BEFORE THE
FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 070183-WS

In the Matter of:

PROPOSED ADOPTION OF RULE 25-30.4325,
F.A.C., WATER TREATMENT PLANT USED
AND USEFUL CALCULATIONS.

____/

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VOLUME 2

Pages 176 through 339

PROCEEDINGS:	HEARING
BEFORE:	CHAIRMAN MATTHEW M. CARTER, II COMMISSIONER LISA POLAK EDGAR COMMISSIONER KATRINA J. MCMURRIAN COMMISSIONER NANCY ARGENZIANO COMMISSIONER NATHAN A. SKOP
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APPEARANCES:	(As heretofore noted.)

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P R O C E E D I N G S

CHAIRMAN CARTER: We'll go back on the record. And I think the last time that we left here, we were taking the last train to Clarksville.

COMMISSIONER SKOP: I think it was Memphis.

CHAIRMAN CARTER: That shows you about how old I am.
Was it to Memphis?

COMMISSIONER SKOP: Yes.

CHAIRMAN CARTER: Okay. I think, Mr. Friedman -- Mr. Hoffman, we finished with you, right, with your witnesses?

MR. HOFFMAN: Yes.

CHAIRMAN CARTER: Well, not with you personally, but (laughter) --

MR. HOFFMAN: That remains to be seen, I guess.

CHAIRMAN CARTER: I'm working on the dialogue. Give me a week or so to get back in the saddle there.

MR. HOFFMAN: Mr. Chairman, I do have one preliminary matter. I think Mr. Seidman is up next.

With respect to Mr. Woodcock's rebuttal, I think that we can, unless the Commissioners have questions, stipulate his rebuttal into the record.

CHAIRMAN CARTER: Oh, that sounds refreshing.
Mr. Friedman, are you cool with that, too?

MR. FRIEDMAN: I'm cool with that.

CHAIRMAN CARTER: All right. Mr. Reilly, let's hear from you on that.

MR. REILLY: It catches me slightly by surprise.

CHAIRMAN CARTER: You beat them down.

MR. REILLY: Well, I mean, he can certainly decide whether he wants to ask cross-examination questions, so there is nothing I have to comment on that. I guess we would yield to staff.

MS. GERVASI: We don't have questions on rebuttal, either.

CHAIRMAN CARTER: Well, see, I was right from the very beginning.

MR. REILLY: I thank the parties.

CHAIRMAN CARTER: So Mr. Woodcock can still go home, can't he?

MR. REILLY: No, he needs to sit here and help me. He's not excused.

CHAIRMAN CARTER: I was trying to help you out, you know. You are welcome to stay. Okay.

MR. JAEGER: Chairman Carter, just before we broke, I think Commissioner Argenziano had a question about Rule 62.

CHAIRMAN CARTER: One second. We will get back to that in a minute. Let's kind of take care of the preliminary matters.

Ms. Gervasi, is there anything that we need to do on this, since the parties are in agreement on the stipulation?

MS. GERVASI: No, sir, other than to have his Rebuttal Testimony offered up into the record as though read at the appropriate time, which I'm sure Mr. Reilly will do.

CHAIRMAN CARTER: Okay. That will be --

MR. REILLY: I'll be happy to do it now, whatever your pleasure.

MS. GERVASI: Probably for the record to read correctly, we ought to wait on that.

CHAIRMAN CARTER: Let's kind of give Mr. Reilly a heads up when we get to that point, all right?

MS. GERVASI: Yes, sir.

CHAIRMAN CARTER: Okay. Mr. Jaeger.

MR. JAEGER: Yes. Rule 62-555.348, titled Planning for Expansion of Public Water System Source Treatment or Storage Facilities. That was effective August 28th, 2003. There has been no changes since then. I checked -- well, the staff helped me check the Florida Administrative Code, there is nothing in the works for amending it. I also called my DEP sources, and they said there is nothing in the works for amending this rule.

CHAIRMAN CARTER: Commissioner Argenziano.

COMMISSIONER ARGENZIANO: Thank you, because I wasn't sure if it was that rule. I know something stuck out about that, and I don't know if we are -- just finding that out makes me feel more comfortable. I appreciate that. Thank you.

CHAIRMAN CARTER: Thank you. I think, Mr. Friedman, you are up next.

MR. FRIEDMAN: Thank you very much. Utilities, Inc. calls Frank Seidman.

CHAIRMAN CARTER: Mr. Seidman, you are recognized. I know you have already been sworn. I saw you in here this morning.

THE WITNESS: Yes, I have been sworn.

FRANK SEIDMAN

was called as a witness on behalf of Utilities, Inc., and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. FRIEDMAN:

Q Would you please state your name and business address?

A Frank Seidman, Post Office Box 13427, Tallahassee, Florida.

Q And, Mr. Seidman, did you prefile Direct Testimony in this docket on behalf of Utilities, Inc. consisting of 42 pages and five exhibits?

A That's correct.

Q And do you have any corrections to your testimony?

A Yes, I have one correction.

Q Could you point that out for us, please?

A That would be on Page 21, Line 20. And in that line there is a Paren 5, it should read Paren 4. That is the only correction.

Q And, Mr. Seidman, if I were to ask you the questions in your prefiled testimony with that one change, would your answers be the same?

A Yes, they would.

MR. FRIEDMAN: I would like to ask that Mr. Seidman's prefiled testimony be submitted into the record as those read.

CHAIRMAN CARTER: The prefiled testimony will be entered into the record as though read.

MR. FRIEDMAN: And, for the record, Mr. Seidman's exhibits have been designated by the staff on Exhibit 1 as 8, 9, 10, 11, and 12. And we will offer those at the appropriate time.

TESTIMONY OF FRANK SEIDMAN
BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION
IN RE THE PROPOSED ADOPTION OF RULE 25-30.4325,
F.A.C., WATER TREATMENT PLANT USED AND USEFUL
CALCULATIONS
DOCKET NO. 070183-WS

Q. Please state your name and business address.

A. My name is Frank Seidman. I am President of Management & Regulatory Consultants, Inc., consultants in the utility regulatory field. My business address is P.O. Box 13427, Tallahassee, FL 32317-3217.

Q. On whose behalf are you appearing in this proceeding?

A. I am appearing on behalf of Utilities, Inc., which owns and operates ten (10) subsidiaries in Florida to which this proposed rule will be applicable.

Q. State briefly your educational background and professional experience.

A. I hold a Bachelor of Science degree in Electrical Engineering from the University of Miami. I have also completed several graduate level courses in economics at Florida State University, including public utility economics. I am a Professional Engineer, registered to practice in the State of Florida. I have over 40 years experience in the field of utility regulation and in utility management and consulting. This experience includes nine years as a staff member of the Florida Public Service Commission, two years as a senior planning engineer for a Florida telephone company, four years as Manager of Rates and Research for a water and wastewater holding company that operated in six states, including Florida, and three years as Director of Technical Affairs for a national association of industrial users of electricity. I have either supervised or prepared rate cases, rate studies, and original cost studies or testified as a witness in utility matters in Florida and six other states. I have participated and/or appeared as a witness in many of this Commission's rulemaking proceedings with regard to water, wastewater and electric rules, as well as proceedings before the Florida Division of Administrative Hearings. I have attached to my testimony a summary of proceedings in which I have taken part (Exhibit FS-1 ___).

Q. **What is the purpose of your testimony?**

A. The purpose of my testimony is to present the position of Utilities, Inc. with regard to the proposed rule and to provide information to the Commission to assist it in reaching its conclusions as to whether the rule should be adopted as proposed or should be modified.

Q. **What is the position of Utilities, Inc. with regard to the proposed rule?**

A. Utilities, Inc. supports the rule, as proposed. Although Utilities, Inc. does not necessarily agree with every part of the proposed rule, it supports it because it represents a compromise resulting from the concerted efforts of the Commission staff and interested parties, including the Office of Public Counsel, the Department of Environmental Protection, the water management districts and the Florida Rural Water Association, which have provided input, written and verbal, in several workshops and through open correspondence. Utilities, Inc. also supports the rule as proposed because it basically codifies decisions of the Commission that have been developed and solidified during the course of many evidentiary hearings occurring over many years that have been heard by many sets of commissioners.

Q. **If Utilities, Inc. supports the proposed rule, why is it providing further input?**

A. Utilities, Inc. supports the <u>whole</u> rule as proposed. It believes that the sum of the sub-parts provide a workable <u>whole</u> rule. However, changing pieces of the rule may not have the same acceptable result. It is, therefore, important that input be provided to address specific alternate proposals that it believes may change the intended direction of the rule as currently proposed. In addition, if alternative proposals are found to be acceptable, Utilities, Inc. would like the opportunity to be able to support those.

Q. **Before you take up any specific concerns, would you please provide to the Commission some background on the used and useful concept which this proposed rules addresses?**

A. I would be glad to. The proposed rule addresses "used and useful calculations." Before valid "calculation" methods can be developed, I believe it is helpful to have some background on the origin of the term used and useful.

The term "used and useful" originates in regulatory law; more specifically, utility regulatory law. It is found in the regulatory statutes of many states, including Florida. But it is not necessarily found in the statutes regulating all of the utilities regulated by those states. For example, here in Florida, the term used and useful is found in the statutes regulating electric and gas utilities and water and wastewater utilities, but it is not found in the statutes regulating telecommunication utilities.

The term "used and useful" is often modified in the law by the phrase "in the public service" as it is in Florida, or by a phrase of similar wording. And it is sometimes followed by a requirement for prudent investment. Here in Florida, prudent investment is required to be considered in the regulation of electric and gas utilities. Prudent investment is not required to be considered in the regulation of water and wastewater utilities, although such consideration is not precluded.

Q. Is there a definition of used and useful in the law?

A. No, there is not. Interestingly, a common thread amongst the regulatory statutes in all states of which I am aware, is that used and useful is never defined. The definition has been left up to the regulatory agencies and the courts. It is as if the legislators placed the term in the law not knowing how to define it, but assuming regulators would know it when they saw it. And, as pointed out in a 1983 Interdepartmental Commission Memorandum (Exhibit FS-2 __), there has been little help from the courts in interpreting what is used and useful. That memo could well have been written today. When I have read unofficial definitions of used and useful, it is usually in an economic or financial context, defining it as a concept used by regulators to determine whether an asset should be included in a utility's rate base. It is this vagueness that has resulted in the calculation of used and useful being a contentious issue in water and wastewater regulation here in Florida for more than forty years and that, once again, brings us before the Commission to attempt to establish a rule to standardize the calculation of used and useful.

Q. **You indicated that we are "once again" before the Commission to consider a rule to standardize the calculation of used and useful. Would you please explain your remark?**

A. Yes. The Commission has been attempting to standardize the calculation of used and useful for many, many years. On an in-house policy basis, staff efforts date back to the 1970's. Then in the early 1980's, the Commission staff conducted workshops to discuss standardization of approaches to calculating used and useful. These workshops did not result in the development of rules. Then, again, in the late 1980's and early 1990's, workshops were again held. The efforts in this case were intense, resulting in numerous drafts of rule language and finally a formal rule proposal in Docket No. 911082-WS, Order No. PSC-93-0455-NOR-WS, issued 3/24/93. This rulemaking proposal included many "cleanup" revisions to existing rules in addition to the proposal for a new used and useful rule. In the end, through Order No. 93-1663-FOF-WS, issued 11/15/93, the Commission adopted the cleanup portions of the rule proposal and withdrew the used and useful portion of rule proposal. The reason for the withdrawal, as best as I could determine, was the complexity of the proposal and the inability of the Commission to draw hard and fast conclusions from the array of testimony presented. Nevertheless, after another nine years (12/26/02), the Commission was able to approve a much simplified rule for the calculation of used and useful for wastewater treatment plants.

Q. Is used and useful an engineering concept?

A. No it is not. I say this knowing full well that it is often thought of as being one and has even been considered to be one by this Commission. As I have previously stated, used and useful is a utility regulatory concept.

Q. Why do you say that used and useful is not an engineering concept?

A. I say that because, to my knowledge, used and useful is not taught in any engineering curriculum, it is not addressed in any engineering text, it does not appear in any engineering reference or manual and it is not a consideration in engineering design.

Q. If used and useful is not an engineering concept, should the Commission give great weight to engineering principles in developing rules for calculating used and useful?

A. Most definitely. It is because used and useful is not an engineering concept that great weight must be given to engineering principles, especially design principles. Otherwise, interpretations of used and useful will be made in a vacuum, without any way to link the reality of before-the-fact water plant design considerations to after-the-fact regulatory analysis of what should be included in rate base.

Q. Is there precedent for this Commission to consider engineering design principles in determining how to calculate used and useful?

A. Yes. As far back as 1973, the Commission engineering staff has given great weight to engineering design principles. In a 1973 memorandum addressing the used and useful concept (Exhibit FS-3 ___), the then Chief Engineer of the Commission's Water and Sewer Department concluded:

> My main recommendation is to assure that each system evaluated for used and useful content be done so in a fair and equitable manner. Full consideration should be given to the design criteria and the reasonableness of same. Using considerations other than design criteria measured against customers served and their requirements will result in an arbitrary decision as to what is used and useful in the public service. (emphasis added)

Then, in Order No. 7684, issued 3/14/77 (Exhibit FS-4 __), in evaluating a Deltona Utilities rate application, the Commission offered a definition of the purpose of used and useful and the means for its determination. It identified a two step process. In the first step, the existence and cost of an asset is determined. In the second step, it is determined whether the asset is really used and useful. The Commission set out three criteria in the second step. First, the asset must be reasonably necessary to furnish adequate service during the course of the prudent operation of the utility. Second, any asset required to perform a function necessary to furnish service to the public is considered used and useful. And third, good engineering design will give a growing utility sufficient capacity over and above actual demand to act as a cushion over a reasonable period of time. (emphasis added)

So, there is adequate precedent for engineering design to be given great weight.

Q. Is there support in the water and wastewater regulatory statute supporting the consideration of engineering design?

A. Yes. Chapter 367.111, Florida Statutes requires that the service provided shall be not less safe, less efficient or less sufficient than is consistent with the approved engineering design of the system. (emphasis added)

COMMENTS ON SPECIFIC OPC RULE CHANGE RECOMMENDATIONS

Q. Thank you for providing that background regarding the origination and interpretation of used and useful. Now please direct your attention to the testimony filed on behalf of the Office of Public Counsel (OPC). Have you read the testimony filed by Mr.Woodcock on behalf of OPC?

A. Yes I have.

Q. Mr. Woodcock recommends amending proposed rule Section (1) (a) to include a reference in the definition of a water treatment system to exclude high service pumping, Do you have any problem with that?

A. No. His recommendation to amend the language in proposed rule Section (1) (a) is acceptable.

Q. Mr. Woodcock also recommends amending proposed rule section (1) (b) to separate the definitions of storage and high service pumps. Do you have a comment on that change?

A. I do not feel it is necessary. For purposes of this rule, defining storage as including the associated high service pumps or defining them separately doesn't make any difference. I do not believe it interferes with evaluating the components separately, as Mr. Woodcock is proposing.

Q. As you have inferred, Mr. Woodcock also recommends that used and useful for storage and high service pumps be evaluated separately. Do you have a comment on that change?

A. I certainly cannot argue that these system components, or for that matter any system components, should not be evaluated separately in certain circumstances. I have taken that position myself in some rate cases in which I have prepared used and useful evaluations. I can, however, argue against making separate component evaluations the rule rather than the exception as proposed by Mr. Woodcock. The rule as currently proposed by PSC Staff provides for a simple, straight forward default methodology of evaluating used and useful for two components - water treatment, as defined, and storage, as defined. It then allows the opportunity for alternatives calculations, which would include a component by component evaluation, as the secondary methodology. This approach is the culmination of evaluating used and useful for hundreds of systems over many years. As I indicated previously in my testimony, the rule as proposed is a compromise. The more complicated the rule, the more difficult to reach a compromise. This rule has to be workable not only for the Class A and B utilities that file their own cases, but for the Class C utilities for which PSC Staff will be preparing the cases. Remember, we are not designing water systems, we are making a determination of what costs are recoverable through rates. The designs for the systems being evaluated for used and useful have already been approved as meeting FDEP criteria and it is not necessary to reevaluate every component. For the exceptions, the proposed rule already provides that opportunity.

Q. Mr. Woodcock next recommends amending proposed rule Section (1) (c) to separate the definitions of peak demand for water treatment systems with

and without storage. Do you have a comment on that change?

A. Yes. If all Mr. Woodcock was doing was separating the definitions, I would argue that it was acceptable, but not necessary. But, he has done more than separate the definitions; he has changed the definition of peak demand for water treatment systems with storage to eliminate the need to cover fire flow demand. I cannot agree to that change.

Q. Why not?

A. The ability to provide for fire protection is one of the most important functions in providing water service. FDEP, in its written comments filed in this proceeding in August, 2006, recognized the importance of the ability of a water treatment system to replenish storage on a daily basis. FDEP observed:

> When calculating maximum day demand, a fire should not be considered an anomaly. Fires happen, and water systems often must be sized to provide fire protection. <u>Even if a water system has sufficient fire storage, source and treatment facilities must be</u>

> capable of replenishing the fire storage on a daily basis so that fire storage is available on any given day. Thus maximum day demand must include fire-flow demand (fire flow rate times fire flow duration. (emphasis added)

This Commission, in the past, has also recognized the importance of including fire flow capacity in the water treatment system in addition to storage in being able to provide for fire flow demand. In Docket No. 890277-WS, regarding Palm Coast Utility Corporation, the Commission recognized the real life situation with regard to fire. A forest fire that swept across Flagler County in 1985 could have devastated the City of Palm Coast if the utility's storage fire fighting capability had not been supplemented by the capability of the treatment system in providing both fire flow demand and continuous service on an extended basis. As the Commission stated in Order No. 22843 in Docket No. 890277-WS:

> Because we are uncomfortable speculating about the likelihood of a fire occurring on the day of maximum demand, we find that the

inclusion of fire demand of 2,000 gpm for five hours does not overstate the used and useful calculations for source of supply and treatment plant facilities.

The ability of a water treatment system to not only replenish storage for fire flow demand, but to supplement it is of special concern today, as changes in our weather patterns have made Florida susceptible to more frequent and sustained forest fires that threaten an ever growing population.

Based on these factors, fire flow demand should be included in evaluating used and useful at all levels of supply, treatment, storage and pumping. A Utility should not be penalized economically because it has the capacity to meet both customer demand and fire flow demand at all levels.

Q. **Mr. Woodcock has also recommended adding "if provided" to Paragraph 1(c) of the proposed rule, regarding the inclusion of fire flow demand. Do you have any comment?**

A. My only comment is that the proposed paragraph already includes that limiting factor. The proposed rule includes the language "where fire flow is provided ..." That being the case, I see no reason to change the proposed language.

Q. Next, Mr. Woodcock has recommended amending the definition of peak demand for storage in proposed rule section 1(d). Would you please comment on that recommendation?

A. The major change recommended by Mr. Woodcock is to define the peak demand for storage as 25% of maximum day demand plus fire flow instead of 100% of maximum day demand plus fire flow. He believes that 100% of maximum day demand is excessive. I believe that his recommendation of 25% of maximum day plus fire flow is inadequate for purposes of determining used and useful. Mr. Woodcock states that his definition mirrors the concepts embodied in FDEP design standards. I do not agree. FDEP Rule 62-555.320(19)(a) requires finished water storage to be at least 25% of maximum day demand and, as indicated, this is only for operational equalization. Mr. Woodcock's recommendation results in the minimum FDEP design standard being used as a maximum for purposes of a utility recovering its costs. I do not believe that disincentives that result in water systems being designed to meet only minimum standards mirrors the concepts embodied in FDEP design standards. In my opinion, Mr. Woodcock's recommended definition also ignores the necessity for emergency storage. Emergency storage is in addition to fire storage and protects against such events as power outages, large main breaks, and unexpected shut downs or failures of the treatment plant or the water supply. The determination of the amount of emergency storage is a judgment call and design resources do not offer any estimates of the range of the amount. However, the "Recommended Standard for Water Works" does provide some guidance. That reference indicates that for a system not providing fire protection, the minimum storage capacity should be equal to average daily consumption. One could conclude that minimum storage for a system with fire flow demand, the minimum storage capacity would be at least the fire flow demand plus average daily demand. The range of maximum to average day demand ratios in the U.S. typically ranges from 1.5 to 3.5. On that basis, one could set minimum storage capacity, other than fire flow at about 50% of maximum day demand, with 25% being for equalization and 25% for emergency demand. Again, this is a minimum. I believe Mr. Woodcock's recommendation, therefore, is inadequate for purposes of calculating used and useful and the proposed rule recommendation of 100% of maximum day demand, though higher than the minimum requirement is not unreasonable.

Q. Mr. Woodcock has recommended a definition of high service pumping demand which he identifies as new section (1)(f). Would you please comment on that recommendation?

A. Yes. Mr. Woodcock's premise is that a separate evaluation of used and useful for high service pumps is necessary. Under that premise, a definition such as he proposes is also necessary. The rule as currently proposed evaluates storage and high service pumps together. As I previously indicated, I do not have a problem evaluating used and useful by components under certain conditions. Under the rule, as proposed, this is an option that is made available, but it is a secondary option. Should the Commission decide that a separate evaluation of used and useful for high service pumps be a part of the rule, then Mr. Woodcock's definition should be considered. My problem with his definition is the same I have with all of his definitions that rely on the wording of FDEP Rule 62-555, FAC., and his application, in general of that rule for purposes of calculating used and useful; i.e., that a rule that sets *minimum* requirements based on design demands is used to set the maximum level of the costs recoverable by a utility through rates.

Q. Since your concern with Mr. Woodcock's application of Chapter 62-555, Florida Administrative Code appears to be a recurring one, would you please explain further why you are concerned with its use for analysis of methods for calculating used and useful?

A. The purpose of Chapter 62-555, F.A.C. is to set the *permitting* requirements for public water systems (see 62-550.102(~~5~~4), F.A.C.). The Chapter sets out standards for how a public water system shall be *designed* and constructed and requires that it be *designed* in accordance with sound engineering practice (see 62-555.320 and 555.320(1), F.A.C.). If a system is designed and constructed in accordance with Chapter 62-555, F.A.C., a permit is issued. Every operating public water system that has been issued a permit by FDEP is, by definition, designed and constructed in accordance with the requirements of Chapter 62-555, F.A.C.

Mr. Woodcock, in developing many of his proposed rule change recommendations has taken the FDEP design criteria, which were minimum criteria based on design assumptions about the demands on the system being permitted, and applied them, after the fact, to actual demands on the system.

Q. **What is wrong with that?**

A. Nothing, if all you are doing is evaluating when and what system upgrades may be needed in the future. In fact, that is what is done in preparing an FDEP required capacity analysis report or when applying for an FDEP expansion permit. But it does not work when trying to determine whether the cost of a system designed and permitted in accordance with FDEP requirements should be recoverable.

Q. Why is that?

A. When a system is being designed, the engineer looks not at used and useful considerations, but rather at sound engineering practice. Using sound engineering practice, a system would not be designed minimally, but with the ability to meet historically anticipated demands at the time of the design. That design demand is what is referred to over and over again in the FDEP rule. Actual demand is not the same as design demand, nor would one necessarily expect it to be; otherwise there would be no ability built into the design to meet historically anticipated demand. When actual demand is substituted for design demand in a FDEP standard and then used to calculate used and useful, the result is almost always an inability of the utility to recover the full cost of the system it had designed in accordance with sound good engineering practice. Let me give you an example.

The primary building block for estimating demand for a water system is per capita water consumption. Average daily water consumption in the United Stats and Florida is and has been for some time, approximately 100 gpd per capita. Generally speaking that is the design capacity used for designing systems in Florida. It is a legitimate, accepted design amount, and a lesser amount might be subject to question in a permit application without substantiated explanation. For many of the utilities with which I have worked in Florida, the actual per capita consumption turns out to less than 100 gpd per capita. That's not a particular problem operationally, but, if the actual rather the design demand is used in a used and useful calculation, it is a certainty that the utility will not receive full recovery of the costs associated with its water system that was designed based on sound engineering practice. In other words, if a system is designed based on 100 gpd per capita, but actual demand is only 80 gpd per capita, the utility will not have the opportunity to recover 20% of the cost of its soundly engineered system. This is a fact not considered in Mr. Woodcock's proposals.

Q. Is there a solution?

A. The simplest solution would be to evaluate used and useful with due consideration to the design demands, as exemplified in the FDEP rules. In the alternative, a methodology such as presented in this proposed rule.

For example, the inclusion of fire demand in the peak demand, for purposes of evaluating used and useful for the water treatment system, as proposed by PSC Staff, does two things. It allows the utility to recover costs it prudently incurred to meet design demand, even though actual demand may be less and it recognizes the practical benefit of of the water treatment system being able to not only replenish storage for demand, but supplement it.

Q. Continuing on, Mr. Woodcock has recommended additional language be added to the definition of unaccounted for water which is found at section (1)(e)of the proposed rule. Would you please comment?

A. Yes. Mr. Woodcock is recommending that language be added that requires that any water claimed as accounted for that was used for flushing, fire fighting, line breaks, etc. be fully documented. These uses are what are now identified in the MFRs as "other uses." The proposal to require that unaccounted for water be "fully documented" is vague, in that it does not indicate the level of documentation required. The Utility is already responsible for supporting any schedule submitted in a rate filing (see PSC Rule 25-30.450, F.A.C.). There is no need for additional language in this rule.

Q. Mr. Woodcock next recommendation concerns proposed rule section (2), which addresses prudence of investment and economies of scale. Do you have any comments?

A. Yes. Mr. Woodcock indicates that prudence of investment is already an issue in rate cases, separate from used and useful and therefore it is not required in this rule. In my opinion, that is not correct. As I previously pointed out, the statute authorizing the regulation of water and wastewater utilities does not address prudent investment. It does not require its consideration nor does it preclude its consideration.

Therefore, I believe it is proper for the Commission to make its intent known in this rule. With regard to economies of scale, Mr. Woodcock is concerned that the current proposed language only mentions economies of scale, but gives no direction or insight about how to address it. His solution is to substitute his recommended paragraph which mentions economies of scale but gives no direction or insight about how to address it. As with the consideration of prudence of investment, I believe it is proper for the Commission to make its intent known in this rule.

Q. Do you have any comments about Mr. Woodcock's recommended substitute for proposed rule section (2)?

A. Yes. Mr. Woodcock's substitute language attempts to combine the language in currently proposed rule sections (2) and (3). Proposed rule section (2), as we have discussed, requires the consideration of prudence of investment and economies of scale, in addition to the calculations of used and useful for the various system components. Proposed rule section (3) provides that separate used and useful calculations shall be made for the water treatment system and storage facilities, but allows alternative calculations to be made.

By combining the language of these sections, Mr. Woodcock defines the consideration of prudence of investment and economies of scale as alternative used and useful calculations, thus limiting there consideration to only when alternative calculations are proposed. That is not the intent of the currently proposed language. The intent of the currently proposed language is to consider these factors regardless of the method of calculation.

I do, however, agree that it would he helpful to add the other factors he has listed to the current proposed rule section (3). In other words, I am recommending that the current proposed rule section (2) be adopted as is and that the following sentence be added to current proposed rule section (3): Examples of factors that are appropriate for consideration in proposing an alternative calculation include, but are not limited to service area restrictions, factors involving treatment capacity, well drawdown limitations and changes in flow due to conservation or a reduction in the number of customers.

Q. Mr. Woodcock also recommends that the option to provide an alternative calculation should be made available to all parties, not just the utility. Would you please comment on that?

A. Yes. I do not disagree with Mr. Woodcock's intent. However, I do not believe it can be addressed in this rule, nor is there a need to. This proposed rule is a subpart of Part V - Rate Adjustment Changes of Chapter 25-30, F.A.C. It addresses the responsibilities and requirements of the <u>utility</u> filing for a rate adjustment. It does not address other parties. In other words, this proposed rule tells the utility what it is required to file. Other parties have every right to respond to the filing of the utility at the proper time and in the proper manner provided for in the law and in rules implementing the law. This rule is just not the right place to address this.

Q. Mr. Woodcock also recommends that proposed rule section (4), which addresses circumstances in which a water treatment system would be 100% used and useful is not necessary, as it is covered under the alternative calculation factors. Do you agree?

A. No. The circumstances listed under proposed rule section (4) are special circumstances which the Commission has previously addressed and found to be the basis for a finding of 100% used and useful. By setting them out separately, it eliminates the need to go through the used and useful calculations, saving both time and expense. The only change I would recommend to the proposed language would be to make applicable to storage as well as the treatment system. I believe this is consistent with its intent.

Q. Mr. Woodcock recommends removing subsection (c) from proposed rule section (4), which designates a water treatment system as 100% used and useful if it only has one well. Do you agree?

A. No. Mr. Woodcock correctly states that although FDEP Rule 62-555.315, F.A.C. requires at least two wells, there are systems that do have only one well and no interconnection to add security. Such cases should be rare because if FDEP picks up on this during an inspection, it will cite the utility. Mr. Woodcock's concern is that the pump on that single well could be operating at 50% capacity because the system is not built out and yet be considered 100% used and useful under the proposed rule. This may well be true on a mathematical basis because the proposed formula for calculating capacity for a system without storage is based on the peak hour demand. But, the peak hour demand is an average of the instantaneous demands occurring during that hour and with only one well and pump, those instantaneous flows, some of which may be considerably higher than the peak hour rate of flow must still be met by that single pump. So, intuitively, with a single well, one should expect the pump rating to be more than required to meet hourly demand. And, although this may be a matter of semantics, the pump would not be operating at 50% of capacity. Its output would still be at 100% of its gpm capacity even if it is not operating at 100% of its cumulative capacity over time. Again, we must focus on the purpose of the used and useful evaluation. It is to determine what costs are legitimately recoverable through rates, not to simply arrive at a used and useful percentage. And it is not to give a signal to downsize a well pump in order to increase the used and useful percentage rather than to size it in accordance with sound engineering practice. In my opinion, the PSC Staff's proposal that a system with a single well should be considered 100% used and useful is reasonable and should be adopted.

Q. **Mr. Woodcock next recommends simplifying the definition of firm reliable capacity in proposed rule subsection (6). Do you agree?**

A. Yes. If the proposed additional language for rule section (3) providing examples of factors that are appropriate for consideration in proposing an alternative calculation is accepted, Mr. Woodcock's simplified language for rule section (6) is acceptable. This recommendation is limited to the opening paragraph of proposed rule section (6) and not to subsections (a) and (b).

Q. Mr. Woodcock takes issue with proposed rule section (6) (b) which sets out that the determination of firm reliable capacity for systems with storage be based on 12 hours of pumping. Would you please address this proposal?

A. Selecting the period of time upon which the capacity of the water treatment systems is evaluated for purposes of calculating used and useful is one of the most important and difficult decisions to be made in developing these rules. Mr. Woodcock's summation of the factors affecting this issue well illustrates their complexity. In designing a system, all of these different factors are considered and it doesn't matter which period of time is used to express capacity, as long as the system provides adequate and sufficient service all the time. However, in adopting a rule for the purposes of calculating used and useful, the Commission is adopting a single default formula; one that best results in a determination of that portion of the cost of the system that can be recovered through rates. Mr. Woodcock recommends that pumping over a 24 hour period should be the default period for expressing firm reliable capacity. PSC Staff recommends that pumping over a 12 hour period should be the default period for expressing firm reliable capacity. The rules, as proposed, allow for consideration of an alternative calculation regardless of which time frame is chosen, 12 hours, 24 hours or something in between.

In making its decision, the arguments by Staff and OPC witness Woodcock should both be carefully considered. Mr. Woodcock points out that prudent and efficient design would seek to maximize the number of hours of pumping time. He also points out there are several good reasons why pumping time should be limited. On this basis he recommends that 24 hours be the default period and all of the other considerations be addressed in an alternative calculation.

PSC staff, in testimony it has filed in recent rate cases, supports its recommendation of a 12 hour time period with two observations. The first is that wells should have some down time to recharge the aquifer and it is environmentally responsible and prudent to rest a well for 12 hours daily so that ground water can recharge.

The second observation is that 12 hours a day reflects the general usage pattern of customers (diurnal use patterns typically show most water use between 6AM and noon and 3PM to 9PM).

For default formula purposes, I believe Staff makes a powerful argument. The argument for environmental responsibility is certainly true today and will be for the foreseeable future. It is a crucial consideration. The Staff argument regarding customer patterns has long been true.

Again, we must look at what we are trying to accomplish. We are trying to adopt a rule that aids in determining that portions of a utility's cost that is recoverable through rates. Staff's recommendation recognizes that there are costs incurred for purposes other than delivering water and that is the cost of protecting the water supply. Mr. Woodcock's recommendation makes protecting the water supply a secondary issue to be addressed with an alternate calculation that will require additional time and expense.

Between the two choices, it is my opinion that staff's recommendation is the more responsible and prudent for a default definition.

Q. **Mr. Woodcock next addresses the definition of peak hour demand in proposed rule section (7) (a). His recommendation is that the peaking factor be set as a range of 1.5 to 2.0, rather than a firm 2.0. Do you agree?**

A. No. Using a range in a default formula opens the door to interpretation that is best handled under the alternate calculation provision already proposed. More importantly, the rules set out that peak hour demand is only used for systems with no storage. Systems with no storage are typically small systems for which storage is not an economic option. As Mr. Woodcock points out, the larger the system, the lower the peaking factor and the smaller the system, the higher the peaking factor. Since this definition will be used with smaller systems, 2.0 should remain the default peaking factor.

Q. **Mr. Woodcock also recommends changes in proposed rule section (7) (a) 2. and also rule section (b)**

2. These sections address using the average of the five highest days for identifying the peak day when the single peak day has an unusual occurrence. Would you please address this issue?

A. The issue here is whether to use the highest five days in a 30 day period as proposed or the highest five days in the peak month as proposed by Mr. Woodcock. I am in agreement with Mr. Woodcock's reasoning. Using the highest five days in the peak month is so much easier to calculate. I agree with his recommendation.

I do, however, have another problem not related to Mr. Woodcock's recommendation. And that is with the whole concept of using the average of the five highest days when the peak day of the year has an unusual occurrence.

Q. Would you please explain?

A. There has been no difference of opinion between parties that the basic demand to be considered in evaluating used and useful is the single maximum day demand. My problem is the big leap from a single day to the average of five days as a proxy. Averaging mitigates maximum demand.

Averaging five days mitigates it more than averaging 4 or 3 or 2 days. Any mitigation gets us away from the purpose of using the single maximum day and that is to recognize that is what the system must be able to serve.

Why do we have to average at all when the simplest solution to just move on the next highest day which has no unusual occurrence? One may counter that the next highest day may also have had an unusual occurrence. But so what? There can not have been an unusual occurrence on every day of the year. It is my opinion that it better to choose the single highest day in which there has not been an unusual occurrence and leave it at that. I am, therefore recommending - that proposed rule sections 7(a) 2. and 7(b) 2. be eliminated and that the wording in sections 7(a) 1. and 7(b) 1. be changed from "The single maximum day (SMD) in the test year unless there is an unusual occurrence …" to "The single maximum day (SMD) in the test year in which there is no unusual occurrence …"

Q. The next recommendation by Mr. Woodcock is to eliminate proposed rule sections (7) (a) 3. and (7) (b) 3. These sections provide an alternative means of estimating the peak day when flow data is not available. Do you agree?

A. Yes. Not only for the reasons stated by Mr. Woodcock, but because I do not believe the proposed method of estimating is valid for all size and character of systems.

Q. Mr. Woodcock next recommends a new section defining the demand and firm reliable capacity for high service pumps. Do you have any comment?

A. My only comment is that I do not disagree with his definitions. Whether they should be a part of the rule depends on whether the Commission decides to adopt Mr. Woodcock's recommendation to evaluate each component separately. My position on that matter has been previously discussed.

Q. Mr. Woodcock's final recommendation is to remove proposed rule sections 10 and 11. Do you agree?

A. No, I do not agree. Both cover factors validly considered by Commission. And the Commission does make used and useful adjustments to accounts other than plant.

Q. Do you have any further comments?

A. Yes. The greater portion of my testimony addresses the recommendations made by Mr. Woodcock on behalf of OPC. I have done that because I believe that OPC, being the sole protester of the proposed rule has the burden to show why the rule as proposed should not be adopted. For the reasons discussed in my testimony, I do not believe they carried the burden of showing why any significant changes to the rule should be made as they pertain to determining used and useful for the purpose of assessing what costs should be recovered through rates.

Throughout my testimony I did identify some changes in which I concur with Mr. Woodcock as well as changes of my own. I have prepared Exhibit (FS-5) ___) which is a mark up of the proposed rule which identifies those portions of the proposed rule for which I recommend a change using the standard add and strike coding.

In concluding, I would like to reiterate that that I believe the rule as proposed is a good, not perfect, rule. It is acceptable with no significant changes. I would also like to ask the Commissioners, as you consider the information you have been provided by all parties, to keep in mind that the purpose of used and useful analysis is not to determine a used and useful percentage. The purpose is to determine what costs should be recovered through rates. Or, in another way, which assets are reasonably necessary to furnish adequate service and whether those assets perform a function which is a necessary step in furnishing service during the prudent operation of the utility. Determining a percentage is not the end result. It is an aid in reaching the end result. In my opinion, the changes recommended by OPC will not allow a utility to recover the cost of providing the facilities which make it possible to operate the system in a manner intended to assure customers get a continuously reliable level of service. They recognize specific capacities and demands as a base for measurement, but they do not adequately recognize the operational and economic considerations of furnishing continuous and adequate service. They only recognize minimum, not adequate and sufficient requirements.

Q. Does that conclude your testimony?

A. Yes.

BY MR. FRIEDMAN:

Q Mr. Seidman, would you briefly summarize your prefiled Direct Testimony?

A Yes, thank you. My Direct Testimony presents the position of Utilities, Inc. and its Florida subsidiaries with regard to this rulemaking. And that basic position of Utilities, Inc. is that it supports the rule as proposed in its entirety, including the stipulations. It supports it even though it may not agree with every part of the rule, but it supports it because it represents a compromise resulting from the concerted efforts of the Commission staff and the interested parties. And, more importantly, it codifies decisions of this Commission that have been developed, solidified during the course of many evidentiary hearings, or occurring over many years before many sets of Commissioners.

Our testimony consists of two parts. The first part lays out some background and history regarding the regulatory concept of used and useful, and the second part consists of comments on specific changes proposed by the Office of Public Counsel to the proposed rule. I have included this background and history for a couple of reasons. In general, I thought it was important for everyone to have an understanding of the roots of the concept in regulatory law, its uniqueness and also its vagueness.

Although the purpose of used and useful is commonly understood to be the means by which we determine which assets of the utility are going to be included in rate base, there is not a clue in any regulatory law as to how that should be accomplished. Specifically, with regard to regulation of water and wastewater utilities in Florida, I thought it was important to understand that this Commission has been examining, and testing, and reexamining, and proposing methods of calculating and standardizing the calculation of used and useful for over 35 years. So there is an awful lot of history behind what is being presented to you today in the staff's proposal and it should not be taken lightly. This is not something that was just developed over a few weeks or even over the two years that were devoted specifically to this rulemaking. These are not hastily conceived sets of rules, but they are rather well thought out codifying conclusions of these many evidentiary hearings which are referred to and they have been subjected to arguments for and against and to cross-examination and ruled on in other rate cases.

With regard to the second part of my testimony wherein I comment on proposed changes of the proposed rule, I believe these comments that you have in hand speak for themselves, and I'm not going to use up your time going over them. I'm just hopeful that they will be useful to you in reaching your final decisions.

And I just want to conclude my summary by reiterating that the purpose of used and useful analysis is not to determine a used and useful percentage, but rather to determine what assets are going to be included in rate base. Determining a percentage is a means to an end and not the end itself. The resulting rule should enable the utility the opportunity to recover the cost of providing the facilities which make it possible to operate a system in an economical manner, protective of the environment, and intended to assure that the customers get a continuously reliable level of service.

Thank you.

MR. FRIEDMAN: We would tender Mr. Seidman for cross-examination at this time.

CHAIRMAN CARTER: Thank you. And, Mr. Reilly, you are recognized.

CROSS EXAMINATION

BY MR. REILLY:

Q Good afternoon, Mr. Seidman.

A Good afternoon.

Q Could I have you refer to your testimony on Page 19, Lines 5 and 6. I believe on these lines it is your testimony that you state that Mr. Woodcock's peak demand for water storage ignores the necessity for emergency storage, is that correct?

A That's correct.

Q So for identical service areas, one served by a water treatment plant with no storage and one served by a water treatment plant with storage, is there a differing standard for emergency volume in your judgment?

A Would you repeat that?

Q We have identical service areas, one served by a water treatment plant with no storage and one with storage. In your judgment would that create a differing standard for emergency volume considerations?

A No, because the emergency volume is related to the storage. If there's no storage, there is obviously no emergency volume contained in a storage facility.

Q So the customers without storage would not get the benefit, obviously, of emergency storage. I mean, there is no provision for emergency for such a system.

A They are without the benefit of any storage.

Q Are you aware of FDEP requirements to include design requirements for water treatment systems that provide for continued operation in emergency situations?

A And what rule is that?

Q I'm asking are you familiar with any FDEP rule that includes design requirements for water treatment systems that provide for continued operation in emergency situations?

A I'm not familiar with anything specific. I think the overall design requirements of DEP through their Rule 62-555 covers basically all situations.

Q Would you say that the concept of firm reliable capacity which involves sizing a plant to meet demands in the event the largest capacity well is required to be out of service is an example of a requirement to cover an emergency?

A Yes, it is.

Q And is the firm reliable capacity concept embodied in the used and useful rule proposed by staff?

A I'm sorry?

Q Is firm reliable capacity, the concept of this embodied in the used and useful rule proposed by staff?

A If you are referring to the extent that leaving one well out of service gives you some buffer, yes.

Q Are you aware of the FDEP requirements regarding standby power generators to allow water treatment plants to operate in the event of power outages?

A Yes.

Q So FDEP has several design requirements for water treatment facilities to maintain service in the event of an emergency, but does not require any emergency volume for system storage, isn't that correct?

A I don't think it necessarily requires emergency storage, but I don't think that has anything to do with the fact that emergency storage is a consideration, and it is well documented in literature for the design of water treatment plants, water treatment systems.

Q But FDEP's effort to help address potential emergencies, it does require standby power, but it does not require quote, unquote, emergency storage, is that correct? Per se, water storage?

A I will defer for what you said, sure.

Q Okay. Shifting subjects, have you read Mr. Hoffnagle's testimony?

A Yes, I have read it.

Q Do you have it handy?

A Yes.

Q I would direct your attention to Page 2 of that testimony, Lines 13 through 19.

A Okay.

Q Do you agree with Mr. Hoffnagle's testimony regarding how FDEP rules relate to Florida Public Service Commission practices? Do you believe his statement is accurate, and do you agree with it?

A If you are referring to the last sentence --

Q I think I'm referring to those Lines 13 through 19. DEP sets/establishes standards of practice and care for the industry to ensure water quality.

A I agree with that.

Q To those lines, okay?

A I agree with that.

Q And that this responsibility remains -- as to quantity, remains with the state's water management districts?

A Yes, I agree with that. I don't have any problem with his answer.

Q Okay. And referring to the same testimony on Page 2, Lines 6 through 9, if I could have you just look at that?

A Page 2 --

Q Same page, Lines 6 through 9. It starts Subparagraph .320, and this is speaking of the general purpose for FDEP Rule 62-555.320. Do you likewise --

A Yes, that's fine.

Q And you do agree with that testimony?

A Sure.

Q Okay. Thank you. Moving to another subject regarding that issue of 12 hours of well pumping. Would you say that a water treatment plant that is twice as big as what is needed to serve its customers base at build-out is prudently designed?

A A system that's twice as big as it needs to be at build-out?

Q Right; would be, in your judgment, prudently designed?

A I think that depends on what the design criteria were at the time that it was designed. We are talking about design conditions here, so at one time when the system was designed, there were certain parameters that were used to determine the size. Now, if it -- okay, at build-out. If it builds out to the full system and it's -- yes, it would be excess.

Q And the answer is you wouldn't consider that prudent?

A No, I wouldn't. No. If you designed it to have only 12 hours operation, I don't think that would be prudent. But I don't think that is what we are talking about here in this rulemaking. I don't think anybody has suggested that a system be designed to use the pumps only 12 hours a day. What is being suggested in these rules is for the purposes of used and useful determination, the 12-hour criteria is a good one because it envelops a lot of other things besides just the requirement to meet the peak demand. Requirements that Mr. Redemann has addressed very well, I think.

Q Do you know of any design criteria that states wells must be designed based on 12 hour a day pump time?

A No. Again, that is not what I see as the issue here. We are not designing plants here. The Commission isn't asking anybody to -- isn't looking at the design of plants in this particular setting here. The design of plants and whether or not they are designed properly is the purview of the DEP. What we are looking at here is how are we going to recoup money that is prudently invested through the rates.

Q But would it be -- and, again, this is an issue of just prudence from an engineering standpoint, and you say this has nothing to do with used and useful, but would it be prudent for an engineer to design a well field to pump for only 12 hours a day when it could be designed to operate at 24 hours a day?

A No, I don't think it is prudent to design it for 12 hours a day. I think I already said that.

Q Have you read Mr. Jenkins' testimony?

A Mr. Whose?

Q Mr. Jenkins, the water management district witness.

A I glanced at it. I've got it here.

Q I just want to verify whether you concur with him with regard to some of his testimony. If you could get a copy of it.

A I've got it.

Q And I will refer you to Page 9, Lines 10 through 13. In fact, I might just have you -- it is so short, maybe you could just read it, and then think, and I will ask you a question about it.

A Lines 10 through 13 on Page 9.

Q Correct.

A "And the bottom line is that there is typically no benefit to operating wells or a well field for a period of 12 hours versus 24 hours in Florida, since localized steady state drawdown conditions are quickly reached and impacts are often caused by regional cumulative withdrawals. However, in some cases, such as where there are localized resource impacts, interference with existing legal uses, or saline water intrusion, short-duration operation of wells can be used to avoid or minimize the impacts."

Q Sir, just 10 through 13.

A I'm sorry.

Q So, I guess if you could just look at 10 through 13 and just confirm whether you concur with that statement?

A No, I think there are benefits. I think that's a pretty broad statement. He says that there are no benefits, and I think there are benefits. And as I said, Mr. Redemann has addressed this more directly than I have, but I certainly see benefits to operating those wells on a rotating basis.

Q But wouldn't the benefits and the need for such reduced pumping depend on the specific system and particular aquifer conditions of that area? There may be no benefits or there may be benefits depending on the specific engineering and environmental considerations?

A Certainly, the benefits are going to vary according to the system and how it's operated and how it's designed. But what we are looking here again in this rule is a way to capture the legitimate costs of a prudent design under a used and useful concept, that is how do you recover the money that the utility has prudently spent. And it's not a design criteria. Again, I'm saying that again. I don't think anybody here has indicated that we should design systems to operate only at 12 hours.

Q Well, given Mr. Jenkins' discussion about the complexities of well impacts in Florida and the numerous special conditions that comprise a typical consumptive use permit issued by the districts, does it not seem likely that if there was a concern of over-pumpage of a well field that it would be addressed as a condition of the consumptive use permit?

A It may or may not. Conditions may change after the permit is issued.

Q Is not the water management district with their expertise and staff best positioned to make those kinds of judgments?

A Well, they may be, but they are not in a position to determine how the dollars associated with putting those wells in the ground and the monies spent on those pumps is going to be recovered. That is not their bailiwick, either. That is what this Commission is doing. And that is what I'm saying in this particular case, I think when you say that -- I mean, the opposite of this is what Mr. Woodcock has proposed is to base it on 24 hours, and I think that is way out of line on the other side. And as I indicated in my Direct Testimony, I think when you look at the consideration that has been given to other factors by staff in proposing the 12-hour basis, that it goes much further towards promoting a good efficient operation of the system and recovering the dollars that are specifically invested by the utility.

Q If a well field is sized to meet max day demand of a service area, how frequently will that well field even be operating 24 hours a day, the entire well field?

A I don't know.

Q Likely not be?

A Operating 24 hours a day every day?

Q Right.

A No, it won't be operating 24 hours a day every day, but I don't know what the daily usage will be.

Q And if a well field is designed to provide the max day demand with the largest well out of service, there will always be at least one well pump not operating on max day, is that correct?

A That's correct.

Q And obviously even less pumpage on an average day?

A Yes.

Q All right. All right. I direct your attention to your testimony on Page 35, and I'm looking at Lines 18 through 20.

A Yes.

Q And I think this is where you speak of staff's recommendation recognizes that there are costs incurred for purposes other than delivering water, and that that is the cost of protecting the water supply, is that correct?

A Yes.

Q In your opinion, is the Florida Public Service Commission charged with protecting the state's water supply?

A Indirectly, yes, I think so.

Q And in what regard?

A There are criteria that utilities have to meet in designing their system, and I believe that Chapter 367.111 indicates that utilities have to meet those criteria as part of what is required of them in providing service. So, indirectly, the Commission is saying that you have to do these things, whatever they are, protect the environment, provide safe water, provide adequate service are all part of the things that you have to do in order to meet the regulatory requirements of this Commission, even though they themselves are not the agency that is going to determine whether those criteria are met.

Q Is it not reasonable to consider the water management districts with their permitting authority diligently work to protect the water supply to the extent that permits issued may contain specific limitations on pumping?

A Sure.

Q Are you aware of the water management districts routinely issuing permits that limit pumping to 12 hours a day?

A No, I'm not aware of what they do routinely.

Q To change the subjects here, if we could look at Page 39, Lines 6 through 9. Here you recommend that OPC's recommendation to eliminate Section (7)(a) 3. and (7)(a)(b) (sic) because you do not believe the proposed method is valid for all size and character of systems, is that correct?

A Yes. Could I look at that? Let me look at that part of the rule. I've got it here.

Right. Those parts of the rule are the part where it says if actual or max day flow data is not available, 1.1 gallons per minute per ERC would be used.

Q And you believe that is inappropriate?

A I think the 1.1 gallons per minute is pretty low, because in most cases this is going to be applying to systems, small systems probably don't have storage are going to be having to meet, you know, peak hour or instantaneous flows. And with small systems, I think that number of 1.1 is pretty low, and rather than have that tied in there as a basis, I would rather see it knocked out.

The other thing is I think there is a concern if there is no maximum flow data for a utility, I think there are other things that are really of more concern. In other words, I'm pretty skeptical of a situation where a utility does not have maximum day flow data.

Q Is one of your concerns given the vast difference between systems of one size fits all as far as a default?

A One size fits all, yes, for that particular instance where we are looking at more of a peak hour instantaneous flow.

MR. REILLY: Okay. I have no further questions.

CHAIRMAN CARTER: Mr. Hoffman.

MR. HOFFMAN: Thank you, Mr. Chairman.

CROSS EXAMINATION

BY MR. HOFFMAN:

Q Good afternoon, Mr. Seidman.

A Good afternoon.

Q I'm Ken Hoffman. I represent Aqua Utilities Florida. Doesn't the Public Service Commission protect the state's water supply through its rate structure authority, including the authority to establish various forms of conservation rates?

A Yes. In fact, it has to do that in concert with the water management districts.

Q Okay. Would you say that the Public Service Commission's water and wastewater rules, including their customer service billing rules and metering rules which require meter accuracy within certain parameters also help to preserve state water supply?

A Yes. The more metering and the more accurate the metering, the better idea we have of what the flows are and can control them.

Q Okay. Thank you. Let me ask you a few questions about this issue of max day demand in Subsection 7 of the proposed rule, which you talk about on Pages 36 through 38 of your testimony. Let me let you turn to that.

Now, this notion of an actual maximum day as it is laid out in the proposed rule, that is still less than an engineer's maximum day estimate that would be used to design a water treatment system, isn't that true?

A That would be correct. An engineer's design would be based on a design maximum day.

Q Now, in addition, for design purposes, isn't the estimated maximum day rate of flow used in designing the plant there to account for growth?

A Please repeat that.

Q Does the estimated maximum day rate of flow that an engineer develops in designing a plant, does that account for customer growth and operating cushion, as well as an operating cushion?

A Yes, because if you are designing for either a new utility or an addition to a utility, you are obviously designing for something in excess of what you are already serving, or you wouldn't need to make the addition or you wouldn't to need have the utility. So it always has to be forward-looking.

Q Now, let me ask you a question based on a very simple hypothetical which is assume for the purpose of this next question that you have a 2007 test year and your max day is

900,000 gallons per day in 2007. That's your test year for a rate case.

