96-04227

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

In the Matter of	DOCKET NO.
Application for a rate increase and increase in service availability charges by SOUTHERN STATES UTILITIES, INC. for Orange-Osceola Utilities, Inc. in Osceola County, and in Bradford, Brevard, Charlotte, Citrus, Clay, Collier, Duval, Highlands, Lake, Lee, Marion, Martin, Nassau, Orange, Osceola, Pasco, Putnam, Seminole, St. Johns, St. Lucie, Volusia and Washington Counties.	**950495-WS**

FIFTH DAY - MORNING SESSION

VOLUME 18

Pages 1880 through 1946

PROCEEDINGS: **HEARING**

BEFORE: CHAIRMAN SUSAN F. CLARK
COMMISSIONER J. TERRY DEASON
COMMISSIONER JULIA L. JOHNSON
COMMISSIONER DIANE K. KIESLING
COMMISSIONER JOE GARCIA

DATE: **Saturday, May 4, 1996**

TIME: Commenced at 9:30 a.m.

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

REPORTED BY: JOY KELLY, CSR, RPR
Chief, Bureau of Reporting
SYDNEY C. SILVA, CSR, RPR
Official Commission Reporters

APPEARANCES:

(As heretofore noted.)

I N D E X

WITNESSES - VOLUME 18

EXHIBITS - VOLUME 18

P R O C E E D I N G S

(Transcript follows in sequence from Volume 17.)

(Hearing commenced at 9:30 a.m.)

CHAIRMAN CLARK: We're ready to reconvene the hearing, and Mr. Twomey, you were still conducting your cross examination.

JOHN WHITCOMB

resumed the stand as a witness on behalf of Southern States Utilities and, having been previously sworn, testified as follows:

CONTINUED CROSS EXAMINATION

BY MR. TWOMEY:

Q I'm not precisely sure where I quit.

CHAIRMAN CLARK: You had about one or two more questions. (Laughter)

Q Let me ask you this, Dr. Whitcomb, have you ever attended any witness training programs?

A No.

Q Not with SSU?

A The answer is no, I've never attempted to go to any witness training, and that may be evident from some of my responses.

Q Okay. The reason I ask is the Commission has a lot of witnesses to hear in this case yet. And what I was wanting to ask from you -- trying to shorten my part in this -- is that you listen closely to my questions. I'll try and ask you questions that elicit a yes or no answer whenever possible. And if I want an explanation I'll ask you. If you can, I would ask you to just answer with yes or no and then allow Mr. Hoffman, who is a very capable attorney, to bring out any explanations that are necessary on your redirect.

MR. HOFFMAN: Madam Chairman, I'm going to object to that instruction. The instruction is not authorized by the order establishing procedure in the rules of Commission. Mr. Twomey knows it's common practice here for the witness to answer yes or no and give an explanation, and I'd ask that the proceedings be conducted consistent with that practice.

CHAIRMAN CLARK: And they will be, Mr. Hoffman. We do ask that you answer the question with a yes or no first so we know where you are going and keep your explanations as short as possible.

MR. TWOMEY: That's all I intended by that was keep them short.

CHAIRMAN CLARK: Okay.

Q (By Mr. Twomey) At the close of business or close to it yesterday, Dr. Whitcomb -- first, let me ask you to turn to Page 13 of your testimony?

A Direct.

Q Direct. I'm not going to ask any questions on rebuttal, so if I refer to any testimony it's your direct. Do you have that, sir?

A Yes.

Q Okay. In answer to the question that begins at Line 11 you say that you have applied the elasticity study model results, results in a consumption reduction of approximately 11% for the conventional and 2.7% for the reverse osmosis service classes on an annual basis. Isn't that correct?

A Yes.

Q Now, I asked you yesterday if it wasn't -- if you could explain the apparent increase in the price elasticity adjustment to the 11% figure from the negative 7.30% figure that had been calculated prior to the elimination of the nonjurisdictional counties from this rate case. Have you come up with an answer for that yet?

MR. HOFFMAN: I'm going to object, Madam Chairman. I recall Mr. Twomey asking questions concerning the different price elasticity adjustments which would result from the inclusion or the exclusion of the nonjurisdictional counties. I don't recall any questions requesting Dr. Whitcomb to perform calculations.

CHAIRMAN CLARK: Mr. Twomey.

MR. TWOMEY: I'm not asking for a calculation. Let me rephrase the question.

Q (By Mr. Twomey) The current price elasticity adjustment that you're recommending to this Commission in your testimony, and which is included in the Company's case, is 11% as stated in your testimony, right?

A That's correct.

Q More precisely, it's a negative 11.7%, is it not, as reflected in the Company's filing, or do you know?

A I believe that's approximately correct.

Q Okay. Do you know if in an earlier filing in this case -- at one point in this case when there were the jurisdictional counties included -- nonjurisdictional counties included, if the price elasticity adjustment was changed from 11 to negative .7%?

A No. I'd say yes, I know there would be a difference, and that it was that 7.3% I can't vouch to -- when you add different systems to the calculations and water rate, you're looking at different sets of information. There's different revenue requirements, there's different user characteristics as far as the bill frequency distribution and other parameters. And so I would expect the output from water rate to be different.

Q Fine. So your answer is that with a different mix of systems, weather conditions, etcetera, as you change the mix, the elasticity adjustment should or might change; is that correct?

A It's not entirely correct. You're talking -- I will agree that as you look at different revenue requirements and different user characteristics it will come up with a different set of price signals. And from those different price signals you'll get a different price elasticity response.

Q Okay. Now, on Page 13, though, you're recommending or supporting the 11% for the conventional systems, and that's on the basis of all of those conventional water plants being considered in total; is that correct?

A Yes.

Q And that -- isn't it true that if the PSC rejects the uniform rate concept but still wants to consider a price elasticity adjustment, they will have to look at each system on an individual basis?

A Yes.

Q Thank you.

You testified yesterday, I believe, that SWFWMD had spent a great deal of money and expended a great deal of time.

COMMISSIONER DEASON: Mr. Twomey, I really hate to interrupt --

MR. TWOMEY: It's quite all right.

COMMISSIONER DEASON: You indicated that if the Commission does not accept the uniform rate structure, that it would be necessary to analyze each individual system for elasticity; is that correct?

WITNESS WHITCOMB: If you want to get a precise answer to that question that would be correct.

The reason being is when you're on an individual stand-alone basis, each one will have a different range of prices. And as I described yesterday, at different price levels there's different price elasticities.

COMMISSIONER DEASON: That's precisely the reason for my question. I thought there were different price levels in effect today for the various systems.

WITNESS WHITCOMB: The calculation you see there for the 11% went from the existing set of rates all to the proposed $2.16 gallonage charge.

COMMISSIONER DEASON: When you say existing rate you're talking about the individual rates that are in effect for the systems today.

WITNESS WHITCOMB: Yes. Not quite today, but before the interim rates went into effect.

COMMISSIONER DEASON: Did you use an uniform rate or did you use the actual rates for each individual system?

WITNESS WHITCOMB: Well, for the ones that all had this prior uniform rate, we used that; we used that rate. For the systems that didn't have the uniform rate, we took -- that existing rate and we went to the $2.16 level and calculated what the price elastic response would be to that.

COMMISSIONER DEASON: So -- I'm sorry. Go ahead.

Well, for the 127 systems which were the subject of the previous rate proceeding, you used the uniform rate for those systems.

WITNESS WHITCOMB: That's right. And in a way you can think of it as this is done all on an individual level then. Because they all went from that existing previous price of $1.23 per thousand gallons to the 2.16 proposed here.

COMMISSIONER DEASON: Thank you, Mr. Twomey.

Q (By Mr. Twomey) But to follow up on the Commissioner's point, your calculations are, in fact, based upon a change in price from the old uniform rates that the -- preceded the interim rates, right?

A Correct.

Q And your calculations are based on a change in -- an expected change in reduction of consumption based upon prices at the old uniform levels to the proposed uniform levels, correct?

A Correct, for the uniform systems. And I would add for the nonuniform systems it was whatever their rates were to the proposed uniform rate.

Q Right. And as Commissioner Deason pointed out, no one, none of the systems, with the exception of the Spring Hill system, are being charged uniform rates currently; isn't that correct?

A That's correct. Well, that's to my knowledge of interim rates.

Q Sir?

A To my knowledge of what happened with the interim rates.

Q So this calculation of price elasticity is based upon an expected change in price signals or perceptions on the part of customers that don't fit reality; isn't that correct?

A When I made these calculations it was before interim rates were adopted and set.

Q Yes, sir. I don't mean that as a criticism of you. That's what you had to work with?

A That's right.

Q It doesn't fit current reality, does it?

A No. And -- you can anticipate the impact from that because the interim rates were an increase in the revenue requirements. To that extent the prices in a general way have increased, and so part of the price elastic response that I predict here is already starting to occur.

Q Yes, sir. But if I were to tell you that my clients at Sugarmill Woods actually got a rate reduction from the old uniform rates as a result of SSU getting an interim increase, would that surprise you?

A If Sugarmill Woods got an interim increase, I would expect their water consumption to go down.

Q No, sir. What I'm saying to you is if I told you that my clients at Sugarmill Woods actually got rate reductions --

A Rate reductions.

Q -- from, as compared to the old uniform rates --

A Right.

Q -- that you calculated as your starting point --

A Okay.

Q -- for your elasticity adjustment --

A There would be a price elastic stimulation.

Q Right.

Now, I started to ask you had you not generally praised the SWFWMD for having spent -- praised the studies that resulted from SWFWMD spending a great deal of time and effort on accomplishing these studies or producing these studies, right?

A Yes. It was both SWFWMD, their staff and the ten participating agencies that supplied all the data.

Q And you've attached or you've included major portions of the documents as attachments or exhibits to your testimony, right?

A The Price Elasticity Study is the document that describes the data collected.

Q Okay. I would like to ask you just a -- do you have your exhibits?

A Yes.

Q Okay. I'd like to just ask you a couple questions on statements that are made in the study and see if you concur with them.

If you'd look at your JBW-2, and I apologize, I've forgotten which number that is?

A I have it.

Q And look at page, if you would, 11 of 91. Okay. Do you have it?

A Yes.

Q Okay. Under the statement on rate structure form, you see the second paragraph?

A Yes.

Q It says "Rate structure form refers to the fixed and variable charges used to collect revenues. The fixed charge is a set fee that each customer must pay per billing period regardless of the amount of water used." It says typically that "A fixed charge recovers the cost of meter reading, billing, meter maintenance and other customer-related expenses not directly related to water consumption. In addition, some utilities include all or a portion of fixed capacity related costs in the fixed monthly charge." Do see that?

A Yes.

Q Is that generally your understanding of how the base facility charge portion of that type of rate structure works?

A In general, yes.

Q Sir?

A Yes.

Q And isn't it true, if you know, that this utility, SSU in this case, has elected to include some of the fixed capacity related cost in its fixed monthly charge in addition to the other meter reading billing charges? That is, isn't it true that they've elected to include in their base facility charge a portion of the return on investment associated with plant?

A I have no expertise or knowledge of the revenue requirements that were derived and the cost categories that they ascribed to.

Q Okay. That's a fair answer.

Let me ask you this: If the fixed capacity related cost varied from system to system, then doesn't it follow that the base facility charge should vary accordingly from system to system?

A Perhaps. It is my experience in conducting rate studies and seeing -- being involved with more than a dozen of them is that certain charges definitely go in the base facility charge, up to about

10% or so. And those have to do with the meter reading and the billing. And then there's about 10% or 20% of cost that go into the gallonage charge that have to do with energy cost, purchased water cost, the things that truly vary with water. And then there's this big percent that's in the middle. And I believe in all of the cases I've seen the actual allocation has been based on other circumstances, other rate objectives that the decision makers consider.

Q Okay. How about turning to Page 13 of 91, please. And look at the Paragraph 3, Economic Efficiency.

A Yes.

Q Okay. It says "Water price has an impact on the economic efficiency with which customers use water. Price relays the scarcity value of water so that water consumption is encouraged when benefits exceed cost and discouraged when costs exceed benefits. While the rate revenue level has some influence on this, it is primarily rate structure form and cost allocation basis which create incentives for customers to use more or less water, or to use water more sparingly in some periods than in others."

I believe you said you had a bachelors degree in economics; is that correct?

A That's correct.
Q Do you agree with that statement?
A I agree with the general spirit of it. I would probably, in the second sentence where it says "Price relays the scarcity value of water so that water consumption is encouraged," etcetera, etcetera. Well, price can relay, I would say.
Q Okay. Okay. Now, the next one, paragraph, talks about equity. Were you here yesterday when Dr. Beecher talked about equity in rate setting? You were here yesterday when Dr. Beecher testified, were you not?
A Yes, I was. And I was in and out of her testimony.
Q Do you recall her testifying about the importance of equity in rate setting?
A No.
Q Okay. Let me just read this and see if you agree with this. "Equity: With respect to water rates, equity is defined as cost of service equity. Achieving cost of service equity requires the development of rates which are cost causative. That is, equity is maximized when each customer's water bill equals as closely as possible the cost borne by the purveyor in providing that service." Do you agree

with that statement?

MR. HOFFMAN: Objection. It's outside the scope of his testimony.

MR. TWOMEY: The witness is here in praise of the SWFWMD study. He is here adopting the allocation of the Company's revenue requirement between the base facility charge and the gallonage charge proposed by this Company. This information bears directly on that.

CHAIRMAN CLARK: Mr. Hoffman.

MR. HOFFMAN: Madam Chairman, I think this is just another example of Mr. Twomey trying to convert Dr. Whitcomb into a rate design witness on the issue of uniform rates versus stand-alone rates.

CHAIRMAN CLARK: Mr. Twomey, I'm going to sustain the objection. I think it is outside the scope of his testimony, and it is questions you have previously directed to Beecher and other witnesses who deal more closely with rate structure.

MR. TWOMEY: Okay.

Q (By Mr. Twomey) On Page 8 of your testimony, again, Dr. Whitcomb, you say that the rate structure proposed by the Company in the old rate case, that is the uniform rate structure approved in Docket 920199, meets the criteria for water conserving rate structure identified in the SWFWMD studies, correct?

A Yes.

Q That's your answer, yes.

A Yes.

Q Now, turn to Page 14 of 91, please? And look at the section above the second paragraph that says "conservation promoting rates." Would you agree with me that that's something that you've testified to that is a conservation promoting rate? Let me ask you the question.

In the second paragraph under that heading, it says in the second sentence -- second paragraph says "One widely used definition was adopted by several federal agencies in the late 1970s, and they are talking about the definition of conservation promoting rates -- and it cites the Bowman (ph) 1984.

It simply states that "Water conservation is brought about when, one, a reduction in the use or loss of water occurs, and two, the reduction must be on balance beneficial." It goes on and says "This is synonymous with the economic efficiency objective. A reduction in water use which is not beneficial fails the test because it is inconsistent with the principle of conservation of all scarce resources."

And my question to you is if the allocation between -- the revenue between the base facility charge and the gallonage charge doesn't reflect the usage at a system-specific location, isn't it true that the conservation cannot -- it can be not beneficial. Do you follow the question?

A I got lost on one of your premises.

Q Okay. It's my understanding that for the -- a base facility gallonage rate structure to be considered conservation promoting, that it has to properly reflect the consumption realities at the system that's being considered. Is that your understanding?

A Consumption realities.

Q Yes, sir. Let me give you an example. You may have a system that has a high percentage of people that go north for the winter, okay? And come down -- go north in the summer, come down here in the winter, and, therefore, have extremely low consumption in the summer months. Do you follow?

A Yes.

Q Now, theoretically isn't it true that a utility that has too much of its fixed cost placed in the gallonage charge could be hurt, could be unreasonably deprived of its revenue because the usage won't occur there. Do you follow?

A I understand that seasonality and occupancy can be a financial hardship on a utility.

Q Whereas, if you had another system where you had fewer retirees that go north and have generally a more even consumption, you could recover -- you could safely recover for a utility more of its revenue requirement through the gallonage charge. Would you agree with that?

A Yes. Because what you're really saying is that you have one situation where water use is fluctuating a lot, their seasonality, and one where it is constant.

Q Right. And if that type of variance occurs amongst the 140-something systems that are in this case, isn't it both fair for SSU in terms of it receiving its revenue through its rates, and as well more beneficial in terms of effecting real conservation, to look at the allocation of revenue responsibility to the base facility charge versus the gallonage charge on a system-by-system basis?

MR. HOFFMAN: Objection. I think the question again goes to the issue of uniform rates versus stand-alone rates. Dr. Whitcomb's testimony has been offered in support of the percentage split between the gallonage charge and the base facility charge. And to support his opinion that that is a conservation rate structure as defined by Brown and Caldwell. He's not testfying on stand-alone rates versus uniform rates.

MR. TWOMEY: And that wasn't the question.

CHAIRMAN CLARK: Mr. Twomey, you don't need to argue. I think he was asking a question related to conservation. I'll let it go. But I would ask if you could speed up your questions a little bit, please.

MR. TWOMEY: Sure.

Q Do you have an answer to that question?

A There are many objectives you have to look at when you say "fair", and I think that from SSU as a big system they have to look at the big picture. So I don't feel qualified to answer that question of what is fair.

Q You testified -- don't you have an exhibit that says that the SSU's rate structure meets the criterion when you calculate the number of the weighted score? Is that your JBW-5?

A Yes.

Q Okay. And the -- for anybody that wanted to understand how that system works, the discussion in the SWFWMD document starts on Page 46 of 91, correct, in your other exhibit, 2? I'm sorry. Don't worry about that, Dr. Whitcomb.

Isn't it true that the 3.2 is the absolute minimum passing score that a rate structure can achieve under that weighting or scoring system?

A Yes.

Q And the maximum score is 5, correct?

A Yes.

Q And, therefore, 3.2 is a 64 percentile rating of the maximum score, right?

A I believe that might be correct. But you're really taking it out of context. This isn't a percentage type of evaluation.

Q No, sir. All I'm saying is isn't it true that 3.2 is 64% of 5?

A I'd have to make that calculation. It seems appropriate.

Q Now, look at Page 49 of 91, please, in your exhibit JBW-2.

A Okay.

Q And look at Table 7-4, weighting factors for Criterion 3?

A Yes.

Q And it says "The percentage of total revenue collected via rates," right?

A Yes.

Q And SSU gives itself -- or you've given it a maximum score of 5, right?

A Yes.

Q If you know -- you are familiar with this discussion, are you not?

A Yes.

Q Isn't it true that what this Criterion 3 is intended to relate to is whether the Utility gets its revenue strictly from its rates, or whether it's being subsidized in some part by, say, a municipality by general revenues or some other source of revenues, right?

A Yes.

Q And SSU has given itself, or you've given it a 5 because it doesn't have any external sources or subsidies, right? That is all of its revenues have come from rates?

A Yes.

Q Now, my question to you is, if you know, is first that this assumption that it got all of its revenues from rates was looked at on a company-wide basis, right?

A Yes.

Q Now, if we were to look at a

system-specific, or as they like to call it, service area, specific area, and were to find that the revenues necessary to support service in that location were not derived completely from rates from that area, and that, therefore, there was a subsidy coming from other areas within the total company operations, on a system-by-system basis, if we made this calculation the numbers would come out different; isn't that correct?

MR. HOFFMAN: Objection. I think it's outside the scope of his testimony and I think that the question includes presumptions that are not in evidence. There's no evidence about subsidies, the type that I think Mr. Twomey is referring to, as being a part of this No. 3 on JBW-5 Page 1 of 1.

I think that what these sources of revenues are talking about, they're talking about rates, taxes and so forth. I don't think they're talking about revenues that may go back and forth between service areas of SSU.

MR. TWOMEY: That's all this case is about in large part is subsidies, Madam Chairman.

CHAIRMAN CLARK: Mr. Twomey, what I need to know is why is it appropriate cross examination of this witness?

MR. TWOMEY: Because he is suggesting to you, his testimony is that this rating -- that these -- this rate structure as proposed by the company, which he adopts and recommends, is conservation promoting. And it is based in large part -- the minimal passing score this rate structure has achieved is based in very large part on the fact that they give themselves a maximum of 5 on Criterion 3.

The ability of any base facility charge rate structure to affect conservation is based upon the underlying premise that the prices reflect cost.

Criterion 3 is designed to determine whether prices reflect cost. That is whether or not they reflect subsidies or not. They have said there are no subsidies involved here and given themselves the maximum score. That's true on a total-company basis. However, if you look at system-specific examples --

CHAIRMAN CLARK: What was of the question you asked him?

MR. TWOMEY: Let me finish the point -- you look at system-specific examples where there are huge internal rate subsidies to support service there, you have to recalculate Criterion 3 to see whether, in fact, the rates are still conservation promoting.

CHAIRMAN CLARK: So what was your question?

MR. TWOMEY: My question to him was if we find in the record that there are internal subsidies flowing to these system-specific systems here, don't you have to recalculate the criterion for No. 3 on a system-by-system basis.

CHAIRMAN CLARK: Okay. He can answer that question. (Pause)

WITNESS WHITCOMB: Well, I believe the answer depends on the context you look at it. And there are certain revenues -- the motivation and -- behind this was to have utilities that might gather a substantial amount of their revenues through sources other than through water rates and impact fees and other fees directly associated with water service.

And to the extent that a company could get -- a utility could get say 50% of its revenues from property values, then that would mean that the rates would not be -- would be lower than otherwise. And this particular guideline in its motivation was put in to prevent that or to at least make that a disadvantage in the calculation.

As to -- you know, you can look at any individual customer and say that there are these types of subsidies between customers, and so I'm kind of --

I don't know how to answer it because I don't know what level is appropriate in this case.

Q Dr. Whitcomb, isn't the goal of this rate structure and this very expensive, as you said, study by SWFWMD to encourage water consumption through rate structure?

A Yes.

Q And doesn't it in large part, isn't one of the fundamental underlying premises of this study that you encourage water consumption by sending the correct price signals to consumers, right?

A No, not encourage water consumption but you want water consumption to reflect the -- to get the economic efficiency objective, you want water priced at essentially its marginal cost.

Q You're correct. I said the wrong word. I meant to say encourage conservation, not consumption.

You want to encourage conservation by having pricess reflect costs and thereby send a correct price signal, right?

A That is correct. And in cost I mean marginal cost.

Q Right. And isn't it true -- and I'll stop on this -- isn't it true that to the extent that prices at any specific system of the 140-something in this system, to the extent that the prices are less than the actual cost, doesn't that send the wrong price signal?

A To the extent that prices do not reflect the marginal cost, it is not optimal in promoting conservation and economic efficiency.

Q Right. And to the extent that any prices at a specific location do not reflect cost, or the marginal cost, if you want to use that, to the extent that price is below cost, water consumption will likely result at that location; isn't that correct?

A In your question you say water consumption will result --

Q If price is below marginal cost at any given location; price is below cost, an increase in consumption can be expected, right?

A No. Because it's relative to the price where you're at.

Q Okay. Thank you, Doctor.

CHAIRMAN CLARK: Mr. Twomey, are you done?

MR. TWOMEY: Yes.

CHAIRMAN CLARK: Oh, okay. Ms. Capeless.

CROSS EXAMINATION

BY MS. CAPELESS:

Q Thank you. Good morning, Dr. Whitcomb.

A Good morning.

Q I have some questions for you on behalf of the Staff. And I'd like to begin by asking you some questions regarding price elasticity and billing determinants.

Staff is in the process of distributing two documents. One contains a letter regarding WATERATE and a copy of your WATERATE User Manual, the other contains pages from SSU's response to OPC's POD No. 28. And if you would please, sir, take a moment to look over those documents. If you'd review the WATERATE document first, please.

CHAIRMAN CLARK: Ms. Capeless, we're going to number this as Exhibit 137, which is "Whitcomb Letter to Staff, WATERATE User's Manuals and Price Elasticity from WATERATE 2.2 Program."

(Exhibit No. 137 marked for identification.)

MS. CAPELESS: Thank you.

CHAIRMAN CLARK: Excuse me just a moment. And we will give the response to OPC's POD 28, Exhibit 138.

(Exhibit No. 138 marked for identification.)

Q (By Ms. Capeless) Regarding what was just lableled Exhibit 137, Doctor, the WATERATE materials, if you'll take a look at the first page of that, does this appear to be a true and correct copy of the WATERATE 2.2 release from Mr. Yingling?

A Yes.

Q Do you recognize the handwritten note at the top of the page as your own?

A Yes.

Q Do the remaining pages of the document appear to be a true and correct copy of your WATERATE User Manual?

A Yes, they appear to be.

Q Regarding the other document which was just labled Exhibit 138, does this appear to be a true and correct copy of pages from SSU's response to OPC's POD No. 28?

A Yes.

Q Thank you. Would you please direct your attention to Exhibit 135 now, which is attached to your testimony. Specifically to the portion that was labeled preliminarily as JBW-3, to Page 1 of that exhibit.

A Page 1 of 153.

Q Yes.

A Yes.

Q This portion of Exhibit 135 is a copy of a water price elasticity study published by the Southwest Florida Water Management District in August '93; is that right?

A Yes.

Q Now, according to your direct testimony on Page 6, if you look at Page 6 starting at Line 3, are you there?

A Yes.

Q You state that given the geographic and demographic Southwest Florida Water Management District and Southern States' service areas, you believe the price elasticities indicated in the water price elasticity study may be properly applied to Southern States; is that correct?

A Yes. That's part of the reason that I believe it can be directly applied.

Q What is the other part?

A I think the three reasons why I believe it's applicable are, one, is the geographic proximity, in having 80% of SSU's systems are in St. Johns or SWFWMD right in Central Florida, and the rest are in the northern part of South Florida.

I think in reviewing the data, there's a very strong case that the climate characteristics among SSU's systems and the SWFWMD -- and 10 utilities participating in the SWFWMD study, that that variation in NIR -- and I'll describe what NIR are is -- is almost identical.

NIR is net irrigation requirement which equals and evapo transpiration minus precipitation. We believe it's a very good indicator of outdoor water use because NIR describes the amount of water required by vegetation given the weather characteristics.

So in looking at it, we have a strong match up there.

Q Thank you. Pardon me. You also point out that SSU was one of the ten utilities who participated in the study by providing data relating to its Spring Hill service area in Hernando County, correct?

A Yes.

Q Do you remember that Mr. Twomey asked you yesterday during his questioning whether the Spring Hill service area is not a part of this rate case? Do you recall that?

A Yes.

Q And your answer was that it is not. Correct?

A That's correct. My answer was I know Spring

Hill is not, and I believe it is not because it's in Hernando County.

Q So none of SSU's service areas which are included in this rate case were included in the elasticity study; is that right?

A Correct.

