize this rule as quickly as possible. It is my understanding that your staff anticipates re-initiating rulemaking within the next few months.

As your agency continues to address these issues of common concern, please remember that my staff is available to offer whatever technical support the Commission, individual commissioners, or your staff may require to ensure that the actions of our sister agencies are as complimentary and consistent as possible. I encourage you to encourage your staff to contact either Van Hoofnagle, Drinking Water Program Administrator, at 488-3601, or Elsa Potts, Domestic Wastewater Program Administrator, at 488-4524, for any direct assistance.

Commissioner Susan F. Clark
Page Two
February 20, 1996

If you have any questions or would like to discuss this issue further, please feel free to call my office, or you may call Mimi Drew, Director, Division of Water Facilities, at 487-1855.

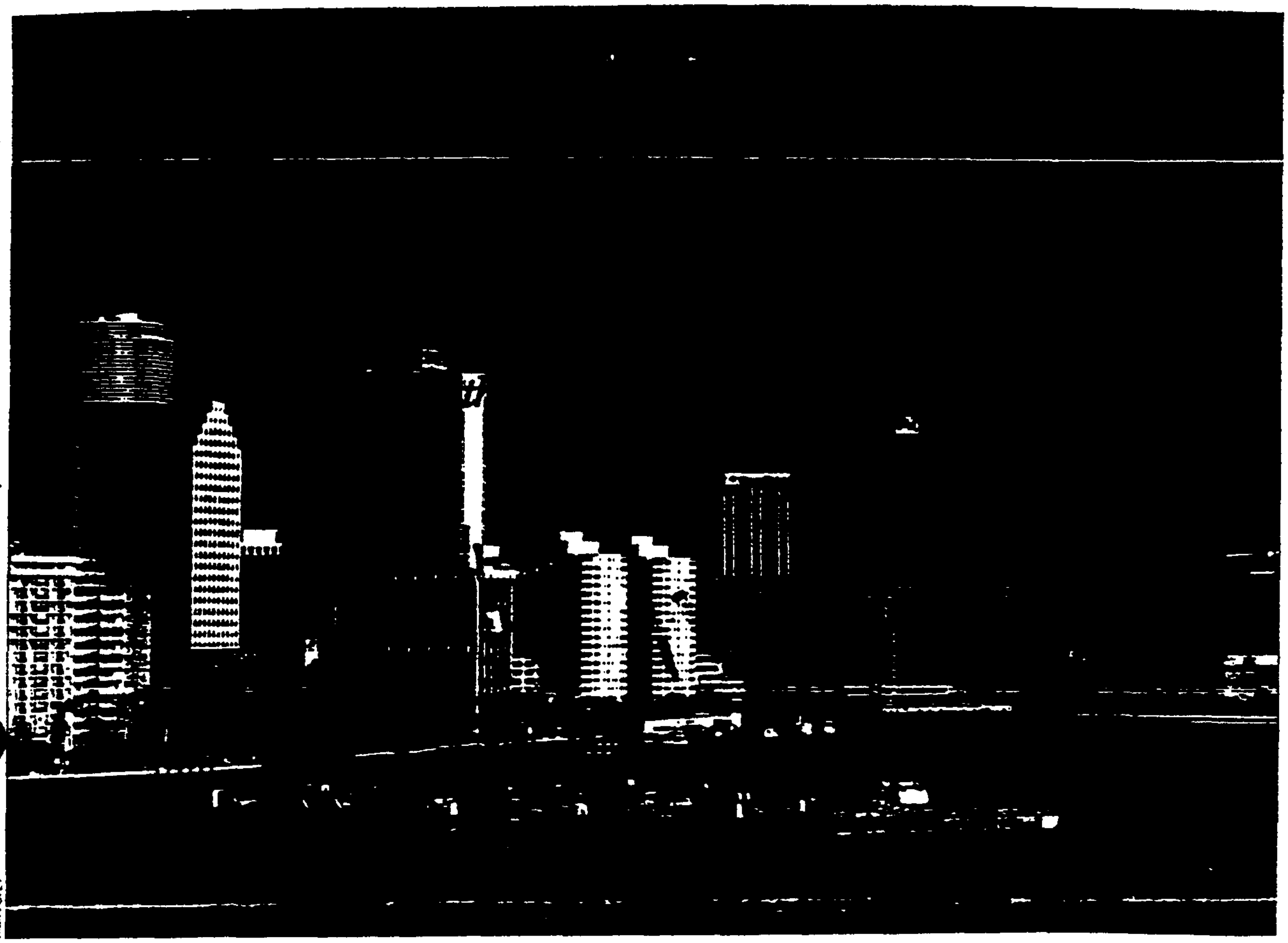
Sincerely,

Ginger

Virginia B. Wetherell
Secretary

VBW/mw/h

cc: Mimi Drew
Van Hoofnagle
Elsa Potts



Miami looks for alternatives to blue-chip sewer overhaul

Under detailed and stringent state and federal mandates, Miami is spending $1.1 billion to rehabilitate the largest wastewater collection and treatment system in the Southeast. The program, about one-third the way toward a 2002 completion deadline, has more than doubled monthly water and sewer bills since 1988, with no expected end in sight.

To date, Miami has made all 194 milestones in the compliance orders, but officials claim the decrees are arbitrary in places, putting construction ahead of planning and forcing costly improvements that may be ultimately unnecessary. The city wants the federal government to devise a sanitary sewer overflow policy that considers local conditions, particularly a groundwater table only 3 ft to 6 ft below the surface and average rainfall of 60 in. per year. Otherwise, they fear, the massive upgrade will still not bring the city's wastewater collection and treatment system into Clean Water Act compliance.

Wake-up call. The 400-sq-mile system comprises 2,400 miles of gravity sewers, 640 miles of force main, 874 pump stations and three treatment plants that together process 320 million gal per day of wastewater on average. Peak flow tops 700 mgd. Thousands of sanitary sewer overflows, coupled with a series of pipe and pump station failures in the late 1980s and early 1990s, caught the attention of media, environmentalists and regulators.

After several well-publicized pipe failures flooded intersections downtown and spilled raw sewage into the Miami River and other bodies of water, many began to question the integrity of a force main under Biscayne Bay. The 72-in.-dia Cross Bay line is the primary conduit for wastewater from the mainland to the 143-mgd Central District treatment plant on Virginia Key. It was built in the 1950s, when the city was desperately trying to keep pace with booming development.

In a 1993 agreement, the Florida Dept. of Environmental Protection specified replacement of the line with a 102-in.-dia alternative. The job came in a year early and well under its $72-million estimated cost (ENR 9/12/94 p. 16).

But the regulators were just getting started. In July 1993, a second pact with the state specified expansion of two treatment plants, odor control improvements at the central facility, additional capacity throughout the collection and transmission systems and expansion of a detailed infiltration and inflow program already under way.

The U.S. Environmental Protection

Agency also stepped in, filing a federal lawsuit that raised the same issues covered by the state's regulators. The U.S. Dept. of Justice, representing EPA, refused to acknowledge the settlement agreements. Miami settled the suit by signing detailed consent decrees, the first in August 1993, and the second in February 1995. In addition to signing off on a program currently pegged at $1.1 billion, the city agreed to spend $5 million to build advanced wastewater treatment works and install reuse and low-flow toilets in public housing. Finally, Miami paid $2 million to the U.S. Treasury, the largest penalty ever collected under the Clean Water Act.

City officials acknowledge the repairs were overdue. But they also maintain the settlements with state and federal regulators duplicate paperwork and put construction's cart before design's horse. A peak-flow study and system-wide sanitary sewer evaluation, both under way but not yet complete, would generate a more cost-effective upgrade plan by the end of next year, they say. The compliance documents are "clearly a premature enforcement of the Clean Water Act," says Anthony J. Clemente, director of the Miami-Dade Water and Sewer Dept.

Force main expansion mandate requires construction of 60 miles of new transmission lines.

Small pipe installation is done by city crews.

"We could spend 40% less to achieve the same goals," estimates Luis Aguiar, the department's assistant director in charge of transmission systems. "But with the agreements in place, we have no room to maneuver."

EPA's intervention after the state already initiated an aggressive enforcement program in 1993 "really was inappropriate," Clemente adds. He suspects the reason may be political, since Attorney General Janet Reno and EPA Administrator Carol Browner are both natives of South Florida. In any case, the city says the requirements are overlapping and heavy-handed, mandating elimination of all sanitary sewer overflows, even though EPA has yet to develop a national SSO policy. "Will the regulatory agencies recognize that all SSOs cannot be eliminated?" asks Clemente. He adds that EPA's regional offices do not apply the same standards across the board to releases of raw or untreated sewage from sanitary collection systems.

High water table causes problems in Miami, especially after heavy rain.

SSO SOS. EPA counters that it is drafting SSO enforcement action guidelines, giving localities more say in developing management plans, says Michael B. Cook, the agency's director of the office of wastewater management. "We want to reduce monitoring and reporting requirements by 25% within the next year," he told the Water Environment Federation convention last October.

EPA is "moving from a technology-based approach to...scientific risk-based analysis on a cost-benefit basis," adds Tudor Davies, EPA's director of the office of science and technology. But he insists, "I don't believe there are different quality criteria for water quality standards for wet weather."

Despite EPA's promises of policy changes, the goal in Miami remains "zero overflows from the collection system," says Roy Herwig, an enforcement officer in the agency's Atlanta office. "These overflows run through schoolyards and playgrounds. It's a public health issue." He adds that fragile ecosystems in two national parks within Dade County, Biscayne Bay and the Everglades, could be compromised by a large-scale failure of the county's wastewater treatment system.