Now, assume that two years before that in 2005 you had a higher max day of 930,000. Are you with me so far?

A Yes.

Q Is there ever any real justification, in your opinion, for using anything less than that 930,000 gallon per day maximum rate of flow in determining used and useful for a water treatment plant?

A I wouldn't think so. I mean, I have been involved in a lot of rate cases and this issue is something that comes up, I wouldn't say very often, but it comes up often. What do we do when we have already reached a peak that is higher than the peak in the test year?

In my way of thinking, if you have already reached a peak, that means that the customers have shown a demand that had to be met. And therefore whatever, say, used and useful came out as a result of that indicates what's the maximum that has been put on that system to date. Going into a test year subsequently to that that has a lower demand means you are going to be lowering the used and useful below an amount you have already indicated was necessary. So it kind of -- you know, it leaves you backing off when you have already indicated that the expenditures the utility has made were necessary.

Q Is that opinion that you have just stated similar to the notion or the fact that this Commission in the past has made determinations in a rate case that a water treatment plant is 100 percent used and useful, and then in a subsequent rate case the demand has dropped due to the institution of conservation programs, but not lowered that 100 percent used and useful finding from the previous case?

A Yes. If I'm understanding you correctly, are you asking me has the Commission in some cases gone ahead and recognized that a drop in demand due to conservation shouldn't result in a drop in used and useful?

Q Yes.

A Yes, I agree with that.

Q Do you agree that the design criteria for a water treatment plant is not dependent on a rate setting test year?

A Oh, definitely not, no.

Q I'm sorry?

A Design is not dependent on a ratemaking test year, definitely not.

Q Let me ask you another hypothetical. If you assume a water system has a 6-inch diameter well that can produce 1,200 gallons per minute, it is a one-well system with no storage. If a four-inch diameter well will produce 500 gallons per minute, but the peak demand of the customers is 600 gallons per minute. Those are the assumed set of facts. Would it have been prudent for the utility to install the 6-inch diameter well? Let me restate that.

Wouldn't it have been prudent for the utility to install the 6-inch diameter well, even though the ratio of the demand to capacity would be only 50 percent?

A I'm going to ask you to repeat it. I think I lost something in there.

Q Okay. I think I'm going to withdraw that.

A Okay.

MR. HOFFMAN: That concludes my questions.

Thank you, Mr. Chairman.

CHAIRMAN CARTER: Commissioners, any questions?

Staff.

MR. JAEGER: Just a few questions, Chairman.

CROSS EXAMINATION

BY MR. JAEGER:

Q Mr. Seidman, could you turn to Page 19 of your testimony. And instead of me reading it, would you read Lines 24 through 25, and then go on to the next page and just finish your answer for that, starting "on that basis."

A "On that basis, one could set minimum storage capacity, other than the fire flow at about 50 percent of maximum day demand, with 25 percent being for equalization and 25 percent for emergency demand."

Q Go ahead and finish the paragraph.

A "Again, this is a minimum." How far do you want me to read?

Q To the end of that answer.

A "I believe Mr. Woodcock's recommendation, therefore, is inadequate for purposes of calculating used and useful and the proposed rule recommendation of 100 percent of maximum day demand, though higher than the minimum requirement is not unreasonable."

Q Thank you.

Are you aware that lime softening reverse osmosis also known as membrane softening, microfiltration, and ion exchange water treatment plants need backwash water and are operated for an extended period of time?

A Yes.

Q Would you apply the 50 percent maximum day storage to these water treatment plants?

A As opposed to what?

Q As opposed to a higher storage, since they are --

A Well, I think a higher storage for systems like that would be helpful, but I don't know, you know, without knowing the specifics of the system, whether it should come from storage or something else.

Q Going back to Page 39, I believe at the top there on Line 2 you are talking about taking out (7)(a) 3., is that correct?

A Yes.

Q And (7)(a)3., is that if the actual maximum day flow data is not available, 1.1 gallons per minute per equivalent residential connection should be used, 1.1 times ERCs, is that correct?

A Right.

Q What do you do if there are no monthly operating reports, what do you use?

A Excuse me?

Q What do you do if there are no monthly operating reports?

A I guess if I'm the DEP, I cite the utility.

Q What do you do if you are the Commission and you are doing a rate case?

A That's a tough one. I have never had a client in that situation. I don't know what to advise the Commission in something like that.

Q Wouldn't it be better to have some kind of default set there in case there are not any operating reports?

A It's better than nothing. But my guess is, knowing what this staff has done in other cases, if you don't provide sufficient information to back up your filing, they're going to deny it.

MR. JAEGER: Staff has no further questions.

CHAIRMAN CARTER: Commissioners?

Commissioner Argenziano. A question for staff.

COMMISSIONER ARGENZIANO: To the question, I guess, of the reverse osmosis plant. How often is it, in your understanding, that the membranes need to be backwashed?

MR. JAEGER: Is that question for me, Commissioner? I'm sorry, I'm not used to being a witness. I would have to defer to engineers on that. But reverse osmosis, I just know that it's pretty constant, it's pretty steady. The membranes keep clogging up with filtered particles, so it's a constant struggle to keep those membranes clean.

COMMISSIONER ARGENZIANO: Right. And that goes to my question, wanting to figure out, I think in a smaller plant, like let's say Dunedin, a reverse osmosis plant, how often -- that's a pretty small plant compared to others, how often that backwashing would take place? To get an understanding, because the gist of your question meant something, and then to understand how often they are backwashed would mean additional information, additional use of that water. I can wait.

CHAIRMAN CARTER: Let's see if one of the engineers can back Mr. Jaeger up on this and help him out.

MS. GERVASI: Mr. Seidman, perhaps, has an answer to that. Also, Mr. Redemann will come to the stand shortly and may be able to answer or address that question, as well.

COMMISSIONER ARGENZIANO: The reason I ask is because it adds to the question that was asked, how often -- the frequency that water needs to be there.

CHAIRMAN CARTER: Do you want to also ask --

COMMISSIONER ARGENZIANO: Yes, I would love to do that. Since he is the witness right now, it would be great for him to --

CHAIRMAN CARTER: Fire away.

THE WITNESS: With reverse osmosis, it's basically a continuous operation of backwashing.

COMMISSIONER ARGENZIANO: I'll wait for staff.

CHAIRMAN CARTER: Thank you.

Commissioners, any further questions?

Staff, any further questions?

I think we are back to Mr. Friedman.

MR. FRIEDMAN: Yes. We have no redirect. I would like to move Mr. Seidman's exhibits, which are designated on the Comprehensive Exhibit List as 8, 9, 10, 11, and 12 into evidence.

CHAIRMAN CARTER: Any objections?

MR. REILLY: No objections.

CHAIRMAN CARTER: Hearing known, Exhibits 8, 9, 10, 11, and 12 are moved in.

(Exhibits 8 through 12 admitted into the record.)

CHAIRMAN CARTER: Any further questions for this witness? I will just say hang loose, Mr. Seidman.

MR. FRIEDMAN: That's the only witness being presented by Utilities, Inc.

CHAIRMAN CARTER: Thank you, Mr. Friedman.

Staff, you are recognized.

MS. GERVASI: Thank you, Mr. Chairman.

At this time staff would request that Mr. Van Hoofnagle's testimony, prefiled Direct Testimony be inserted into the record as though read.

CHAIRMAN CARTER: And we have no objections on that, do we, by either party? Show it done.

MS. GERVASI: Thank you. And he did not have any prefiled exhibits.

And at this time I would also request that the prefiled Direct Testimony of Dwight Jenkins be inserted into the record as though read.

CHAIRMAN CARTER: Any objections?

MR. HOFFMAN: No objections.

MR. REILLY: None.

CHAIRMAN CARTER: Show it done.

MS. GERVASI: Thank you. Mr. Jenkins had one exhibit, and at this time I would like to offer into evidence Exhibit 13.

CHAIRMAN CARTER: Any objections?

MR. HOFFMAN: None.

MR. REILLY: None.

CHAIRMAN CARTER: Show it done.

(Exhibit 13 admitted into the record.)

DIRECT TESTIMONY OF VAN HOOFNAGLE, P.E.

Q. Please state your name and business address.

A. Van R. Hoofnagle, Florida Department of Environmental Protection, Bob Martinez Center, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

Q. Please state a brief description of your educational background and experience.

A. I have a B.S. degree (1973) in Civil Engineering from the University of Washington (Seattle, WN) and a Masters of Engineering degree from the University of Virginia (1977). Upon graduation from the University of Washington, I worked as a national park engineer for the Servicio de Parques Nacionals in Costa Rica for two years for the U.S. Peace Corps; after graduation from the University of Virginia, I worked as a project engineer for the consulting firm of Gannett Fleming in Harrisburg, PA until 1980. I obtained my P.E. in the State of Florida in 1980 while working for the Florida Department of Environmental Regulation (now DEP). From 1980 until early 1991, I worked as a P.E. Administrator in the Facilities Planning Section reviewing 201 facilities plans for the construction of wastewater facilities in what is now the DEP's State Revolving Fund Program. In April of 1991 I became the Administrator of the DEP's Drinking Water Section and have been its P.E. Administrator since then.

Q. What are your general responsibilities at the FDEP?

A. I am responsible for implementing the federal and state Safe Drinking Water Acts in Florida. The program oversees the permitting, compliance, enforcement and basic administrative support through 15 field offices that regulate approximately 5900 public water systems covered under these acts. Our office in Tallahassee is directly responsible for ensuring program consistency, rule and program guidance, technical assistance, public education, budgeting, and staff training.

Q. What is the general purpose of DEP's Rule 62-555.315, F.A.C., regarding public water system wells and Rule 62-555.320, F.A.C., Design Criteria of Public Water Systems?

A. Rule 62-555.315 addresses additional requirements for wells over and above those found in Rule 62-532 and addresses other components of a system's wells and distribution system. For example, it covers such things as corrosion of pipes, bacteriological surveys, well capacity, minimum number of wells, and security. Subparagraph .320 is an extensive rule governing design and operation of public water systems and addresses treatment plants, pumping facilities, materials' standards, ancillary well features, storage, power, tankage, distribution system and plant operational issues, and safety.

Q. What is your understanding of how these DEP rules relate to Florida Public Service Commission (PSC or Commission) practice regarding the economic regulation of water utilities?

A. DEP sets/establishes standards of practice and care for the industry to ensure water quality. Issues of adequacy of supply are related to this overriding goal of water safety and quality as it might impact operating pressure and such concerns as fire flow. We do not directly oversee water supply or quantity as such. This responsibility remains with the state's water management districts. As I understand the role of the PSC, it is this agency that oversees rates, customer service and economic issues affecting private utilities under its jurisdiction.

Q. Would DEP support a utility's decision to design and construct wells, treatment, and storage facilities that are larger than these minimum criteria?

A. Yes, the DEP would approve a permit that met or exceeded our standards, be it for either quantity or quality. Construction projects that the DEP reviews for the purpose of receiving a federal or state loan or grant have to meet a separate demonstration of need. This often involves utilization of a planning horizon based on a 20-year present worth analysis. This is a different approach to planning and one generally practiced by water municipalities and utilities and also encouraged by the DEP. Perhaps the more germane question would be; is the PSC willing to accept a theoretical design (for the purpose of establishing rates) that does not meet the DEP's minimum design standards? This may be the case where a small system would be required to design for "peak instantaneous demand" under our requirements, but be limited to "peak hour demand" under the used and useful demonstration.

Q. Overall does the DEP have any major concerns with the rule as proposed?

A. No, generally we support the rule and are pleased that the PSC is moving to codify the 'Used and Useful' calculation by rule. We have worked with the PSC and its staff for over two years on this rule and submitted comments on two previous occasions. At this point, our only major comment that remains deals with the issue of use of 'peak hour' versus 'peak instantaneous' demand for small systems; and primarily for those small systems under 1000.

Q. Could you please elaborate on the issue of use of "peak hour" versus "peak instantaneous demand" for small systems, and you believe demand should be measured for small systems under 1000 population?

A. Small water systems that use hydropneumatic tanks and do not provide fire protection and that serve less than about 1000 persons must be designed from a somewhat different perspective than larger municipal water systems. Typically, these small systems have very limited, or no, assured water storage available to their distribution system, and they experience peak instantaneous water demands significantly greater than their peak-hour water demand. In fact, for these small systems, peak instantaneous demands might be 10 or more times their average daily water demand and 2 to 2.5 or more times their peak-hour demand. Because these small systems have very little, or no, assured storage available to their distribution system to meet peak instantaneous demands, these systems must have water source, treatment, and pumping facilities capable of meeting peak instantaneous demands. The ratio of the peak instantaneous demand to the peak-hour demand tends to decrease as a water system's service population increases and tends to approach 1.0 as a system's service population approaches about 1,000.

Q. Do you have anything further to add?

A. No, I do not.

DIRECT TESTIMONY OF DWIGHT T. JENKINS, ESQ., P.G.

Q. Would you please state your name and business address?

A. My name is Dwight T. Jenkins. My business address is 4049 Reid Street, Palatka, Florida, 32178.

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

A. I am employed by the St. Johns River Water Management District as the Director of the Division of Water Use Regulation.

Q. Would you please summarize your educational and professional experience?

A. I graduated from the University of Florida in 1981 with a Bachelor of Science degree in Geology. I received my Masters of Science degree in Geology from the University of Florida in 1983, and my Juris Doctor degree in 1994 from the University of Florida College of Law. I am a licensed Florida Professional Geologist and a member of The Florida Bar.

I began my professional employment as a hydrogeological consultant in 1984, and in 1986 I was employed by the St. Johns River Water Management District as the Manager of the District's Orlando office. In this capacity, I was responsible for overseeing that office's water use and compliance/enforcement programs. In 1997, I became Director of the District's Division of Water Use Regulation. My responsibilities include managing the District's water use water well regulatory programs which includes specific responsibilities for overseeing the District's consumptive use (i.e.,water use) permitting and compliance programs, formulation of District water use, compliance, enforcement and water shortage policies, directing staff reviews and processing of consumptive use water well permit applications, coordination with local government and the regulated public utilities, and testifying as an expert witness in administrative hearings.

Q. Would you please summarize the purpose of your testimony?

A. The purpose of my testimony is to do the following:

(a) Explain how public water supply utilities are permitted by Florida's water management districts (WMDs), focusing on the St. Johns River Water Management District;

(b) Discuss how the aquifer is affected by pumping at wells in various locations and circumstances, including whether the effects are the same if a withdrawal of the same quantity of groundwater occurs over twelve hours, eighteen hours, or twenty-four hours;

(c) Express an opinion on whether pumps should have "down time" in order for the aquifer to recharge in the pumping zones;

(d) Opine on whether the general usage pattern of most customers reflects a need for only twelve hours of pumping;

(e) Explain whether conservation has reduced (or can be reasonably expected to reduce) the amount of water used on a per customer or per ERC basis.

Q. Have you attached any exhibits to your testimony?

A. Yes. I have attached one exhibit to my testimony: Exhibit DTJ-1 contains my Curriculum Vitae.

Q. How do the water management districts permit water supply utilities?

A. The regulatory paradigm for issuing consumptive use permits (CUPs) in Florida consists of three layers: (1) the enabling statutory authority and mandates in Chapter 373, Florida Statutes (F.S.); (2) agency interpretation and implementation in title 40, Florida Administrative Code, (F.A.C.); and (3) each water management district's "user's manual," entitled Applicant's Handbook or Basis of Review, depending on the district.

While the programs are very similar from district to district, they are not identical, so one must review each district's rules to obtain an understanding of the detailed requirements in each district. Water utilities are permitted pursuant to the authority and requirements set forth in Part II of the Florida Water Resources Act, Chapter 373, F.S. Section 373.216, F.S., requires Florida's WMDs to implement a program for the issuance of permits authorizing the consumptive use of particular quantities of water covering those areas deemed appropriate by the governing board. Starting in the early 1970s, all five WMDs have implemented such programs.

The primary goals of the CUP programs are set forth in sections 373.219 and 373.016, F.S. Section 373.219 provides:

The governing board or the department may require such permits for consumptive use of water and may impose such reasonable conditions as are necessary to assure that such use is consistent with the overall objectives of the district or department and is not harmful to the water resources of the area.

In addition, section 373.016(d) provides that it is the policy of the Legislature "To promote the availability of sufficient water for all existing and future reasonable-beneficial uses and natural systems." The basic goal of this provision is to allow for allocation of water to meet all reasonable-beneficial needs while, at the same time, protecting and ensuring sustainability of water resources and natural systems. The regulatory standard interwoven throughout WMD rules is the prevention of "harm."

Section 373.223, F.S., sets out the basic requirements to obtain a CUP. Section 373.223(1) provides that "To obtain a permit pursuant to the provisions of this chapter, the applicant must establish that the proposed use of water:

(a) Is a reasonable-beneficial use as defined in s. 373.019;

(b) Will not interfere with any presently existing legal use of water; and

(c) Is consistent with the public interest.

The requirements above are typically referred to as the "three-prong test," and the WMDs have adopted comprehensive rules and technical requirements to implement it. WMD rules pertaining to CUP are set forth in chapter 40, F.A.C., and in each district's Basis of Review or Applicant's Handbook. The majority of WMD CUP requirements fall under the reasonable-beneficial use prong. "Reasonable-beneficial use" is a term of art that is defined in section 373.019(16) as "the use of water in such quantity as is necessary for economic and efficient utilization for a purpose and in a manner which is both reasonable and consistent with the public interest." Generally, in order to obtain a permit, an applicant must establish that the proposed use of water meets the following criteria.

Under the reasonable-beneficial use prong of the test , the applicant must:

- Demonstrate a need for the water (i.e. no "water banking");
- Establish that the source is suitable for the use;
- Show that neither environmental nor economic harm will occur;
- Implement all feasible water conservation;
- Use lower quality sources;
- Not cause saline water intrusion; and
- Not violate state water quality standards.

In addition, the other two prongs of the three-prong test require that the proposed use of water not interfere with existing legal uses and be consistent with the public interest. WMD rules set forth comprehensive criteria for each of the above requirements, and each type of use (for example, agriculture or public water supply) will have specific requirements.

Some additional information regarding CUPs:

- When evaluating whether a proposed use meets CUP requirements and whether the use will cause harm, the WMDs look at individual and cumulative impacts. That is, the WMDs look to see whether the proposed use of water alone will cause harm and whether all existing uses put together will cause harm.
- WMD rules allow permits to be requested and issued for many different types of uses including public water supply, commercial/industrial purposes and agriculture.
- CUP regulates the entire "use cycle" associated with a given water use. For example, the withdrawal of water from the resource, its use by the permittee, and the ultimate discharge are all covered under the permit.
- All uses of water, except one, are regulated by the CUP provisions of chapter 373. The statute exempts only self-supplied domestic use. In addition, the WMDs have adopted rules exempting from permitting many other uses that are either regulated by another permitting program or have very little potential for causing harm.
- WMDs regulate all waters in the state. This includes ground, surface, storm, and reclaimed water, as well as seawater.
- Water in Florida belongs to the State of Florida. The only ownership right an entity has is a "usuary" right pursuant to Florida's regulatory requirements. An entity has a right to use water only if it is doing so in accordance with Florida's regulatory requirements.
- CUPs are issued with finite permit durations. These durations range from very short (less than 1 year) up to 20 years and are based on the applicant's

demonstration that the proposed use of water will meet CUP requirements. When a CUP expires, the permittee must apply for a renewal of the CUP and demonstrate that the use of water will meet all permitting requirements in existence at the time of renewal.

- CUPs are issued with "limiting conditions" that govern the water use. Generally, limiting conditions either prohibit actions (e.g., using more water than allocated) or mandate actions (e.g., hydrologic monitoring). CUPs for large water users such as public water supply utilities may contain 40 or more conditions.

The consumptive use of water by public utilities is permitted under the regulatory scheme described above. To obtain a CUP, a public utility must demonstrate it meets all applicable CUP requirements included in the three-prong test. When a utility demonstrates it meets these requirements, a permit will be issued for a duration (up to 20 years) based on the applicant's demonstration that the proposed use meets WMD requirements. The permit will contain numerous limiting conditions that govern how the water is used.

Some of the typical limiting condition requirements placed on public water supply permits include the requirements to:

- Implement a water conservation plan;
- Provide reclaimed water to users such as residential irritation users, golf courses and agricultural projects;
- Perform hydrologic monitoring;
- Develop and use alternative water supplies; and
- Submit five-year compliance reports pursuant to section 373.236(4), F.S.

Q. Can you explain how the aquifer is affected by pumping in various circumstances? For example, is the aquifer affected by the amount of continuous pumping each day, i.e., 12 hours, 16 hours, or 24 hours a day?

A. To fully answer those questions, I would need to discuss very technical aspects of ground and surface water hydraulics and hydrology. Instead, and for the purposes of this PSC proceeding, I have attempted to provide a basic, less technical explanation below.

How an aquifer is affected by pumping is primarily a function of four things. These are the:

- Hydraulic aspects of the aquifer;
- Design of the wells and wellfield;
- Volume of water being withdrawn; and
- Rate of withdrawal.

When a well is pumped in Florida, it creates a three dimensional "cone of drawdown" in the aquifer. This cone of drawdown reduces the potentiometric pressure in an artesian aquifer (such as the Floridan Aquifer) and can also lower water levels in water table aquifers (such as the Surficial Aquifer). Lower aquifer pressure and water levels generally result in a change and increase in recharge into the aquifer. The change in recharge can occur from above, beside and/or below the aquifer zone being pumped. Lowering of water levels and change in recharge can cause undesirable impacts or harm to water resources. However, it does not always cause undesirable impacts or harm. Actually, because of consumptive use regulation and permitting, withdrawals are managed such that they rarely cause such impacts or harm.

The potential for undesirable impacts or harm due to the pumping of ground water is a function of many factors. Examples of undesirable impacts or harm that can be caused by the lowering of water levels and a change in recharge due to pumping include:

- lowering of water levels in lakes and wetlands, resulting in loss of habitat;
- reduction in spring flows, resulting in loss of habitat;
- saline water intrusion, reducing the usability of the water resource;
- increased sinkhole formation, which can cause personal and economic damage; and
- interference with existing legal uses of water, impairing the ability of a water user to access the water resource.

As discussed above, when a well is pumped, a cone of drawdown is created. The cone "grows" in the aquifer, starting from when the well pump is turned on and will increase in size until the volume of water that is being withdrawn is offset by increased recharge. When the cone stops growing, hydrologists refer to it as "reaching steady state conditions." In Florida, localized steady state conditions are typically reached quickly, i.e., in a matter of hours or days after a well starts pumping, although a true steady state can take years to achieve. The quickness with which localized steady state conditions can be reached in Florida is an important factor in the discussion of whether operating wells for shorter or longer periods helps avoid harm that can be caused by pumping.

Another important aspect of this topic is the role of cumulative drawdowns. Most concerns associated with ground water withdrawals in Florida are due to the cumulative withdrawals by multiple permittees, not withdrawals from a single well or well field. For example, the concerns associated with large-scale environmental impacts in central Florida are due to cumulative withdrawals in the region.

Q. Is there a benefit from operating wells for shorter periods of time instead of longer periods?

A. The answer to this question depends on many factors. However, because steady state conditions are reached very quickly in Florida and because impacts of concern result primarily from regional cumulative withdrawals, management of these impacts is typically a function of regulating long term withdrawals. In evaluating whether a proposed withdrawal will cause harm to lakes, wetlands and spring flows, the WMDs generally look at the volume of water that will be used in a single month, or more commonly, each year. However, since some impacts such as localized environmental harm, interference and upconing saline water intrusion can be caused by short periods of high volume pumping, shorter pumping periods have to be evaluated in cases where these impacts are a concern.

The bottom line is that there is typically no benefit to operating wells or a well field for a period of 12 hours versus 24 hours in Florida since localized steady state drawdown conditions are quickly reached and impacts are often caused by regional cumulative withdrawals. However, in some cases, such as where there are localized resource impacts, interference with existing legal uses, or saline water intrusion, short-duration operation of wells can be used to avoid or minimize the impacts. More importantly, shifting withdrawals from one well to another may be more beneficial in addressing such impacts since doing so moves withdrawals away from the point of concern.

Q. In view of that testimony, do you have an opinion as a professional geologist on whether public water supply pumps should have "down time" each day so that the aquifer can recharge in the pumping zones?

A. Yes, the general answer to this question is that pumps may need downtime in specific cases to avoid harms such as localized resource impacts, interference with existing legal uses or saline water intrusion. However, it is more important to regulate longer term withdrawals of water, to prevent harm.

I think another way to ask and answer this question is "Do we need to manage or regulate individual and cumulative withdrawals of ground water in order to prevent harm to the environment and water resources due to short and long term pumping?" And the answer is absolutely yes!

Q. For the purposes of the PSC's proposed rule, is it reasonable to base firm reliable capacity on a duration of well pumping that is less than 24 hours?

A. Yes, it is reasonable. It is important that a water supply utility have the ability under PSC rules to install additional pumps and wells so that they have withdrawal capacity above what is needed to meet typical water user demands. Although it is very specific to the particular utility, utilities will typically have an installed withdrawal capacity of at least 120% of their peak day water demand. In some cases, the amount of "redundant" installed withdrawal capacity needed can be much higher. The reason for the additional installed capacity is that wells often do need to be taken off-line for short, and sometimes, long periods of time. When a well is off-line, water demands will need to be met via withdrawals from other wells. Examples of why wells go, or are taken, off-line include:

1. Standard maintenance and replacement of pump hardware;
2. Unanticipated pump and/or well failure;
3. Distribution system problems that isolate a well or wellfield;
4. Water quality/contamination in a well or wellfield
5. Shifting withdrawals to avoid unacceptable water resource impacts (ex. To avoid saline water upconing); and
6. Shifting withdrawals to avoid interference with other existing legal uses of water.

Well operation of a multiple-wellfield water supply utility can be complex. A typical system will have wells that are operated almost continuously to provide a base flow (this is acceptable in areas where continuous withdrawal does not cause resource harm), wells that are operated intermittently to augment the base flow to meet peak demands, wells that allow for shifting of withdrawals if such are needed to address well-specific impact concerns and back-up wells that may only be occasionally operated when other wells are not available or during emergencies. While it may appear unwarranted to the layperson, having all this additional installed capacity is necessary in order to provide reliable service.

The bottom line is that, it is reasonable to base firm reliable capacity on something less than an assumption that all wells will be pumped 24 hours a day, 7 days a week since the wellfield taken as a whole cannot operate this way.

Q. Explain whether conservation has reduced (or can be reasonably expected to reduce) the amount of water used on a per customer or per ERC basis.

A. Review of historical water use information throughout the state of Florida has shown that implementation of water conservation measures has and will result in the reduction of the amount of water used by residential and other water users. In some cases, it is anticipated that water use can be reduced by 15% or more in some utility service areas. The ability to reduce water use is a function of many factors including the degree of discretionary use, current water use inefficiency, and cultural/social interest in conserving. However, it should be noted that there is a limit to the ability to reduce water use through conservation in Florida. While conservation, alone, will not be sufficient to meet long term water demands in most areas, water conservation will help address water needs while alternative water supplies are being developed.

Q. Does that conclude your testimony?

A. Yes.

MS. GERVASI: Staff then calls Mr. Richard Redemann to the stand. Oh, he is already there.

Mr. Redemann, have you been sworn?

THE WITNESS: Yes, I have.

MS. GERVASI: Thank you.

RICHARD P. REDEMANN, P.E.

was called as a witness on behalf of the Staff of the Public Service Commission, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MS. GERVASI:

Q Could you please state your full name for the record?

A Richard Paul Redemann, P.E.

Q Have you submitted prefiled Direct Testimony in this case consisting of 38 pages?

A Yes.

Q Do you have any changes to make to that prefiled testimony?

A No.

Q If I were to ask you the same questions as contained in your prefiled Direct Testimony today, would your answers be the same?

A Yes, they would.

MS. GERVASI: I would like to request that the prefiled Direct Testimony of Mr. Redemann be inserted into the record as though read.

CHAIRMAN CARTER: The prefiled testimony will be accepted into the record as though read.

MS. GERVASI: Thank you.

DIRECT TESTIMONY OF RICHARD P. REDEMANN, P.E.

Q. Please state your name and business address.

A. Richard P. Redemann, Florida Public Service Commission, 2540 Shumard Oak Blvd., Tallahassee, FL 32399.

Q. Please give a brief description of your educational background and experience.

A. I received a B.S. Degree in Civil Engineering from the University of Wisconsin-Platteville, Platteville, WI, in May 1984. From June 1984 to present, I have worked for the Florida Public Service Commission (FPSC or Commission). Prior to my work at the Commission, I worked for the Wisconsin Department of Transportation in the summers in 1980 and 1982 through 1983. In May through November of 1981, I worked for an engineering testing lab in Appleton and LaCrosse, WI. A copy of my resume is attached. (EX__ RPR-1)

Q. What is your current position at the Commission?

A. I am a Professional Engineer III.

Q. Are you licensed as a Professional Engineer under Chapter 471, Florida Statutes (F.S.)?

A. Yes, I am currently licensed as a Professional Engineer in the State of Florida. I have been licensed as a Professional Engineer since 1989.

Q. What are your general responsibilities at the Commission?

A. I review, analyze, and make recommendations regarding the engineering aspects of original and grandfather certificates, transfers, amendments, rate cases, and overearnings cases for water and wastewater utilities. I also review and make recommendations on territorial agreements for electric and gas utilities. I have prepared and presented expert testimony concerning quality of service and used and useful issues before the Commission.

Q. How many cases have you testified in before the Commission?

A. I testified in Docket No. 860149-WU, (Application of Sunnyland for a rate increase) and in Docket No. 020071-WS, (Application for rate increase in Marion, Orange, Pasco, Pinellas, and Seminole Counties by Utilities, Inc. of Florida). I also filed testimony in Docket No. 060368-WS (Application for increase in water and wastewater rates in Alachua, Brevard, Highlands, Lake, Lee, Marion, Orange, Palm Beach, Pasco, Polk, Putnam, Seminole, Sumter, Volusia and Washington Counties by Aqua Utilities Florida, Inc.), Docket No. 940761-WS (Request for approval of special service availability contract with Lake Heron in Pasco County by Mad Hatter Utility, Inc.), Docket No. 850206-WS (Application of Ussepa Island Utilities, Inc. for interim and permanent rate increase in Lee County), Docket No. 860544-SU (Investigation of rates of Rookery Bay Utility Company in Collier County for possible overearnings), and Docket No. 861441-WS (Investigation into the earnings of Mangonia Park Utility Company, Inc. for 1985).

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

A. The purpose of my testimony is to provide evidence as to the appropriate methodology for calculating the used and usefulness of water systems in rate making proceedings and to support the proposed rule and offer certain alternative language to the proposed rule.

Q. What information have you relied on in preparing your testimony?

A. I reviewed a number of American Water Works Association (AWWA) Manuals and a Committee Report related to water distribution system design, groundwater, and unaccounted for water; the AWWA Water Distribution Systems Handbook; the Recommended Standards for Water Works; the U.S. Army Corps of Engineers Design of Small Water Systems Manual; portions of the Department of Environmental Protection (DEP) rules related to the design and permitting of water systems; and some of the consumptive use permit (CUP) and water conservation rules for three of the five Water Management Districts (WMDs) in Florida.

Q. Can you describe the basis for the recommended methodology in the proposed rule for determining the used and usefulness of water systems?

A. Yes. Utility systems should be designed prudently, with economies of scale in mind (See proposed Rule 25-30.4325(2), EX__ RPR-2.); however, existing customers should not be required to pay for future growth in excess of the statutory requirement (Section 367.081(2)(a)2., F.S.). A used and useful adjustment is made to reduce rate base and expenses if the Commission determines that a portion of those costs should not be passed on to existing rate payers. Section 367.081(2)(a)1., F.S., states that "[t]he commission shall, either upon request or upon its own motion, fix rates which are just, reasonable, compensatory, and not unfairly discriminatory. In every such proceeding, the commission shall consider the value and quality of the service and the cost of providing the service, which shall include, but not be limited to, debt interest; the requirements of the utility for working capital; maintenance, depreciation, tax, and operating expenses incurred in the operation of all property used and useful in the public service; and a fair return on the investment of the utility in property used and useful in the public service." Rule 25-30.432, Florida Administrative Code (F.A.C.), contains the method for determining the used and usefulness of wastewater treatment plants. Staff's proposed rule for determining the used and usefulness of water treatment systems is proposed Rule 25-30.4325, Water Treatment Plant Used and Useful Calculations. (EX__ RPR-2).

Q. What other criteria should be considered in developing a used and useful rule for water systems?

A. Section 367.111(2), F.S., provides that each utility shall provide safe, efficient, and sufficient service which is consistent with the approved engineering design of the system and the reasonable and proper operation of the utility in the public interest. Ch. 62-555, F.A.C., of the DEP rules contains the minimum design criteria for water systems; however, DEP witness Hoofnagle has provided testimony indicating that DEP would support a utility's decision to design and construct wells, treatment, and storage facilities that are larger than these minimum criteria.

Q. Can you describe the reason for the proposed rule?

A. Yes. Over the years, a number of different methods for calculating used and useful for water systems have been used. As a result, substantial amounts of staff, utility, consultant, and ratepayer advocate time has been spent litigating the used and useful percentage for each case. This litigation results in substantial rate case expense, which is ultimately passed on to the utility's ratepayers. In 2003, the Commission concluded a rate proceeding by Order No. PSC-03-1440-FOF-WS, issued in Docket No. 020071-WS, issued December 22, 2003 which included testimony from various parties, as well as staff. I filed testimony in that proceeding which summarized the Commission's policy at that time on used and useful calculations for water treatment systems. The proposed rule is designed to codify the Commission's current policy on used and useful calculations for water treatment systems.

Q. What is the basic formula used to calculate the used and usefulness of a water treatment plant?

A. The sum of the peak demand less excessive unaccounted for water plus a growth allowance and fire flow, if provided, is divided by the firm reliable capacity of the wells to determine the used and usefulness of a water treatment plant. (See proposed Rule 25-30.4325(1)(c) and (5), EX__ RPR-2).

Q. How should the peak day demand be determined?

A. The peak day demand is the single maximum day demand in the test year. However, if there is an unusual occurrence on that day, such as a fire, then the average of the five highest days in a 30 day period in the test year, excluding the day(s) with the unusual occurrence should be used. (See proposed Rule 25-30.4325(7), EX__ RPR-2.) A peak day during which there was a fire (or some other unusual occurrence like a line break) should not be used, because the formula includes a separate element for fire flow. The peak day(s) are determined from the utility's DEP monthly operating reports.

Q. Are there other considerations regarding peak demand for systems with little or no storage?

A. Yes. Water systems with little or no storage capacity must be able to meet the peak hour demands on the system. Most water utilities experience a peak demand in the morning when customers are first waking up and again in the late afternoon when customers are coming home from work and cooking the evening meal. If storage capacity is available, the utility can meet the peak demand periods by relying on water stored in elevated or ground storage tanks that are filled during off peak hours. If the system does not have storage, then the utility must meet the peak demand periods from its well capacity. However, most water utilities do not record water usage on an hourly basis; they maintain records of daily water flows.

Q. How is the peak hour demand determined?

A. The peak hour demand is estimated by dividing the peak day demand by 1440 minutes, which represents the average demand on that peak day in gallons per minute, and then multiplying that amount by a peaking factor. (See proposed Rule 25-30.4325(7)(a), EX__ RPR-2.)

Q. What peaking factor should be used to estimate peak hour flows for water systems?

A. According to the American Water Works Association (AWWA) Manual of Water Supply Practices, Distribution Network Analysis for Water Utilities (M32), the ratio of peak hour demand has been observed to vary from 1.3 - 2.0 times the maximum day demand. (EX__ RPR-3)

Q. Why is a peak hour factor of 2 used in the proposed rule?

A. This method has been used by the Commission in numerous rate cases. By Order No.

PSC-96-1320-FOF-WS, issued on October 30, 1996, in Docket No. 950495-WS, the Commission approved used and useful calculations based on the use of estimated peak hour flows for systems that did not have storage capacity. A peaking factor of 2 was applied to the maximum day demand to estimate the peak hour demand. Although that case was appealed to the First District Court of Appeal on certain issues, the parties did not appeal the use of a peak hour calculation for systems without storage. Southern States Utilities., Inc. v. FPSC, 714 So. 2nd 1046 (1st DCA 1998). There are many other Orders in which the Commission applied a peaking factor of 2, including in Order No. PSC-05-0442-PAA-WU, issued April 25, 2005, in Docket No. 040254-WU (Keen); Order No. PSC-06-0378-PAA-WU, issued May 8, 2006, in Docket No. 050449-WU (Dixie Groves); and Order No. PSC-07-0425-PAA-WU, issued May 15, 2007, in Docket No. 060599-WU (Pasco Utilities, Inc.).

Q. Do you agree with OPC's proposed rule language regarding the use of a range of peaking factors to estimate peak hour flows?

A. No. The purpose of the rule is to simplify and standardize the used and useful formula. OPC's proposed rule language provides that "consideration shall be given to the size and character of the system service area" and refers to "larger systems with a diverse customer base" and "smaller systems with a uniform customer base." These criteria do not give a clear indication of the appropriate factor within the range to be used. In addition, a peaking factor of 2 reflects an allowance for a higher level of quality of service. Even with a peaking factor of 2, many water systems have low pressure problems, and additional plant or line facilities are needed to increase water pressure and the quality of service.

Q. Do you agree with OPC's proposed rule language defining peak demand for a water treatment system?

A. No. OPC's proposal to exclude fire flow from peak demand, unless the maximum day demand with no peaking factor is used, is not consistent with sound engineering design.

OPC's proposal is based on DEP permitting rules regarding the minimum capacity a system must have in order to be permitted. As previously noted, witness Hoofnagle states that DEP would support a utility's decision to design facilities that are larger than these minimum criteria.

Q. How should the utility's current demand be determined for water systems that do not have adequate DEP monthly operating reports (MORs) with a record of daily master metering readings?

A. For systems that do not have adequate DEP MORs with a record of daily master metering readings, the current demand should be estimated based on a peak hour design criteria of 1.1 gallons per minute per equivalent residential connection (ERC). The assumption is that the system should be designed to provide at least 1.1 gallons per minute of water for each ERC in a peak hour. This is consistent with the assumptions of the AWWA M32 manual regarding average to peak hour flows. (See proposed Rule 25-30.4325(7)(a), EX__ RPR-2.)

Q. Has the Commission approved used and useful calculations using an estimated peak hour demand of 1.1 gallons per minute per residential connection for other water systems that do not have a record of daily flows?

A. Yes. This method has been used by the Commission in cases such as in Docket No. 020406-WU, by Order No. PSC-03-0008-PAA-WU, issued January 2, 2003 (Pinecrest Ranches, Inc.).

Q. What is unaccounted for water?

A. The difference between the amount of water produced (or purchased) and the amount sold to customers or documented as being used for fire fighting, testing, or flushing or resulting from documented line breaks is referred to as unaccounted for water. Unaccounted for water is typically the result of unmetered usage, faulty meters, and leaks in the water system.

Q. Why isn't the water used for fire fighting, testing, flushing, or the amount of water lost through line breaks considered to be unaccounted for water?

A. Some water is used by the utility to flush its distribution system, service lines, mains, hydrants, and tanks to properly maintain the system. Water loss can also occur when lines break during construction. The utility is required to maintain records of the amount of water used to maintain the system or lost through line breaks. The fire department should measure or estimate the amount of water used for firefighting or testing and report the usage to the utility. If water used for maintaining the system or lost through line breaks is properly documented, then it should not be considered unaccounted for usage.

Q. Why is unaccounted for water a concern?

A. Water is a limited natural resource that must be conserved to assure adequate supply; therefore, water utilities should be taking reasonable steps to avoid excessive losses. It is Commission practice to allow 10% of the total water produced or purchased as acceptable unaccounted for water. Excessive unaccounted for water is removed from the peak demand in calculating used and useful. In addition, the chemical and electrical expenses and purchased water costs associated with unaccounted for water in excess of 10% should be adjusted so that rate payers do not bear those costs. The Commission has also required utilities to take corrective action to reduce the excessive unaccounted for water, if economically feasible. (See proposed Rule 25-30.4325(1)(e), EX__ RPR-2.)

Q. Why is unaccounted for water over 10% considered an excessive amount?

A. This has been a long-standing Commission practice. In addition, I reviewed several AWWA publications and WMD rules related to consumptive use permits and water conservation, which support 10% as a reasonable amount of unaccounted for water. Page 31 of the AWWA M32 Manual states that "[t]he percentage of unaccounted-for water can vary widely from system to system. Values ranging from 4-30 percent of the total accounted-for consumption are found, although 10-15 percent may be more prevalent. The percentage can also vary from year to year in the same system. The higher values generally are associated with older systems, in which leakage, no meters or faulty meters are more common place than in newer systems. Systems operating at high pressures usually will experience a high loss percentage." (EX__ RPR-3) The St. Johns River WMD Rule 12.2.5 on Water Conservation Plans requires utilities applying for a public supply water use permit to perform a meter survey. If the initial unaccounted for water is 10% or greater, the utility may need to initiate a meter change-out program and must complete a leak detection evaluation. (EX__ RPR-4) The Southwest Florida WMD Water Use Permit handbook requires water systems in the Northern Tampa Bay Water Use Caution Area (Pasco, Pinellas and Northern Hillsborough Counties) and the Southern Water Use Caution Area (Southern Hillsborough, Manatee, Sarasota, Charlotte, Desoto, Hardee, Highlands and Polk Counties) to take remedial action if the annual report reflects greater than 12% unaccounted for water. For water systems that are not in a Water Use Caution Area, applicants with unaccounted for use greater than 15% may be required to address the reduction of such use through better accounting or reduction of unmetered uses of system losses. (EX__ RPR-5) The Northwest Florida WMD considers 10% a reasonable amount of unaccounted for water. That WMD does not have a specific rule, but relies on a "reasonable and beneficial" test prescribed by Statute.

Q. Should an adjustment be made for unaccounted for water for systems with unaccounted for water in excess of 10%?

A. For those water systems that have over 10% unaccounted for water, if the utility has performed a water audit and is in the process of reducing the amount of water loss, no adjustment to expenses is needed because the cost the company will incur to correct the problem will likely exceed the expenses that would be removed. Also, for those systems that have slightly over 10% unaccounted for water, the adjustment on such small amounts of unaccounted for water would be immaterial. For those water systems with unaccounted for water in excess of 10% where the utility has not taken steps to reduce the water loss, a reduction in peak demand and chemical and electrical expenses and purchased water should be made. In addition, the utility should investigate the source of the water loss and reduce the amount of unaccounted for water if it has not done so already. (See proposed Rule 25-30.4325(1)(e) and (10), EX__ RPR-2.)

Q. Should a growth allowance be included in the used and useful calculation?

A. Yes. Pursuant to Section 367.081(2)(a)2., F.S., a growth allowance must be included in the used and useful calculation for plant needed to serve new customers for five years after the end of the test year, not to exceed 5% per year. Rule 25-30.431, F.A.C., contains the criteria for a growth allowance.

Q. Should fire flow be included in the used and useful calculation?

A. Yes. For water systems where there is a requirement by the local city or county government to provide fire flow, the used and useful calculation should include the required fire flow. If fire flow is provided but is not mandated by the local government, 500 gallons per minute for 2 hours should be included in the used and useful calculation, unless the utility can demonstrate that a greater amount is provided. (See proposed Rule 25-30.4325(1)(c) and (d), EX__ RPR-2.)

Q. Do you agree with OPC's proposed rule language which would include an allowance for fire flow, if provided?

A. No. Fire hydrants are designed by professional engineers and approved by the DEP to provide fire protection. The Commission has consistently recognized the need for fire flow protection and considered it in the determination of used and useful. While hopefully fires do not occur frequently, I believe it is important to allow the utility to include fire flow in its used and useful calculation if there is a local requirement to provide fire flow and fire hydrants exist in the service area. This is consistent with Order No. PSC-96-1320-FOF-WS, issued October 30, 1996, in Docket No. 950495-WS (Southern States Utilities, Inc.), in which the Commission found that, while the Commission does not test fire hydrants or require proof that hydrants are functional or capable of the flows requested, an investment in plant should be allowed.

Q. How should firm reliable capacity be determined for those water systems that have more than one well and are not built out? (See proposed Rule 25-30.4325(6), EX__ RPR-2.)

A. For systems that have more than one well and are not built out, Commission practice has been to remove the largest well and base the capacity on the remaining well(s). This is known as the system's firm reliable capacity. The assumption is that the largest well should be removed to recognize that the utility must be able to meet its demand when one of the wells is out of service. This is consistent with the Recommended Standards for Water Works. Paragraph 3.2.1.1 Source Capacity, states that "[t]he total developed groundwater source capacity...shall equal or exceed the design maximum day demand with the largest well out of service." And paragraph 6.3 Pumps, states that "[a]t least two pumping units shall be provided. With any pump out of service, the remaining pump or pumps shall be capable of providing the maximum pumping demand of the system." (EX__ RPR-6)

Q. Has the Commission approved used and useful calculations for water systems based on firm reliable capacity?

A. Yes. This practice has been accepted by the Commission in Order No. PSC-02-0656-PAA-WU, issued May 14, 2002, in Docket No. 992015-WU (Sunshine Utilities of Central Fla., Inc.); Order No. PSC-96-1320-FOF-WS, issued October 30, 1996, in Docket No. 950495-WS (Southern States Utilities, Inc.); Order No. PSC-93-0423-FOF-WS, issued March 22, 1993, in Docket No. 920199-WS (Southern States Utilities, Inc., and Deltona Lakes

Utilities); and Order No. PSC-02-1449-PAA-WS, issued October 21, 2002, in Docket No. 011451-WS (Plantation Bay Util. Co.).

Q. What is the function of a water storage tank?

A. Storage tanks are used to provide reserve supply for operational equalization and fire suppression. With storage, variations in water quality, quantity, and system pressure will be improved.

Q. How should the utility's firm reliable capacity be determined for water systems that have storage capacity?

A. For systems with ground or elevated storage, the firm reliable capacity of the water system should be based on the capacity of the well(s), with the largest removed from service, and with the remaining well(s) operating 12 hours per day. The assumption is that the wells should have some down time to allow the aquifer to recharge. It is environmentally responsible and prudent to rest a well for 12 hours per day so that the ground water can recharge. Excessive pumping has caused wells to draw air, sand and gravel into the water system; saltwater intrusion; land subsidence; and collapsed wells. The use of 12 hours per day of pumping also reflects the general usage pattern of customers. (See proposed Rule 25-30.4325(6)(b), EX__ RPR-2.)

Q. Has the Commission previously used a 12-hour day to determine well capacity?

A. Yes. This practice has been accepted by the Commission in numerous rate cases, including Order No. PSC-02-1449-PAA-WS, issued October 21, 2002, in Docket No. 011451-WS (Plantation Bay Util. Co.); Order No. PSC-02-0656-PAA-WU, issued May 14, 2002, in Docket No. 992015-WU (Sunshine Utilities of Central Fla., Inc.); Order No. PSC-01-1574-PAA-WS, issued July 30, 2001, in Docket No. 000584-WS (Laniger Enterprises of America, Inc.); Order No. PSC-00-1774-PAA-WU, issued September 27, 2000, in Docket No. 991627-WU (Park Water Co., Inc.); Order No. PSC-01-2385-PAA-WU, issued December 10, 2001, in

Docket No. 010403-WU (Holmes Utilities, Inc.); and Order No. PSC-96-1320-FOF-WS, issued October 30, 1996, in Docket No. 950495-WS (Southern States Utilities, Inc.).

Q. How do you recommend that used and useful be calculated for storage tanks?

A. The used and useful calculation for storage should be made by dividing the peak demand by the useable storage of the storage tank. Useable storage capacity less than or equal to the peak demand should be considered 100 percent used and useful. (See proposed Rule 25-30.4325(1)(d), (8), and (9), EX__ RPR-2.)

Q. Has the Commission recognized that one full day of storage may be needed for a system in prior cases?

A. Yes. See Order No. PSC-97-0847-FOF-WS, issued July 15, 1997, in Docket No. 960329-WS (Gulf Util. Co.).

Q. Are there standards for sizing of storage tanks?

A. The AWWA Water Distribution Systems Handbook and the U. S. Army Corps of Engineers Design of Small Water Systems Manual each recommend guidelines for storage capacity. The AWWA Water Distribution Systems Handbook states that the principal function of storage is to provide reserve supply for operational equalization, fire suppression reserves, and emergency needs. Operational storage is to make up the difference between the consumers' peak demands and the system's available supply. The volume of operational storage required is a function of demand fluctuation in a community and is commonly estimated at 25 percent of the total maximum day. Fire storage needs vary significantly by community. Emergency storage is the volume of water recommended to meet demand during emergency situations, such as source of supply failures, major transmission main failures, pump failures, electrical power outages, or natural disasters. The Department of the Army's Design of Small Water Systems Manual states in Section 4-3c that "distribution storage facilities are used to meet peak demands (including fire flows), allow continued service when the supply is interrupted, equalize system pressures, eliminate continuous pumping, and facilitate the use of economical pipe sizes...[D]epending upon system size and type, distribution storage volume may vary from about one-half the average daily use, to the maximum daily use, to a 2- or 3-day supply." (EX __ RPR-7) Florida has frequent fires, lightning, hurricanes, and floods which can cause power outages for an extended period of time or well contamination. The only source of water would be the amount in the ground or elevated storage tanks.

Q. Do you agree with OPC's proposed rule language defining peak demand for storage?

A. No. OPC's proposal to include only 25% of the utility's maximum day demand for storage is based on DEP Rule 62-555.320, F.A.C., which contains the minimum criteria for designing storage capacity.

Q. Do you agree with OPC's proposal to evaluate used and useful for high service pumps and storage tanks separately?

A. No. High service pumps should not be evaluated separately from storage. The cost of high service pumps is minimal compared to the cost of storage. If a party to a proceeding believes that a separate evaluation should be made for high service pumps, the alternative calculation provision in the proposed rule may be used.

Q. Should the hydropneumatic tank be included in the storage calculation?

A. No. The hydropneumatic tank is designed to maintain pressure in the water distribution system. Once the pressure drops it must be refilled from the well or storage tank and high service pumps. (See proposed Rule 25-30.4325(8), EX __ RPR-2.)

Q. How should the utility's firm reliable capacity be determined for water systems that have no storage capacity?

A. For systems with no storage, the firm reliable capacity should be based on the gallons per minute capacity of the well(s), with the largest well removed from service. (See proposed

Rule 25-30.4325(6)(a), EX __ RPR-2.)

Q. What if the systems are built out?

A. The used and useful formula is for systems with potential growth in the service territory. If the utility's service territory is built out and there is no apparent potential for expansion in the surrounding area, the system should be considered 100% used and useful if it appears that the system was designed prudently. (See proposed Rule 25-30.4325(4)(b), EX __ RPR-2.)

Q. Has the Commission previously found utility water systems to be 100% used and useful if the utility's service territory is built out and there is no apparent potential for expansion in the surrounding area?

A. Yes. In Order No. PSC-98-0130-FOF-WS, issued January 26, 1998, in Docket No. 970633-WS (Paradise Lakes Util., Ltd.); Order No. PSC-99-0243-FOF-WU, issued February 9, 1999, in Docket No. 980726-WU (Dixie Groves Estates, Inc.); Order No. PSC-00-0807-PAA-WU, issued April 25, 2000, in Docket No. 991290-WU (Brendenwood Water System); and Order No. PSC-96-1320-FOF-WS, issued, October 30, 1996, in Docket No. 950495-WS (Southern States Utilities, Inc.).

Q. How should used and useful be calculated for water systems with only one well?

A. For systems with only one well, the system should be considered 100% used and useful unless it appears that the well is oversized. As with any used and useful calculation, prudence and economies of scale are always considered. Commission rules and statues require the Commission to evaluate quality of service in rate cases, including the operational condition of the utility's plant and facilities and the utility's attempt to address customer satisfaction. With one well systems, the reliability is poor and the result can be poor customer satisfaction. Over time, the one well system will fail or need repair, which will require it to be out of service. I believe from a quality of service standpoint one well should be 100% used and useful. (See proposed Rule 25-30.4325(4)(c), EX __ RPR-2.)

Q. Has the Commission found water utilities with only one well to be 100% used and useful in other cases?

A. Yes. This practice has been accepted by the Commission in many cases including Docket No. 991290-WU, by Order No. PSC-00-0807-PAA-WU, issued April 25, 2000, (Brendenwood Water System), and in Docket No. 950495-WS, by Order No. PSC-96-1320-FOF-WS, issued October 30, 1996 (Southern States Utilities, Inc.).