Q Do you know what specific geographic aspects of SWFWMD's area are directly comparable to that of any other water management district in Florida?

A I'd say only in general that I know that the climates among -- that the climates among the water management districts in Florida are similar in that they're characterized as being subtropical by the National Oceanic and Atmospheric Administration; the weather is warm, humid, wet and variable.

Q But you don't know specifically; is that correct? You said generally?

A Yes. And in general, I guess, the topoghraphy is another issue. There's no mountain ranges in Florida of any significant -- of any magnitude. You know, if you had -- if Marco Island was in a desert, arid climate, they're growing cactus, and if Sugarmill Woods received six feet of snow each year, or Deltona was up at 6,000 feet in a regular forest, then I would believe that would come to my attention that there are differences. Because that's not the case, I feel confident that the application of the SWFWMD study is applicable to SSU.

Q Thank you.

Now, with respect to the comparability of demographic characteristics between SWFWMD and SSU systems located outside that district, do you know the percentage of customers in the St. Johns River Water Management District whose property values are in the low, medium or high range as defined in your model?

A No.

Q Do you know the percentage of customers in the South Florida Water Management District whose property values are in the low, medium or high range as defined in your model?

A No.

Q Same question for Bradford County in the Swannee River Water Management District, do you know the percentage in Bradford County?

A No.

Q Do you know the percentage of customers in Washington County, in the northwest Florida Water Management District, whose property levels are in the low, medium or high range?

A No.

Q I'm sorry, did you say no?

A The answer is no. And I'd like to add that the SWFWMD analysis actually identified different price elasticities with different wealth, property value categories. And you don't have to have -- and the reason they are doing that, stratifying the results, is then you can go from one utility that has certain characteristics, and apply this model by weighting it, the elasticity estimates that are from, like, the low income. And then you go to a high income area and you weight more the price elasticity estimate generated for that customer group. So there's this customization that could occur in accommodating different areas with different property values.

Q But you do use specific percentages in the low, medium and high range in the study; is that right?

A Yes.

Q I've assumed that the low, medium and high percentages are a reflection of the low, medium and high percentages seen in the ten different agencies in the SWFWMD study.

Q Thank you. Referring now to the bottom of Page 6 of your direct testimony, you indicate that you applied your software program, WATERATE, to uniform rates to determine price elasticity adjustments, right?

A Yes.

Q Now, if you were to apply WATERATE to a water structure other than the one proposed by SSU, would that affect the results of the analysis?

A Yes.

Q You state towards the bottom of Page 9, again this is your direct testimony, that once additional consumption information is included on customers' bills, that SSU's conservation rate structure rating will increase to 3.3, correct?

A Yes. And it's my understanding that SSU now has the historical information on their water bills currently, and so that they actually are at the 3.3 level right now.

Q Isn't it true that placing additional consumption information on customers' bills would have the affect of increasing any conservation rate structure score regardless of the rate structure in effect?

A Yes.

Q We note in your testimony you seem to favor the term "water conserving rate structure" rather than the term "water conservation rate structure." And just to be clear, do you use those two terms interchangeably?

A Yes.

Q Okay. Thank you.

Looking now at Page 11 of your direct testimony, starting at Line 5, here you state that "High year-round evapotranspiration levels combined with irregular rainfall pattern makes outdoor water use in SSU, and Florida in general, both high and irregular relative to other part of the country." Correct?

A Yes.

Q Is it correct that evapotranspiration measures the amount of water -- it measures the amount of water evaporated and transpired from a vegetative surface if water supply is not a limiting factor?

A Yes.

Q You go on to state at Page 11, beginning at Line 11, that Florida likely has the largest weather-caused variability experienced in the U.S., correct?

A Yes.

Q But you don't have any documentation or studies with information to support your statement that high year-round evapotranspiration levels and irregular rainfall patterns in SSU and in Florida are high and irregular relative to other parts of the country, do you?

A I -- the answer is yes in a -- and the documents are, the people who work on -- work with NIR and the projects that I've worked on in NIR, I have noticed -- I've done a number of calculations of NIR in California, in Nevada, in Arizona, and in up in the Eastern Mid Atlantic states. So from my experience of looking at that data, I make that judgment.

I also see that it's very, it's very logical for me to come to this conclusion because, if you look at the climates, if you look at in the Northeast, for example, in the winter, you have it's cold, the grass, the vegetation is largely dormant, at least the irrigable vegetation is largely dormant, and it's not really an issue.

While in Florida here you have the warm winters, you still need to irrigate in the winter depending on precipitation and ET levels, but there is still a need to do that. So I think really it is a function of the winter water consumption which adds to the overall variability that you see in Florida. It can happen year round, not just the one season.

The other point, if you're -- since I'm going to ask to make an opinion on NIR and its variability around the country, if you look out in the West, it rarely rains, the rainfalls are more characteristic of these frontal systems that come through rather than the convective thundershowers that you see here in Florida in the late afternoons.

Q Dr. Whitcomb, do you remember what the question was, first of all, what I asked you, if you have any --

A You asked --

Q Go ahead.

A Yes, I remember the question.

Q Do you remember that I asked you that same question at deposition?

A Yes.

Q Do you recall what your answer was at that time?

A I believe I said no. And the difference is in my explanation is, I don't have a specific study that will tell you that NIR in this state is this and NIR in that state is this and have that all documented and that variability. So I base my, my, the difference between the answers is I do have a number of experience in documents in specific areas on specific projects where they wanted to look at the NIR.

Q So you're speaking from experience rather than from specific data; is that correct?

A I'm speaking from experience and I'm speaking from specific reports that I know that NIR where it has been calculated. But in my deposition I understood the question at that time to be, do I have a report that documents that Florida has the most variable NIR? And I answered no.

Q Do you have a copy of the deposition with you?

A No. Hold on.

Q At Page 20 of deposition I asked you, "What data do you have to support that year-round evapotranspirtion levels are high in SSU and in Florida?"

A Yes.

Q Then we moved on to Page 21, you gave an explanation. At Page 27, I said, "Do you have any documents with that information on it, studies?"

And you answered at Line 9, "Not a document specifically addressing that issue, no."

A Yes. I meant there that there was no document that made the comparison -- there's no one single document that makes all the comparisons. I have a specific document that would have some NIR calculations used for that specific purpose of that study.

Q Thank you.

Dr. Whitcomb, I would like to ask you some questions now about your software program. You developed a software program known as WATERATE which simulates how changes in water and wastewater prices impact water revenues and water demand; is that right?

A Yes. I would, to clarify the situation, Brown and Caldwell was involved in the, in the beginning of this; and actually I would say that they were involved also with the development.

Q And you used the price elasticity model in conjunction with the WATERATE program to determine the anticipated level of reductions in water consumption which would result under the Company's proposed rate structure, correct?

A Yes.

Q Now in the exhibit marked 135 which was preliminarily marked Exhibit JBW-6, also attached to your direct testimony, you provide a discussion there of calculating the price elastic water change resulting from SSU's proposed uniform rate structure;

is that right?

A Yes.

Q Do you recall during your deposition that Staff asked you for the version of the WATERATE program that you used in this docket?

A Yes.

Q Okay. Referring you to Exhibit -- it was just marked Exhibit 137 concerning WATERATE. Could you please look at the first page of this exhibit?

A Yes.

Q Do you recognize this letter as what you sent to Staff in response to our deposition request?

A It was -- no. It was not directly given as a document request at that time because it was not, it did not come out until a later time. What you received was part of a mass mailing to the registered, the over 50 registered users of WATERATE at that time; and that's why the date was, I think, I believe, was in January of 1996 is when it was sent.

Q Okay. You indicate on Page 1 of Exhibit 137, the WATERATE exhibit, that WATERATE 2.2 is the version being used in this case, correct?

A No.

Q Could you please explain?

A Yes. The model, the SWFWMD model -- the water rate 2.1 was used to calculate the price elastic repression in this can case. The WATERATE 2.1 reflects the price elasticity estimates that generated in the SWFWMD price elasticity study as documented in JBW-3.

Q The -- excuse me.

A Let me explain it all. The WATERATE 2.2 came out because in the process of updating our model, given we learned about new ways to improve the demand specification, we then agreed that it was best to issue out the next model because we believed the results were more accurate in depicting how price elasticity changes to customers in -- from the study.

MS. CAPELESS: Just one moment, please.

(Pause)

Q (By Ms. Capeless) Have you made any changes to the user manual with regard to the short run, the short run price elasticities on Page 5 of the user manual?

A No. The short run elasticities are set by the user.

Q Okay, thank you.

Isn't it true that changes in water use result from a combination of behavioral changes such as taking shorter showers and structural changes such as converting landscape from turfgrass to Xeriscape?

A Yes, those are some among numerous factors.

Q And isn't it true that, while customers can effect behavioral changes in the short run, they're limited in their ability to alter capital investments in outdoor landscaping and water use appliances and fixtures?

A Yes.

Q So would you agree that while price increases may induce some customers to act sooner it may take other customers years to complete their desired changes?

A Yes. And I would say, I would add it is not just some customers but a customer to -- a specific customer, it may take that specific customer, they may do a number of steps over time to arrive at the long run price elasticity adjustment.

Q So you don't expect the full customer response to be reflected until several years in the future; is that right?

A Yes.

Q So price elasticity can be expected to be greater in the long run than in the short run?

A Yes.

Q And in the water rate manual, based on your review of the available literature and previous studies, you have suggested a short run half life of one year, right?

A Yes.

Q So, in other words, the WATERATE program is set up with values that assume 50% of the customer's response to a proposed price change will occur in Year 1; then 25% of the response will occur in Year 2; 12.5% will occur in Year 3; and 6.25% will occur in Year 4. Am I right?

A Yes, those are incremental additions.

Q You didn't use those values for SSU's WATERATE runs, though, did you?

A No.

Q Why not?

A The situation here is we have the existing set of rates and we have this -- in the rate -- in this case we have a proposed set of rates. I then I needed to determine what is going to be the price elastic response from going from this one time period to the next time period.

What I did is I assumed that the price elastic response would be 75% of the long run price elasticity adjustment.

I do that based on two reasons. One, is I knew that interim rates were a potential -- would potentially increase the price signal being sent to customers. That starts the whole process of the price elastic adjustment in motion and hence right now currently it's happening, at least on a -- in a general scale because of the increase in the revenue requirements.

Two, is I used the 75 number because I knew that it just wouldn't -- that this change in the price elastic adjustment is going to be, it should reflect a period, a period in the future when the rates would actually be in effect. And that's how I came to the assumption of a .75% -- excuse me, 75%.

Q Okay. And for SSU you also assumed that the customer response would be zero in Years 2 and 3 with the final 25% of their response occurring in Year 4, right?

A No. I think you're not reading what I did with the WATERATE. WATERATE is a multiyear tool which calculates what is going to be the price change up to -- it projects over three years. In this rate case, I was just looking at two periods, before and after. So WATERATE and the simulations that were done, the Years 2 and 3 were null and not part of the calculations.

Q The 75% reduction, was that an arbitrary number that you picked?

A Well, as I explained, there was two reasons why I came to that number. One is that the interim rates are going to be in effect over a number of months before, before these proposed rates get adopted, if they are adopted. And because we're looking over a -- it's kind of an aggregation of those years reflects the 75% estimate.

Q But why 75% as opposed to 74 or 73? How did you arrive at that particular value?

A Well, that's the total price elasticity adjustment that would happen over, over, in the second year.

MS. CAPELESS: Okay, thank you.

I would like to move on to the topic of conservation rates. And we'll go ahead and distribute two more of your responses to PSC interrogatories this time, Nos. 12 and 13. And we will ask for those to be marked, please with the next available exhibit numbers.

CHAIRMAN CLARK: The Response to PSC Interrogatory 12 will be Exhibit 139; and the Response to PSC Interrogatory 13 will be Exhibit 140.

MS. CAPELESS: Thank you.

(Exhibit Nos. 139 and 140 marked for identification.)

Q (By Ms. Capeless) Do these documents appear to be true and correct copies of your responses to these interrogatories, Dr. Whitcomb?

A Yes.

Q Referring first to what has been marked 139? Exhibit No. 139, which is your response to Interrogatory No. 12, do you have that?

A Yes.

Q Isn't it true that seasonal rates are generally considered to be superior to nonseasonal rates?

A When the situation warrants, I would say yes.

Q When does the situation warrant it?

A The situation is warranted when there is a large seasonal peak in water consumption is the first criteria. And the second is that the infrastructure and the cost base of developing the system is based on peaking criteria, such as a treatment plant.

To the extent that increases in water consumption will force the utility to increase their, have to increase their infrastructure, it has a much, a much more important impact than in the offpeak season when water fluctuates and you don't have to make any capital changes.

Q Thank you. By Exhibit 139, you indicate that SSU is not an ideal candidate for seasonal rates because the seasonal peak is not large or consistent; is that right?

A Yes.

Q And referring to Exhibit 140, your response to Interrogatory No. 13. According to this response, you believe that a block rate structure is not always a water conserving rate structure, correct?

A Yes.

Q And you also believe that a single price rate structure with a relatively low base facility charge sends a stronger price signal than a block rate structure with a relatively high base facility charge, correct?

A I'm sorry, can you repeat it?

Q Sure. Do you also believe that a single price rate structure with a relatively low base facility charge sends a stronger price signal than a block rate structure with a relatively high base facility charge?

A You would have to look -- I think that that certainly is in general true. I wouldn't say that you couldn't develop a specific case of a block rate where that may be false, but I generally would say that's true.

Q Thank you. I would like to move on to some questions concerning SSU's proposed weather normalization clause. If you please refer to Page 11 of your testimony, at Lines 8 through 11.

A Yes.

Q Here you describe the statistical tests which you conducted in order to determine the water use variation caused by weather, right?

A Yes.

Q Isn't it correct that the weather-related risk was the only factor that you used to determine the water use variation?

A Please repeat.

Q Was the weather-related risk the only factor that you used to determine the water use variation?

A Yes.

Q However, as you note on Page 12 of your direct testimony, there are other risks which could be used to determine the water use variation, correct?

A Yes.

Q On Page 14 now of your direct testimony, at Lines 19 and 20, there you testify that the water normalization clause is being proposed to achieve revenue stability, right?

A That is, that is one of the objectives of the weather normalization clause is revenue stability to, to decrease the financial risks to both SSU's customers and to the Company.

Q Thank you. Isn't it true that there are other methods of achieving revenue stability?

A There are other methods of achieving revenue stability, yes.

Q And isn't it true that one of these methods would be a revenue stabilization fund where the Utility would collect excess revenues and store them in a fund until weather pricing and other changes cause revenue shortfalls?

A Yes.

Q Isn't it true that, although there are differences in how a utility may administer a revenue stabilization fund, there is no bottom line difference between a revenue stabilization fund and a weather normalization clause?

A In general, yes.

Q Now, at Page 15 of your direct testimony at Lines 19 through 21, here you state that, "Implementation of the weather normalization clause would mitigate SSU's revenue stability concerns since it would ensure that SSU would meet its gallonage charge revenue requirement." Right?

A Yes.

Q But weather isn't the only factor that would affect SSU's revenue stability, right?

A No, that's correct. Any factors that would affect their water consumption would affect the gallonage charge revenues.

Q Isn't it true that 45% of the consumption derivation is due to weather?

A That was my estimate in the Exhibit No. 140 -- wrong -- yes, 140.

Q Is that still your answer?

A Yes.

Q 45%? So 55% of the consumption derivation is due to some other factor, such as tourism or the economy?

A Yes. And, in fact, along these lines, I would think, I think that the -- in naming the weather normalization clause, it would be much more appropriate to call it a water normalization clause because it effectively bases rates on actual consumption and not projections of consumption.

Q Wouldn't it be more appropriate to make adjustments to the gallonage charge for all risk factors and not only for risks associated with weather?

A Yes.

Q Why didn't you do that?

A Let me make sure I understood your question here again.

Q Why did you not make adjustments to the gallonage charge for all risk factors and not only those for risks associated with weather?

A Well, the current WNC and how it is set up it does account for all the variations -- all water variations from those projected, from those projected and adopted in this rate case. So it does account for more than just weather, it accounts for any variation in water use.

Q Thank you. Dr. Whitcomb, you have described the weather normalization clause as a win/win situation for everyone -- or win/win/win/win, I believe you said, including the customers, SSU, the Commission, and the state of Florida, correct?

A Correct.

Q Although you testify in your prefiled direct testimony that the WNC is a win/win, isn't it true that when you were approached by SSU about the weather normalization clause you advised them that it was a very difficult thing to do?

MR. HOFFMAN: Madam Chairman, I'm going to object and just ask for clarification what counsel means by the use of the word "difficult"?

MS. CAPELESS: I believe this was Dr. Whitcomb's terminology used at deposition, and I can refer you to the deposition transcript.

CHAIRMAN CLARK: Why don't you give us the page of the transcript.

Q (By Ms. Capeless) Page 112 of your deposition, Dr. Whitcomb, starting at Line 13 on Page 112.

There you state, "When I was contacted by SSU and was going to help them back in February and they asked me the question on weather normalization and it was my advice to them that it was a very difficult thing to do and for several reasons."

A Okay. I think there's a misunderstanding here.

Q Okay.

A And the misunderstanding is weather normalization is one topic and the weather normalization clause is another topic. If we called it water normalization clause to begin with there wouldn't be that confusion.

The water normalization -- the weather normalization I was talking about here is they were asking if -- SSU was inquiring if I could take the data that they had available and come up with a weather-normalized projection or actually prediction of, yeah, of next, of the projected year water consumption in this rate case.

And I told them that that was, was a very difficult thing to do. And as I, as I continue on, there are several reasons, some of which are in the deposition here. But the reasons are is that they didn't have an adequate length of time period in order for me to disentangle all the different factors that affect water and water consumption.

They have the price from the 1992 rate case. The prices had changed; the prices had been changing. There was other possible trends going on in water consumption having to do with technology. And I, as a rule of thumb in conducting these studies before, you need at least six years to disentangle these different effects before you can isolate what is the actual impact going on from weather.

The other point is that when I was asked to do this, asked if we could do that, there wasn't enough time to conduct such a study in order to get it in this rate case. It would take a number of months to calculate all the data in order to do this full, this more complex study.

And, you know, and the real reason -- not -- the most important reason is that the WNC, the water normalization clause, it effectively, since -- it effectively takes care of the situation of projecting water use.

Now, water use rates are going to be set effectively on actual water consumption and not the projections of water consumption.

Q Thank you. Isn't it true that SSU's proposed weather normalization clause is based on its proposed uniform rate structure?

A Yes.

Q Isn't it also true that if the proposed uniform rate structure is not approved then the weather normalization clause would be much more complicated to administer?

A Yes.

MS. CAPELESS: Okay. My final line of questioning for you, Dr. Whitcomb, has to do with rate case expense. And we're going to go ahead and distribute one more document.

CHAIRMAN CLARK: That will be marked as Exhibit 141.

MS. CAPELESS: Thank you.

CHAIRMAN CLARK: It is an Appendix from OPC's Production of Documents Request No. 305.

(Exhibit No. 141 marked for identification.)

Q (By Ms. Capeless) If you would refer to that document, please, Dr. Whitcomb, Exhibit 141. And if you would turn to Page No. 1854, containing Invoice No. 95-19?

A Yes.

Q That's dated April 30th, 1995, correct?

A Yes.

Q And according to this invoice, your total expenses incurred through April 30th of 1995 amounted to $22,140.42, right?

A Yes.

Q That invoice contains a listing of four tasks that you are involved in with regard to this rate case and the hours budgeted for each, right?

A Yes.

Q Can you provide an explanation of your duties and responsibilities related to Task 1, "Weather Normalization"?

A The results of that task is the report generated as Exhibit No. 140, entitled, "Financial Risk and Water Conserving Rate Structures." In this study, I looked at different rate structures and made an assessment of the financial risks associated with each rate structure with respect to SSU.

Q Can you provide an explanation of your duties and responsibilities related to Task 2, please, sir, "Rate Alternatives"?

A That task, the principal number of hours spent had to do with running different scenarios within WATERATE to see how different rate structures, what their impacts would be on both water consumption and how it affects financial risk.

The hours were mainly spent in simulations of WATERATE of SSU's data.

Q Okay. You say, going back to weather normalization just for a moment -- I'm sorry, we're staying on rate alternatives. You say you ran this for various rate structures?

A Yes. We looked at a whole range of different block rate structures and different levels of base facility charge versus gallonage charge.

Q Okay. How did you estimate the 170 budgeted hours for Task 2?

A Based on the time it would take me to

collect and assimilate the information from SSU so that it can be applied directly into the WATERATE 2.1.

Q Can you provide an explanation of your duties and responsibilities related to Task 3, "Water Sales Adjustment."

A That would be called -- that would be the weather normalization clause, or what I now like to prefer to call it as the water normalization clause.

The hours were spent in looking at different, different WNC options with respect to should it be a monthly adjustment, a quarterly adjustment or an annual adjustment; and how those calculations should be made to ensure that rates are effectively based on actual consumption and not projections of water consumption.

Q How do your tasks related to Task 3 differ to your tasks related to Task 1?

A The difference is that Task 3 was specifically looked at how the clause would work and how it would, how it would operate. The weather normalization -- the Task 1, weather normalization, had to do with collecting weather data from 14 different stations within SSU's service area and correlating that with water consumption.

Q Thank you. Can you provide an explanation of your duties and responsibilities related to Task 4, "Expert Witness"?

A I have a detailed, I have a detailed estimate of that. But in general, Task 4, expert witness hours were spent in making direct testimony, in replying to the over 80 interrogatory and documents requests that I have had -- although up to April 30, there was still more to come.

It included the -- it included the time for depositions and other expenses incurred directly in responding to this rate case.

Q You said depositions. Did you have more than one?

A There was one deposition.

MS. CAPELESS: Thank you, sir, I have no further questions.

CHAIRMAN CLARK: Commissioners?

COMMISSIONER DEASON: I have some questions.

Dr. Whitcomb, could you refer to your exhibit which was initially identified as JBW-3, Page 20 of 153. This is a least squares progression line, is it?

WITNESS WHITCOMB: Correct, ordinary least squares fitting those ten points where it was regressing water consumption for each one of those utilities against an average marginal price.

COMMISSIONER DEASON: You do not use least squares as the methodology to fit the curve to the data; is that correct?

WITNESS WHITCOMB: To this data?

COMMISSIONER DEASON: Right.

WITNESS WHITCOMB: Least squares -- ordinary least squares was used to fit this line to the data.

COMMISSIONER DEASON: All right. Now yesterday there was cross examination about the curve and the flexibility of the curve and all that. How does that relate to what's shown on Page 20?

WITNESS WHITCOMB: There was, let me make sure we have this all in context. There was the original demand model that was created by -- that was reported in JBW-3, and that is the information in the WATERATE 2.1 and that is the information used here in this rate case.

Then there was an -- we made the, updated the model because we believed, through our peer review, we believed there was an improvement that could have been made to our demand function. We then created, using that new information, we came up with WATERATE 2.2.

The criticism that we got in our -- we

submitted the updated model for publication. One of the reviewers liked it, one of the reviewers didn't. The reason given by the reviewer that didn't like it was that if you extrapolate past the range of experience of prices in the study, past the $7.05 cap there, if you extrapolate past the cap there, you come to an unrealistic result.

The point that I'm making with this graph yesterday is that you can't hold that, that's an unrealistic standard for publication. In fact, if you held that standard to all the published science articles out there, 90% of all that's been published would not meet this guy's standard. So the point --

COMMISSIONER DEASON: That's sufficient for my question.

So the least squares line which shows on Page 20, that is the basis then for your repression recommendation in this case?

WITNESS WHITCOMB: No, there's a big difference. Here we're looking at 10 different data points. And each one of these data points, there's differences among these different agencies with respect to lot size, with respect to property value, with respect to weather, with respect to irrigation restrictions. There's all these other independent variables that haven't been accounted for on this simple graph.

So we illustrate that here is, this obviously shows there's a negative correlation between consumption and water use --

COMMISSIONER DEASON: This is a depiction of the raw data?

WITNESS WHITCOMB: This is of the raw averaged aggregated data.

COMMISSIONER DEASON: Okay. Now --

WITNESS WHITCOMB: The data --

COMMISSIONER DEASON: That's fine. That's fine. The X, which is for Venice, I assume that's the City of Venice; is that correct?

WITNESS WHITCOMB: Yes.

COMMISSIONER DEASON: Do you know what rate structure the City of Venice has?

WITNESS WHITCOMB: Yes. They have, during the study they had a uniform charge. Let me make it clear: They had a nonblock water charge and they had a nonblock sewer charge.

COMMISSIONER DEASON: Do you know what that rate is?

WITNESS WHITCOMB: Yes. As of June '92, they had a water charge of $2.84 per thousand gallons, and they had a combined water and sewer price of $6.21 per thousand gallons. So if you had water and sewer service, it was $6.21; and if you had water only, it would be $2.84.

I believe most customers in that service area had both water and sewer service.

COMMISSIONER DEASON: So that means there's a 3.37 per thousand sewer charge? It's supposed to total $6.21; is that correct?

WITNESS WHITCOMB: $6.21.

COMMISSIONER DEASON: Okay. And so there were no other blocks, it was the base charge plus a total of $6.21 per thousand gallons for water and wastewater?

WITNESS WHITCOMB: Correct.

COMMISSIONER DEASON: What was the base charge?

WITNESS WHITCOMB: I don't have the information.

COMMISSIONER DEASON: You don't have that information?

WITNESS WHITCOMB: No.

COMMISSIONER DEASON: That's not relevant?

WITNESS WHITCOMB: For the purposes of identifying this demand curve, what we want is -- what we looked at is, what is the price, the gallonage charge price, that's being -- and then we associated that with the consumption.

Because to the customer, if they're looking at the reward or the penalty of either of changing their water consumption by one unit, that is going to be the price.

COMMISSIONER DEASON: I thought you testified earlier about an income effect of rate structure and how the base charge is part of that income effect.

WITNESS WHITCOMB: Correct.

COMMISSIONER DEASON: Why is that not relevant for the City of Venice?

WITNESS WHITCOMB: That was calculated. That is relevant to Venice. The base facility charge was collected as part of this study, is I don't have it here to tell you what it is.

COMMISSIONER DEASON: Do you know if there are any water use restrictions in place in the City of Venice?

WITNESS WHITCOMB: The water restrictions, they change over time, of course, depending on water supply-and-demand situations. Certain times it could have been three days a week limitation, it could have been two days a week limitation, or a one-day limitation? I do not know right now what it is.

COMMISSIONER DEASON: Did you analyze the degree of water restrictions in the City of Venice in relation to the other utilities which you show on Page 20 of 153? Is there anything that makes the City of Venice different in that regard?