Miami has put together "a tremendous program," says Herwig, who adds that it was long overdue. "We felt the [operation and maintenance] budget had been inadequate for years. It's like a car. If you never change the oil.

you shouldn't complain about having to replace a shot engine."

Clemente and engineers with Montgomery Watson, the Pasadena, Calif., consultant leading program management for the department, say a consistent SSO policy, considering actual risks and local conditions, would be more cost-effective. "You can engineer a brick to fly but it will be mighty expensive," says Ron Ballard, MW program director.

Clemente says EPA pushed reforms already under way.

Expense was also a concern with EPA, says Adam M. Kushner, the Justice Dept.'s chief attorney on the Miami case. The government filed suit to protect public health, but also to secure its own investment. Miami had used $300 million in federal funds to expand its system over the last 25 years, he notes, but spent little to keep it in shape. "We're working at the confluence of two principal problems—unstemmed growth that limited hydraulic capacity and a failure to invest in O&M," he says. "Between 1985 and 1994 we noted between 2,200 and 2,600 overflows system wide, according to the department's own records. If somebody in Miami even thought about rain they had an overflow."

Observers agree. "There's no question that they were playing catch-up," says Rick Arbour, president of Rick Arbour & Associates, Inc., a Hopkins, Minn., consulting engineer that has advised EPA on Miami's problems.

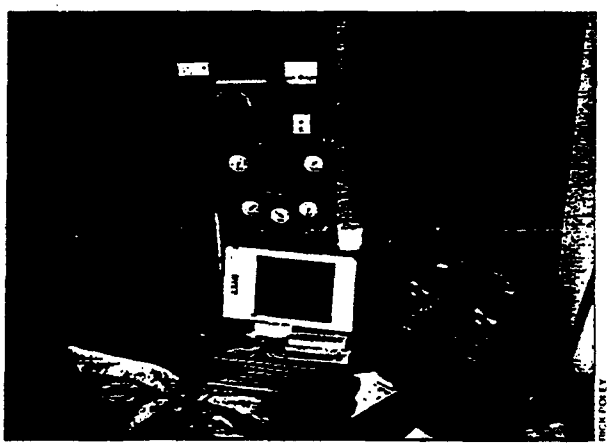
Some of those problems date back to 1973, when the city established a single metropolitan water and sewer agency that cobbled together a large system from 30 smaller ones. The clean water law provided federal funds so Miami and other cities could bring their systems into compliance. Regulators say officials found it politically expedient to take federal money for capital expansion, while keeping customer rates low, at the expense of the existing pipe and pump stations.

"Miami had one of the lowest sewer rates in the nation," says EPA's Herwig. In 1988, the city billed $20.64 for average monthly levels of 10,000 gal each of water and wastewater. By 1995, to fund the compliance orders, the levy had climbed to $44.22—comparable to rates in Dallas and Orlando, but well below rates in San Francisco, Boston and even communities in northern Florida.

Best practice? Underfunding maintenance led to massive infiltration and inflow in the deteriorating collection system. Compounding this were design methods regarded as "best practice" 20 years ago, but since disproved, says Aguiar. Oversized force mains caused widespread cavitation and in several instances blew out manhole covers. Installing manual air release valves and using certain pipe materials encouraged corrosion instead of inhibiting it, as intended, he adds.

In the late 1980s, the system started to break down frequently under peak flow conditions. The city started an infiltration and inflow remediation program in 1991, following an agreement with the county. Extensive inspection of the system, mainly through smoke testing and televised line inspections, revealed the weak spots. "We have the largest TV and grout fleet in the U.S.—16 trucks," boasts Aguiar.

An estimated 40% of the total flow to treatment plants during wet weather is tied to infiltration and inflow. Still, the condition "is very hard to quantify," says Aguiar. Some solutions, especially with inflow, are inexpensive and low-tech. Smoke bombs showed extensive inflow from missing cleanout caps on private property. The owner is responsible, but the process—notification and follow-up to secure replacement—costs $250 per site, says Aguiar. It's cheaper and easier to supply crews with $3 caps and replace the caps themselves.



Computer-operated system tells sewer line repair crews where to go and what to fix.

Plastic inserts that fit below manhole covers and seal the aperture during storms are also inexpensive, at $7 or $8 each. Aguiar was first skeptical these would work, "but after putting a camera in a manhole during a storm and watching water just pouring in, I decided to try them." The city has installed 55,000 since 1991 and has reduced peak flows during wet weather.

EPA wants 20% of the gravity system evaluated annually. Inspection crews doubled up on repair efforts, which cost 200 to 800 hours per worker in overtime last year, but "kept us ahead of the curve," Aguiar says.

Pump station improvements involve 874 units scattered throughout ... collection network.

Pipe repairs have added 40 mgd of capacity.

Fixing infiltration requires more expensive, longer-term projects—replacing and repairing pipe. The department is encouraging a full range of techniques: grouting, sliplining, resin-impregnated liners and pipe-bursting. Still, says Aguiar, "this country is way behind Europe in trenchless technology. We're just picking up on techniques they've had for 30 or 40 years."

Department crews handle trenching pipe of 20 in. diameter or less, and bid out the rest. Three projects totaling some $64 million are under construction. They involve 17 miles of force main and interconnections of lines ranging from 60 to 72 in. in diameter.

Infiltration and inflow work has cut peak flow to the treatment plants by 40 mgd and eliminated proposed capacity upgrades for 90 pump stations, saving $10 million in construction, says Aguiar. But there is plenty of pump station work in the program. Within the next three years, 358 stations are scheduled for upgrading, along with construction of 60 miles of new force main. Estimated cost is $195 million. All 874 pump stations will be equipped with remote monitoring equipment tied together in a Supervisory Control and Data Acquisition system.

Brant fears aquifer contamination will trigger another decree.

The consent decree establishes a design criterion for the pump stations based on a net average pump operating time for each station as 10 hours a day. "EPA set forth the 10-hour criteria as a short-term fix," says Rosanne W. Cardoza, MW's deputy program manager. "The peak-flow study will show if 10 hours is correct, too much or too little."

No time. Post, Buckley, Schuh & Jernigan Inc., Miami, is developing a digitized model of the collection and transmission system, due next September, and will deliver the peak flow management study a year later. "Houston had the advantage of a detailed water quality study that guides the design of their whole program," says William M. Brant, sewer department deputy director. "We weren't given time to do that."

The study will extract data from the collection model to reach a single goal: "to develop a capital improvement plan that will mitigate storm-induced wastewater overflows in a feasible cost-effective manner," says Marc P. Walch, a PBSJ engineer. The collection model will combine data from the pump stations and force mains to determine how much wastewater the system can store and transport. The peak flow study will factor in weather impacts. In a new twist, officials will use a so-called Virtual Rain Gauge. This computer link to weather data from satellite and ground station reports can generate accurate storm event data every 15 minutes.

A geographic information system combines weather information and collection system data to forecast wastewater flow through the system in a 24-hour interval. As a design tool, it will yield data regarding transmission capacity, pressure levels at connection points and possible overflow points within the gravity system, says Walch.

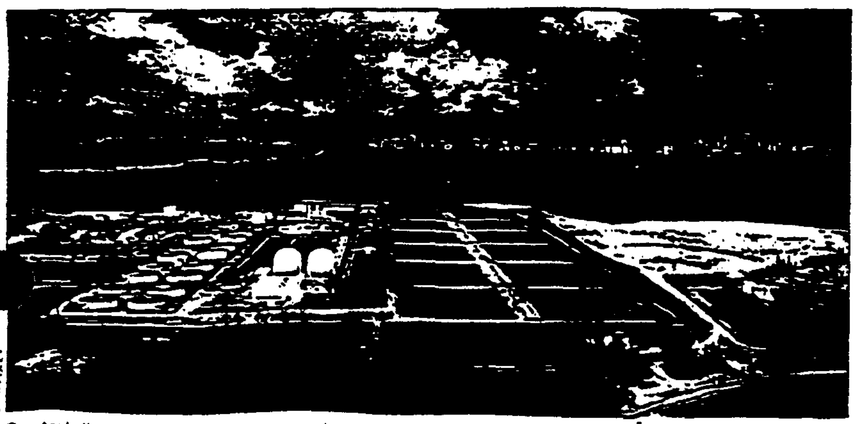
Miami's upgrade concentrates on the system's weakest link, the collection system, but treatment plants will also be rehabbed. The 40-year-old central district plant features two parallel process trains that dewater sludge before discharging treated wastewater 3 miles offshore through a 120-in-dia. outfall. An 80-mgd pure oxygen activated sludge train will remain on-line, but a 60-mgd high-rate activated sludge train with open aeration tanks will be replaced by a second closed-tank pure oxygen unit for odor control. The other two plants are also slated for capacity expansions.

Despite all the work, Miami's troubles with regulators may not be over. They are now scrutinizing injection wells at the south district plant that are used for effluent reuse. The 1983-vintage plant, scheduled for upgrade from 100 mgd to 112.5 mgd, injects treated effluent about 3,000 ft deep into the Florida Aquifer's boulder zone. This lies several strata and hundreds of feet below the Biscayne Aquifer—source of Miami's drinking water. In 1994, a monitoring well in the Biscayne Aquifer detected ammonia, a possible indicator of treated effluent.