Q. Can you please summarize your testimony?

A. A rule to address the amount of used and useful water facilities to be included in a water utility's rate base must be broad enough to address a wide range of issues concerning the size, age, and types of treatment while balancing utility and customer concerns. Minimum design criteria must be weighed against economies of scale. I believe that staff's proposed rule generally meets those criteria. However, there are three sections of the proposed rule that could be revised to clarify the intent of those provisions. Exhibit RPR-8 contains a matrix showing the proposed rule and the changes that the Commission may want to consider.

Q. Do you agree with OPC and the industry regarding moving the provisions in section (11) of the proposed rule to section (2)?

A. Yes. This rule generally addresses the utilities filing requirements for a rate proceeding. Moving the provisions of section (11) to section (2) clarifies and consolidates some of the factors the Commission considers in evaluating used and useful plant.

Q. Do you agree with OPC's proposal to move alternatives and limiting factors found in several other sections of the rule to section (3)?

A. Yes. Section (3) of the proposed rule addresses, in part, alternative used and useful calculations. OPC's proposal to move alternatives and limiting factors found in sections (6) and (11) of the rule, such as service area restrictions, treatment capacity, and well draw down limitations, to section (3) provides additional clarification and consolidation of the rule language. The new language allows any party to a proceeding, not just the utility, or the Commission staff to propose and justify an alternative calculation.

Q. Do you agree with Aqua Utilities, Inc.'s witness Guastella's proposal to revise the language regarding unaccounted for water?

A. I agree in concept with that change. Witness Guastella proposes that the alternative language in Rule 25-30.4325(1)(e) should read "Excessive unaccounted for water (EUW) is finished potable water produced (delivered to the system) that exceeds 10% of that production quantity." The proposed rule could be changed for clarification purposes to read "Excessive unaccounted for water (EUW) is unaccounted for water in excess of 10 percent of the amount produced."

Q. Do you have anything further to add?

A. No. I do not.

BY MS. GERVASI:

Q Mr. Redemann, did you prefile or cause to be prefiled Exhibits RPR-1 through RPR-8 along with your prefiled testimony?

A Yes.

Q Do you have any changes to make to any of your prefiled exhibits?

A Yes. I have one correction to make in two places on my prefiled Exhibit RPR-8. I have prepared a corrected exhibit.

CHAIRMAN CARTER: Hang on one second. That is RPR-8?

THE WITNESS: RPR-8, which has been handed out to the parties and the Commission.

CHAIRMAN CARTER: Okay.

THE WITNESS: The correction is as follows on Exhibit RPR-8, Page 3 of 5, the middle column, Paragraph (7)(a). I have replaced the words "change '30-day period' to 'maximum month'" to "no change recommended." Also on Exhibit RPR-8, Page 4 of 5, middle of the column, Paragraph (7)(b), I replaced the words "change '30-day period' to 'maximum month'" to "no change recommended."

BY MS. GERVASI:

Q Thank you. Does that conclude the changes to your prefiled exhibits?

A Yes.

Q Have you prepared a brief summary of your testimony?

A Yes, I have.

Q Could you please present that to the Commission at this time?

A Yes. Over the years, a number of different methods have been used to calculate water treatment plant used and useful. This has resulted in a substantial amount of staff, utility, and ratepayer advocate time and litigation. The litigation results in substantial rate case expense, which results in higher rates.

In 2003, in Docket 020071-WS, which was a rate case for Utilities, Inc. of Florida, I testified to the Commission's policy at that time on the water treatment plant used and useful. There was also testimony from the utility and Public Counsel in that case. The proposed Rule 25-30.4325 is designed to codify the Commission's policy and streamline the water treatment plant used and useful calculations.

MS. GERVASI: Thank you. Staff tenders the witness for cross-examination.

CHAIRMAN CARTER: Mr. Reilly, you're recognized.

MR. REILLY: Thank you. I'm having my engineer witness just pass out a two-page Citizens' cross-examination exhibit. It is just a copy of two rules of the PSC, and I'm just going to ask him a question or two about those two rules, and how they might apply to our proceeding.

CHAIRMAN CARTER: Okay.

CROSS EXAMINATION

BY MR. REILLY:

Q Mr. Redemann, I was just going to ask you very few questions on this rule. Are you familiar with this rule?

A Yes, but I don't have it in my prefiled testimony.

Q But I still would like to ask you a question.

MS. GERVASI: Staff would like to voice an objection at this point in time based on these questions having to do with the AFPI rule or the service availability rule go beyond the scope of the witness' prefiled testimony.

CHAIRMAN CARTER: Mr. Reilly.

MR. REILLY: We can just brief the rule and that's fine. It was my desire to bring before the Commissioners that there is a mechanism for utilities to seek recovery of plant that is not deemed used and useful, and that was the reason for these one or two questions.

CHAIRMAN CARTER: The objection is that it's outside the scope of the rule.

MR. REILLY: And in response to that, if the Commission doesn't give me leave to ask a question, we will just brief it in our brief.

CHAIRMAN CARTER: Why don't we do that. Let's try to stay close to home base. I mean, we kind of got off. Let's stay close to home base on this one. You have got his testimony, his Direct Testimony, you have got his exhibits, and --

MR. REILLY: The rules speak for themselves.

CHAIRMAN CARTER: Okay.

BY MR. REILLY:

Q Mr. Redemann, staff's version of the rule includes a provision for using peak hour design criteria of 1.1 gallons per minute per ERC for systems that do not have adequate FDEP monthly operating reports?

A Yes, that's correct.

Q How would you define ERC?

A An equivalent residential connection.

Q And what does that mean to you?

A That's the customer demand that is placed on the system by one residential connection.

Q And if you had a mobile home park with 200 ERC connections and no records, this would be the provision of the rule that you would use?

A For a mobile home park, I would multiply it by .8.

Q .8, okay. And is that provision of applying .8 in the rule or what would be the basis of making such a calculation?

A I believe it's in our 25-30 rule.

Q So that would apply in that situation?

A Yes.

Q And, likewise, with regard to the provision using for maximum day design criteria of 787.5 gallons per day per ERC of actual flows, you would --

A Multiply it by .8.

Q For a system?

A With mobile homes.

Q Okay. If I could have you refer to your testimony on Page 7, Lines 24 through 25, and Lines 1 and 2 on the following Page 8. You state excluding fire flow from peak hour demand is not consistent with sound engineering design, but is based on FDEP permitting rules. Is that correct?

A Yes.

Q Does that mean that you do not consider FDEP design criteria as presented in Chapter 62-555.320 to embody sound engineering design principles?

A Remember, we're calculating used and useful for plant, so we need to consider the design criteria, yes, but we are also trying to establish a used and useful plant that is put into rate base.

Q But would you not assume that the DEP rules do at least embody sound engineering?

A We have a Commission policy and orders on the correct amount of used and useful as detailed in my testimony.

Q Repeat that again.

A I have Commission orders and references and incipient policy in my testimony on the proper method of used and useful.

Q And that is -- and how is that responsive to the question that, in fact, that constitutes sound engineering principles?

A Repeat your question?

Q I asked you in your statement in your testimony does that mean that you do not consider FDEP design criteria presented in their rule to embody sound engineering principles?

A Yes. DEP does have engineering design criterion that are sound engineering principles.

Q Including the particular one I mentioned, which is 62-555.320?

A Can you read the rule to me?

Q That is the rule that is for design and construction of public water systems.

CHAIRMAN CARTER: Mr. Reilly, just let him look at it and see if he is familiar with the rule, but I think we are really once again getting far afield. That's a DEP rule. But if you want to ask him about is he familiar with the rule, then we will go from that. I think you can get the same thing that you are trying to accomplish by --

MR. REILLY: Do you have a copy of the rule? And in his testimony he makes reference -- well, let's just take a look at it here.

CHAIRMAN CARTER: Do you have a copy of that rule?

THE WITNESS: Not with me.

CHAIRMAN CARTER: Staff, can you get him a copy of it?

MS. GERVASI: Yes, sir.

CHAIRMAN CARTER: Let's take a moment here. If we're going to ask a witness a question, we need to give him some information so he can respond to it. So let's just take about two minutes here and everyone just kind of exhale a little bit. This may be a good point to stretch. Let's take five minutes.

(Recess.)

CHAIRMAN CARTER: Okay. We are back on the record.

And when we left, Mr. Reilly was going to provide the witness with a copy of the rule.

MR. REILLY: Yes.

BY MR. REILLY:

Q And have you had an opportunity to look at it?

And the limited scope, the nature of this question, I'm not asking detailed questions about this DEP rule, it's just the testimony that says OPC's proposal is not consistent with sound engineering practices. And then the very next sentence says, "Nevertheless, it is based on DEP's permitting rules regarding the capacity of the system."

So my simple straightforward question is do you not believe that the FDEP rule embodies sound engineering principles? I guess that's the nature of it.

A Well, the DEP rules include minimum designs. You need also to use the engineering references and guidance documents attached to the DEP rule.

MR. REILLY: Okay. Enough on the DEP rule.

CHAIRMAN CARTER: I'm with you.

MR. REILLY: I sense that.

BY MR. REILLY:

Q Mr. Redemann, are you aware of the likelihood of a fire occurring on the annual peak demand hour of a water system, that is the highest hour out of 24 hours on the highest day of the 365 days?

A I am not aware of that happening.

Q It is highly unlikely?

A Not highly unlikely because many water treatment plants have the same peak day every day, so it could very easily happen.

Q It could very easily happen that a fire would occur on the peak hour of the entire year?

A Well, the peak days sometimes aren't really peak days that much. I mean, the pattern develops and the peak days aren't really that -- there isn't that much change over a year, of a yearly period.

Q But you are not aware of any instance where that has ever happened?

A Not that I can recall.

Q If there were to be a fire in the water system service area, would you expect that the fire demands would tend to suppress simultaneous peak demands?

A If there is a fire that happens, the well pump -- I mean, the pumper trucks would pull from the fire hydrants, and the demand would be slightly less, because they are going to put out the fire.

Q Real quickly, I'm going to ask you the same questions I asked Mr. Seidman if you have handy Mr. Hoofnagle's testimony.

A I don't have it with me right here.

Q Could he be given one real quickly?

CHAIRMAN CARTER: One second. We will take one second.

Staff, if you could provide that information to the witness. Also, while he is asking that, Mr. Hoofnagle and Mr. Jenkins also, is that right, do you want them to have both of those?

MR. REILLY: I believe so. I think on this witness I am only asking Mr. Hoofnagle.

CHAIRMAN CARTER: Oh, really?

MR. REILLY: Yes. I think it's a good idea. Let me get Mr. Jenkins' testimony just so we can all sing kum-ba-yah.

CHAIRMAN CARTER: I was just anticipating.

THE WITNESS: I have Mr. Hoofnagle's testimony.

BY MR. REILLY:

Q And, again, I think we are looking at Page 2, Lines 13 through 19. And I guess if you could just read that and determine if you concur with that statement?

A Thirteen through 19?

Q Yes, sir.

A Page 2?

Q Yes, sir.

A "DEP sets/establishes standards of practice and care for the industry to ensure water quality. Issues of adequacy of supply related to this overriding goal of water safety and quality as it might impact operating pressure and such concerns as fire flow. We do not directly oversee water supply or quantity as such. This responsibility remains with the state's water management districts. As I understand the role of the PSC, it is the agency that oversees rates, customer service and economic issues affecting private utilities under its jurisdiction."

Q And you are okay with that statement?

A Yes.

Q And the last question on Page 2, Lines 6 through 9, this is where -- if you would just take a look at that, it begins Subparagraph .320?

A Subparagraph .320 is an extensive rule governing design and operation of public water systems and addresses treatment plants, pumping facilities, materials' standards, ancillary well features, storage, power, tankage, distribution system and plant operational issues, and safety.

Q And you concur as well with that statement?

A Yes.

Q All right. Changing the subject to high service pumps. Under your proposal including high service pumping with storage for used and useful calculations, the capacity of the high service pumps relative to system demand is not considered, is that correct?

A Yes. I did a spreadsheet of pumping costs and storage costs, and the pumping costs was very minimal compared to storage cost.

Q And define that for me, if you would?

A Well, I think it was about .3 percent.

Q Of total?

A Pumping cost, 311.4, versus storage cost, Account 330.4. So it was just minimal.

Q So you just feel it is de minimis?

A I don't feel like it is needed because it's a lot of work and you are not getting, you know, very much value out of it.

MR. REILLY: Just one second.

CHAIRMAN CARTER: Take your time.

BY MR. REILLY:

Q In your analysis, would you believe that's really true in every case concerning this cost of high service pumping?

A Well, apparently what's happening is either they are putting them on the storage cost, or they are putting them in 311.2, which is the well cost, which is also pumps. So it's just not a cost-effective solution to multiply or to do the high service pump calculation. You could apply it to the storage calculation.

Q Let me have you refer to your testimony on Page 16, Lines 18 through 19.

A Has the Commission previously used the 12-hour day to determine well capacity? Yes.

Q Okay. You state in this testimony that the single well system should be considered 100 percent used and useful unless it appears to be oversized?

A Yes, that's correct.

Q How would you determine if a well is oversized?

A I would need to see the calculations. But, basically, what I have done is I looked on line for well capacity, and from about 80 gallons per minute to 325 gallons per minute, the wells cost the same.

Q And determining whether it is oversized, would be one way is to look at the well's capacity relative to the system demands?

A Yes, that would be one way to do it. You probably would need to consider economies of scale. Well, for one well, we would consider that to be 100 percent used and useful.

Q But if there was still some question of being oversized, wouldn't you make allowances for growth, excessive unaccounted for water, and, if provided, fire flow?

A Well, that would all be looked at in the calculation, of course.

Q To determine whether it was oversized or not?

A Yes.

Q And those would be other factors that you would consider?

A Yes.

Q Is that not the used and useful calculation?

A That is the used and useful calculation.

Q Okay. Thank you. Moving on to another subject. This 100 percent used and useful for build-out systems. I would refer you to, I guess, the same page, 16, Lines 3 through 6. Here you say that water systems that are built out with no apparent potential expansion in the surrounding areas should be considered 100 percent used and useful if designed prudently, is that correct?

A That's correct.

Q How do you determine if there was no apparent expansion of the service area?

A If they had an amendment case application in.

Q Excuse me?

A If there was an amendment application in. Most of the systems that we see out there are fixed systems, meaning they have been there for 20 or 30 years, and just are not growing. They are fully developed and built out.

Q If an area is built out at least in its current service territory, however, if in the surrounding area there is large amount of acreage where the system has the potential to grow, if and when development is economically feasible in those areas, would that not still constitute a potential growth for that system?

A Well, I would have to see the exact area. I mean, certainly if the neighboring communities are all growing right there, you might want to consider it. But in most cases, most of the utility systems, they are not growing, and the agricultural land next to them has been agriculture for many, many years.

Q So it might depend on the zoning and the whole growth patterns?

A If you wanted to change the zoning, you would have to get it approved by the county, of course.

Q Right. As part of evaluating if a system is prudently designed, this prudent standard you mention in your system, would you not also look to see if it was substantially oversized for the service area which is now built out?

A Yes.

Q Now, on the subject of 24 hours versus -- a subject we have talked about a lot -- 24 hours versus 12 hours, would you say that a water treatment plant that is twice as big as what is needed to serve its customer base at build-out is prudently designed?

A Twice as big? No. But remember, the usage patterns of most customers indicate that they are not using the water 24 hours a day. The water management districts, both the Southwest Florida and South Water Management District, each have one day watering. So watering -- irrigation is just not occurring like it used to anymore.

Q Could you make -- I appreciate the clarification, but was that a yes or a no on the question of whether if at the end of the day and you have a built-out system and it is twice as big as it needs to be, would that be an indication of it being prudently designed?

A Well, you would have to look at the specific components of the water system. You might have to do an economies of scale adjustment, that's a possibility.

Q But this would raise a question in your mind as to whether it was prudently designed if that was the final result at the build-out?

A I would have to think about the specific situation, but, yes, I would think about it.

Q Do you know of any design criteria that states wells must be designed based on 12 hours per day of pumping time?

A No, but the reason that I'm using the 12 hours is these systems have storage, and the water quality is generally poor, they usually have an aerator on. There is hydrogen sulfide in the water. And continually pumping that water 24 hours will just deteriorate the water quality. So I'm recommending that it is prudently -- it would be prudent to rest the well for 12 hours to replenish the water supply to get better quality of water service to the customers.

Q I misspoke. My engineer, in fact, does have a question about Mr. Jenkins' testimony. So we will do this real quickly. If you could refer to it. And, again, I will just refer you to the same area of questioning as Mr. Seidman. I guess we are looking at Page 9, Lines 10 through 13. You don't have to read it out, but just if you could refer to it and just tell me whether you can agree with the statement?

A I don't agree with the statement. Because, as I indicated earlier, most of the water systems that you would use the 12 hours have storage, and the water quality is poor, and you need aeration generally for hydrogen sulfide. And the concentration of the water, pumping it 24 hours would just deteriorate the water quality. It's really a water quality issue.

Q And is that not the type of issue that -- water quality issue you say?

A Water quality. That would be the Florida Department of Environmental Protection.

Q Okay. Given Mr. Jenkins' discussion about the complexities of well impacts in Florida and the numerous special conditions that comprise a typical consumptive use permit issued by the district, does it not seem likely that if there was any concern about pumpage in terms of quantity now, that it would be addressed in a condition of the consumptive use permit?

A Yes, that would be addressed in the consumptive use permit if there is saltwater intrusion.

Q Now, if a well field is sized to meet the maximum day demand of a service area, how frequently will that well field be operating at 24 hours a day?

A Probably not very frequently at all.

Q And if a well field is designed to provide max day demand with the largest well out of service, there will always be at least one well pump not operating on the max day, is that correct?

A Well, the reason we take the one well out is during periods of time over the years the well will need to be replaced and so there may not be two wells there, there may only be one well for a period of time.

Q So the answer is -- what is the yes or no answer to that?

A Repeat the question?

Q And if a well field is designed to provide the maximum day demand with the largest well out of service, there will always be at least one well pump not operating on the max day, is that correct?

A If one well is out of service, you will only have one well, if it's a two-well system.

Q Right, if it's a two-well system. That's right, obviously it has to be -- maybe my question is two or more wells.

A If there are two or more wells, then you would have one less than however many wells you have.

Q Okay. Could you explain how water quality and aerators affect well pumping?

A The aerator for water quality, depending on what the problem is, if it's hydrogen sulfide, the water will flow over the aerator and the aerator will release the hydrogen sulfide.

Q But how does it affect well pumping?

A The water quality -- as you pump a well, you have a draw down of the well and it concentrates the components of what is inside the well, and then you get a higher concentration if you continually pump the well.

Q Would you say that's true for all systems everywhere?

A No, probably that's not true for all systems.

Q What about storage without aerators?

A There's very few of those, but there are probably some. I can't think of any right now. Generally speaking, the reason why you have storage is because of the water quality issue, particularly in the Central Florida area.

Q You said you had storage because of water quality issues, not because of pressure demands and --

A Well, you could have it for both, yes.

Q Excuse me?

A You could have storage for both.

MR. REILLY: Bear with us just one quick second.

BY MR. REILLY:

Q Here is the question: For a system that has lime softening and storage, and no aeration, how does that affect well pumping for 12 hours?

A Well, for example, Florida Cities Water Company, which is the only system I know that has lime softening, they had used some of the wells some of the time, they couldn't use them all at once. That is the only lime softening plant I'm aware of.

Q I understand you are aware of that system, but how does it affect well pumping?

A Well, in that particular system, they couldn't use all the wells at one time. That had to alternate them. The water management district required them to do that, I believe.

Q But that was done by the water management districts because of the specific circumstances of that case?

A Yes.

MR. REILLY: Thank you.

That concludes my questions of Mr. Redemann.

CHAIRMAN CARTER: Okay. I believe Mr. Hoffman is next.

MR. HOFFMAN: Thank you, Mr. Chairman.

CROSS EXAMINATION

BY MR. HOFFMAN:

Q Good afternoon, Mr. Redemann.

A Good afternoon.

Q Let me ask you a question first about unaccounted for water, which is on Page 11?

CHAIRMAN CARTER: Excuse me, Mr. Hoffman. I had one of my over-50 moments.

Commissioner Argenziano, the question that you had, I forgot it, but I did remember that you had a question.

COMMISSIONER ARGENZIANO: Thank you. Just to find out, and I'm sure it varies from plant-to-plant, whether it's ocean seawater or brackish, but do you have an estimate on how often a plant -- and I'm sure the gallonage has to be incorporated in there, also -- how often the reverse osmosis membranes need to be backwashed?

THE WITNESS: I don't recall exactly, but probably -- usually they are set on timers and stuff, or when the pressure builds up, then they have to go into automatic backwash. So I would estimate maybe 10 percent of the water, maybe 15 percent, if I recall correctly.

COMMISSIONER ARGENZIANO: How often?

THE WITNESS: Well, they are on a pressure cycle, so when the pressure builds up, it turns on and off. So, maybe what you are asking is how much time they are --

COMMISSIONER ARGENZIANO: No. No. I think in the interim I found out the answer myself, and it really depends on what type of facility. There is a plant in -- the Diablo plant in California, which has also reverse osmosis, or seawater desalination for drinking water as well as cooling water, and I'm finding out, and I'm going to place a call to them, and finding out they haven't even backwashed their filters yet. There was no need.

But, yet, the City of Dunedin, I think, uses about 130 gallons to backwash every 48 hours. So it is just dependent. But, that is what I really wanted to know was the frequency, and I guess it depends on what type of plant, where it is located, and what technology, whether it is new or older technology.

Thank you.

CHAIRMAN CARTER: Thank you, Commissioner.

Mr. Hoffman, sorry to interrupt, but I had one of my over-50 moments there.

MR. HOFFMAN: Thank you, Mr. Chairman.

BY MR. HOFFMAN:

Q Mr. Redemann, a question about unaccounted for water, which is addressed at least in part on Page 11 of your prefiled testimony.

A Yes.

Q Okay. On Page 11, Lines 2 through 5, there is a sentence there that states, "For those water system with unaccounted for water in excess of 10 percent, where the utility has not taken steps to reduce the water loss, a reduction in peak demand and chemical and electrical expenses and purchased water should be made."

My question is, would you agree that where unaccounted for water is in excess of 10 percent, and the utility has taken such steps to reduce the water loss, that a reduction in peak demand and chemical and electrical expenses and purchased water should not be made?

A Yes, that's correct. What I'm really looking for is for the utility to contact the Florida Rural Water Association, and they have circuit riders around the state that help the utilities find unaccounted for water. Other times it's a metering issue, or they actually have the equipment to find the leaks along with the water management district. So before you come in for a rate case, it would be a good idea for those systems that are over 10 percent to have the water management district -- I mean, the Florida Rural Water Association find the leaks and make a recommendation on the system and what needs to be done.

Q And your testimony is that when a utility has taken those steps under these circumstances that there should not be a reduction in peak demand and chemical and electric expenses and purchased water, correct?

A That would probably be correct. It all depends on what the Florida Rural Water Management recommends. It may be, you know, replacement meters or something like that, so it just depends on what they recommend.

Q Let me ask you a question or two about peak day and how that is determined under the proposed rule. That is Subsection 7 of the proposed rule, and you talk about it on Page 5 of your testimony. Just a couple of questions on this.

Would you agree that if the maximum day has an unusual occurrence, that for consistency the Commission should turn to the next highest day that does not have an unusual occurrence?

A Well, I have done that before. I have used the second highest day if there was no unusual occurrence. Recently we have just used the five-day maximum average, but I have used that in the past.

Q And in your expert opinion, then, either methodology would be appropriate?

A Yes, either methodology would be reasonable.

Q And would you agree that when a five-day average is used, and this is simply a matter of math, when a five-day average is used, the utility will not recover the cost for the max day in the test year?

A It all depends if there was a previous rate case and the system was 100 percent used and useful the last time, then I would recommend that it be 100 percent again. It just depends on the situation.

Q Okay. Let me try a hypothetical with you that sort of addresses Subsection 4 of the rule, which is the instances where a water treatment system is considered 100 percent used and useful, and you get into this on Page 16 of your testimony.

Are you with me, Mr. Redemann?

A Yes.

Q If you would assume that a utility's water system has a peak demand of 600 gallons per minute; and then assume, secondly, that a four-inch well has a peak capacity of 500 gallons per minute. So that is less than the peak demand of the customers. And then assume that a six-inch well has a peak capacity of 1,200 gallons per minute. Those are my three facts for my hypothetical.

Now, you would agree, would you not, that in order for the utility to meet its obligation to serve it would have to use that six-inch well, correct?

A Yes.

Q And would you agree that under the proposed rule, which you support Subsection (4)(a), that that six-inch well would be 100 percent used and useful?

A That is correct.

MR. HOFFMAN: Thank you. Those are all the questions I have.

Thank you, Mr. Chairman.

CHAIRMAN CARTER: Mr. Friedman.

MR. FRIEDMAN: I have none.

CHAIRMAN CARTER: Commissioners? Staff?

MS. GERVASI: We have no redirect.

CHAIRMAN CARTER: Okay. Then let's take care of some housekeeping matters.

MS. GERVASI: Staff would move Exhibits 14 through 20, and Exhibit 21 as revised.

CHAIRMAN CARTER: Any objections? Hearing none, Exhibits 13, 14, 15, 16, 17, 18, 19, 20, and 21, correct?

MS. GERVASI: And 21 as revised, yes, sir.

CHAIRMAN CARTER: Show it done.

MS. GERVASI: Thank you.

(Exhibits 14 through 20, and 21 as revised, admitted into the record.)

MS. GERVASI: And it appears at this time this would be the appropriate time for Public Counsel to move in the Rebuttal Testimony of Mr. Woodcock.

MR. REILLY: I do so move.

CHAIRMAN CARTER: No objections? Show it done. That would be exhibit -- I guess we will need to start on another list, then.

MS. GERVASI: That would be Rebuttal Testimony, and I don't believe he had any exhibits to his rebuttal, is that correct?

MR. REILLY: That is correct.

CHAIRMAN CARTER: Okay.

PREFILED REBUTTAL TESTIMONY OF
ANDREW T. WOODCOCK P.E., M.B.A.

Q. WHAT IS YOUR NAME AND BUSINESS ADDRESS?

A. My name is Andrew Woodcock. My business address is 201 East Pine St. Suite 1000, Orlando, Florida.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. The purpose of my testimony is to respond to the testimonies of Mr. Seidman, Mr. Guastella, Mr. Redemann, Mr. Hoofnagle, and Mr. Jenkins.

Q. WILL YOU DESCRIBE THE STRUCTURE OF YOUR TESTIMONY?

A. Given the number of issues and testimonies I have generally structured my testimony to provide discussion by issue in the general order of the proposed rule. To the extent that there are other issues with respect to individual testimonies, they are addressed toward the end of my testimony. Where necessary, I may cross reference testimonies. As with my direct testimony I refer to Staff's proposed rule as the "proposed rule". Any changes to the proposed rule that I recommend are referred to as "recommendation" or "recommended language".

Q. MR. SEIDMAN IN HIS TESTIMONY IMPLIES THAT A SEPARATE CALCULATION FOR HIGH SERVICE PUMPING U&U COMPLICATES A RULE THAT IS THE RESULT OF COMPROMISE AND THAT SUCH A COMPONENT EVALUATION SHOULD BE CONSIDERED AS AN ALTERNATIVE CALCULATION. WHAT ARE YOUR THOUGHTS ON HIS POSITION?

A. As I have stated in my prefiled testimony I do not believe that a separate calculation of high service pumping used and usefulness complicates the rule. High service pumping is a common component in water treatment plants that has a separate and distinct design basis and service requirement from storage. As such, it requires a separate U&U evaluation. Mr. Seidman in his own testimony says that he has taken similar positions in the past. My opinion is that high service pumping is of a sufficient different nature from storage facilities that a separate U&U calculation is warranted.

Q. TO CONTINUE WITH HIGH SERVICE PUMPING, MR. GUASTELLA'S TESTIMONY STATES THAT THERE IS ALMOST NO NEED TO CONDUCT AN ANALYSIS OF HIGH SERVICE PUMPS BECAUSE IN MOST INSTANCES THEY ARE 100% U&U BY OBSERVATION. WHAT ARE YOUR THOUGHTS ON THIS APPROACH?

A. The rationale behind Mr. Guastella's statement appears to be that when multiple pumps that are manifolded (piped) together are pumping at the same time there can be increased pressure in the discharge piping that can cause the pumps to operate at less than their rated capacity. This capacity/pressure relationship is a common property of centrifugal pumps in general, not just specific to high service pumps, and is a factor that is considered in the design process. An appropriately designed high service pumping system will actually operate in an envelope of capacity that will vary based on downstream pressure. At high pressures the pumps may deliver slightly less than the rated capacity and at low pressure pumps may deliver slightly more than the rated capacity. The rated capacity of the pumps usually represents the mid-point of the operating envelope and in my opinion is the appropriate capacity to use for U&U analysis.

Q. WHAT IS YOUR OPINION OF MR. REDEMANN'S TESTIMONY OF HIGH SERVICE PUMPS?

A. Mr. Redemann states that the cost of high service pumps is minimal compared to the cost of storage and should not be evaluated separately. Regardless of the minimal cost issue, which is a subjective determination, high service pumps are inherently different than storage and are evaluated for U&U in a completely different manner.

He also states that a separate evaluation of high service pumping could be made under the alternative calculation provision. I am of the opinion that high service pumps are not a special or unique case. They are a critical component of a water system that is always present after storage

Q. MR. SEIDMAN, MR. GUASTELLA AND MR. REDEMANN TAKE ISSUE WITH YOUR CHANGE TO THE PEAK DEMAND FOR WATER TREATMENT SYSTEMS WITH STORAGE, STATING THAT YOU HAVE ELIMINATED THE FIRE FLOW CONSIDERATION. WHAT IS YOUR RESPONSE TO THIS?

A. I agree with some of the arguments presented. I recommend the following change to my recommended rule change:

> "2. For utilities with storage, the utility's maximum day demand, excluding excessive unaccounted for water plus a growth allowance based on the requirements in Rule 25-30.431, F.A.C., and where provided, a minimum of either the fire flow required by local governmental authority or 2 hours at 500 gpm. Fire flow shall

> be considered to the extent the treatment facilities can replenish fire flow volume over a 24 hour period."

This revised language mirrors the language that is presented in staff's proposed rule, while recognizing that with storage, water treatment facilities need not meet the peak requirements of fire flow that are addressed by storage and high service pumping.

Q. WHAT IS YOUR RESPONSE TO MR. SEIDMAN'S, AND MR. GUASTELLA'S COMMENTS ON YOU ADDING "IF PROVIDED" TO PARAGRAPH (1)(c) OF THE PROPOSED RULE?

A. It is purely a matter of wording. I am fine with staff's proposed language of "where fire flow is provided" with regard to this issue in proposed paragraph 1(c).

Q. WHAT ARE YOUR COMMENTS REGARDING MR. REDEMANN'S STATEMENTS REGARDING YOUR PROPOSED LANGUAGE DEFINING PEAK WATER DEMANDS FOR WATER TREATMENT SYSTEMS?

A. Mr. Redemann states that my definition is not consistent with sound engineering design and then says my proposal is based on FDEP permitting rules. I am of the opinion that FDEP's requirements are certainly consistent with sound engineering design and are appropriate for U&U calculations.

Q. WHAT IS YOUR RESPONSE TO MR. SEIDMAN'S, MR. GUASTELLA'S AND MR. REDEMANN'S CONCERNS ABOUT YOUR RECOMMENDED LANGUAGE FOR PROPOSED PARAGRAPH 1(d) REGARDING THE PEAK DEMAND FOR STORAGE?

A. Mr. Seidman raises several issues regarding peak demand for storage. His first argument rests with the fact that my recommended 25% plus fire flow volume represents the regulatory minimum being proposed to recover cost and that such a proposal is a disincentive that results in utilities only meeting minimum design standards. In my review of the FDEP rules I would have to disagree with this. Subsection (19) of FDEP Rule 62-555.320, F.A.C., has additional provisions that would allow a utility to use less than 25% of the maximum day demand provided certain demonstrations are met that include the ability of the water treatment facility to replenish storage volume and hydropnuematic volume. I believe this criteria to be the regulatory minimum, but is far too complicated to be included in the U&U process. Furthermore, the FDEP rules, while they may be considered regulatory minimums, are established to provide safe and reliable drinking water to the general public and are the basis of design for water systems statewide. It is also important to note that FDEP makes no specific allowances for growth in its storage requirements, which is a part of my recommended U&U calculations.

Q. MR. SEIDMAN ALSO MAKES REFERENCE TO THE FACT THAT YOUR RECOMMENDED LANGUAGE DOES NOT INCLUDE AN ALLOWANCE FOR EMERGENCY STORAGE IN ADDITION TO FIRE STORAGE. WHAT IS YOUR COMMENT ON THIS?

A. As Mr. Seidman states in his testimony, establishing emergency volumes is a judgment call. FDEP has many requirements to keep water treatment facilities in service in the event of emergencies, such as auxiliary power and firm capacity requirements. It does not make provisions for emergencies in the design of storage.

The impression of Mr. Seidman's testimony on this issue is that more volume is always better, and that is not the case. Too much storage volume that does not get "turned over" in a storage tank can cause water quality problems including loss of disinfection residual or formation of DBPs, which are a regulated category of water contaminants. Therefore, my recommendation is that 25% of maximum day flow, plus an allowance for fire flow, plus the statutory growth allowance is appropriate.

Q. IN HIS TESTIMONY MR. SEIDMAN GOES INTO A DISCUSSION ABOUT USING THE MINIMUM FDEP CRITERIA FOR HIGH SERVICE PUMPS SPECIFICALLY AND U&U IN GENERAL. WILL YOU COMMENT?

A. I am of the opinion that the requirements of FDEP are the single largest driver of water system sizing in the State of Florida and that many of the concepts and requirements embodied in FDEP rules are appropriate for use in U&U calculations. FDEP requirements may be considered minimum, but in no way should they be considered to be the cheap way out or generally insufficient to provide service to customers. As Mr. Hoofnagle states in his testimony on page 2, beginning on line 13, "DEP sets/establishes standards of practice and care for the industry to ensure water quality. Issues of adequacy of supply are related to this overriding goal of water safety and quality as it might impact operating pressure and such concerns as fire flow."

Q. WHAT IS YOUR OPINION OF MR. SEIDMAN'S AND MR. GUASTELLA'S TESTIMONY ON DESIGN DEMANDS VERSUS ACTUAL DEMANDS?

A. It can occur that actual demands are less than design demands. In fact, for a new system with no historic usage as a guideline it would be difficult to predict the exact actual usage. However, in considering this issue I think it is important to consider what portion of the water system is actually being used by the customers and whether it is appropriate for those customers to bear the cost of using less of a system than was originally planned. Keep in mind the customer has no input into the sizing of the water facilities to provide them service. However, they do have control over the amount of the water facilities that they use. An investor owned utility that is sizing water treatment facilities is making a decision with knowledge of the regulatory environment and the concepts of U&U. I am of the opinion that the utility in making these decisions should bear the risk associated with any difference between the design and actual usage.

Q. WHAT IS YOU OPINION OF MR. SEIDMAN'S AND MR. GUASTELLA'S COMMENTS ON THE DOCUMENATION REQUIREMENT FOR ACCOUNTED FOR BUT UNBILLED WATER?

A. I concur with Mr Redemann that water is a limited natural resource that must be conserved to assure adequate supply. On page 9 of his testimony, Mr. Redemann states that water utilities should take reasonable steps to avoid excessive losses. On this page he further states that: "The utility is required to maintain records of the amount of water used to maintain the system or lost through line breaks. The fire department should measure or estimate the amount of water used for fire fighting or testing and report the usage to the utility. If water used for maintaining the system or lost through lines breaks is **properly documented,** then it should not be considered unaccounted for usage." (Emphasis added). I concur with Mr. Redemann that water used to maintain the system, water lost through line breaks, or water used to fight fires should not be considered unaccounted for water, so long as these flows are adequately documented. It is crucial that contemporaneous records of amounts of water used for these purposes be maintained by the utility at all times. My recommended paragraph (1)(g) includes this requirement.

Q. MR. REDEMAN IS RECOMMENDING A REWORDING OF THE PROPOSED RULE REGARDING UNACCOUNTED FOR WATER IN RESPONSE TO MR. GUASTELLA'S TESTIMONY. WHAT IS YOUR OPINION OF HIS ALTERATION?

A. I can agree with his clarification and make the follow revision to my recommended paragraph (1)(g):

> "(g). Excessive unaccounted for water (EUW) is unaccounted for water in excess of 10 percent of the amount produced. Any water claimed as accounted for that was used for flushing, fire fighting, and water lost through line breaks must be documented by complete records of these flow losses."

Q. WHAT ARE YOUR COMMENTS ON MR. SEIDMAN'S AND MR. GUASTELLA'S TESTIMONY REGARDING PRUDENCE AND ECONOMIES OF SCALE FOUND IN PROPOSED PARAGRAPH (2)?

A. Upon reading Mr. Seidman's and Mr. Guastella's testimony I realize that my prior testimony was unclear with respect to these issues, however, that does not change my recommendations to the rule on these issues.

Q. PLEASE EXPLAIN.

A. With respect to prudence of investment the intent of my testimony was to state that prudence of investment is not a U&U **calculation** issue. Pursuant to Chapter 367.081(3), F.S., the Commission has always considered the prudent cost of providing service when fixing rates. Proposed paragraph (2) provides no additional guidance to the Commission regarding the application of prudence to U&U.

I agree that Mr. Seidman's comment that my proposal regarding economies of scale provides no further clarification than the proposed rule. It is for this very reason that I believe it should be considered as an alternative methodology under my recommended paragraph (2) and not part of the primary U&U calculation.

Q. PLEASE DISCUSS MR. SEIDMAN'S, MR. GUASTELLA'S AND MR REDEMANN'S COMMENTS REGARDING PROPOSED PARAGRAPH (3) AND YOUR RECOMMENDED PARAGRAPH (2)?

A. Mr. Seidman and Mr. Redemann agree with my recommended language that includes service area restrictions, factors involving treatment capacity, well drawdown limitations, and changes in flow due to conservation or a reduction in number of customers as factors that are appropriate for potential alternative calculations.

Q. WHAT IS YOUR POSITION ON MR. SEIDMAN'S, MR GUASTELLA'S AND MR. REDEMANN'S TESTIMONY REGARDING ALTERNATIVE CALCULATIONS BEING MADE AVAILABLE TO ALL PARTIES?

A. For different reasons Mr. Seidman and Guastella do not provide for other parties to utilize alternative calculations. When adopted, this rule will define the Commission's policy concerning the calculations of the U&U percentages for water for production, treatment, storage and high service pumping. The rule will equally affect all of the parties' and staff's future recommendations to the Commission regarding these subjects. When specific circumstances warrant, the Commission should be permitted to consider alternative U&U calculations, not only from the perspective of the utility, but also from the perspective of staff and intervenors. The alternative calculation provision should be available to all parties, including staff, who can meet the burden of proof as to the appropriateness of the alternative calculation under the specific facts of the case.

Mr. Redemann appears to agree with my position on this issue. In his testimony on page 18, he proposes new language to proposed paragraph (3) to allow any party to a proceeding to propose and justify an alternative calculation. However, I note in his Exhibit RPR-8 page 2 of 5 that his language removes the word "utility" rather than explicitly stating "any party". I believe that my recommended paragraph (2) which refers to "any party" is clearer on this issue than Mr. Redemann's proposal.

Q. WHAT IS YOUR OPINION CONCERNING MR. SEIDMAN'S TESTIMONY

THAT THE PROPOSED PARAGRAPH (4) REMAIN TO ELIMINATE TIME AND EXPENSE?

A. Automatically considering a system 100% U&U while administratively expedient must be very carefully considered for the reasons I state in my direct testimony. I believe that by including these as an alternative calculation would permit the Commission to consider these arguments when the specific facts of the case require it.

Q. WHAT ARE YOUR COMMENTS ON MR. REDEMANN'S TESTIMONY REGARDING U&U OF SYSTEMS THAT ARE BUILT OUT?

A. Mr. Redemann's testimony only partially speaks to the requirements stated in paragraph (4)(b) of the proposed rule. First, his testimony does not explain or describe the necessity of including the term "mature" in the rule. As I have stated in my direct testimony the age of a system does not affect a U&U calculation. Secondly, Mr. Redemann adds to his testimony the system must not only be built out, with no apparent potential for expansion, **but also must be designed prudently**. I agree, and believe that one of the initial steps to determining if a system was prudently designed is to perform a U&U calculation. The way the proposed rule is written a system could be considered 100% U&U with no further consideration. Built out systems should be treated no differently than other systems, unless it can be documented that the system has service area restrictions that prevent expansion and that the system was prudently designed. In his testimony in Exhibit RPR 8, page 2 of 5, it appears that Mr. Redemann agrees with my recommended language in proposed paragraph (3) that addresses the issue of service area restrictions. I do not believe the statement needs to be in both proposed paragraph (3) and proposed paragraph (4)(b).

Q. WHAT IS YOUR OPINION OF MR. SEIDMAN'S TESTIMONY REGARDING THE U&U OF SYSTEMS WITH ONLY ONE WELL?

A. The fact is that FDEP allows small systems to be constructed with only one well and just because a system has only one well doesn't mean that it should be considered automatically 100% U&U with no further analysis. A well could be grossly oversized with respect to the customer demand and the application of this paragraph to the rule would completely ignore that fact and automatically have the customers bear the cost of the unused portion of the well. Mr. Seidman's discussion of instantaneous demand does not address the impact of this rule on the many single well systems that are currently in service. For existing systems, automatically considering a well 100% U&U with no analysis is not likely to improve the service the customers receive, but will definitely affect how much the customers pay for that service.

Q. WHAT ARE YOUR COMMENTS ON MR. REDEMANN'S TESTIMONY REGARDING U&U OF SYSTEMS WITH ONLY ONE WELL?

A. I find that his testimony on this does not match with how I read the proposed rule. Mr. Redemann states on page 16, line 18 of his testimony that systems with one well should be considered 100% U&U unless it appears that the well is oversized. The rule as proposed does not include "…unless it appears that the well is oversized". From how the proposed rule reads a one well system is 100% U&U, with no further analysis necessary. It is my opinion that a U&U analysis on a single well system would be necessary to determine if, in fact, the well is oversized.

Q. WHAT IS YOUR OPINION CONCERNING MR. HOOFNAGLE'S TESTIMONY ON PEAK HOUR VS. INSTANTANEOUS PEAK DEMAND?

A. I can agree that in general small systems experience peak demands that are greater than those of larger systems. It appears in Mr. Hoofnagle's testimony that designing small systems on a peak hour basis instead of an instantaneous peak does not meet FDEP's design standards. I have reviewed FDEP's rules with respect to this issue and can find no criteria or guidance on the use of instantaneous demand over peak hour demand, which makes it difficult to interpret in terms that can be utilized in a U&U calculation. I am of the opinion that the provision for alternative calculations can adequately address this issue, should it occur.

Q. WHAT ARE YOUR COMMENTS ON MR. SEIDMAN'S, MR GUASTELLA'S AND MR. REDEMANN'S TESTIMONY CONCERNING PROPOSED PARAGRAPH (6)?

A. It seems were are in agreement on all items with the exception of (6)(b) which has to do with basing well capacity on a 12 hour run time. I can find no good reason to justify a 12 hour run time on a consistent basis. In my direct testimony, I stated that prudent and efficient well field design would seek to maximize well pumping for a 24 hour period. For this reason, I believe 24 hours is the appropriate default value for the proposed rule. Mr. Seidman's arguments about aquifer recharge, protecting the water resources and environmental responsibility are issues that would be better addressed by the Water Management District and incorporated into a utilities' consumptive use permit for well withdrawal.

Mr. Jenkins' testimony speaks well to the complexity of the issues involved in wellfield permitting and the limiting conditions that go into a utility's consumptive use permit. My recommended paragraph (4)(b) will allow for the specific application of any pumping restrictions as determined through the Water Management District's rigorous permitting process. Mr. Jenkins in his testimony states "the bottom line is that there is typically no benefit to operating wells or a well field for a period of 12 hours versus 24 hours in Florida." He goes on to state that there are some cases that operating wells may avoid adverse aquifer impacts. Any pumping restrictions would be included as a permit limiting condition. Since prudent engineering design would consider a well operating on a 24 hour basis I believe it should be the default basis of determining U&U.

Another thing to keep in mind on this issue is how frequently the well pumps would actually be operating for 24 hours per day. It is important to remember that wellfields are sized on maximum day or peak hour demand criteria which only occur once in a 12 month period. Furthermore, with consideration of the largest well out of service the entire installed capacity of a wellfield will never be fully utilized.

Q. MR REDEMANN ALSO MENTIONS THAT 12 HOURS REFLECTS THE GENERAL USAGE PATTERN OF CUSTOMERS. WHAT ARE YOUR THOUGHTS ON THIS?

A. Mr. Redeman does not provide any detail on what comprises a 12 hour usage pattern. One could state that water usage generally coincides with the typical waking hours of the general population. However, restrictions that are placed on irrigation have shifted some demands to hours when the general population would be asleep. Regardless of usage patterns, the daily change in demands in a water system do not always correlate to well pump usage times. In fact, for systems with storage and high service pumping daily demand patterns have no direct bearing on wellfield capacity.

Q. WHAT ARE YOUR COMMENTS REGARDING MR. SEIDMAN'S, MR. GUASTELLA'S AND MR. REDEMANN'S TESTIMONY ON YOUR

RECOMMENDED PEAKING FACTORS FOR PROPOSED PARAGRAPH (7)?

A. I firmly believe that there are situations in which utilizing a 2.0 peak demand factor may inaccurately represent the true peak hour demand of the system. However, I do recognize that incorporation of my recommended language on this point provides for a range of values that can be open to interpretation, does not provide for the clarity the rule is attempting to achieve, and could be better handled as an alternative calculation under my recommended paragraph (2). Therefore, I am revising my recommendation to reflect just a 2 peak hour factor in accordance with the proposed rule. Conversely, I recommend adding changes in peaking factors as an additional enumerated specific case that might warrant the use of an alternative U&U calculation under my recommended paragraph (2).

Q. DO YOU HAVE ANY FURTHER COMMENTS REGARDING MR. SEIDMAN'S TESTIMONY?

A. I note that we are in agreement on removing proposed paragraphs 7(a) 3. and 7(b) 3. from the proposed rule. I also note that while he recommends retaining paragraph (11) he also agrees with my recommendation to incorporate the same language in proposed paragraph (3), which is my recommended paragraph (2). I do not believe the statement needs to be in two places.

Q. ANYTHING ELSE ON MR. SEIDMAN'S TESTIMONY?

A. No, not at this time.

Q. ANY FURTHER COMMENTS ON MR. GUASTELLA'S TESTIMONY?

A. Yes. My first comment pertains to a statement made on page three, line seventeen regarding water systems being designed to include a safety factor so that when fully developed the capacity of the facilities will be greater than the actual demands. It is my opinion that the safety factor Mr. Guastella refers to is incorporated in my recommended

U&U rule in the concept of reliable capacity which allows for the largest capacity unit to be removed from service.

Q. WHAT IS YOUR OPINION REGARDING MR. GUASTELLA'S USE OF ISO AND NBFU CRITERIA FOR ESTABLISHING FIRE FLOW ADJUSTMENTS TO U&U?

A. I am not aware of any design requirement that relies upon these organizations for the sizing of water system capacity. It has been my experience that fire flows in a service area are established by the local governing authority and applied as part of the development review process. In reviewing ISO's Guide for Determination of Needed Fire Flow (Exhibit JFG-1) the preface states that "...ISO provides, statistical, actuarial, underwriting and claims information and analyses; consulting and technical services; policy language; information about specific locations; fraud identification tools...." Nowhere does it state that it is an engineering document for determining fire flow requirements for public water systems. This is a useful document for the fire protection industry and its guidelines may, through local fire departments, make its way into a fire flow requirement. However, local governments establish fire flow criteria.

Q. HAVE YOU REVIEWED THE TESTIMONY OF MR. HOOFNAGLE?

A. Yes I have.

Q. DO YOU HAVE ANY COMMENTS ON HIS DIRECT TESTIMONY?

A. I do not find it surprising that the FDEP would approve a permit application where the facilities exceed their standards, although I do note in his testimony that FDEP standards are established to ensure water safety and quality.

Q. DO YOU HAVE ANY OTHER COMMENTS ON MR. HOOFNAGLE'S TESTIMONY?

A. I have no additional comments other than what has already been presented herein.

Q. HAVE YOU REVIEWED THE TESTIMONY OF MR. JENKINS?

A. Yes I have.

Q. WHAT COMMENTS DO YOU HAVE REGARDING HIS TESTIMONY?

A. I have no additional comments other than what has already been presented herein.

Q. DOES THAT CONCLUDE YOUR TESTIMONY AT THIS TIME?

A. Yes it does.

MS. GERVASI: So that brings us to the Surrebuttal Testimony of Mr. Guastella.

CHAIRMAN CARTER: Hang on one second. Let me get my notes together here.

MS. GERVASI: Sure.

CHAIRMAN CARTER: Mr. Hoffman, you are recognized, sir.

MR. HOFFMAN: Thank you, Mr. Chairman. Aqua Utilities Florida would recall Mr. Guastella.

JOHN F. GUASTELLA

was called as a surrebuttal witness on behalf of Aqua Utilities Florida, and having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. HOFFMAN:

Q Good afternoon, Mr. Guastella.

A Good afternoon.

Q Are you the same John Guastella who prefiled prefiled Direct Testimony in this proceeding?

A Yes.

Q And did you prepare and cause to be filed three pages of prefiled Surrebuttal Testimony in this proceeding?

A Yes.

Q Do you have any changes to your Surrebuttal Testimony?

A No.

Q If I asked you the questions that were contained in your prefiled Surrebuttal Testimony this afternoon, would your answers be the same?

A Yes.

MR. HOFFMAN: Mr. Chairman, I would ask that Mr. Guastella's prefiled Surrebuttal Testimony be inserted into the record as though read.

CHAIRMAN CARTER: Your prefiled Surrebuttal Testimony will be entered into the record as though read.

MR. HOFFMAN: Thank you, Mr. Chairman.

Q. Have you reviewed the rebuttal testimony of Mr. Woodcock?

A. Yes.

Q. Do you have comments regarding Mr. Woodcock's testimony with respect to fire flow requirements?

A. Yes. Mr. Woodcock states that he is not aware of any design requirement that relies on the Insurance Service Organization (ISO) or the National Board of Fire Underwriters (NBFU). These organizations have established design standards for water supply systems, including fire flow requirements, and those standards are recognized and relied upon and used by engineers, water utilities and regulatory agencies in states around the country. These standards and fire flow requirements have long been recognized by the American Water Works Association (AWWA). For example, an AWWA M5 Management Manual, Copyright 1959, "A Training Course in Water Utility Management" states in the second paragraph of Chapter 4, Fire Protection, that "The most generally accepted standards for public fire protection are contained in the Standard Schedule for Grading Cities and Towns of the United States With Reference to Their Fire Defense and Physical Conditions, published by the National Board of Fire Underwriters (NBFU)." This chapter is provided as Exhibit JFG-4, and I provided a copy of the referenced Standard Schedule in Exhibit JFG-2 to my direct testimony.

A more recent publication of the AWWA M-5 manual, copyright 1999, Chapter 4 - Fire Protection (included in Exhibit JFG-4), references the NBFU's successor, the Insurance Services Office, and its published "Guide for Determination of Needed Fire Flow." See Exhibit JFG-1, filed with my direct testimony. Accordingly, it is clear that the AWWA has recognized and accepted the work of the NBFU and ISO organizations in developing fire flow standards for many years. The fire flow requirements have also been accepted in numerous cost allocation and rate design studies that I have submitted in rate cases before regulatory agencies in several states across the country. Importantly, the NBFU and ISO have also graded thousands of communities as to their fire fighting ability, including the reliability of the water systems serving those communities.

While I agree that the fire flow requirements established by local government should be met by water utilities and considered in the context of a used and useful determination, there are certainly instances where those fire flow requirements may not be the most appropriate for either design purposes or for used and useful calculations. For example, I am aware of an instance in Florida where the local government set a fire flow requirement that was exactly the same for each hydrant. Not only was the per-hydrant requirement clearly inadequate to meet the needs of large residential or commercial structures, but it did not address the overall fire flow requirement a water utility must meet on a system-wide basis or for multiple fires. These considerations thus were left to the water utility. A rule that is limited to the minimum local government requirements does not recognize that a utility must provide the most appropriate fire flow requirement, even if that is in excess of the minimum required by the local government.