WITNESS WHITCOMB: The water restrictions were a variable in these models. To the extent we tried to -- we controlled for the differences that happened, that occurred with these irrigation restrictions among the utilities. Hence, we, in the detailed evaluation that we conducted, it was accounted for. It was not accounted for in this particular graph that you see on Page 20.

COMMISSIONER DEASON: So you are telling me it was accounted for but you don't really know right now what the degree of restrictions were in the city in relation to the other cities?

WITNESS WHITCOMB: Correct.

COMMISSIONER DEASON: Are you familiar with the operations in the City of Venice or did you just analyze the raw data and just fit it into the model?

WITNESS WHITCOMB: Just the raw data.

COMMISSIONER DEASON: So you have no -- do you have any reason to explain in common, everyday, walking around language why the City of Venice data point seems to be, it appears to be kind of what I would refer to as an outlier?

WITNESS WHITCOMB: The City of Venice, I would characterize it as an outlier because, in one sense, to the extent that the point is very close to the demand curve identified -- the linear demand curve identified right there before you. It is an outlier to the extent that its price is much higher relative to all the other nine agencies in the study.

COMMISSIONER DEASON: And that was the reason it was chosen, correct?

WITNESS WHITCOMB: Part of the aspirations of the project was to get a wide range of prices so that we can see how price elasticity was a function of price level. So there were several objectives in picking a utility and that was one of them.

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(Transcript continues in sequence in Volume 19.)

DOCKET 950495-WS
EXHIBIT NO. 137
CASE NO. 96-04227

~~EXHIBIT~~ NO. 137

WITNESS: JOHN WHITCOMB, PH.D.

DOCKET NO. 950495-WS

Application for rate increase by

SOUTHERN STATES UTILITIES, INC.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DESCRIPTION:

Whitcomb's Letter to Staff
WATERATE 2.2 User's Manual
Table 2: Price Elasticities From WATERATE 2.2 Program

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 950495 EXHIBIT NO. 137
COMPANY/WITNESS: Whitcomb
DATE: 4/29/96

Jennie –

This software is being used in the Southern States Utilities rate case.

JL

RECEIVED
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Florida Public Service Commission
Division of Water and Wastewater

FROM: Jay Yingling, Senior Economist, Planning Department JWY

SUBJECT: WATERATE 2.2 RELEASE

Registered users of WATERATE 2.1 (issued December 1994) are being issued an updated version of the software titled WATERATE 2.2. WATERATE is a planning tool that simulates how changes in water and sewer rate structures impact water revenues and demand. As with WATERATE 2.1, version 2.2 does not replace, but is a complement to an in-house rate practitioner or a hired consultant. WATERATE assumes the user can appropriately identify revenue requirements and is cognizant of rate impacts related to cost-of-service equity, revenue stability, administrative implementation, and other rate objectives.

The changes to WATERATE are based on feedback over the last year and on peer review of the price elasticity estimates. The biggest change in version 2.2 is that the single family default price elasticity algorithm has been updated. The default price elasticities are still based on SWFWMD-specific data from the large empirical study conducted by Brown and Caldwell and Dr. Whitcomb. The estimation equation was simply revised to more accurately reflect SWFWMD conditions. A complete list of the changes to WATERATE is attached.

Registered users will still be able to call the WATERATE customer support toll-free phone line in 1996 between the hours of 11 a.m. and 3 p.m. Eastern Standard Time.. The number is 1-800-800-9519. This year, customer support will also assist users in obtaining property value percentages for your service area from the U.S. Census STF 3a database. This information is used with the default single family price elasticity algorithm in the model.

The District still retains the rights to WATERATE 2.1 and current users may continue to use it. However, upon review of the improvements in version 2.2, we feel the improvements are worth the conversion. WATERATE 2.2 is copyrighted by Watertech Software and Consulting and is being distributed free of charge

WELCOME TO WATERATE

WATERATE is a planning tool that simulates how changes in water and sewer rate structures impact water revenues and water demand. It automates complex calculations and provides a comprehensive, flexible framework from which to evaluate alternative rate structures. Features include single or multiblock rate structures that can vary by season, short- and long-run price elasticity adjustments specified by customer class, and detailed reporting of expected water use changes over a three year planning horizon.

The Southwest Florida Water Management District (SWFWMD) supported development of WATERATE to assist its member water agencies in pricing issues related to water conservation. WATERATE's built-in default price elasticity algorithm, which can be overridden by the user, is based on the results from a large SWFWMD empirical price elasticity study.

WATERATE's features include:
1. Alternative types of quantity charges: Single (uniform) or block (up to 6 blocks).
2. Seasonal rates (2 seasons).
3. Price elasticities specified by customer class.
4. An optional price elasticity algorithm for Florida single family customers.
5. Short-run adjustments of long-run price elasticities.
6. Inflation adjustments to account for real prices.
7. Graphs of price elasticity and bill frequency data.
8. Distinguishing between sewer and non-sewer customer price signals.
9. Up to 6 customer classes.
10. Alternative billing cycles, calendar/fiscal years, and water billing units.
11. A 3 year planning horizon.
12. Input entered by clicking the mouse on value bars.
13. On-line help for each step of process.
14. Only requires Windows 3.0 or higher computer operating system with mouse and 1 megabyte of hard disk space.
15. Detailed calculations not feasible to program using spreadsheets.

We suggest new users go through a four step process.
1. Load WATERATE on your computer and quickly tour through each of the 6 sets of tables. Experienced Windows users will find the environment familiar.
2. Enter general information on the first table. Get a blank printout of Tables 1 through 5b by clicking the mouse on the 'Print All Input Tables' option on the top menu bar.
3. Enter information for your utility directly on the blank tables. WATERATE's '?' buttons associated with each data parameter on the tables can assist the user in defining terms and handling special circumstances.
4. Start WATERATE and enter the information recorded on the blank tables into the model. WATERATE can now be used to explore how different rate structures impact revenues and water consumption.

WATERATE provides a user-friendly interface from which to enter, view, and print data. The first three tables collect general utility information, price elasticity estimates, and revenue requirements. In Tables 4a, 4b and 4c, customer characteristics such as number of customer accounts, annual water use, and water use distribution (bill frequency) are entered. In Tables 5a and 5b the user inputs historic and projected water and sewer rate structure information. Finally, Tables 6a, 6b and 6c show simulated impacts on revenues and water use from rate structure changes.

Trigger model events by using the left mouse button. Color is an important parameter. On all tables, user enters information ONLY in white cells. Gray cells cause an action if clicked. Light blue cells show label headings and results. Use the top menu bar to open/save a WATERATE data file, and print or move to one of the 6 sets of tables.

TABLE 1 GENERAL INFORMATION

Customer Classes

Water customers can be divided into a maximum of 6 customer categories. The model uses single family, multiple family, commercial, public, and irrigation classes as defaults. You can add/delete/rename classes by clicking the left mouse button on the cell to be altered and typing in changes. If using less than 6 classes, start with the top cell box and work progressively downward (do not leave gap between cell names!).

Special Circumstance: If a utility has more than six classes, aggregate classes that have similar price elasticities. If it is assumed that commercial and public classes both have a price elasticity of -0.25, for example, then these classes can be combined without any loss of accuracy in the final model output. Another option is to make two runs of WATERATE.

Special Circumstance: If a customer class has separable subclasses with significantly different price elasticities, then the subclasses should be individually listed. For example, multiple family customers can be divided into those that separately meter each dwelling unit and those that are master metered (i.e., master metered likely have a lower price elasticity).

Special Circumstance: If a utility has water prices varying by geographic location, such as inside/outside city customers, you may want to run the model separately for both inside and outside customers.

RATE STRUCTURE

Select one of three general rate structure types. You can choose from non-block, incremental block, or non-incremental block rate structures. Click on the box to the right of each customer class and an 'X' will appear to mark your selection.

Select non-block rates if your agency uses and plans to continue using a single, constant price for all water and associated sewer units sold to a customer during a billing period. Non-block rates are sometimes called uniform rates.

With block rates, a customer pays a different unit price with increasing increments of water use during a billing period. Both incremental and nonincremental block rates can be used. With incremental block rates, all units of water in the first block are sold at the first block price, all units in the second block at the second block price, and so on. This is called incremental block pricing. Some water agencies, however, charge all water units at a single price depending on which block a customer ends up in for a billing period. This is called nonincremental block pricing.

If your agency uses or wants to investigate block rate pricing, select either incremental or nonincremental block pricing. As a consequence of selecting block rates for a customer class, you will have to enter water bill frequency information in Table 3b.

Special Circumstance: Even if your water agency uses a non-block (uniform) water charge, customers (e.g., single family) may have a cap on the amount of water for which the sewer charge applies (e.g., 10 TG/Month); in this case, you must select one of the block rate options.

SEASONAL RATES

The model can evaluate either annual (non-seasonal) or seasonal (two season) water rate structures. For utilities not already using seasonal rates, we recommend that you familiarize yourself with the model using annual rates and then later explore the seasonal rate alternative. Each of these rate structures can have up to 6 rate blocks for each customer class where water use over specified water use increments in a billing period is priced at different levels.

CPI ANNUAL RATE OF INFLATION

Enter the annual growth rate of the consumer price index (CPI) in the base year. This information is used by the price elasticity algorithm to adjust for inflation.

YEAR TYPE

User needs to identify if utility uses either a fiscal or calendar year. If fiscal, it does not matter what month fiscal year starts or ends. Information is used for table titles.

BASE YEAR

The base year can be the most recent year for which year-end data is available. It can also be the current year if utility does not plan to change water prices for the remainder of year. To select base year, click on up arrow to increase year or on down arrow to decrease year.

WATER UNIT

Water billing units can be in thousands of gallons (TG), 100 cubic feet (Ccf), or in cubic meters (M3).

Special Circumstance: Utilities using other billing units can still use the model. If you are going to use the single family price elasticity default, then you must convert your water billing units to one of the three options. If you are not using the single family price elasticity default, then the billing unit information is used solely for table titles and it does not matter which one you select as long as you remember to consistently use and interpret the alternative water unit on all tables.

BILLING CYCLE

Select either monthly, bimonthly, or quarterly billing cycle.

Special Circumstance: If your utility uses another cycle (e.g. semi-annual), then you will have to convert your fixed charges and water use bill frequency information into quarterly resolution in order to use WATERATE.

TABLE 2. PRICE ELASTICITIES

LONG-RUN PRICE ELASTICITIES

Enter the long-run constant unit price elasticities by class. A unit elasticity measures the percentage change in water use resulting from every 1 percent change in real (inflation adjusted) price. An elasticity of -0.25, for example, means that for every 1 percent increase in price a -0.25 percent change in water use results. These are long-run elasticities. It may take several years for customers to make all the capital-related adjustments resulting from a price change.

The unit price elasticity calculations use the following procedure. After discounting for inflation, the model first calculates the number of one percent changes needed to equal the price change. For example, it takes 20 one percent increases to equal a 22 percent increase in real price. For each one percent increase in price, water use changes by the unit price elastic response. A unit elasticity of -1.00 taken 20 times, for example, results in a 18.2 percent (1-0.99**20) long-run reduction in water use.

For Florida utilities, we recommend using a constant unit elasticity of 0 for multiple family master-metered customers, -0.25 for commercial and industrial customers, -0.20 for public users, and -0.40 for irrigation customers.

For single family customers, we recommend Florida utilities use the default calculation of price elasticity which varies with price level and property value. You can use the default price elasticity calculation for the top two classes listed by clicking on the 'SWFWMD DEFAULT' option buttons; sometimes a utility may want to have more than one grouping of single family users such as inside/outside city customers.

The single family default price elasticity calculation is based on water demand curves identified in a large SWFWMD 1993 empirical study, as revised in 1995. Price elasticity varies between -0.12 and -0.67 in the 0 to 7 $/TG range and tends to be more elastic in the 2 to 4 $/TG range and for the low property value group. Click on the 'SEE GRAPH' button to view relationship. For prices above \$7/TG, a unit constant elasticity of -0.1 is assumed.

The default single family price elasticity calculation is complex. Hence, the model was developed to automate the calculation for users' convenience and to minimize interpretation errors. The model uses the following equation:

Demand = D1 * PVLOW% + D2 * PVHIGH%
where,
D1 = Exp(-25.074*PRICE + 24.343*PRICE^1.0098)
D2 = Exp(-43.517*PRICE + 42.827*PRICE^1.0053)
PVLOW% = percentage of low property value homes in service area
PVHIGH% = percentage of high property value homes in service area
P = water and sewer price in 1992 dollars

Demand is calculated for all years. The percentage change in Demand from one year to the next determines the long-run percentage change in water use from one year to the next. In the case of block rates, Demand equals a weighted average of each block's individual calculation of Demand. Weights are based on the percentage of water marginal derived from information in Table 4c. A similar calculation is made if seasonal rates are used.

Special Circumstance: Single family default elasticity calculation is available only for top two classes listed. If more than two single family classes exist and user wants to use default price elasticity calculation, then user must create separate runs of WATERATE with the single family classes as the top two class in each case.

SINGLE FAMILY PROPERTY VALUES AND PRICE ELASTICITY CALCULATIONS

Enter the percentage of single family customers in your service area that have a 1992 property value tax assessment above and below \$64,000.

In most cases it may be easier to use U.S. Census data to determine property value percentages. You can use Summary Tape File of the 1990 U.S. Census to obtain this information. If using this source, determine the percentage of 'Owner-Occupied Housing Units' with specified property values above and below \$75,000. (\$64,000 tax assessment is approximately equivalent to \$75,000 1990 Census value).

You can contact John Whitcomb via EMail at JBWhitcomb@aol.com for assistance with this step. Please provide best descriptive political boundary (e.g., city of Tampa) of your service area so that an accurate estimate can be provided.

SHORT-RUN PRICE ELASTICITIES

The second law of demand states that the short-run response to a price increase is smaller in the short-run than in the long-run. Changes in water use result from a combination of behavioral changes (e.g., shorter showers) and structural changes (e.g., converting landscape from turfgrass to xeriscape).

In the short-run, customers can affect behavioral changes but are limited in their ability to alter capital investments in outdoor landscaping and water using appliances and fixtures. Once a customer makes a water related investment it becomes a sunk cost. It may take a long time before that investment needs replacing. It may take an extreme climate fluctuation (e.g., freeze) before landscaping gets replanted with drought-tolerant alternatives (xeriscape). Bathroom fixtures (e.g., toilets) may last for over 30 years. Hence, while price increases may induce customers to act sooner, it may take some customers years to complete desired changes. In addition, it may take a customer a number of billing cycles just to understand the ramifications of a rate structure change. Because of these factors, price elasticity can be expected to be greater in the long run than in the short run.

Based on review of previous studies, we assume a short-run half life of one year. In other words, 50, 25, 12.5, and 6.25 percent of the long-run price impact occurs in the first, second, third and fourth years after a price change. These assumptions can be changed by clicking on a cell and using the value bar to change its value.

TABLE 3. REVENUE REQUIREMENTS

BASE YEAR REVENUE REQUIREMENTS

Enter annual revenue requirements to be collected solely through water rates (fixed and quantity charges). Revenue requirements should be net of other utility revenues such as connection (development) fees. In addition, enter direct short-run water revenue requirements. These costs are part of the water revenue requirements listed above, but are individually identified because they vary directly with water consumption. Direct short-run costs could include purchased water, energy, and chemical costs. These costs are identified because water use changes caused by pricing will in turn proportionally change these costs.

ANNUAL GROWTH PERCENTAGES

Users can directly enter annual revenue requirements in future years or extrapolate base year entries by an annual percentage rate. Enter the annual growth rates by customer class if you are going to use the extrapolation option and click on the 'CALCULATE PROJECTIONS' button below.

Special Circumstance: If revenue requirements in the base year are 'atypical', then we suggest your projected revenue requirements be adjusted to reflect more normal (expected) circumstances; do not use a simple extrapolation of base year revenue requirements in this case.

VALUE BAR INSTRUCTIONS

Use the value bar to change the value of a cell. Start by clicking on the white cell to be changed. It will then be highlighted yellow. Then click on the up arrows of the value bar to increase the cell's value or the down arrows to decrease its value. You can also change a cell's value by clicking on the center gray square of the value bar and dragging the square either up or down. This approach is faster when making large changes. The left bar changes a cell's value by millions, the center bar by thousands and the right bar by ones.

TABLE 4A. ACCOUNTS

EQUIVALENT METER UNITS
Water utilities collecting some revenue requirements from customers based on meter size need to specify equivalent meter unit (EMU) factors (also known as equivalent residential units (ERU) among other names). EMUs measure how large meters relate to a base meter size (typically 5/8 or 3/4 inch). If a 1 inch meter has a factor of 2.5, for example, then 1 inch meter customers pay 2.5 times what base meter customers do for this charge. Customers can also be assessed a per customer fixed charge that is independent of meter size (Table 5a).

The default values are based on Florida Public Service Commission Rule 25.30.060 and are widely used in Florida. (Note: the factor for 3/4 inch meters is officially 1.5 although in practice it is often set to 1).

NUMBER OF METERS
Enter the number of meters by meter size in the base year. Because the number of meters varies during the year, calculate the average number. Taking the mid-year number of meters is probably a good estimate.

ANNUAL GROWTH PERCENTAGES
You can directly enter number of meters in future years or extrapolate base year entries by an annual percentage rate. If you want to extrapolate, Select 'YES' to the AUTO PROJECT question. Then enter the annual growth rates by meter size and click on the 'CALCULATE' button below.

METER INFORMATION BY CUSTOMER CLASS
We recommend that users enter meter information for each customer class (Select 'YES'). Select and enter information in each class by clicking mouse on one of the classes on a list that will appear to the left. Be sure to enter information for all classes. If information is not available by class, you may enter meter information combined for all classes (Select 'NO'). If you select 'NO', the output data shown in Table 6a will not show fixed meter revenues by class.

SELECT CLASS
You need to enter meter information separately for each class. Select a customer class by clicking mouse on one of the classes listed above. Repeat process for all classes!

VALUE BAR INSTRUCTIONS

Use the value bar to change the value of a cell. Start by clicking on the white cell to be changed. It will then be highlighted yellow. Then click on the up arrows of the value bar to increase the cell's value or the down arrows to decrease its value. You can also change a cell's value by clicking on the center gray square of the value bar and dragging the square either up or down. This approach is faster when making large changes. The left bar changes a cell's value by thousands and the right bar by ones.

TABLE 4B. ANNUAL WATER USE

BASE YEAR WATER USE

Enter number of water units sold in the base year for each customer class.

ANNUAL GROWTH PERCENTAGES

Users can directly enter water units in future years or they can extrapolate base year entries by an annual percentage rate. Enter the annual growth rates by customer class if you are going to use the extrapolation option.

Special Circumstance: If water use in the base year is 'atypical' (e.g. drought), then we suggest your projected water use be adjusted to reflect more normal (expected) circumstances; do not use a simple extrapolation of base year water use in this case.

TABLE 4C. BILL FREQUENCY DATA

WATER BILL FREQUENCY DATA

If your utility uses or is contemplating using water or sewer block rate pricing structures, then a water bill frequency analysis is required. This will usually be the most demanding data task for the model user as it requires computer analyses of historic water billing data. Bill frequency information is used to calculate revenues generated with block rates and by WATERATE's price elasticity algorithm to determine price change effects for different customer water use levels.

For the base year (or other representative annual period), enter the percent of bills falling within each of 40 bin intervals. Percent of bills is obtained by counting the number of bills falling within each of 40 bin intervals and dividing by the total number of nonzero bills. Only 20 bins are shown on the screen; use the scroll bar to view additional bins. Information needs to be stratified by customer class and for sewer/non-sewer customers. If you are analyzing seasonal rates, bill counts must also be stratified by season. You will need to write a simple computer program for your customer billing database to get this information.

In the grid above, first enter the maximum water unit level of each bin in either TG/Bill or Ccf/Bill. Corresponding minimum values are calculated automatically. Maximum bin levels need to progressively increase in value and must be calculated for all 40 bins! The bin intervals do not have to be of the same size. For the last bin (40), the maximum bin level should be set so that the average of the minimum and maximum bin values equals the average billed water use for customers in the last bin. For example, if MIN of the last bin equals 40 TG/month and the average water use for all bills equal to or over 40 TG/month equals 43 TG/month, then the MAX bin threshold should be set to 46 TG/month.

Special Note: Select bin maximums equaling potential block rate thresholds. This will improve the accuracy of WATERATE's price elasticity algorithms.

Special Circumstance: Ideally, if block rates are used, a separate bill count should be calculated for both sewer and non-sewer customers in each class. If sewer customers are not individually identified in the database, however, then some approximate allocation between the two groups is necessary. One could assume sewer and non-sewer customers have the same relative count frequencies (enter identical values in both columns).

SEASONAL WATER USE PERCENTAGES
Enter water use distribution data for both off-peak and peak seasons for each class. This information is used to allocate annual water use to season under the seasonal rate option.

SEWER AND NONSEWER WATER USE PERCENTAGES
WATERATE distinguishes between sewer and nonsewer customers in making its price elasticity calculations. Select the percentage of total annual water use (seasonal if analyzing seasonal rates) that is sold to sewer and nonsewer customers in each class by using the value bar to the right.

SELECT CLASS
Enter water use distribution data for each class listed below. Be sure not to skip a class. Classes are determined from Table 1.

SINGLE FAMILY DEFAULT BILL FREQUENCY DISTRIBUTION
WATERATE can calculate monthly default bill frequency percentages for single family customers based on data from 1,200 homes from 10 utilities with the SWFWMD. If your utility is calculating bill frequency percentages for other classes, however, we strongly recommend you also include single family customers to get more precise, utility specific data. Warning: the default corresponds to monthly data (e.g., not bimonthly).

TABLE 5A. FIXED METER CHARGES

Enter the fixed bill charge per account and per EMU (as determined in Table 4a) for each of the years. Remember that one of the best ways to reduce water consumption is to shift cost recovery from fixed charges to quantity charges. You can lower meter charges and increase water price and still collect the same revenues."

Special Circumstance: If a utility has a minimum water allowance included with the fixed service charge (e.g., 5 TGs per month), enter the entire service charge amount here. Then in Table 5b, the first block of the rate structure should include the water allowance (e.g., 5 TGs per month) with a zero price.

You must enter meter independent ($/Account/Bill) and dependent ($/EMU/Bill) charges for each and every customer class.

If all customers in all customer classes with the same sized meter pay the same fixed charge, then select 'NO'. If, on the other hand, customers in different classes with the same sized meter pay different fixed charges, select 'Yes'. You need to enter meter information by class back in Table 4a with this selection."

TABLE 5B. WATER PRICES

BLOCK DEFINITIONS

This model version allows for up to six blocks. Enter the maximum water use assigned to each block starting with the first block. For the top block you select, leave the maximum cell empty. The minimum values will automatically be calculated. If no blocks, then leave all maximum boxes empty. View blocks 4, 5, and 6 by using the scroll on the right side of each grid.

WATER AND SEWER PRICES

Enter water and sewer prices ($/water unit) for up to 6 blocks.

Special Circumstance: If water block thresholds differ from sewer block thresholds, create additional blocks. For example, assume a two-block water rate structure with the first block ending at 8 TGs per month. Sewer customers, in contrast, have to pay a sewer charge for all water units up to 10 TG per month. This situation requires three blocks. The first will be for water use up to 8 TGs per month and will include both the first block water price and the sewer charge. The second block extends from 8 to 10 TGs per month and includes the second block water price and the sewer charge. The third block, which starts at 10 TGs per month, consists of only the second block water charge.

Special Circumstance: What if water or sewer prices are changed mid-year or several times a year? One approach would be to average prices over the course of a year and insert averages into Table 5b. For example, if a utility on a calendar year had water prices changed on a calendar basis but sewer prices on July 1, then the user could average the sewer price over the first six months of the year with sewer price over the second six months of the year to arrive at a composite value.

SELECT CLASSES

You must enter price information for each class. Select class by clicking on class on list above.

SELECT SEASON
Select either 'Off-Peak' or 'Peak' season below. Make sure to enter block and price information for both seasons.

TABLE 6A. REVENUE SUMMARY

This table shows the water revenue impacts from changes in water and sewer rates. The top section identifies the revenue requirements to be recovered from rates after adjusting for price caused changes in water use (direct short-run revenue requirements from Table 3). The middle section calculates fixed service charge revenues and quantity charge revenues by class. Lastly, the bottom line shows the ability of the fixed (Table 5a) and quantity (Table 5b) charges to recover revenue requirements; if positive there is a surplus and if negative there is a shortfall.

TABLE 6B. WATER SUMMARY

This table shows three columns of information. The first column shows the base water use for each class as identified in Table 4b.

The second column shows the change in base year water use projections caused by changes in water and sewer rates. The third column shows the percentage change in base year water use caused by changes in water and sewer rates. If seasonal rates are selected, you can view changes by season using the toggle switch that will appear above.

TABLE 6C. WATER CHANGES BY RATE BLOCK

This table shows the percentage change in base water use occurring in each class and rate block. Toggle between classes using the class list (Click mouse on class). If seasonal rates are selected, results can be viewed for the off-peak or peak season.

SELECT CLASS
You can view the percentage change in block water use occurring for a class by clicking on one of the classes listed above.

BASE % SOLD
This column calculates the percentage of water use sold within each rate block. The sum over all blocks for a year equals 100 percent. The block percentages are determined from an algorithm analyzing Table 4c bill frequency information.

NEW % SOLD
This column calculates the percentage of water use sold within each rate block after accounting for water use changes resulting from water and sewer price changes. The sum of all block percentages does not necessarily equal 100 percent. If a class realizes an overall 10 percent price caused reduction in water demand, for example, then the sum of percentages over all blocks will equal 90 percent.

% CHANGE
This column calculates the percentage change between 'BASE % SOLD' and 'NEW % SOLD.'

ADDITIONAL INFORMATION

LICENSE AGREEMENT
This is a legal agreement between USER and WATERTECH Software and Consulting to use the software program WATERATE. WATERATE is owned by WATERTECH Software and Consulting and is protected by United States copyright laws. Unauthorized copying of WATERATE is expressly forbidden and you may be held legally responsible for any copyright infringement that is caused or encouraged by your failure to abide by the terms of this License. You may not rent, lease or transfer WATERATE to another party. You may not make backup copies of WATERATE. WATERTECH Software and Consulting will provide a free replacement disk if the original becomes damaged or defective.

Others wishing to obtain a site license of WATERATE or develop a customized version can contact WATERTECH Software and Consulting by EMail at JBWhitcomb@aol.com or by phone at 1-800-800-9519.