The department suspects a defective monitoring well. It was capped, but traces of ammonia have been detected at other points. The department is negotiating with regulators to develop a remediation program. "The burden of proof is on us to prove that we are not the source," says Brant.

The stakes are high, since the south district handles roughly one-third of the department's sewage. Any alternative to deep injection would be an expensive proposition for a city already on the hook for one of the most expensive wastewater treatment capital programs in the U.S. ■

By Andrew G. Wright in Miami



Central district plant will replace activated sludge tanks with pure ox[illegible]r odor control.

(b) A means to determine daily fluoride chemical dosage shall be provided. When weighing scales are used to determine the amount of chemical fed, the scales shall be installed flush with the loading platform at floor level to avoid unnecessary lifting of large containers.

(c) Chemicals in powdered or granular form used for fluoridation shall be kept in color-coded containers to distinguish from other water treatment chemicals.

(d) Analytical equipment is required to accurately determine the fluoride ion concentration in the treated water. Analysis of the treated water for fluoride content shall be performed daily and reported to the HRS State Dental Health Office monthly along with the daily fluoride dosage and the daily quantity of chemical fed.

(4) Quality Assurance.

(a) At monthly intervals, each plant practicing fluoridation shall collect a raw, an effluent, and four distribution system samples. The samples shall be "split" and sent to a laboratory of the Department of Health and Rehabilitative Services or another certified laboratory for analysis. The results of analysis by the plant and the other laboratory shall be submitted to the HRS State Dental Health Office.

(b) If the Department finds that fluoridation is not being carried out in compliance with these rules, it may order corrective action.

(c) The HRS State Dental Health Office is authorized to conduct annual or more frequent inspections of fluoridation facilities at public water systems.

Specific Authority: 403.853(3), 403.861(6),(9), 403.862(1), F.S.
Law Implemented: 403.852(12),(13), 403.853(3),(5), F.S.
History: New 11-19-87, Formerly 17-22.625, Amended 1-18-89, 1-3-91, Formerly 17-555.325.

62-555.330 Engineering References for Public Water Systems. In addition to the requirements of this chapter, the standards and criteria contained in the following standard water works manuals and technical publications are hereby incorporated by reference and shall be applied in determining whether applications to construct or alter a public water system shall be issued or denied. They do not supersede the specific requirements detailed in these rules. Copies of these technical volumes may be obtained by writing the appropriate publisher at the address indicated.

(1) "Water Quality and Treatment: A Handbook of Community Water Supplies," American Water Works Association, 4th Edition, 1990, McGraw-Hill Publishing Company, 1221 Avenue of the Americas, New York, New York 10020.

(2) "Water Treatment Plant Design," 2nd Edition, 1990, American Society of Civil Engineers and American Water Works Association, Published by McGraw-Hill Publishing Company, 1221 Avenue of the Americas, New York, New York 10020.

(3) "Recommended Standards for Water Works," 1987 Edition, A Report of the Committee of the Great Lakes – Upper Mississippi River Board of State Public Health and Environmental Managers, Published by Health Research Inc., Health Education Service Division, P.O. Box 7126, Albany, N.Y. 12224.

(4) "Standards of the American Water Works Association," in effect on June 1, 1992, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

(5) "Water Fluoridation – A Manual for Engineers and Technicians," Thomas G. Reeves, P.E., National Fluoridation Engineer, Published by the U.S. Department of Health and Human Services, Public Health Service Centers for Disease Control, Dental Disease Prevention Services, Atlanta, Georgia 30333, September 1986.

(6) "Recommended Practice for Backflow Prevention and Cross-Connection Control (M14)," American Water Works Association, 1990, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

(7) "Cross Connections and Backflow Prevention," 2nd Edition, American Water Works Association, 1974, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

Specific Authority: 403.861(9), F.S.
Law Implemented: 403.861(9), F.S.
History: New 11-19-87, Formerly 17-22.630, Amended 1-18-89, 1-3-91, 1-1-93, Formerly 17-555.330.

62-555.335 **Guidance Documents for Public Water Systems.** The following publications are adopted as technical guidance to assist suppliers of water in achieving compliance with Chapters 62-550, 62-551, 62-555 and 62-560, F.A.C. Specific portions of a publication which contain enforceable criteria may be referenced in these rules. Information in the publications does not supersede the specific requirements detailed in these rules. Copies of the publications may be obtained from the source indicated:

(1) "Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources," October 1990 Edition, Environmental Protection Agency, Science and Technology Branch, Criteria and Standards Division, Office of Drinking Water, Washington, D.C., Source: U.S. Department of Commerce, National Technical Information Service, Springfield, VA 22161.

(2) "The Lead and Copper Guidance Manual, Volume 1: Monitoring," September 1991 Edition, Environmental Protection Agency, Science and Technology Branch, Criteria and Standards Division, Office of Drinking Water, Washington, D.C., Source: U.S. Department of Commerce, National Technical Information Service, Springfield, VA 22161.

(3) "Lead and Copper Rule Guidance Manual, Volume II: Corrosion Control Treatment," March 1992 Edition, Environmental Protection Agency, Science and Technology Branch, Criteria and Standards Division, Office of Drinking Water, Washington, D.C., Source:

U.S. Department of Commerce, National Technical Information Service, Springfield, VA 22161.

(4) "Treatment Techniques for Controlling Trihalomethanes in Drinking Water," 1982, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

(5) "Disinfection By-Products: Current Perspectives," 1989, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

(6) "Distribution System Maintenance Techniques," 1987, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

(7) "Standard Methods for the Examination of Water and Wastewater, 17th Edition," 1989, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

(8) "Activated Carbon for Water Treatment," 2nd Edition, 1988, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

(9) "Manual of Small Public Water Supply Systems," May 1991, U.S. Environmental Protection Agency, Publication number EPA 570/9-91-003, Office of Water, Washington, D.C. 20020.

(10) "Air Stripping for Volatile Organic Contaminant Removal," 1989, American Water Works Association, 6666 W. Quincy Avenue, Denver, Colorado 80235.

Specific Authority: 403.861(9), F.S.
Law Implemented: 403.861(9), F.S.
History: New 1-3-91, Amended 1-1-93, Formerly 17-555.335.

62-555.340 **Cleaning and Disinfection.** No supplier of water shall put into service or resume the use of any plant, pumping station, main standpipe, reservoir, tank, or other pipe or structure through which water is delivered to consumers for drinking and household purposes unless the plant, pumping station, main standpipe, reservoir, tank, or other pipe or structure has been effectively disinfected and approved for operation by the Department. This prohibition may not necessarily apply to mains, reservoirs, tanks, or other structures which contain water before it is treated.

Specific Authority: 403.861(9),(10), F.S.
Law Implemented: 403.852(12),(13), 403.853(1),(3), F.S.
History: New 11-19-87, Formerly 17-22.640, Amended 1-18-89, Formerly 17-555.340.

62-555.345 **Certification Letter and Clearance for Public Water Systems.** Upon completion of construction, the engineer of record or the system's professional engineer who was responsible for overseeing construction shall submit a certification of completion letter to the Department. When the letter of certification and a copy of satisfactory bacteriological

Before the
Florida Public Service Commission

Docket No. 960258-WS

In the Matter of

Petition to Adopt Rules on
Margin Reserve and Imputation of
Contributions-in-Aid of Construction
on Margin Reserve Calculation

Direct Testimony of

Mark F. Kramer
Manager of Regulatory Accounting

for

Utilities, Inc.

October 24, 1996

Q. Can you state your name and business address for the record?

A. Yes. My name is Mark Kramer. My business address is 2335 Sanders Road, Northbrook, Illinois 60062.

Q. What is your occupation?

A. I am a Manager of Regulatory Accounting for Utilities, Inc. and its subsidiaries, including Alafaya Utilities, Inc., Lake Placid Utilities, Inc., Lake Utility Systems, Inc., Mid-County Services, Inc., Miles Grant Water and Sewer Company, Tierra Verde Utilities, Inc., Utilities, Inc. of Florida, and Utilities, Inc. of Longwood.

Q. Please summarize your professional background.

A. I have been employed by Utilities, Inc. since 1992. Since that time I have been involved in many phases of rate-making in several regulatory jurisdictions. I am a Certified Public Accountant. I graduated from University of Illinois at Urbana-Champaign in 1989 with a Bachelor's of Science Degree in Accountancy. I had three years of public accounting experience prior to joining Utilities, Inc. I will graduate from the Lake Forest Graduate School of Management with a Masters of Business Administration in January of 1997. I have attended the NARUC Utility Rate Seminar and several independently sponsored seminars.

Q. Please explain your job responsibilities with Utilities, Inc.?

A. Utilities, Inc. has approximately 50 wholly owned subsidiaries engaged in the water and/or wastewater utility service business in 15 different states. Those states are Florida, Louisiana, Illinois, North Carolina, South Carolina, Indiana, Ohio, Virginia, Georgia, Mississippi, Tennessee, New Jersey, Pennsylvania, Maryland, and Nevada. Through those subsidiaries Utilities, Inc. owns and operates about 250 utility systems serving over 150,000 customers.

I am responsible for rate-making activities for individual companies within the group.

Q. What is the purpose of your testimony?

A. To present the position of Utilities, Inc. (UI) and its subsidiaries regarding the proposed rule.

Q. What is the position of UI regarding the proposed rules?

A. Our position is consistent with that of the Florida Waterworks Association (FWWA). Specifically, we have issue with three items of the Rule, two of which the FWWA addresses in their testimony, and one that has yet to be addressed.