The important point is that the used and useful rule would be better if it specifically recognizes the need for water systems to be designed meet the most appropriate fire flow requirements, and for a water utility's rates to include the costs to do so. My recommendation to include "an appropriate fire flow" in addition to consideration of fire flow requirements of local government simply provides for the recognition of fire flows that may be more appropriate.

Q. Does that conclude your rebuttal testimony?

A. Yes.

BY MR. HOFFMAN:

Q Mr. Guastella, have you also attached one exhibit to your Surrebuttal Testimony?

A Yes.

Q And that is Exhibit JFG-4?

A Correct.

MR. HOFFMAN: Mr. Chairman, I believe that this particular Exhibit JFG-4 has been premarked for identification as Exhibit 22.

CHAIRMAN CARTER: You're correct.

BY MR. HOFFMAN:

Q Mr. Guastella, do you have a brief summary of your prefiled Surrebuttal Testimony?

A Yes. Basically my testimony simply covers fire flow requirements and sources for those determinations.

MR. HOFFMAN: Thank you. The witness is available for cross.

CHAIRMAN CARTER: Mr. Reilly, you are recognized.

MR. REILLY: Yes, sir.

CROSS EXAMINATION

BY MR. REILLY:

Q Just a few questions where I'm going to try to understand any differences and compare your JFG-2 exhibit filed with your Direct Testimony versus this JFG-4, which was filed with your Rebuttal Testimony. Just so that I can make sure I understand how these two references work with each other, is it true that JFG-2 is considering population, the level of population amounts in determining fire flow rates?

A That's one of the tables that is included in JFG-2.

Q And if I'm going to the right place, would that be on -- well, this is an excerpt, but it would be Page 16 of JFG-2? It looks to be a table.

A Yes. The Page 16 you are referring to is the Page 16 out of the standard schedule for grading cities and towns.

Q Just one of the excerpts. Now, this JFG-2, it's a 1956 National Board of Fire Underwriters reference, is that correct?

A That was the latest edition at that time, yes.

Q Now, if I could have you look at this most recent exhibit, JFG-4, and is it titled -- let's see, it says AMMA. Is that actually AWWA you mean to say? Is that a typographical --

A Yes, that is a typographical error.

Q And that's excerpts from M-5 manual?

A That's correct.

Q And my question, if I could direct your attention to a certain page on there so you could help me understand where this later reference, how it affect your first reference. And I believe I need to direct your attention to -- I guess it's Page 22, but it is also an excerpt. And it's the page dealing with fire flow requirements, is that correct? Are you on that page?

A Page 22?

Q It's in the top left corner of the page, and it is right after -- well, it is many pages back, but it's just -- well, it's Chapter 4 dealing with fire protection.

A Well, there are two. In Exhibit JFG-4 there are two. One of them is water utility management manual for AWWA, which has a Chapter 4, and then there was a subsequent water management report by AWWA. So that in both AWWA water management training course in water management, one refers to the grading schedule and another refers to an updating of the fire flow requirements by ISO.

Q Okay. The first part of your JFG-4, and it is on the second page right after your cover page, it says water utility management, AWWA. That's an excerpt, and what is the date? The date on that is 19 -- I'm sorry.

A 1959 copyright date.

Q That is the second page, and I didn't speak correctly. That's a training course in water utility management. That's the first part, is that correct?

A That's one of the excerpts that I'm including which refers to the standard schedule for grading cities and towns, which is JFG-3, as one of the most generally accepted standards for public fire protection.

Q And if you move from your cover page to the third page over, there is a Chapter 4, fire protection. And what is the date of this little excerpt that you have pulled out and underlined all of this language? What is the date of this particular part of your JHG-4?

A The first page is a training course in water utility management, and that extends from the first, second, third, fourth, fifth, sixth, seventh, and eighth pages, so that's all part of the first reference by AWWA to the standard schedule that is shown in my Exhibit JFG-3. And then there is a second part to Exhibit 4, which states water utility management, AWWA Manual M-5, and that also consists of a number of pages. That refers to Exhibit JFG-2 that I included in my Direct Testimony. So the American Water Works Association has recognized both the older grading schedule in JFG-3 and the more recent schedule of ISO in Exhibit JFG-2.

Q I might be able to help you to an answer on this. I just saw here the copyright 1959 on that second page of the first reference.

A Correct.

Q And then later attached to this is apparently a much newer reference, and it is, in fact, also talking about the same chapter, Chapter 4, fire protection, is that correct, but it just seems to be a lot newer?

A Well, this is copyright 1999. So the AWWA has recognized the older version in the 1959 copyright, and the more recent version of ISO requirements in the 1999 copyright.

Q But this later one is, in fact, the far newer one as compared to 1959?

A 1999 is newer than 1959.

Q And now that we have established that, if you could just move on to the second reference, the newer reference, AWW. There is a couple of sentences in there I just want you to help explain to me. And, of course, it is right on our subject, fire flow requirements. And it's found on -- well, it is excerpted Page 22, the top left corner. And what I'm drawing your attention to is the first couple of sentences that follow the word fire flow requirements. And if you could read those first two sentences.

A "Another important change in the schedule is the method of estimating required fire flow. The formula, based on population, included in the schedule since it was first published has been eliminated. The calculation" --

Q That's good enough. Just those two sentences. My question is is, in fact -- or give me your interpretation of what that sentence means to you, concerning the applicability of population as being a valid basis?

A Well, the grading schedule -- this recognized that over the course of many years, scores of years, the population -- the table containing fire flows for various populations were a good reliable estimate. As times have changed, the ISO has gone to a specific formula for specific buildings. So whether you use the population as a guide or whether you use the specific formula regardless of population, you still come up with a reasonable level of required fire flow.

In both instances the AWWA states that it specifically generally recognizes as the most acceptable standard for fire flow requirements is the ISO or its predecessor. This is what I rely on in performing many fire flow requirements and studies. That's accepted generally around the country as the most generally and widely accepted method is using the ISO formula, whether it is the older one or the newer one.

Q I appreciate that clarification of your position, but my narrow question is by virtue of this language, am I interpreting it correctly to mean that this has been eliminated as one of the factors, the population?

A That's correct. They no longer use population, they use a different formula.

MR. REILLY: Okay. Thank you.

CHAIRMAN CARTER: Okay. Mr. Friedman.

MR. FRIEDMAN: I have no questions.

CHAIRMAN CARTER: Thank you.

Commissioners, any questions? Staff.

MR. JAEGER: Staff has no questions.

CHAIRMAN CARTER: Mr. Hoffman.

MR. HOFFMAN: No redirect.

CHAIRMAN CARTER: Okay. Let's take care of our housekeeping chores here.

MR. HOFFMAN: Mr. Chairman, Aqua would move Exhibit 22. We would note the correction to the title of the cover page to AWWA M-5 manual excerpts, and ask that that be admitted into the record.

CHAIRMAN CARTER: Any objection?

MR. REILLY: No objections.

CHAIRMAN CARTER: Show it done.

MR. HOFFMAN: Thank you.

(Exhibit 22 admitted into the record.)

CHAIRMAN CARTER: Staff.

MS. GERVASI: Staff knows of no other matters that need to be attended to at this time. I would simply note that the transcript of today's hearing is due on February 5th, followed by post-hearing briefs on February 19th for a post-hearing agenda of April the 8th.

CHAIRMAN CARTER: Okay. Let me, first of all, thank the attorneys and the witnesses for their courtesy and the professionalism that you conducted yourself today here in our hearing.

Commissioners, anything for the good of the order?

Any other matters, staff?

MS. GERVASI: None that we are aware of.

CHAIRMAN CARTER: Hearing none, we are adjourned.

(The hearing concluded at 4:06 p.m.)

STATE OF FLORIDA)
: CERTIFICATE OF REPORTER
COUNTY OF LEON)

I, JANE FAUROT, RPR, Chief, Hearing Reporter Services Section, FPSC Division of Commission Clerk, do hereby certify that the foregoing proceeding was heard at the time and place herein stated.

IT IS FURTHER CERTIFIED that I stenographically reported the said proceedings; that the same has been transcribed under my direct supervision; and that this transcript constitutes a true transcription of my notes of said proceedings.

I FURTHER CERTIFY that I am not a relative, employee, attorney or counsel of any of the parties, nor am I a relative or employee of any of the parties' attorney or counsel connected with the action, nor am I financially interested in the action.

DATED THIS 29th day of January, 2008.

Jane Faurot

JANE FAUROT, RPR
Official FPSC Hearings Reporter
(850) 413-6732

Comprehensive Exhibit List for Entry into Hearing Record

Hearing I.D. #	Witness	I.D. # As Filed	Exhibit Description	Entered
Staff				
1		Exhibit List- 1	Comprehensive Exhibit List	
Testimony Exhibit List				
Office of Public Counsel (Direct)				
2	Andrew T. Woodcock, P.E., M.B.A.	ATW-1	Resume of Andrew T. Woodcock	
3	Andrew T. Woodcock, P.E., M.B.A.	ATW-2	OPC Recommended Rule No. 25-30.4325, F.A.C.	
Aqua Utilities of Florida (Direct)				
4	John F. Guastella, P.E.	Attachment 1	Qualifications and Experience	
5	John F. Guastella, P.E.	JFG-1	Guide for Determination of Needed Fire Flow	
6	John F. Guastella, P.E.	JFG-2	Standard Schedule for Grading Cities and Towns of the United States With Reference to Their Fire Defense and Physical Conditions	
7	John F. Guastella, P.E.	JFG-3	Water Rates – AWWA Manual M1 Fourth Edition	
Utilities, Inc. of Florida (Direct)				
8	Frank Seidman, P.E.	FS-1	Summary of Cases	
9	Frank Seidman, P.E.	FS-2	PSC Staff Memorandum, February 7, 1983	
10	Frank Seidman, P.E.	FS-3	PSC Staff Memorandum, April 14, 1975	

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 1
COMPANY FPSC Staff
WITNESS Exhibit List-1 (Comprehensive)
DATE 01/22/08

Comprehensive Exhibit List for Entry into Hearing Record

Hearing I.D. #	Witness	I.D. # As Filed	Exhibit Description	Entered
11	Frank Seidman, P.E.	FS-4	PSC Order No. 7684 (issued March 14, 1977) (Excerpt)	
12	Frank Seidman, P.E.	FS-5	Mark Up of Proposed Rule 25-30.4325	
Staff (Direct)				
13	Dwight T. Jenkins, Esq., P.G.	DTJ-1	Curriculum Vitae of Dwight T. Jenkins, Esq., P.G.	
14	Richard P. Redemann, P.E.	RPR-1	Resume of Richard Paul Redemann, P.E.	
15	Richard P. Redemann, P.E.	RPR-2	Proposed Rule No. 25-30.4325	
16	Richard P. Redemann, P.E.	RPR-3	AWWA M32	
17	Richard P. Redemann, P.E.	RPR-4	St. Johns River Water Management District Water Conservation Plan	
18	Richard P. Redemann, P.E.	RPR-5	SWFWMD Water Use Permit Information Manual	
19	Richard P. Redemann, P.E.	RPR-6	Recommended Standards for Water Works	
20	Richard P. Redemann, P.E.	RPR-7	AWWA Water Distribution Systems Handbook and U.S. Army Corp of Engineers Design of Small Water Systems	
21	Richard P. Redemann, P.E.	RPR-8	Matrix	
Aqua Utilities of Florida (Surrebuttal)				
22	John F. Guastella, P.E.	JFG-4	AMMA M-5 Manual (Excerpts)	

HEARING EXHIBITS

Exhibit #	Witness	Counsel	Description	Moved In/Due Date of Late Filed
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HEARING EXHIBITS

Exhibit #	Witness	Counsel	Description	Moved In/Due Date of Late Filed
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HEARING EXHIBITS

Exhibit #	Witness	Counsel	Description	Moved In/Due Date of Late Filed
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EXHIBIT ATW-1

RESUME

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS EXHIBIT 2
COMPANY Office of Public Counsel (Direct)
WITNESS Andrew T. Woodcock, P.E., M.B.A. (ATW-1)
DATE 01-22-08

TETRA TECH

ANDREW T. WOODCOCK, P.E., M.B.A.

Mr. Woodcock has been involved with many different facets of environmental engineering including planning, design, and permitting of both water and wastewater treatment facilities, wastewater collection systems, pipeline systems, pumping stations and effluent disposal systems. He has special expertise in utility due diligence investigations, utility valuations, financial feasibility analyses and business plans. He is also experienced in the preparation and review of capital improvement programs, master planning and water and wastewater impact fees.

EXPERIENCE

Mr. Woodcock's major design and planning experience includes the design, and permitting functions associated with several water and wastewater projects. Representative water projects include the Venice Gardens Utilities Center Road WTP 0.6 MGD RO facility expansion and the City of Port St. Lucie wellfield expansion. Wastewater design projects include the 0.5 MGD expansion to the Deltona Lakes WWTP and the 1.6 MGD expansion to the City of Sanibel's WWTP both of which include treatment to public access reuse standards.

Mr. Woodcock's water and wastewater utility planning experience includes several master plans and capital improvements programs. Recent planning projects include the City of Winter Haven Water Master Plan, the Town of Palm Beach Water Capital Improvements Program, and the Marion County Utility Consolidation Program.

Mr. Woodcock has participated in over 60 water and wastewater utility valuations and acquisitions for utility systems located throughout the Southeast United States. The acquisition projects cover a wide range of utility system configurations and sizes and include engineering due diligence inspections, valuations, and financing activities associated with the transactions. Major projects include the City of Peachtree City GA acquisition of Georgia Utilities Company, the City of Winter Haven FL acquisition of Garden Grove Water Company and the acquisition of the Deltona and Marion County systems from Florida Water Services Corp.

Additionally, Mr. Woodcock has experience in the review and analysis of water and wastewater utility impact fees and utility financial feasibility studies in support of capital funding including studies for the Cities of Apopka, Brooksville, and Bartow, Pasco County and the Tohopekaliga Water Authority.

Title:
Senior Project Manager

Education:
B.S.E., University of Central Florida, 1988

M.S.E., University of Central Florida, 1989

M.B.A., Rollins College, 2001

Registrations/ Certifications:
Professional Engineer, Florida, No. 47118

Professional Affiliations:
Water Environment Federation

American Water Works Association

Office:
Orlando, Florida

Years of Experience:
1990 – Present

Years with Tetra Tech:
1991 – Present

Specific Recent Project Experience Includes:

Deltona, Florida
Utility Acquisition of Florida Water Services Corp (2003)
Consulting Engineers Report, Series 2003; Utility System Revenue Bonds, $81.72 million.
Water and Wastewater Impact Fee Study (2005)
Water and Wastewater Rate Study (2006)
Utility Replacement Cost Study (2004)

Marion County Florida
Water and Wastewater Impact Fee Study (2005)
Utility Acquisition of Florida Water Services (2003)
Utility Acquisition of AP Utilities, Palm Bay Utilities, Oak Run Utilities, Pine Run Utilities, Quail Meadow Utilities
Consulting Engineering Report, Series 2003; Utility System Revenue Bonds, $40.19 million
Consulting Engineers Report, Series 2001; Utility System Revenue Bonds, $27.27 million
Water and Wastewater Utility Master Plan (2005)

City of Orlando, Florida
Research Park Economic Impact Evaluation (2005)

Collier County, Florida
Utility Regulatory Services – Orangetree Utilities (2004)

St. Johns County, Florida
Utility Regulatory Services – Intercoastal Utilities (2002, 2005)

Pasco County, Florida
Acquisition Feasibility Program (2001)
Acquisition of East Pasco Utilities and Forrest Hills Utilities (2002)
Utility Valuation of Lindrick Utilities and Hudson Utilities (2004)
Comprehensive Water, Wastewater and Reclaimed Water Rate and Charge Study (2003, 2007)
Reclaimed Water Rate Study (2005)
Water, Wastewater, and Reclaimed Water Impact Fee Review (2005)
Series 2006 Water and Sewer Refunding Revenue Bonds, $71.16 million

City of Orange City, Florida
Impact Fee Review (2004)
Revenue Sufficiency Study (2006)

City of Naples Florida
Reclaimed Water Project Assessment and Funding Program (2006)
Comprehensive Water, Wastewater and Reclaimed Water Rate Study (2007)
Stormwater Utility Financial Review (2007)

City of Minneola, Florida
Water Impact Fee Update (2006)
Stormwater Utility Rate Study (2006)

Florida Office of Public Counsel
Utility Regulatory Services – Aqua America Utilities (2007)

Henry County Water District No 2. – KY
Utility Regulatory Services

PAPERS AND PRESENTATIONS

"Water and Wastewater Impact Fees: An Overview" Florida Rural Water Association, Utility Management Training, April 4, 2005.

EXHIBIT ATW-2

OPC RECOMMENDED RULE NO. 25-30.4325, FAC

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183 EXHIBIT 3
COMPANY Office of Public Counsel (Direct)
WITNESS Andrew T. Woodcock, P.E., M.B.A. (ATW-2
DATE 01-22-08

25-30.4325 Water Treatment, Storage and High Service Pumping Used and Useful Calculations

(1) Definitions.

(a) A water treatment system includes all facilities, such as wells and treatment facilities, excluding storage and high service pumping, necessary to pump and treat potable water .

(b) Storage facilities include ground or elevated storage tanks.

(c) High service pumping includes those pumps after storage that deliver potable water to a transmission and distribution system.

(d) Peak demand for a water treatment system includes:

1. For utilities without storage, the greater of:

(i) the utility's maximum hour demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements in Rule 25-30.431, FAC, or

(ii) the utility's maximum day demand, excluding excessive unaccounted for water plus a growth allowance based on the requirements in Rule 25-30.431, FAC, and if provided, a minimum of either the fire flow required by local government authority or 2 hours at 500 gpm.

2. For utilities with storage, the utility's maximum day demand, excluding excessive unaccounted for water plus a growth allowance based on the requirements in Rule 25-30.431, FAC.

(e) Peak demand for storage includes 25% of the utility's maximum day demand, excluding excessive unaccounted for water, plus an allowance for fire flow, if provided, a minimum of either the fire flow required by local governmental authority or 2 hours at 500 gallons per minute, and a growth allowance based on the requirements in Rule 25-30.431, FAC.

(f) Peak demand for high service pumping includes the greater of:

1. The utility's maximum hour demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements in Rule 25-30.431, FAC, or

2. The utility's maximum day demand, excluding excessive unaccounted for water plus a growth allowance based on the requirements in Rule 25-30.431, FAC, and if provided, a minimum of either the fire flow required by local government authority or 2 hours at 500 gpm.

(g) Excessive unaccounted for water (EUW) is potable water produced in excess of 110 percent of the accounted for usage, including water sold, water used for flushing or fire fighting, and water lost through line breaks. Any water claimed as accounted for that was used for flushing, fire fighting and water lost through line breaks must be documented by complete records of these flow losses.

(2) The used and usefulness of a water treatment system shall be calculated separately from the storage facilities. If any party believes a used and useful calculation should be utilized in a specific case which differs from the provisions of this rule, such calculation may be provided along with supporting documentation. The party proposing the alternative calculation shall have the burden to prove that the alternative calculation is more appropriate for the specific case than application of the calculation

provided by this rule. Examples of such specific cases that might warrant the use of alternative U&U calculations include but are not limited to: economies of scale, service area restrictions, factors involving treatment capacity, well drawdown limitations, and changes in flow due to conservation or a reduction in number of customers.

(3) The used and usefulness of a water treatment system is determined by dividing the peak demand by the firm reliable capacity of the water treatment system.

(4) The firm reliable capacity of a water treatment system is equivalent to the pumping capacity of the wells, excluding the largest well for those systems with more than one well.

(a) For systems with no storage, the firm reliable capacity shall be expressed in gallons per minute.

(b) For systems with storage, the firm reliable capacity shall be expressed as gallons per day, based upon 24 hours of pumping, unless there is documented restrictions to the hours of pumping as required by the Water Management District or other regulatory body, in which case the restriction shall apply.

(5) Peak demand includes peak hour demand for a water treatment system with no storage capacity and a peak day demand for a water treatment system with storage capacity.

(a) Peak hour demand, expressed in gallons per minute, shall be calculated as follows:

1. The single maximum day (SMD) in the test year where there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water divided by 1440 minutes in a day

times a peaking factor ranging between 1.5 to 2 [((SMD-EUW)/1,440) x 1.5 to 2], or

2. The average of the 5 highest days (AFD) within the maximum month of the test year less excessive unaccounted for water divided by 1440 minutes in a day times a peaking factor ranging between 1.5 to 2 [((AFD-EUW)/1,440) x 1.5 to 2], or

3. In determining an appropriate peaking factor in the range for a specific system consideration shall be given to the size and character of the system service area. For larger systems with a diverse customer base a lower peaking factor shall be used and conversely for smaller systems with a uniform customer base a higher peaking factor shall be used.

(b) Peak day demand, expressed in gallons per day, shall be calculated as follows:

1. The single maximum day in the test year, if there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water (SMD-EUW), or

2. The average of the 5 highest days within the maximum month of the test year less excessive unaccounted for water (AFD-EUW).

(6) The used and usefulness of storage is determined by dividing the peak demand for storage as defined in this rule by the usable storage of the storage tank. Usable storage capacity less than or equal to the peak demand shall be considered 100 percent used and useful. A hydropneumatic tank is not considered usable storage.

(7) Usable storage determination shall be as follows:

(a) An elevated storage tank shall be considered 100 percent usable.

(b) A ground storage tank shall be considered 90 percent usable if the bottom of the tank is below the centerline of the pumping unit.

(c) A ground storage tank constructed with a bottom drain shall be considered 100 percent usable, unless there is a documented limiting factor, in which case the limiting factor will be taken into consideration.

(8) The used and usefulness of high service pumping is determined by dividing the peak demand for high service pumping as defined in this rule by the firm reliable capacity of the high service pumps.

(9) The firm reliable capacity of high service pumping is equivalent to the pumping capacity of the high service pumps, excluding the largest high service pump for those systems with more than one high service pump.

Specific Authority: 350.127(2), 367.121(1)(f) FS.

Law Implemented: 367.081(2), (3) FS.

History: New .

Rule 25-30-4325.ldh.doc

Docket No. 070183-WS
Attachment 1

QUALIFICATIONS

&

EXPERIENCE

JOHN F. GUASTELLA

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 4
COMPANY Aqua Utilities of FL (Direct)
WITNESS John F. Guastella, P.E. (Attch. 1)
DATE 01/22/08

PROFESSIONAL QUALIFICATIONS AND EXPERIENCE
of
JOHN F. GUASTELLA

B.S., Mechanical Engineering, Stevens Institute of Technology, 1962, Licensed Professional Engineer.

Member:
- American Water Works Association, Lifetime Member
- National Association of Water Companies
- New England Water Works Association, Lifetime Member

Committees:
- AWWA, Water Rates Committee (Manual M-1, 1983 Edition)
- National Association of Regulatory Utility Commissioners (NARUC) and NAWC, Joint-Committee on Rate Design
- NAWC, Rates and Revenues Committee
- NAWC, Small Water Company Committee

Mr. Guastella is President of Guastella Associates, Inc., which provides management, valuation and rate consulting services for municipal and investor-owned utilities, as well as regulatory agencies. His clients include utilities in the states of Alaska, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Maine, Maryland, Massachusetts, Missouri, Michigan, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Pennsylvania, South Carolina, Texas, Rhode Island and Virginia. He has provided consulting services that include all aspects of utility regulation and rate setting, encompassing revenue requirements, revenues, operation and maintenance expenses, depreciation, taxes, return on investment, cost allocation and rate design. He has performed depreciation studies for the establishment of average service lives of utility property. He has performed appraisals of utility companies for management purposes and in connection with condemnation proceedings. He has also negotiated the sale of utility companies.

Mr. Guastella served for more than four years as President of Country Knolls Water Works, Inc., a water utility that served some 5,500 customers in Saratoga County, New York. He also served as a member of the Board of Directors of the National Association of Water Companies.

Mr. Guastella has qualified and testified as an expert witness before regulatory agencies and municipal jurisdictions in the states of Alaska, California, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Maryland, Massachusetts, Missouri, Montana, Nevada, New Hampshire, New Mexico, New Jersey, New York, North Dakota, Ohio, Pennsylvania, Rhode Island, South Carolina, Texas and Virginia.

Prior to establishing his own firm, Mr. Guastella was employed by the New York State Public Service Commission for sixteen years. For two years he was involved in the regulation of electric and gas utilities, with the remaining years devoted to the regulation of water utilities. In 1970, he was promoted to Chief of Rates and Finance in the Commission's Water Division. In 1972, he was made Assistant Director of the Water Division. In 1974, he was appointed by Alfred E. Kahn, then Chairman of the Commission, to be Director of the Water Division, a position he held until he resigned from the Commission in August 1978.

At the Commission, his duties included the performance and supervision of engineering and economic studies concerning rates and service of many public utilities. As Director of the Water Division, he was responsible for the regulation of more than 450 water companies in New York State and headed a professional staff of 32 engineers and three technicians. A primary duty was to attend Commission sessions and advise the Commission during its decision making process. In the course of that process, an average of about fifty applications per year would be reviewed and analyzed. The applications included testimony, exhibits and briefs involving all aspects of utility valuation and rate setting. He also made legislative proposals and participated in drafting Bills that were enacted into law: one expanded the N.Y. Public Service Commission's jurisdiction over small water companies and another dealt specifically with rate regulation and financing of developer-related water systems.

In addition to his employment and client experience, Mr. Guastella served as Vice-Chairman of the Staff-Committee on Water of the National Association of Regulatory Utility Commissioners (NARUC). This activity included the preparation of the "Model Record-Keeping Manual for Small Water Companies," which was published by the NARUC. This manual provides detailed instruction on the kinds of operation and accounting records that should be kept by small water utilities, and on how to use those records.

Each year since 1974 he has prepared study material, assisted in program coordination and served as an instructor at the Eastern Annual Seminar on Water Rate Regulation sponsored over the years by the NARUC in conjunction with the University of South Florida, Florida Atlantic University, the University of Utah, Florida State University, the University of Florida and currently Michigan State University. In 1980 he was instrumental in the establishment of the Western NARUC Rate Seminar and has annually served as an instructor since that time. This course is recognized as one of the best available for teaching rate-setting principles and methodology. More than 5,000 students have attended this course, including regulatory staff, utility personnel and members of accounting, engineering, legal and consulting firms throughout the country.

Mr. Guastella served as an instructor and panelist in a seminar on water and wastewater regulation conducted by the Independent Water and Sewer Companies of Texas. In 1998, he prepared and conducted a seminar on basic rate regulation on behalf of the New England Chapter of the National Association of Water Companies. In 2000 and 2001, Mr. Guastella developed and conducted a special seminar for developer related water and wastewater utilities in conjunction with Florida State University, and again in 2003 in conjunction with the University of Florida. It provided essential training for the financial structuring of small water and wastewater utilities, rate setting, financing and the establishment of their market value in the event of a negotiated sale or condemnation. In 2004, he prepared and conducted a special workshop seminar on behalf of the Office of Regulatory Staff of South Carolina, covering rate setting, valuation and general regulation of water and wastewater utilities. In 2006, he participated in an expert workshop on full cost pricing conducted by the U. S. Environmental Protection Agency in coordination with the Institute of Public Utilities, Michigan State University. In 2006, he prepared and conducted a special seminar on rate setting and valuation on behalf of the New York Chapter of the NAWC. In 2007, he prepared and conducted a special seminar on rate setting and valuation on behalf of the New England Chapter of NAWC.

Mr. Guastella has made presentations on a wide variety of rate, valuation and regulatory issues at meetings of the National Association of Regulatory Utility Commissioners, the American Water Works Association, the New England Water Works Association, the National Association of Water Companies, the New England Conference of Public Utilities Commissioners, the Florida, New England, New Jersey and New York Chapters of NAWC, the Mid-America Regulatory Conference, the Southeastern Association of Regulatory Utility Commissioners, the Pennsylvania Environmental Conference, and the Public Utility Law Section of the New Jersey Bar Association.

John F. Guastella
List of Proceedings in which Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
1966	Sunhill Water Corporation	New York	23968
1967	Amagansett Water Company	New York	24210
1967	Worley Homes, Inc.	New York	24466
1968	Amagansett Water Company	New York	24718
1968	Amagansett Water Company	New York	24883
1968	Sunhill Water Corporation	New York	23968
1968	Worley Homes, Inc.	New York	Supreme Court
1969	Amagansett Water Supply	New York	24883
1969	Citizens Water Supply Co.	New York	25049
1969	Worley Homes, Inc.	New York	24466/24992
1970	Brooklyn Union Gas Company	New York	25448
1970	Consolidated Edison of New York	New York	25185
1971	Hudson Valley Water Companies	New York	26093
1971	Jamaica Water Supply Company	New York	26094
1971	Port Chester Water Works, Inc.	New York	25797
1971	U & I Corp. - Merrick District	New York	26143
1971	Wanakah Water Company	New York	25873
1972	Spring Valley Water Company	New York	26226
1972	U & I Corp. - Woodhaven District	New York	26232
1973	Citizens Water Supply Company	New York	26366
1978	Rhode Island DPU&C (Bristol County)	Rhode Island	1367A
1979	Candlewick Lake Utilities Co.	Illinois	76-0218
1979	Candlewick Lake Utilities Co.	Illinois	76-0347
1979	Candlewick Lake Utilities Co.	Illinois	78-0151
1979	Jacksonville Suburban Utilities	Florida	770316-WS
1979	New York Water Service Corporation	New York	27594
1979	Salem Hills Sewerage Disposal Corp. v. V. of Vorheesville	New York	Supreme Court
1979	Seabrook Water Corporation	New Jersey	7910-846
1979	Southern Utilities Corporation	Florida	770317-WS
1979	Township of South Brunswick	New Jersey	Municipal
1979	Westchester Joint Water Works	New York	Municipal
1979	Woodhaven Utilities Corporation	Illinois	77-0109
1980	Crestwood Village Sewer Company	New Jersey	BPU 802-78
1980	Crestwood Village Water Company	New Jersey	BPU 802-77
1980	Gateway Water Supply Corporation	Texas	Municipal
1980	GWW-Central Florida District	Florida	800004-WS
1980	Jamaica Water Supply Company	New York	27587
1980	Rhode Island DPU&C (Newport Water)	Rhode Island	1480
1981	Briarcliff Utilities, Inc.	Texas	3620
1981	Candlewick Lake Utilities Co.	Illinois	81-0011
1981	Caroline Water Company, Inc.	Virginia	810065
1981	GDU, Inc. - Northport	Florida	Municipal
1981	GDU, Inc. - Port Charlotte	Florida	Municipal
1981	GDU, Inc. - Port Malabar	Florida	80-2192
1981	Hobe Sound Water Company	Florida	8000776
1981	Lake Buckhorn Utilities, Inc.	Ohio	80-999
1981	Lake Kiowa Utilities, Inc.	Texas	3621
1981	Lakengren Utilities, Inc.	Ohio	80-1001
1981	Lorelei Utilities, Inc.	Ohio	80-1000
1981	New York Water Service Corporation	New York	28042
1981	Rhode Island DPU&C (Newport Water)	Rhode Island	1581
1981	Shawnee Hills Utility Company	Ohio	80-1002
1981	Smithville Water Company, Inc.	New Jersey	808-541
1981	Spring Valley Water Company, Inc.	New York	27936
1981	Spring Valley Water Company, Inc.	New York	27936
1981	Sunhill Water Corporation	New York	27903
1981	Swan Lake Water Corporation	New York	27904
1982	Chesterfield Commons Sewer Company	New Jersey	822-84
1982	Chesterfield Commons Water Company	New Jersey	822-83
1982	Crescent Waste Treatment Corp.	New York	Municipal
1982	Crestwood Village Sewer Company	New Jersey	821-33
1982	Crestwood Village Water Company	New Jersey	821-38
1982	Salem Hills Sewerage Disposal Corp.	New York	Municipal
1982	Township of South Brunswick	New Jersey	Municipal
1982	Woodhaven Utilities Corporation	Illinois	82-0167
1983	Country Knolls Water Works, Inc.	New York	28194
1983	Heritage Hills Water Works Corp.	New York	28453
1984	Crestwood Village Sewer Company	New Jersey	8310-861
1984	Crestwood Village Water Company	New Jersey	8310-860
1984	Environmental Disposal Corp.	New Jersey	816-552
1984	GDU, Inc. - Port St. Lucie	Florida	830421
1984	Heritage Village Water (water/sewer)	Connecticut	84-08-03
1984	Hurley Water Company, Inc.	New York	28820

John F. Guastella
List of Proceedings in which Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
1984	New York Water Service Corporation	New York	28901
1985	Deltona Utilities (water/sewer)	Florida	830281
1985	J. Filiberto Sanitation, Inc.	New Jersey	8411-1213
1985	Sterling Forest Pollution Control	New York	Municipal
1985	Water Works Enterprise, Grand Forks	North Dakota	Municipal
1986	GDU, Inc. - Port Charlotte	Florida	Municipal
1986	GDU, Inc. - Sebastian Highlands	Florida	Municipal
1986	Kings Grant Water/Sewer Companies (settled)	New Jersey	WR8508-868
1986	Mt. Ebo Sewage Works, Inc.	New York	Municipal
1986	Sterling Forest Pollution Control	New York	Municipal
1987	Country Knolls Water Works, Inc.	New York	29443
1987	Crestwood Village Sewer Co. (settled)	New Jersey	WR8701-38
1987	Deltona Utilities - Marco Island	Florida	850151-WS
1987	Deltona Utilities, Inc. - Citrus Springs (settled)	Florida	870092-WS
1987	First Brewster Water Corp. v. Town of Southeast (settled)	New York	Supreme Court
1987	GDU, Inc. - Silver Springs Shores	Florida	870239-WS
1987	Ocean County Landfill Corporation	New Jersey	SR-8703117
1987	Palm Coast Utility Corporation	Florida	870166-WS
1987	Sanlando Utilities Corp. (settled)	Florida	860683-WS
1987	Township of South Brunswick	New Jersey	Municipal
1987	Woodhaven Utilities Corp. (settled)	Illinois	87-0047
1988	Crescent Estates Water Co., Inc.	New York	88-W-035
1988	Elizabethtown Water Co.	New Jersey	OAL PUC3464-88
1988	Heritage Village Water Company	Connecticut	87-10-02
1988	Instant Disposal Service, Inc.	New Jersey	SR-87080864
1988	J. Filiberto Sanitation v. Morris County Transfer Station	New Jersey	01487-88
1988	Ohio Water Service Co.	Ohio	86-1887-WW-CO1
1988	St. Augustine Shores Utilities	Florida	870980-WS
1989	Elizabethtown Water Co.	New Jersey	BPU WR89020132J
1989	GDU (FPSC generic proceeding as to rate setting procedures)	Florida	880883-WS
1989	Gordon's Corner Water Co.	New Jersey	OAL PUC479-89
1989	Heritage Hills Sewage Works	Connecticut	Municipal
1989	Heritage Village Water Company	Connecticut	87-10-02
1989	Palm Coast Utility Corporation	Florida	890277-WS
1989	Southbridge Water Supply Co.	Massachusetts	DPU 89-25
1989	Sterling Forest Water Co.	New York	PSC 88-W-263
1990	American Utilities, Inc. - United States Bankruptcy Court	New Jersey	85-00316
1990	City of Carson City	Nevada	Municipal
1990	Country Knolls Water Works, Inc.	New York	90-W-0458
1990	Elizabethtown Water Company	New Jersey	WR900050497J
1990	Kent County Water Authority	Rhode Island	1952
1990	Palm Coast Utility Corporation	Florida	871395-WS
1990	Southern States Utilities, Inc.	Florida	Workshop
1990	Trenton Water Works	New Jersey	WR90020077J
1990	Waste Management of New Jersey	New Jersey	SE 87070552
1990	Waste Management of New Jersey	New Jersey	SE 87070566
1991	City of Grand Forks	North Dakota	Municipal
1991	Gordon's Corner Water Co.	New Jersey	OAL PUC8329-90
1991	Southern States Utilities, Inc.	Florida	900329-WS
1992	Elizabethtown Water Co.	New Jersey	WR 91081293J
1992	General Development Utilities, Inc. - Port Malabar Division	Florida	911030-WS
1992	General Development Utilities, Inc. - West Coast Division	Florida	911067-WS
1992	Heritage Hills Water Works, Inc.	New York	92-2-0576
1993	General Development Utilities, Inc. - Port LaBelle Division	Florida	911737-WS
1993	General Development Utilities, Inc. - Silver Springs Shores	Florida	911733-WS
1993	General Waterworks of Pennsylvania - Dauphin Cons. Water Supply	Pennsylvania	R-00932604
1993	Kent County Water Authority	Rhode Island	2098
1993	Southern States Utilities - FPSC Rulemaking	Florida	911082-WS
1993	Southern States Utilities - Marco Island	Florida	920655-WS
1994	Capital City Water Company	Missouri	WR-94-297
1994	Capital City Water Company	Missouri	WR-94-297
1994	Elizabethtown Water Company	New Jersey	WR94080346
1994	Elizabethtown Water Company	New Jersey	WR94080346
1994	Environmental Disposal Corp.	New Jersey	WR94070319
1994	General Development Utilities - Port Charlotte	Florida	940000-WS
1994	General Waterworks of Pennsylvania	Pennsylvania	R-00943152
1994	Hoosier Water Company - Mooresville Division	Indiana	39839
1994	Hoosier Water Company - Warsaw Division	Indiana	39838
1994	Hoosier Water Company - Winchester Division	Indiana	39840
1994	West Lafayette Water Company	Indiana	39841
1994	Wilmington Suburban Water Corporation	Delaware	94-149 (stld)
1995	Butte Water Company	Montana	Cause 90-C-90
1995	Heritage Hills Sewage Works Corporation	New York	Municipal

John F. Guastella
List of Proceedings in which Expert Testimony was Presented

Year	Client	State	Regulatory Docket/Case Number
1996	Consumers Illinois Water Company	Illinois	95-0342
1996	Elizabethtown Water Company	New Jersey	WR95110557
1996	Palm Coast Utility Corporation	Florida	951056-WS
1996	PenPac, Inc.	New Jersey	OAL-00788-93N
1996	Southern States Utilities, Marco Island	Florida	950495-WS
1997	Crestwood Village Water Company	New Jersey	BPU 96100739
1997	Indiana American Water Co., Inc.	Indiana	IURC 40703
1997	Missouri-American Water Company	Missouri	WR-97-237
1997	South County Water Corp	New York	97-W-0667
1997	United Water Florida	Florida	960451-WS
1998	Consumer Illinois Water Company	Illinois	98-0632
1998	Consumers Illinois Water Company	Illinois	97-0351
1998	Heritage Hills Water Company	New York	97-W-1561
1998	Missouri-American Wastewater Company	Missouri	SR-97-238
1999	Consumers Illinois Water Company	Illinois	99-0288
1999	Environmental Disposal Corp.	New Jersey	WR99040249
1999	Indiana American Water Co., Inc.	Indiana	IURC 41320
2000	South Haven Sewer Works, Inc.	Indiana	Cause: 41410
2000	Utilities Inc. of Maryland	Maryland	CAL 97-17811
2001	Artesian Water Company	Delaware	00-649
2001	Citizens Utilities Company	Illinois	01-0001
2001	Elizabethtown Water Company	New Jersey	WR-0104205
2001	Kiawah Island Utility, Inc.	South Carolina	2001-164-W/S
2001	Placid Lakes Water Company	Florida	011621-WU
2001	South Haven Sewer Works, Inc.	Indiana	41903
2001	Southlake Utilities, Inc.	Florida	981609-WS
2002	Artesian Water Company	Delaware	02-109
2002	Consumers Illinois Water- Grant Park	Illinois	02-0480
2002	Consumers Illinois Water- Village Woods	Illinois	02-0539
2002	Valencia Water Company	California	02-05-013
2003	Consumers Illinois Water - Indianola	Illinois	03-0069
2003	Elizabethtown Water Company	New Jersey	WR-030-70510
2003	Golden Heart Utilities, Inc.	Alaska	U-02-13, 14 & 15
2003	Utilities, Inc. - Georgia	Georgia	CV02-0495-AB
2004	Aquarion Water Company	Connecticut	04-02-14
2004	Artesian Water Company	Delaware	04-42
2004	El Dorado Utilities, Inc.	New Mexico	D-101-CU-2004-
2004	Environmental Disposal Corp.	New Jersey	DPU WR 03 070509
2004	Heritage Hills Water Company	New York	03-W-1182
2004	Jersey City MUA	New Jersey	Municipal
2004	Rockland Electric Company	New Jersey	EF02110852
2005	Aquarion Water Company	New Hampshire	DW 05-119
2005	Intercoastal Utilities, Inc.	Florida	04-0007-0011-0001
2005	Haig Point Utility Company, Inc.	South Carolina	2005-34-W/S
2005	Aquarion Water Company	New Hampshire	DW 05-119
2005	South Central Connecticut Regional Water Auth.	Connecticut	Municipal
2006	Pennichuck Water Works, Inc.	New Hampshire	DW-04048
2006	Village of Williston Park	New York	Municipal
2006	Connecticut Water Company	Connecticut	06-07-08
2006	Birmingham Utilities, Inc.	Connecticut	06-05-10
2006	Aqua Utilities, Inc.	Florida	060368-WS
2007	Aquarion Water Company of CT	Connecticut	07-05-19
2007	Pennichuck Water Works, Inc.	New Hampshire	DW 04-048

Papers and Presentations
By
John F. Guastella

Year	Title	Forum
1974 through Present	1. Basics of Rate Setting 2. Cost Allocation and Rate Design 3. Revenue Requirements	Semi-annual seminars on utility rate regulation, National Association of Regulatory Utility Commissioners, sponsored by University of South Florida, of Utah, Florida State University, and University of Florida, held in the states of Florida, Utah and California
1974	Rate Design Studies: A Regulatory Point-of-View	Annual convention of the National Association of Water Companies, New Haven, Connecticut
1976	Lifeline Rates	Annual convention of the National Association of Water Companies, Chattanooga, Tennessee
1977	Regulating Water Utilities: The Customers' Best Interest	Annual symposium of the New England Conference of Public Utilities Commissioners, Mystic Seaport, Connecticut
1978	Rate Design: Preaching v. Practice	Annual convention of the National Association of Water Companies, Baton Rouge, Louisiana
1979	Small Water Companies	Annual symposium of the New England Conference of Public Utilities Commissioners, Newport, Rhode Island
1979	Rate Making Problems Peculiar to Private Water and Sewer Companies	Special educational program sponsored by Independent Water and Sewer Companies of Texas, Austin, Texas
1980	Water Utility Regulation	Annual meeting of the National Association of Regulatory Utility Commissioners,Houston, Texas
1981	The Impact of Water Rates on Water Usage	Annual Pennsylvania Environmental Conference, Harrisburg, Pennsylvania
1981	A Realistic Approach to Regulating Water Utilities	Mid-America Regulatory Conference, Clarksville, Indiana
1982	Issues in Water Utility Regulation	Annual symposium of the New England Conference of Public Utilities Commissioners, Rockport, Maine
1982	New Approaches to the Regulation of Water Utilities	Southeastern Association of Regulatory Utility Commissioners, Asheville, North Carolina
1983	Allocating Costs and Revenues Fairly and Effectively	Maryland Water and Sewer Finance Conference, Westminster, Maryland
1983	Lifeline and Social Policy Pricing	Annual conference of the American Water Works Association, Las Vegas, Nevada (published)
1984	The Real Cost of Service: Some Special Considerations	Annual New Jersey Section AWWA Spring Meeting, Atlantic City, New Jersey
1987	Margin Reserve: It's Not the Issue	Florida Waterworks Association Newsletter, April/May/June 1987 issue
1987	A "Current" Issue: CIAC	NAWC - New England Chapter November 6, 1987 meeting
1988	Small Water Company Rate Setting: Take It or Leave It	NAWC - New York Chapter June 14, 1988 meeting
1989	The Solution to all the Problems of Good Small Water Companies	NAWC Quarterly magazine, Winter issue
1989	Current Issues Workshop - Panel	New England Conference of Public Utilities Commissioners, Kennebunkport, Maine
1991	Alternative Rate Structures	New Jersey Section 1991 Annual Conference, AWWA, Atlantic City, New Jersey

Papers and Presentations
By
John F. Guastella

Year	Title	Forum
1994	Conservation Impact on Water Rates	New England NAWC and New England AWWA, Sturbridge, Massachusetts
1996	Utility Regulation - 21st Century	NAWC Annual Meeting, Orlando, Florida
1997	Current Status Drinking Water State Revolving Fund	NAWC Annual Meeting, San Diego, California
1998	Small Water Companies - Problems and Solutions	NAWC Annual Meeting, Indianapolis, Indiana
1998	Basic Rate Regulation Seminar	New England Chapter - NAWC, Rockport, Maine
2000	Developer Related Water and Sewer Utilities Seminar	Florida State University, Orlando, Florida
2001	Developer Related Water and Sewer Utilities Seminar	Florida State University, Orlando, Florida
2002	Regulatory Cooperation - Small Company Education	New England Chapter - NAWC, Annual Meeting
2003	Developer Related Water and Sewer Utilities Seminar	University of Florida, Orlando, Florida
2004	Basic Regulation & Rate Setting Training Seminar	Office of Regulatory Staff, Columbia, South Carolina
2005	Municipal Water Rates	Nassua-Suffolk Water Commissioners Association, Franklin Square, New York
2005	Innovations in Rate Setting and Procedures	NAWC New York Chapter, West Point, New York
2006	Basics of Rate Setting	The Connecticut Water Company, Clinton, Connecticut
2006	Innovations in Rate Setting and Procedures	NAWC New York Chapter, Catskill, New York
2006	Best Practices as Regulatory Policy	NAWC New England Chapter, Ogunquit, Maine
2006	Rate and Valuation Seminar	NAWC New York Chapter
2006	Full Cost Pricing	U.S. Environmental Protection Agency Expert Workshop, Lansing, Michigan
2006	Innovations in Rate Setting	NAWC New England Chapter, Portsmouth, New Hampshire
2007	Weather Sensitive Customer Demands	NAWC Water Utility Executive Council, Half Moon Bay, California
2007	Basics of Rate Setting and Valuation Seminar	NAWC New England Chapter, Ogunquit, Maine
2007	Small Company Charateristics	National Drinking Water Symposium, La Jolla, California

Docket No. 070183-WS
Exhibit JFG-1

GUIDE FOR DETERMINATION

OF

NEEDED FIRE FLOW

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 5
COMPANY Aqua Utilities of FL (Direct)
WITNESS John f. Guastella, P.E. (JFG-1)
DATE 01/22/08

GUIDE FOR DETERMINATION OF NEEDED FIRE FLOW

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FOREWORD

ISO has prepared this guide as an aid in estimating the amount of water that should be available for municipal fire protection. ISO calls this the needed fire flow. This publication is only a guide and requires knowledge and experience in fire protection engineering for its effective application.

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PREFACE

ISO is the premier source of information, products, and services related to property and liability risk. For a broad spectrum of types of insurance, ISO provides statistical, actuarial, underwriting, and claims information and analyses; consulting and technical services; policy language; information about specific locations; fraud-identification tools; and data processing. In the United States and around the world, ISO serves insurers, reinsurers, agents, brokers, self-insureds, risk managers, insurance regulators, fire departments, and other government agencies.

One of ISO's important services is to evaluate the fire suppression delivery systems of jurisdictions around the country. The result of those reviews is a classification number that ISO distributes to insurers. Insurance companies use the Public Protection Classification (PPC™) information to help establish fair premiums for fire insurance – generally offering lower premiums in communities with better fire protection.

ISO uses the Fire Suppression Rating Schedule (FSRS) to define the criteria used in the evaluation of a community's fire defenses. Within the FSRS, a section titled "Needed Fire Flow" outlines the methodology for determining the amount of water necessary for providing fire protection at selected locations throughout the community. ISO uses the needed fire flows to:

1. Determine the community's "basic fire flow." The basic fire flow is the fifth highest needed fire flow in the community. ISO uses the basic fire flow to determine the number of apparatus, the size of apparatus fire pumps, and special fire-fighting equipment needed in the community.
2. Determine the adequacy of the water supply and delivery system. ISO calculates the needed fire flow for selected properties and then determines the water flow capabilities at these sites. ISO then calculates a ratio considering the need (needed fire flow) and the availability (water flow capability). ISO uses that ratio in calculating the credit points identified in the FSRS.

ISO developed the needed fire flow through a review of actual large-loss fires. ISO recorded the average fire flow and other important factors, including construction type, occupancy type, area of the building, and exposures. Those factors are the foundation of the needed fire flow formula.

The following pages include a number of excerpts from another ISO document, the Specific Commercial Property Evaluation Schedule (SCOPES). ISO uses the SCOPES manual to weigh features of individual properties for the purpose of defining the building's vulnerability to future fire loss. Insurers also use the information in their underwriting and ratemaking decisions.

CHAPTER 1

Needed Fire Flow Formula

To estimate the amount of water required to fight a fire in an individual, nonsprinklered building, ISO uses the formula:

$$NFF = (C)(O)(1+(X+P))$$

where

NFF = the needed fire flow in gallons per minute (gpm)
C = a factor related to the type of construction
O = a factor related to the type of occupancy
X = a factor related to the exposure buildings
P = a factor related to the communication between buildings

To calculate the needed fire flow of a building, you will need to determine the predominant type (class) of construction, size (effective area) of the building, predominant type (class) of occupancy, exposure to the property, and the factor for communication to another building.

Here is the step-by-step process:

Step 1. Determine the predominant construction type and the associated factor (F).
Step 2. Determine the effective area (A).
Step 3. Substituting the values for "F" and "A" into the formula $C=18F(A)^{0.5}$ and calculate the construction factor (C).
Step 4. Round the construction factor (C) to the nearest 250 gpm.
Step 5. Determine the predominant occupancy type and the associated factor (O).
Step 6. Determine if there is an exposure charge by identifying the construction type and length-height value of the exposure building as well as the distance (in feet) to the exposure building. Also make note of any openings and protection of those openings in the wall facing the subject building (the building the needed fire flow is being calculated on). The factor related to the exposure building is (X).
Step 7. Determine if there is a communication charge by identifying the combustibility of the passageway, whether the passageway is open or closed, the length, and a description of any protection provided in the passageway openings. The factor related to the communications between buildings is (P).
Step 8. Substitute the values for the factors in the formula NFF = (C)(O)(1+(X+P)) to determine the needed fire flow.

Note: ISO does not determine a needed fire flow for buildings rated and coded by ISO as protected by an automatic sprinkler system meeting applicable National Fire Protection Association standards. See Chapter 6, "Determining Recognition of Automatic Sprinkler Systems," for more information.

CHAPTER 2

Type of Construction (C) and Effective Area (A)

To determine the portion of the needed fire flow attributed to the construction and area of the selected building, ISO uses the formula:

$$C = 18F\,(A)^{0.5}$$

where

F = coefficient related to the class of construction
F = 1.5 for Construction Class 1 (wood frame construction)
= 1.0 for Construction Class 2 (joisted-masonry construction)
= 0.8 for Construction Class 3 (noncombustible construction and Construction Class 4 (masonry noncombustible construction)
= 0.6 for Construction Class 5 (modified fire-resistive construction) and Construction Class 6 (fire-resistive construction)
A = effective area

Appendix A provides C for a range of construction classes (F) and effective areas (A).

1. Construction Materials and Assemblies

ISO uses the following definitions to determine the construction class for a building:

a. Combustible: Wood or other materials that will ignite and burn when subjected to fire, including materials with a listed flame-spread rating greater than 25. Also included are assemblies or combinations of combustible materials with other materials, such as the following:

(1) Metal walls or floors sheathed on either interior or exterior surfaces (with or without air space) with wood or other combustible materials (flame-spread rating over 25).

(2) Metal floors or roofs with combustible insulation or other combustible ceiling material attached to the underside of the floor or interior surface of the roof deck, or within 18" of the horizontal supports.

(3) Combustible wall materials with an exterior surface of brick, stone, or other masonry materials (commonly known as "masonry veneer").

(4) Noncombustible wall or roof construction on a skeleton wood frame (commonly known as "wood-iron clad").

(5) Combustible wall or roof construction on a noncombustible or slow-burning frame.