CUSTOMER SUPPORT
If you should experience problems operating WATERATE or adapting it to your particular needs, you may contact WATERTECH by EMail at JBWhitcomb@aol.com or by phone at 1-800-800-9519. We appreciate comments and suggestions.

DEMONSTRATION CASE
You can analyze a case study illustrating one way of changing rates to decrease water consumption. Customer water characteristics and revenue requirements are based on data from Winter Park, Florida. Users can view the data by loading the file 'Demo1.dat' in WATERATE which is placed in the WATERATE directory on your hard disk during installation. Use the File/Open menu option on Table 1 to load file.

One way rates can be changed to decrease water consumption is to lower fixed monthly service charges and increase quantity charges. Higher quantity charges increase the financial incentive for customers to decrease their water use. In the case study, the monthly fixed account and EMU charges in Table 5a are decreased in half from $5.00

and \$2.50 to \$2.50 and \$1.25 respectively. This leads to a 50 percent decrease in meter revenues as shown in Table 6a.

The decrease in meter revenues is made up through increasing quantity charges. Water price increases from \$0.61/TG in the base year to \$0.92/TG, \$0.96/TG, and \$1.00/TG during the next three years respectively to be (approximately) revenue neutral. For single family customers, quantity charge increases lead to -6.1, -8.9, and -10.1 percent reductions in base water use over the three years respectively. This is based on using the single family default price elasticity algorithm and the short-run price elasticity adjustments shown in Table 2. For multifamily customers, these rate changes do not affect water consumption as the price elasticity for this class is zero. For commercial customers, on the other hand, the constant unit price elasticity of -0.25 and the short-run adjustment factors listed in Table 2 lead to a decrease in water consumption of -1.9, -2.6, and -2.7 percent over the three years. Results are summarized in Table 6b.

The net result of these rate changes is to significantly reduce water consumption while still collecting sufficient revenues (Table 6a). Because water use is affected by other factors than just price, such as weather, the precise savings seen in future years will vary to some degree. WATERATE calculates expected water savings given stated assumptions hold true. These rate changes will also impact other rate making objectives such as revenue stability. Collecting more revenue requirements through variable charges may decrease revenue stability. These types of impacts must be carefully analyzed and possibly mitigated.

DISCLAIMER

This software program has been prepared and is licensed for distribution for the sole purpose of assisting water supply utilities in estimating water and sewer price induced changes in water use and revenues. This model does not replace, but is a complement to the services of a qualified rate analyst. The user bears all risk of the use of this software.

SPREADSHEET LINK

This is an advanced feature. Many of WATERATE's functions are not feasible to program using spreadsheets. However, for those using spreadsheet based financial models, it is possible to directly link spreadsheet information into WATERATE. This tie allows users to quickly evaluate the impacts from changes in basic information (e.g., revenue requirements or water use characteristics) or rate structure. Ideally, WATERATE works in conjunction with a spreadsheet to complete the complex calculations needed to accurately evaluate changes in water use and revenues from alternative rate structures. Contact John Whitcomb via Email at JBWhitcomb@aol.com or via phone at 1-800-800-9519 (Noon to 3 p.m EST) to find out more.

Table 2. Price Elasticities

Long-Run Elasticity

User Class	User Specified	SWFWMD Default
Single Family	Default	●
Multiple Family	0.00	
Commercial	0.00	
Public	0.00	
Irrigation	0.00	

Short-Run Elasticity

	% of Long-Run Response
1st Year	50%
2nd Year	25%
3rd Year	13%
4th Year	6%
Other Years	6%
Total	100%

SWFWMD Default

Single Family Property Values for Default Calculation	
Low Value	50%
High Value	50%
Total	100%

New File

FL Public Service Commission 01-May-96

DOCKET 950495-WS
EXHIBIT NO. 138
CASE NO. 96-04227

~~EXHIBIT~~ NO. 138

WITNESS: JOHN WHITCOMB, PH.D.

DOCKET NO. 950495-WS

Application for rate increase by

SOUTHERN STATES UTILITIES, INC.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

DESCRIPTION:

SSU's Response to OPC's POD 28 -- Appendices A and C

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 950495 EXHIBIT NO 138
COMPANY/
WITNESS:
DATE: 4/29/96

SOUTHERN STATES UTILITIES, INC.
RESPONSE TO REQUEST FOR PRODUCTION OF DOCUMENTS
DOCKET NO.: 950495-WS

REQUESTED BY:	OPC
SET NO:	1
DOCUMENT REQUEST NO:	28
ISSUE DATE:	07/18/95
WITNESS:	JOHN B. WHITCOMB
RESPONDENT:	John B. Whitcomb

DOCUMENT REQUEST: 28

Provide a complete copy of all inputs and outputs with associated assumptions for Dr. Whitcomb's Exhibit JBW-6

RESPONSE: 28

Attached as Appendix DR28-A are copies of inputs (printouts of tables 1 through 5 of the Waterate model) and outputs (table 6 of the Waterate model) which support Exhibit JBW-6, which excluded Hernando, Hillsborough, and Polk Counties. Attached as Appendix DR28-B are copies of inputs and outputs for the supplemental filing which includes Hernando, Hillsborough, and Polk Counties.

Appendix DR28-C is a summary of Dr. Whitcomb's price elasticity work and assumptions used in the Waterate model, excluding Hernando, Hillsborough and Polk Counties. Please note that this analysis combined plants in the Conventional Treatment category. The Reverse Osmosis Treatment plants (Marco Island and Burnt Store) were analyzed separately. In addition, analyses for current FPSC Uniform plants (excluding Burnt Store) and current FPSC Non-uniform plants (excluding Marco Island) were made.

Attached as Appendix DR28-D is a summary of Dr. Whitcomb's price elasticity work and assumptions used in the Waterate model for the supplemental filing, which includes Hernando, Hillsborough and Polk Counties. Separate analyses were presented for current Uniform plants (excluding Burnt Store), current FPSC Non-uniform plants (excluding Marco Island), Spring Hill and the other County regulated plants.

Current Uniform Waterate Tables
Original Filing
(excludes Hernando, Polk, and Hillsbororugh counties)

Conventional Treatment
(excludes Burnt Store)

Table 2. Price Elasticities

Long-Run Elasticity

User Class	SWFWMD Default	User Specified
Res	◉	Default
Other	○	-0.20
		0.00
		0.00
		0.00
		0.00

SWFWMD Default

Single Family Property Values for Default Calculation

Low Value	33%
Medium Value	34%
High Value	33%
Total	100%

Short-Run Elasticity % of Long-Run Response

1st Year	75%
2nd Year	0%
3rd Year	0%
4th Year	0%
Other Years	25%
Total	100%

File=c:\uniform1.40

Southern States Utilities 08-Aug-95

Current Non-Uniform Waterate Tables
Original Filing
(excludes Hernando, Polk, and Hillsbororugh counties)

Conventional Treatment
(excludes Marco Island)

Table 2. Price Elasticities

Long-Run Elasticity

User Class	SWFWMD Default	User Specified
Res	◉	Default
Other	○	-0.20
		0.00
		0.00
		0.00
		0.00

SWFWMD Default

Single Family Property Values for Default Calculation

Low Value	33%
Medium Value	34%
High Value	33%
Total	100%

Short-Run Elasticity % of Long-Run Response

1st Year	75%
2nd Year	0%
3rd Year	0%
4th Year	0%
Other Years	25%
Total	100%

File=c:\nonuni1.40

Southern States Utilities 08-Aug-95

Burnt Store Waterate Tables

Table 2. Price Elasticities

Long-Run Elasticity

User Class	SWFWMD Default	User Specified
Res	◉	Default
Other	○	-0.20
		0.00
		0.00
		0.00
		0.00

SWFWMD Default

Single Family Property Values for Default Calculation

Low Value	33%
Medium Value	34%
High Value	33%
Total	100%

Short-Run Elasticity
% of Long-Run Response

1st Year	75%
2nd Year	0%
3rd Year	0%
4th Year	0%
Other Years	25%
Total	100%

File=c:\burntstr.40

Southern States Utilities 04-Aug-95

Marco Island Waterate Tables

Table 2. Price Elasticities

Long-Run Elasticity

User Class	SWFWMD Default	User Specified
Res	◉	Default
Other	○	-0.20
		0.00
		0.00
		0.00
		0.00

SWFWMD Default

Single Family Property Values for Default Calculation

Low Value	33%
Medium Value	34%
High Value	33%
Total	100%

Short-Run Elasticity
% of
Long-Run Response

1st Year	75%
2nd Year	0%
3rd Year	0%
4th Year	0%
Other Years	25%
Total	100%

File=c:\marcoi.40

Southern States Utilities 04-Aug-95

SCHEDULE OF WATER RATES - 1996
Summary of Waterate Software Inputs and Outputs 1/

Company: SSU / FPSC Jurisdiction / Proposed Conventional and Reverse Osmosis Treatment
Docket No.: 950495-WS
Schedule Year Ended: 12/31/96
Water [x] Wastewater [ ]
Interim [ ] Final [x]
Historical [ ] Projected [x]
Present: FPSC Uniform [x] FPSC Non-uniform [x]
Proposed: Conventional [x] Reverse Osmosis [x]

FPSC
Schedule: E1-4
Page 1 of 3
Preparer: Bencini

Explanation: Provide a summary schedule of the Waterate software tool inputs and outputs.

			Conventional Treatment	Reverse Osmosis
	Revenues 2/			
1	Original Rev. Req. Less Direct Short Run Exp.		$22,831,166	$10,458,202
2	Direct Short Run Expenses 3/		$3,201,573	$1,218,241
3	Total Original Revenue Requirement		$26,032,739	$11,676,443
4	Direct Short-Run RR Price Elastic Change 4/		-$257,819	-$32,872
5	Adjusted Revenue Requirement	L3-L4	$25,774,920	$11,643,571
6				
7	BFC Revenues	40% * L5 5/	$10,309,968	$4,657,428
8	Gallonage Revenues	60% * L5 5/	$15,464,952	$6,986,143
9	Total Revenues to be Collected from Rates	L7+L8	$25,774,920	$11,643,571
10				
11	**Billing Determinants 6/**			
12	Projected Monthly ERCs		83,866	18,324
13	Projected Consumption TG		8,040,449	2,183,794
14				
15	Projected Residential Consumption TG		7,074,030	1,101,846
16	Projected Multi-Family Consumption TG		81,741	282,106
17	Projected Other Consumption TG 7/		884,678	799,843
18	Total Projected Consumption TG	L15+L16+L17	8,040,449	2,183,795
19				
20	**Price Elasticity Adjustments 8/**			
21	Residential Price Elasticity Change TG		-826,864	-25,914
22	Multi-Family Price Elasticity Change TG		0	0
23	Other Price Elasticity Change TG		-40,169	-31,841

SCHEDULE OF WATER RATES - 1996
Summary of Waterate Software Inputs and Outputs 1/

Company: SSU / FPSC Jurisdiction / Proposed Conventional and Reverse Osmosis Treatment
Docket No.: 950495-WS
Schedule Year Ended: 12/31/96
Water [x] Wastewater [ ]
Interim [ ] Final [x]
Historical [ ] Projected [x]
Present: FPSC Uniform [x] FPSC Non-uniform [x]
Proposed: Conventional [x] Reverse Osmosis [x]

FPSC
Schedule: E1-4
Page 2 of 3
Preparer: Bencini

Explanation: Provide a summary schedule of the Waterate software tool inputs and outputs.

		Conventional Treatment	Reverse Osmosis
Price Elasticity Adjustments cont. 9/			
24 Total Price Elasticity Change TG	L21+L22+L23	-876,053	-57,755
25			
26 Adjusted Projected Consumption TG	L18+L24	7,164,396	2,126,040
27			
28 Residential Price Elasticity Change Percentage	L21/L15	-11.7%	-2.4%
29 Multi-Family Price Elasticity Change Percentage	L22/L16	0.0%	0.0%
30 Other Price Elasticity Change Percentage	L23/L17	-5.6%	-4.0%
31 Overall Price Elasticity Change Percentage	L24/L18	-10.9%	-2.6%
32			
33 Preliminary Rate Calculations 9/			
34 BFC Rate	(L7/L12)/12	$9.15	$23.78
35 Gallonage Charge	L8/L26	$2.16	$3.29

1/ The information on this schedule is a brief summary of some of the inputs and outputs from the Waterate software tool. Refer to the testimony of John Whitcomb, Ph.D. for the complete set of input and output tables and discussion of the model.

2/ Revenues are required income from Schedule B-1. The numbers are slightly different due to an increase in the payroll tax which was not ran back through the Waterate model because the impact would have been minimal. The difference in revenues for Conventional Treatment is $32,534 (B1 revenue is higher), and for Reverse Osmosis the difference is $5,303 (B1 revenue is higher).

3/ Direct short-run revenue requirements is composed of purchased power, purchased water and chemicals. These are expenses that are directly related to water volume.

PAGE 2 OF 3

SCHEDULE OF WATER RATES - 1996
Summary of Waterate Software Inputs and Outputs 1/

Company: SSU / FPSC Jurisdiction / Proposed Conventional and Reverse Osmosis Treatment
Docket No.: 950495-WS
Schedule Year Ended: 12/31/96
Water [x] Wastewater [ ]
Interim [ ] Final [x]
Historical [ ] Projected [x]
Present: FPSC Uniform [x] FPSC Non-uniform [x]
Proposed: Conventional [x] Reverse Osmosis [x]

FPSC
Schedule: E1-4
Page 3 of 3
Preparer: Bencini

Explanation: Provide a summary schedule of the Waterate software tool inputs and outputs.

	Conventional Treatment	Reverse Osmosis

4/ The predicted price elasticity driven decrease in consumption would also reduce the direct short-run costs. Refer to the testimony of John Whitcomb, Ph.D. for a detailed explanation of the Waterate model.

5/ The 40% base and 60% gallonage split for revenues is being used for this rate case. This qualifies as a conservation promoting rate structure according to the Brown & Caldwell weighting definition. Refer to the testimony of John Whitcomb, Ph.D. for details.

6/ The billing determinants provided did not include bulk water from Marco Island. The ERCs are stated as monthly numbers because that is how they are used in the Waterate software tool. The consumption number is after the conservation program adjustments. Refer to schedule E1-2 in the 1996 Conventional Treatment and Reverse Osmosis tabs for details. These numbers may not tie to other schedules due to rounding.

7/ Other consumption includes commercial, public authority and irrigation. SSU took the conservative approach by classifying irrigation in the same classification as commercial. This was done because the breakout of our irrigation customers by residential, multi-family and commercial classes is not possible at this time.

8/ The price elasticity adjustments are outputs from the Waterate software tool. They have been converted from a gallonage number to a percentage for application purposes. Please refer to the testimony of John Whitcomb, Ph.D. for details.

9/ The preliminary rates are derived from the Waterate software tool. They do not exactly match our final rates due to rounding and the slight increase in revenue requirements not taken into consideration in Waterate. In addition, any non-standard rate design classes (like raw water in the reverse osmosis treatment category), are not included.

<u>Notes about the Waterate simulation:</u>

Assumed 75% of long-run price elastic response.
Assumed long-run nonresidential price elasticity of -0.20 (0 for multi-family and -.25 for other).
Fire protection BFC is 1/12 of BFC.
Bill frequency information based on 1994 water use consumption.
Non-uniform historical gallonage and sewer charges based on weighted average of prices.

APPENDIX OR 28-C
PAGE 3 OF 3

DOCKET 950495-WS
EXHIBIT NO. 139
CASE NO. 96-04227

139

EXHIBIT NO. ______

WITNESS: JOHN WHITCOMB

DOCKET NO. 950495-WS

Application for rate increase by

SOUTHERN STATES UTILITIES, INC.

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

DESCRIPTION:

RESPONSE TO PSC INTERROGATORY 12

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET
NO. 950495 EXHIBIT NO 139
COMPANY/
WITNESS: Whitcomb
DATE: 4/25/96

SOUTHERN STATES UTILITIES, INC.
DOCKET NO.: 950495-WS
RESPONSE TO INTERROGATORIES

REQUESTED BY:	FPSC
SET NO:	1
INTERROGATORY NO:	12
ISSUE DATE:	08/31/95
WITNESS:	John B. Whitcomb
RESPONDENT:	John B. Whitcomb

INTERROGATORY NO: 12

On page 18 of 91 of Dr. Whitcomb's Exhibit (JBW-2), seasonal rates are shown to be superior to nonseasonal rates. SSU did not propose a seasonal rate in this proceeding. Please provide an analysis of why seasonal rates are not appropriate for SSU.

RESPONSE: 12

Seasonal rates are superior to nonseasonal rates where there is a large, consistent seasonal peak in water use. SSU is not an ideal candidate for seasonal rates because the seasonal peak is not large or consistent. Relative to other utilities in the U.S., SSU has a mild peak season. Water use in the four highest months is less than 50 percent greater than in the other off-peak months. The seasonality in water use is also highly variable, largely resulting from variable seasonal weather patterns.

48 DOCKET 950495-WS
EXHIBIT NO. 140
CASE NO. 96-04227

EXHIBIT NO. ______

WITNESS: JOHN WHITCOMB

DOCKET NO. 950495-WS

Application for rate increase by

SOUTHERN STATES UTILITIES, INC.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

<u>DESCRIPTION:</u>

RESPONSE TO PSC INTERROGATORY 13

DISCUSSION OF SINGLE PRICE RATE STRUCTURE AND

REPORT "FINANCIAL RISK AND WATER CONSERVING

RATE STRUCTURES"

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 950495 EXHIBIT NO 140
COMPANY/ WITNESS: Whitcomb
DATE: 4/29/96

SOUTHERN STATES UTILITIES, INC.
DOCKET NO.: 950495-WS
RESPONSE TO INTERROGATORIES

REQUESTED BY:	FPSC
SET NO:	1
INTERROGATORY NO:	13
ISSUE DATE:	08/31/95
WITNESS:	John B. Whitcomb
RESPONDENT:	John B. Whitcomb

INTERROGATORY NO: 13

On page 10, lines 307, Dr. Whitcomb states that he can design a single price rate structure that sends a stronger water conservation price signal to customers than any of the block rate structures currently being used in Florida. Please provide an example of such a rate structure and an explanation as to why it is better.

RESPONSE: 13

It can be clearly shown that a single price rate structure with a relatively low BFC sends a stronger price signal than a block rate structure with a relatively high BFC. My report to SSU dated April, 1995 entitled "Financial Risk and Water Conserving Rate Structures", attached as Appendix 13-A (which previously was provided to Staff in SSU's response to OPC discovery), demonstrates this point (see Figure 3-2). Too often it is said that because a utility has a block rate structure it has a water conserving rate structure. This is not always the case. The level of the BFC and percentage of revenues collected through it, the percentage of revenues collected through the gallonage charge, the level of the block rates, and the relationship between the block rates must all be examined to see if the structure is a water conserving rate structure.

If the FPSC wants to increase the water conservation price signal sent to customers, it could lower the percentage of revenues collected via the BFC from 40%. However, SSU does not support such action because by doing so the FPSC would greatly increase SSU's financial risk, given its volatile water use patterns. A larger elasticity adjustment than the ones indicated in my testimony and the MFRs also would be required. I also have been informed that this would have an upward impact on the required return on equity. The best course would be to institute a weather normalization clause as required by SSU, thereby minimizing financial risk and lower the BFC (and increase the gallonage charge) to maximize the water price signal. It is a "win-win" situation. Finally, U must note that reversion to some form of stand alone rate structure would eliminate the feasibility of a normalization clause as it would require more than 100 calculations each month.

Southern States Utilities

FINANCIAL RISK

AND

WATER CONSERVING

RATE STRUCTURES

APRIL 1995

Report Submitted By:
WATERTECH Software and Consulting
John B. Whitcomb, Ph.D.
1-800-800-9519

SUMMARY

This report evaluates the tradeoff between revenue stability and water conservation promotion associated with alternative water rate structures for the Southern States Utilities (SSU). SSU seeks to minimize variations in annual revenues resulting from variations in annual water use. SSU experiences a large variation in annual water use, largely caused by variations in weather. From an analysis of historical residential water consumption and weather patterns, the 95 percent confidence interval around average annual per account water use spans plus and minus 10.9 percent. This large variation translates into a relatively large variation in revenues; the precise magnitude of revenue deviation depending on rate structure. A rate structure that collects a large share of its revenues through a fixed monthly service charge, for example, tends to be more stable in generating revenues. A single water price tends to be more stable than a block rate structure, all other factors held constant. This evaluation quantifies the financial risk associated with seven alternative rate structures.

SSU also recognizes that pricing can be an important tool in managing scarce water resources. SSU wants to develop a water conserving rate structure that improves the price signal sent to customers by increasing the price customers pay for their last unit of water consumed. Increasing marginal price gives a bigger reward to customers that take water conserving steps to reduce water consumption. Ideally, SSU seeks a rate structure that achieves improved water savings while reducing financial risk.

This evaluation finds, however, that water conservation promotion through pricing and financial risk minimization are competing objectives. More of one objective is gained at the expense of the other. Moreover, out of the rate structures analyzed, no single rate structure proved better than the others in achieving both objectives. Identical water savings achieved through each rate structure option would cause an almost identical increase in financial risk. This is an interesting and important finding. This finding, however, is specific to the current circumstances analyzed for SSU and should <u>not</u> be

inferred as a universal conclusion by any means. By changing associated water and sewer price levels or bill frequency distribution information, for example, a preference for a particular rate structure is likely to occur.

Given that SSU's financial risk exposure from varying water demands is high (likely to be one of the highest in the U.S.), there is strong reason for SSU not to move towards a more risky position by increasing the conservation price signal sent to customers. And yet, SSU could achieve dramatic water savings through using price. For example, lowering the base facility charge from $5.13 to $2.00 per month and increasing the gallonage charge from $1.23 to $1.78/TG (revenue neutral change) would lead to an estimated long-run 12.6 percent reduction in water use.

As high-quality, low-cost drinking water becomes more scarce in Florida, the need for improved management techniques becomes more important. This report's recommendation is that SSU pursue means of mitigating its financial risk with respect to water demand so that it could then afford to adopt improved water conserving rate structures. Some type of water sales adjustment mechanism, where revenue deviations occurring from water use deviations are offset by changes in water price, is suggested. Such a mechanism would provide a win-win situation with respect to covering SSU's risk and allowing for a stronger water conserving rate structure.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

FPSC Florida Public Service Commission
NIR Net irrigation requirement for turfgrass in inches. Equals the depth of water ideally needed to irrigate turfgrass given evapotranspiration and rainfall values.
SSU Southern States Utilities
TG Thousand Gallons

1. INTRODUCTION

Water rate design involves multiple objectives. Desirable rate making objectives commonly include revenue stability, water conservation promotion (resource efficiency), cost-of-service equity, customer understanding and acceptance, and administrative ease.[1] No one rate structure is best in achieving each and every objective. Rather, the objectives are often competing and tradeoffs among objectives must be explored. A variety of uniform, decreasing block, increasing block, and seasonal rate structures are currently being used by water purveyors in the U.S.[2]

The purpose of this report is to measure the tradeoff between revenue stability and water conservation promotion from alternative water rate structures for SSU. SSU seeks to minimize variations in annual revenues resulting from variations in annual water use. SSU's water use can vary significantly year to year as described and quantified in Chapter 2. SSU also recognizes that pricing can be an important tool in managing scarce water resources. SSU wants to develop a water conserving rate structure with minimal sacrifice with respect to revenue stability.

Chapter 3 presents how seven alternative candidate rate structures impact both revenue stability and water conservation potential. Each rate structures is developed so that expected revenues equal revenue requirements; revenue neutrality is a constraint. The seven rate structures include:

1. Single gallonage charge for all water use
2. Increasing two block with threshold at 6 TG/month and 25% block price differential
3. Increasing two block with threshold at 6 TG/month and 50% block price differential
4. Increasing two block with threshold at 6 TG/month and 100% block price differential
5. Increasing two block with threshold at 10 TG/month and 25% block price differential

[1] Bonbright, J.C., Principles of Public Utility Rates, Columbia University Press, New York, 1961.
[2] Ernst and Young, National Water and Wastewater Rate Survey, 1992.

6. Increasing two block with threshold at 10 TG/month and 50% block price differential
7. Increasing two block with threshold at 10 TG/month and 100% block price differential

In addition, with each of the above rate structures, the impacts of varying the percentage of revenues collected via the base facility charge and the gallonage charge are analyzed. The base facility charge is a meter-size dependent fixed charge that is independent of water consumption. The gallonage charge, as the name implies, is the price paid for each TG consumed by a customer.

For each of the rate structures and for varying levels of base facility charges, this report estimates the impact on revenue stability and water conservation potential. Revenue stability is assessed by quantifying the statistical distribution of annual revenues associated with each rate structure option. We find revenue stability increases with increases in the base facility charge and with decreases in the block price differential. In contrast, we find water conservation promotion increases with decreases in the base facility charge and with increases in the block price differential. Therefore, revenue stability and water conservation promotion are competing objectives; you get more of one objective by sacrificing the other. The analysis shown in Chapter 3 shows the rate of tradeoff between the objectives.

Chapter 4 contains a summary of financial risk and water conserving rate structures as applicable to SSU. In addition, the ability of a rate structure to be defined as "water conserving" is examined using a set of guidelines set forth by the Southwest Florida Water Management District.

2. SSU WATER USE VARIATION

Before assessing the revenue stability associated with alternative rate structures, it is important to first characterize the statistical distribution of SSU's water use. Water use varies over time for a variety of reasons. Typically, weather is a major factor as water use tends to increase during hot, dry periods and to decrease under cool, wet periods. Florida's highly variable weather patterns can translate into highly variable water use patterns. In addition, other factors such as water price, tourism, and seasonal residents can affect SSU's water use, among other random influences.

The objective of this chapter is to statistically quantify SSU's variation in annual water sales. We look at both residential (single family) and nonresidential customer classes. Unfortunately, we only have a relatively short time series of monthly water consumption to study, spanning between 1991 and 1994. This period is too short to accurately reflect long-term weather patterns. To accommodate this fact, we develop a monthly model of water use based on weather. We then simulate what water use would be from the model given 46 years of actual weather data (1949-1994). This simulation results in a better, fuller description of the true variation that can be expected in water use.

Water Use Data

Water use consumption records come from water meter recordings made for billing purposes. Residential and nonresidential water use aggregated over all systems[3] over the four year period 1991 through 1994 is summarized in Table 2-1.

---

[3] SSU's number of water systems equaled 105 in 1994.