First is the margin reserve period. The proposed Rule proposes the margin reserve period to be only eighteen months. We have experienced in our subsidiaries that the "time period needed to install the next economically feasible increment of plant capacity" often exceeds eighteen months by years, not months. Our concerns regarding this issue in its entirety are expressed the testimony provided by the FWWA.

The second issue is the imputation of contributions-in-aid of construction (CIAC) on margin reserve. The entire premise of margin reserve is obfuscated by imputing CIAC. Rather than be repetitive, our concerns regarding this issue in its entirety are expressed the testimony provided by the FWWA.

Finally, we believe the ultimate reliance on historical data to estimate future growth rates should be eliminated. The Florida Public Service Commission realizes that other factors impact growth, however the proposed Rule 25-30.431 (5) (d) states:

> The utility shall also submit a linear regression analysis using average ERCs for the last 5 years. The utility may submit other information that will affect growth in ERCs.

Although a linear regression analysis may be useful in the majority of cases, specifically requesting the analysis promotes ultimate reliance on the estimating device.

Q. What changes in the wording of Rule 25-30.431 (5) (d) do you propose?

A. We propose that the request for a linear regression analysis be eliminated. The section should read:

> The utility may also submit other information that will affect growth in ERCs.

Q. Why are you proposing this change in the Rule?

A. By requiring the utility to submit a regression analysis in all cases, the analysis likely to become an inflexible ruler for measuring growth estimates. The analysis only predicts future growth based on historical growth. This reliance on past data can work to both over and under estimate future growth.

For instance, if a system is relatively new, and new subdivisions are in a planning stage, historical growth is a poor indicator of future growth. Assume a system serves only one or two subdivisions in the first five years of operation. In year six, three new large subdivisions are planned and subsequently built. In this instance obviously the reliance on historical growth rates in year six would be grossly inaccurate in estimating future growth.

In the converse situation, if the subdivisions served by the utility are in the tail end of their development, growth rates will diminish rapidly. For example, a utility that historically served new developments with a constant growth rate is nearing the completion of its current development. Within the next year the subdivisions served are planned to completely built out, and future planned subdivision construction will not occur for several years. Under these conditions, a regression analysis would over estimate future growth.

In both of the aforementioned scenarios, the obvious external factors would be addressed. However, we are concerned that as all utilities are required to file a regression analysis, the analysis will carry greater weight than is appropriate to determine an adequate growth estimate. At what point will the Staff analyst reject the staple analysis for "other information that will affect growth in ERCs" as the Rule suggests may be submitted by the utility.

Q. Are proposing the Commission abandon the use of regression analysis altogether?

A. Absolutely not. Used properly, in a relatively stable environment, regression analysis can adequately predict future growth rates. However, regression analysis is not always the best tool to use, and by requiring its submission an undue influence will exist from the analysis' results. Consequently, the focus of the utility will change from supporting a reasonable growth rate to disproving the results of the regression analysis in favor of other evidence offered by the utility.

Q. Does this conclude your testimony?

A. Yes it does.

RESPONSIVE TESTIMONY OF FRANK SEIDMAN
BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION
REGARDING THE RULES FOR MARGIN RESERVE AND IMPUTATION
OF CIAC ON MARGIN RESERVE
ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION
DOCKET NO. 960258-WS

Q. Please state your name.
A. My name is Frank Seidman.

Q. Have you previously filed testimony in this docket on behalf of the Florida Waterworks Association (FWWA)?
A. Yes, I have.

Q. What is the purpose of your responsive testimony?
A. The purpose is to respond to portions of the prefiled testimony of PSC staff witness Crouch and the comments of the Office of Public Counsel (OPC) and the Florida Department of Environmental Regulation (DEP.)

RESPONSE TO WITNESS CROUCH

Q. On page 3 of his testimony, Mr. Crouch describes what should be considered used and useful by the Commission. Do you agree with his description?

A. Yes, I am in complete agreement with his description. Unfortunately, what Mr. Crouch describes does not reflect Commission policy, and Mr. Crouch's recommendation for margin reserve policy does not honor that description.

Q. Would you please explain your comment further?

A. Yes. According to Mr. Crouch:

"The utility's investment, prudently incurred, in meeting its statutory obligations shall be considered used and useful. On the other hand, investment not prudently incurred, and/or not required to provide safe, efficient and sufficient service to existing customers shall not be considered used and useful."

This statement is at odds with Commission policy because current Commission policy relegates portions of prudently invested plant to non-used & useful plant, the carrying costs of which are theoretically recoverable from future customers through a mechanism called AFPI or "Allowance for Funds Prudently Invested."

Thus the Commission on the one hand recognizes the funds are prudently invested and on the other hand designates the investment as non-used and useful.

Q. How does Commission policy relegate funds prudently invested to non-used plant?

A. By failing to recognize as used and useful through the margin reserve allowance, or any other means, the cost of plant that has been prudently sized to take advantage of economies of scale and to comply with DEP planning requirements.

Q. At page 6 of his testimony, Mr. Crouch describes margin reserve as a factor that recognizes the amount of plant needed to be available to connect customers that will be coming on line after the test year. Do you agree with that description?

A. No. It is incomplete. It fails to recognize that other major purposes of margin reserve are to provide the utility with the ability to meet changes in the demands of existing customers, to protect the integrity of the system for them and to allow the utility to serve them in an economic manner.

Q. **At page 9 of his testimony, Mr. Crouch quotes a portion of the DEP rules regarding the planning of wastewater facilities, seemingly as support for recommending a three year margin reserve for wastewater plant. Do you have any comment with regard to his quotation?**

A. Yes. Mr. Crouch quotes Section 62.600.405(8)(c) of the DEP rules, which indicates that a utility must submit a completed construction permit application if permitted capacity will be equaled or exceeded within three years. But this partial quote of the relevant rule is misleading in that it makes it appear as if the DEP requirements for treatment plant expansion begin only three years prior to that expansion. If he had also quoted subparagraphs (a) and (b) of Section 62.600.405(8), F.A.C., it would be clear that a utility must begin planning and preliminary design some five years prior to expansion. The prefiled comments of DEP in this docket make this very clear.

At page 9 of his testimony, Mr. Crouch acknowledges that before a utility can submit a construction permit application, it must invest a considerable amount of time and money in design and planning. Yet his recommended margin reserve fails to reflect that very time period during which a utility must have capacity adequate to serve its certificated area.

Q. **Does Mr. Crouch provide any support for his recommendation that the margin reserve period for water plant remain at 18 months?**

A. No. He merely observes that the DEP has not yet formulated a planning expansion rule water plants similar to that for wastewater plants. But DEP has made it clear through its comments at a previous workshop and in this docket that the position of the department with regard to capacity planning for water is similar to that for wastewater. The Commission should acknowledge this in setting a margin reserve period for water plant.

Q. Also at page 9 of his testimony, Mr. Crouch discusses the differences between the PSC's margin reserve and the DEP's reserve margin. Do you agree with his conclusions?

A. No. Either Mr. Crouch does not understand the function of a reserve or he is playing word games. Mr. Crouch says that to DEP, reserve margin represents the amount of capacity needed to function properly, but to the PSC it is an economic consideration for setting rates.

Whether it is called margin reserve or reserve margin is of no consequence. But whether being considered by DEP or PSC, the reserve indeed should be the capacity needed for a utility to function properly. Whatever capacity is necessary to allow the utility to function properly until the next increment of plant comes on line and to meet its obligations to the public is the capacity for which the PSC should determine the cost and allow in rate base.

Q. What do you think of Mr. Crouch's last sentence on page 9 of his testimony, "A legitimate reserve capacity may in fact be a prudent, wise investment by a utility, but it might not be totally included in the margin reserve period covered by the PSC."

A. I think that sentence is illogical and sums up all that is wrong with the existing and proposed Commission policy on margin reserve. It clearly points out that Commission policy is not coordinated with DEP policy and apparently by design. Mr. Crouch's statement leads one to conclude that the ratemaking considerations for determining allowable reserves do not, and are not intended to, reflect the cost of providing service. If they were intended to reflect cost of providing service, they would include in rate base the cost of capacity, including reserves, necessary for the utility to function properly. And Mr. Crouch's statement is a blatant admission that the existing Commission policy, and the recommended policy, do not compensate, and do not intend to compensate a utility for "a prudent, wise investment."

Q. Based on Mr. Crouch's comments regarding reserves, is it a prudent, wise decision for a utility to invest in reserves needed to function properly?

A. From the viewpoint of meeting its statutory obligations, maintaining reserves adequate for the utility to function properly is prudent and wise. But, from an economic viewpoint, it is clearly imprudent and unwise for a utility to invest in plant for which it knows it will not be compensated.

Q. At page 10 of his testimony, Mr. Crouch says that a utility can recover the cost of reserves required for a utility to function properly through AFPI. Do you agree?

A. No. The studies prepared by Milian, Swain & Associates show that this just does not happen. But regardless, a reserve that has been identified as necessary for the utility to function properly, is a cost responsibility of current customers. The Commission's responsibility is not just to keep costs low, but to provide sufficient compensation to a utility to allow it to attract capital at a reasonable cost and to remain financially sound. This won't be the case under Mr. Crouch's scenario. The funds for this necessary plant must come from investors or lenders. But since there is no current source of earnings for them, the cost of the riskiness associated with recovery through AFPI will most likely result in higher debt costs. It won't be met with higher equity costs because the Commission's leverage formula doesn't address this type of risk. And without a risk premium related to speculative deferred income for used and useful plant, equity infusion is not a likely source of capital.