(6) Composite assemblies of noncombustible materials with combustible materials, such as a combustible core between two noncombustible panels, or a noncombustible panel with a combustible insulation material (flame-spread rating over 25).

(7) Composite assemblies of noncombustible or slow-burning materials combined with foamed plastic materials (with any flame-spread rating), unless the foamed plastic materials qualify as slow-burning. (Refer to Item f, below.)

(8) Combustible assemblies which are listed as having not less than a one-hour rating.

b. **Fire-resistive:** Noncombustible materials or assemblies which have a fire-resistance rating of not less than one hour.

c. **Masonry:** Adobe, brick, cement, concrete, gypsum blocks, hollow concrete blocks, stone, tile, and similar materials with a minimum thickness of 4".

d. **Noncombustible:** Materials, no part of which will ignite and burn when subjected to fire, such as aluminum, asbestos board, glass, gypsum board, plaster, slate, steel, and similar materials. Also included are:

(1) Fire-resistive and protected-metal assemblies with a fire-resistance rating of less than one hour

(2) Materials or composite materials with a listed surface-flame-spread rating of 0 and of such composition that surfaces that would be exposed by cutting through the material in any way would not have a listed flame-spread rating greater than 0

(3) Masonry walls less than 4" thick, which are not a part of combustible walls (masonry veneer)

Note: Combustible nailing (furring) strips fastened directly to noncombustible supports shall not affect the classification of noncombustible walls, floors, or roofs.

e. **Protected metal:** Metal which is protected by materials so that the resulting assembly has a fire-resistance rating of not less than one hour.

f. **Slow-burning:** Materials with a listed flame-spread rating greater than 0 but not greater than 25; except, foamed plastic materials shall be rated as slow-burning if such materials or coverings meet one of the conditions in (1) or (2) below.

An acceptable thermal barrier includes those which have been tested as part of a field-fabricated or factory-manufactured composite assembly which has passed one of the acceptable wall or ceiling panel tests, when applied over foamed plastic material of a thickness and listed flame-spread rating not greater than that used in the composite assembly tested. Where any material is of a type which falls or drips to the floor of the furnace during the flame-spread test, the flame-spread rating of the material, when not protected by a thermal barrier, shall be based on the flame-spread rating of the material on the floor of the furnace, where this flame-spread is higher than the flame-spread of the material on the furnace ceiling. In all other cases, the normal flame-spread rating of the material on the furnace ceiling shall be used.

(1) An acceptable thermal barrier consisting of 1/2" or greater noncombustible material, such as plaster, cement, or gypsum board, when used over foamed plastic material having a listed flame-spread rating not greater than 25

(2) An acceptable thermal barrier which is listed with not less than a 15-minute finish rating when used over foamed plastic material having a listed flame-spread rating not greater than 25

Note 1: Combustible nailing (furring) strips fastened directly to slow-burning supports shall not affect the classification of slow-burning walls, floors, or roofs.

Note 2: Lumber and lumber products shall be eligible for consideration as slow-burning only when all the ceilings and the walls are treated with a listed flame-retardant impregnation which meets all of the following requirements:

(1) Impregnation-treated materials shall be properly identified as having a flame-spread rating of 25 or less.

(2) Such identification shall indicate that there is no evidence of significant progressive combustion when subjected to at least 30 minutes test duration.

(3) Such identification shall indicate that the material has a permanent treatment not subject to deterioration from the effects of weathering, exposure to moisture or humidity, etc. (This requirement only applies where the treated material is exposed to the weather or moisture.) However, combustible nailing (furring) strips, doors, trim, and the top surfaces of combustible floors shall not be required to be treated.

g. **Unprotected metal:** Metal with no fire-resistive protection, or with a fire-resistance rating of less than one hour.

2. Classification of Basic Construction Types

ISO classifies construction types into six different categories:

Construction Class 6 (fire-resistive construction)
Construction Class 5 (modified fire-resistive construction)
Construction Class 4 (masonry noncombustible construction)
Construction Class 3 (noncombustible construction)
Construction Class 2 (joisted-masonry construction)
Construction Class 1 (wood frame construction)

Note: In applying the rules below, ISO disregards below-grade basement walls and the construction of the lowest floor (usually concrete).

a. **Fire-resistive (Construction Class 6):** Buildings constructed of any combination of the following materials:

Exterior walls or exterior structural frame:

- Solid masonry, including reinforced concrete, not less than 4 inches in thickness
- Hollow masonry not less than 12 inches in thickness
- Hollow masonry less than 12 inches, but not less than 8 inches in thickness, with a listed fire-resistance rating of not less than two hours
- Assemblies with a fire-resistance rating of not less than two hours

Note: Panel or curtain sections of masonry may be of any thickness.

Floors and roof:

- Monolithic floors and roof of reinforced concrete with slabs not less than 4 inches in thickness
- Construction known as "joist systems" (or pan-type construction) with slabs supported by concrete joists spaced not more than 36 inches on centers with a slab thickness not less than 2 ¾ inches
- Floor and roof assemblies with a fire-resistance rating of not less than two hours

Structural metal supports:

- Horizontal and vertical load-bearing protected metal supports (including prestressed concrete units) with a fire-resistance rating of not less than two hours

Note: Wherever in the SCOPES reference is made to "prestressed," this term shall also include "posttensioned."

b. **Modified fire-resistive (Construction Class 5):** Buildings with exterior walls, floors, and roof constructed of masonry materials described in a., above, deficient in thickness, but not less than 4 inches; or fire-resistive materials described in a., above, with a fire-resistance rating of less than two hours, but not less than one hour.

c. **Masonry noncombustible (Construction Class 4):** Buildings with exterior walls of fire-resistive construction (not less than one hour), or of masonry, not less than 4 inches in thickness and with noncombustible or slow-burning floors and roof (including noncombustible or slow-burning roof decks on noncombustible or slow-burning supports, regardless of the type of insulation on the roof surface).

d. **Noncombustible (Construction Class 3):** Buildings with exterior walls, floors, and roof of noncombustible or slow-burning materials supported by noncombustible or slow-burning supports (including noncombustible or slow-burning roof decks on noncombustible or slow-burning supports, regardless of the type of insulation on the roof surface).

e. **Joisted-masonry (Construction Class 2):** Buildings with exterior walls of fire-resistive construction (not less than one hour), or of masonry, and with combustible floors and roof.

f. **Frame (Construction Class 1):** Buildings with exterior walls, floors, and roof of combustible construction, or buildings with exterior walls of noncombustible or slow-burning construction, with combustible floors and roof.

Notes applicable to construction-type definitions above:

Note 1: Masonry or fire-resistive walls with panels composed of glass, noncombustible, slow-burning, combustible, or open sections shall retain their classification as masonry or fire-resistive, provided that such panels are in or supported by a structural frame of masonry or protected metal (two hours fire resistance if in walls classed as Construction Class 6, one hour in classes 2, 4, or 5). Similarly, masonry or fire-resistive floors with wood or other combustible surfacing in buildings otherwise subject to Construction Classes 5 or 6 shall retain their classification as Classes 5 or 6.

Note 2: Noncombustible or slow-burning roof deck with an exterior surface of combustible materials, such as combustible insulation, felt, asphalt, or tar, shall retain its classification as noncombustible or slow-burning.

3. Crosswalk to Other Construction Types

The International Code Council (ICC) and the National Fire Protection Association (NFPA) have their own classification of construction types. These classifications are used in the codes and standards that they promulgate and are unique to their organization's publications. Below is a table that generally compares ISO's construction types to those of these other organizations.

Construction Types

ISO SCOPES Definition	ISO Construction Class	International Code (ICC)	NFPA 220	NFPA 5000	Standard Code 1997 (SBCCI)	National 1999 (BOCA)	Uniform Code 1997 (ICBO)
Wood frame	1	V, B	V	V	VI	5B	V
Ordinary (joisted masonry)	2	III, A	III	III	V	3	IIIV
Non-combustible (all metal)	3	II, B	II	II	IV	2C	II-N
Non-combustible (masonry)	4	II, A	II	III	IV	2B	II- 1 hr.
Modified – fire resistive	5	II, A	II	II	II	1B	II fire resistive
Fire resistive	6	I, A	I	I	I	1A	I
Heavy timber	2	IV	IV	IV	III	4	IV

4. Classification of Mixed Construction

In buildings constructed as defined in two or more classes above, ISO determines the appropriate construction class as follows:

Note: In applying these rules, ISO disregards basement walls and the lowest floor level.

a. **Fire-resistive:** Any building with 66 2/3 % or over of the total wall area and 66 2/3 % or over of the total floor and roof area constructed as defined in Construction Class 6.

b. **Modified fire-resistive:** Any building with 66 2/3 % or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in Construction Class 5; or

Any building with 66 2/3% or over of the total wall area, and 66 2/3% or over of the total floor and roof area constructed as defined in Construction Classes 5 and 6, but with neither type in itself equaling 66 2/3% or over of the total area.

c. **Masonry noncombustible:** Any building with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in Construction Class 4; or

Any building not qualifying under a. or b., above, with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in two or more of Construction Classes 4, 5, and 6, but with no single type in itself equaling 66 2/3% or over of the total area.

d. **Noncombustible:** Any building with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in Construction Class 3; or

Any building not qualifying under a. through c., above, with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in two or more of Construction Classes 3, 4, 5, and 6, but with no single type in itself equaling 66 2/3% or over of the total area.

e. **Joisted-masonry:** Any building not qualifying under a. through d., above, with 66 2/3% or over of the total wall area constructed as described in Construction Class 2; or

Any building not qualifying under a. through d., above, with 66 2/3% or over of the total wall area and 66 2/3% or over of the total floor and roof area constructed as defined in two or more of Construction Classes 2, 3, 4, 5, and 6, but with no single type in itself equaling 66 2/3% or over of the total area.

f. **Frame:** Any building not qualifying under a. through e., above, or any building with over 33 1/3 % of the total wall area of combustible construction, regardless of the type of construction of the balance of the building.

5. Determining Effective Area (A_i)

In the portion of the needed fire flow formula attributed to the construction and area of the subject building,

$$C = 18F (A)^{0.5}$$

the factor "A" is the "effective area" of the subject building.

a. Exempt areas:
Disregard the following in the determination of the effective area:

- In nonsprinklered buildings, or buildings which do not qualify for sprinkler credit (see Chapter 6, "Determining Recognition of Automatic Sprinkler Systems"), disregard floor areas (including basement and subbasement) where the entire floor is protected by an acceptable system of automatic sprinklers or other acceptable automatic fire protection systems, provided that there are no Combustibility Class C-5 occupancies on the floor (see "Occupancy Factor," 1e., "Rapid-burning or flash-burning").

- Basement and subbasement areas which are vacant, or are used for building maintenance, or which are occupied by occupancies having C-1 or C-2 contents combustibility (see "Occupancy Factor") regardless of the combustibility class applicable to the building. A basement is a story of a building which is 50% or more below grade, unless such story is accessible at grade level on one or more sides. A story which is less than 50% below grade shall also be considered a basement if such story is wholly enclosed by blank masonry foundation walls.

- In breweries, malt mills, and other similar occupancies, disregard perforated (slatted) operating decks which contain no storage.

- Roof structures, sheds, or similar attachments.

- Courts without roofs.

- Areas of mezzanines less than 25% of the square foot area of the floor immediately below.

b. Modification for division walls:
An acceptable division wall shall be constructed entirely of noncombustible materials with a fire-resistance rating of not less than one hour, or of masonry materials, and shall:

(1) Extend from one exterior wall to another (or form an enclosed area within the building).

(2) Extend from one masonry or fire-resistive floor to another masonry or fire-resistive floor, or from a masonry or fire-resistive floor to a roof of any construction.

(3) Have all openings through the wall protected by an automatic or self-closing labeled Class B (not less than one-hour) fire door.

Where division walls meet the above requirements, the maximum area on any floor used to determine the effective area shall be the largest undivided area plus 50% of the second largest undivided area on that floor.

c. Effective-area calculation:

After modification for division walls as provided above, the effective area shall be the total square foot area of the largest floor in the building, plus the following percentage of the total area of the other floors:

(1) Buildings classified as Construction Classes 1 - 4: 50% of all other floors.

(2) Buildings classified as Construction Classes 5 or 6:

(a) If all vertical openings in the building are protected (see 4d., "Protection requirements," below), 25% of the area of not exceeding the two other largest floors.
(b) If one or more vertical openings in the building are unprotected (see 4d., "Protection requirements," below), 50% of the area of not exceeding 8 other floors with unprotected openings.

Note: The effective area determined under item 4c.(2)(b), above, shall not be less than the effective area that would be determined under item 4c.(2)(a), above, if all openings were protected.

d. Protection requirements:

The protection requirements for vertical openings are only applicable in buildings of Construction Class 5 or 6. The type of protection for vertical openings shall be based on the construction of the enclosure walls and the type of door or other device used for the protection of openings in the enclosure.

The following materials are acceptable for one-hour construction in enclosure walls: 4-inch brick, 4-inch reinforced concrete, 6-inch hollow block, 6-inch tile, or masonry or noncombustible materials listed with a fire-resistance rating of not less than one hour.

Protected openings:

Enclosures shall have walls of masonry or fire-resistive construction with a fire-resistance rating of not less than one hour.

Doors shall be automatic or self-closing and be labeled for Class B opening protection (not less than one-hour rating).

Elevator doors shall be of metal or metal-covered construction, so arranged that the doors must normally be closed for operation of the elevator.

Unprotected openings:

Unprotected floor openings. Also includes doors or enclosures not meeting the minimum requirements for protected openings, above.

5. Maximum and Minimum Value of C:

The value of C shall not exceed

8,000 gpm for Construction Class 1 and 2
6,000 gpm for Construction Class 3, 4, 5, and 6
6,000 gpm for a 1-story building of any class of construction

The value of C shall not be less than 500 gpm.

ISO rounds the calculated value of C to the nearest 250 gpm.

CHAPTER 3

Occupancy Factor (O)

The factors below reflect the influence of the occupancy in the subject building on the needed fire flow:

Occupancy Combustibility Class	Occupancy Factor (O)
C-1 (Noncombustible)	0.75
C-2 (Limited-combustible)	0.85
C-3 (Combustible)	1.00
C-4 (Free-burning)	1.15
C-5 (Rapid-burning)	1.25

1. Determining Occupancy Type

Occupancy combustibility classifications reflect the effect of the combustibility of contents on the building structure. ISO uses the following definitions to determine the combustibility classification of an occupancy:

a. **Noncombustible (C-1)** - Merchandise or materials, including furniture, stock, or equipment, which in permissible quantities do not in themselves constitute an active fuel for the spread of fire.

No occupancy shall be eligible to this classification which contains a sufficient concentration of combustible material to cause structural damage OR which contains a sufficient continuity of combustible materials so that a fire could spread beyond the vicinity of origin.

The maximum amount of combustible materials in any 10,000-square-foot section of an occupancy otherwise containing noncombustible materials shall not exceed 1000 board feet of lumber, or over 2 barrels (110 gallons) of combustible liquids or greases or equivalent amounts of other combustible materials. Further, the maximum total area containing combustible material in an occupancy otherwise containing noncombustible materials shall not exceed 5% of the total square foot area of that occupancy.

Note: In determining the applicability of C-1, combustible interior walls or partitions (including combustible finish), mezzanines, racks, shelves, bins, and similar combustible construction shall be considered combustible material.

Examples of occupancies which may (subject to survey) be eligible for C-1 classification include those storing asbestos, clay, glass, marble, stone, or metal products and some metalworking occupancies.

b. **Limited-combustible (C-2)** - Merchandise or materials, including furniture, stock, or equipment, of low combustibility, with limited concentrations of combustible materials.

Examples of occupancies classified as C-2 include banks, barber shops, beauty shops, clubs, habitational occupancies, hospitals, and offices.

Occupancies classified as C-2 in the occupancy classification list may be eligible for C-1 classification provided that such occupancy meets all of the requirements for C-1 classification.

Note: For manufacturing occupancies where over 20% of the total square foot area of the occupancy contains storage of combustible material or materials crated or wrapped in combustible containers, the combustibility class applicable to the occupancy shall not be less than C-3.

c. **Combustible (C-3)** - Merchandise or materials, including furniture, stock, or equipment, of moderate combustibility.

Examples of occupancies classified as C-3 include food markets, most wholesale and retail occupancies, etc.

Occupancies classified as C-3 in the occupancy classification list may be eligible for C-2 classification, provided that the total square foot area containing combustible material does not exceed 10% of the total square foot area of the occupancy.

Note: For the purpose of the above rule, combustible interior walls or partitions (including combustible finish), racks, shelves, bins, and similar combustible construction shall be considered combustible material.

d. **Free-burning (C-4)** - Merchandise or materials, including furniture, stock, or equipment, which burn freely, constituting an active fuel.

Examples of occupancies classified as C-4 include cotton bales, furniture stock, and wood products.

e. **Rapid-burning or flash-burning (C-5)** - Merchandise or materials, including furniture, stock, or equipment, which either

(1) burn with a great intensity

(2) spontaneously ignite and are difficult to extinguish

(3) give off flammable or explosive vapors at ordinary temperatures

(4) as a result of an industrial processing, produce large quantities of dust or other finely divided debris subject to flash fire or explosion

Examples of occupancies classified as C-5 include ammunition, excelsior, explosives, mattress manufacturing, matches, and upholsterers.

2. Determining Occupancy Combustibility Classification in Multiple Occupancy Buildings

In sole-occupancy buildings or in multiple-occupancy buildings with occupancies subject to a single-occupancy classification, the occupancy classification applicable to the occupant(s) shall also apply to the building.

In multiple-occupancy buildings with occupancies having different occupancy classifications, the occupancy classification applicable to the building shall be determined according to the total floor area (including basements and subbasements) occupied by each occupancy, as follows:

Note: Basement and subbasement areas which are either vacant or used for building services or building maintenance shall be considered C-2 combustibility. Where such areas are used for other purposes, the combustibility class for those areas shall be determined according to the combustibility class of their occupancies.

- **C-1** combustibility shall apply ONLY where 95% or more of the total floor area of the building is occupied by C-1 occupants, and there are no C-5 occupancies.

- **C-2** combustibility shall apply to buildings which
  a. do not qualify as C-1 above, but where 90% or more of the total floor area of the building is occupied by C-1 and C-2 occupancies; OR
  b. are classified as CSP Construction Class 5 or 6, AND where 80% or more of the total floor area of the building is occupied by C-1 and C-2 occupancies, AND NOT MORE THAN 5% of the total floor area is occupied by C-5 occupancies.

- **C-4** combustibility shall apply to any building containing C-4 occupants, where the combined total area occupied by C-4 and C-5 (if any) occupants is 25% OR MORE OF THE TOTAL FLOOR AREA of the building, provided the C-5 occupancies occupy, in total, less than 15% of the total floor area.

- **C-5** combustibility shall apply to any building where 15% OR MORE OF THE TOTAL FLOOR AREA is occupied by C-5 occupancies.

- **C-3** combustibility shall apply to any building not provided for above.

Occupancy Type Examples

Noncombustible (C-1) - Merchandise or materials, including furniture, stock, or equipment, which in permissible quantities do not in themselves constitute an active fuel for the spread of fire.

C-1 occupancy type examples:

- Asbestos storage
- Clay storage
- Marble storage
- Metal products storage
- Stone storage

Limited-combustible (C-2) - Merchandise or materials, including furniture, stock, or equipment, of low combustibility, with limited concentrations of combustible materials.

C-2 occupancy type examples:

- Airport, bus, railroad terminal
- Apartment
- Artist's studio
- Auto repair shop
- Auto showroom
- Aviary
- Barber shop
- Church
- Cold storage warehouse
- Day care center
- Educational institution
- Gasoline service station
- Greenhouse
- Health club
- Jail
- Library
- Medical laboratory
- Motel
- Museum
- Nursing home
- Office
- Pet grooming shop
- Photographer's studio
- Radio station
- Recreation center
- Rooming house
- Undertaking establishment

Combustible (C-3) - Merchandise or materials, including furniture, stock, or equipment, of moderate combustibility.

C-3 occupancy type examples:

- Auto parts store
- Auto repair training school
- Bakery
- Boat sales (where storage 15%)
- Book store
- Bowling establishment
- Casino
- Commercial laundry
- Contractor equipment storage
- Department store (where storage 15%)
- Dry cleaner (no flammable fluids)
- Gift shop (where storage 15%)
- Hardware store (where storage 15%)
- Leather processing
- Municipal storage building
- Nursery sales outlet store
- Pavilion or dance hall
- Pet shop
- Photographic supplies
- Printer
- Restaurant
- Sandwich shop
- Shoe repair
- Sporting goods (where storage 15%)
- Supermarket
- Theater
- Vacant building
- Wearing apparel factory (except furs)

Free-burning (C-4) - Merchandise or materials, including furniture, stock, or equipment, which burn freely, constituting an active fuel.

C-4 occupancy type examples:
Aircraft hangers
Cabinet making
Combustible metals (e.g., Magnesium)
Dry cleaner (using flammable fluids)
Feed store (with > 1/3 ton of hay)
Fur apparel manufacturing
Furniture manufacturing
Kennels
Lumber
Packaging and crating
Paper products manufacturing
Petroleum bulk-distribution center
Stables
Tire manufacturing
Tire recapping or retreading
Wax products (candles, etc.)
Woodworking shop

Rapid-burning or flash-burning (C-5) - Merchandise or materials, including furniture, stock, or equipment, which either

(1) burn with a great intensity

(2) spontaneously ignite and are difficult to extinguish

(3) give off flammable or explosive vapors at ordinary temperatures

(4) as a result of an industrial processing, produce large quantities of dust or other finely divided debris subject to flash fire or explosion

C-5 occupancy type examples:
Ammunition
Feed mill (with > 7 tons of hay & straw)
Fireworks
Flammable compressed gases
Flammable liquids
Flour mill
Highly flammable solids
Matches
Mattress factory
Nitrocellulose-based plastics
Painting with flammables or combustibles
Rag storage
Upholstering shop
Waste paper storage

CHAPTER 4

Exposure and Communication Factor (X + P)

The factors developed in this item reflect the influence of adjoining and connected buildings on the needed fire flow. An exposure building has a wall 100 feet or less from a wall of the subject building. A communicating building has a passageway to the subject building. ISO develops a value for the exposure to another building for the side with the highest charge. Likewise, ISO develops a value for a communication to another building for the side with the highest charge. The formula is:

(X + P), with a maximum value of 0.60

1. Exposures (Table 330.A)

The factor for X depends upon the construction and length-height value (length of wall in feet, times height in stories) of the exposure building and the distance between facing walls of the subject building and the exposure building. Table 330.A of the FSRS gives the factors. When there is no exposure on a side, X = 0.

a. Construction of facing wall of exposure – ISO considers the wall construction of the exposure. The exposure factor used considers only the side of the subject building with the highest factor.
b. Length-height value of the facing wall of the exposure – ISO determines the length-height value of the facing wall of the exposure by multiplying the length of the facing wall of the exposure in feet by the height of the exposure in stories. ISO considers buildings five stories or more in height as five stories. Each 15 feet or fraction thereof equals one story.
c. Exposure distance – The distance in feet from the subject building to the exposure building, measured to the nearest foot, between the nearest points of the buildings. Where either the subject building or the exposure is at a diagonal to the other building, ISO increases the exposure distance by 10 feet.
d. Construction of facing wall of subject building – The wall construction of the subject building.

2. Exposure exceptions

The following conditions rule out exposure charges from adjacent buildings:

- Buildings rated sprinklered (See Chapter 6, "Determining Recognition of Automatic Sprinkler Systems.")
- Buildings rated as habitational, including their appurtenant outbuildings
- Buildings of Construction Class 5 or 6
- Buildings of Construction Class 3 or 4 with C-1 or C-2 contents combustibility class applicable to the building

TABLE 330.A FACTOR FOR EXPOSURE (X)

			Construction of Facing Wall of Exposure Building Classes			
				2, 4, 5, & 6		
Construction of Facing Wall of Subject Building	**Distance in Feet to the Exposure Building**	**Length-Height of Facing Wall of Exposure Building**	**1,3**	**Unprotected Openings**	**Semiprotected Openings (wired glass or outside open sprinklers)**	**Blank Wall**
Frame, Metal or Masonry with Openings	0 – 10	1-100	0.22	0.21	0.16	0
		101-200	0.23	0.22	0.17	0
		201-300	0.24	0.23	0.18	0
		301-400	0.25	0.24	0.19	0
		Over 400	0.25	0.25	0.20	0
	11 - 30	1-100	0.17	0.15	0.11	0
		101-200	0.18	0.16	0.12	0
		201-300	0.19	0.18	0.14	0
		301-400	0.20	0.19	0.15	0
		Over 400	0.20	0.19	0.15	0
	31 - 60	1-100	0.12	0.10	0.07	0
		101-200	0.13	0.11	0.08	0
		201-300	0.14	0.13	0.10	0
		301-400	0.15	0.14	0.11	0
		Over 400	0.15	0.15	0.12	0
	61 - 100	1-100	0.08	0.06	0.04	0
		101-200	0.08	0.07	0.05	0
		201-300	0.09	0.08	0.06	0
		301-400	0.10	0.09	0.07	0
		Over 400	0.10	0.10	0.08	0
Blank Masonry Wall	Facing wall of the exposure building is higher than the subject building. Use the above table EXCEPT use only the length-height of the facing wall of the exposure building ABOVE the height of the facing wall of the subject building. Buildings five stories or over in height, consider as five stories.					
	When the height of the facing wall of the exposure building is the same or lower than the height of the facing wall of the subject building, X = 0.					

3. Communications (Table 330.B)

The factor for P depends upon the protection for communicating party-wall openings and the length and construction of communications between fire divisions. Table 330.B of the FSRS gives the factors. When more than one communication type exists in any one side wall, apply only the largest factor P for that side. When there is no communication on a side, P = 0.

a. Communications with combustible construction - An open passageway must be open on top or at least one side.
b. Fire-resistive, noncombustible, or slow-burning communications – ISO considers the type of construction found within the passageway.
c. Description of protection of passageway openings – The protection for the openings to the passageway by Class A or B, single or double fire door.

4. Communications Exceptions

The following conditions rule out charges for communication with other separately rated buildings:

- Buildings rated sprinklered (See Chapter 6, "Determining Recognition of Automatic Sprinkler Systems.")
- Buildings rated as habitational, including their appurtenant outbuildings
- Buildings of Construction Class 5 or 6
- Buildings of Construction Class 3 or 4 with C-1 or C-2 contents combustibility class applicable to the building

TABLE 330.B FACTOR FOR COMMUNICATIONS (P)

	Fire-resistive, Noncombustible, or Slow-Burning Communications				Communications with Combustible Construction					
	Open	Enclosed			Open			Enclosed		
Description of Protection of Passageway Openings	Any Length	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +	10 Ft. or Less	11 Ft. to 20 Ft.	21 Ft. to 50 Ft. +
Unprotected	0	++	0.30	0.20	0.30	0.20	0.10	++	++	0.30
Single Class A Fire Door at One End of Passageway	0	0.20	0.10	0	0.20	0.15	0	0.30	0.20	0.10
Single Class B Fire Door at One End of Passageway	0	0.30	0.20	0.10	0.25	0.20	0.10	0.35	0.25	0.15
Single Class A Fire Door at Each End or Double Class A Fire Doors at One End of Passageway	0	0	0	0	0	0	0	0	0	0
Single Class B Fire Door at Each End or Double Class B Fire Doors at One End of Passageway	0	0.10	0.05	0	0	0	0	0.15	0.10	0

\+ For over 50 feet, P = 0.

++ For unprotected passageways of this length, consider the 2 buildings as a single fire division

Note: When a party wall has communicating openings protected by a single automatic or self-closing Class B fire door, it qualifies as a division wall for reduction of area. Where communications are protected by a recognized water curtain, the value of P is 0.

CHAPTER 5

Separate Classifications of Buildings

ISO classifies the following as separate buildings:

a. Buildings separated by two independent walls, with no common or continuous combustible roof, that meet all of the requirements under either (1), (2), or (3) below.

  (1) Where there is no communication between the two buildings

  (2) Where the independent walls have communicating passageways constructed and protected as follows:

    (a) A passageway open on the top or at least one side

    (b) An enclosed passageway of glass, noncombustible, slow-burning, or fire-resistive construction more than 10 feet in length (or, if combustible, more than 20 feet in length)

    (c) An enclosed passageway of glass, noncombustible, slow-burning or fire-resistive construction 10 feet or less in length (or, if combustible, 20 feet or less in length), provided that any such passageway is protected on at least one end by an automatic or self-closing labeled Class A fire door installed in a masonry wall section in accordance with standards

    Where one or both of the communicating buildings qualify for sprinkler credit under ISO's Specific Commercial Property Evaluation Schedule (see Chapter 6, "Determining Recognition for Automatic Sprinkler Systems"), the above rules (including the Class A door requirement) apply. However, where acceptable sprinklers are installed over the communication in a masonry wall in the sprinklered building, such sprinklers are acceptable in lieu of the Class A door.

    NOTE: A passageway is a structure providing communication between two otherwise separate buildings. Passageways must not contain contents. Enclosed passageways must not be more than 15 feet in width (least dimension). Passageways open on the top or at least one side shall not be more than 25 feet in width (least dimension). Any communicating structure that contains contents, or is more than 15 feet in width if enclosed, or is more than 25 feet in width if open, is a structure subject to all of the requirements regarding separate classification under this item.

  (3) Where the independent walls have no communications, or where the two buildings have passageways constructed and protected as provided above, ISO classifies each building separately, with appropriate charges for exposure and communication (if any) under Chapter 4, "Exposure and Communication Factor."

b. Buildings separated by one continuous masonry party wall conforming to all of the following requirements:

(1) The party wall is constructed of brick or reinforced concrete not less than 6 inches in thickness; OR reinforced concrete building units (or filled blocks) with a fire-resistance rating of not less than two hours and not less than 6 inches in thickness; OR other masonry materials not less than 8 inches in thickness.

(2) The party wall rises to the underside of AND is in direct contact with a fire-resistive, masonry, or noncombustible roof; OR pierces a slow-burning or combustible roof. In addition, no combustible material extends across any parapet that pierces a slow-burning or combustible roof.

(3) The party wall extends to the interior surface of AND is in direct contact with a fire-resistive, masonry, or noncombustible wall OR pierces a slow-burning or combustible wall. In addition, combustible cornices, canopies, or other combustible material do not extend across the party wall.

(4) All load-bearing structural metal members in the party wall are protected metal (not less than one hour).

(5) At least a single automatic or self-closing labeled Class A fire door protects all access communications through the party wall. Where one or both of the communicating buildings qualify for sprinkler credit under ISO's Specific Commercial Property Evaluation Schedule (see Chapter 6, "Determining Recognition for Automatic Sprinkler Systems"), acceptable sprinklers installed over the communications are acceptable in lieu of the Class A door.

A single, labeled 1½ hour damper protects all communications caused by air conditioning and/or heating ducts piercing a party wall.

Note 1: Where unprotected metal, noncombustible, or combustible wall, floor, or roof supports are continuous through a masonry wall, such a wall is not be acceptable for separate classification.

Note 2: ISO ignores the usual openings provided for common utilities when their size is limited to that necessary to provide for normal clearances and vibration; such openings are the rule rather than the exception, and their effect is included in the overall analysis. ISO also ignores openings protected by one-hour listed firestop systems. ISO may also ignore abnormally large openings when mortar or other masonry material fills the excessive clearances.

ISO classifies all buildings not eligible for separate classification under a. or b. as a single building.

CHAPTER 6

Determining Recognition of Automatic Sprinkler Systems

ISO uses the Specific Commercial Property Evaluation Schedule (SCOPES) to evaluate sprinkler protection of a property. The criteria within the SCOPES manual permit determination of the percentage of credit for the sprinkler protection. For ISO to rate and code the property as a sprinklered property, it must score at least 10 points (out of the initial 100 points available) in ISO's sprinkler grading.

A grading of 100 points represents the value of a two-source (water supply) wet-pipe installation, standard in all respects, where no unusual conditions of construction or occupancy exist. In addition, the system must be installed and maintained as outlined in the National Fire Protection Association (NFPA) Standard 13, NFPA Standard 25, and other NFPA standards as appropriate.

ISO classifies a property as a sprinklered property if it meets the following minimum conditions:

- The sprinklered building has assured maintenance. Shut down, idle, or vacant structures have acceptable watchman or waterflow and control-valve supervision (remote or central station) or a caretaker. A caretaker is a responsible person who visits the premises not less than weekly.
- The usable unsprinklered area does not exceed:
  a) 25% of the total area in buildings with an Occupancy Combustibility Class of C-1
  b) 20% of the total area in buildings with an Occupancy Combustibility Class of C-2 or C-3
  c) 10,000 square feet or 15% of the total area in buildings with an Occupancy Combustibility Class of C-4
  d) 5,000 square feet or 10% of the total square foot area in buildings with an Occupancy Combustibility Class of C-5

  See Chapter 3, "Occupancy Factor" for definitions of the occupancy combustibility classes.

  Note: the area limitations above do not include unused, unsprinklered areas such as underfloor areas, attic areas, etc. However, ISO classifies usable vacant areas as used areas. ISO considers areas with obstructed sprinklered protection as unsprinklered.
- Installation has evidence of flushing and hydrostatic tests of both the underground and overhead piping in accordance with NFPA Standard 13.
- A full-flow main drain test has been witnessed within the last 48 months.
- Dry-pipe installations have evidence of a satisfactory or partly satisfactory dry-pipe trip test conducted within the last 48 months.
- Fire-pump installations have evidence and results of a fire-pump test conducted within the last 48 months.

CHAPTER 7

Other Considerations for Determining Needed Fire Flow (NFF)

- When the subject building or exposure buildings have a wood-shingle roof covering and ISO determines that the roof can contribute to spreading fires, ISO adds 500 gpm to the needed fire flow.

- The maximum needed fire flow is 12,000 gpm. The minimum is 500 gpm.

- ISO rounds the final calculation of needed fire flow to the nearest 250 gpm if less than 2,500 gpm and to the nearest 500 gpm if greater than 2,500 gpm.

- For 1- and 2-family dwellings not exceeding 2 stories in height, ISO uses the following needed fire flows:

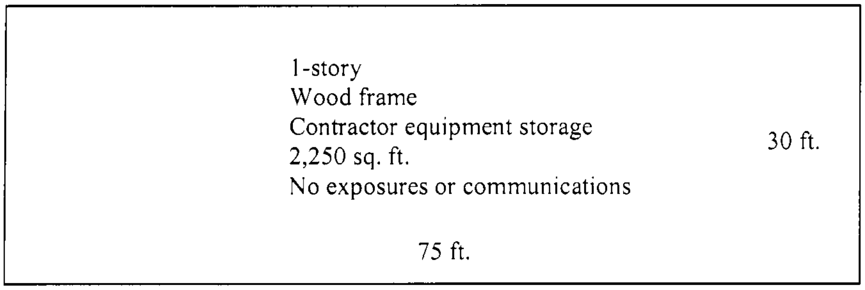
DISTANCE BETWEEN BUILDINGS	NEEDED FIRE FLOW
More than 100'	500 gpm
31-100'	750 gpm
11-30'	1,000 gpm
10' or less	1,500 gpm

- For other types of habitational buildings, the maximum needed fire flow is 3,500 gpm.

CHAPTER 8

Examples

Example 1.



CONSTRUCTION TYPE

Construction Class 1 (wood frame construction)
Construction type coefficient (F) = 1.5
Effective area (A) = 2,250

$C = 18F\,(A)^{0.5}$
$C = 18(1.5)\,(2{,}250)^{0.5}$
$C = 27\,(47.43)$
$C = 1{,}280.72$
$C = 1{,}250$ (rounded to the nearest 250 gpm)

OCCUPANCY TYPE

Contractor equipment storage
Occupancy combustibility class C-3 (Combustible)
Occupancy factor (O) = 1.00

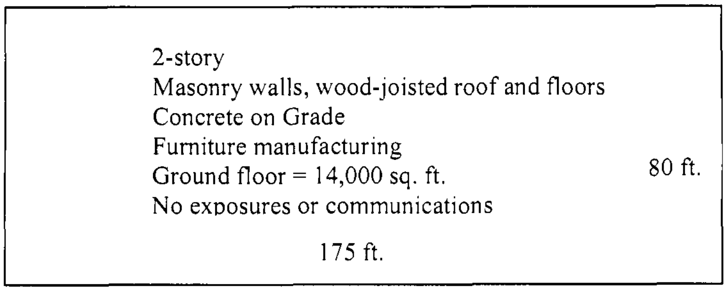
EXPOSURES AND COMMUNICATIONS

None
Exposure and communication factor (X + P) = 0.00

CALCULATION

$NFF = (C)(O)(1+(X+P))$
$NFF = (1{,}250)(1.00)(1+(0.00))$
$NFF = (1{,}250)(1.00)(1.00)$
NFF = 1,250 gpm

Example 2



2-story
Masonry walls, wood-joisted roof and floors
Concrete on Grade
Furniture manufacturing
Ground floor = 14,000 sq. ft.
No exposures or communications

CONSTRUCTION TYPE

Construction Class 2 (joisted-masonry construction)
Construction type coefficient (F) = 1.0
Effective area (A) = 21,000 (ground floor + ½ of second floor area)

$C = 18F\,(A)^{0.5}$
$C = 18(1.0)\,(21{,}000)^{0.5}$
$C = 18\,(144.91)$
$C = 2{,}608.45$
C = 2,500 (rounded to the nearest 250 gpm)

OCCUPANCY TYPE

Furniture manufacturing
Occupancy combustibility class C-4 (free-burning)
Occupancy factor (O) = 1.15

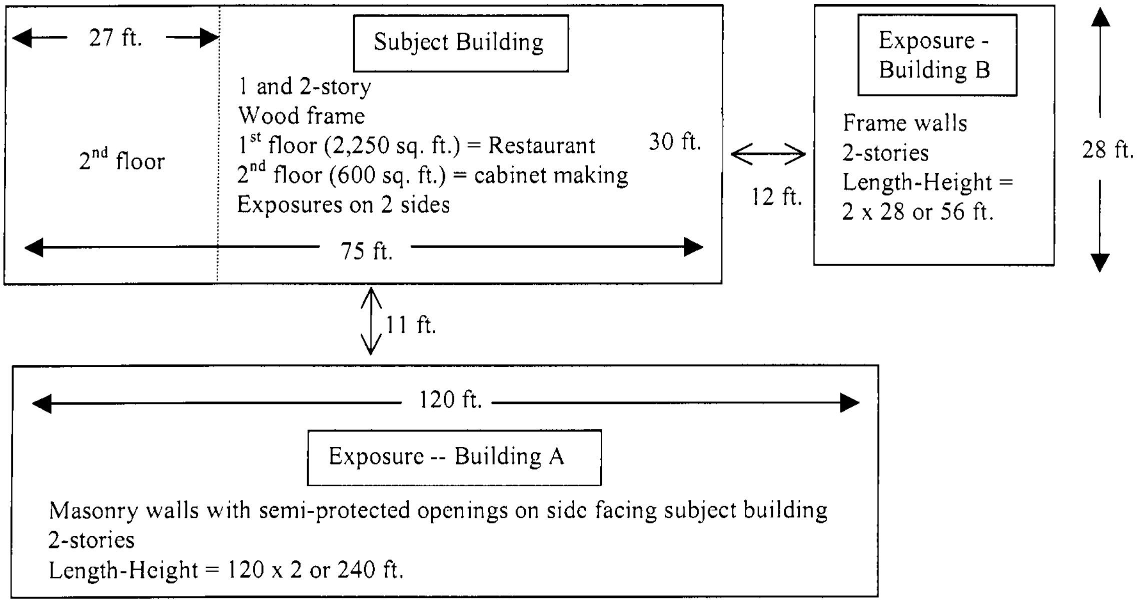
EXPOSURES AND COMMUNICATIONS

None
Exposure and communication factor (X + P) = 0.00

CALCULATION

NFF = (C)(O)(1+(X+P))
NFF = (2,500)(1.15)(1+(0.00))
NFF = (2,500)(1.15)(1.00)
NFF = 2,875
NFF = 3,000 gpm (because it is greater than 2,500 ISO rounds the NFF to the nearest 500 gpm)

Example 3



CONSTRUCTION TYPE

Construction Class 1 (wood-frame construction)
Construction type coefficient (F) = 1.5
Effective area (A) = 2,655 (ground floor + ½ of second floor area)

$C = 18F\,(A)^{0.5}$
$C = 18(1.5)\,(2{,}655)^{0.5}$
$C = 27(51.53)$
$C = 1{,}391.31$
C = 1,500 (rounded to the nearest 250 gpm)

OCCUPANCY TYPE

Cabinet making (occupies over 25% of the total floor of the building)
Occupancy combustibility class C-4 (free-burning)
Occupancy factor (O) = 1.15

EXPOSURES AND COMMUNICATIONS

Exposure charge for Building A = 0.14
Exposure charge for Building B = 0.17
The building with the highest charge is Building B.
Exposure factor (X) = 0.17
Communication (P) charge = none
Exposure and communication factor (X + P) = 0.17

CALCULATION

$NFF = (C)(O)(1+(X+P))$
$NFF = (1{,}500)(1.15)(1+(0.17))$
$NFF = (1{,}500)(1.15)(1.17)$
$NFF = 2{,}018$
NFF = 2,000 gpm

APPENDIX A

Needed Fire Flow/Effective Area Table

TYPE OF CONSTRUCTION FACTOR AS DETERMINED BY RANGE IN EFFECTIVE AREA

Class	1		2		3,4		5,6	
Factor (F)	1.5		1.0		0.8		0.6	
	Effective Area (A)		Effective Area (A)		Effective Area (A)		Effective Area (A)	
(C)	At Least	Not Over	At Least	Not Over	At Least	Not Over	At Least	Not Over
500	0	535	0	1,205	0	1,883	0	3,348
750	536	1,050	1,206	2,363	1,884	3,692	3,349	6,564
1,000	1,051	1,736	2,364	3,906	3,693	6,103	6,565	10,850
1,250	1,737	2,593	3,907	5,835	6,104	9,117	10,851	16,209
1,500	2,594	3,622	5,836	8,150	9,118	12,734	16,210	22,639
1,750	3,623	4,822	8,151	10,852	12,735	16,954	22,640	30,140
2,000	4,823	6,194	10,853	13,937	16,955	21,776	30,141	38,714
2,250	6,195	7,737	13,938	17,409	21,777	27,202	38,715	48,359
2,500	7,738	9,452	17,410	21,267	27,203	33,230	48,360	59,076
2,750	9,453	11,338	21,268	25,511	33,231	39,861	59,077	70,864
3,000	11,339	13,395	25,512	30,140	39,862	47,095	70,865	83,724
3,250	13,396	15,624	30,141	35,156	47,096	54,931	83,725	97,656
3,500	15,625	18,025	35,157	40,557	54,932	63,374	97,657	112,659
3,750	18,026	20,597	40,558	46,344	63,375	72,413	112,660	128,734
4,000	20,598	23,341	46,345	52,517	72,414	82,058	128,735	145,881
4,250	23,342	26,256	52,518	59,076	82,059	92,306	145,882	164,100
4,500	26,257	29,342	59,077	66,020	92,307	103,156	164,101	183,390
4,750	29,343	32,600	66,021	73,350	103,157	114,610	183,391	203,751
5,000	32,601	36,029	73,351	81,066	114,611	126,666	203,752	225,185
5,250	36,030	39,630	81,067	89,168	126,667	139,325	225,186	247,690
5,500	39,631	43,402	89,169	97,656	139,326	152,587	247,691	271,267
5,750	43,403	47,346	97,657	106,529	152,588	166,452	271,268	295,915
6,000	47,347	51,461	106,530	115,788	166,453		295,916	
6,250	51,462	55,748	115,789	125,434				
6,500	55,749	60,206	125,435	135,464				
6,750	60,207	64,836	135,465	145,881				
7,000	64,837	69,637	145,882	156,684				
7,250	69,638	74,609	156,685	167,872				
7,500	74,610	79,753	167,873	179,446				
7,750	79,754	85,069	179,447	191,406				
8,000	85,070		191,407					

Docket No. 070183-WS
Exhibit JFG-2

STANDARD SCHEDULE
FOR GRADING CITIES AND TOWNS OF THE UNITED STATES
WITH REFERENCE TO THEIR FIRE DEFENSE AND PHYSICAL CONDITIONS

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 6
COMPANY Aqua Utilities of FL (Direc
WITNESS John F. Guastella, P.E. (JFG-
DATE 01/22/08

STANDARD SCHEDULE
FOR
GRADING
CITIES AND TOWNS OF THE UNITED STATES
WITH REFERENCE
TO THEIR FIRE DEFENSES AND PHYSICAL CONDITIONS

NATIONAL BOARD OF FIRE UNDERWRITERS
New York, Chicago, San Francisco

Adopted, December 14, 1916
Edition of 1956

For residential districts only, the required duration may be reduced for required fire flows of 2,500 gpm and less, but in no case shall it be less than 50 per cent of that given in Table 6 for the corresponding required fire flow, and the minimum duration required in any case shall be 2 hours.

TABLE 5.

REQUIRED FIRE FLOW

Population	*Required Fire Flow for Average City,*		*Duration, hours*	*Population*	*Required Fire Flow for Average City,*		*Duration, hours*
	gpm	*mgd*			*gpm*	*mgd*	
1,000	1,000	1.44	4	22,000	4,500	6.48	10
1,500	1,250	1.80	5	27,000	5,000	7.20	10
2,000	1,500	2.16	6	33,000	5,500	7.92	10
3,000	1,750	2.52	7	40,000	6,000	8.64	10
4,000	2,000	2.88	8	55,000	7,000	10.08	10
5,000	2,250	3.24	9	75,000	8,000	11.52	10
6,000	2,500	3.60	10	95,000	9,000	12.96	10
10,000	3,000	4.32	10	120,000	10,000	14.40	10
13,000	3,500	5.04	10	150,000	11,000	15.84	10
17,000	4,000	5.76	10	200,000	12,000	17.28	10

Over 200,000 population, 12,000 gpm, with 2,000 to 8,000 gpm additional for a second fire, for a 10-hour duration.

Pressure. In grading a water supply the principal requirement considered is the ability to deliver water in sufficient quantity to permit pumpers of the Fire Department to obtain an adequate supply from hydrants. To overcome friction loss in the hydrant branch, hydrant, and suction hose, a minimum residual water pressure of 20 psi is required during flow, except that a minimum of 10 psi is permissible in districts where there is no deficiency in Items 28 or 29 and no deficiency for size of hydrants or hydrant connections in Item 31, where all hydrants are provided with at least one nominal 4½-inch outlet, and where the large outlet is normally used by the Fire Department.

Higher sustained pressure is of value in permitting direct supply to automatic sprinkler systems and building standpipe-and-hose systems, and in maintaining a water plane such that no portion of the protected area is without water. Such pressure may also be of value in enabling the Fire Department to use satisfactory hose streams direct from hydrants.

For communities requiring not more than 2,500 gpm fire flow and with not more than 10 buildings exceeding 3 stories in height, a residual pressure of 60 psi, and for other places a residual pressure of not less than 75 psi, maintained under fire demand, will permit the Fire Department to use effective streams direct from hydrants if hydrant spacing is such as to allow short hose lines; in thinly built residential sections and in small village mercantile districts having buildings of small area and not exceeding 2 stories, a residual pressure of 50 psi may be satisfactory.

The value of higher pressures is recognized in Items 6c, 20, 21, 22, and 23, Water Supply, Items 13 and 14, Fire Department, and Item 2, Credits.

1. APPOINTMENT OF EMPLOYEES

Employees of municipal systems shall be under adequate civil service rules or the equivalent, properly administered, with tenure of office secure. Long tenure of office and an efficient organization may be considered the equivalent.

For inadequate provisions for appointment and tenure:

Use 1/10 Deficiency Scale.

2. QUALIFICATIONS OF EXECUTIVES

The superintendent or chief engineer and his assistants shall be qualified by experience, preferably supplemented by education and professional registration, to perform their respective duties efficiently.

For executives not qualified:

Use 1/10 Deficiency Scale.

GRADING SCHEDULE

WATER SUPPLY

An adequate and reliable water supply is an essential part of the fire-fighting facilities of a municipality.

Minimum Recognized Water Supply. In order to be recognized for grading purposes, a water supply shall be capable of delivering at least 250 gpm for a period of 2 hours, or 500 gpm for one hour, for fire protection plus consumption at the maximum daily rate. Any water supply which cannot meet this minimum requirement shall not be graded, and a deficiency of 1,950 points shall be assigned.

Adequacy and Reliability. A water supply is considered to be adequate if it can deliver the required fire flow for the number of hours specified in Table 4, with consumption at the maximum daily rate; if this delivery is possible under certain emergency or unusual conditions, the water supply is also considered to be reliable.

TABLE 4.

REQUIRED DURATION FOR FIRE FLOW

Required Fire Flow gpm	Required Duration Hours
10,000 and greater	10
9,500	9
9,000	9
8,500	8
8,000	8
7,500	7
7,000	7
6,500	6
6,000	6
5,500	5
5,000	5
4,500	4
4,000	4
3,500	3
3,000	3
2,500 and less	2

In order to provide reliability, duplication of some or all parts of a water supply system will be necessary, the need for duplication being dependent upon the extent to which the various parts may reasonably be expected to be out of service as a result of maintenance and repair work, an emergency, or some unusual condition. The introduction of storage, either as part of the supply works or on the distribution system, may partially or completely offset the need for duplicating various parts of the system; the value of the storage depends upon its amount, location, and availability.

Docket No. 070183-WS
Exhibit JFG-3

WATER RATES

AWWA MANUAL M1

4TH EDITION

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183WS **EXHIBIT** 7
COMPANY Aqua Utilities of FL
WITNESS John F. Guastella, P.E. (JFG-3)
DATE 01/22/08

Water Rates

AWWA MANUAL M1

Fourth Edition

FOUNDED
1881

American Water Works Association

customer class that places summertime lawn irrigation loads on the system typically has a much higher peak-demand requirement, relative to the average demand, than does a petroleum refinery, which may require water on a relatively uniform basis throughout the year.

The classification of water customers as to whether they are inside or outside the city limits is related to each major group's responsibility for overall costs. As explained later in this manual, this factor is of major importance to government-owned utilities and may, in some instances, have a bearing on investor-owned utilities.

Legal requirements or customs may require recognition of certain customer classifications from an accounting standpoint, and such requirements can be accommodated in rate studies. However, general service characteristics, demand patterns, and location with regard to city limits are generally the principal considerations in customer classification.

General Classes

The three principal customer classes typical of most water utilities are (1) residential, (2) commercial, and (3) industrial. Definition of these general customer classes differs among utilities, but in very broad terms, the following definitions are common:

Residential—One- and two-family dwellings, usually physically separate.

Commercial—Multifamily apartment buildings and nonresidential, nonindustrial business enterprises.

Industrial—Manufacturing and processing establishments.

For specific utilities, there may be a breakdown of these general classes into more specific groups. For example, the industrial customer group may be subdivided into small industry, large industry, and special, the latter typified by a petroleum refinery.

In many systems, particularly larger ones, frequently there are customers having individual water-use characteristics, service requirements, or other reasons that set them apart from other customers with regard to cost responsibility. These customers should, therefore, have a separate class designation. Such classes may include large hospitals, universities, military establishments, and other such categories.

Special Classes

In addition to the general classes of service previously described, water utilities often provide service to certain special classes of customers. Four of those considered here are (1) wholesale service, (2) fire-protection service, (3) lawn irrigation, and (4) air conditioning and refrigeration.

Wholesale service. Wholesale service is usually defined as a situation in which water is sold to a customer at one or more major points of delivery for resale to individual retail customers within the wholesale customer's service area. Treated-water service is provided in most cases, but on occasion raw water is provided to wholesale customers. Usually, the wholesale customer is a separate municipality or water district adjacent to the supplying utility, but it may be in an area within the jurisdiction of the supplying utility.

Fire-protection service. Fire-protection service has characteristics that are markedly different from other types of water service. The service provided is principally of a standby nature—that is, readiness to deliver relatively large quantities of water for short periods of time at any of a large number of points in the water distribution system while the total annual quantity of water delivered is relatively small.

There are two principal approaches to the determination of fire-protection service costs that differ widely in both theory and application. One approach proposes that the costs of fire-protection service, other than those of the direct cost related to the hydrants themselves, be determined on the basis of the potential demand for water for fire-fighting purposes in relationship to the total of all potential demands for water. A second approach proposes that fire-protection-service costs be allocated as an incremental cost to the costs of general water service. This second approach is based on the premise that the prime function of the water utility is to supply general water service and that fire-protection service is a supplementary service. Each approach has advocates among water utility professionals. For the purposes of illustration in this manual, the first approach discussed above is used.