Table 2-1. Annual Water Use By Class

Description	1991	1992	1993	1994	Ave 1991-94
Residential					
Total Accounts	92,326	95,583	99,716	99,128	96,688
Total TGs	10,354,378	11,408,509	11,578,438	10,219,367	10,890,173
TG/Account/Month	9.346	9.946	9.676	8.591	9.390
Nonresidential					
Total Accounts	3,259	3,073	3,391	3,398	3,280
Total TGs	1,558,819	1,620,052	1,993,258	2,088,738	1,815,217
TG/Account/Month	39.856	43.928	48.983	51.225	45.998

Approximately 96.7 percent of SSU's customers and 85.7 percent of water sales are from the single family residential class. Residential water use is variable, ranging from 5.9 percent above the 1991-94 average in 1992 to 8.5 percent below the average in 1994. Nonresidential water use shows an increasing trend over time.

Weather Data

SSU's water customers are located throughout Florida. Because of this geographic diverseness, there is no single weather station that is representative of weather conditions facing SSU's customers. Instead, to obtain representative weather information it is necessary to calculate a weighted average of weather information from multiple stations.

Table 2-2 lists the closest NOAA weather station to 105 of SSU's water systems. The table also lists the percentage of total SSU water use in 1994 associated with each system. Spring Hill, Deltona, and Marco Island are the largest systems comprising over 60 percent of total usage.

Table 2-2. SSU System Weather Stations and Water Sales (1994)

SSU SYSTEM	NOAA Weather Station	Residential % of Total	Non-Residential % of Total
1. Spring Hill	Weeki Wachee	26.35%	6.23%
2. Deltona	Stanford Exp	24.19%	7.17%
3. Marco Island	Naples	10.29%	51.22%
4. Beacon Hills	Jacksonville Beach	4.28%	2.19%
5. Lehigh	La Belle	3.23%	3.30%
6. Sugar Mill Woods	Inverness	3.05%	0.69%
7. University Shores	Orlando WSO	2.99%	5.07%
8. Seaboard	Tampa	2.00%	2.04%
9. Silver Lake Estates	Lisbon	1.81%	0.24%
10. Deep Creek	Punta Gorda	1.76%	1.90%
11. Marion Oaks	Lisbon	1.50%	0.79%
12. Amelia Island	Fernandina Beach	1.50%	8.34%
13. Woodmere	Jacksonville Beach	1.43%	1.76%
14. Citrus Springs	Inverness	1.34%	0.41%
15. Apple Valley	Stanford Exp	1.16%	0.17%
16. Pine Ridge	Inverness	1.06%	0.08%
17. Keystone Heights	Gainesville Arpt	0.96%	0.27%
18. Lake Gibson Estates	Lake Alfred	0.70%	0.05%
19. Palm Terrace	Bradenton	0.61%	0.05%
20. Meredith Manor	Stanford Exp	0.56%	0.76%
21. Chuluota	Stanford Exp	0.55%	0.27%
22. Leilani Heights	Stuart 1 N	0.42%	0.00%
23. Valrico Hills Utilities	Tampa	0.38%	0.00%
24. Druid Hills	Stanford Exp	0.37%	0.01%
25. Tropical Park	Kissimmee 2	0.31%	0.04%
26. Sunny Hills	Chipley 3 E	0.26%	0.09%
27. Hershel Heights	Tampa	0.25%	0.17%
28. Citrus Park	Ocala	0.24%	0.04%
29. Sugar Mill	Daytona Beach	0.23%	0.09%
30. Lake Harriet Estates	Stanford Exp	0.22%	0.11%
31. Palm Valley	St Augustine	0.22%	0.08%
32. Western Shores	Lisbon	0.20%	0.00%
33. Pine Ridge Estates	Kissimmee 2	0.20%	0.00%
34. Enterprise Util. Corp.	Stanford Exp	0.18%	0.01%
35. Point O' Woods	Inverness	0.17%	0.06%
36. Piney Woods	Lisbon	0.17%	0.01%
37. Daetwyler Shores	Orlando WSO	0.15%	0.00%
38. Burnt Store	Punta Gorda	0.14%	1.57%

Table 2-2. SSU System Weather Stations and Water Sales (1994) (Continued)

SSU SYSTEM	NOAA Weather Station	Residential % of Total	Non-Residential % of Total
39. Fern Park	Stanford Exp	0.14%	0.11%
40. Rolling Green	Inverness	0.14%	0.00%
41. Intercession City	Kissimmee 2	0.14%	0.06%
42. Postmaster Village	Gainesville Arpt	0.14%	0.00%
43. Lake Ajay Estates	Kissimmee 2	0.13%	0.00%
44. Imperial Mobile Terrace	Lisbon	0.13%	0.00%
45. Gibsonia Estates	Lake Alfred	0.13%	0.08%
46. Fern Terrace	Lisbon	0.12%	0.00%
47. Orange Hill	Lake Alfred	0.12%	0.00%
48. Westmont	Isleworth	0.12%	0.00%
49. Oak Forest	Inverness	0.12%	0.00%
50. Grand Terrace	Lisbon	0.12%	0.00%
51. Keystone Club Estates	Gainesville Arpt	0.11%	0.00%
52. Carlton Village	Lisbon	0.11%	0.00%
53. Picciola Island	Lisbon	0.11%	0.00%
54. River Park	Crescent City	0.11%	0.00%
55. Zephyr Shores	Bradenton	0.10%	0.04%
56. Fox Run	Stuart 1 N	0.10%	0.00%
57. Oakwood	Titusville	0.10%	0.00%
58. Dol Ray Manor	Stanford Exp	0.10%	0.16%
59. Interlachen Lake Estates	Palatka	0.09%	0.00%
60. Palisades Country Club	Lisbon	0.09%	0.12%
61. Remington Forest	St Augustine	0.09%	0.00%
62. Fisherman's Haven	Stuart 1 N	0.09%	0.01%
63. Geneva Lake Estates	Gainesville Arpt	0.09%	0.14%
64. Venetian Village	Lisbon	0.08%	0.02%
65. Pomona Park	Crescent City	0.08%	0.14%
66. Windsong	Kissimmee 2	0.08%	0.01%
67. River Grove	Palatka	0.08%	0.00%
68. Lake Conway Park	Kissimmee 2	0.07%	0.00%
69. Marco Shores	Naples	0.07%	0.79%
70. Skycrest	Lisbon	0.07%	0.00%
71. Harmony Homes	Stanford Exp	0.06%	0.00%
72. Leisure Lakes	Archbold Biologic	0.06%	0.03%
73. Hobby Hills	Lisbon	0.06%	0.00%
74. Bay Lake Estates	Kissimmee 2	0.06%	0.00%
75. Lake Brantley	Stanford Exp	0.06%	0.00%
76. Hermits Cove	Palatka	0.06%	0.02%

Table 2-2. SSU System Weather Stations and Water Sales (1994) (Continued)

SSU SYSTEM	NOAA Weather Station	Residential % of Total	Non-Residential % of Total
77. Sugar creek	Lake Alfred	0.06%	0.00%
78. Crystal River Highlands	Inverness	0.06%	0.01%
79. East Lake Harris Estates	Lisbon	0.05%	0.00%
80. Holiday Heights	Orlando WSO	0.05%	0.00%
81. Palm Port	Palatka	0.05%	0.00%
82. Rosemont	Inverness	0.04%	0.00%
83. Golden Terrace	Inverness	0.04%	0.01%
84. Holiday Haven	Deland 1 SSE	0.04%	0.01%
85. Morningview	Lisbon	0.04%	0.00%
86. Kingswood	Titusville	0.04%	0.00%
87. Apache Shores	Inverness	0.03%	0.00%
88. Welaka	Crescent City	0.03%	0.00%
89. St. Johns Highlands	Palatka	0.03%	0.00%
90. Fountains	Kissimmee 2	0.03%	0.00%
91. Jungle Den	Deland 1 SSE	0.03%	0.00%
92. Beecher's Point	Crescent City	0.02%	0.19%
93. Salt Springs	Ocala	0.02%	1.43%
94. Saratoga Harbour	Crescent City	0.02%	0.04%
95. Silver Lake Oaks	Palatka	0.02%	0.00%
96. Quail Ridge	Lisbon	0.02%	0.00%
97. Palms Mobile Home Park	Lisbon	0.02%	0.08%
98. Friendly Center	Lisbon	0.01%	0.00%
99. Park Manor	Palatka	0.01%	0.00%
100. Stone Mountain	Lisbon	0.01%	0.00%
101. Lakeview Villas	Gainesville Arpt	0.01%	0.00%
102. Wootens	Crescent City	0.01%	0.00%
103. Gospel Island Estates	Inverness	0.01%	0.00%
104. Samira Villas	Ocala	0.00%	0.04%
105. Sunshine Parkway	Lisbon	0.00%	1.18%
TOTAL		100.00%	100.00%
Total Water Sales (TGs)		10,219,367	2,078,255

Tabulating the total percentage of water use sold by weather station, we get the results shown in Table 2-3. The top 14 weather stations cover 96.6 percent of total residential water use. These 14 stations are used in the weather analysis.

Table 2-3. Weather Stations Weighted by 1994 Water Consumption

NOAA Weather Station	Observation Start Date	Residential % of Total
Stanford Exp	Jul 1948	27.61%
Weeki Wachee	Jun 1969	26.35%
Naples	Jul 1948	10.36%
Inverness	Jul 1948	6.06%
Jacksonville Beach	Jul 1948	5.71%
Lisbon	Dec 1958	4.72%
La Belle	Jul 1948	3.23%
Orlando	Jul 1948	3.20%
Tampa	Jan 1933	2.63%
Punta Gorda	Jan 1931	1.90%
Fernandina Beach	Jul 1948	1.50%
Gainesville Arpt	Jan 1930	1.31%
Kissimmee 2	Jan 1931	1.02%
Lake Alfred	Jan 1930	1.00%
Bradenton		0.72%
Stuart 1 N		0.61%
Palatka		0.34%
St Augustine		0.31%
Crescent City		0.27%
Ocala		0.27%
Chipley 3 E		0.26%
Daytona Beach		0.23%
Titusville		0.13%
Isleworth		0.12%
Deland 1 SSE		0.07%
Archbold Biologic		0.06%
Total		100.00%

As an indicator of outdoor water use, we calculated the net irrigation requirement (NIR) for each station by month. NIR equals potential evaporation (ET) minus effective rainfall (ER). ET measures the amount of water evaporated and transpired from a vegetative surface if water supply is not limiting. ET is estimated using the Thornthwaite method which was calibrated on data from the east-central USA. The method estimates ET based on average monthly temperature and latitude data as follows:

$$ET_t = 1.6\left[\frac{10 * TEMP_t}{INDEX}\right]^c * LATITUDE$$

where,

ET_t	= potential evaporation in month t (cm)
TEMPt	= average monthly air temperature in month t (ºC)
INDEX	= annual heat index = $\sum_{i=1}^{12}\left[\frac{TEMPi}{5}\right]^{1.5}$
c	= $0.49 + 0.0179*INDEX - 0.0000771*INDEX^2 + 0.000000675*INDEX^3$
LATITUDE	= {Jan=0.87, Feb=0.93, Mar=1.00, Apr=1.07, May=1.14, Jun=1.17, Jul=1.16, Aug=1.11, Sep=1.03, Oct=0.96, Nov=0.89, Dec=0.91}

Rainfall naturally satiates some of the ET water needs. Not all rain offsets ET, however, as some is lost as runoff or percolates past the relatively shallow root zone of vegetation such as turfgrass. To estimate the amount of rainfall effective at reducing ET, an empirical equation formulated by the United States Agricultural Department-Soil Conservation Service is used as follows[4]:

$$ER_t = 0.7*(1.25*RAIN_t^{0.824} - 2.93)*10^{0.000955*ET_t/10}$$

where,

ERt	= effective rainfall in month t (mm)
RAINt	= total rainfall in month t (mm)

[4] Jensen, M.E., R.D. Burman, and R.G. Allen editors, Evapotranspiration and Irrigation Water Requirements, ASCE Manuals and Reports on Engineering Practice No. 70, New York, pp. 67-68, 1990. The adjustment for alternative depletion depths is 0.7.

After calculating a weighted average of ET (about 4 feet/year) and ER (about 2 feet/year) based on the percentage of SSU's total residential water use associated with each of the 14 selected weather stations, monthly NIR values are calculated. If a station did not have complete weather observations for a particular month, that station is excluded from the averaging process for that month. The annual variation in weighted NIR is shown in Figure 2-1. A great variation in NIR exists; NIR generally ranges from plus or minus 20 percent from its normal value of about 2 feet/year. This variation, driven by relatively high year round ET values and sporadic rainfall, is likely one of the largest variations in the United States.

Correlation Between Water Use and Weather

How much of the variation in water use is caused by variation in weather? Figure 2-2 plots monthly residential water use and NIR over 1991 through 1994. A positive correlation is apparent in most months, especially in the last three years. In 1991, NIR and water use did not correlate well. Figure 2-3 plots nonresidential water use. A significant upwards trend and a non-weather related increase in the January-April periods are shown. Because nonresidential water use only accounts for about 15 percent of water sales and is more influenced by non-weather related factors, an analysis of nonresidential water use is not conducted for this report.

FIGURE 2-1. WEIGHTED NIR ANNUAL VARIATION (1949-1994)

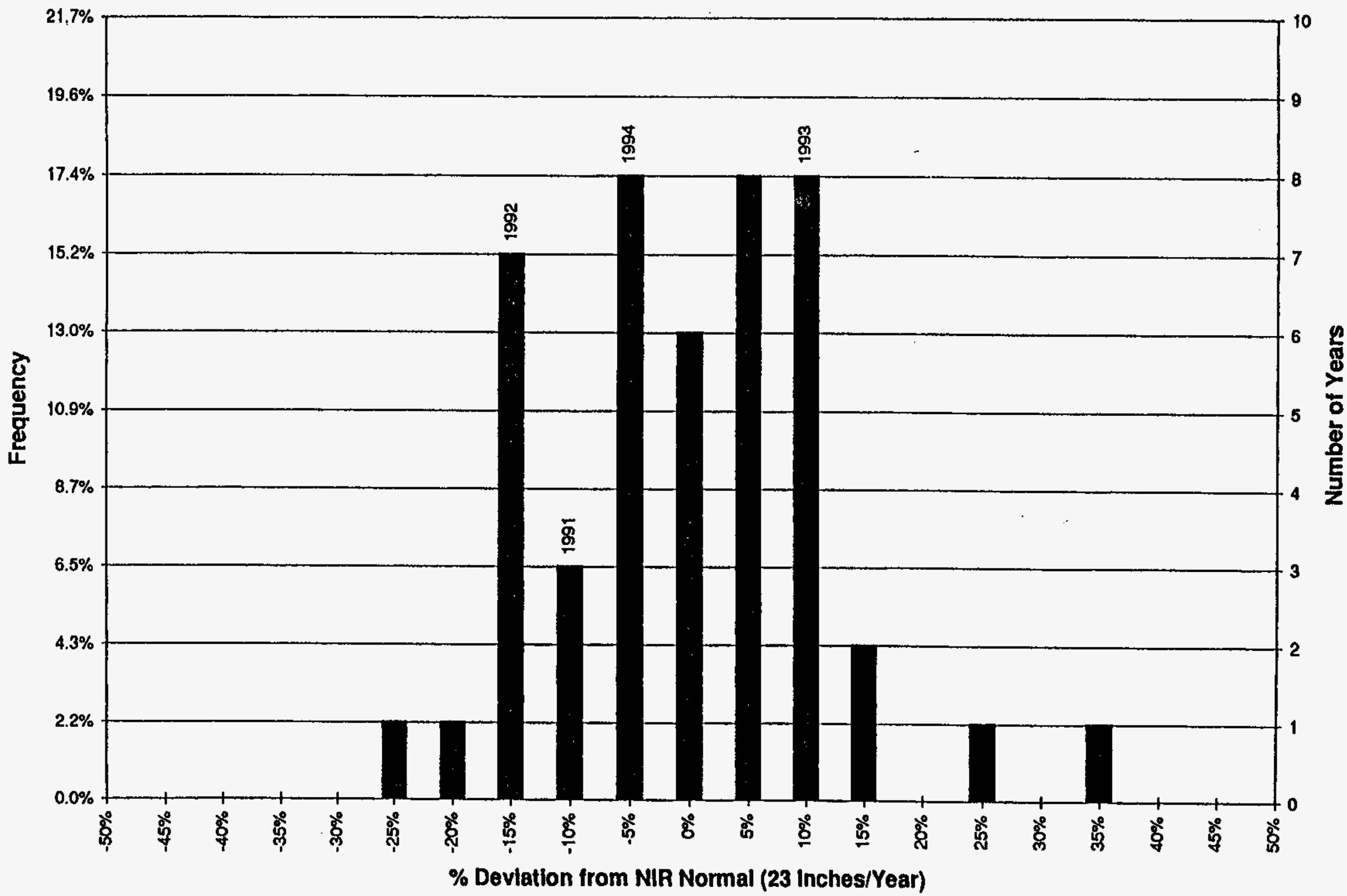

FIGURE 2-2. RESIDENTIAL WATER USE AND NIR

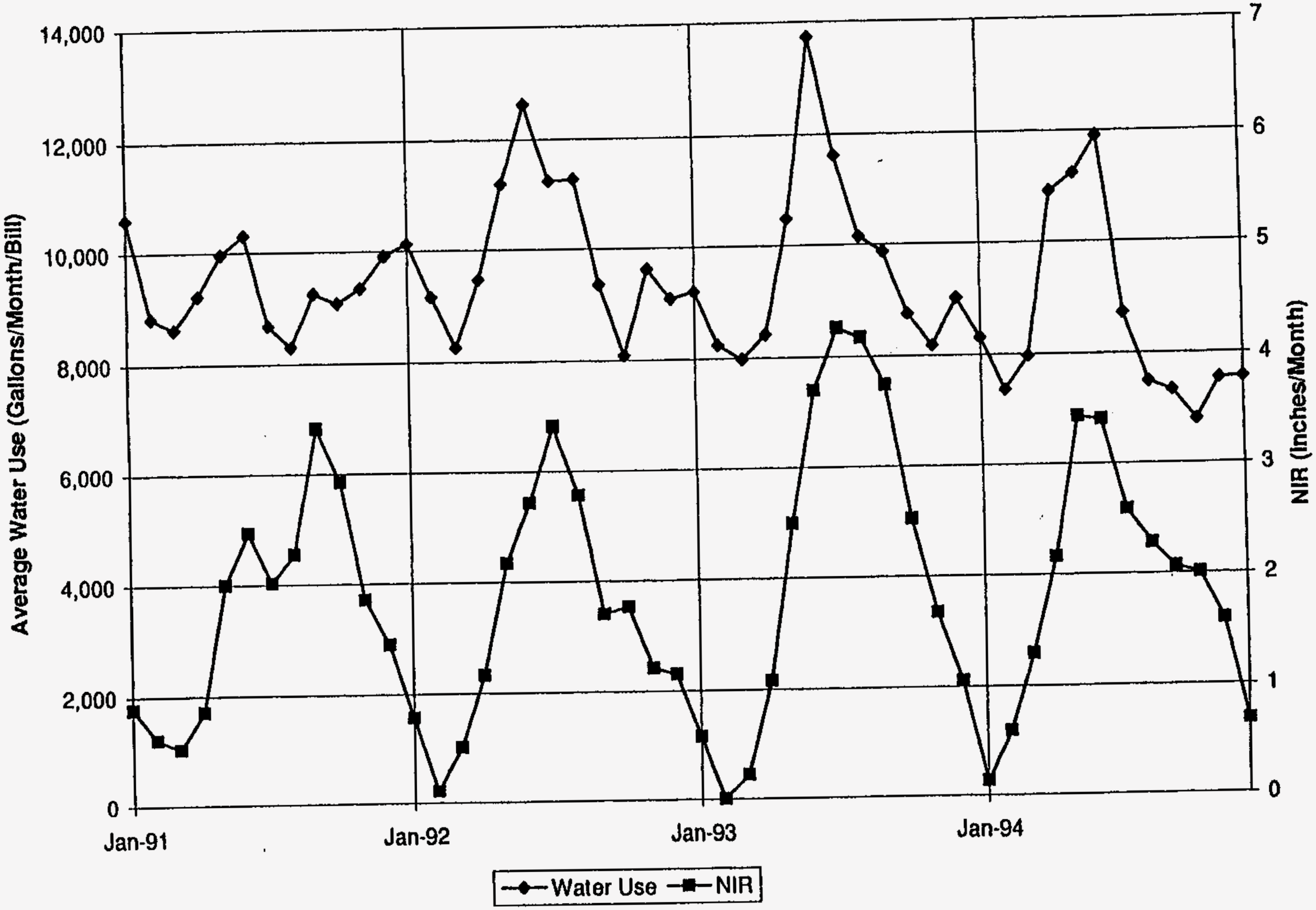

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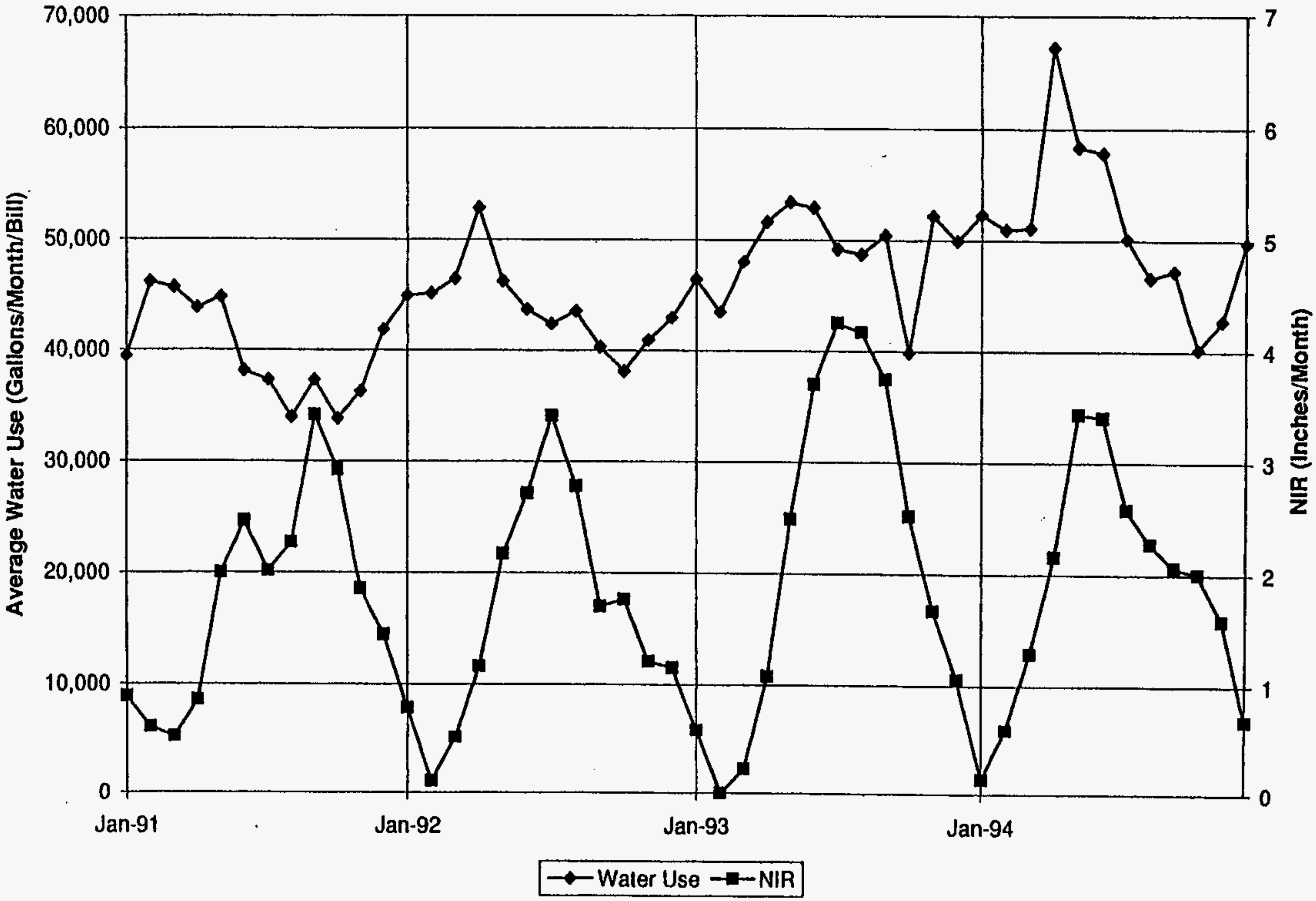
FIGURE 2-3. NONRESIDENTIAL WATER USE AND NIR



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To statistically quantify the correlation between residential water use and NIR over the three years 1992-94, the following regression model is estimated:

$$WATER_t = 7721 + 915 * NIR_t + 0.566 * E_{t-1} + E_t$$

where,

$WATER_t$ = average TG/Bill/Month in month t

NIR_t = adjusted[5] NIR in inches in month t

E_t = error term in month t

Weather in the regression equation explains 45 percent of the water use variation; this is a moderate amount. As shown in Figure 2-2, there are months when water use and NIR do not track well. For example, water use at the end of 1994 is unexplainably low. This point illustrates that weather is one, but not the only factor affecting water consumption. The autoregressive error coefficient of 0.566 indicates that model errors go in streaks; if the model underestimates (overestimates) water use in the previous period, it is likely to do so again in the current period.

To obtain an estimate of the expected variation in SSU's annual residential water use sales, monthly water use is simulated using the regression model and 1949 through 1994 weighted NIR weather values[6]. The annual values of the simulation are shown in Figure 2-4. Average annual weather normalized water consumption equals 9.476

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[5] Because a water bill consists of water use approximately over the previous 30 days, a water bill sent out in a given month is likely to consist of some water use from the previous calendar month. By assuming water bills are read mid-month on average, the weather experienced during that billing period would include the last half of the previous month and the first half of the current month. To account for this fact, we adjusted NIR in a given month to equal the average NIR of that month and the previous month.

[6] Because the model is monthly, values are calculated on a monthly basis and then annualized. For each month, we obtained a prediction of water use by using the observed weighted NIR value and randomly selecting values for the autoregressive error term with zero mean and 1080 standard deviation or N(0,1080). This is the residual characterized from the regression model. This process is repeated 20 times to obtain a fuller description of the randomness of the resulting water use distribution. This process is called a Monte Carlo simulation.

TG/bill/month. The 95 percent confidence interval around this estimate is 8.443 and 10.509 or plus and minus 10.9 percent. This information is used in the rate structure simulation process to assess revenue stability.

Correlation Between Water Use and Block Sales

The rate structures analyzed in Chapter 3 include increasing block rate structures with block thresholds at 6 and 10 TG/month. In assessing revenue stability with block rates, it is important to know not only how annual water use changes, but also how the distribution of water sold in each block changes. For example, in low water using months, does the percent of water use sold over 6 TG/month change?