RESPONSE TO COMMENTS OF OPC

Q. At page 1 of its comments, OPC states that margin reserve is neither used nor useful to present customers. Do you agree with that statement?

A. No. It is wrong and I have addressed it at considerable length in my prefiled direct testimony. Margin reserve is necessary to protect the quality of service to existing customers as new customers hook up to the system. The most obvious test of the OPC argument would be to build a utility system with zero margin reserve and make the OPC phone number available to each customer for complaints. But that is not a viable option.

The OPC argument fails also to recognize that in order to meet DEP requirements, a utility cannot operate without a reserve. Specifically with regard to wastewater service, a utility must expand its plant before it reaches capacity. Section 367.081, F.S. entitles a utility to the opportunity to earn a fair return on property used and useful in the public service. It doesn't say on property used and useful in serving existing customers or in serving future customers. It says "in the public service." The ability to be ready to serve is a statutory obligation and makes the investment to be ready to serve an investment in the public service.

A water and wastewater utility is not like a service company operating on the free market. It cannot choose whether to provide service; it is obligated to provide service. It cannot wait for expressed customer demand before it commits funds to provide service; it is obliged to be ready. A utility is obligated by law to be ready to serve, and in turn the law gives the utility the opportunity to earn on the investment necessary to meets its obligations. It is a two way arrangement. The OPC wants it to be a one way arrangement wherein the utility must commit to the investment but <u>speculate</u> as whether it can recover costs.

Q. **How does the Commission address the recovery of the cost of reserves and making capacity available to serve new electric and gas customers?**

A. All prudent costs associated with providing electric or gas service, current or future, are recovered through rates to current customers.

Q. **On page 2 of its comments, OPC states that to achieve a proper matching of CIAC and investment, CIAC equivalent to the ERCs represented by margin reserve should be imputed to rate base. Do you agree?**

A. No. Imputation does not match CIAC to investment. As I have previously stated, if it were a match, you would not need to impute it. Margin reserve is an investment already made in the test year. Imputed CIAC is a payment to be received outside of the test year. It is, in fact, a payment to be received 1.5 to 5 years outside of the test year, depending on the designation of the margin reserve period. If I were to propose in a rate application to include as test year costs, expenses to be incurred in the 1.5 to 5 year period following the test year, the Commission would throw them out, and rightly so - they are not matching. If it were proper to impute CIAC associated with future customers over a 1.5 to 5 year period following the test year, then it would be just as proper to impute the plant investment associated with them, including investment in margin reserve, and to impute the revenues, expenses, depreciation and taxes associated with them. Let's be honest about it; imputation is not matching, it is the antithesis of matching.

Q. At page 2 of its comments, OPC states that the risk of serving future customers is a risk that should be borne by stockholders and that the utility is compensated for that risk in its allowed return of equity. Do you agree?

A. No. And I have no idea where this theory comes from. Clearly, as a regulated monopoly, a utility is obligated to provide, and be ready to provide, service within its certificated area. In return for meeting this obligation, the utility is protected from the type of risk of which OPC speaks. That is one of the factors that distinguishes a regulated monopoly from a free market enterprise. A free market enterprise has the option of serving or not serving. It can act to minimize financial risk by simply waiting for demand to build up before serving it. A regulated monopoly does not have that option. It must be ready to serve, and as long as it makes rational decisions based on the best information available at the time, the investment associated with those decisions is considered prudent.

Q. OPC states that the Commission needs to adjust its leverage formula if it does not impute CIAC on margin reserve. Is that correct?

A. No. The Commission's Order No. PSC-95-0982-FOF-WS, establishing the leverage formula and level of allowable return on equity does not even mention margin reserve or imputed CIAC. It does not allude to any premium built in related to the risk of future customers connecting to the system. The risk premiums addressed by the order are those generally related to the inability of water and wastewater utilities to access the public debt and equity markets because of their size. There is no risk premium related to future customer connections in the leverage formula for which an adjustment can be made.

Q. At page 3 of its comments, OPC argues that margin reserve is not needed to provide a cushion for changing load conditions because "averages used to calculate used and useful already take plant load fluctuations into consideration." Do you agree?

A. No. If used and useful is based on the peak demand on the system, it certainly incorporates the ability of the system to meet fluctuations between the historic minimum and peak loads. In that sense peak capacity provides the ability to serve average demand. But it does not provide any cushion whatsoever to meet fluctuations in the peak demands of existing customers, whatever the cause. All types of utilities require some margin or cushion to be able to react to changes in the peak demands of their existing customers. It would be shortsighted and irresponsible not to have capacity in reserve to meet changing peak demand.

Further, at page 3 of its comments, OPC argues that since water and wastewater utilities are heavily contributed, we cannot compare them to electric utilities with regard to the need for a reserve. Whether or not a utility finances a portion of its plant through CIAC has no bearing on whether reserves are necessary for a utility to adequately meet its service obligations. Reserves are either needed or not needed. How the costs of reserves are accounted for is not a factor in determining whether they are needed. However, with regard to cost responsibility for necessary reserves, it should be clear that the CIAC paid by customers is a <u>prorata</u> share of the costs incurred to serve them. CIAC is not a "readiness to serve" charge as implied by OPC nor is any customer paying a premium or paying the same costs twice or paying for in rates what has already been paid for through CIAC. That is why rate base reflects the investment <u>net of CIAC</u>. OPC's allegations simply detract from the issue at hand; i.e. determining the extent of margin reserve necessary for a utility to function properly and meets its statutory obligations.

Q. At page 3 of its comments, OPC argues that margin reserve is not used and useful and therefore should be included for cost recovery in AFPI. Do you agree?

A. Obviously not. A primary purpose of our prefiled testimony is to show the consistent, historical support for a reserve requirement being used and useful plant. To suddenly reverse that conclusion to placate OPC is uncalled for. As a matter of logic, <u>if</u> margin reserve were truly not used and useful [which is clearly not the case], then it should not be built . The Commission should then tell utilities outright "do not build a reserve margin - it is not used and useful. If you are unable to meet your obligations to serve because you do not have a reserve margin, you will not be penalized. It will not be considered a service deficiency." At least then, everyone will know where they stand. But I do not think anyone wants to make such a statement and be subject to the resulting consequences. The simple fact is, margin reserve is necessary and it is used and useful.

RESPONSE TO COMMENTS OF DEP

Q. At page 4 of its comments, DEP concludes that reuse facilities should be considered 100% used and useful. Do you agree?

A. Yes. DEP substantiates that the provisions of Section 403.064, F.S. require this Commission to allow utilities to fully recover prudently incurred costs through its rate structure. The only persons to whom rates can be charged are existing customers. In addition, DEP points out that it is DEP that is responsible for defining reuse and that the PSC should cross reference its rules to those of DEP. We agree with DEP's comments on this matter. The policies of the agencies regulating utilities should be coordinated.

Q. If the Commission does not recognize reuse projects as 100% used and useful, what would be the potential consequence?

A. If a utility cannot earn a return on a portion of the project costs, then the project would no longer be economically prudent for the utility to initiate. The consequence would be to discourage the development of reuse projects in contradiction to the state objectives stated in Section 373.250(1), F.S. (1995).

Q. Does that conclude your responsive testimony?

A. Yes, it does.

RESPONSIVE TESTIMONY OF DEBORAH D. SWAIN

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

REGARDING THE RULES FOR MARGIN RESERVE AND

IMPUTATION OF CIAC ON MARGIN RESERVE

ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

Q. PLEASE STATE YOUR NAME AND ADDRESS FOR THE RECORD.

A. My name is Deborah Swain.

Q. DID YOU FILE DIRECT TESTIMONY IN THIS CASE ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION (FWA)?

A. Yes, I did.

Q. WHAT IS THE PURPOSE OF YOUR RESPONSIVE TESTIMONY?

A. I would like to respond to certain comments filed by Office of Public Counsel (OPC).

Q. ON PAGE 2 OF ITS COMMENTS, OPC STATES THAT IN ORDER TO PROPERLY MATCH CIAC AND INVESTMENT, CIAC MUST BE IMPUTED. DO YOU AGREE WITH THIS STATEMENT?

A. No, not at all. This statement highlights the most basic error in the practice of imputing CIAC. An imputation causes a mismatch with margin reserve, not a match. As I explained in my direct testimony, the money for margin reserve plant has already been spent whereas the CIAC funds have not been received. As a matter of fact, if CIAC is imputed, in order to create a match, an imputation of plant costs to be incurred in the future should be made.

Q. OPC STATES THAT IF CIAC IS NOT IMPUTED, THE UTILITY MAY OVEREARN. DO YOU AGREE?

A. No, I do not. This concern is nonsensical. The utility should be able to earn a fair return on margin reserve if it is a used and useful cost. In order to preserve the margin reserve, enabling the utility to earn a fair return on it, you cannot impute CIAC. As a matter of fact, if CIAC is imputed, the utility will underearn. OPC has completely failed to recognize that as new customers connect, not only does the utility collect CIAC, but it must make expenditures to provide for the then future customers. As I show on Table 5-1 in Exhibit DDS-2, in an eleven year study of 174 utilities, plant expenditures outpaced CIAC collected three to one.

Q. OPC ALSO STATES THAT NOT IMPUTING CIAC WOULD ENCOURAGE UTILITIES TO OVERPROJECT CUSTOMER GROWTH. DO YOU AGREE?

A. No, I do not. And in any event, this assertion is not pertinent. The utility's projection of customer growth must be adequately justified in its rate application, and can easily be challenged and / or validated upon review. Obviously, the utility must be able to prove the basis for its projections. Such justification may include any combination of historical growth statistics, developer agreements, comprehensive master plans, construction plans, etc. To suggest that margin reserve should be eliminated by imputing CIAC as a way to keep the utility honest is absurd.