Costs allocated to fire-protection service as a class can be subdivided into those related to public fire-protection service and private fire-protection service. The specific methodology for such subdivision is presented in chapter 4.

The reader of this manual is referred to chapter 2 of AWWA Manual M26, *Water Rates and Related Charges*, for further discussion of fire-protection rates and charges.

Lawn irrigation. Residential lawn irrigation is characterized by the relatively high demands it places on the water system, usually during the late afternoon and early evening hours. In most of the United States, lawn irrigation is very seasonal in nature, being most pronounced during the summer months and virtually nonexistent during the winter months.

In most instances, lawn irrigation service is not separate from other service; therefore, the high-peaking characteristics of lawn irrigation need to be recognized as a part of residential-class water-use characteristics. However, where separate metering for lawn irrigation is provided, as is sometimes the case for automatic lawn sprinkling systems, parks, and golf courses, and where such loads are significant in the system, a separate class designation is warranted.

Air conditioning and refrigeration. In the 1950s and 1960s, there was a trend away from water-cooled air conditioning and refrigeration. Subsequent to the rapid increase in electric-power and natural-gas costs in the 1970s, commercial and industrial customers have reconsidered the economics of alternative cooling methods. In some cases, it has been found that higher initial outlays for water-cooled units can be more than offset by the operating economies of water costs versus power requirements. In many communities, however, city codes prohibit the use of "water-wasting" units. The use of recirculating units needing only make-up water is a proposed alternative. Make-up water requirements will vary, but a common rule of thumb for make-up water due to evaporation, quality control, and other causes is estimated as 20 gpd/ton of air conditioning.

A survey of the magnitude of water-cooled air conditioning and refrigeration service provided or expected could determine the need or advisability of recognition of such service as a separate class.

Service Outside City Limits

Many government-owned utilities recognize in their rate structures the differences in costs of serving water users located outside the corporate limits of the supplying city or jurisdiction compared with those located within the corporate limits. A government-owned utility may be considered to be the property of the citizens within the city. Customers within the city are owner customers, who must bear the risks and

Costs related to billing and collecting may be distributed among customer classes based on the total number of bills rendered to the respective classes in a test year. In some instances, it is appropriate to recognize, through billing ratios, that billing and collecting for larger services may incur more cost than for smaller services.

An illustration of the development of the test-year units of service for the hypothetical utility, using the base–extra capacity method of cost allocation and distribution, is presented in Table 3-1. Test-year units of service reflect the prospective average annual customer water-use requirements during the test-year study period considered in this example.

For the example, it is assumed that retail service and fire-protection service are provided inside the city to residential, commercial, and industrial classes. Outside-city service is provided on a wholesale basis.

For each customer class, under the heading of Base in Table 3-1, the total annual water use in thousand gallons is shown, as well as the average rate in thousand gallons per day. Maximum-day capacity factors are applied to average-day rates of flow to develop total capacity by class. Extra capacity is the difference between total capacity and average rate of use. Fire-protection service is considered to require negligible flow on an average basis but 960 thou. gpd on a maximum daily basis. Maximum-hour extra capacity is developed similarly. Maximum-hour fire-protection service reflects the assumption that flow for fires is concentrated in a four-hour period.

Equivalent meters and services are derived by applying equivalent ratios to the number of meters of each size by class. The number of bills is simply the total number of bills rendered annually for each class.

Table 3-2 shows the development of the units of service applicable to the commodity–demand method of cost allocation. It differs from Table 3-1 only by the fact that the maximum-day extra capacity column is excluded.

It should be recognized that the maximum total capacity on both a maximum-day and maximum-hour basis for the total system (shown in Tables 3-1 and 3-2) is the estimate of the sum of noncoincidental peaking requirements on the system; that is, it is the sum of the peaks for each class, regardless of the day or hour in which such

Table 3-1 Units of Service—Base–Extra Capacity Method (Test Year)

	Base		Maximum Day			Maximum Hour				
Customer Class	Annual Use *thou. gal*	Average Rate *thou. gpd*	Capacity Factor %	Total Capacity *thou. gpd*	Extra Capacity *thou. gpd*	Capacity Factor %	Total Capacity *thou. gpd*	Extra Capacity* *thou. gpd*	Equivalent Meters and Services	Bills
Inside-City:										
Retail service										
Residential	968,000	2,652	250	6,630	3,978	400	10,608	3,978	15,652	185,760
Commercial	473,000	1,296	200	2,592	1,296	325	4,212	1,620	1,758	14,640
Industrial	1,095,000	3,000	150	4,500	1,500	200	6,000	1,500	251	420
Fire-protection service				960	960		5,760	4,800		
Total inside-city	2,536,000	6,948		14,682	7,734		26,580	11,898	17,661	200,820
Outside-City:										
Wholesale service	230,000	630	225	1,418	788	375	2,363	945	34	48
Total system	2,766,000	7,578		16,100	8,522		28,943	12,843	17,695	200,868

*Maximum-hour demand in excess of maximum-day demand.

DOCKET NO. 070183-WS

EXHIBIT (FS-1)______
CONSISTING OF 17 PAGES

SUMMARY OF CASES - FRANK SEIDMAN

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 8
COMPANY Utilities, Inc. of FL (Direct)
WITNESS Frank Seidman, P.E. (FS-1)
DATE 01-22-08

Revised:11/01/07

SUMMARY OF PROCEEDINGS PARTICIPATED IN

FRANK SEIDMAN

I. Participation In Specific Water And Sewer Cases

California

Case: California Cities Water co., Rate Case, 1973
Sponsor: California Cities Water Co.
Purpose: Supervise Rate Case preparation and present testimony re intercompany tax allocations.

Florida

Case: Florida 2nd Judicial District Court; re Contributions In Aid of Construction, 1970
Sponsor: Court Subpoena
Purpose: Testify re Relationship of CIAC and Rates.

Florida

Case: Docket No. I-71184-WS; GAC Utilities, Inc., of Florida, Cape Coral Division, Investigation of Main Extension Fees, 1971
Sponsor: GAC Utilities, Inc.
Purpose: Prepare Main Extension Fee Study and testify re Main Extension Fees.

Florida

Case: Docket No. 71581-WS; GAC Utilities Inc., Poinciana Division; Application for Certificate of Convenience and Necessity, 1971
Sponsor: GAC Utilities, Inc.
Purpose: Testify re Application.

Florida

Case: Sarasota County; Florida Cities Water Co., Rate Case, 1972
Sponsor: Florida Cities Water Co.
Purpose: Prepare Rate Case and testify re Application.

Florida

Case: Docket No. 800594-WS; Palm Coast Utility Corp., Rate Case and Certificate Filing, 1980
Sponsor: Palm Coast Utility Corp.
Purpose: Prepare Original Cost Study and Minimum Filing Requirements.

Florida

Case: Docket No. 810485-WS; Palm Coast Utility Corp., Rate Case, 1982
Sponsor: Palm Coast Utility Corp.
Purpose: Prepare Minimum Filing Requirements.

Florida

Case: Charlotte County; Fiveland Investments, Inc. Rate Case, 1982
Sponsor Fiveland Investments, Inc.
Purpose: Prepare Rate Case and make presentation before Utility Board.

Florida
Case: Docket No. 820152-WS; San Carlos Utilities, Inc. Rate Case, 1982
Sponsor: San Carlos Utilities, Inc.
Purpose: Assist in Preparing Minimum Filing Requirements.

Florida
Case: Docket No. 820153-S; Shell Point Village Rate Case, 1982
Sponsor: Shell Point Village
Purpose: Prepare Rate Case and represent SPV before PSC.

Florida
Case: Docket No. 840092-WS; Palm Coast Utility Corp., Rate Case, 1983
Sponsor: Palm Coast Utility Corp.
Purpose: Prepare Rate Case and testimony re Application.

Florida
Case: Docket No. 840105-WS; Gulf Utility company, Rate Case, 1983
Sponsor: Gulf Utility Company
Purpose: Prepare Rate Case and testimony re Application.

Florida
Case: Collier County, East Naples Water Systems, Inc., Rate Case, 1984
Sponsor: East Naples Water Systems, Inc.
Purpose: Prepare Rate Case and present testimony re Application.

Florida
Case: Docket No. _______; East Naples Water systems, Inc., Application for Certificate and Certificate Extension, 1985
Sponsor: East Naples Water Systems, Inc.
Purpose: Prepare Case for presentation to PSC.

Florida
Case: Docket No. ________; East Naples Water Systems, Inc. Rate Case, 1985
Sponsor: East Naples Water Systems, Inc.
Purpose: Prepare Rate Case and testimony re Application.

Florida
Case: Docket No. 850100-WS; Du-Lay Utility Company, Inc.; Rate Case, 1984
Sponsor: Du-Lay Utility Company, Inc.
Purpose: Prepare rate case and present testimony re Application.

Florida
Case: Docket No. 850062-WS; Meadowbrook Utility Systems, Inc. Rate Case, 1984 - 1988
Sponsor: Meadowbrook Utility Systems, Inc.
Purpose: Coordinate case and prepare testimony re Application.

Florida
Case: Docket No. 870330-WS; Seminole Utility Systems, Inc., Rate Case, 1986
Sponsor: Seminole Utility Systems, Inc.
Purpose: Prepare Rate Case and present testimony re Application.

<u>Florida</u>
Case: Docket No. 870166-WS; Palm Coast Utility Corp., Rate Case, 1986 - 1987
Sponsor: Palm Coast Utility Corp.
Purpose: Prepare Rate Case and present testimony re Application.

<u>Florida</u>
Case: Docket No. 870149-WS; Atlantis Utilities Company, Overearnings Investigation
Sponsor: Atlantis Utilities Company
Purpose: Participate in preparation of response to PSC.

<u>Florida</u>
Case: Undocketed (Sarasota County), Dolomite Utilities Corporation, Rate Case, 1988 - 1989.
Sponsor: Dolomite Utilities Corporation
Purpose: Prepare Rate Case and present testimony re Application.

<u>Florida</u>
Case: Undocketed (Charlotte County), West Charlotte Utilities, Market Value Appraisal, 1988
Sponsor: West Charlotte Utilities
Purpose: Appraisal for additional financing

<u>Florida</u>
Case: Docket No. 880756-WS; Atlantis Utilities Company, Rate Case, 1988
Sponsor: Atlantis Utility Company
Purpose: Prepare Rate Case

<u>Florida</u>
Case: Undocketed (Charlotte County), West Charlotte Utilities, Pass-Thru Application, 1989
Sponsor: West Charlotte Utilities
Purpose: Prepare Pass-Thru Application

<u>Florida</u>
Case: Docket No. 891114-WS; Sailfish Point Utility Corporation, Rate Case, 1989
Sponsor: Sailfish Point Utility Corporation
Purpose: Prepare Rate Case

<u>Florida</u>
Case: Docket No. 890554-WU; Lake Griffin Utilities Inc., Certificate Application, 1989
Sponsor: Lake Griffin Utilities Inc.
Purpose: Prepare original cost and application for initial rates and charges.

<u>Florida</u>
Case: Undocketed; 1988-1989
Sponsor: Atlantis Utility Company
Purpose: Market Value Appraisal and Sale Negotiations

Florida

Case: Undocketed; 1990
Sponsor: Tangerine Woods Utilities and Englewood Utilities Co.
Purpose: Study Re Englewood Water District Master Plan

Florida

Case: Docket No. 900329-WS; United Florida Utilities Corporation; Marion and Washington Counties
Sponsor: Southern States Utilities; United Florida Utilities, and Deltona Utilities
Purpose: Prepare and Present Rate Application for Marion and Washington County portion of twenty-seven county rate increase application, including substantiation of original cost. Assist with testimony and brief for entire application.

Florida

Case: Docket No. 900682-WS; Exemption Request, 1990
Sponsor: W.P. Utilities
Purpose: Request for Exemption from PSC Regulation

Florida

Case: Docket No. 900816-WS; Sailfish Point Utility Corporation, Rate Case, 1990
Sponsor: Sailfish Point Utility Corporation
Purpose: Prepare and Present Rate Case

Florida

Case: Undocketed; Sailfish Point Utility Corporation, 1991
Sponsor: Sailfish Point Utility Corporation
Purpose: Prepare Market Valuation

Florida

Case: Docket No. 910020-WS; Utilities Inc. of Florida (Pasco County), Rate Case, 1991
Sponsor: Utilities Inc. of Florida
Purpose: Prepare and Present Rebuttal Testimony on Used & Useful.

Florida

Case: Docket No. 911082-WS; Revisions to Water and Wastewater Rules, 1992-93.
Sponsor: Florida Water Works Association
Purpose: Prepare and present comments of Association regarding rule revisions, including ratemaking and used and useful formulae.

Florida

Case: Docket No. 920174-WU; Utilities Inc. of Florida (Lake County), Application for Amendment of Certificate and Objection to City of Clermont Ord. 273-C, establishing a Chapter 180 F.S., W&S Utility, 1992
Sponsor: Utilities Inc. of Florida
Purpose: Prepare and Present Testimony supporting certificate application and objecting to formation of utility that encompasses UIF certificated service areas and prevents their economic development.

Florida

Case: Docket No. 920199-WS; Southern States Utilities, Inc. Combined System Rate Case, 1991 & 1992
Sponsor: Southern States Utilities;
Purpose: Develop all rate base data and prepare MFRs for systems in Osceola, Orange, Brevard and Clay counties as part of a combined system rate application.

Florida

Case: Docket No. 920650-WS; Application for Certificate, 1992.
Sponsor: W.P. Utilities
Purpose: Apply for certificate, establish original cost for rate base and rates.

Florida

Case: Undocketed; Rolling Oaks Utility, 1992.
Sponsor: Southern States
Purpose: Prepare duee diligence and valuation report.

Florida

Case: Docket No. 920834-WS; Utilities Inc. of Florida (Pasco County), Limited proceeding to increase rates to recover cost of purchased assets, 1992.
Sponsor: Utilities Inc. of Florida
Purpose: Prepare Original Cost Study and design rates to recover costs.

Florida

Case: Docket No. 921293-SU; Mid-County Services, Inc. (Pinellas County), Application to increase rates tand service availability (SAC) charges.
Sponsor: Mid-County Services, Inc.
Purpose: In response to protest of SACs, prepare analysis of requested charges and evaluate compliance with PSC rules.

Florida

Case: Docket No. 930770-WU; St. George Island Utility Company, Ltd, Rate Application, 1993.
Sponsor: St. George Island Utility
Purpose: Prepare all MFRs and supporting testimony

Florida

Case: Docket No. 940109-WU; St. George Island Utility Company, Ltd, Rate Application, 1994.
Sponsor: St. George Island Utility
Purpose: Prepare all MFRs and supporting testimony

Florida

Case: Docket No. 930570-WS; Lake Placid Utilities, Inc., Application for certificate transfer.
Sponsor: Lake Placid Utilities, Inc.
Purpose: Prepare original cost study.

Florida

Case: Undocketed; Sailfish Point Utility Corporation, 1994
Sponsor: Sailfish Point Utility Corporation
Purpose: Prepare Market Valuation

Florida

Case: 1994-5; Undocketed [THIS IS NOT A RATE APPLICATION]
Sponsor: Miami-Dade Water and Sewer Department [Subcontractor to Milian, Swain & Associates]
Purpose: Subcontracted to prepare billing analysis and design rates to recover five year projected cost of service.

Florida

Case: 1994-5; Undocketed Rulemaking on Used & Useful and Petition to Adopt Rules
Sponsor: Florida Waterworks Association
Purpose: Develop position, draft proposed rule, participate in workshops and consult re Petition to Adopt Rules regarding margin reserve and imputation of CIAC.

Florida

Case: Docket No. 951056-WS; Palm Coast Utility Corporation; Application for Increase in Rates
Sponsor: Palm Coast Utility Corporation
Purpose: Prepare MFRs and supporting testimony; prepare rebuttal testimony; participate in hearing and post hearing procedures.

Florida

Case: Docket No. 951593-WS; Palm Coast Utility Corporation; Application for Revision in Service Availability Charges
Sponsor: Palm Coast Utility Corporation
Purpose: Prepare application; prepare response to staff recommendation; participate in Commission agenda conference.

Florida

Case: Docket No. 960258-WS; Petition to adopt Rules on Margin Reserve and Imputation of CIAC
Sponsor: Florida Waterworks Association
Purpose: Develop position, draft proposed rule, participate in studies to support position; prepare testimony; prepare responses to testimony; participate in hearings. Testify in subsequent DOAH rule challenge.

Florida

Case: Docket No. 970076-WS; Sailfish Point Utility Corporation, Joint Application to transfer assets to Sailfish Point Service Corporation, 1997
Sponsor: Sailfish Point Utility Corporation
Purpose: Assist with Application

Florida

Case: Docket No. 960283-WS; Wedgefield Utilities, Inc., Application for Transfer of Certificates from Econ Utilities Corp. to Wedgefield, 1997
Sponsor: Wedgefield Utilities, Inc.
Purpose: Testify re Acquisition Adjustment and Policy

Florida

Case: Docket No. 960444-WU; Lake Utility Services, Inc., Application for Rate Increase and for increase in Service Availability Charges, 1997
Sponsor: Lake Utility Services, Inc.
Purpose: File Testimony re Used & Useful and Future Connections for SAC.

Florida

Case: Undocketed - Challenge at DOAH of PSC Rule 25-30.431, 1997-98
Sponsor: Florida Waterworks Association
Purpose: Assist with strategy and discovery; appear as expert witness re Regulation and policy issues.

Florida

Case: Undocketed - Market value appraisal, 1997,8 & 2000
Sponsor: Water Management Services, Inc.
Purpose: Prepare market value appraisal and update for re-financing.

Florida

Case: Docket No. 980483-WU; Lake Utility Services, Inc., Investigation re overcollection of AFPI, 1998
Sponsor: Lake Utility Services, Inc.
Purpose: Participate in preparation of testimony.

Florida

Case: Docket No. 971220-WS; Cypress Lakes Utilities, Inc., Application for certificate transfer, 1999
Sponsor: Cypress Lakes Utilities, Inc.
Purpose: Prepare testimony re acquisition adjustment.

Florida

Case: Docket No. 971065-SU; Mid-County Services, Inc., Application for increase in rates, 1999
Sponsor: Mid-County Services, Inc.
Purpose: Prepare testimony re used and useful, margin reserve and imputation of CIAC.

Florida

Case: Undocketed; PSC Annual Reports, 1999
Sponsor: AquaSource, Inc.
Purpose: Prepare annual reports for newly acquired multi-system Crystal River Utilities, Inc.

Florida
Case: Undocketed; Market Valuation, 1999
Sponsor: Northern Trust Bank of Naples
Purpose: Prepare market valuation for defaulted utility, Bonita Country Club Utilities, Inc.

Florida
Case: Docket No. 990975-SU; Application for Certificate Transfer, 1999,2000
Sponsor: Realnor Hallandale, Inc..
Purpose: Participate in preparation of application to transfer Certificate from Bonita Country Club Utilities, Inc., provide consulting re utility operations, prepare PSC annual reports.

Florida
Case: Docket No. 000154-SU; Proposed Rule 25-30.432 re used and useful, 2000
Sponsor: Florida Water Works Association
Purpose: Represent FWWA at PSC Staff workshop; prepare presentation.

Florida
Case: Undocketed; Water and wastewater rates and charges analysis, 2000
Sponsor: North Miami Beach, City of
Purpose: Through Milian Swain and Associates, Inc. prepare analysis and recommendation for all charges.

Florida
Case: Docket No. 991437-WU; Application for increase in water rates, 1997-2001
Sponsor: Wedgefield Utilities, Inc.
Purpose: Prepare testimony re used and useful and acquisition adjustment; Provide consulting re entire case and issues.

Florida
Case: Docket No. 000694-WU; Application for limited proceeding for increase in rate to recover cost of replacing supply mains on new bridge, 2000
Sponsor: Water Management Services, Inc.
Purpose: Prepare schedules supporting increase; participate in preparation of State Revolving Fund loan application.

Florida
Case: Docket No. 990696-WS; Application for original certificate in Duval and St. Johns counties, 2000-01
Sponsor: Nocatee Utility Corp.
Purpose: Through Milian Swain and Associates, Inc. provide analysis of Intervenor studies, assist with case analysis, preparation, discovery and hearings.

Florida
Case: Docket No. 001502-WS; Proposed Rule 25-30.0371, Acquisition Adjustments, 2001
Sponsor: Utilities, Inc.
Purpose: Represent UI and present position at PSC workshop.

Florida

Case: Docket No. 001820-SU; Application for certificate transfer, 2001
Sponsor: Utilities, Inc. of Eagle Ridge
Purpose: Prepare original cost study of newly acquired Cross Creek system.

Florida

Case: Undocketed; Application for original rates and charges and tariffs in St. Johns County, 2000-01
Sponsor: St. Joe Utility Co.
Purpose: Prepare supporting schedules for rates and charges.

Florida

Case: Undocketed; PSC Annual Reports, 2001
Sponsor: Harbor Hills Utilities, Inc.
Purpose: Prepare annual reports and reconcile records in accordance with PSC staff requests.

Florida

Case: Undocketed; Prepare Cost of Service Study, 2002.
Sponsor: CWS - Palm Valley
Purpose: Prepare cost study to support mobile home park conversion from to direct utility billing from rent inclusion.

Florida

Case: Undocketed; Application for original franchise certificate in Flagler County, 2002
Sponsor: MHC, Inc. - Bulow Village
Purpose: Prepare application and supporting documents - application put on hold.

Florida

Case: Docket No. 020006-WS; Reestablishment of Authorized Rate of Return for Water and Wastewater Utilities, 2002
Sponsor: Florida Water Services Corp.
Purpose: Prepare expert testimony on effect of rule change proposal.

Florida

Case: Docket No. 020071-WS; Application for increase in rates and charges, 2002
Sponsor: Utilities Inc. of Florida
Purpose: Prepare Used & Useful analysis and MFR engineering schedules for six county rate application.

Florida

Case: Docket No. 020407-WS; Application for increase in rates and charges, 2002
Sponsor: Cypress Lakes Utilities, Inc.
Purpose: Prepare complete MFR supporting rate increase.

Florida

Case: Docket No. 020409-SU; Application for increase in rates and charges, 2002
Sponsor: Utilities, Inc. of Sandalhaven
Purpose: Prepare complete MFR supporting rate increase.

Florida

Case: Docket No. 020408-SU; Application for increase in rates and charges, 2002
Sponsor: Alafaya Utilities, Inc.
Purpose: Prepare Used & Useful analysis, MFR engineering schedules and original cost study for purchased assets.

Florida

Case: Docket No. 030443-WS; Application for increase in rates and charges, 2003
Sponsor: Labrador Utilities, Inc.
Purpose: Prepare Used & Useful analysis and MFR engineering schedules.

Florida

Case: Docket No. 030444-WS; Application for increase in rates and charges, 2003
Sponsor: Bayside Utility Services, Inc.
Purpose: Prepare complete MFR supporting rate increase.

Florida

Case: Docket No. 030445-SU; Application for increase in rates and charges, 2003
Sponsor: Utilities, Inc. of Eagle Ridge
Purpose: Prepare complete MFR supporting rate increase.

Florida

Case: Docket No. 030446-SU; Application for increase in rates and charges, 2003
Sponsor: Mid-County Utility Services, Inc.
Purpose: Prepare complete MFR supporting rate increase.

Florida

Case: Undocketed - Hillsborough County; Application for increase in rates and charges, 2003
Sponsor: East Lake Water Services, Inc.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida

Case: Docket No. 040247-WS; Application for original water and wastewater certificates, rates and charges and tariffs in Franklin County, 2004
Sponsor: St. James Island Utility Company.
Purpose: Prepare application, tariffs and supporting schedules for rates and charges.

Florida

Case: Docket No. 040358-SU; Application for original wastewater certificate, rates and charges and tariffs in Bay County, 2004
Sponsor: Crooked Creek Utility Company.
Purpose: Prepare application, tariffs and supporting schedules for rates and charges.

Florida
Case: Undocketed - Sarasota County; Application for increase in rates and charges, 2004
Sponsor: Siesta Key Utilities Authority.
Purpose: Prepare application and supporting schedules.

Florida
Case: Docket No. 040450-WS; Application for increase in rates and charges, 2004
Sponsor: Indiantown Co., Inc.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida
Case: Undocketed - Certificate Application, 2005 (never filed)
Sponsor: MHC, Inc.
Purpose: Prepare application and supporting rates and charges.

Florida
Case: Docket No. 050281-WS; Application for increase in rates and charges, 2005
Sponsor: plantation Bay Utility Co.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida
Case: Docket No. 050587-WS; Application for increase in rates and charges, 2005
Sponsor: MSM Utilities
Purpose: Assist w/SARC; prepare annual report.

Florida
Case: Docket No. 980876-WS; Application for certificate (update), 2005
Sponsor: Ocala Springs Utility, Inc.
Purpose: Prepare updated analysis.

Florida
Case: Undocketed (Collier County) Applicaton for change in meter installation charges, 2006
Sponsor: Orange Tree Utility Co.
Purpose: Prepare application.

Florida
Case: Docket No. 060246-WS; Application for increase in rates and charges, 2006
Sponsor: Gold Coast Utility Corp.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida
Case: Docket No. 060256-WS; Application for increase in rates and charges, 2006
Sponsor: Alafaya Utilities Inc.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida

Case: Docket No. 060257-WS; Application for increase in rates and charges, 2004
Sponsor: Cypress Lakes Utilities, Inc.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida

Case: Docket No. 060260-WS; Application for increase in rates and charges, 2006
Sponsor: Lake Placid Utilities, Inc.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida

Case: Docket No. 060254-SU; Application for increase in rates and charges, 2006
Sponsor: Mid-County Services, Inc.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida

Case: Docket No. 060255-WS; Application for increase in rates and charges, 2006
Sponsor: Tierra Verde Utilities, Inc.
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida

Case: Docket No. 060253-WS; Application for increase in rates and charges, 2006 (six county system)
Sponsor: Utilities,Inc. Of Florida
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida

Case: Docket No. 060261-WS; Application for increase in rates and charges, 2006
Sponsor: Utilities, Inc. of Pennbrooke
Purpose: Prepare Used & Useful Analysis and MFR engineering schedules.

Florida

Case: Docket No. 060285-WS; Application for increase in rates and charges, 2006
Sponsor: Utilities, Inc. of Sandalhaven
Purpose: Prepare Used & Useful analysis and Projected TY MFR.

Michigan

Case: Northern Michigan Water; Rate Case, 1972
Sponsor: Northern Michigan Water Co.
Purpose: Prepare Rate Case and present testimony re Appropriate Rate of Return.

North Carolina

Case: Carolina Water Service, Inc. of North Carolina; Rate Case, 1992.
Sponsor: Carolina Water Service, Inc. of North Carolina
Purpose: Prepare and present rebuttal testimony regarding the concept of used and useful for a regulated utility.

II. Participation In Specific Electric Cases

Alabama

Case: Docket No. 18117; Alabama Power co., Rate Case, 1981
Sponsor: U.S. Steel Co.
Purpose: Analyze impact of Rate Proposals; Critique APCO Filing; Evaluate Cost Allocation Methodology; Recommend Position.

Alabama

Case: Remand of Docket No. 18117; Alabama Power Co., Rate Case, 1982
Sponsor: U.S. Steel Co.
Purpose: Analyze impact of Rate Proposals; Critique APCO Filing; Evaluate Cost Allocation Methodology; Recommend Position.

Arkansas

Case: Docket No. U-2972; Arkansas Power & Light Co., 1979
Sponsor: Associated Industries of Arkansas, Inc.
Purpose: Prepare and present Rebuttal testimony regarding Industrial Response to Peak Load Pricing.

California

Case; Los Angeles Dept. of Water and Power; PURPA Hearings, 1979
Sponsor: Anheuser Busch et al.
Purpose: Prepare and present Rebuttal testimony re Rate Design and Marginal Cost Pricing.

Delaware

Case: Docket No. 82-83, Delmarva Power & Light co., Rate Case, 1983
Sponsor: Diamond Shamrock et al.
Purpose: Prepare and present Rebuttal testimony re Cost of Service and Rate Design.

Florida

Case: Docket No. 74680-CI; General Investigation of the Fuel Adjustment Clause, 1974
Sponsor: Florida Public Service Commission
Purpose: Prepare and present testimony re Power Plant Operating Efficiency.

Florida

Case: Docket No. 74576-EU; General Investigation of the Capital Facilities Charge for Electric Utilities, 1975
Sponsor: Florida Public Service Commission
Purpose: Prepare and present testimony re Method of Developing a Capital Facilities Charge.

Florida

Case: Department of Environmental Regulation, Applications for Site Certification; 1974 - 1977
Sponsor: Florida Public Service Commission
Purpose: Prepare Determination of Need Analysis and testify as required re PSC Position on:

1. Florida Power & Light Co. - Palatka Plant,
2. Florida Power & Light Co. - St. Lucie Nuclear Plant
3. City of Tallahassee - Hopkins Plant

4. Lake Worth Utilities Authority - Combined Cycle Plant

Florida

Case: Docket Nos. 790571-EU, 790859-EU and 780973-EU; Relating to the PURPA Rate Design Standards, 1979, 1980
Sponsor: Florida Industrial Users Group
Purpose: Prepare and present testimony re Economies of Scale and Industrial Response to Peak Load Pricing.

Florida

Case: Docket No. 800119-EU, FLorida Power Corp., Rate Case, 1980
Sponsor: Stauffer Chemical Co.
Purpose: Analyze Impact of Proposed Change in Interruptible Rate; participate in contract renegotiations; develop position for Rate Case.

Florida

Case: Docket Nos. 820406-EU, 830377-EU; Cogeneration Rule-making and Implementation Proceedings, 1982-1984
Sponsor: IMC et al.
Purpose: Prepare and present testimony re Proposed Cogeneration Rules and their Implementation.

Florida

Case: Docket No. 820460-EU; Determination of need for Cogeneration Facility, 1982
Sponsor: International Minerals & Chemical (IMC)
Purpose: Prepare and present testimony re Basis of Determining Need for Cogeneration.

Florida

Case: Docket No. 840399-EU; Provision of Utility Transmission Service To Qualifying Facilities At Multiple Locations, 1984
Sponsor: CF Industries, et al
Purpose: Prepare and present testimony re Rule Change

Florida

Case: Docket No. 850004-EU; Annual Planning Hearing on Load Forecasts, Generation Expansion Plans and Cogeneration Prices, 1985
Sponsor: Industrial Cogenerators
Purpose: Prepare testimony re Cogeneration Pricing.

Florida

Case: Docket No. 860004-EU; Annual Planning Hearing on Load Forecasts, Generation Expansion Plans and Cogeneration Prices, 1986
Sponsor: Industrial Cogenerators
Purpose: Prepare and present testimony re Cogeneration Pricing.

Florida

Case: Docket No. 860001-EI-E; Florida Power & Light Company Avoided O&M Payments to Qualifying Facilities, 1986
Sponsor: Florida Crushed Stone
Purpose: Prepare and present testimony on Variable O&M Payment.

Florida

Case: Docket No. 870184-EU; Retail Sale of Electricity by Private Suppliers, 1987
Sponsor: Industrial Cogenerators
Purpose: Prepare comments on PSC Retail Sales issues.

Florida

Case: Docket No. 880004-EU, 890004-EU; Planning Hearings on Load Forecast, Cogeneration Expansion Plans and Cogeneration Prices, 1988, 1989.
Sponsor: Industrial Cogenerators
Purpose: Prepare and present testimony re Cogeneration Pricing.

Florida

Case: Docket No. 881005-EG; Amendment of Cogeneration Rules 25-17.091 for Solid Waste Facilities, 1988.
Sponsor: City of Tampa
Purpose: Prepare and present testimony re Cogeneration pricing for Solid Waste Facilities.

Florida

Case: Docket Nos. 890973 and 890974-EI; FPL Petition for Need, Lauderdale and Martin Plants
Sponsor: Broward County
Purpose: Represent the interests of Broward County

Florida

Case: Docket No. 891049-EU; Revision of Cogeneration Rules
Sponsor: Florida Industrial Cogenerators Association
Purpose: Prepare and present comments re revisions to cogeneration rules

Florida

Case: Docket No. 891324-EU; Revision of Conservation Cost Effectiveness Rules
Sponsor: Florida Industrial Cogenerators Association
Purpose: Prepare and present comments re rule revisions

Florida

Case: Docket No. 910004-EU; Planning Hearings on Load Forecast, Cogeneration Expansion Plans and Cogeneration Prices, 1990.
Sponsor: Florida Industrial Cogenerators Association
Purpose: Prepare and present testimony on cogeneration pricing

Florida

Case: Docket No. 910603-EQ; Implementation of Cogeneration Rules regarding negotiated contracts
Sponsor: Florida Industrial Cogenerators Association
Purpose: Prepare and present testimony re rule implementation.

Florida

Case: Docket No. 001574-EQ; Proposed Amendments to Rule 25-17.0832, Firm Capacity and Energy Contracts, 2002
Sponsor: City of Tampa and Solid Waste Authority of Palm Beach County
Purpose: Prepare expert testimony on effect of rule change proposal.

Florida

Case: Undocketed (Jefferson County) Financing to upgrade Wasteto-Energy Generating Plant, 2006
Sponsor: K&M Energy, LLC
Purpose: Prepare Feasibility Report

Florida

Case: Docket No. 060555-EI; Proposed Amendments to Rule 25-17.0832, Firm Capacity and Energy Contracts, 2006
Sponsor: City of Tampa and Solid Waste Authority of Palm Beach County, et al
Purpose: Prepare expert testimony on effect of rule change proposal and alternative rule.

Texas

Case: Docket No. 1776; Hearing on PURPA Rate Design Standards, May 1978
Sponsor: ELCON at request of Texas PUC
Purpose: Co-sponsor testimony re Impact of Alternative Rate Structures on Utilities and Their Customer Classes.

Texas

Case: Docket No. 3955; Houston Lighting & Power, Rate Case, 1981
Sponsor: United States Steel Co.
Purpose: Evaluate Rate Application and file testimony re Customer Load Characteristics and Impact of Tariff Provisions (Case settled).

Texas

Case: Docket No. 4540; Houston Lighting & Power, Rate Case, 1982
Sponsor: United States Steel Co.
Purpose: Analyze Impact of Rate Proposals; Critique HL&P Filing; evaluate Cost Allocation Methodology; Recommend Position.

Utah

Case: Docket No. 81-035-12; Utah Power & Light co., Request For Vintage pricing
Sponsor: United States Steel Co.
Purpose: Analyze impact of Proposal; Evaluate concept; Rec. position.

Utah

Case: Docket No. 82-035-13; UP&L, Rate Case
Sponsor: United States Steel Co.
Purpose: Analyze Impact of Rate Proposals; Critique UP&L Filing, Evaluate Cost Allocation Methodology; Recommend Position.

III. Participation In Specific Gas Cases

Florida

Case: Central Florida Gas Corp., Rate Case, 1971
Sponsor: Central Florida Gas Corp.
Purpose: Prepare Original Cost Study, Rate Case and testimony re Application.

Florida

Case: Arbitration Panel, Central Florida Gas Corp., Condemnation Proceeding by the City of Bartow
Sponsor: Central Florida Gas Corp.
Purpose: Prepare and present testimony re Economic Losses Due to Condemnation.

IV. Participation in Specific Telephone Cases

Florida

Case: Docket No. 910289-TP; Edgewater Communications, Show Cause Re Alleged Violation of Certificate Statutes & Rules.
Sponsor: Edgewater Communications
Purpose: Prepare Testimony supporting EC Position that it is a Transient Reseller, exempt from Regulation under PSC rules.

Florida

Case: Undocketed; Edgewater Communications, Re Payment of Gross Receipts and Sales Taxes to Department of Revenue.
Sponsor: Edgewater Communications
Purpose: Prepare Interpretation of Tax Liability and assist in calculation of taxes and penalties.

Florida

Case: Docket No. 910869-TL; Revision to Rule 25-4.0345 re Customer Premise Equipment and Inside Wire.
Sponsor: Edgewater Communications
Purpose: Prepare Comments for Commission Workshop

Florida

Case: Docket No. 911214-TP; Teleco Communications, Show Cause Re Alleged Violation of Certificate Statutes & Rules.
Sponsor: Teleco Communications
Purpose: Define issues and defend company's position.

Florida

Case: Docket No. 950561-TL; Call Aggregator Rules
Sponsor: Edgewater Communications
Purpose: Prepare position and respond to draft of proposed rules.

DOCKET NO. 070183-WS

EXHIBIT (FS-2)______
CONSISTING OF 2 PAGES

PSC STAFF MEMORANDUM, February 7, 1983

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 9
COMPANY Utilities, Inc. Of FL (Direct)
WITNESS Frank Seidman, P.E. - (FS-2)
DATE 01/22/08

Docket No.070183-WS
1983 Staff Memo
Exhibit (FS-2)_____
Page 1 of 2

MEMORANDUM

February 7, 1983

TO: JAMES COLLIER, WATER & SEWER DEPARTMENT

FROM: GREGORY J. KRASOVSKY, ASSOCIATE GENERAL COUNSEL

RE: LEGAL INTERPRETATION OF TERM "USED AND USEFUL" AS CONTAINED IN SECTION 367.081(2), FLA. STAT.

This is in response to your request for a legal opinion as to the intent and use of the term "used and useful" as found in s. 367.081(2), Fla. Stat.

There are two aspects to the determination of utility property used and useful in the public service. First, a determination as to the value of utility property must be made. This question, revolving around the issue of original cost or fair value cost, has been addressed by the courts of this State and resolved. Valuation under the current statute is being determined based on original cost. Keystone v. Hawkins, 313 So.2d 724 (Fla. 1975).

The second aspect of a used and useful determination is what portion of a utility's property is involved in providing service to the public. Inherent in your request for a legal opinion on this issue are the following questions:

1. What may be included as being used and useful and,
2. What methodology is to be used in making that determination.

Docket No.070183-WS
1983 Staff Memo
Exhibit (FS-2)
Page 2 of 2

The aspect of determining what is used and useful has seen little interpretation from the courts. There is no judically approved approach or favored methodology which can be relied upon as the "proper" method for making that determination. By the same token, there is no established laundry list of items or criterion which should be considered in such a determination. In short, a legal precedent in this area is less than helpful in answering the above stated questions.

What decisions there have been on the issue of used and useful have revolved around whether the Commission's position is supported by competent substantial evidence. Almost all of these decisions have been nothing more than per curiam affirmed decisions which have upheld the Commission's used and useful determination without the rational for doing so being stated. What these decisions do indicate, is that this issue is at the early stage of legal development where the adequacy of the evidence is the critical factor. Until the courts indicate otherwise, it would appear that any methodology or regulatory philosophy which Commission staff can support by competent substantial evidence can be utilized in making a used and useful determination.

GJK:lh

cc: Mr. Howe
Mr. Harrold

DOCKET NO. 070183-WS

EXHIBIT (FS-3)______
CONSISTING OF 17 PAGES

PSC STAFF MEMORANDUM, April 14, 1975

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 10
COMPANY Utilities, Inc. of FL (Direct)
WITNESS Frank Seidman, P.E. (FS-3)
DATE 01-22-08

Docket No.070183-WS
1975 Staff Memo
Exhibit (FS-3)_____
Page 1 of 17

MEMORANDUM

April 14, 1975

TO : WATER AND SEWER STAFF

FROM: JAMES O. COLLIER, JR.,CHIEF ENGINEER

RE : USED AND USEFUL CONCEPT

In February 1973 I prepared the attached as a memorandum to the director with copies to the then assigned staff members.

I am again furnishing each staff member a copy for his information and guidance in interpolation of engineering exhibits presented by this section in rate cases.

JOC:kg

attachment

WATER AND SEWER SYSTEMS
AS USED AND USEFUL IN PUBLIC SERVICE

The staff has considered the terminology of "used and useful" in preparation of and testimony given in several rate cases to date.

I feel that we do not have any particular difficulty in the proper definition of those terms. The real difficulty arises in forming a consistant guide for arriving at the amount or percentage of plant or plants in service allowable in a rate base as used and useful in public service.

From my observation there seems to be a tendency to use a very "sharp cutting edge" in defining the part of total plant to be allowed in a rate base as used and useful in public service.

I have definite convictions as to a proper method to be used in determination of used and useful in the engineering sense. My reasoning and references are set forth as follows.

Water and Sewer

Within the specific confines of the water and wastewater systems normally to be designed, the nature, position, and size of needed treatment works must be determined in optimal relationship (1) to the source and quality of the water to be treated, (2) to the origin and composition of the wastewaters produced, (3) to the nature of the receiving water into which the wastewaters are to be dispersed, (4) to the configuration and topography of the community and its environs,

(5) to anticipated population, industrial growth, and areal expansion, and (6) to possible as well as probable physical amalgamations and the creation of regional and metropolitan authorities.[1]

Few projects are so clearly fixed and so straightforward in their possible development as to justify the adoption of a <u>single design period</u>. Optimization may call for the staging of plant capacities and for progressive increases in treatment. To be resolved for each stage are the capacities, interest charges and funding, economies of scale, treatment capacities and levels, investment of funds, and service charges. To be recognized in studies of this kind is the difficulty of anticipating new technology and the cost of introducing new processes in comparison with the cost of continuing old ones.[1]

It is rarely possible to establish complete physical, chemical, and biological similitudes. Therefore transfer from small to full-scale units and operations may offer some difficulties, and the exercise of good engineering judgment may provide the only anchor to windward. The water drawn from water purification plants and their subsequent delivery as spent waters to wastewater treatment systems may vary seasonally, monthly, daily, and hourly, not only in terms of flow, but also in terms of raw water quality and wastewater concentration. Treatment works are generally designed to deal with the maximum day's and even the maximum hour's worst flows within the span of the design period. Because design capacities must be founded on estimates of the most rigorous conditions encountered, the design of works and scheduling of operations are generally brought into harmony either by making provision for turning excess capacities to use while damping flow extremes, or by recognizing the possibility of introducing supplemental treatment that can counter either peak flow conditions or sudden changes in water or wastewater quality.

Examples in water purification plants are (1) holding treatment flows close to the average by storage of raw water inflow and product water outflow and (2) adjusting treatment performance to poor raw water quality by prechlorination or breakpoint chlorination and by the addition of powdered activated carbon or other useful chemicals. Examples in wastewater treatment are (1) offsetting similar variances by proper timing of waste discharges from the holding tanks of industry and (2) adding coagulating chemicals to the concentrated flows arriving at the treatment works.[1]

Water Treatment Plants

The rated or nominal capacity of the treatment plant, usually expressed in gallons per day or million gallons per day, should exceed the maximum daily water demand of the system.[2]

A treatment plant is designed to serve the needs of the system adequately for a number of years. Expansion is indicated when the maximum daily demands of the system approach the rated capacity of existing facilities. As a general rule, steps to provide additional capacity should be taken at least 5 years before present capacity is reached to allow sufficient time for engineering investigations and design, financing, and construction.[2]

Future water demands are predicted as a basis for establishing treatment plant capacity. Studies to forecast water demand must consider population, commercial and industrial growth, water use trends, metering and extension policies, and service area boundary changes (as might occur through annexation).[2] System water demands are commonly projected for 25 years or more.

Involved are decisions to build initially for ultimate needs or to provide for development in steps. Fair and Geyer have listed six factors which have a bearing on the period of design of treatment facilities: (1) the useful life of facilities, (2) the cost of extension, (3) the rate of growth of the service area, (4) the rate of interest on the loan, (5) the change of purchasing power during the debt period, and (6) the performance of the facilities during the early years.[2]

A common approach is to provide initially those portions of the ultimate plant that may not be built economically and conveniently in stages, and to provide the other facilities in steps as the need develops. Structures like pumping and chemical buildings fall in the former category, and tanks and filters in the latter. Initial investment is thus kept lower, releasing funds that would otherwise be tied up on unused facilities.[2]

When capacities of water treatment plants are determined, reserve capacities for contingencies may be set up in either one of two ways: (1) by using conservative design criteria or (2) by using carefully derived maximum-value criteria and adding reserve units. For example, unless the plant can be taken out of service for a substantial period of time for repair and maintenance work, it is usual to provide not less than two of any important items, such as settling basins, flocculators, or filters. The degree of standby provided is also an index of the importance of the item under consideration. It is not usual to provide a spare chemical feeder for corrosion control or for fluoridation but it is usual to provide a spare coagulant feeder when trubid water is expected, and a spare chlorinator is always provided. When continuity of pumping is essential, a spare pump unit is provided.[2]

In many instances, the units under consideration may not be absolutely essential, and the plant will function moderately well without them for a limited period of time. For example, a single rapid mix unit may be sufficient, and a plant having two settling basins may function reasonably well with only one.[2]

An additional factor to be taken into account is the degree of risk involved. When the plant is treating a water that is highly contaminated, a more conservative allowance for standby units should be made than might be required for a treatment such as iron removal alone.[2]

Water Distribution Systems

After collection and processing of a water supply, the distribution system must deliver it to the ultimate users. The importance of the distribution system is obvious when it is realized that more than half of the total investment in water supply facilities is allocated to the distribution of finished water.[3]

To be adequate, a distribution system must be capable of furnishing an ample supply of water of satisfactory sanitary and aesthetic quality whenever and wherever it is required in the service area. The system must maintain adequate pressures for normal residential, commercial and industrial uses and for providing the supply necessary for fire protection. It is usually necessary to raise the water to a sufficient elevation to provide the pressures necessary to distribute it through the area pipelines to the service mains and through the individual customer services and meters. In most systems, distribution storage is necessary to equalize and reduce the peak loads placed on the production and transmission elements of the system. Booster pumping is often required to serve more elevated areas or remote customers. The distribution system includes the pumps, pipelines, control valves, hydrants, distribution storage, service connections, mains, and meters.[3]

Rarely does a system produce or serve water at an average rate. The rate varies considerably over the year and during the day and differs in various sections of the country and in different types of communities. Data on average consumption and variations in consumption given in various textbooks are an indication of the growth in demand over the years.[3]

These figures are only general estimates based on past experience. They should be used with caution in forecasting future requirements, for many variables influence their applicability to any one system. Some of these variables are local climatic conditions, the character of community served, the extent of air-conditioning and lawn-sprinkling use, the relative amount of commercial and industrial development, and the percentage of customers metered.[3]

Forecasts of future water demands are commonly based on population estimates and on per capita consumption. Estimates of future population to be served are difficult to make, because so much depends on human judgment.[3]

Expansion of service areas presents one of the most critical problems in the provision of adequate and reliable water service. In most cities, great increases in population are not taking place within the political boundaries; they are more often taking place through rather haphazard annexation of outlying areas. County or area-wide planning is becoming increasingly necessary to determine adequately the extent of the future growth of a water system. The extent of such expansion, both in the immediate and more remote future, must be recognized in planning the distribution system.[3]

As outlying areas are haphazardly developed and extensions are made for service, developers often install small mains for domestic service only, and many dead ends result. The people served expect, but rarely get, all the conveniences of potable water supplied at good pressures, and in adequate quantities. Later, fire service, which requires larger mains, becomes a necessity. New mains and extensions should not be laid except under a carefully considered plan that takes into account the location of the mains, hydrants, and valves and insures that the material and its installation meet specifications equal to those for the system of which it will ultimately become a part.[3]

Sewage Collection System

A design period throughout which the capacity of the sewers will be adequate must be chosen in the design of sanitary sewers. Since the quantity of domestic sewage is a function of the population and of water consumption, lateral and submain sewers should be designed for the saturation density of population expected in the areas served.

Trunk sewers, outfalls and interceptions should be designed for the tributory area, land use, and population estimated to prevail at least 25 to 50 years in the future.[4]

Sewage Pumping Stations

The establishment of the station capacity depends upon such studies as well as upon a forecast of probable growth in the area tributary to the station. If the area is not fully developed, the designer will be obliged to establish an initial station capacity which will probably meet the requirements for a reasonable time in the future, customarily for a period of not less than 10 years. The initial flows under these conditions may not be as great as allowed in the design. The effects of the minimum flow conditions must be carefully considered to assure that retention of the sewage in the wet well will not create a nuisance and that the pumping equipment will not operate too infrequently. Future requirements for station capacity must also be given consideration in order that additional or larger pumps can be installed as required to meet the inflow conditions as they develop. It should be readily apparent that the station capacity must be adequate to meet the maximum rate of flow.[4]

Sewage Treatment Plant Design

Periods for design of a treatment plant vary not only with the type and degree of development of the community under consideration but also with the different parts of the sewage treatment plant. A normal design period would require treatment units to be designed for population and sewage flows anticipated some 15 to 20 years after completion of construction.[5]

Within a treatment plant main conduit channels and other units which cannot be readily enlarged are designed for periods of not less than 20 to 25 years in the future. Provision for increasing capacities is made in pump, sludge disposal, and chemical buildings either by leaving space for future installation of additional equipment or by making oversized connections to present units.[5]

The following information has been extracted from a Comprehensive, "Regional Water Reclamation Plan" made by Consulting Engineers for the Upper Occoquan Sewage Authority, Virginia.

This report contains pertinent explanations of design criteria used in this proposed (now under construction) system to serve a very large area.

The SWCB (State Water Control Board) Occoquan Policy limits the certified flow of the initial plant to 10 mgd. However, the SWCB has confirmed that the original plant construction may have a larger capacity so long as the flow through the facility is held at or below the SWCB certified flow. In fact, the SWCB stated in their letter of November 5, 1971, to CH2M/HILL (Consulting Engineers) "...since the Policy envisions a flow of 25 mgd by 1980, a plant design of more than 15 mgd should be considered." As can be seen from the discussion presented in Chapter III, there is no doubt that the demand for sewer service in the UOSA service area is great enough that the present SWCB policy flow allocations for the years 1975-2000 will indeed require some restriction of the development which could occur if the policy were not in effect.

Population and flow projections for the study area clearly indicate that a 10 mgd facility would be loaded to capacity almost immediately if it were placed in service in late 1974. This would require the immediate initiation of a plant expansion program. The time required to complete the design and construction of the needed expansion would be two to three years, placing a moratorium on any further development during this period. Such a plan would (1) result in higher plant construction costs over the next few years than would the initial construction of a larger facility; (2) would place an unnecessary hardship on an area which already has faced an explosive, unmet demand for additional sewer service for several years; and (3) could create a serious lack of confidence in the UOSA by the populace because of "poor planning" in constructing a plant of inadequate capacity for the immediate needs of the area. Recognition of these facts prompted the SWCB to encourage the initial construction of a plant with capacity of "more than 15 mgd." Inefficient use of SWCB grant funds and local public funds would occur if the construction of a smaller facility were encouraged.

As noted in Chapter III, if there were no monetary or SWCB policy flow constraints involved the potential demand for sewer service in the UOSA area is so great that an initial plant capacity of 30 to 40 mgd could be justified for a design period of 10 years. Selection of capacity for the area's initial plant must be based not only on evaluation of growth potential, but also on the following considerations:

The financial capability of the populace to pay for plant capacity needed in the future has a finite limit. Phased construction of the regional system will be required for orderly development of the service area. This growth will also provide the funds needed for the financial support of future increases in plant capacity.

The SWCB requires an initial plant redundancy of 100 percent. This requirement magnifies the economic effects of increasing the initial plant capacity. For example, an initial nominal plant capacity of 10 mgd actually will involve construction of an equivalent 20 mgd facility; a 15 mgd plant, the equivalent of 30 mgd; a 20 mgd plant, the equivalent of 40 mgd, etc. Each increase in nominal capacity involves an equal amount of redundant capacity.

The SWCB policy allows a decrease in redundancy to as low as one-fourth of nominal capacity after plant efficiency and reliability has been proven. Thus, the cost of future plant expansions will not be as severely affected by redundancy requirements as will the initial plant.

In considering the above factors and the potential demand for future sewer service, an approach for plant capacity determination was developed which offers a balance between current financial capabilities, future demands for service, and the restrictions imposed by the SWCB policy.

The SWCB policy permits up to a 4:1 future ratio of on-line units to redundant units, while initially requiring a 1:1 ratio. This lessening of redundancy in the future permits construction of the initial plant with an on-line treatment train (operational system) and redundant treatment train, each made up of two parallel elements of equal capacity. After the initial demonstration period, one of the two elements of the redundant train can then be transferred to the on-line status. This would provide a 50 percent increase in the on-line capacity while still maintaining a satisfactory 3:1 on-line to redundant capacity ratio, with no further construction needed. Figure IX-1 presents this concept graphically. Provision of four elements, each with 50 percent (Q/2) capacity provides increased flexibility of operation as compared to only two elements, each with 100 percent (Q) capacity.