To answer this type of question, we analyzed monthly water bill frequency data from 1991 through 1994. The bill frequency distribution over 1991-1994 is shown in Figure 2-5. The plot shows the frequency of bills of varying water use amounts. For example, 10 percent of residential bills were for 4 TG/month. Figure 2-6 shows the same information in a cumulative bill frequency distribution.

FIGURE 2-4. SIMULATED AND ACTUAL (1991-94) RESIDENTIAL WATER USE DISTRIBUTION

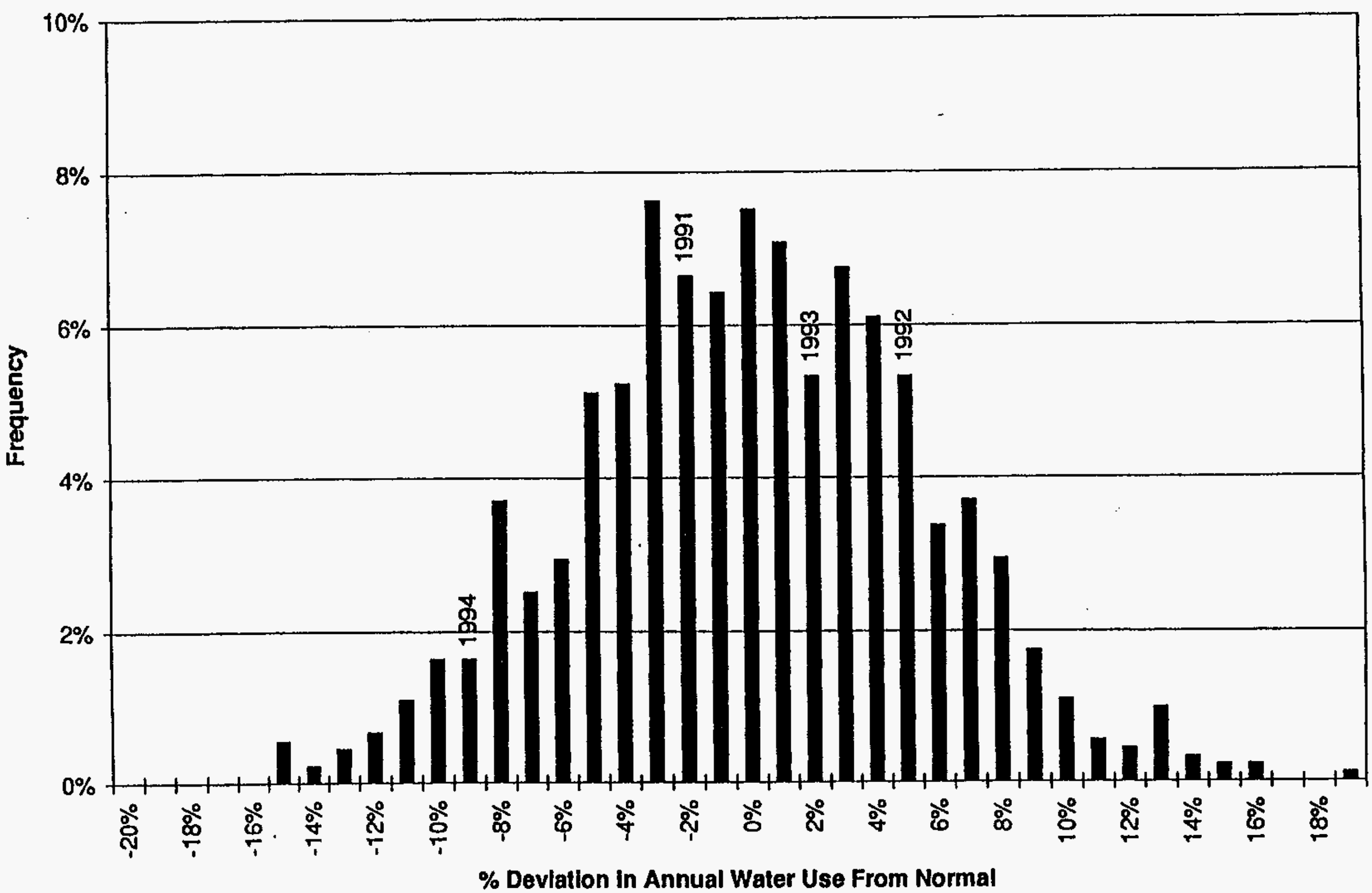


FIGURE 2-5. RESIDENTIAL BILL FREQUENCY

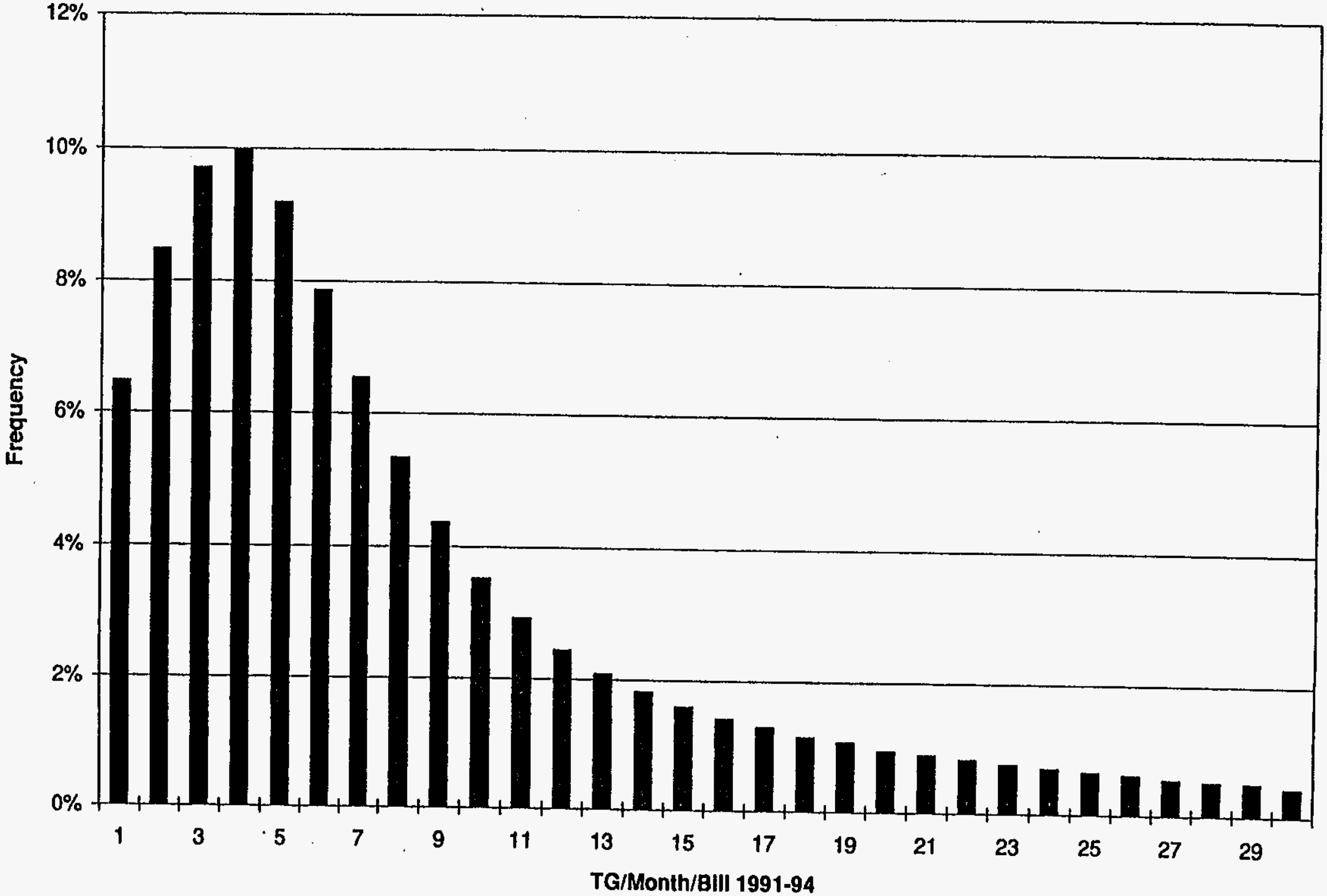
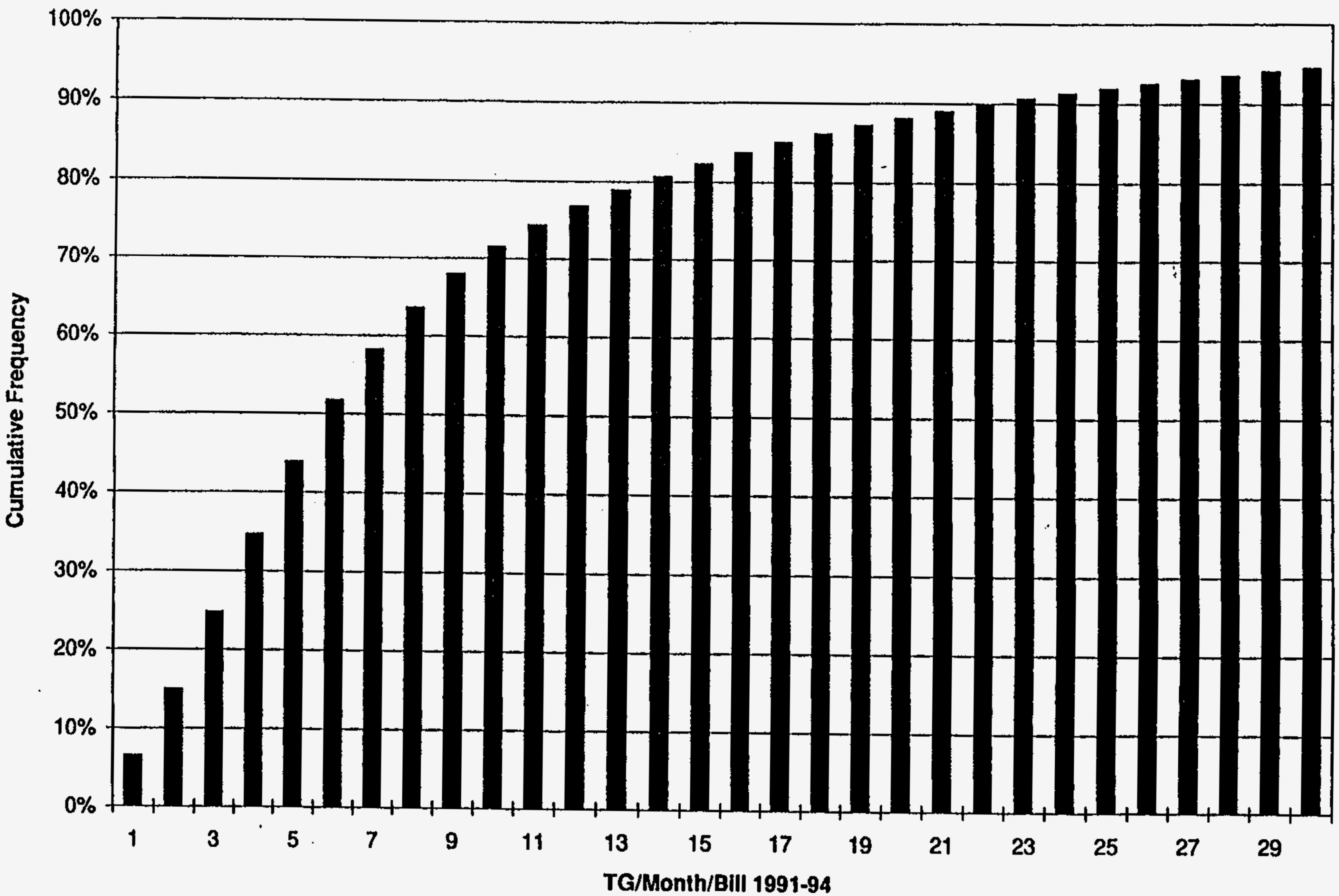


FIGURE 2-6. RESIDENTIAL CUMULATIVE BILL FREQUENCY



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This analysis investigates how the percent of water use sold over 6 and 10 TG/month varies as a function of average water use level. Figure 2-7 plots these two parameters over the 1991-94 period. A strong correlation exists. We measured the correlation using the following regression models:

$SOLD>6_t$ $= 0.141355 + 3.79E\text{-}05 * WATER_t + E_t$

$SOLD>10_t$ $= -0.02188 + 3.77E\text{-}05 * WATER_t + E_t$

where,

$SOLD>6_t$ = % of water sold over 6 TG/month/account in month t

$SOLD>10_t$ = % of water sold over 10 TG/month/account in month t

$WATER_t$ = average TG/month/account in month t

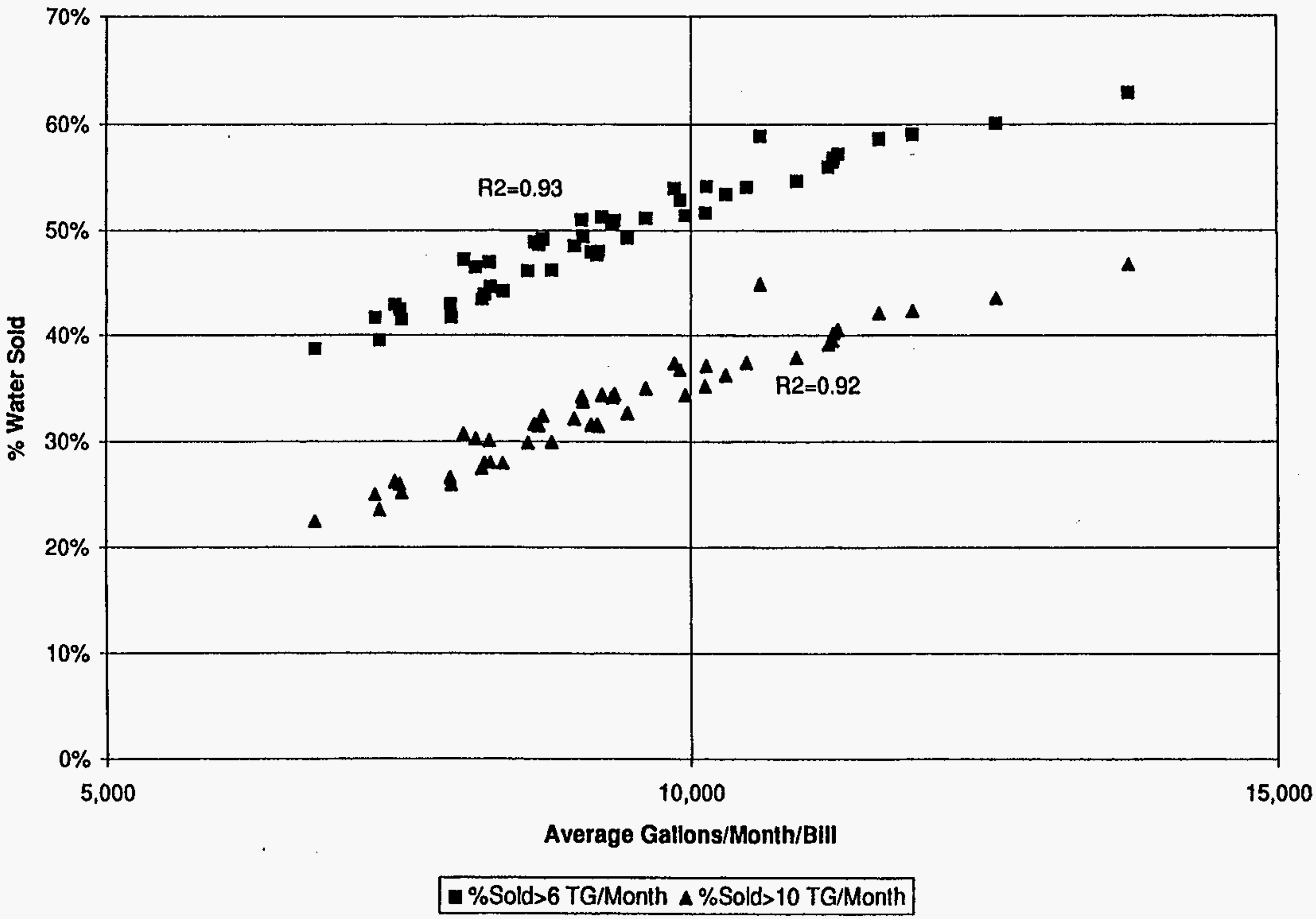
E_t = error term in month t

The percentage of water sold over 6 and 10 TG/month rises with increasing average water use. This is the expected correlation. The percentage sold at the lower and upper limits of average water use based on the simulation results and a 95 confidence interval are show in Table 2-4. This information is used in the rate structure simulation analysis in Chapter 3.

Table 2-4. Water Sold by Block As Function of Average Water Use

Description	Average Gal/Month	%Sold>6	%Sold>10
Lower Limit	8,443	46.6%	30.1%
Expected Value	9,476	50.4%	33.8%
Upper Limit	10,509	54.1%	37.5%

FIGURE 2-7. WATER SOLD BY BLOCK LEVEL



3. RATE STRUCTURE SIMULATION

This chapter analyzes the expected revenue stability and water conservation promotion impacts resulting from alternative water rate structures. Water prices for each rate structure alternative are set so as to be revenue neutral; expected rate revenues equal revenue requirements. Because of variations in water use, however, actual revenues can vary significantly from expected revenues. The magnitude of the deviation depends somewhat on rate structure selection. A rate structure that collects a large share of its revenues through a fixed monthly service charge, for example, tends to be more stable in generating revenues. A single water price tends to be more stable than a block rate structure, all other factors held constant. This chapter quantifies the financial risk associated with alternative rate structures.

The motivating objective for considering alternative rate structures is to obtain a rate structure that improves the price signal sent to customers to conserve a scarce resource. Water conserving rate structures tend to increase the price customers pay for their last unit of water consumed. Increasing marginal price gives a bigger reward to customers that take water conserving steps to reduce water consumption. As water price increases, water use decreases. This is the first law of consumer demand in economic theory.

Unfortunately, revenue stability and water conservation promotion are competing objectives. More of one objective is obtained at the expense of the other. What is the tradeoff? Which rate structure provides the best combination of revenue stability and conservation promotion? The information provided in this chapter can assist decision makers in answering this question.

Alternative Rate Structures

This analysis investigates seven types of rate structure alternatives as follows:

1. Single gallonage charge for all water use
2. Increasing two block with threshold at 6 TG/month and 25% block price differential
3. Increasing two block with threshold at 6 TG/month and 50% block price differential
4. Increasing two block with threshold at 6 TG/month and 100% block price differential
5. Increasing two block with threshold at 10 TG/month and 25% block price differential
6. Increasing two block with threshold at 10 TG/month and 50% block price differential
7. Increasing two block with threshold at 10 TG/month and 100% block price differential

In addition, the impacts of varying the percentage of revenues collected via the base facility charge and the gallonage charge are considered with each of the above rate structures. The base facility charge is a meter-size dependent fixed charge that is independent of water consumption. Base facility charge revenues are very stable, depending only on number of customers. The gallonage charge, on the other hand, generates a much less stable stream of revenues. As water use varies, which it does to a relatively high extent as shown in Chapter 2, gallonage charge revenues vary.

Alternatives 2 through 4 make use of a two block rate structure where water use over 6 TG/month is charged at a higher rate. The 6 TG threshold coincides with median billed water use as shown back in Figure 2-6 and also matches the sewer cap (water above 6 TG/month is not assessed a sewer charge by SSU). The higher 10 TG/month threshold associated with rate structures 5 through 7 is just above the water use of the average bill.

WATERATE Simulation Software

Calculating the revenue stability and conservation potential for each of the rate structures and for varying levels of base facility charges requires a great many calculations. To automate the task, the water pricing software application WATERATE is used.[7] WATERATE simulates how changes in water and sewer rate structures impact water revenues and demand. Its price elasticity calculations are based on results from a large empirical study conducted for the Southwest Florida Water Management District in 1993.[8]

The simulation is conducted only for the residential customer class. It is the largest class, comprising of over 85 percent of SSU's water sales. In addition, the block rate structures explored here do not apply to commercial users which are a much more heterogeneous group. It is expected that non-residential customers will maintain their current single price quantity charge.[9]

For purposes of the simulation, all of SSU's residential customers are aggregated into one group. Although most systems use the same FPSC uniform rate structure, others use independent rates based on local costs and perhaps advanced water treatment. Current water charges for FPSC uniform users include a $5.13/month base facility charge (5/8" meter) and a single price $1.23/TG gallonage charge. As WATERATE also accounts for the impacts of sewer price on water use, the analysis also assumes sewer users face the FPSC uniform sewer rate structure which is currently $3.66/TG with a cap of 6 TG/month. Approximately 41 percent of residential customers are on a sewer system, while the remainder are on individual septic systems.

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[7] Version 2.1 of WATERATE was licensed for distribution by the Southwest Florida Water Management District. This project uses an updated version, WATERATE 2.2, which incorporates a number of user interface improvements and advanced features. WATERATE 2.2 uses the same price elasticity algorithm as WATERATE 2.1.

[8] Water Price Elasticity Study, prepared for the Southwest Florida Water Management District by Brown and Caldwell Consultants in Association with John B. Whitcomb, August 1993.

[9] However, It should be noted that it is possible to shift the percent of revenues collected from the base facility charge to the gallonage charge for nonresidential users.

Price elasticity varies with price level and residential property value. Generally, long-run price elasticity varies from -0.2 to -0.5 over the range of factors analyzed. The simulation assumes that SSU's residential customer property values are similar to the mix of property values seen in the Southwest Florida Management District as a whole. SSU serves a diverse client base.

For the purposes of long-run water rate structure planning, the analysis compares alternative rate structures assuming long-run price elastic responses take effect. In the short-run, however, customers can not immediately make all of the price induced adjustments related to water consumption. It may take years for some customers to replace water-using appliances (e.g., toilets) with more water efficient types and to replant landscaping. The long-run elastic response may have a half-life of one year before coming effective.[10] That is, 50 percent of the long-run price elastic response would occur in the first year, 75 percent of the response would take effect in the second year, 82.5 percent by the third year, and so on. This is an important point to remember in that a utility can not jump from one rate structure to another each year and expect that the full price signal to be fully acted upon. Results to be shown in the next section are from a long-run perspective.

Simulation Results

WATERATE computed a large number of simulations. To convey the results, graphs showing the tradeoffs between prices, water savings, and financial risk are generated.

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[10] A half-life of one year is the recommended and default value set up in WATERATE based on a review of empirical research.

Figure 3-1 plots the tradeoff between the base facility charge and the gallonage charge for the seven rate structure alternatives. Looking at the single price rate structure alternative, if the base facility charge is $5.13, then the gallonage charge is $1.23/TG. This is the base case (current rates) in the simulation evaluation. Expected revenues derived from all other rate alternatives are set so that they equal the expected revenues derived from the base case. In an expected value sense, all rate scenarios are constructed to be revenue neutral.

At $5.13, the base facility charge accounts for approximately 33 percent of total revenues on average. If the base facility charge is increased, the associated gallonage charge is decreased. At $8.00, for example, the base facility charge accounts for 51 percent of revenues and the gallonage charge decreases to $0.83/TG. In contrast, as the base facility charge decreases, the gallonage charge increases. For example, if the base facility charge is set to zero, the gallonage charge needs to increase to $2.21/TG.

The impact on water prices from adopting the block rate structures is also shown. Keeping the base facility charge at $5.13, adopting a two block rate structure split at 6 TG/month and having a 25 percent price differential leads to first and second block prices of $1.12 and $1.40. Under the same conditions but with either a 50 or 100 percent price differential, prices would be $1.03 and $1.55 or $0.91 and $1.82 respectively. If the block threshold is moved to 10 TG/month, the prices in the blocks increase over the 6 TG/month scenarios.

With each block rate structure, the base facility charge and the gallonage charge are inversely related. This is consistent with the single price rate alternative. This is an obvious finding in that as the base facility charges decreases, the gallonage charge must be correspondingly increased to collect more revenues. Figure 3-1 plots the second block prices for each alternative. Knowing the price differential, the first block prices can be easily computed from the shown second block prices.

FIGURE 3-1. PRICES OF ALTERNATIVE RATE STRUCTURES

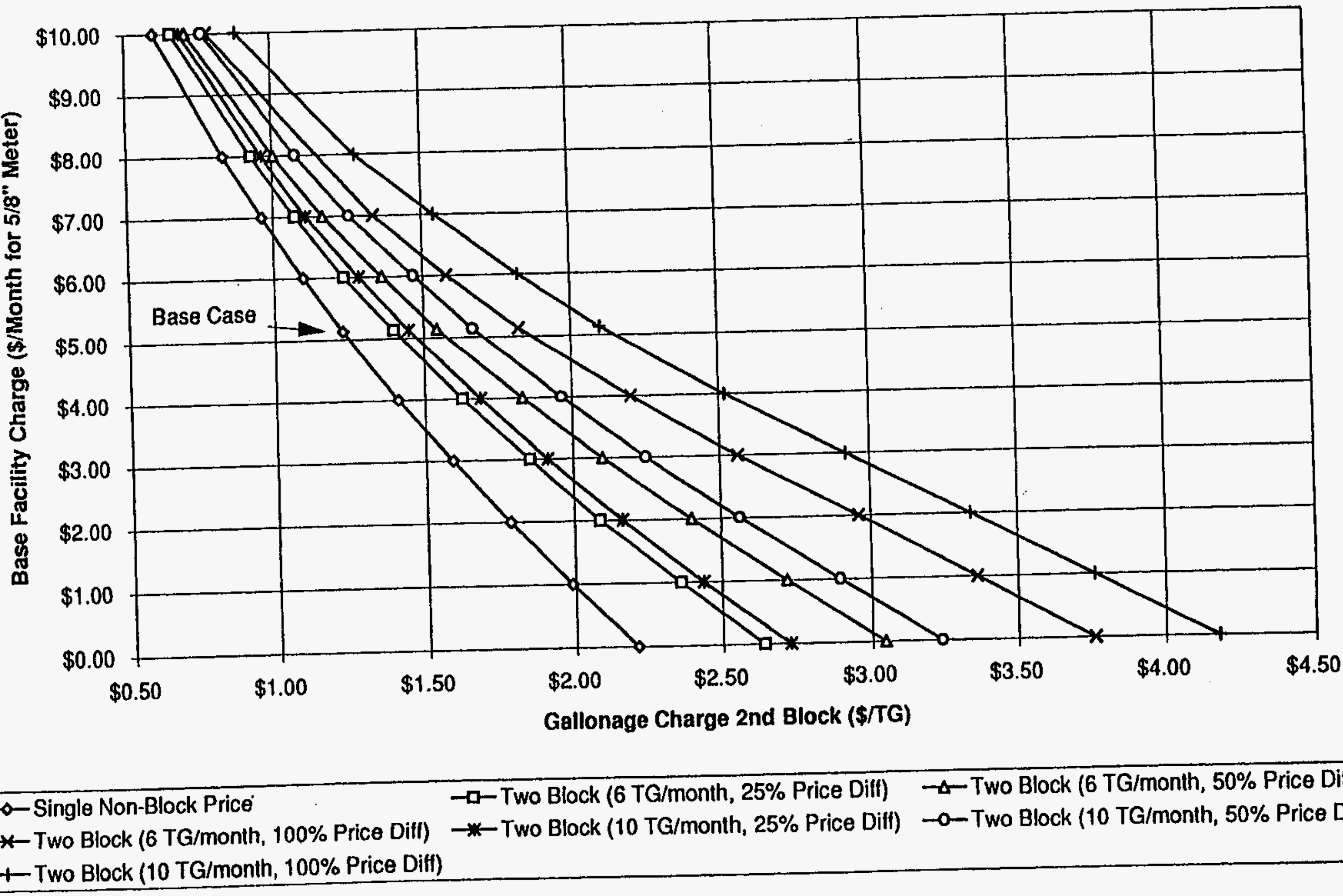


Figure 3-2 plots the water use change resulting from the different rate structure alternatives. With a base facility charge at $5.13 and a single gallonage charge of $1.23/TG, the price elastic water change is zero; this is the base case. As the base facility charge increases and the gallonage charge decreases, water use increases. At a base facility charge of $8.00, for example, water use increases by 11.8 percent. Moving the other way, at a base facility charge of zero the long-run price elastic reduction in water use equals 20 percent.