Q. OPC SUGGESTS THAT MARGIN RESERVE BE ELIMINATED, AND INSTEAD BE INCLUDED IN AFPI. WOULD THIS BE ACCEPTABLE?

A. No, it would not. The utility should not have to recover margin reserve through such a speculative means, when, as we have demonstrated, margin reserve should be recovered from existing customers. Furthermore, while conducting our study, we found many utilities do not have an AFPI rate approved. There is little incentive to utilities to request AFPI because it is so speculative, and because its recovery period is so narrow.
The fact is, margin reserve benefits existing customers, and as such, it should be, as it has been, recoverable from existing customers.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

RESPONSIVE TESTIMONY OF ARSENIO MILIAN, P.E.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

REGARDING THE RULES FOR MARGIN RESERVE AND

IMPUTATION OF CIAC ON MARGIN RESERVE

ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION

DOCKET NO. 960258-WS

Q. PLEASE STATE YOUR NAME AND ADDRESS FOR THE RECORD.

A. My name is Arsenio Milian.

Q. DID YOU FILE DIRECT TESTIMONY IN THIS CASE ON BEHALF OF THE FLORIDA WATERWORKS ASSOCIATION (FWA)?

A. Yes, I did.

Q. WHAT IS THE PURPOSE OF YOUR RESPONSIVE TESTIMONY?

A. I would like to respond to certain comments made by Gerald Hartman and Richard Harvey on behalf of Southern States Utilities, Inc. I agree with the comments each of them filed, but there are several in particular which I feel merit further discussion.

Q. ON PAGE 7, STARTING LINE 13, OF MR. HARTMAN'S TESTIMONY, HE EXPLAINS THE FLAW IN THE

COMMISSIONS MARGIN RESERVE PERIOD. DO YOU AGREE WITH HIS OBSERVATIONS?

A. Yes, absolutely. The Commission has equated the margin reserve period to the average plant construction duration. As Mr. Hartman observes, the Commission treats margin reserve as a "surrogate" for future plant expansion, but does not include the actual, higher cost of future plant. However, we are not suggesting that margin reserve be equal to actual future construction costs to be incurred in the next five years, but to include only a portion of already incurred historical cost which benefits current customers over that period. The margin reserve period of five years represents the period of time necessary to have plant planned, designed, permitted and constructed in order to serve the next customer to connect. That process usually averages five years, and as Mr. Hartman points out, sometimes more.

Q. **DO YOU AGREE WITH MR. HARTMAN' S STATEMENT ON PAGE 17, LINE 19, THAT THE COMMISSION'S POLICIES ON MARGIN RESERVE SERVE AS A DISINCENTIVE TO ECONOMIES OF SCALE?**

A. Yes, I do. In my own experience as a utility manager for many years, and as a result of the survey my firm conducted, I see over and over again that the final choices made by utilities hinge strongly on the treatment they expect from the Commission. If the Commission wants utilities to make the prudent economic choices, they should not send the opposite signal. When the Commission allows a margin reserve period of only one or two years, then how can they expect utilities to do anything other than construct in small one to two year increments, that will inevitably result in higher rates to existing and future customers.

Q. **ON PAGE 9, MR. HARTMAN DEFINES WHY MARGIN RESERVE IS NECESSARY. DO YOU AGREE?**

A. Yes, I do. He has summarized the key issues we have raised to explain why it is necessary to allow a five year margin reserve. We have performed a study which proves that margin reserve encourages economies of scale, for which there is a significant economic benefit to both the utility and the customers. Furthermore, if margin reserve is inadequate, the utilities will be compelled to construct in small increments, and always be on the edge of regulatory compliance. In effect, this will result in an increase in the cost to the customers as the utility must be in a state of managing multiple projects, defending regulatory compliance, and filing rate applications.

Q. **ARE YOU IN AGREEMENT WITH COMMENTS MADE BY MR. RICHARD HARVEY WITH RESPECT TO THE IMPACT OF ECONOMIC REGULATION ON ENVIRONMENTAL COMPLIANCE?**

A. Yes, I am. I have long advocated protection of the environment, but became more aware and supportive after serving as a Board Member on the South Florida Water Management District. Legislation has been enacted which establishes the importance of protecting our resources at the local, state and national levels. However the Commission may not realize the serious potential impact of their rules on the environment. On numerous occasions, utilities are forced to struggle between environmental compliance and economic survival. While at the District, our staff actively participated in efforts to educate the public, similar to Mr. Harvey's own experiences. But despite the efforts of the Districts and DEP, the Commission has not recognized that when environmental protection legislation is enacted, the economic choice has been made. No one is well served by forcing utilities to live on the edge, barely meeting environmental requirements, for the purpose of artificially holding down rates on a short term. Any Commission policy that would in effect disallow prudent utility investment to protect our environment is short sighted and should be discontinued. The Commission must encourage utilities to operate in a manner that enables them to adhere to the goals of State and the protection of our natural resources. Their proposed rule will not accomplish this.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

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DIVISION OF APPEALS

RESPONSIVE TESTIMONY OF JOHN F. GUASTELLA

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

ON BEHALF OF

SOUTHERN STATES UTILITIES, INC.

DOCKET NO. 960258-WS

Q. **PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

A. John F. Guastella, P.O. Box 371, Peapack, New Jersey.

Q. **WHAT IS YOUR OCCUPATION?**

A. I am President of Guastella Associates, Inc. I am a licensed Professional Engineer, and I have been actively engaged in matters involving utility valuations, management, rates and service for thirty-four years. I formed Guastella Associates in 1978 to provide consulting services, specializing in water and wastewater utilities.

Q. **PLEASE STATE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.**

A. I graduated from Stevens Institute of Technology in June of 1962, receiving a degree in Mechanical Engineering. I have completed courses in utility regulation sponsored by the National Association of Regulatory Utility Commissioners (NARUC) and conducted by the University of South Florida, Florida Atlantic University, the University of Utah and Florida State University.

I was employed by the New York State Public Service Commission for sixteen years from 1962 to 1978. With the exception of two years in which I was involved in the regulation of electric and gas utilities, my time with the New York Commission was devoted to the regulation of water utilities. After a series of promotions during the years 1962 to 1970, attained through competitive examinations, I was promoted to Chief of Rates and Finance in the Commission's Water Division. In 1972 I was made Assistant Director of the Water Division. In 1974 I was appointed by the Chairman of the Commission as Director of the Water Division, a position I held until my resignation from the Commission in August of 1978.

My duties with the Commission included the performance and supervision of various engineering and economic studies concerning valuation of utility property, financing, rates and service of electric, gas and water utilities. While in the Water Division, I either examined or supervised the examination of the books and records of literally hundreds of water utilities.

As Director of the Water Division, I was responsible for the regulation of more than 450 water companies in New York State, heading a professional staff consisting of 32 engineers and three technicians. One of my primary duties was to advise the Commission during its adjudication of formal proceedings, as well as other matters. In the course of those deliberations, testimony, exhibits and briefs submitted in formal proceedings were reviewed and analyzed. My duties and responsibilities covered such subjects as the reasonableness of investments in utility plant, appropriate depreciation, contributions in aid of construction, advances in aid of construction, construction work in progress, working capital, amortizations, rate base, revenue level, operation and maintenance expenses, taxes, cost of capital, fundable capital, financing, capital structure, rate of return, rate design, rate structure, quality of service, and in general, all aspects of utility valuation, rate setting and service.

Another major responsibility was the review of all proposed legislation affecting water utilities in New York and the subsequent preparation of recommendations for use by the governor or the legislature in considering such legislation. I also made legislative proposals and participated directly in drafting bills that were enacted: one expanded the New York Commission's jurisdiction with respect to the regulation of the service provided by small water companies and another dealt specifically with rate regulations and financing of developer-related water systems. During my employment with the New York Commission, I handled or supervised the handling of thousands of consumer complaints by individuals, corporations and municipal, governmental and political officials.

Concurrently with my position as President of Guastella Associates, Inc., I served as President of Country Knolls Water Works, Inc., from 1987 to 1991, directing the management and operation of this utility which served some 5,000 customers.

I have prepared appraisals and valuations of utility property, depreciation studies, rate analyses, cost allocation and rate design studies, and management and financial analyses. I have provided consulting services for municipal and investor-owned water and wastewater utilities as well as gas utilities and solid waste collection and disposal companies.

Q. **BEFORE WHAT REGULATORY AGENCIES AND MUNICIPAL JURISDICTIONS HAVE YOU PREVIOUSLY PRESENTED EXPERT TESTIMONY?**

A. I have testified as an expert witness in the areas of water/wastewater utility engineering, rate-making, economics and valuation, and I have testified on one or more of these subjects in the states of Connecticut, Florida, Illinois, Massachusetts, Missouri, Nevada, New Jersey, New Mexico, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, Texas and Virginia.

Q. BRIEFLY STATE YOUR ACTIVITIES IN CONNECTION WITH PROFESSIONAL ORGANIZATIONS AND ASSOCIATIONS.

A. I served as Vice-Chairman of the Staff-Committee on Water of the National Association of Regulatory Utility Commissioners (NARUC).. While on that committee, I prepared a 95-page instruction manual entitled, "Model Record-keeping Manual for Small Water Companies," which was published by the NARUC. The manual describes in detail the kinds of operating and accounting records that should be kept by small water utilities, with instructions on how to use those records in order to properly operate a water system and properly keep account of the cost of providing services.