With this approach, the maximum practical size of some of the treatment units becomes a limiting factor in selecting the initial capacity. Some elements in the AWT processes (i.e., the carbon columns) have a maximum size corresponding to a capacity of about one mgd per element. However, where a larger number of elements is to be provided, the SWCB has agreed that the desired reliability can be achieved without mirror image redundancy. This is, if 15 carbon columns are required for a given capacity, it is not necessary to provide another 15 columns as redundancy, since the probability of 15 elements failing simultaneously is extremely small. The limitations of maximum element size are thus more important for those elements which are fewer in number and do require complete redundancy.[6]

IN SUMMATION - My main recommendation is to assure that each system evaluated for used and useful content be done so in a fair and equitable manner. Full consideration should be given to the design criteria and the reasonableness of same. Using considerations other than design criteria measured against customers served and their requirements will result in an arbitrary decision as to what is used and useful in the public service.

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4. Design and Construction of Sanitary and Storm Sewers, Joint Committee of the American Society of Civil Engineers and The Water Pollution Control Federation, ASCE Manual of Engineers Practice No. 37, ASCE, New York, 1960.

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DOCKET NO. 070183-WS

EXHIBIT (FS-4)______
CONSISTING OF 2 PAGES

PSC ORDER NO. 76844, Excerpt

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 11
COMPANY Utilities, Inc. of FL (Direct)
WITNESS Frank Seidman, P.E. (FS-4)
DATE 01/22/08

3/14/77

Docket No.070183-WS
Deltona Case
Exhibit (FS-4)_____
Page 1 of 2

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Petition of DELTONA UTILITIES, a)
Division of THE DELTONA CORPORATION, to)
increase its water and sewer rates in)
Volusia County, Florida. (Section 367.)
081(5), Florida Statutes))
_______________________________________)

DOCKET NO. R-750626-WS
(CR)

ORDER NO. 7684

The following Commissioners participated in the disposition of this matter:

PAULA F. HAWKINS, Chairman
WILLIAM H. BEVIS
WILLIAM T. MAYO

Pursuant to notice, the Florida Public Service Commission, by its duly designated Hearing Examiner, WILLIAM B. THOMAS, held public hearings on the above matter in Deltona, Florida, on March 10 and 11, 1976.

APPEARANCES: WILLIAM J. LIVINGSTON, 3250 Southwest Third Avenue, Miami, Florida, representing the applicant.

C. EARL HENDERSON, Associate Public Counsel, The Holland Building, Tallahassee, Florida 32301, representing the Citizens of the State of Florida.

RAYMOND E. VESTERBY, 700 South Adams Street, Tallahassee, Florida 32304, for the Florida Public Service Commission.

The utility and the intervenors have waived their right to further participation by the Examiner and consented to the presentation of this application directly to the Commission. Now, having considered all the evidence herein and the briefs submitted by the applicant and Public Counsel, we enter our order.

ORDER

BY THE COMMISSION:

On June 24, 1976, we issued Order No. 7293 in this docket. In that Order we denied the Petition of Deltona Utilities, a Division of The Deltona Corporation, for an increase in rates for water and sewer service. The denial was based upon the grounds that Deltona had failed to present evidence as to the amount of its contributions-in-aid-of-construction, which rendered us unable to determine an appropriate rate base and rate of return.

We had found that persons who purchased homes and/or lots from 1962 until March 1, 1969, did pay some portion or all of the water and sewer systems.

Our Order was appealed to the Supreme Court of Florida which rendered its decision on February 3, 1977.

The Court found, in part, as follows:

"The basis for the action taken by the Commission in this case appears to be, as public counsel has urged and the Commission's order recites, that Deltona engaged in fraudulent land sales practices and 'should be held responsible for the plain meaning of its (advertisements and filings.'[3] If Deltona has engaged in an unfair business practice or committed fraud, however, it may be a concern of other state agencies or the basis for private law suits (on which we express no opinion), but it is not a matter of statutory concern to the Public Service Commission. That agency has no authority to vindicate breaches, if any, of the land sales laws or private contracts, and it may not assume the existence of some indefinite amount of contributions-in-aid-of-construction which its

Docket No.070183-WS
Deltona Case
Exhibit (FS-4)______
Page 2 of 2

Rate Base

Used and Useful -

Section 367.081(2), Florida Statutes, requires this Commission in setting rates to:

> "...consider the value and quality of the service and the cost of providing the service, which shall include, but not be limited to, debt interest, the utility's requirements for working capital, maintenance, depreciation, tax and operating expenses incurred in the operation of all property used and useful in the public service, and a fair return on the utility's investment in property used and useful in the public service." (emphasis added)

The concept of "used and useful in the public service" basically an engineering concept, is one of the most valuable tools in utility regulation and rate making. It is basically a measuring rod or test used to determine the portion or amount of the utility's assets which are to be included in its rate base and upon which the utility has an opportunity to earn a return.

Basically a two-step determination, the first step is to establish the physical existence and cost of the assets which the utility alleges are in its operations. This is done by any of several methods, either individually or in combination. These include previous rate case determinations, original cost accounting records coupled with field verification and engineering cost evaluations.

Once the existence and cost of a utility's assets has been established, the second step in defining used and useful is to determine which identified assets are really used or useful in performing the utility's service obligation. The asset must be reasonably necessary to furnish adequate service to the utility's customers during the course of the prudent operation of the utility's business.

Generally, any asset which is required to perform a function which is a necessary step in furnishing the service to the public is considered used and useful.

In addition, good engineering design will give a growing utility a sufficient capacity over and above actual demand to act as a cushion for maximum daily flow requirements and normal growth over a reasonable period of time.

In the process of its review and verification, our staff has verified the existence and the original cost of the assets included in the application by the utility. We note that the applicant eliminated from its application almost $2,100,000 as excess water capacity out of a net water utility plant of $4,120,000; and also eliminated $170,000 as excess sewer capacity out of a net sewer utility plant of $2,190,000.

A. Sewer Plant and Collection System -

The sewage collection system is confined to the three housing areas. Mr. James Collier, Chief Engineer of our Water and Sewer Department, testified that the density of connections on the mains designated as used and useful was well within reasonable limits and that any questionable excess mains had been deleted from the used and useful assets (Ex. 29).

Concerning the sewer treatment plant, Mr. Collier testified that by using historic flow experience and allowing for a 20% growth factor, the entire plant would be considered used and useful (Ex. 29).

DOCKET NO. 070183-WS

EXHIBIT (FS-5)______
CONSISTING OF 4 PAGES

MARK UP OF PROPOSED RULE 25-30.4325

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 12
COMPANY Utilities, Inc. OF FL (Direct)
WITNESS Frank Seidman (FS-5)
DATE 01/22/08

25-30.4325 Water Treatment and Storage Used and Useful Calculations

(1) Definitions.

(a) A water treatment system includes all facilities, such as wells and treatment facilities, excluding storage and high service pumping, necessary to pump and ~~produce~~, treat~~,~~ ~~and deliver~~ potable water to a transmission and distribution system.

(b) Storage facilities include ground or elevated storage tanks and high service pumps.

(c) Peak demand for a water treatment system includes the utility's maximum hour or day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements in Rule 25-30.431, Florida Administrative Code, and where fire flow is provided, a minimum of either the fire flow required by local governmental authority or 2 hours at 500 gallons per minute.

(d) Peak demand for storage includes the utility's maximum day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.

(e) Excessive unaccounted for water (EUW) is finished potable water produced in excess of 110 percent of the accounted for usage, including water sold, other water used, such as for flushing or fire fighting, and water lost through line breaks.

(2) The Commission's used and useful evaluation of water treatment systems and storage facilities shall include a determination as to the prudence of the investment and consideration of economies of scale.

(3) Separate used and useful calculations shall be made for the water treatment system and storage facilities. However, if the utility believes an alternative calculation is appropriate, such calculation may also be provided, along with supporting documentation.

CODING: Words underlined are additions; words in ~~struck through~~ type are deletions from the proposed rule.

<u>Examples of cases that might warrant the use of alternative used and useful calculations include, but are not limited to: economies of scale, service area restrictions, factors involving treatment capacity, well drawdown limitations, and changes in flow due to conservation or a reduction in number of customers.</u>

(4) A water treatment system, <u>and storage,</u> is considered 100 percent used and useful if:

(a) The system is the minimum size necessary to adequately serve existing customers plus an allowance for growth, and fire flow; or

(b) The service territory the system is designed to serve is mature or built out and there is no potential for expansion of the service territory; or

(c) The system is served by a single well.

(5) The used and useful calculation of a water treatment system is made by dividing the peak demand by the firm reliable capacity of the water treatment system.

(6) The firm reliable capacity of a water treatment system is equivalent to the pumping capacity of the wells, excluding the largest well for those systems with more than one well. ~~However, if the pumping capacity is restricted by a limiting factor such as the treatment capacity, or draw down limitations, then the firm reliable capacity is the capacity of the limiting component or restriction of the water treatment system. In a system with multiple wells, if a utility believes there is justification to consider more than one well out of service in determining firm reliable capacity, such circumstance will be considered. The utility must provide support for its position, in addition to the analysis excluding only the largest well.~~

(a) Firm reliable capacity is expressed in gallons per minute for systems with no storage capacity.

(b) Firm reliable capacity is expressed in gallons per day, based on 12 hours of pumping, for systems with storage capacity.

(7) Peak demand is based on a peak hour for a water treatment system with no storage capacity and a peak day for a water treatment system with storage capacity.

(a) Peak hour demand, expressed in gallons per minute, shall be calculated as follows:

1. The single maximum day (SMD) in the test year ~~unless there is an~~ in which there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water divided by 1440 minutes in a day times 2 [((SMD-EUW)/1,440) x 2] , or

~~2. The average of the 5 highest days (AFD) within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water divided by 1440 minutes in a day times 2 [((AFD-EUW)/1,440) x 2], or~~

~~3. If the actual maximum day flow data is not available, 1.1 gallons per minute per equivalent residential connection (1.1 x ERC).~~

(b) Peak day demand, expressed in gallons per day, shall be calculated as follows:

1. The single maximum day in the test year, ~~if there is~~ in which there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water (SMD-EUW), or

~~2. The average of the 5 highest days within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water (AFD-EUW), or~~

~~3. If the actual maximum day flow data is not available, 787.5 gallons per day per equivalent residential connection (787.5 x ERC).~~

(8) The used and useful calculation of storage is made by dividing the peak demand by the usable storage of the storage tank. Usable storage capacity less than or equal to the peak day demand shall be considered 100 percent used and useful. A hydropneumatic tank is not considered usable storage.

CODING: Words underlined are additions; words in ~~struck through~~ type are deletions from the proposed rule.

(9) Usable storage determination shall be as follows:

(a) An elevated storage tank shall be considered 100 percent usable.

(b) A ground storage tank shall be considered 90 percent usable if the bottom of the tank is below the centerline of the pumping unit.

(c) A ground storage tank constructed with a bottom drain shall be considered 100 percent usable, unless there is a limiting factor, in which case the limiting factor will be taken into consideration.

(10) To determine whether an adjustment to plant and operating expenses for excessive unaccounted for water will be included in the used and useful calculation, the Commission will consider all relevant factors, including whether the reason for excessive unaccounted for water during the test period has been identified, whether a solution to correct the problem has been implemented, or whether a proposed solution is economically feasible.

(11) In its used and usefulness evaluation, the Commission will consider other relevant factors, such as whether flows have decreased due to conservation or a reduction in the number of customers.

Specific Authority: 350.127(2), 367.121(1)(f) FS.

Law Implemented: 367.081(2), (3) FS.

History: New

EX_DTJ – 1

CURRICULUM VITAE OF
DWIGHT T. JENKINS, ESQ., P. G.

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070193-WS **EXHIBIT** 13
COMPANY FL PSC Staff (Direct)
WITNESS Dwight T. Jenkins, Esq. (DTJ-1)
DATE 01/22/08

Exhibit DTJ-1

Curriculum Vitae of
Dwight T. Jenkins, Esq., P.G.

1. Professional Address/Contact Information

Dwight T. Jenkins, Esq., P.G.
Director, Division of Water Use Regulation
Department of Resource Management
St. Johns River Water Management District
P.O. Box 1429
4049 Reid Street/Highway 100 West
Palatka, FL 32178-1429
Office Phone: (386) 329-4491
Cell Phone: (386) 937-0529
Email: djenkins@sjrwmd.com

2. Academic Degrees

J.D.	University of Florida College of Law	1994	Law
M.S.	University of Florida	1983	Geology
B.S.	University of Florida	1981	Geology
A.A.	University of Central Florida	1979	General Studies

3. Relevant Professional Experience

Managerial/Technical Employment:

Director, Division of Water Use Regulation
St. Johns River Water Management District
Palatka, Florida; 1997 to present

Manage District's water use regulatory and water well construction programs. Responsibilities include: programmatic oversight and development of 4 regulatory programs; management of 42+ member professional staff located in four service centers; formulation and drafting of District water use, compliance, and shortage rules, regulatory policies, and technical requirements; and directing staff review and processing of consumptive use permit and water well construction applications. Duties also include directing rule-making activities; coordinating with District's water supply management planning initiatives, assisting with the setting of minimum flows and levels, coordination with other agencies, local government and the regulated public, and acting as agency representative and testifying as an expert witness in administrative hearings and in civil litigation.

Hydrologist IV
St. Johns River Water Management District
Orlando, Florida; 1986 - 1991, 1994 - 1995

Manage Water Use Regulatory, and compliance/enforcement, programs for the District's Orlando Office. Participated in the formulation and drafting of District rules, regulatory policies and technical requirements. Reviewed District water use and surface water management permit applications, comprehensive plans, development of regional impact plans, performed special project research and hydrogeologic modeling, and testified as an expert witness in hydrogeology.

Research Geologist
Florida Sinkhole Research Institute
University of Central Florida
Orlando, Florida; 1984 - 1986
Performed hydrogeologic research on Florida's karst geology, focusing on sinkhole phenomenon. Developed and implemented field and office studies. Published and presented scientific publications.

Hydrogeologic Consultant
Orlando, Florida; 1984 - 1986

Contracted as a hydrogeologic consultant on an industrial ground water contamination project located in Bainbridge, Georgia. Duties included ground water sampling, water quality analysis, data review and analysis, determination of contaminant concentration and plume extent, and report drafting.

Legal Employment:

Attorney, Office of General Counsel
South Florida Water Management District
West Palm Beach, Florida; 1995 to 1997

Position was District Water Resource Program Attorney within the Office of General Counsel's Regulatory and Planning Section. Duties associated with this position related to general program support of the District's Regulatory Department, particularly the Water Use Division, Surface Water Management Division, and the District's Water Supply Planning Department. Support of the District's Water Use and Surface Water Management Divisions include: review of technical staff reports; research, analysis, and drafting of legal opinions on a variety of legal issues associated with regulatory and water use projects; conducting rulemaking, assisting with policy development; treating with regulated public; and conducting water management related administrative litigation. Support of the District's Planning Department included: attendance at intergovernmental coordination meetings; support of the District's Upper District water supply planning initiatives; review and revision of District planning documents; and general support of staff.

Legal Intern, Office of Counsel
South Florida Water Management District
West Palm Beach, Florida; Summer 1993

Performed legal research and other tasks related to the management and regulation of Florida's water resources. Tasks included summarizing changes to environmental laws and rules; rewriting District regulations for revision; helping with rulemaking; and working on current litigation projects.

University of Florida, College of Law
Gainesville, Florida; 1993-1994

Worked as a reference materials consultant in the Reference Section of the College of Law's Legal Information Center.

Teaching Employment:

Adjunct Instructor, Department of Civil Engineering
University of Central Florida
Orlando, Florida; 1984 - 1991

Instructed geology, geography and natural resource management courses. Assisted in instructing various engineering courses.

4. Licenses and Certifications

Licensed Florida Professional Geologist (No. 0001072)
Member of The Florida Bar (No. 0008753)

5. Professional Affiliations

American Water Resources Association
American Water Works Association

6. Publications

Kissimmee Basin Water Supply Plan Background Document: South Florida Water Management District.

Interdistrict Coordination on Water Resource Management Issues: Env. and Land Use Law Section Reporter, v. 17, No. 3, p. 23, 1996.

Statewide Water Well Regulation in Florida: Env. and Land Use Law Section Reporter, v. 17, No. 2, p. 16-17, 1996.

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with Beck, Barry F.; and Parker, John W.; *Cause of Localized Land Subsidence at the MacDill A.F.B., Tampa, Florida*: The Florida Sinkhole Research Inst. (Univ. of Central Florida), Rpt. 85-85-4, 1985.

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with Smith, Douglas L.; *Paleomagnetic Measurements in the Eastern Ouachita Mountains, Arkansas*: A Guidebook to the Geology of the Central and Southern Ouachita Mountains, Arkansas; Arkansas Geol. Commission, guidebook no. 84-2, p. 99, 1984.

Paleomagnetics of the Eastern Ouachita Mountains, Arkansas, and their Tectonic Implications: M.S. thesis, Univ. of Florida, Gainesville, 158 p., 1983.

EX_RPR – 1

RESUME OF RICHARD PAUL REDEMANN, P.E.

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 14
COMPANY FL PSC Staff (Direct)
WITNESS Richard P. Redemann, P.E. (RPR-1)
DATE 01/22/08

EXHIBIT__ RPR-1 (Page 1 of 2)

RESUME

RICHARD PAUL REDEMANN, P.E.

2540 Shumard Oak Boulevard
Tallahassee, FL 32399
Work: (850) 413-6999

EDUCATION

University of Wisconsin-Platteville, B.S. Degree in Civil Engineering, May 1984
Emphasis: Sanitary-Environmental, Geotechnical and Structures

Related Course Work

Wastewater Treatment, Hydrology, Sanitary Engineering, Advanced Soil Mechanics, Fluid Mechanics, Steel Design, Foundation Design, Structural Mechanics, Computer Application, Reinforced Concrete, Engineering Geology, Transportation Systems, Engineering Economics, Technical Writing, and Business Law.

PROFESSIONAL LICENSE

State of Florida Professional Engineer No. 41668

PROFESSIONAL EXPERIENCE

Florida Public Service Commission

Professional Engineer III – March 2005 - to Present

Duties and Responsibilities include: Review and evaluate highly complex and controversial rate, original, grandfather, transfer, territorial agreement and amendment of certificate applications. Industries include water and wastewater, gas and electric utilities. This position handles highly complex customer inquiries, complaints and special projects. The position requires preparation and presentation of expert engineering testimony at hearings held by Commissioners.

Utility Systems/Communication Engineer - July 1990 – March 2005

Duties and Responsibilities included: Review and evaluate highly complex and controversial original, grandfather, transfer, and amendment of certificate and exemption applications. This position handles highly complex customer inquires, complaints and special projects. The position requires preparation and presentation of expert engineering testimony at hearings held by Commissioners.

Engineer IV - June 1989 - July 1990

Duties and Responsibilities included: Review and evaluate the more complex and controversial original, grandfather, transfer, and amendment of certificate and exemption applications. The position required preparation and presentation of engineering recommendations. This position handled the more complex customer inquires, complaints and special projects.

PROFESSIONAL EXPERIENCE (Continued)

Engineer III - June 1987 - June 1989

Duties and Responsibilities included: Reviewed, analyzed, and evaluated engineering data in complex rate and over earnings investigations, identifying issues and ultimately making final engineering recommendations and conclusions to be utilized by the Commission in its decisions. The position required preparation and presentation of recommendations and/or expert testimony concerning complex matters before the Commission. Conducted engineering investigations and inspections of water and wastewater utilities to determine compliance with Commission standards.

Engineer II - Feb 1986 - June 1987

Duties and Responsibilities included: Reviewing, analyzing, and evaluating engineering data in rate and overearnings investigations, identifying issues and ultimately making final engineering recommendations and conclusions to be utilized by the Commission in its decisions. This position required preparation and presentation of recommendations and/or expert testimony concerning matters before the Commission. Conduct engineering investigations and inspections of water and wastewater utilities to determine compliance with Commission standards.

Engineer I - June 1984 - Feb 1986

Duties and Responsibilities included: Reviewed, analyzed, and evaluated engineering data in rate cases, identifying issue and ultimately making final engineering recommendations and conclusions to be utilized by the Commission in its decisions. Evaluated the percentage of plant used and useful in the public service in rate cases. Conduct engineering investigations and inspections of water and wastewater utilities to determine compliance with Commission standards.

Wisconsin Department of Transportation, District 4, Wisconsin Rapids, WI

Engineer Trainee - May 1980 - August 1983 (Summers) (Except 1981)

Responsibilities included: Supervising the construction of bituminous and concrete road surfaces, and graveling of shoulders and intersections. Supervising the construction of curbs and gutters, culverts, storm sewer pipes, inlets, manholes and bridges. Surveying mainline, curves, ramps, and realignment of roads for highways and bridges. Running gradations for sand, gravel and concrete stones and computing concrete mix designs for quality control. Computing payments and checking final projects costs.

Twin City Testing and Engineering Laboratory, Appleton and LaCrosse, WI

Engineer Trainee - May 1981 - Nov. 1981

Responsibilities included: Analysis of sod savers with load testing machine, which I constructed. Running proctors, gradations and computing soil density of various types of soil. Breaking concrete and mortar cylinders. Working with strain gauges. Helping drill soil borings.

COMPUTER EXPERIENCE

WordPerfect for Windows, Lotus 1-2-3, Microsoft Word, Microsoft Excel, Netscape, Internet Explorer, Microsoft Outlook, Juno.

EX_RPR – 2

PROPOSED RULE NO. 25-30.4325

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 15
COMPANY FL PSC Staff
WITNESS Richard P. Redemann, P.E. (RPR-2)
DATE 01/22/08

25-30.4325 Water Treatment and Storage Used and Useful Calculations

(1) Definitions.

(a) A water treatment system includes all facilities, such as wells and treatment facilities, excluding storage, necessary to produce, treat, and deliver potable water to a transmission and distribution system.

(b) Storage facilities include ground or elevated storage tanks and high service pumps.

(c) Peak demand for a water treatment system includes the utility's maximum hour or day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where fire flow is provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.

(d) Peak demand for storage includes the utility's maximum day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.

(e) Excessive unaccounted for water (EUW) is finished potable water produced in excess of 110 percent of the accounted for usage, including water sold; other water used, such as for flushing or fire fighting; and water lost through line breaks.

(2) The Commission's used and useful evaluation of water treatment system and storage facilities shall include a determination as to the prudence of the investment and consideration of economies of scale.

(3) Separate used and useful calculations shall be made for the water treatment system and storage facilities. However, if the utility believes an alternative calculation is appropriate, such calculation may also be provided, along with supporting documentation.

(4) A water treatment system is considered 100 percent used and useful if:

(a) The system is the minimum size necessary to adequately serve existing customers plus an allowance for growth and fire flow; or

(b) The service territory the system is designed to serve is mature or built out and there is no potential for expansion of the service territory; or

(c) The system is served by a single well.

(5) The used and useful calculation of a water treatment system is made by dividing the peak demand by the firm reliable capacity of the water treatment system.

(6) The firm reliable capacity of a water treatment system is equivalent to the pumping capacity of the wells, excluding the largest well for those systems with more than one well. However, if the pumping capacity is restricted by a limiting factor such as the treatment capacity or draw down limitations, then the firm reliable capacity is the capacity of the limiting component or restriction of the water treatment system. In a system with multiple wells, if a utility believes there is justification to consider more than one well out of service in determining firm reliable capacity, such circumstance will be considered. The utility must provide support for its position, in addition to the analysis excluding only the largest well.

(a) Firm reliable capacity is expressed in gallons per minute for systems with no storage capacity.

(b) Firm reliable capacity is expressed in gallons per day, based on 12 hours of pumping, for systems with storage capacity.

(7) Peak demand is based on a peak hour for a water treatment system with no storage capacity and a peak day for a water treatment system with storage capacity.

(a) Peak hour demand, expressed in gallons per minute, shall be calculated as follows:

1. The single maximum day (SMD) in the test year unless there is an unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water, divided by 1440 minutes in a day, times 2 [((SMD-EUW)/1,440) x 2], or

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

2. The average of the 5 highest days (AFD) within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water, divided by 1440 minutes in a day, times 2 [((AFD-EUW)/1,440) x 2], or

3. If the actual maximum day flow data is not available, 1.1 gallons per minute per equivalent residential connection (1.1 x ERC).

(b) Peak day demand, expressed in gallons per day, shall be calculated as follows:

1. The single maximum day in the test year, if there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water (SMD-EUW), or

2. The average of the 5 highest days within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water (AFD-EUW), or

3. If the actual maximum day flow data is not available, 787.5 gallons per day per equivalent residential connection (787.5 x ERC).

(8) The used and useful calculation of storage is made by dividing the peak demand by the usable storage of the storage tank. Usable storage capacity less than or equal to the peak day demand shall be considered 100 percent used and useful. A hydropneumatic tank is not considered usable storage.

(9) Usable storage determination shall be as follows:

(a) An elevated storage tank shall be considered 100 percent usable.

(b) A ground storage tank shall be considered 90 percent usable if the bottom of the tank is below the centerline of the pumping unit.

(c) A ground storage tank constructed with a bottom drain shall be considered 100 percent usable, unless there is a limiting factor, in which case the limiting factor will be taken into consideration.

(10) To determine whether an adjustment to plant and operating expenses for excessive unaccounted for water will be included in the used and useful calculation, the

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

Commission will consider all relevant factors, including whether the reason for excessive unaccounted for water during the test period has been identified, whether a solution to correct the problem has been implemented, or whether a proposed solution is economically feasible.

(11) In its used and useful evaluation, the Commission will consider other relevant factors, such as whether flows have decreased due to conservation or a reduction in the number of customers.

Specific Authority: 350.127(2), 367.121(1)(f) FS.

Law Implemented: 367.081(2), (3) FS.

History: New ____________.

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

EX_RPR – 3

AWWA MANUAL M 32

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 16
COMPANY FL PSC Staff (Direct)
WITNESS Richard P. Redemann, P.E. (RPR-3)
DATE 01/22/08

Exhibit - RPR-3 (Page 1 of 3)

Distribution Network Analysis for Water Utilities

AWWA MANUAL M32

First Edition

FOUNDED
1881

American Water Works Association

Exhibit - RPR-3 (Page 2 of 3)

Unaccounted-for Water

Unaccounted-for water usage is always present in a water system. The unaccounted-for usage is estimated by comparing the average annual water production with the average annual metered consumption of a system. The difference between the two values is unaccounted-for water.

Unaccounted-for water usage can result from many factors. Some of the most prevalent factors include unidentified leaks in a pipe network, main breaks, periodic fire-hydrant flushing, tank drainage for maintenance purposes, unauthorized use, unmetered services, inaccurate and nonfunctioning meters, and water and wastewater treatment plant use. The uses of water at a plant for backwashing filters, mixing chemicals, rinsing equipment and tanks, and sanitary purposes are sometimes not metered and can represent up to 5 percent of the production rate for a system. Losses at the source or treatment facility customarily do not affect the model, as long as pump-suction characteristics are properly defined.

The unaccounted-for water usage must be added to system demands in the system model so that total water supplied will equal total water demand. The unaccounted-for usage is generally distributed equally to all nodes because specific or isolated causes are difficult to pinpoint, unless district zone measurements are made throughout the distribution system. System-wide district zone measurements permit a more accurate allocation of unaccounted-for usage. To increase accuracy, some systems have used leakage tests in subareas of the distribution system to prorate the unaccounted-for water usage. When, through subarea leakage tests, it was determined that various areas had various rates, the total leakage was allocated accordingly.

It is important to note that much of system analysis is conducted using peak-hour conditions. This reduces the impact of inaccurately distributing leakage to system nodes. For example, if total unaccounted-for water usage is 15 percent at average-daily demand, then at maximum-day demand it will generally constitute less than 10 percent, and at peak-hour demand, less than 5 percent. Such inaccuracy is generally less than the achievable accuracy of the model demand allocation.

The percentage of unaccounted-for water can vary widely from system to system. Values ranging from 4–30 percent of the total accounted-for consumption are found, although 10–15 percent may be more prevalent. The percentage can also vary from year to year in the same system. The higher values generally are associated with older systems, in which leakage, no meters, or faulty meters are more commonplace than in newer systems. Systems operating at high pressures usually will experience a high loss percentage.

Demand-Allocation Process

Demand allocation is the process of assigning water-consumption data to appropriate nodes in the system model. Consumption data from meter-route books or other sources are allocated to the nodes that best represent actual system withdrawal characteristics. Allocating demands to nodes is more an art than a science and requires, more than anything else, good working knowledge of system usage. Demand-allocation subroutines are available with some network-solution programs. A tabular approach, using a personal computer and spreadsheet software, can be an effective tool for expediting demand assignment.

Meter-route books. Meter-route data is of great value for allocating water consumption over a computer-simulated pipe network. Information available from meter-route books generally includes quarterly consumption for each customer and

Exhibit - RPR-3 (Page 3 of 3)

curve and the maximum-day demand rate at any point in time would represent the flow into or out of storage facilities.

At the minimum-hour demand rate, represented by point C in Figure 3-1, the demand for storage replenishment is at its maximum. This is often a limiting condition that must be analyzed to determine whether the distribution system can provide this replenishment rate to the storage facilities.

At the peak-hour demand rate, represented by point D in Figure 3-1, flow out of the storage reservoirs is at its maximum rate. The storage reservoirs must provide outflow to meet the demand above the maximum-day demand rate. This is another limiting condition that must be evaluated to determine whether the distribution system can draw flow from storage and distribute it to meet the system demands at this rate.

Fire-flow demand. An important limiting demand condition that is not shown on the curve is fire-flow demand. According to the Insurance Services Office, fire-flow demands should be superimposed on the average demand of the maximum day. This occurs at points A and B on the curve in Figure 3-1. The most limiting of these points is B, because at this point storage facilities would have been used for equalization of demands and would be at a lower water level than at point A.

Peaking factors. Peaking factors are most-limiting demand conditions. Peaking factors are developed from the diurnal-demand curve, with maximum-day demand used as the base demand (Figure 3-2). The peak factors for the example diurnal-demand curve in Figures 3-1 and 3-2 are

peak-hour demand/maximum-day demand = 1.45

minimum-hour demand/maximum-day demand = 0.39

Typical ranges observed for these peak factors in distribution systems of various size are

peak-hour demand/maximum-day demand: 1.3–2.0

minimum-hour demand/maximum-day demand: 0.2–0.6

Additionally, a peak factor is generally developed for the ratio of maximum-day demand to average-day demand. This ratio has been observed to vary from 1.2 to 2.5.

Effect on system components. The various limiting demand conditions are most limiting to various components of the distribution system. In general, the relationship between limiting demand conditions and system-component performance is as follows:

The most-limiting demand conditions for system piping are maximum-day demand plus fire-flow demand, maximum storage-replenishment rate, and peak-hour demand.

The most-limiting demand conditions for system storage are peak-hour demand, and maximum-day demand plus fire-flow demand.

The most-limiting demand conditions for pumps are maximum-day demand, maximum-day demand plus fire-flow demand, and peak-hour demand.

Note that average-day demand is not included in the list of limiting conditions. Generally, average-day demand is a limiting condition only for pump selection, and it can be accommodated without individual model runs. Pumps are generally required to meet maximum-day demand, fire-flow demand, and/or peak-hour demand and are selected to have performance curves that allow operation through the full range of demands, including average-day demand.

EX_RPR – 4

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT WATER CONSERVATION PLAN

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 17
COMPANY FL PSC Staff (Direct)
WITNESS Richard P. Redemann P.E. (RPR-4)
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EXHIBIT_RPR-4 (Page 1 of 4)

of a new use when either no records are available or there are less than one year's records, a ratio of between 1.5 and 2.0 will be used, although engineering documents justifying a different ratio are acceptable evidence in determining a different ratio.

When a utility operates more than one treatment plant and the plants operate independently (no interconnections), a maximum daily withdrawal is determined for each treatment plant and its associated wellfield(s).

12.2.5 Water Conservation Plan

12.2.5.1 All permit applicants for a public supply-type water use who satisfy the following water conservation requirements at the time of permit application are deemed to meet the criterion in 10.3(3):

(a) An audit of the amount of water used in the applicant's production and treatment facilities, transmission lines, and distribution system using the District's Water Audit Form No. 40C-22-0590-3 (see Appendix C-3) must be submitted. The audit shall include all existing production, treatment and distribution systems accessible to the applicant. The audit period must include at least 12 consecutive months within the three year period preceding the application submittal.

(b) An applicant is required to perform a meter survey, and to correct the water audit to account for meter error, if the initial unaccounted for water is 10% or greater based on the results of the initial water audit. The purpose of this survey is to determine a potential correction factor for metered water use by testing a representative sample of meters of various ages. The survey also helps to determine the appropriateness of a meter change-out program. As part of the survey, the applicant must randomly test 5% or 100 meters, whichever is less. The sampling must be of meters representing an even distribution of type and age, or cumulative lifetime flow. A documented meter change-out program that can provide an estimate of the overall meter accuracy may be substituted for this requirement.

(c) An applicant whose water audit, as required under paragraph 12.2.5.1(a), shows greater than 10% unaccounted for water use, must complete the leak detection evaluation portion of Form 40C-22-0590-3. Based upon this evaluation, an applicant may choose to implement a leak detection program immediately or develop an alternative plan of corrective action to address water use accountability and submit a new water audit to the District within two years. If the subsequent audit shows greater than 10% unaccounted for water, the applicant must implement a leak detection and repair program within one year unless the applicant demonstrates that implementation is not economically feasible. In all cases, this evaluation and the repair program may be designed by the applicant to first address the areas which are most suspect for major leaks. The evaluation and repair program may be terminated when the permittee demonstrates that its unaccounted for water loss no longer exceeds 10%.

(d) Implementation within the first year after permit issuance of a meter replacement program will be required for those applicants whose small and medium meter survey indicates that a group or type of meters is not 95% accurate. Permittees will be required to replace meters which have been in operation for 15 years or longer or have a cumulative lifetime flow exceeding the maximum lifetime operational flow specified by the manufacturer, unless a comparison of meter survey information to meter manufacturer specifications indicates a decreased accuracy of the meters. An alternative meter replacement schedule shall be approved by the District upon a showing by the applicant that the meter manufacturer specifications predict a different lifetime or gallonage capacity or based upon the results of a meter survey performed by the applicant.

(e) A customer and employee water conservation education program which includes all of the elements listed below as nos. 1 through 10 must be implemented. The frequency and extent to which each of the elements must be implemented will depend upon the size of the applicant's utility, the financial means of the applicant, the degree to which excess water use is identified as a problem, the particular types of uses which are identified as responsible for the excess water use, and any other relevant factors. Implementation of these may be achieved through collaboration with other entities, including the District.

1. Televise water conservation public service announcements.
2. Provide water conservation videos to local schools and community organizations.
3. Construct, maintain, and publicize water efficient landscape demonstration projects.
4. Provide water conservation exhibits in public places such as trade shows, festivals, shopping malls, utility offices, and government buildings.

5. Provide/Sponsor water conservation speakers to local schools and community organizations.

6. Provide water conservation articles and/or reports to local news media.

7. Display water conservation posters and distribute literature.

8. Provide landscape irrigation audits and irrigation system operating instructions to local small businesses and residents.

9. Establish a water audit customer assistance program which addresses both indoor and outdoor water use.

10. Provide water conservation information to customers regarding landscape irrigation, including the requirements contained within Rule 40C-2.042, F.A.C.

(f) The applicant must submit a written proposal and implement a water conservation promoting rate structure, unless the applicant demonstrates that the cost of implementing such a rate structure is not justified because it will have little or no effect on reducing water use. In the event that the applicant has a water conservation promoting rate structure in effect, the applicant must submit a written assessment of whether the existing rate structure would be more effective in promoting water conservation if it were modified, and if so, describe and implement the needed changes. Upon request, the District will assist the applicant by providing available demographic data, computer models, and literature. In evaluating whether a proposed rate structure promotes water conservation, the District will consider customer demographics, the potential for effectiveness, the appropriateness to the applicant's particular circumstances, and other relevant factors. Those permittees required to implement a water conservation rate structure must provide written reminder notices to their customers at least twice a year of the financial incentive to conserve water in order that the rate structure does not lose its effectiveness.

(g) When an applicant operates a reclaimed water system and requests a back-up water source to meet peak demands for reclaimed water, the applicant must submit a management plan designed to minimize the need for augmentation. In developing this plan, the applicant must consider:

1. creation of additional storage,

2. use of lower quality water sources for back-up,

3. pressure reduction,

4. designation of primary and secondary customers,

5. financial incentives for voluntary use reductions,

6. reclaimed water interconnects with adjacent communities,

7. peak demand irrigation restrictions,

8. providing customers with written information supporting the need to conservatively use reclaimed water, and

9. any other measures identified by the District.

The plan must include an explanation of how the above nine items were considered by the applicant.

(h) When an audit and/or other available information indicates that there is a need for additional water conservation measures in order to reduce a project's water use to a level consistent with projects of a similar type, or when an audit and/or other information indicates that additional significant water conservation savings can be achieved by implementing additional measures, other specific measures will be required by the District, to the extent feasible, as a condition of the permit. Additional water conservation measures include those listed in Appendix I.

12.2.5.2 Applicants who cannot implement all of the items listed in 12.2.5.1 must submit documentation demonstrating that the proposed use will otherwise meet the criterion in section 10.3(e).

12.3 Commercial/Industrial-Type Uses

12.3.1 Allocation

The reasonable need for a requested allocation must be based upon the amount of water needed to perform an industrial process in an efficient, non-wasteful and economic manner. If the criteria listed in section 8.0 or 9.0 are satisfied, the allocation will be equal to the reasonable need for water. A reasonable need for water is the greatest allocation which staff will recommend.

EX_RPR – 5

SWFWMD WATER USE PERMIT INFORMATION MANUAL

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 18
COMPANY FL PSC Staff (Direct)
WITNESS Richard P. Redemann (RPR-5)
DATE 01/22/08

EXHIBIT_RPR-5 (Page 1 of 6)

Southwest Florida Water Management District

WATER USE PERMIT

INFORMATION MANUAL

PART B

BASIS OF REVIEW

January 2007

is associated with the mining or dewatering, a water balance diagram combining these activities is preferred (to separate water balances for each activity). The balance may be in the form of a spreadsheet or a flow diagram that indicates all water sources and losses. All sources of water that input to the activity must be accounted for. Sources may include, but are not limited to:

a. Ground water from wells,
b. Ground water from water table dewatering or drainage,
c. Surface water withdrawals,
d. Collected rainfall, and
e. Recycled or reused water.

The uses of these water inputs are quantified, and the amount used and lost during each stage of the activity is calculated. All uses and losses must be listed. Uses and losses may include, but are not limited to:

a. Water used to wash the product,
b. Evaporation from settling/recirculation ponds,
c. Water retained and shipped with the product (product moisture),
d. Water used to separate or beneficiate the product, and\
e. Water used to transport the product (slurry).

The final disposal of all water then must be identified. Disposals may include, but are not limited to:

a. Off-site discharges,
b. Disposal/recharge through percolation ponds,
c. Disposal by spray irrigation,
d. Water entrained in clay materials, and
e. Recycling of wastewater.

The amount of water withdrawn should equal the sum of the system losses and disposals.

3. Other uses--determined by calculating the total withdrawal quantity minus the quantity for the uses identified above. Other uses may include lawn and landscape irrigation, outside use, air conditioning and cooling, fire fighting, water lost through leaks, and unaccounted uses. Other uses should generally not exceed 15% of total withdrawals. Applicants with other uses in excess of 15% may be required to address the reduction of such use through identification of specific uses or the reduction of system losses.

CONSERVATION PLANS FOR MINING AND DEWATERING USES WITHIN THE SWUCA

All permit applicants for ground water withdrawals within the SWUCA for mining or dewatering uses are required to submit a water conservation plan describing where and when water savings can be reasonably achieved and specifically addressing all components of use and loss in the water balance, including but not limited to recycling, reuse, landscaping and an implementation schedule to the District at time of application. Existing permittees with ground water withdrawals not previously within a Water Use Caution Area shall submit a conservation plan by January 1, 2003.
1-1-03

3.6 PUBLIC SUPPLY

In order to accurately calculate demand, public supply Applicants must identify the demand for each of the uses listed in this section. Information typically required to demonstrate reasonable demand for each component may include the number, type, and size of service connections; past monthly pumpage records by use type; projected permanent and seasonal population data for the service area; data on the specific uses; development projections; and data specific to the forecasting models used. Demand quantities should be based on quantities required by end-use customers, not withdrawal quantities. The quantities must be expressed in average annual gallons per day for each component of demand.

Where metering, billing, or other record-keeping methods do not provide accurate use estimates, the Applicant must provide the best estimates for each use type and must document the estimation method used.

In applications where a portion of the demand is derived from wholesale customers (e.g., a county utility sells water to a municipality), the Applicant must obtain and report demand information from each wholesale customer. This information is required to demonstrate that the quantities applied for are supported by reasonable demand. Per capita use guidelines and water conservation plans apply to wholesale customers as well as the Applicant.

All public supply Applicants must identify the demand for the following components:

1. Residential Use - shall be divided into single-family residential use and multi-family residential use in accordance with local government zoning policies;
2. Other metered uses - include all uses other than residential accounted for by meter;
3. Unaccounted uses - the total water system output minus all accounted uses above. Unaccounted use may include unmetered use, water lost through leaks, water used to flush distribution lines, firefighting, and other unidentified uses. This quantity generally should not exceed 15% of total distribution quantities. Applicants with unaccounted use greater than 15% may be required to address the reduction of such use through better accounting or reduction of unmetered uses or system losses; and
4. Treatment losses - significant treatment process losses such as reject water in desalination or backflush quantities associated with sand filtration systems. This component should only be calculated when such losses are significant.

1-1-03

PER CAPITA DAILY WATER USE

Per capita daily water use is a guideline used to measure the reasonable withdrawal requests of public supply Applicants. Per capita water use is generally considered to be population-related withdrawals associated with residential, business, institutional, industrial, miscellaneous metered, and unaccounted uses. Projected per capita daily use is calculated by adding the quantities identified for the uses shown in the previous list, except for treatment losses, and then dividing by the permanent or seasonally adjusted population of the service area. Where the per capita daily water use rate exceeds 150 gpd the applicant must address reduction of the high rate in the conservation plan.

SWUCA REQUIREMENTS

The following water conservation requirements designated to apply within the SWUCA shall apply to all public supply utilities and suppliers with Permits that are granted for an annual average daily quantity of 100,000 gallons per day or greater, as well as wholesale customers supplied by another entity which obtain an annual average daily quantity of 100,000 gallons per day or greater, either indirectly or directly under water use permits within the SWUCA, regardless of the name(s) on the water use permit. Failure of a wholesale customer to comply may result in modification of the wholesale permit to add a permit condition limiting or reducing the wholesale customer's quantities, or other actions by the District.
Transferred from Chapters 7.1 and 7.2, 1-1-07.

PER CAPITA DAILY WATER USE WITHIN THE SWUCA

Adjusted Gross Per Capita--Within the SWUCA permittees shall have an adjusted gross per capita daily water use rate no greater than 150 gallons per person per day (gpd). Permittees may deduct significant uses, treatment losses, and environmental mitigation. However significant uses must be reported if deducted and accounted for in a water conservation plan developed by the applicant/permittee which includes specific water conservation programs for each user or type of use, as described in the section "Deducted Water Uses Within the SWUCA", below. The formula used for determining adjusted gross per capita is as follows:

Year: 1955. Quantities in MGD, Average Annual/Peak Month					
Water Sources	Permitted Quantities	Projected Deman	Safe Yield	Safe Yield Balance	Permitted Q Balance
Wellfield A	30/40	30/40	30/35	0/-5	0/0
Wellfield B	10/15	10/15	8/12	-1/-3	0/0
Reservoir A	35/45	45/55	35/45	0/0	-10/-10
Proposed Source	20/40	10/30	40/60	+20/+20	+10/+10
Totals	95/140	95/140	103/142	+18/+12	0/0

In this example, the existing permitted sources show a deficit in safe yield by the year 1995 of 2 MGD on an Average Annual basis and 8 MGD on a Peak Month basis, as well as a deficit in permitted quantities of 10 MGD for both the Average and Peak Month. The proposed source shows a demand of 10 MGD Average and 30 MGD Peak Month, which, combined with the system deficit of 10 MGD average and 10 MGD Peak Month, results in proposed permitted quantities of 20 MGD Average and 40 MGD Peak Month. If permitted, this proposed source would satisfy system-wide demands as well as the safe yield deficit.

This type of information will be used to analyze the total demands of the entire interconnected service area in relation to the availability of the supply sources and permitted quantities. This analysis is useful to analyze the needs and sources of each demand area/supply source individually and the interrelationships among all users and sources.

CONSERVATION REQUIREMENTS WITHIN THE SWUCA

Water Audit--All water supply permittees within the SWUCA shall implement water audit programs within 2 years of permit issuance. Water audits which identify a greater than 12% unaccounted water shall be followed by appropriate remedial actions. A thorough water audit can identify what is causing unaccounted water and alert the utility to the possibility of significant losses in the distribution system. Unaccounted water can be attributed to a variety of causes, including unauthorized uses, line flushing, authorized unmetered uses, under-registration of meters, fire flows, and leaks. Any losses that are measured and verifiably documented are not considered unaccounted water. Large, complex water supply systems may conduct the audit in phases, with prior approval by the District. Each annual report shall state the percentage of unaccounted water. If any annual report reflects a greater than 12% unaccounted water, the permittee must complete a water audit within 90 days of submittal of the annual report. A water audit report shall be submitted within 90 days of completion of the water audit. The water audit report shall include a summary of the water audit and an implementation schedule for remedial actions to reduce the unaccounted water below 12%. The District shall take into account a permittee's adherence to the remedial action plan in any subsequent years when the permittee's annual report reflects greater than 12% unaccounted water.
1-1-03

Exemptions from Water Conservation Requirements--Permittees within the SWUCA whose permitted annual average quantity is less than 100,000 gallons per day are exempted from the residential water use report, water conserving rate structure, and water audit requirements.
1-1-03

GOAL-BASED WATER CONSERVATION PLANS

A public water supply utility may propose a goal-based water conservation plan that is tailored to its individual circumstances. Progress toward goals must be measurable. If the utility provides reasonable

EXHIBIT_RPR-5 (Page 5 of 6)

7.0 WATER USE CAUTION AREAS

7.1 HIGHLANDS RIDGE WATER USE CAUTION AREA

All provisions of Section 7.1 deleted in their entirety 1-1-07.

7.2 EASTERN TAMPA BAY WATER USE CAUTION AREA

All provisions of Section 7.2 deleted in their entirety 1-1-07.

7.3 NORTHERN TAMPA BAY WATER USE CAUTION AREA

The Governing Board declared portions of Hillsborough, Pasco, and Pinellas Counties a Water Use Caution Area (WUCA) on June 28, 1989. The area designated is shown in Figure 7.3-1; the legal description is provided in Rule 40D-2.801(3)(c), F.A.C. As of the effective date of this rule, all existing water use permits within the Water Use Caution Area are modified to incorporate the applicable measures and conditions described below. Valid permits, legally in effect as of the effective date of this rule, are hereafter referred to as existing permits. Applicable permit conditions, as specified below, are incorporated into all existing water use permits in the Water Use Caution Area and shall be placed on new permits issued within the area. However, both the language and the application of any permit conditions listed may be modified when appropriate.

These portions of the Basis of Review for the Northern Tampa Bay Water Use Caution Area are intended to supplement the other provisions of the Basis of Review and are not intended to supersede or replace them. If there is a conflict between requirements, the more stringent provision shall prevail.

1. Public Supply

A wholesale public supply customer shall be required to obtain a separate permit to effect the following conservation requirements unless the quantity obtained by the wholesale public supply customer is less than 100,000 gallons per day on an annual average basis and the per capita daily water use of the wholesale public supply customer is less than the applicable per capita daily water use requirement outlined in Section 7.3 1.1.1.

The following water conservation requirements shall apply to all public supply utilities and suppliers with Permits that are granted for an annual average quantity of 100,000 gallons per day or greater, as well as wholesale customers supplied by another entity which obtain an annual average quantity of 100,000 gallons per day or greater, either indirectly or directly under water use permits within the Water Use Caution Area, regardless of the name(s) on the water use permit.

1.1 Per-Capita Use

Per-capita daily water use is defined as population-related withdrawals associated with residential, business, institutional, industrial, miscellaneous metered, and unaccounted uses. Permittees with per-capita daily water use which is skewed by the demands of significant water uses can deduct these uses provided that these uses are separately accounted. Generally, the formula used for determining gallons per day per capita is as follows: total withdrawal minus significant uses, environmental mitigation, and treatment losses, divided by the population served (adjusted for seasonal and tourist populations, if appropriate). For interconnected systems, incoming transfers and wholesale purchases of water shall be

The Permittee shall adopt a water conservation oriented rate structure no later than two years from the date of permit issuance. The Permittee shall submit a report describing the rate structure and its estimated effectiveness within 60 days following adoption.
1-1-03

1.3 Water Audit

All water supply utilities shall implement water audit programs by January 1, 1993. A thorough water audit can identify what is causing unaccounted water and alert the utility to the possibility of significant losses in the distribution system. Unaccounted water can be attributed to a variety of causes, including unauthorized uses, line flushing, authorized unmetered uses, under-registration of meters, fire flows, and leaks. Any losses that are measured and documented are not considered unaccounted water.

This requirement shall be implemented by applying the following permit condition to all existing Public Supply permits:

The permittee shall conduct water audits of the water supply system during each management period. The initial audit shall be conducted no later than January 1, 1993. Water audits which identify a greater than 12% unaccounted for water shall be followed by appropriate remedial actions. Audits shall be completed and reports documenting the results of the audit shall be submitted as an element of the report required in the per capita condition to the District by the following dates: January 1, 1993; January 1, 1997; January 1, 2001; and January 1, 2011. Water audit reports shall include a schedule for remedial action if needed.

Large, complex water supply systems may conduct the audit in phases, with prior approval by the District. A modified version shall be applied to new permits, replacing the initial audit date with a date two years forward from the permit issuance date. Prior to each management period, the District will reassess the unaccounted-for water standard of 12%, and may adjust this standard upward or downward through rulemaking.

1.4 Residential Water Use Reports

Beginning April 1, 1993, public supply permittees shall be required to annually report residential water use by type of dwelling unit. Residential dwelling units shall be classified into single family, multi-family (two or more dwelling units), and mobile homes. Residential water use consists of the indoor and outdoor water uses associated with these classes of dwelling units, including irrigation uses, whether separately metered or not. The permittee shall document the methodology used to determine the number of dwelling units by type and their quantities used. Estimates of water use based upon meter size may be inaccurate and will not be accepted.

This requirement shall be implemented by applying the following permit condition to all public supply permits:

Beginning in 1993, by April 1 of each year for the preceding fiscal year (October 1 through September 30), the permittee shall submit a residential water use report detailing:

a. The number of single family dwelling units served and their total water use,

EX_RPR – 6

RECOMMENDED STANDARDS FOR WATER WORKS

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS EXHIBIT 19
COMPANY FL PSC Staff (Direct)
WITNESS Richard P. Redemann, P.E. (RPR-6)
DATE 01/22/08

FLORIDA PUBLIC SERVICE COMMISSION

EXHIBIT RPR-6 (Page 1 of 4)

Recommended Standards For Water Works

2003 Edition

Great Lakes – Upper Mississippi River Board of State and Provincial
Public Health and Environmental Managers

Illinois Indiana Iowa Michigan Minnesota Missouri
New York Ohio Ontario Pennsylvania Wisconsin

EXHIBIT_RPR-6 (Page 2 of 4)

Recommended Standards For Water Works

2003 Edition

Policies for the Review and Approval of Plans and Specifications for Public Water Supplies

A Report of the Water Supply Committee of the
Great Lakes--Upper Mississippi River Board
of State and Provincial Public Health and Environmental Managers

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3.1.5.2 Construction

may require

a. approval from the appropriate regulatory agencies of the safety features for stability and spillway design,

b. a permit from an appropriate regulatory agency for controlling stream flow or installing a structure on the bed of a stream or interstate waterway.

3.1.5.3 Water Supply Dams

Water supply dams shall be designed and constructed in accordance with the requirements of the appropriate regulatory agency.