The water change resulting from block rates shows an interesting pattern. The water change associated with both block rate structures with a 25 percent price differential are almost identical over the spectrum of base facility charges. Water savings do not depend on if 6 or 10 is the block threshold level. The same finding occurs with the rate structures associated with the 50 and 100 percent price differentials. Savings do not significantly change with block threshold. This result is coincidental and it should not be inferred that selecting other threshold levels would generate the same conclusion. Holding base facility charge constant, another major finding is that water savings increase with price differential. At $5.13, for example, water savings would equal approximately 3.4, 6.1, and 10.5 percent for the 25, 50 and 100 percent block price differential alternatives.

Figure 3-3 quantifies financial risk associated with each rate structure option. Assuming the annual variation in water use is plus or minus 10.9 percent at the 95 percent confidence level as described in Chapter 2, the annual variation in revenues associated with each rate structure alternative can be charted. Assuming the base facility charge is zero and all revenue comes from the gallonage charge, the annual variation in revenues will be in direct proportion to the annual variation in water use. The risk assigned to this alternative is 10.9, which is the percentage deviation using a 95 percent confidence interval. As a larger share of the revenues are collected via the base facility charge, risk decreases. At $5.13, SSU's current position, the risk factor equals 7.3. At a base charge of $8.00, risk decreases to 5.4.

FIGURE 3-2. WATER CHANGE OF ALTERNATIVE RATE STRUCTURES

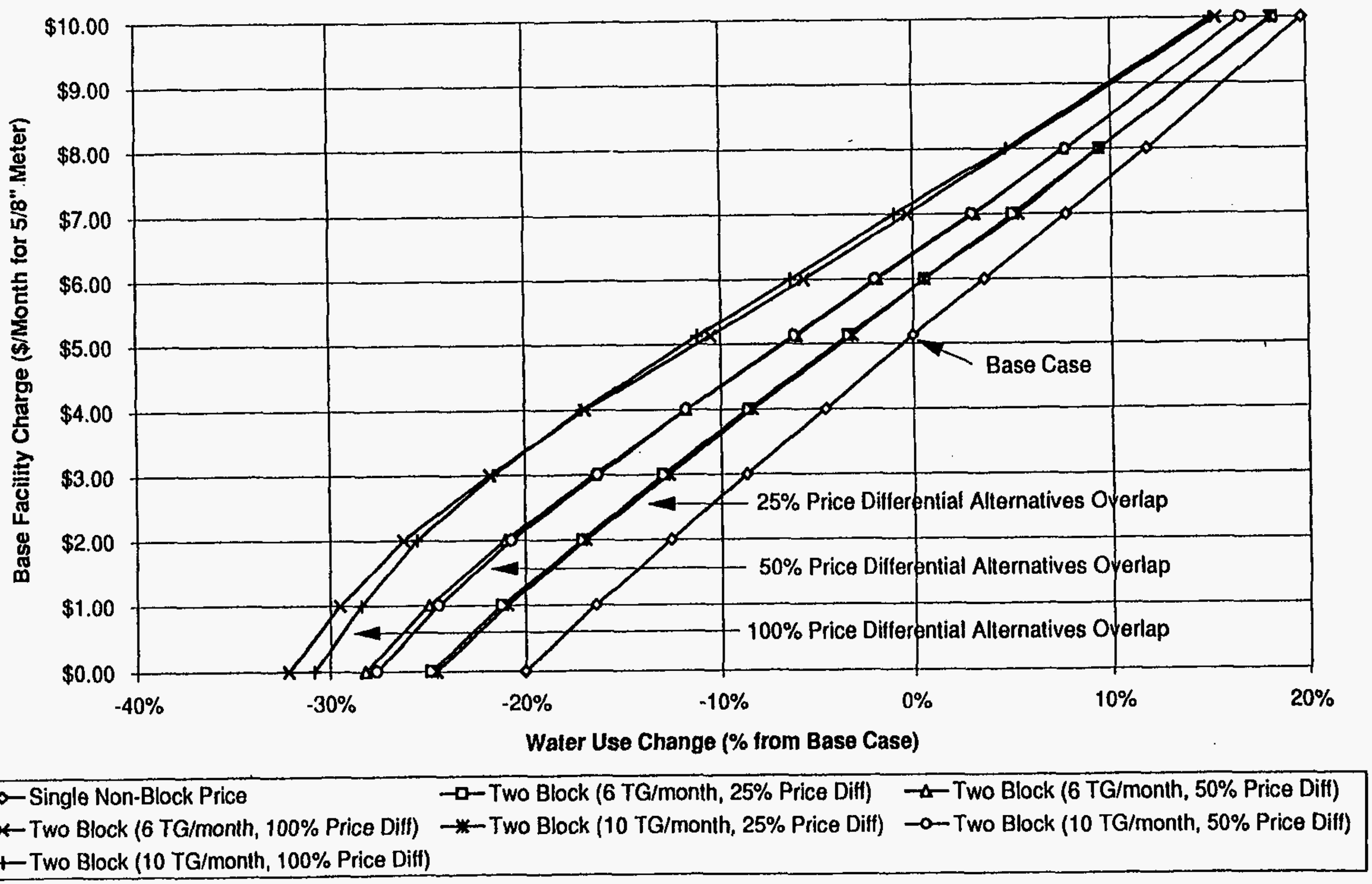
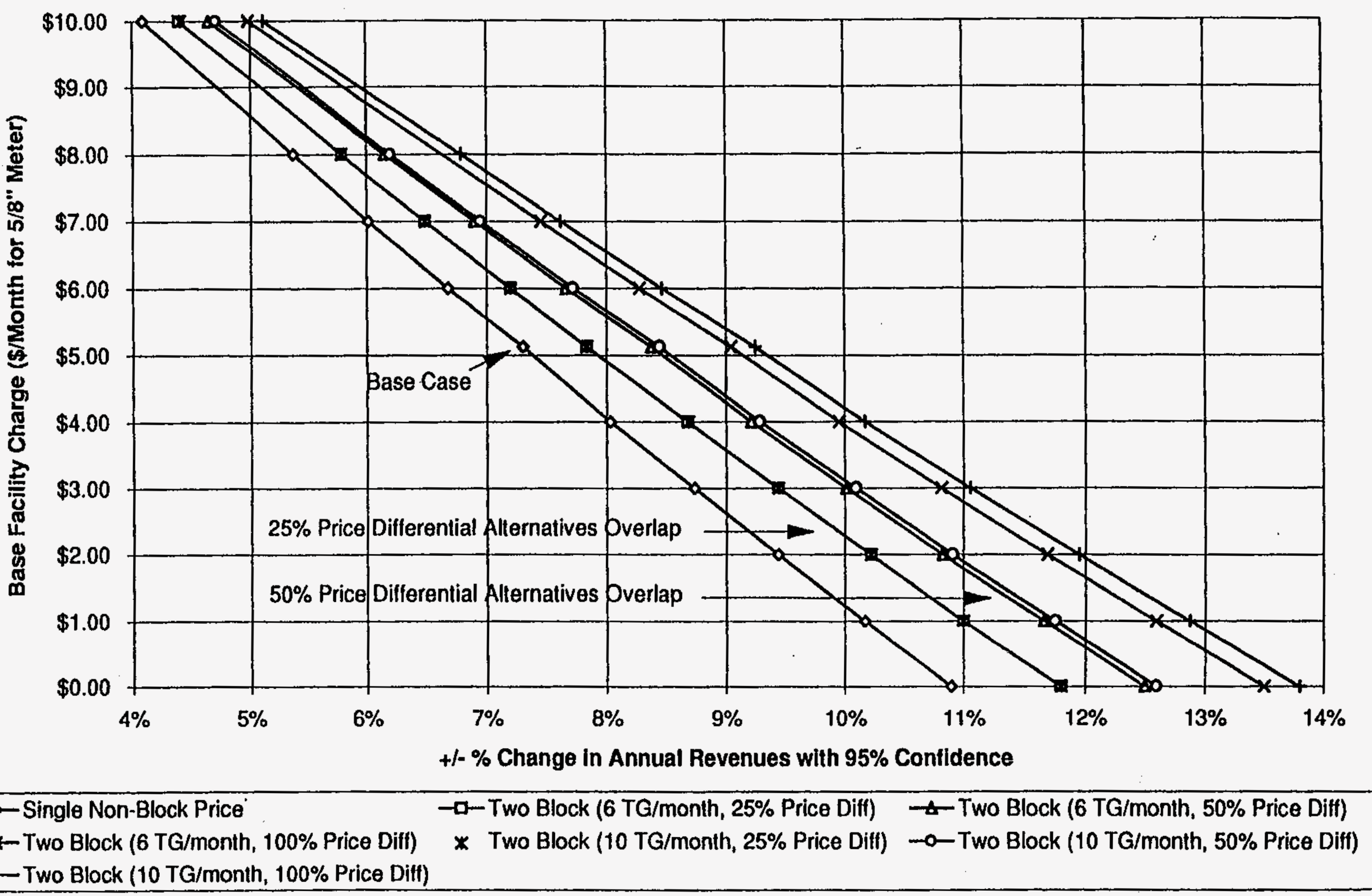


FIGURE 3-3. FINANCIAL RISK OF ALTERNATIVE RATE STRUCTURES



The block rate alternatives increase financial risk.[11] With a $5.13 base facility charge and a 6 TG/month threshold, risk increases to 7.8, 8.3 and 8.9 with the 25, 50 and 100 percent block price differentials respectively. Results are similar with the 10 TG/month block threshold alternatives. Again, choice of either a 6 or 10 TG/month threshold does not have a big impact on results.

[11] The analysis factors in the fact that the percent of water sold in each block changes with average water use as shown in Table 2-4. Revenue confidence intervals with block rates are not perfectly symmetrical, although they are found to be nearly so in this case.

4. CONCLUSIONS

Chapter 3 developed curves showing the tradeoffs between prices, water savings, and financial risk. Both water savings and financial risk increase as the base facility charge decreases and as the block rate price differential increases. Therefore, water savings and reductions in financial risk are competing objectives. Is there a particular rate structure that can achieve at least as much water savings as other rate structures, but take on less financial risk? This would be a superior rate structure position in the context of the water conservation promotion and minimal financial risk objectives.

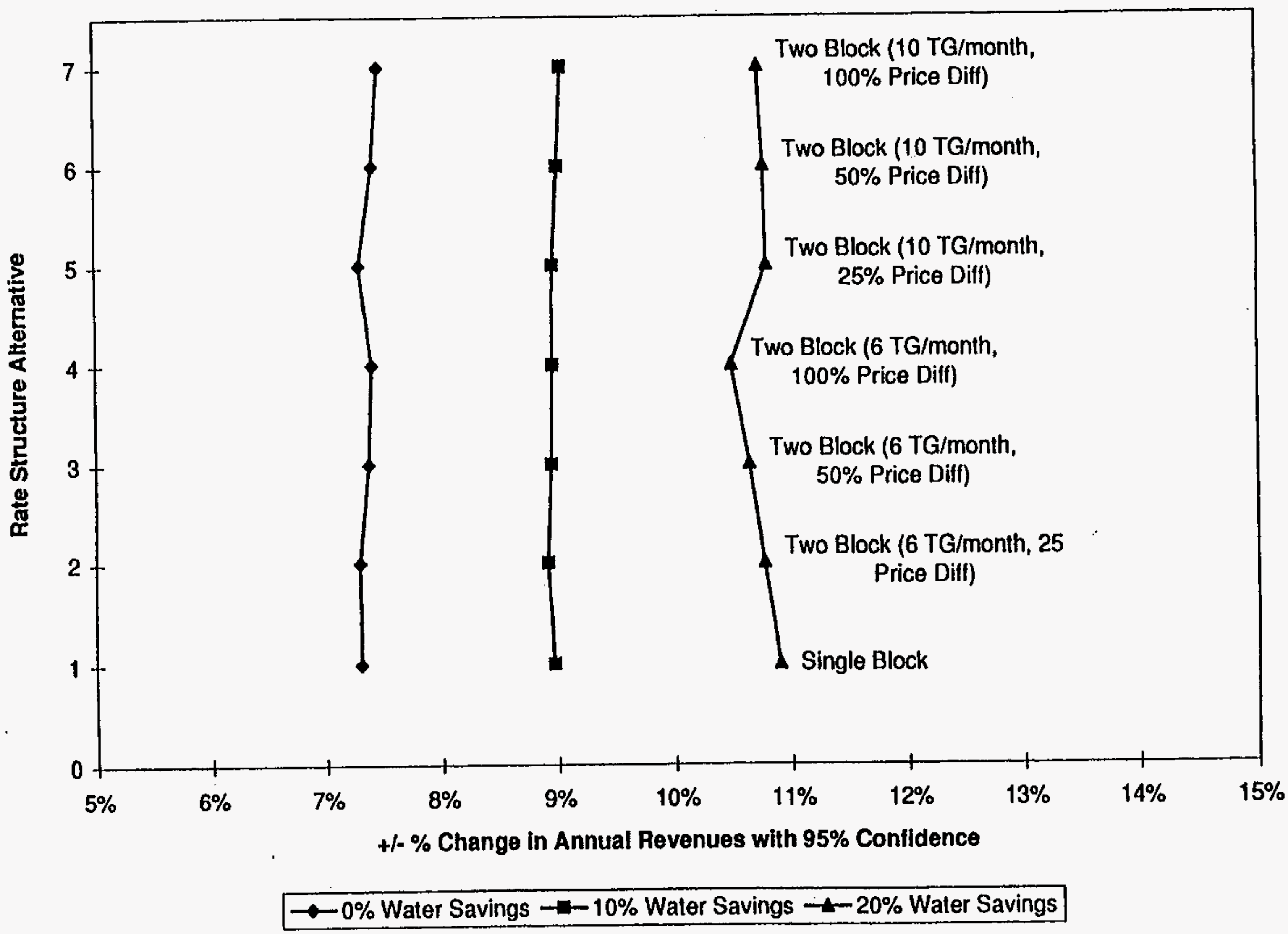
To answer this question, alternative rate structures that achieve 0, 10 and 20 percent water savings are compared as shown in Figure 4-1. The isometric (equality in water savings) lines are nearly vertical with respect to financial risk. The amount of risk taken on by each rate structure in obtaining 10 percent water savings, for example, is nearly 8.4 percent in each case. The conclusion, therefore, is that none of the rate structures analyzed is superior to any of the other rate structures with respect to the tradeoff between water savings and financial risk.[12]

Definition of Water Conserving Rate Structure

It is the author's view that the definition of a water conserving rate structure is a matter of degree. Some rate structures are more water conserving than others as shown back in Figure 3-2. In a regulatory environment, however, there are motivations for using a binary definition; either a rate structure is or is not a water conserving rate structure.

[12] This result may not hold for other non-analyzed rate structures.

FIGURE 4-1. FINANCIAL RISK AND WATER SAVINGS



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One binary definition of a water conserving rate structure has been forwarded by the Southwest Florida Water Management District.[13] Based on a weighted scoring system[14], a rate structure must have a score of at least 3.2 to be defined as conservation promoting. The criteria, weights, and score of SSU's current rate structure using this standard are shown in Table 4-1.

Table 4-1. Weighting System Scoring

Criteria	Weighting %	Score	Weighted Score
1. Rate structure form	20	2.5	0.5
2. Allocation of fixed/variable charges	40	2	0.8
3. Sources of utility revenues	30	5	1.5
4. Communication on bill	10	4	0.4
Total	100		3.2

The rate structure form score of 2.5 is based on a uniform rate structure, which SSU currently has. It is interesting to note that if SSU adopts block rates with a 50 price differential or less, the rate structure form score would drop from 2.5 to 2.0 and the total score would drop from 3.2 to 3.1. This structure would not be defined as water conservation promoting. This result appears inconsistent with the objective of water conservation promotion as expressed by the results of Chapter 3.

SSU's current allocation of costs attributable to the gallonage (variable) charge is approximately 67 percent. Given the scoring system in Table 4-2, this level achieves a score of 2. It is interesting to note that SSU could lower its gallonage charge percent to 60 percent and still be defined as a water conserving rate structure.

---

[13] Definition of Water Conservation Promoting Rates, February 1993. Report prepared by Brown and Caldwell Consultants for the Southwest Florida Water Management District.

[14] There is also a go/no go format of defining a water conserving rate based on nine criteria. SSU current rate structure does not pass at least two of these criteria (75% of revenues from variable charge and historic customer water use on water bill).

Table 4-2. Weights for Criteria 2

Percent of Revenues Collected Via the Variable Charge	Score
90-100	5
80-89	4
70-79	3
60-69	2
50-59	1

SSU's source of revenues comes exclusively from rates. It does not collect revenues from taxes, transfers from general funds, or other subventions. Hence, SSU gets the top score of 5 for criteria 3. Lastly, SSU gets a score of 4 for criteria 4 as it includes information on both water rates and current water use on the water bill.

DOCKET 950495-WS
EXHIBIT NO. 141
CASE NO. 96-04227

141

EXHIBIT NO. ______

John Whitcomb
WITNESS: ~~**FORREST L. LUDSEN**~~

DOCKET NO. 950495-WS

Application for rate increase by

SOUTHERN STATES UTILITIES, INC.

BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

DESCRIPTION:

PAGES 1845-1869 FROM APPENDIX DR305-B TO ~~STAFF~~ OPC POD NO. 305 CONCERNING RATE CASE EXPENSE SUPPORT

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 950495 EXHIBIT NO 141
COMPANY/ WITNESS: Whitcomb
DATE: 4/29/96

SOUTHERN STATES UTILITIES, INC.
RESPONSE TO REQUEST FOR PRODUCTION OF DOCUMENTS
DOCKET NO.: 950495-WS

REQUESTED BY:	OPC
SET NO:	21
DOCUMENT REQUEST NO:	305
ISSUE DATE:	02/12/96
WITNESS:	Forrest L. Ludsen
RESPONDENT:	Forrest L. Ludsen

DOCUMENT REQUEST: 305

Please provide all documents supporting the Company's requested rate case expense in the instant docket, including invoices, vouchers and the like that have been received by all consultants and attorneys hired by SSU. This request includes the rate case expenses the Company is requesting with respect to the statewide rate investigation. Provide all documents which the Company believe supports its request.

RESPONSE: 305

Appendix DR305-A: Analysis of Rate Case Expense and Summary of Invoices for the 1995 Consolidated Rate Case, Docket No. 950495-WS.

Appendix DR305-B: Copies of invoices paid as of January 31, 1996 for the 1995 Consolidated Rate Case, Docket No. 950495-WS.

Appendix DR305-C: Analysis of Rate Case Expense and Summary of Invoices for the Uniform Rate Investigation, Docket No. 930880-WS.

Appendix DR305-D: Copies of invoices paid as of January 31, 1996 for the Uniform Rate Investigation, Docket No. 930880-WS.

Accounts Payable Voucher

By: [signature] | Manual Check #: | Date:

Vendor #: 3859 | Vendor Name: John Whitcomb WATERTECH SOFTWARE

Inv Date: 2-19-95 | Inv #: 95-18 | Inv $: 2219.11

Due Date: 3-8-95 | Discount:

Month/Yr: 3/95 | Purchase Order #: 38339 | Job Code:

Description: SOFTWARE CONSULTING

Account Number	Project Number	Dollar Amount
00001615.99.1861.0000.150	95RA100	✓2219.11

Voucher Prepared By: [signature]

WATERTECH Software and Consulting

February 19, 1995

Tony Isaacs
Southern States Utilities
1000 Color Place
Apopka, FL 32703

Invoice No. 95-18

Subject: **Invoice**

Dear Tony:

This invoice encompasses work I performed February 16 and 17 for the Southern States Utilities with respect to rate structure evaluation and implementation of the software model WATERATE. My total expenses equal $2,219.11 as itemized below.

DESCRIPTION	AMOUNT
Labor 16 hours @ $95/hr.	$1,520.00
Airline Fare	$548.00
Hotel	$88.00
Taxi to SSU (no rental car available)	$42.00
Lunches $6.63 + $14.48	$21.11
Total	$2,219.11

Make check payable to John Whitcomb. My social security number is 562-70-7930 if needed.

Best Regards,

RECEIVED
MAR 06 1995
Accounts Payable

John Whitcomb

John B. Whitcomb, Ph.D.
Enclosures (Receipts)

001.0001.615.99.1161.000.150.95RA100

RECEIVED
FEB 27 1995
Accounts Payable

1375 EATON AVENUE, SAN CARLOS CA 94070 PHONE/FAX 1-800-800-9519

nn Whitcomb

JEST CHECK

65	494560	

cheese & rice
white
B/B
med

525
58

620
43
663

TAX

SYSCO CORPORATION, HOUSTON, TX — REORDER

HOJO INN

1317 S. ORANGE BLOSSOM TRL
APOPKA, FLORIDA 32703-7605

FOR RESERVATIONS CALL (800) 446-4656 OR DIRECT (407) 886-1010

No 08194

Date In
Date Out
NAME John Whitcomb
STREET 1375 Eaton ~~Street~~ Ave
CITY San Carlos STATE CA ZIP 94070
REPRESENTING
DRIVER LIC # STATE
MAKE OF AUTO None LICENSE # STATE
OF PERSONS 2 ADULTS 1 CHILDREN
TELEPHONE SERVICE REQUIRED ☐
HOW DID YOU KNOW ABOUT HoJo INN? TV ☐ NEWSPAPERS ☐
YELLOW PAGES ☐ BILLBOARD ☐ FRIEND ☐ OTHER ☐

NOTICE: This property is privately owned and the management reserves the right to refuse service to anyone, and will not be responsible for the loss of money, jewelry or valuables of any kind.

PETS ARE NOT PERMITTED ON THE PROPERTY

ROOM #	ROOM CHARGES	ROOM TAXES	TELEPHONE CHARGES	TOTAL	DEPOSITS TEL	DEPOSITS KEY
105	50	5.80		88.00		

MO TU WE TH FR SA SU

855-1111
Company

407-873-0302
Mobile

Custom Taxi Van

Willie Rosado

Date: Feb 16, 1995
Amount: 42.00
Van# 65

Orlando Area & Attractions
and Out of Town

Orlando Airport to SSA in Apopka

John Whitcomb
Lunch with
Tony Isaacs
Feb 17, 1995

Sunset Grill

DATE 2-17-95
PERS. 2
CHECK NO. 051629
AMT. OF CHECK $14.45

RECEIVED
FEB 27 1995
Accounts Payable

DIXON SAN CARLOS TRAVEL
1495 LAUREL STREET · SAN CARLOS, CALIFORNIA 94070
(415) 592-7793 · FAX (415) 592-5090

ASTA

ISALG

MR JOHN WHITCOMB
1375 EATON AVENUE
SAN CARLOS CA 94070

PASSENGER NAMES
WHITCOMB/JOHN

RECONFIRM RETURNING AND CONTINUING RESERVATIONS 72 HOURS IN ADVANCE FOR INTERNATIONAL FLIGHTS, AND SUGGEST 48 HOURS IN ADVANCE FOR DOMESTIC FLIGHTS.
CAUTION: TICKETS HAVE VALUE. RETURN FOR CREDIT OR REFUND.