Since 1974 I have prepared the rate case study material, assisted in the coordination of the program and served as an instructor at the Annual Fall Seminar on Water Rate Regulation sponsored by the NARUC and conducted by the University of South Florida, Florida Atlantic University, University of

Utah, and currently Florida State University. This seminar is recognized as being one of the best in the country for teaching rate-setting principles and methodology. It is attended by representatives of regulatory agencies, utilities, engineering, accounting, economic and law firms throughout the country. In 1980, as a special consultant to NARUC, I assisted in the establishment of another similar seminar which has been held annually in the spring in the western United States.

I served as an instructor and panelist in a seminar on water and sewer utility regulation conducted by the Independent Water and Sewer Companies of Texas. As a member of the National Association of Water Companies (NAWC), I serve on its Rates and Revenue Committee and Small Company Committee. I am a member of the American Water Works Association and served on its Water Rates Committee, and assisted in the preparation of the AWWA Rates Manual, Third Edition. I have also served on a joint committee on rate design composed of staff members of NARUC and NAWC. In connection with my serving on these committees, and in connection with cost allocation and rate design studies I have performed in the course of my work, I have participated in decisional meetings to determine proper engineering and construction criteria in relation to costs in the design of water and sewer systems.

I have prepared and presented papers at a number of meetings of the National Association of Water Companies, the National Association of Regulatory Utility Commissioners, the New England Conference of Public Utilities Commissioners, and at meetings of the Mid-America Regulatory Conference, the Public Utility Law Section of the New Jersey Bar Association, the Pennsylvania Environmental Council, the Southeastern Association of Regulatory Utility Commissioners, and the New Jersey Chapter of the American Water Works Association.

Q. **WHAT IS THE NATURE OF YOUR INVOLVEMENT IN THIS CASE?**

A. I have been asked by Southern States Utilities to offer responsive testimony to the direct testimony and comments submitted by other parties in this docket. In that regard I will address the rate setting principles regarding the specific issue of margin reserve and the related issue of imputation of contributions in aid of construction (CIAC).

Q. IN WHAT CONTEXT ARE THE ISSUES OF MARGIN RESERVE AND IMPUTATION OF CIAC ADDRESSED IN THE RATE SETTING PROCESS?

A. Margin reserve is a component of the used and useful analyses, and the imputation of CIAC is a related rate setting adjustment where margin reserve allowances have been made.

Q. WOULD YOU PLEASE EXPLAIN WHAT IS MEANT BY "USED AND USEFUL?"

A. The term "used and useful" is simply a regulatory rate setting term which describes the cost of property included in a utility's rate base (net investment) upon which the utility is entitled to earn a rate of return. The balance of the cost of property which is excluded from rate base is referred to as "non-used" plant.

Q. WHAT IS YOUR EXPERIENCE IN OTHER STATES REGARDING USED AND USEFUL CONSIDERATIONS?

A. I have provided consulting services for utilities in nearly half of the states in the country, and I am generally familiar with rate setting practices in most states as to any unique rate setting methodology. I am not aware of any state which does not require that rates be based on the investment in utility plant in service which is used and useful. However, I am also not aware of any other state which determines used and useful for water and wastewater utilities as the Florida Commission does.

In general, all regulatory agencies expect utilities to install economically-sized facilities which have sufficient capacity to meet today's as well as tomorrow's demands. In other states, if a water or wastewater utility merely has a plan to utilize a new or expanded facility, it is considered entirely used and useful -- even if only a small portion of its capacity is utilized when it initially goes into service. There are for example, cases in which the cost of acquiring land for a future reservoir or treatment plant would be considered entirely used and useful for rate setting purposes, despite the fact that it would not actually be "in use" within the immediate future. In contrast, the Florida Commission has recognized land acquired for future plant sites as used and useful only for electric and other utilities, not water and wastewater utilities.

Q. **WHY, IN THE EXAMPLE YOU REFERENCED, WOULD THE COST OF LAND FOR FUTURE USE BE INCLUDED IN RATE BASE AS ENTIRELY USED AND USEFUL EVEN THROUGH IT WILL NOT**

ACTUALLY BE IN SERVICE WHEN THE NEW RATES GO INTO EFFECT?

A. Because first and foremost rate setting is a process of establishing the cost of providing safe, efficient and sufficient service. Throughout the country and in Florida for utilities other than water and wastewater utilities, "used and useful" allowances are not limited to only the exact proportion of current demands to capacity or existing customers to potential customers. If a utility must install prudently-sized facilities in order to adequately serve customers on a continuous and long-term basis -- in compliance with regulatory requirements as to adequacy of service -- then the cost of doing so must be reflected in the allowed rates. Otherwise, the rates would not be consistent with such legal guideposts as the <u>FPC v. Hope Natural Gas Co.</u>, 320 U.S., 591, 603 (1944), which states that:

> It is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock... By that standard the return to the equity

> owner should be commensurate with risks on investments in other enterprises having corresponding risks. That return, moreover, should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital.

Q. **WHAT IN YOUR OPINION IS THE PROBLEM IN FLORIDA WITH RESPECT TO USED AND USEFUL CONSIDERATIONS FOR WATER AND WASTEWATER FACILITIES?**

A. Florida gas, electric, and telephone utilities do not suffer the unjustifiable used and useful treatment imposed on water/wastewater utilities despite the fact all of these utilities make investment in plant necessary to meet peek demands of current customers and to maintain the capability to provide safe, efficient, and sufficient service to all customers in the future. In the past, the Commission has noted that these other utilities do not generally collect CIAC charges at the level received by water/wastewater utilities. This distinction does not justify a grossly divergent method of applying used and useful to water/wastewater utilities. Investment is made by electric, gas, and telephone utilities in facilities necessary to serve the same geographic areas (the same developments) served by water/wastewater utilities; yet, the gas, electric, and telephone utilities are allowed to recover their investment in such facilities as prudent and fully used and useful from current customers while the water/wastewater utilities are not. The collection of CIAC by water/wastewater utilities does not justify this result. If the same used and useful methods that applied to other Florida utilities were applied to water/wastewater utilities and overearnings arose due to CIAC collection (or any other reason), the Commission could and likely would initiate an overearnings investigation. A Commission's overearnings oversight is the historic and almost universally applied system of checks and balances in utility ratemaking. Artificial mechanisms to reduce rates, such as CIAC imputation and margin reserve periods inconsistent with real-world engineering and economic considerations, are not fair or reasonable. Further, since the CIAC which may be collected from each new customer equates to only a portion of the total cost of plant necessary to serve future customers -- at maximum 75% under the

Commission's guidelines and often a much smaller portion -- it is unreasonable to consider future collections of CIAC as a justification for reduced margin reserve and used and useful levels, as Public Counsel suggests.

Q. **WHAT OTHER PROBLEMS HAVE YOU IDENTIFIED?**

A. Used and useful allowances, including the portion related to margin reserve, coupled with the imputation of CIAC, have been made in many instances regardless of their impact on the ability of water and wastewater utilities to cover the cost of providing adequate service. As reflected in the presentation of other industry representatives in this docket, used and useful calculations and margin reserve allowances have not adequately provided for the planning, permitting, design, construction and testing of facilities needed to comply with regulatory and environmental requirements. The existing FPSC practices do not adequately recognize economies of scale, and in certain instances, allowances have not provided enough revenue requirement to cover even the least cost facility. Moreover, the imputation of CIAC related to margin reserve erroneously presumes that future service availability charges are currently available to offset the cost of the existing facilities.

Accordingly, rates for water and wastewater utilities in Florida are not consistently established under the same cost recovery principles and used and useful definitions as have been applied throughout the country (and in Florida for other utilities).

Q. **DO YOU HAVE AN OPINION AS TO WHY THE FPSC TREATS WATER AND WASTEWATER UTILITIES DIFFERENTLY WITH RESPECT TO USED AND USEFUL CONSIDERATIONS?**

A. I believe the reason the FPSC treats water and wastewater utilities differently with respect to used and useful considerations is to protect utility rate payers from subsidizing the risk of the success or failure of related real estate developers.

Q. **IS THAT A VALID REASON?**

A. Affiliated real estate developers should bear the risk associated with the success or failure of their real estate business. That being said, it must be understood that the real estate development business is a highly competitive business for which there is no need for a substitute for competition. A real estate developer's profit is not regulated, nor should it be. There are obviously many factors which determine the success or failure (or level of profitability) of a particular real estate project. While utility rate payers should not subsidize affiliated real estate developers, it is equally appropriate that they should not be subsidized by affiliated real estate developers.

With respect to the utility business, there is no competitive market which establishes the profitability of water and wastewater utilities. Utility rate regulation serves as a substitute for competition when establishing the profitability of utilities. When utility rate regulation functions properly, utility rates are established to cover <u>the cost of providing utility service</u>. Establishing utility rates based on the utility's cost of providing service should not add to or take away from the profitability of real estate sales.

Q. **ON WHAT BASIS SHOULD USED AND USEFUL CONSIDERATIONS BE MADE IN ORDER TO PROTECT UTILITY RATE PAYERS FROM SUBSIDIZING AFFILIATED REAL ESTATE DEVELOPERS AND, AT THE SAME TIME, PROTECT REAL ESTATE DEVELOPERS FROM SUBSIDIZING THE COST OF PROVIDING UTILITY SERVICE?**

A. Used and useful determinations for water and wastewater utilities in Florida should reflect the same considerations and definitions as for other utilities in Florida and throughout the country.