FEB 07 1995 950208219

ITINERARY

15 FEB 95 - WEDNESDAY
DELTA 212 COACH CLASS
LV: SAN FRANCISCO 1025P NONSTOP EQP-767 CONFIRMED
AR: ATLANTA 543A ARRIVAL DATE-16 FEB
SEAT-36G
NO WINDOW OR AISLE SEAT AVAILABLE FOR PRE-ASSIGNMENT
SEE IF AGENT CAN IMPROVE SEAT AT CHECK-IN

16 FEB 95 - THURSDAY
DELTA 579 COACH CLASS
LV: ATLANTA 647A NONSTOP EQP-L10 CONFIRMED
AR: ORLANDO/INTL 805A
SEAT-35E

HOWARD JOHNSONS 01 NT/S - OUT 17FEB CONFIRMED
HOJO INN APOPKA FL 1 ROOM/S / 2 DOUBLE GUARANTEE-NONE
1317 S ORANGE BLOSSOM TRA PHONE-407 886-1010 RATE- 80.00
APOPKA FL 32703-7605
CONFIRMATION-61612776

17 FEB 95 - FRIDAY
DELTA 229 COACH CLASS
LV: ORLANDO/INTL 620P NONSTOP EQP-72S CONFIRMED
AR: SALT LAKE CTY 855P
DINNER SEAT-26F

DELTA 1889 COACH CLASS
LV: SALT LAKE CTY 951P NONSTOP EQP-757 CONFIRMED
AR: SAN FRANCISCO 1040P Seat 42 A

RECEIVED
FEB 27 1995
Accounts Payable

TICKET NUMBER/S:
WHITCOMB/JOHN 1497930958 CARD 548.00

AIR TRANSPORTATION 492.72 TAX 55.28 TTL 548.00
SUB TOTAL 548.00
CREDIT CARD PAYMENT 548.00-
AMOUNT DUE 0.00

Southern States Utilities

RECEIVING REPORT

R/R 40046

PURCHASE ORDER NUMBER: 38339

PLANT NAME: [illegible]

SUPPLIER: [illegible]

PLANT NUMBER: [illegible]

LINE ITEM #	QTY. REC'D.	ITEM NO.	DESCRIPTION	COMPLETE	INCOMPLETE
1			[illegible] 14 HRS @ 95/HR	✓	
2			Airline Fare	✓	
3			[illegible]	✓	
4			Taxi to SSU	✓	
5			2 [illegible]	✓	

RECEIVED
FEB 27 1995
Accounts Payable

PURPOSE & NECESSITY Consultant for Rate Structure Issues for 1995 Rate Filing

[illegible] 2/24/95
RECEIVED BY DATE

[illegible] 2/24/95
CHECKED BY DATE

W/O#: G. L. #:

WHITE - FIELD / YELLOW - ACCOUNTS PAYABLE / PINK - PURCHASING

APPENDIX DS-20 [illegible]

PAGE 1850 OF 2226

SSU

Southern States Utilities
PURCHASING DEPARTMENT
1000 COLOR PLACE
APOPKA, FLORIDA 32703
(407) 880-0058

PURCHASE ORDER

Purchase Order: 30339
Date: 2/28/1995
Requisitioner:
Confirmed to: JOHN WHITCOMB
Description: REQ. 178696 PHYLLIS SIMS - DVM

Print Number: 1
Project: 9GRA100
Task:

Payment Terms: NET PAYABLE IN 30 DAYS
FOB: OUR PLANT
Ship via: BEST WAY
Freight Terms: FREIGHT NOT APPLICABLE

Vendor:
WATERTECH SOFTWARE & CONSULTIN
1375 EATON AVENUE
SAN CARLOS, CA 94070

Ship to:
SOUTHERN STATES UTILITIES, INC
1000 COLOR PLACE
APOPKA, FL 32703

Bill to:
SOUTHERN STATES UTILITIES, INC
1000 Color Place
Apopka, FL 32703

Line	Item No.	Description	Due Date	Quantity	UM	Unit Cost	Extended Cost
1	066-RTE-0006	CONFIRMING PURCHASE ORDER PREVIOUSLY ORDERED. CONSULTING SERVICES NOTE: INCLUDES ALL LABOR & TRAVEL EXPENSES. INV. #SL-10 Acct Code: 001.00001.616.99.1061.0000.100	2/19/1995	1.00	LOT	2,219.11	2,219.11

RECEIVED
MAR 0 1 1995
Accounts Payable

Total $ 2,219.11

IMPORTANT: THIS ORDER IS SUBJECT TO THE TERMS AND CONDITIONS PRINTED ON THE REVERSE SIDE

AUTHORIZED SIGNATURE
JOHN HILTON, C.P.M.

ACCOUNTS PAYABLE

APPENDIX DK30S-D

PAGE 1851 OF 2226

SSU

78596

3.59

REQUISITION

NOTE: SHADED FIELDS ARE REQUIRED

PLANT/DEPT: 9CT01 RATES
REQUESTED BY: [illegible]
REQUEST DATE: 2/28/95
DATE REQUIRED: ASAP

VENDOR NAME: [illegible] Software & Consulting
ADDRESS: 1395 [illegible] Ave
San [illegible], CA 94040
PHONE NO: 800-800-9519

SHIP TO: DEPT/PLANT: [illegible]
ADDRESS:
ATTN:

PO #	TERMS	SHIP VIA	FOB	DUE DATE	CONFIRMING	MAIL	TAXABLE
33331	[illegible]	B	DP	2-14	Johnson	Y	N

L/N	Item No.	QNTY	U/M	Item Description (include p/n, cat. #, mfg, model, size, etc.)	PLANT	RSP	UC	ACCT	SUB-A	CEO	PROJECT	TASK	SUBT	Unit Price	Amount
					001.0			615	99.[illegible]		(95 RATES)			1,570.00	1,570.00
1		1	L.S.	Labor 16 hrs @ $85/hr	"									548.00	548.00
2				Airline Fare	"									88.00	88.00
3				Hotel	"									42.00	42.00
4				Taxi to SSU (no rental [illegible])	"									21.11	21.11
5				Lunches $6.43 + $14.68											
				Chron # 95-18											

855

SUBTOTAL	$2,211.11
FL. TAX	
FREIGHT	
OTHER	
TOTAL	2,211.11

APPROVALS

[illegible signature]

PURPOSE AND NECESSITY

Consultant for Rate Structure Issues for Rate Filing

☒ BUDGETED ☐ UN-BUDGETED

ACCOUNTS PAYABLE

```
5/23/1995 10:04:38     Interactive trial balance     - GLGTXI     GLDTXI
                                                       JOURNAL DETAILS
Journal number :   17743 RECORD ACCRUED TGI CHARGES-FEB  Monetary
Reference : SJ520 RES  Source : GJ        Year/period : 1995 03
?  rcompany table : 001                   Auto rev jrn :   17615
C. dit total :            13,748.75    units      Total :
Debit  total :            13,748.75               Total :
Locate account . 001.00001.620.99.1861.0000.150    +
    Co#.Plant.Rsp.UC.Acct.Sbac.CEC         Job code                Amount
Account Description            Transaction Description          units
          project#   task/sub-t
    001.00001.620.99.1861.0000.150                                 574.58-
Deferred Rate Case Costs       RATE CASE ASSISTANCE
         95RA100
    001.00001.000.99.2330.1000.000                               13594.75
Accounts Payable-Topeka/MP     TOTAL ACCRUED TGI CHARGES-FEB

    001.00001.000.99.2410.2000.000                                 865.89-
Accrued Audit Fees             SSU TAX RETURN
                                                                        +

5
F3=Exit  F4=Prompt  F6=Journal Header  F8=Function keys  F24=More keys
```

[redacted] Voucher

Approved by: VBC　　Manual Check #: ______　　Date: ______

Type: ______

Vendor #: 3869

Inv Date: 4-30-95　　Vendor Name: JOHN WHITCOMB

Due Date: 5-31-95　　Inv #: 95-19　　Inv $: 22,140.42

Month/Yr: 5/95　　Discount: ______　　Terms: ______

Purchase Order #: B95357

Description: CONSULTANT FOR '95 RATE ISSUES

Units: ______　　Job Code: ______

Account Number Plt.ResCtr.UC.Acct.SubAcct.CEC	Project Number	Dollar Amount
00001.615.99.1861.0000.150	95RA100	22,140.42

Voucher Prepared by: [signature]

_ Software and Consulting

April 30, 1995

Forrest Ludsen
Southern States Utilities
1000 Color Place
Apopka, FL 32703

Invoice No. 95-19

Subject: **Invoice for Purchase Order ______**

Dear Forrest:

This invoice encompasses consulting services I performed through April 30, 1995 for the Southern States Utilities with respect to the evaluation of alternative water rate structures. My total expenses equal $22,140.42 as itemized below.

DESCRIPTION	Hours Budgeted	Hours Spent to Date	Hours Spent this Billing Period	AMOUNT @ $95/hr.
Task 1 Weather Normalization	120	77	77	$7,315.00
Task 2. Rate Alternatives	170	123	123	$11,685.00
Task 3. Water Sales Adjustment	100	24	24	$2,280.00
Task 4. Expert Witness	100	0	0	$0.00
Travel Expenses (receipts attached)				$860.42
Total		224	224	$22,140.42

The limiting fee of the purchase order is $50,000. The amount previously invoiced is $0. The balance outstanding is $22,140.42.

Have check made payable to John Whitcomb. My social security number is 562-70-7930.

Best Regards,

John Whitcomb

John B. Whitcomb, Ph.D.
Enclosures (Receipts)

RECEIVED
MAY 1 2 1995
Accounts Payable

1375 EATON AVENUE, SAN CARLOS CA 94070 PHONE/FAX 1-800-800-9519

VIU

Manual Check #:

3859

John Whitcomb

Vendor Name: Watertech

In... e: 5/31/95

Inv #: 95-20

Inv $: 10,761.00

Due Date: 6/14/95

Discount:

Terms:

Month/Yr: 6/95

Purchase Order #: 895367

Description: Consultant

Units:

Job Code:

Account Number Plt.ResCtr.UC.Acct.SubAcct.CEC	Project Number	Dollar Amount
00001.6599.1861.0000.50	95RA100	10,761.00

Voucher Prepared by: [signature]

WATERTECH Software and Consulting

May 31, 1995

Forrest Ludsen
Southern States Utilities
1000 Color Place
Apopka, FL 32703

Invoice No. 95-20

Subject: **Invoice for Purchase Order ______**

Dear Forrest:

This invoice encompasses consulting services I performed during May, 1995 for the Southern States Utilities with respect to the evaluation of alternative water rate structures. My total expenses equal $10,761.00 as itemized below.

DESCRIPTION	Hours Budgeted	Hours Spent to Date	Hours Spent this Billing Period	Amount this Billing Period @ $95/hr.
Task 1 Weather Normalization	120	80	3	$285.00
Task 2. Rate Alternatives	170	179	56	$5,320.00
Task 3. Water Sales Adjustment	100	56	32	$3,040.00
Task 4. Expert Witness	100	12	12	$1,140.00
Travel Expenses (receipts attached)				$976.00
Total		327	103	$10,761.00

The limiting fee of the purchase order is $50,000. The total amount invoiced to date is $32,901.42. The balance outstanding is $10,761.00.

Have check made payable to John Whitcomb. My social security number is 562-70-7930.

Best Regards,

John Whitcomb

001.001.615.99.1861.150 95RB10

John B. Whitcomb, Ph.D.
Enclosures (Receipts)

6/8/95

RECEIVED
JUN 09 1995

Accounts Payable Voucher

Approved by: VJC

Manual Check #:

Date:

Type:

Vendor #: 3859

Vendor Name: John Whitcomb Watertech Software

Date: 6/30/95

Inv #: 95-21

Inv $: 7600.00

Due Date: 7/12/95

Discount:

Terms:

Month/Yr: 7/95

Purchase Order #: B95367

Description: Consultant

Units:

Job Code:

Account Number Plt.ResCtr.UC.Acct.SubAcct.CEC	Project Number	Dollar Amount
00001.615.99.1861.0000.150	95eA100	7600.00

Voucher Prepared by:

WATERTECH Software and Consulting

June 30, 1995

Invoice No. 95-21

Forrest Ludsen
Southern States Utilities
1000 Color Place
Apopka, FL 32703

Subject: **Invoice for Purchase Order ______**

Dear Forrest:

This invoice encompasses consulting services I performed during June 1995 for Southern States Utilities. The work included revisions in the weather normalization model including new risk calculations, final calculation of price elastic water reductions, and development of the WNC. My total expenses equal $7,600.00 as itemized below.

DESCRIPTION	Hours Budgeted	Hours Spent to Date	Hours Spent this Billing Period	Amount this Billing Period @ $95/hr.
Task 1 Weather Normalization	120	98	18	$1,710.00
Task 2. Rate Alternatives	170	179	0	$0.00
Task 3. Water Sales Adjustment	100	112	56	$5,320.00
Task 4. Expert Witness	100	18	6	$570.00
Travel Expenses (receipts attached)				$0.00
Total		407	80	$7,600.00

The limiting fee of the purchase order is $50,000. The total amount invoiced to date is $40,501.42. The balance outstanding is $7,600.00.

Have check made payable to John Whitcomb. My social security number is 562-70-7930.

Best Regards,

RECEIVED
JUL 06 1995
Accounts Payable

John B. Whitcomb, Ph.D.

CC1.C001.615.99.1861.150 95RA100

1375 EATON AVENUE SAN CARLOS CA 94070 PHONE/FAX 1-800-800-9519

NOTE: SHADED FIELDS ARE REQUIRED

Southern States Utilties

RECEIVING REPORT

R/R 60759

PURCHASE ORDER NUMBER: D95767

PLANT NAME: Apopka

SUPPLIER: Whitcomb Utility Consulting

PLANT NUMBER: 70001

LINE ITEM #	QTY. REC'D.	DESCRIPTION	COMPLETE	INCOMPLETE
1		Weather Normalization	✓	
2		Water Loss Accounting	✓	
3		Expert Witness		
		001.0001.615.99.1861.150 95RA100		
		RECEIVED JUL 06 1995 Accounts Payable		

FOR BLANKET USE ONLY

INVOICE # [illegible] 95-21

DOLLAR AMOUNT $7,600.00

PURPOSE & NECESSITY: Consultant for Rate Structure issues for 1995 Rate Filing

W/O#:

G.L #:

6/29/95 P Sims
DATE RECEIVED BY

DATE CHECKED BY

REV 3/94

ACCOUNTS PAYABLE

NOTE: SHADED FIELDS ARE REQUIRED

Southern States Utilties

RECEIVING REPORT

R/R 60768

PURCHASE ORDER NUMBER: B95357

PLANT NAME: Apopka

SUPPLIER: Watertech Software + Consulting - John Whitcomb

PLANT NUMBER:

LINE ITEM #	QTY. REC'D.	DESCRIPTION ACCRUED	COMPLETE	INCOMPLETE
1		~~Plant #~~		
		GL #		
		~~WO #~~		
		$ Amt.		
		~~Initials~~		
		Mo/Yr		

RECEIVED
OCT 09 1995
Accounts Payable

FOR BLANKET USE ONLY

INVOICE #

DOLLAR AMOUNT $ 7,

PURPOSE & NECESSITY

W/O#:

G.L #:

10/4/95 — DATE — RECEIVED BY

DATE — CHECKED BY

REV 8/94

001.02701.207.01.6202.0000.125	174.41	HOME DEPOT #B95363	
001.02701.205.01.6505.0000.160	47.87	HOME DEPOT #B95363	
001.02701.205.02.7505.0000.160	10.57	HOME DEPOT #B95363	
001.01429.205.01.6505.0000.160	1.90	HOME DEPOT #B95363	
001.01429.205.02.7505.0000.160	1.84	HOME DEPOT #B95363	
001.01429.209.01.6206.0000.125	28.73	HOME DEPOT #B95363	
001.01429.207.02.7205.0000.125	43.00	HOME DEPOT #B95363	
001.02301.137.01.6202.0000.125	220.00	JAX UTILITIES #L134081	
001.02601.313.02.7115.0000.999	432.00	J&J BAKER #B95279	
001.02601.313.02.7115.0000.999	1,440.00	J&J BAKER #B95279	
001.00001.615.99.1861.0000.150	7,600.00	JOHN WHITCOMB #B95357	95RA100
001.02601.313.02.7115.0000.999	864.00	J&J BAKER #B95279	
001.02601.312.01.6353.0000.150	1,616.65	J&J BAKER #B95271	
001.01802.120.02.7355.0000.153	21.60	KARR ENV. #B95374	
001.00440.120.02.7206.0000.125	45.22	LAB SAFETY #L129948	
001.00444.120.02.7206.0000.125	45.23	LAB SAFETY #L129948	
001.00472.120.02.7206.0000.125	45.23	LAB SAFETY #L129948	
001.02601.312.01.6204.0000.125	93.59	LAWSON PROD #B95243	
001.90001.676.99.6207.0000.140	16.48	MARCO TRUE VAL #B95250	
001.00886.135.01.6505.0000.160	138.25	MIKE DAVIDSON FRD#40921	
001.00886.135.02.7505.0000.160	134.41	MIKE DAVIDSON FRD#40921	
001.00888.135.01.6505.0000.160	53.76	MIKE DAVIDSON FRD#40921	
001.00888.135.02.7505.0000.160	46.82	MIKE DAVIDSON FRD#40921	
001.02301.135.01.6505.0000.160	8.68	MIKE DAVIDSON FRD#40921	
001.02302.135.01.6505.0000.160	2.11	MIKE DAVIDSON FRD#40921	
001.90001.670.99.6207.0000.140	177.93	OFFICE DEPOT #L135863	
001.90001.225.99.6208.0000.140	88.14	OFFICE DEPOT #L128949	
001.90001.515.99.6208.0000.140	536.25	OFFICE DEPOT #L136708	
001.90001.183.99.6208.0000.140	271.71	OFFICE DEPOT #L131321	
001.90001.125.99.6208.0000.140	81.49	OFFICE DEPOT #L136774	
001.90001.225.99.6208.0000.140	374.15	OFFICE DEPOT #L128945	
001.90001.570.99.1059.2000.140	85.00	OFFICE DEPOT #L135910	
001.90001.230.99.6208.0000.140	201.33	OFFICE DEPOT #L134835	
001.90001.135.99.6208.0000.140	227.38	OFFICE DEPOT #L136406	
001.90001.515.99.6208.0000.140	309.27	OFFICE DEPOT #L133023	
001.90001.515.99.6208.0000.140	125.85	OFFICE DEPOT #L136705	
001.90001.500.99.6208.0000.140	42.19	OFFICE DEPOT #L136182	

APPENDIX DR303-B

PAGE 1862 OF 2226

Journal Entry Transaction Form

Prepared By: Approved By: Entered By:

YEAR/PERIOD:	95/12	Source Code	GJ	Journal #	21078
Company	001	Batch Type (M = Monetary, S = Statistical)	M	Batch #	8804
Inter Co. Table	001	Reference Code	S1554	Auto Accrual?	—

DESCRIPTION: 12/95 A/P Accrual

Line	Account Number	Project	CPR	SUBT	Description	Amount
1	0000100099.2310.2000000				12/95 A/P Accruals	<153,370.78>
2						
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14						
15						
16						
17						

Total Number of lines	0
Total Debits	0.00
Total Credits	0.00

CS

Accounts Payable Voucher

Approved by: Manual Check #: Date:

Type:

Vendor #: 3859 Vendor Name: John Whitcomb

Inv Date: 7/31/95 Inv #: 95-22 Inv $: 2470.00

Due Date: 8/30/95 Discount: Terms:

Month/Yr: 8/95 Purchase Order #: B95367

Description: expert witness

Units: Job Code:

Account Number Plt.ResCtr.UC.Acct.SubAcct.CEC	Project Number	Dollar Amount
00001.615.99.1861.0000.150	95RA100	2470.00

Voucher Prepared by:

WATERTECH Software and Consulting

July 31, 1995

Forrest Ludsen
Southern States Utilities
1000 Color Place
Apopka, FL 32703

Invoice No. 95-22

Subject: **Invoice for Purchase Order ______**

Dear Forrest:

This invoice encompasses consulting services I performed during July 1995 for Southern States Utilities. The work included generation of an updated report titled Financial Risk and Water Conserving Rate Structures July 1995, WATERATE calculations related to including formerly non-FPSC systems into the rate case, and development of responses to the Interrogatories and Documents requests made by FPSC. My total expenses equal $2,470.00 as itemized below.

DESCRIPTION	Hours Budgeted	Hours Spent to Date	Hours Spent this Billing Period	Amount this Billing Period @ $95/hr.
Task 1 Weather Normalization	120	98	0	$0.00
Task 2. Rate Alternatives	170	179	0	$0.00
Task 3. Water Sales Adjustment	100	112	0	$0.00
Task 4. Expert Witness	100	44	26	$2,470.00
Travel Expenses (receipts attached)				$0.00
Total	490	433	26	$2,470.00

The limiting fee of the purchase order is $50,000. The total amount invoiced to date is $42,971.42. The balance outstanding is $2,470.00.

Have check made payable to John Whitcomb.

RECEIVED
AUG 15 1995
Accounts Payable

Best Regards,

John Whitcomb

John B. Whitcomb, Ph.D.

CC 1.0001.615. 99.1861.150 95RA100

1375 EATON AVENUE, SAN CARLOS CA 94070 PHONE/FAX 1-800-800-9519

NOTE: SHADED FIELDS ARE REQUIRED

Southern States Utilties

RECEIVING REPORT

R/R 60764

PURCHASE ORDER NUMBER: B 95367

PLANT NAME: Arena

SUPPLIER: Watertech Software & Consulting

PLANT NUMBER: 9001

LINE ITEM #	QTY. REC'D.	DESCRIPTION	COMPLETE	INCOMPLETE
1		Expert Witness	✓	
		001.0001.615.99.1861.150 95RARD		

RECEIVED
AUG 15 1995
Accounts Payable

FOR BLANKET USE ONLY

INVOICE # 95-22

LAR AMOUNT $2,470.00

PURPOSE & NECESSITY

"Consultant For Rate Structure Issues
For 1995 Rate Filing

W/O#:

G.L.#:

8/10/95 P. Sims
DATE RECEIVED BY

8/11/95 LW
DATE CHECKED BY

REV. 8/94

ACCOUNTS PAYABLE

WATERTECH Software and Consulting

VOUCHER NO:
PO NO.: B95357
VENDOR NO: 3859
INVOICE NO.: Invoice No. 95-23
INV DATE: 12/18/95 DUE DATE: 1/3/96
INVOICE AMOUNT: 5279.63
DESCRIPTION: TESTING
PROJECT NO: 95RA1100
G/L NO: 0001.615.99.1861.0060.150
APPROVED: (AUTHORIZED SIGNATURE ONLY)

December 18, 1995

Forrest Ludsen
Southern States Utilities
1000 Color Place
Apopka, FL 32703

Subject: **Invoice for Purchase Orders 865-RTE-0006 & 865-CHG-0001**

Dear Forrest:

This invoice encompasses consulting services I performed during August through December 1995 for Southern States Utilities. The work included responses to interrogatories/document requests and a trip to SSU for a deposition on November 6, 1995. My total expenses for this period equal $5,279.63 as itemized below.

DESCRIPTION	Budget	Spent to Date	Spent this Billing Period
Labor Hours			
Task 1 Water Variability	120	98	0
Task 2. Rate Structure Alternatives	170	179	0
Task 3. Weather Normalization Charge	100	112	0
Task 4. Expert Witness	100	90	46
Task 5. Stand-Alone Rates (added)	80	0	0
Total Labor Hours	570	479	46
Labor Expense @ $95/hour	$54,150.00	$45,505.00	$4,370.00
Travel Expense ($)	$3,200.00	$2,746.05	$909.63
Total Expenses	$57,350.00	$48,251.05	$5,279.63

Have check made payable to John Whitcomb.

Best Regards,

John Whitcomb

John B. Whitcomb, Ph.D.

0001.615.99.1861.150 95RA100
$5,279.63
Fw

1375 Eaton Avenue San Carlos CA 94070 Phone/Fax 1-800-800-9519

DIXON **SAN CARLOS TRAVEL**

1495 LAUREL STREET • SAN CARLOS, CALIFORNIA 94070
(415) 592-7793 • FAX (415) 592-5090

ASTA

PASSENGER NAMES

RECONFIRM RETURNING AND CONTINUING RESERVATIONS 72 HOURS IN ADVANCE FOR INTERNATIONAL FLIGHTS, AND SUGGEST 48 HOURS IN ADVANCE FOR DOMESTIC FLIGHTS
CAUTION: TICKETS HAVE VALUE. RETURN FOR CREDIT OR REFUND

ITINERARY

[illegible]

HOTEL [illegible] CONFIRMED
EMBASSY SUITES ROOMS
225 E ALTAMONTE DR PHONE-407 834-2400
ALTAMONTE SPRINGS FL 3270[illegible]
CONFIRMATION-83330561
NOV 4 AND NOV 5 ROOM RATE IS $109.00
NOV 6-1NIGHT ROOM RATE IS $144.00
REQUESTED NON-SMOKING KING/STD TO VISA

PAY IN 95

07 NOV 95 - TUESDAY
UNITED 471 COACH CLASS
LV: ORLANDO/INTL 820A NONSTOP EQP-757 CONFIRMED
AR: SAN FRANCISCO 1112A
BREAKFAST-SNACK-MOVIE SEAT-21F

THIS SPECIAL FARE TICKET IS NON-REFUNDABLE.
CHANGES CAN BE MADE FOR $50 PER TICKET PLUS ANY INCREASE IN AIRFARE.
PASSENGER ADVISED OF PENALTY FEE.
ADDITIONAL AGENCY SERVICE CHARGES MAY APPLY IF TICKET
IS EXCHANGED OR REFUNDED.

TICKET NUMBER/S:
WHITCOMB/JOHN 1430185807 CARD 441.00

AIR TRANSPORTATION	398.18	TAX	42.82	TTL	441.00
		SUB TOTAL			441.00
		CREDIT CARD PAYMENT			441.00-
		AMOUNT DUE			0.00

EMBASSY SUITES®

ORLANDO NORTH
225 E Altamonte Drive
Altamonte Springs, FL 32701
407/834-2400
Fax: 407/834-2117

Name & Address

WHITCOMB/JOHN
1495 LAUREL ST

SAN CARLOS CA 94070-5183 US

ILLEIS09

Room	719
Arrival Date	4NOV 22:36
Dept. Date	7NOV
Adult/Child	1/0
Room Rate	109.00

[illegible]

X
SIGNATURE

7NOV95

DATE	REFERENCE	DESCRIPTION	AMOUNT
4NOV	1000185	02:58 Guest Suite	109.00
	93000185	02:58 STATE TAX	7.63
	94000185	02:58 CITY TAX	3.27
5NOV	77000959	17:09 Telephone-Local	.75
	1000153	02:53 Guest Suite	109.00
	93000153	02:53 STATE TAX	7.63
	94000153	02:53 CITY TAX	3.27
6NOV	1000190	02:36 Guest Suite	109.00
	93000190	02:36 STATE TAX	7.63
	94000190	02:36 CITY TAX	3.27
	Will be settled to VS424689900353		360.45
		** Balance **	0

EMBASSY SUITES®

Thank You!

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  3/05/1996 11:34:38     Interactive trial balance      GLGTXI     GLDTXI
                                                        JOURNAL DETAILS
Journal number :   21194 12/95 A/P ACCRUALS              Monetary
Reference : SJ554      Source : GJ        Year/period : 1996 01
Intercompany table :
C dit total :              153,490.85     units       Total :
. .t  total :              153,490.85                 Total :
Locate account . 001.00001.615.99.1861.0000.150
    Co#.Plant.Rsp.UC.Acct.Sbac.CEC         Job code                  Amount
Account Description              Transaction Description          units
           project#    task/sub-t
    001.00001.615.99.1861.0000.150                                     7600.00-
Deferred Rate Case Costs         JOHN WHITCOMB #B95357
          95RA100
    001.01901.215.01.6751.0000.220                                       50.00-
OFFICE GROUNDS MAINTENANCE       SAFARI LAWN CARE(SEABOARD)

    001.01901.215.02.7751.0000.220                                      250.00-
OFFICE GROUNDS MAINTENANCE       SAFARI LAWN CARE(SEABOARD)
                                                                          +

F3=Exit  F4=Prompt  F6=Journal Header  F8=Function keys  F24=More keys
```