With respect to margin reserve, the presentations by other industry representatives have made specific recommendations, supported by thorough analyses and discussions as to why margin reserve allowances are essential and as to the appropriate magnitude of those allowances. I not only agree with those findings and recommendations, I have made similar recommendations in individual rate cases in Florida. Those presentations underscore the fact that Florida water and wastewater utilities have not been treated the same as other utilities, resulting in rates which produce less revenue than the cost of providing service. Therefore, we are not dealing with a situation in which utility rate payers may be subsidizing the real estate business. Instead we are attempting to correct a situation in which used and useful considerations as to margin reserve and the imputation of CIAC have required utility stockholders to subsidize the actual cost of providing utility service.

Q. **WHAT IS YOUR OPINION WITH RESPECT TO THE IMPUTATION**

OF CIAC?

A. With the exception of the comments by Public Counsel, there is universal recognition that imputation of CIAC related to margin reserve creates a mismatch between revenues and costs. I have similarly testified in rate cases on many occasions. The imputation of CIAC, and inadequate margin reserve allowances, deny water and wastewater utilities the same rate setting treatment given other utilities in establishing the cost of providing service.

Q. **IN YOUR OPINION, ARE THE RECOMMENDATIONS BY OTHER INDUSTRY REPRESENTATIVES REASONABLE?**

A. Yes, the industry recommendations regarding margin reserve allowance and the elimination of the imputation of CIAC are consistent with used and useful considerations throughout the country, and would produce rates which balance the need to protect both utility rate payers and utility stockholders from cross-subsidization.

In sum, those recommendations are consistent with the establishment of rates equal to the cost of providing service. They are also in the best interest of the rate payers since they will provide the incentive as well as financial ability to construct economically sized facilities which are sufficient to protect the public health and the environment.

Q. **DOES THIS CONCLUDE YOUR TESTIMONY AT THIS TIME?**

A. Yes.

State of Florida

Public Service Commission

-M-E-M-O-R-A-N-D-U-M-

DATE: December 4, 1996

TO: BLANCA BAYO, DIRECTOR OF RECORDS AND REPORTING

FROM: CHRISTIANA T. MOORE, DIVISION OF APPEALS CTM

RE: DOCKET NO. 960258-WS, IN RE: PETITION TO ADOPT RULES ON MARGIN RESERVE AND IMPUTATION OF CONTRIBUTIONS-IN-AID-OF-CONSTRUCTION ON MARGIN RESERVE CALCULATION, BY FLORIDA WATERWORKS ASSOCIATION

Enclosed for filing in the above docket is a Revised Statement of Estimated Regulatory Costs.

CTM
Attachment

cc: N.D. Walker
Persons on Attached List

APTRULES.MRD

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M E M O R A N D U M

November 25, 1996

TO: DIVISION OF APPEALS (MOORE)

FROM: DIVISION OF RESEARCH AND REGULATORY REVIEW (HEWITT) BH RD

SUBJECT: REVISED STATEMENT OF ESTIMATED REGULATORY COSTS FOR DOCKET NO. WS-960258; PROPOSED REVISIONS TO RULE 25-30.431, FAC, MARGIN RESERVE

SUMMARY OF THE RULE

The proposed rule reflects the 1991 Commission standard operating procedure (SOP 2406, effective 3/29/91) and recent Commission file and suspend rate case rulings regarding margin reserve and the imputation of contributions-in-aid-of-construction (CIAC). The proposed rule defines margin reserve for water and wastewater utilities as the amount of plant capacity needed to meet the expected demand resulting from customer growth. The rule specifies that, upon the utility's request and when justified, a provision for margin reserve shall be included in the used and useful determination in file and suspend rate case proceedings. The rule also indicates the data submission requirements for margin reserve, the specific calculation of margin reserve, and the additional information which will be considered by the Commission in margin reserve determinations. Unless otherwise justified, the rule sets the margin reserve period as follows: eighteen months for water source and treatment facilities, eighteen months for wastewater treatment and effluent disposal facilities, twelve months for water transmission and distribution facilities, and twelve months for wastewater transmission and collection facilities. If margin reserve is authorized, a corresponding provision for the imputation of CIAC is prescribed.

However, CIAC imputation is limited to the rate base component associated with margin reserve.

ESTIMATED NUMBER AND DESCRIPTION OF INDIVIDUALS AND ENTITIES REQUIRED TO COMPLY

There are 226 active certificates for water and wastewater companies in Florida regulated by the Commission. In many cases, the one company will hold both a water certificate and wastewater certificate. Included are 24 Class A certificates, 56 Class B certificates, and 146 Class C certificates.

DIRECT COSTS TO THE AGENCY AND OTHER STATE OR LOCAL GOVERNMENT ENTITIES

No direct costs to the Commission or other state or local government entities are expected to result from adoption of the proposed rule. However, the adoption of a rule regarding margin reserve and CIAC imputation may reduce the Commission staff effort required to prepare for and attend hearings on these issues in file and suspend rate case proceedings.

No other state or local government entities should have additional costs as a result of the proposed rules with the exception of the Florida Department of Environmental Protection (DEP). The DEP has participated in proceedings concerning Commission policy and DEP rules and may incur costs participating in future proceedings regarding the margin reserve period for individual utilities.

ESTIMATED TRANSACTIONAL COSTS TO INDIVIDUALS AND ENTITIES REQUIRED TO COMPLY

In order to determine the costs and benefits to those parties directly affected by the proposed rule, both the 1991 Commission SOP on margin reserve and recent case history were reviewed. Little material impact is expected because the proposed rule reflects the Commission SOP and recent Commission file and suspend rate case rulings regarding margin reserve and imputation of CIAC.

A review of the file and suspend rate cases completed from 1993 through

1995 revealed that in a slight majority of the cases, the Commission determined that utility plant was 100 percent used and useful. Therefore, margin reserve was not a relevant issue in those cases. It appears that in the majority of the cases for which plant was less than 100 percent used and useful (and margin reserve was requested by the utility), the Commission has adhered to an eighteen-month guideline for measuring a margin reserve period for plant other than lines. While all of these decisions did not follow the margin reserve period guidelines, the rule allows for deviation from the proposed reserve period if justified by a Commission review of other pertinent information. All but one of the file and suspend rate cases in the past three years included imputation of CIAC if margin reserve was approved.

The proposed rule requires two additional data filings that are not currently in the SOP for those utilities requesting margin reserve; however, the cost impact on the utility is expected to be minimal. The rule requires utilities to submit their most recent wastewater capacity analysis report to the Commission. This should result in minimal costs for the utilities because the report is currently prepared for DEP. Utilities are also expected to provide a linear regression of annual equivalent residential connections (ERCs) for the last five years. Although this calculation is currently performed by Commission staff, it is relatively straightforward and can be performed with a hand calculator.

The adoption of a Commission rule regarding margin reserve is expected to benefit ratepayers, the utilities, and Commission staff by reducing file and suspend rate case expenses. Rule adoption may help reduce rate case expenses by limiting testimony on margin reserve to special circumstances. However, if planned system additions include larger capacity than the minimum required for 18 months of growth, but which include economies of scale savings for the company and future customers, there may be additional time spent on related proceedings.

IMPACT ON SMALL BUSINESSES, SMALL COUNTIES, OR SMALL CITIES

Little direct impact on small businesses is foreseen, as the adoption of the proposed rule would impose minimal additional expected costs on water and wastewater utilities in general, including those which qualify as a small business as defined in Section 288.703(1), Florida Statutes (1995). Water and wastewater companies may experience a reduction in rate case expenses if the rule is adopted. No material impact is expected for other small businesses, as the rule is not expected to significantly affect the price of water and wastewater services.

REASONABLE ALTERNATIVE METHODS

One alternative to the adoption of the proposed rule is to retain the non-rule practice. However, staff believes that without the adoption of a rule, both Commission and utility staff time and effort will continue to be expended on re-hearing these issues during file and suspend rate case proceedings. Staff believes a rule should be adopted concerning margin reserve and the imputation of CIAC in order to reduce uncertainty regarding the Commission treatment of used and useful plant capacity. Both ratepayers and utilities would benefit from the reduced uncertainty and from rate case expense reductions which should result from rule adoption. While numerous alternatives to the specifics of the proposed rule are possible, staff believes that the alternative guidelines which deviate from current Commission policy will be most efficiently presented at hearing.

Southern States Utilities (SSU) submitted testimony and evidence that emphasizes the advantage of using larger capacity plant than that required by an 18-month growth horizon because of the benefits derived from economies of scale. For a slightly higher dollar outlay, a lower cost per unit can be achieved if a larger scale plant is designed and constructed. However, if the planning horizon is 18 months, the amount of the outlay that is allowed for used and useful may not be sufficient for the company to build the larger capacity. SSU recommends a five- year margin reserve period in order to be able to build and achieve economies of scale.

However, the proposed rule would require the Commission, when determining the margin reserve period, to consider the rate of growth of customers; the time needed to meet the guidelines of DEP for planning, designing, and construction of plant expansion; and the technical and economic options available for sizing increments of plant expansion. Each of these considerations could potentially justify a longer reserve margin period than the 12- and 18-month standard periods. The proposed alternative would effectively remove the burden of justifying a longer margin reserve period from the utility and place greater risk on ratepayers for the costs of a larger, excessively-sized plant.

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