3.2 GROUNDWATER

A groundwater source includes all water obtained from dug, drilled, bored or driven wells, and infiltration lines.

3.2.1 Quantity

3.2.1.1 Source capacity

The total developed groundwater source capacity, unless otherwise specified by the reviewing authority, shall equal or exceed the design maximum day demand with the largest producing well out of service.

3.2.1.2 Number of sources

A minimum of two sources of groundwater shall be provided, unless otherwise specified by the reviewing authority.

3.2.1.3 Standby power

a. To ensure continuous service when the primary power has been interrupted, a standby power supply shall be provided through

   1. connection to at least two independent public power sources, or

   2. portable or in-place auxiliary power.

b. When automatic pre-lubrication of pump bearings is necessary, and an auxiliary power supply is provided, the pre-lubrication line shall be provided with a valved by-pass around the automatic control, or the automatic control shall be wired to the emergency power source.

3.2.2 Quality

3.2.2.1 Microbiological quality

6.2.7 Lighting

Pump stations shall be adequately lighted throughout. All electrical work shall conform to the requirements of the National Electrical Code or to relevant state and/or local codes.

6.2.8 Sanitary and other conveniences

All pumping stations that are manned for extended periods should be provided with potable water, lavatory and toilet facilities. Plumbing must be so installed as to prevent contamination of a public water supply. Wastes shall be discharged in accordance with Part 9.

6.3 PUMPS

At least two pumping units shall be provided. With any pump out of service, the remaining pump or pumps shall be capable of providing the maximum pumping demand of the system. The pumping units shall

a. have ample capacity to supply the peak demand against the required distribution system pressure without dangerous overloading,

b. be driven by prime movers able to meet the maximum horsepower condition of the pumps,

c. be provided with readily available spare parts and tools,

d. be served by control equipment that has proper heater and overload protection for air temperature encountered.

6.3.1 Suction lift

Suction lift shall

a. be avoided, if possible,

b. be within allowable limits, preferably less than 15 feet.

If suction lift is necessary, provision shall be made for priming the pumps.

6.3.2 Priming

Prime water must not be of lesser sanitary quality than that of the water being pumped. Means shall be provided to prevent either backpressure or backsiphonage backflow. When an air-operated ejector is used, the screened intake shall draw clean air from a point at least 10 feet above the ground or other source of possible contamination, unless the air is filtered by an apparatus approved by the reviewing authority. Vacuum priming may be used.

6.4 BOOSTER PUMPS

Booster pumps shall be located or controlled so that

a. they will not produce negative pressure in their suction lines,

b. pumps installed in the distribution system shall maintain inlet pressure as required in Section 8.2.1 under all operating conditions. Pumps taking suction from storage tanks shall be provided adequate net positive suction head,

EX_RPR – 7

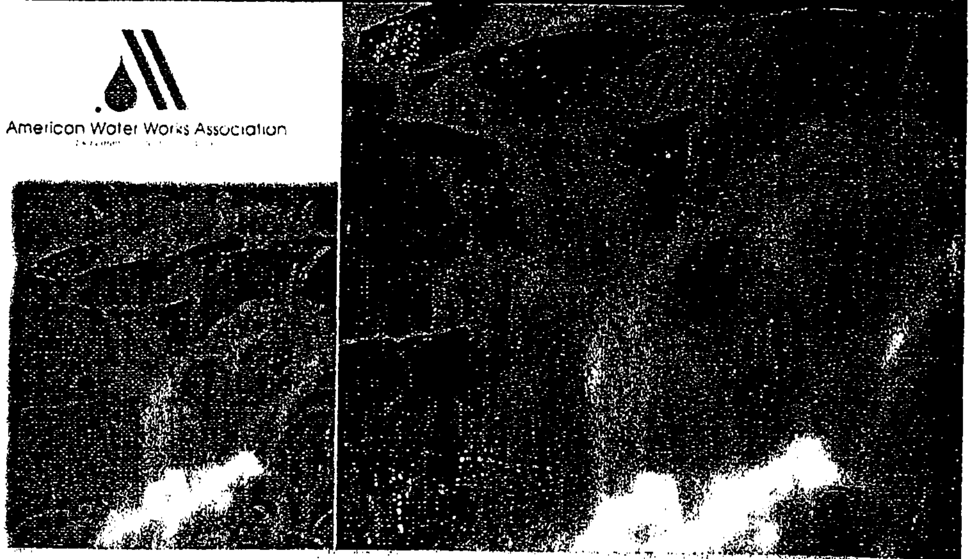
AWWA WATER DISTRIBUTION SYSTEMS HANDBOOK

U S ARMY CORP OF ENGINEERS DESIGN OF SMALL WATER SYSTEMS

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 20
COMPANY FL PSC Staff (Direct)
WITNESS Richard P. Redemann, P.E. (RPR-7)
DATE 01/22/08

McGRAW-HILL HANDBOOKS

American Water Works Association



WATER DISTRIBUTION SYSTEMS HANDBOOK

LARRY W. MAYS

3.2.2 Planning and Design Criteria

To plan and design a water distribution system effectively, criteria must be developed and adopted against which the adequacy of the existing and planned system can be compared. Typical criteria elements include the following:

- Supply
- Storage
- Fire demands
- Distribution system analysis
- Service pressures

3.2.2.1 Supply. In determining the adequacy of water supply facilities, the source of supply must be large enough to meet various water demand conditions and be able to meet at least a portion of normal demand during emergencies, such as power outages and disasters. At a minimum, the source of supply should be capable of meeting the maximum day system demand. It is not advisable to rely on storage to make up any shortfall in supply at maximum day demand. The fact that maximum day demand may occur several days consecutively must be considered by the system planner/designer. It is common for communities to provide a source of supply that meets the maximum day demand, with the additional supply to meet peak hour demand coming from storage. Some communities find it more economical to develop a source of supply that not only meets maximum day but also peak hour demand.

It is also good practice to consider standby capability in the source of supply. If the system has been designed so the entire capacity of the supply is required to meet the maximum demand, any portion of the supply that is placed out of service due to malfunction or maintenance will result in a deficient supply. For example, a community that relies primarily on groundwater for its supply should, at a minimum, be able to meet its maximum day demand with at least one of its largest wells out of service.

3.2.2.2 Storage. The principal function of storage is to provide reserve supply for (1) operational equalization, (2) fire suppression reserves, and (3) emergency needs.

Operational storage is directly related to the amount of water necessary to meet peak demands. The intent of operational storage is to make up the difference between the consumers' peak demands and the system's available supply. It is the amount of desirable stored water to regulate fluctuations in demand so that extreme variations will not be imposed on the source of supply. With operational storage, system pressures are typically improved and stabilized. The volume of operational storage required is a function of the diurnal demand fluctuation in a community and is commonly estimated at 25 percent of the total maximum day demand.

Fire storage is typically the amount of stored water required to provide a specified fire flow for a specified duration. Both the specific fire flow and the specific time duration vary significantly by community. These values are normally established through the local fire marshall and are typically based on guidelines established by the Insurance Service Office, a nonprofit association of insurers that evaluate relative insurance risks to communities.

Emergency storage is the volume of water recommended to meet demand during emergency situations, such as source of supply failures, major transmission main failures, pump failures, electrical power outages, or natural disasters. The amount of emergency storage included with a particular water system is an owner option, typically based on an assessment of risk and the desired degree of system dependability. In

CECW-ET Engineer Manual 1110-2-503	Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000	EM 1110-2-503 27 February 1999
	Engineering and Design DESIGN OF SMALL WATER SYSTEMS	
	Distribution Restriction Statement Approved for public release; distribution is unlimited.	

assure that an adequate supply is available during critical periods (e.g., droughts).

c. Peak use. A measure of peak use, such as the maximum hourly use, maximum instantaneous use, or fire flow is needed to size distribution facilities (e.g., pipelines, booster pumps, storage) so that peak demands can be satisfied without overtaxing production and treatment facilities or causing excessive pressure losses.

d. Intermediate use. A measure of use between the average and peak values is ordinarily used in the hydraulic design of treatment facilities. Many engineers design treatment processes to operate normally at the average daily flow rate, but be hydraulically capable of passing a greater flow, say the maximum daily flow. This occasional "overloading" or "overrating" of the plant, or portions thereof (e.g., rapid sand filters), may be acceptable even though effluent quality is reduced to some extent. Alternatively, the plant may be designed to operate without overloading at the maximum daily use rate. In this situation, the plant may normally operate at process rates lower than those used in design, or various treatment units may be taken off line and held in reserve until needed. The latter approach is frequently used, especially with rapid sand filters. Another possibility is that the treatment plant may be designed to meet average demands by operating for only a portion of the day. Higher rates of demand can then be met rather easily by extending the hours of operation. This approach is usually uneconomical for larger cities, but can be very attractive for small operations.

4-3. Storage Requirements

a. Introduction. Depending upon the particular situation, several different types of storage facilities may be needed to ensure that an adequate water supply is always available. Examples include raw water storage (e.g., surface water impoundment), finished water storage at the treatment plant (e.g., clear well and backwash tank), and distribution storage (e.g., ground, elevated or hydropneumatic tanks). Regardless of the type of facility, the basic method used to determine the required storage volume is essentially the same.

b. Raw water storage.

(1) General. Where a surface water supply is used, it may be possible to design a supply system to operate without any raw water storage facility dedicated specifically to water supply. Examples might be a small town drawing water from a large multipurpose impoundment, or even a large city taking water from one of the Great Lakes. However, in the general case, some provision must be made to catch water during periods of moderate to high streamflow and store it for later use. The size of the storage facility required is usually determined based upon consideration of hydrologic information such as minimum dry-weather streamflow, average streamflow and rainfall/runoff patterns, and some average measure of water use, for example, the average daily use. The mass diagram, or Rippl, method has traditionally been used to determine storage requirements. This technique is amenable to either a simple graphical or more complex analytical approach, and is widely known since it is covered in many standard water supply and applied hydrology textbooks (Clark, Viessman, and Hammer 1977; Fair, Geyer, and Okun 1966a; Linaweaver, Geyer, and Wolff 1966; Salvato 1982; Steel and McGhee 1979). Essentially the same method is used to size equalization basins used in wastewater treatment (Metcalf and Eddy 1991). The mass diagram technique is very flexible and may be used in either a deterministic or probabilistic format. For more information the reader is directed to the references noted above.

(2) Design criteria. In the eastern United States, raw water reservoirs are usually designed to refill every year. In more arid regions, streamflow is less dependable and water must be stored during wet years for use during extended dry periods. Typical American practice over the last 50 or 60 years has been to size raw water storage facilities to be adequate to compensate for any drought condition expected to occur more often than once in about 20 years, plus some additional reserve storage allocation (e.g., 25 percent). This rule of thumb, combined with the implementation of use reduction measures when reservoir storage is depleted to some critical level, ordinarily results in a reasonable trade-off between storage requirements and user inconvenience. However, in recent years many other methods have appeared in the water supply literature. Regardless of the method used, it is important to consider the effects of evaporation, seepage, and siltation any time a reservoir is to be designed.

(3) Groundwater. When groundwater serves as the source of supply, no provision for long-term raw water storage is usually made. Short-term storage is, however, often useful. A good example is a situation where groundwater is extracted by a number of relatively low-yield wells (i.e., low-yield water supply to total water demand), pumped to a central storage tank and then withdrawn for distribution. This technique is especially useful for equalizing pumping rates when water from some, or all, of the wells requires treatment prior to distribution. The mass diagram approach mentioned in *b*(1) above may be used to size the storage tank so long as the inflow and outflow rates are known.

c. Finished water storage. Distribution storage facilities are used to meet peak demands (including fire flows), allow continued service when the supply is interrupted, equalize system pressures, eliminate continuous pumping, and facilitate the use of economical pipe sizes. While it is possible to size tanks using the mass diagram approach, it is more common to rely on various rules of thumb. Salvato (1982) suggests that, depending upon system size and type, distribution storage volume may vary from about one-half the average daily use, to the maximum daily use, to a 2- or 3-day supply. Even when rule-of-thumb criteria are used to size distribution storage facilities, it may be useful to conduct a mass diagram type of analysis (*b*(l) above) to ensure that peak demands can be met. Storage requirements for filter backwash tanks, clear wells, and other reservoirs can also be determined from mass diagrams if so desired.

4-4. Municipal Water Use

a. Introduction. As previously mentioned (paragraph 4-2*a*), municipal water use varies widely from city to city and from time to time for a given city. American Water Works Association (AWWA) (1975, 1981) and U.S. Geological Survey (1975) present data that indicate clearly that U.S. water use patterns vary considerably with geographical location. This point is further emphasized by the per capita water use data contained in Metcalf and Eddy (1991), Murray and Reeves (1972), and van der Leeder (1975).

b. Design approach. Design values for water use rates are usually determined as follows:

- Select the design period.
- Forecast the population to be served by the end of the design period.
- Estimate the expected average water use rate at the end of the design period.
- Estimate design use rates by multiplying the average use rate by selected factors.
- Determine the required fire demand from insurance requirements.
- From the various use rates calculated above, select those applicable to various system components.

A brief discussion of each step is outlined below. The same basic format is followed in later sections where rural, recreation area, military installation, and highway rest area systems are specifically addressed.

(1) Design period. As a general rule, the design period for portions of the system that may be readily enlarged (e.g., well fields and treatment plants) is chosen as 10 to 25 years. Components that are difficult and costly to enlarge (e.g., large dams) may be designed for a longer period, say 25 to 50 years. Prevailing interest rates are an important factor, with higher rates generally favoring shorter periods. The source of funds is also important. When funding assistance is available (e.g., in the form of grants or subsidized loans) there is a tendency to overdesign. In effect, this represents extension of the design period. Water lines serving residential areas are usually sized for full development since residential requirements in developing areas tend to change rapidly and replacement of such lines is costly.

(2) Population forecasts. Population forecasts are usually based on some combination of official census data; special studies made by various private and public interests (e.g., market surveys); the attitudes of local people (especially business and political leaders) toward expansion; and input from state, regional, and local planning agencies. Most states have developed population forecasting formulas that are adjustable for various regions within the given state. Because population forecasting has long been of interest to sanitary engineers, the topic is adequately covered in most standard water supply and wastewater engineering texts (Clark, Viessman, and Hammer 1977; Technical Manual 5-813-3; Fair, Geyer, and Okun 1966a; Metcalf and Eddy 1991; Steel and McGhee 1979).

(3) Average per capita use. Average per capita water use is usually determined from past experience in the local area or similar areas, regulatory agency requirements, or the water supply literature. Many studies of municipal water use have been reported and an overall average of about 450 to 800 liters per capita per day (L/cd) (100 to 175 gallons per capita per day (gpcd)) seems to be applicable for the United States. Publications prepared by the AWWA, U.S. Geological Survey and others (Metcalf and Eddy (1991), Murray and Reeves (1972), and van der Leeder (1975)) indicate an estimated national average of 755 L/cd (166 gpcd) for 1975. However, the reported range of values (less than 227 L/cd (50 gpcd) to more than 2273 L/cd (500 gpcd)) is so wide that specific knowledge about the area to be served should take precedence over national, or even regional, averages. A substantial improvement in water use forecasting can be realized by disaggregating municipal water use as described below.

(4) Disaggregated use. Municipal water use can be disaggregated (if sufficient data are available) and allocated to various water use sectors. An example scheme is shown in Table 4-1. Many other arrangements could, of course, be used. Typical allocations expressed as percentages of the average daily use are shown in Table 4-2. Disaggregation generally improves forecasting accuracy since the effects of such factors as climate (i.e., need for irrigation), commercial activity, industrial development, and water conservation programs can be readily considered. Residential water use can be further

EX_RPR – 8

MATRIX

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 21
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WITNESS Richard P. Redeman, P.E. (RPR-8)
DATE 01-22-08

EXHIBIT_RPR-8 (Page 1 of 5)

25-30.4325 Water Treatment and Storage Used and Useful Calculations

Proposed Rule	**Comments**	**Alternative Rule**
(1) Definitions. (a) A water treatment system includes all facilities, such as wells and treatment facilities, excluding storage, necessary to produce, treat, and deliver potable water to a transmission and distribution system.	No change recommended	(1) Definitions. (a) A water treatment system includes all facilities, such as wells and treatment facilities, excluding storage, necessary to produce, treat, and deliver potable water to a transmission and distribution system.
(b) Storage facilities include ground or elevated storage tanks and high service pumps.	No change recommended	(b) Storage facilities include ground or elevated storage tanks and high service pumps.
(c) Peak demand for a water treatment system includes the utility's maximum hour or day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where fire flow is provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.	No change recommended	(c) Peak demand for a water treatment system includes the utility's maximum hour or day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where fire flow is provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.
(d) Peak demand for storage includes the utility's maximum day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.	No change recommended	(d) Peak demand for storage includes the utility's maximum day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.
(e) Excessive unaccounted for water (EUW) is finished potable water produced in excess of 110 percent of the accounted for usage, including water sold; other water used, such as	May reword for clarification purposes.	(e) Excessive unaccounted for water (EUW) is unaccounted for water in excess of 10 percent of the amount produced.

for flushing or fire fighting; and water lost through line breaks.		
(2) The Commission's used and useful evaluation of water treatment system and storage facilities shall include a determination as to the prudence of the investment and consideration of economies of scale.	Add "and other relevant factors such as whether flows have decreased due to conservation or a reduction in the number of customers."	(2) The Commission's used and useful evaluation of water treatment system and storage facilities shall include a determination as to the prudence of the investment and consideration of economies of scale and other relevant factors, such as whether flows have decreased due to conservation or a reduction in the number of customers.
(3) Separate used and useful calculations shall be made for the water treatment system and storage facilities. However, if the utility believes an alternative calculation is appropriate, such calculation may also be provided, along with supporting documentation.	Change "However, if the utility believes an alternative calculation is appropriate, such calculation" to "An alternative calculation" Add "and justification, including but not limited to service area restrictions, factors involving treatment capacity, well drawdown limitations, and changes in flow due to conservation or a reduction in number of customers."	(3) Separate used and useful calculations shall be made for the water treatment system and storage facilities. An alternative calculation may also be provided, along with supporting documentation and justification, including but not limited to service area restrictions, factors involving treatment capacity, well drawdown limitations, and changes in flow due to conservation or a reduction in number of customers.
(4) A water treatment system is considered 100 percent used and useful if: (a) The system is the minimum size necessary to adequately serve existing customers plus an allowance for growth and fire flow; or (b) The service territory the system is designed to serve is mature or built out and there is no potential for expansion of the service territory; or (c) The system is served by a single well.	No change recommended	(4) A water treatment system is considered 100 percent used and useful if: (a) The system is the minimum size necessary to adequately serve existing customers plus an allowance for growth and fire flow; or (b) The service territory the system is designed to serve is mature or built out and there is no potential for expansion of the service territory; or (c) The system is served by a single well.
(5) The used and useful calculation of a water treatment system is made by dividing the peak demand by the	No change recommended	(5) The used and useful calculation of a water treatment system is made by dividing the peak demand by the

firm reliable capacity of the water treatment system.		firm reliable capacity of the water treatment system.
(6) The firm reliable capacity of a water treatment system is equivalent to the pumping capacity of the wells, excluding the largest well for those systems with more than one well. However, if the pumping capacity is restricted by a limiting factor such as the treatment capacity or draw down limitations, then the firm reliable capacity is the capacity of the limiting component or restriction of the water treatment system. In a system with multiple wells, if a utility believes there is justification to consider more than one well out of service in determining firm reliable capacity, such circumstance will be considered. The utility must provide support for its position, in addition to the analysis excluding only the largest well.	Delete after first sentence and move substance to (3)	(6) The firm reliable capacity of a water treatment system is equivalent to the pumping capacity of the wells, excluding the largest well for those systems with more than one well.
(a) Firm reliable capacity is expressed in gallons per minute for systems with no storage capacity. (b) Firm reliable capacity is expressed in gallons per day, based on 12 hours of pumping, for systems with storage capacity.	No change recommended	(a) Firm reliable capacity is expressed in gallons per minute for systems with no storage capacity. (b) Firm reliable capacity is expressed in gallons per day, based on 12 hours of pumping, for systems with storage capacity.
(7) Peak demand is based on a peak hour for a water treatment system with no storage capacity and a peak day for a water treatment system with storage capacity.	No change recommended	(7) Peak demand is based on a peak hour for a water treatment system with no storage capacity and a peak day for a water treatment system with storage capacity.
(a) Peak hour demand, expressed in gallons per minute, shall be calculated as follows: 1. The single maximum day (SMD) in the test year unless there is an unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water, divided by	~~Change "30-day period" to "maximum month"~~ No change recommended.	(a) Peak hour demand, expressed in gallons per minute, shall be calculated as follows: 1. The single maximum day (SMD) in the test year unless there is an unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water, divided by

1440 minutes in a day, times 2 [((SMD-EUW)/1,440) x 2], or 2. The average of the 5 highest days (AFD) within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water, divided by 1440 minutes in a day, times 2 [((AFD-EUW)/1,440) x 2], or 3. If the actual maximum day flow data is not available, 1.1 gallons per minute per equivalent residential connection (1.1 x ERC).		1440 minutes in a day, times 2 [((SMD-EUW)/1,440) x 2], or 2. The average of the 5 highest days (AFD) within a maximum month in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water, divided by 1440 minutes in a day, times 2 [((AFD-EUW)/1,440) x 2], or 3. If the actual maximum day flow data is not available, 1.1 gallons per minute per equivalent residential connection (1.1 x ERC).
(b) Peak day demand, expressed in gallons per day, shall be calculated as follows: 1. The single maximum day in the test year, if there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water (SMD-EUW), or 2. The average of the 5 highest days within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water (AFD-EUW), or 3. If the actual maximum day flow data is not available, 787.5 gallons per day per equivalent residential connection (787.5 x ERC).	~~Change "30-day period" to "maximum month"~~ No change recommended.	(b) Peak day demand, expressed in gallons per day, shall be calculated as follows: 1. The single maximum day in the test year, if there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water (SMD-EUW), or 2. The average of the 5 highest days within a maximum month in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water (AFD-EUW), or 3. If the actual maximum day flow data is not available, 787.5 gallons per day per equivalent residential connection (787.5 x ERC).
(8) The used and useful calculation of storage is made by dividing the peak demand by the usable storage of the storage tank. Usable storage capacity less than or equal to the peak day demand shall be considered 100 percent used and useful. A hydropneumatic tank is not considered usable storage.	No change recommended	(8) The used and useful calculation of storage is made by dividing the peak demand by the usable storage of the storage tank. Usable storage capacity less than or equal to the peak day demand shall be considered 100 percent used and useful. A hydropneumatic tank is not considered usable storage.
(9) Usable storage determination	No change recommended	(9) Usable storage determination

shall be as follows: (a) An elevated storage tank shall be considered 100 percent usable. (b) A ground storage tank shall be considered 90 percent usable if the bottom of the tank is below the centerline of the pumping unit. (c) A ground storage tank constructed with a bottom drain shall be considered 100 percent usable, unless there is a limiting factor, in which case the limiting factor will be taken into consideration.		shall be as follows: (a) An elevated storage tank shall be considered 100 percent usable. (b) A ground storage tank shall be considered 90 percent usable if the bottom of the tank is below the centerline of the pumping unit. (c) A ground storage tank constructed with a bottom drain shall be considered 100 percent usable, unless there is a limiting factor, in which case the limiting factor will be taken into consideration.
(10) To determine whether an adjustment to plant and operating expenses for excessive unaccounted for water will be included in the used and useful calculation, the Commission will consider all relevant factors, including whether the reason for excessive unaccounted for water during the test period has been identified, whether a solution to correct the problem has been implemented, or whether a proposed solution is economically feasible.	No change recommended	(10) To determine whether an adjustment to plant and operating expenses for excessive unaccounted for water will be included in the used and useful calculation, the Commission will consider all relevant factors, including whether the reason for excessive unaccounted for water during the test period has been identified, whether a solution to correct the problem has been implemented, or whether a proposed solution is economically feasible.
(11) In its used and useful evaluation, the Commission will consider other relevant factors, such as whether flows have decreased due to conservation or a reduction in the number of customers.	Delete and move substance to (2)	

REVISED EX_RPR – 8

MATRIX

FLORIDA PUBLIC SERVICE COMMISSION
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COMPANY FPSC Staff (Direct)
WITNESS Richard P. Redemann, P.E. (RPR-8)
DATE 01/22/08

25-30.4325 Water Treatment and Storage Used and Useful Calculations

Proposed Rule	**Comments**	**Alternative Rule**
(1) Definitions. (a) A water treatment system includes all facilities, such as wells and treatment facilities, excluding storage, necessary to produce, treat, and deliver potable water to a transmission and distribution system.	No change recommended	(1) Definitions. (a) A water treatment system includes all facilities, such as wells and treatment facilities, excluding storage, necessary to produce, treat, and deliver potable water to a transmission and distribution system.
(b) Storage facilities include ground or elevated storage tanks and high service pumps.	No change recommended	(b) Storage facilities include ground or elevated storage tanks and high service pumps.
(c) Peak demand for a water treatment system includes the utility's maximum hour or day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where fire flow is provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.	No change recommended	(c) Peak demand for a water treatment system includes the utility's maximum hour or day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where fire flow is provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.
(d) Peak demand for storage includes the utility's maximum day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.	No change recommended	(d) Peak demand for storage includes the utility's maximum day demand, excluding excessive unaccounted for water, plus a growth allowance based on the requirements of Rule 25-30.431, Florida Administrative Code, and, where provided, a minimum of either the fire flow required by the local governmental authority or 2 hours at 500 gallons per minute.
(e) Excessive unaccounted for water (EUW) is finished potable water produced in excess of 110 percent of the accounted for usage, including water sold; other water used, such as	May reword for clarification purposes.	(e) Excessive unaccounted for water (EUW) is unaccounted for water in excess of 10 percent of the amount produced.

for flushing or fire fighting; and water lost through line breaks.		
(2) The Commission's used and useful evaluation of water treatment system and storage facilities shall include a determination as to the prudence of the investment and consideration of economies of scale.	Add "and other relevant factors such as whether flows have decreased due to conservation or a reduction in the number of customers."	(2) The Commission's used and useful evaluation of water treatment system and storage facilities shall include a determination as to the prudence of the investment and consideration of economies of scale and other relevant factors, such as whether flows have decreased due to conservation or a reduction in the number of customers.
(3) Separate used and useful calculations shall be made for the water treatment system and storage facilities. However, if the utility believes an alternative calculation is appropriate, such calculation may also be provided, along with supporting documentation.	Change "However, if the utility believes an alternative calculation is appropriate, such calculation" to "An alternative calculation" Add "and justification, including but not limited to service area restrictions, factors involving treatment capacity, well drawdown limitations, and changes in flow due to conservation or a reduction in number of customers."	(3) Separate used and useful calculations shall be made for the water treatment system and storage facilities. An alternative calculation may also be provided, along with supporting documentation and justification, including but not limited to service area restrictions, factors involving treatment capacity, well drawdown limitations, and changes in flow due to conservation or a reduction in number of customers.
(4) A water treatment system is considered 100 percent used and useful if: (a) The system is the minimum size necessary to adequately serve existing customers plus an allowance for growth and fire flow; or (b) The service territory the system is designed to serve is mature or built out and there is no potential for expansion of the service territory; or (c) The system is served by a single well.	No change recommended	(4) A water treatment system is considered 100 percent used and useful if: (a) The system is the minimum size necessary to adequately serve existing customers plus an allowance for growth and fire flow; or (b) The service territory the system is designed to serve is mature or built out and there is no potential for expansion of the service territory; or (c) The system is served by a single well.
(5) The used and useful calculation of a water treatment system is made by dividing the peak demand by the	No change recommended	(5) The used and useful calculation of a water treatment system is made by dividing the peak demand by the

firm reliable capacity of the water treatment system.		firm reliable capacity of the water treatment system.
(6) The firm reliable capacity of a water treatment system is equivalent to the pumping capacity of the wells, excluding the largest well for those systems with more than one well. However, if the pumping capacity is restricted by a limiting factor such as the treatment capacity or draw down limitations, then the firm reliable capacity is the capacity of the limiting component or restriction of the water treatment system. In a system with multiple wells, if a utility believes there is justification to consider more than one well out of service in determining firm reliable capacity, such circumstance will be considered. The utility must provide support for its position, in addition to the analysis excluding only the largest well.	Delete after first sentence and move substance to (3)	(6) The firm reliable capacity of a water treatment system is equivalent to the pumping capacity of the wells, excluding the largest well for those systems with more than one well.
(a) Firm reliable capacity is expressed in gallons per minute for systems with no storage capacity. (b) Firm reliable capacity is expressed in gallons per day, based on 12 hours of pumping, for systems with storage capacity.	No change recommended	(a) Firm reliable capacity is expressed in gallons per minute for systems with no storage capacity. (b) Firm reliable capacity is expressed in gallons per day, based on 12 hours of pumping, for systems with storage capacity.
(7) Peak demand is based on a peak hour for a water treatment system with no storage capacity and a peak day for a water treatment system with storage capacity.	No change recommended	(7) Peak demand is based on a peak hour for a water treatment system with no storage capacity and a peak day for a water treatment system with storage capacity.
(a) Peak hour demand, expressed in gallons per minute, shall be calculated as follows: 1. The single maximum day (SMD) in the test year unless there is an unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water, divided by	No change recommended	(a) Peak hour demand, expressed in gallons per minute, shall be calculated as follows: 1. The single maximum day (SMD) in the test year unless there is an unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water, divided by

1440 minutes in a day, times 2 [((SMD-EUW)/1,440) x 2], or 2. The average of the 5 highest days (AFD) within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water, divided by 1440 minutes in a day, times 2 [((AFD-EUW)/1,440) x 2], or 3. If the actual maximum day flow data is not available, 1.1 gallons per minute per equivalent residential connection (1.1 x ERC).		1440 minutes in a day, times 2 [((SMD-EUW)/1,440) x 2], or 2. The average of the 5 highest days (AFD) within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water, divided by 1440 minutes in a day, times 2 [((AFD-EUW)/1,440) x 2], or 3. If the actual maximum day flow data is not available, 1.1 gallons per minute per equivalent residential connection (1.1 x ERC).
(b) Peak day demand, expressed in gallons per day, shall be calculated as follows: 1. The single maximum day in the test year, if there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water (SMD-EUW), or 2. The average of the 5 highest days within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water (AFD-EUW), or 3. If the actual maximum day flow data is not available, 787.5 gallons per day per equivalent residential connection (787.5 x ERC).	No change recommended	(b) Peak day demand, expressed in gallons per day, shall be calculated as follows: 1. The single maximum day in the test year, if there is no unusual occurrence on that day, such as a fire or line break, less excessive unaccounted for water (SMD-EUW), or 2. The average of the 5 highest days within a 30-day period in the test year, excluding any day with an unusual occurrence, less excessive unaccounted for water (AFD-EUW), or 3. If the actual maximum day flow data is not available, 787.5 gallons per day per equivalent residential connection (787.5 x ERC).
(8) The used and useful calculation of storage is made by dividing the peak demand by the usable storage of the storage tank. Usable storage capacity less than or equal to the peak day demand shall be considered 100 percent used and useful. A hydropneumatic tank is not considered usable storage.	No change recommended	(8) The used and useful calculation of storage is made by dividing the peak demand by the usable storage of the storage tank. Usable storage capacity less than or equal to the peak day demand shall be considered 100 percent used and useful. A hydropneumatic tank is not considered usable storage.
(9) Usable storage determination shall be as follows:	No change recommended	(9) Usable storage determination shall be as follows:

(a) An elevated storage tank shall be considered 100 percent usable. (b) A ground storage tank shall be considered 90 percent usable if the bottom of the tank is below the centerline of the pumping unit. (c) A ground storage tank constructed with a bottom drain shall be considered 100 percent usable, unless there is a limiting factor, in which case the limiting factor will be taken into consideration.		(a) An elevated storage tank shall be considered 100 percent usable. (b) A ground storage tank shall be considered 90 percent usable if the bottom of the tank is below the centerline of the pumping unit. (c) A ground storage tank constructed with a bottom drain shall be considered 100 percent usable, unless there is a limiting factor, in which case the limiting factor will be taken into consideration.
(10) To determine whether an adjustment to plant and operating expenses for excessive unaccounted for water will be included in the used and useful calculation, the Commission will consider all relevant factors, including whether the reason for excessive unaccounted for water during the test period has been identified, whether a solution to correct the problem has been implemented, or whether a proposed solution is economically feasible.	No change recommended	(10) To determine whether an adjustment to plant and operating expenses for excessive unaccounted for water will be included in the used and useful calculation, the Commission will consider all relevant factors, including whether the reason for excessive unaccounted for water during the test period has been identified, whether a solution to correct the problem has been implemented, or whether a proposed solution is economically feasible.
(11) In its used and useful evaluation, the Commission will consider other relevant factors, such as whether flows have decreased due to conservation or a reduction in the number of customers.	Delete and move substance to (2)	

Docket No. 070183-WS
Exhibit JFG-4

A~~MM~~WWA M-5 MANUAL (EXCERPTS)

FLORIDA PUBLIC SERVICE COMMISSION
DOCKET NO. 070183-WS **EXHIBIT** 22
COMPANY aqua Utilities of FL (Surrebuttal
WITNESS John F. Guastella, P.E. (JFG-4)
DATE 01/22/08

AWWA M5
MANAGEMENT
MANUAL

A TRAINING COURSE IN

Water Utility Management

AMERICAN WATER WORKS ASSOCIATION
Incorporated
2 Park Avenue, New York, N. Y. 10016

Foreword

The preparation of training manuals for water utility personnel was undertaken by the AWWA Committee on Education in trying to ascertain the status of in-service training in the industry and to improve the quality of that training. In May 1953 at the Grand Rapids Convention, the committee reported its findings concerning the quality of "short courses" as provided in the various states at that time. That survey covered sponsorship, financing, personal expenses, course frequency, course length, attendance, education requirements, examinations, and course content. Two recommendations of the committee were that short courses with higher educational prerequisites should be developed for water works personnel, placing more emphasis on in-service training, and that conferences for management should be developed.

In following its own recommendations, the committee prepared outlines of the content of six short courses to cover the water works field. These outlines, published in the October 1955 issue of *Willing Water*, have since been used by several "short-course" schools to improve content. To achieve the greatest benefit from the outlines, however, the committee believed that manuals should be prepared from them. The manuals could then be used as texts or could be studied independently by the ambitious water works man. After receiving committee approval, the plan was approved by the AWWA Board of Directors in St. Louis in May 1956. Since that time, six groups of members, carefully selected for their special knowledge, were invited to prepare the original drafts of the manuals. More than 80 members participated in this project.

This manual, one of a series of four to be prepared from the original six outlines, includes one or more chapters by each of the following authors:

Ellwood H. Aldrich
E. Jerry Allen
J. J. Barr
Kenneth J. Carl
John G. Copley
J. P. Dister
Raymond J. Faust
Burton S. Grant
Richard S. Green
C. P. Harnish
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Melvin P. Hatcher
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Frank E. Maloney
John W. McFarland
Robert S. Millar
Edward A. Reinke
S. Cook Shaw
W. S. Stephens
W. Victor Weir
William C. Welmon

The AWWA and the Committee on Education gratefully acknowledge the contribution of each of these men. Their only compensation will be the satisfaction derived from the knowledge that their efforts are contributing to the advancement of the water works industry.

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Manufactured in the USA

outside the corporate limits of the municipality. Some courts have held that a municipality operating a water works has a right to base its charges upon reasonable classifications determined upon such factors as the cost of service, the purpose for which the service or product is received, the quantity received, the different character of the services furnished, the time of their use, or any other matter which presents a substantial difference. The courts generally condemn only arbitrary, capricious, or unreasonable discrimination.

Fluoridation. Fluoridation has often involved considerable litigation. To date, all court tests have indicated that the practice is legal. But more to the point, water utilities that have followed the AWWA policy of leaving the decision concerning the adoption of the practice to the health and public authorities have been able to avoid the litigation.

Discontinuance of service. Responsibility to provide water normally ends when payments for the water are in arrears for an unreasonable length of time. This right to cut off water service to the premises involved has recently been extended to cover the nonpayment of sewerage service charges when the water utility has the responsibility to collect that charge. Generally, however, utilities cannot force payment by cutting off service to other premises of an owner in arrears.

These points have merely been examples of the manner in which the responsibility of a utility creates problems for management which must be foreseen and provided for. All the way from the source of supply to the customer's tap, water utility facilities and operations impinge upon the public health and wealth—and where the public is involved, there is the responsibility of a public utility.

QUESTIONS

1. What is the primary responsibility of a water utility?
2. Through what means is the water utility's discharge of its responsibilities enforced?
3. What are some of the common causes of lawsuits against water utilities?
4. What are some of the means utilities can take to protect themselves against specific types of suit?
5. What are your utility's rules on shutoffs? How are they exercised?

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CHAPTER 4

Fire Protection

PUBLIC water supply systems generally provide water for fire protection. Although this responsibility, or function, is secondary to the primary one of providing water for potable use, the fire protection requirements have a very important influence on the design and operation of most systems. Fire protection furnished by water utilities falls into two broad classifications: public protection, available directly from hydrants supplied by the public distribution system; and private protection, provided through fire service connections to sprinkler, standpipe, or other special extinguishing systems or to private yard distribution systems supplying hydrants.

Public Fire Protection

The most generally accepted standards for public fire protection are contained in the *Standard Schedule for Grading Cities and Towns of the United States With Reference to Their Fire Defenses and Physical Conditions,* published by the National Board of Fire Underwriters (NBFU). The first edition of this work appeared in 1916, the most recent in 1956. The schedule is used to determine the relative classifications of municipalities from the fire protection standpoint. [redacted] the various states. To determine these classifications, deficiency points are assigned for each feature of fire protection in which the municipality fails to meet the standards established in the schedule. The total number of deficiency points assigned establishes the class. The maximum number of points is 5,000, and there are 10 possible classes, each class covering a range of 500 points—for instance, a municipality with 1,340 points is Third Class, one with 2,760 points, Sixth Class. Seven major phases of municipal fire protection are considered in the schedule, and the 5,000 points are divided among them as shown in Table 4-1.

The 1,700 points assigned to water supply represent 34 per cent of the total, indicating the importance of water supply in relation to the overall fire protection of a municipality. There are ten possible classes for water supply, each class covering a range of 170 points—for example, a water supply with 250 points is Second Class and one with 1,100 points Seventh Class.

psi. For smaller municipalities requiring not more than 2,500 gpm and having not more than 10 buildings exceeding three stories in height, 60 psi is needed. In sparsely built residential areas or small village business districts with buildings of small area and not higher than two stories, 50 psi is required.

In the grading of municipal water supplies under the NBFU schedule, residual pressure is based on delivery to fire department pumpers throughout.

Adequacy of Supply Works

To be considered adequate under the schedule, a system should be capable of delivering the required fire flow with consumption at the maximum daily rate. [redacted]

* As an illustration, consider a city with a population of 40,000 and a maximum daily consumption rate of 8.50 mgd. Table 2 gives a required fire flow of 6,000 gpm or 8.64 mgd ~~for a city of this size~~, so that the system would be required to deliver 8.50 + 8.64 = 17.14 mgd. This rate must be available over a 10-hr period.

All components shld be sized for MDF plus Rqd Fire Flow

The supply works [redacted], intakes, suction lines, pumps, boilers, treatment works, and supply lines, should, in connection with the storage on the distribution system, be capable of delivering the maximum daily consumption rate plus the required fire flow. As no two water systems are exactly alike, the specific methods employed to meet these requirements differ considerably, but the overall techniques generally fall into one of three categories:

1. Provide supply works capacity to meet the total requirements. This would be 17.14 mgd for the supply works of the city used for illustration.

2. Provide supply works capacity equal to the maximum daily consumption rate [redacted]. In the illustration, a capacity of 8.50 mgd would be provided for the supply works plus storage capable of supplying 8.64 mgd for 10 hr. The storage required would be:

$$8.64 \times \frac{10}{24} = 3.60 \text{ mil gal}$$

As storage fluctuates, the actual storage capacity installed should be greater by an amount sufficient to provide 3.60 mil gal as the normal minimum storage.

3. Provide supply works capacity in excess of the maximum daily consumption rate with storage on the distribution system capable of supplying, for the specified duration, the difference between the total required rate and the capacity of the supply works. In the illustration, if a capacity of 12.50 mgd were provided for the supply works, the required normal minimum storage would be

$$(17.12 - 12.50) \times \frac{10}{24} = 1.93 \text{ mil gal.}$$

Reliability of Supply Works

To comply with NBFU standards, the supply works should be able to meet the requirements not only under normal conditions but also under emergency or unusual conditions. There are various ways in which the required reliability can be obtained, but it usually necessitates duplication of units or lines or the provision of additional storage.

To evaluate the reliability of the source of supply, consideration is given to such factors as: the frequency and duration of droughts; physical condition of intakes; danger from earthquakes, floods, forest fires, ice formations; silting; [redacted]. [redacted] or similar [redacted] for extended periods, [redacted] or special provisions [redacted]

* The standards also indicate that the number and capacities of the pumps installed should be such that, with the two most important units out of service, the fire flow can be delivered for the required number of hours during a period of 5 days with consumption at the maximum daily rate. This applies to both low- and high-lift pumps. If, in the illustration previously used, the high-lift pumps consisted of a 9-, a 7-, and a 5-mgd unit, it can be seen that, with the two largest units out, the remaining pump could not even deliver the maximum daily rate. If another 5-mgd unit were provided, 10 mgd would be available with the two largest units out, and the normal minimum storage required on the distribution system would be

$$(17.12 - 10) \times \frac{10}{24} = 2.96 \text{ mil gal.}$$

If another 7-mgd unit were added instead of a 5-mgd one, the normal minimum storage required would be reduced to

$$(17.12 - 12) \times \frac{10}{24} = 2.13 \text{ mil gal.}$$

The treatment works are required to be of sufficient capacity so that, with one filter or other treatment unit out of service, the system can deliver the maximum daily consumption rate plus the fire flow. Overloads based on operating records may be considered in meeting these requirements. Storage in clear wells at the plant and on the distribution system not only improves the reliability of the plant but also enables the plant to be operated at more uniform rates.

Supply lines, including those in and around pumping stations and treatment works and those which extend into the distribution system as principal arteries, should be so arranged and valved that a break will not prevent the system from delivering the fire flow for the specified number of hours during a period of 5 days with consumption at the maximum daily rate. The locations at which a break would have the most serious effect are usually in pump suction or discharge headers. A simple arrangement of suction and discharge piping for four pumps is shown in Fig. 4-1. A study of this figure will indicate that not more than one pump can be put out of service by a single break.

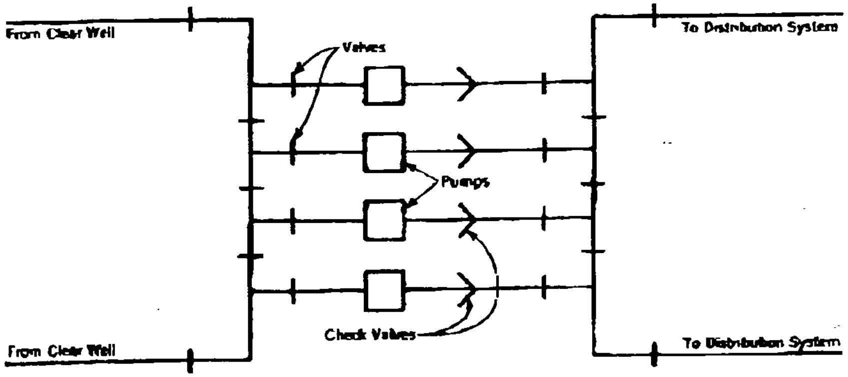

Fig. 4-1. Simple Arrangement of Suction and Discharge Piping for Four Pumps

As far as supply works piping is concerned, NBFU standards require that valves be installed in such a way that the repair of any valve will not interrupt or seriously reduce the supply. In the arrangement shown in Fig. 4-1 the repair of any valve will not put more than two pumps out of service. An arrangement of this type, with a valve between each pump connection, provides a reasonable degree of reliability.

The power used to drive the various units in the supply works must be reliable. It is required that electric power be supplied over at least two lines, preferably underground, with all equipment arranged so that a failure in any line, or the repair or replacement of a transformer, high-tension switch, control unit, or other electric-power device will not prevent the system from delivering the fire flow for the required number of hours during a period of 2 days with consumption at the maximum daily rate.

Bus bars supplying pump motors should be in duplicate or sectionalized so that the above requirement can be met. In order to offset unreliable features in electric-power supply, pumps may be provided with auxiliary internal-combustion engines, or electric generators driven by such engines may be installed; additional storage on the distribution system may also be used.

Where steam is used, it is required that, if 25 per cent of capacity (or at least one boiler) is out of service, the remaining boiler capacity must be adequate to operate the equipment and pumps necessary for the system to deliver the fire flow for the required number of hours during a period of 5 days with consumption at the maximum daily rate. Steam piping, boiler feed lines, fuel piping (gas or oil lines to boilers as well as gas, oil, or gasoline lines to internal-combustion engines), and air lines to wells should be arranged so that a failure in any line or the repair or replacement of a valve, fuel pump, boiler feed pump, injector, or other necessary device will not prevent delivery of fire flow for the required number of hours during a period of 2 days with consumption at maximum daily rate.

In providing reliable power for the various units of the supply works, due consideration should be given to wash water pumps, chemical feed machines, mixing apparatus, power-operated valves, and other appurtenances.

NBFU standards require that pumping stations and other important structures contain no combustible material in their construction. When located within the same structure, sections containing pumps, boilers, high-potential electric power equipment, filters, laboratories, shops, storage, offices, garages, and other important equipment or functions should be separated by fire-resistive partitions or fire walls. Openings in fire walls should be provided with at least one standard fire door; openings in other fire-resistive partitions should be provided with wired-glass, metal frame doors or windows as a minimum. All electrical equipment should be installed in accordance with the National Electrical Code and all hazards, including those introduced by boiler-plant operations, internal combustion engines, storage and handling of fuel and lubricating oils, and heating devices, should be properly safeguarded. Fire extinguishers of suitable type for the occupancy, inside standpipes with small hose, and outside hydrants should be provided; if the building is remote from a fire station, hose should be provided at the hydrants.

Distribution System

The standards for supply mains require that arteries and secondary feeders extend throughout the system. These should be of sufficient size, considering their length and the character of the sections served, to deliver fire flow and consumption demands to all areas. They should be properly spaced (usually about 3,000 ft apart) and looped so that no large areas are dependent upon single mains.

The gridiron of minor distribution mains should consist of mains at least 6 in. in diameter arranged so that the lengths on the long sides of blocks between intersecting mains do not exceed 600 ft. Where longer lengths of 6-in. pipe are necessary, 8-in. or larger intersecting mains are required. Where the layout of the streets and the topography are not well adapted to the above arrangement or where dead ends and poor gridironing are unavoidable, 8-in. should be the minimum main size.

In high-value districts, the minimum size should be 8-in. with intersecting mains in each street; 12-in. or larger mains should be used on the principal streets and for all lines that are not connected to other mains at intervals close enough for proper mutual support.

Valves

To isolate sections of main in the event of a break or in connection with construction or repair work, NBFU standards require that the system be equipped with an adequate number of properly located valves. Supply lines should be valved at least once a mile and interconnections between such lines should have two valves. Arterial mains require valves at not more than ¼-mi intervals; connections to the smaller mains of the distribution system should be arranged and valved so that a break or repair in any of these smaller mains will not necessitate the shutdown of an artery. Exclusive of arterial mains, valves should be installed so that shutoff lengths do not exceed 500 ft in high-value districts and 800 ft in residential districts.

If valves are to be used effectively during an emergency, they must be properly maintained. This requires a program of regular annual inspections for all valves and more frequent inspections of the large and important valves, including those at pumping stations, treatment works, and reservoirs. During these inspections the valves should be operated and any necessary repairs made. Even though the valve mechanism itself may be in good operating condition, regular inspections frequently reveal that the valve boxes have been paved over, the box has shifted so that the valve key cannot be placed on the operating nut, or the box is filled with dirt. As any of these defects could delay operation during an emergency, they have an effect on the fire rating. Inspections sometimes also reveal that valves that are supposed to be open are actually closed, thus preventing the use of the full capacity of the mains in the system. Suitable valve records should be maintained indicating inspections, operations, condition, and repairs.

Hydrants

As all water used for public fire protection must be delivered through hydrants, it is important that a sufficient number be provided on the distribution system. The number of hydrants needed in any area depends upon the fire flow required. Table 4-3 gives the hydrant distribution required for fire flows of 1,000 to 12,000 gpm; the average area served for intermediate fire flows not given in the table may be interpolated. Street intersections are the best locations for hydrants, as hose can usually be stretched in any of four directions from a pumper connected to a hydrant at an intersection. It is good practice, therefore, to place at least one hydrant at each intersection and to add intermediate hydrants, when necessary, to attain standard distribution. In high-value districts requiring large fire flows and numerous hydrants, two or more hydrants are generally used at intersections.

TABLE 4-3

Standard Hydrant Distribution

Fire Flow Required gpm	Average Area per Hydrant sq ft
1,000	120,000
2,000	110,000
3,000	100,000
4,000	90,000
5,000	85,000
6,000	80,000
7,000	70,000
8,000	60,000
9,000	55,000
10,000	48,000
11,000	43,000
12,000	40,000

The standards require that hydrants be able to deliver 600 gpm with a loss of not more than 2.5 psi in the hydrant and a total loss of not more than 5 psi between the street main and outlet. A 4½-in. and two 2½-in. outlets should be provided, but one of the 2½-in. size may be omitted if the fire department normally uses the large outlets. Connections to the main should be at least 6 in. in diameter and gated.

If hydrants are to be properly maintained, a regular inspection program is necessary. Inspections should be made semiannually and after use. During these inspections the hydrant should be operated, checked for leaks and proper drainage, and lubricated as required. Proper records of inspections, condition, and repairs should be maintained.

Separate Zones of Service

Topography makes it necessary to provide more than one pressure zone of distribution in many municipalities. In the application of the schedule, these zones are considered individually from the standpoint of providing adequate and reliable fire protection. The various factors previously discussed, including pumping capacity, storage, power supply, construction of pumping stations, arterial mains, and minor distribution lines, are of importance, especially if these zones involve large portions of the municipality. When supply is available from one zone to another by opening normally closed valves, such emergency supplies may be of considerable value in meeting demands. In arranging service limits, the creation of dead ends by closing valves should be kept to a minimum, especially where the lines are 6 in. or smaller in size.

Private Fire Protection

Private protection is provided from the public distribution system through fire service connections supplying sprinkler, standpipe, water spray, foam, and yard hydrant systems. Standards for these special fire-extinguishing systems have been prepared by the National Fire Protection Association and have been adopted by many insurance organizations, including the NBFU. Certain portions of these standards deal with the water supplies for these systems. As the flows and pressures needed depend upon the type of system and its individual characteristics as well as the type of occupancy it is to protect, the requirements are somewhat general in nature, but the specific requirements for any installation can be obtained from the insurance rating organization in the state or from the insurance carrier.

Fire service connections are required to extend from the public distribution system directly to the fire-extinguishing system with no intermediate connections for domestic use. No connections should be made to any portion of an extinguishing system to provide domestic supply. Although practice differs, most water utilities in the United States do not require meters on fire service connections. Where meters are used, they should comply with AWWA Standard for Cold-Water Meters—Fire Service Type (C703). Detector check valves with a metered bypass are frequently used; these devices accurately measure small flows, but do not measure the large flows used during fires. They are intended for use by those water utilities that do not wish to charge for water used during fires, but do wish to control unauthorized use of water through fire service connections.

In order to supply some fire-extinguishing systems properly, it is necessary to install special fire pumps. It may also be necessary to improve the supply by the installation of ground storage as suction for the pumps or elevated storage on the private system. Standards of the National Fire Protection Association are available for such installations.

Leaders in the water utility field are strongly of the opinion that a special charge should be made by the utility for private fire protection service. Such a service places upon the water utility the responsibility to install pumps, distribution mains, and related facilities sufficient to supply the private fire hydrants and sprinkler heads although they are used only in emergencies.

In all fire-extinguishing systems that receive their supply from a public distribution system, care must be taken to prevent any contamination of the public supply. Cross connections should not be made between nonpotable sources of supply and private fire-extinguishing systems supplied through fire service connections by public water systems. All fire-extinguishing systems should be installed to comply with the requirements of the health authorities having jurisdiction.

When a private fire-extinguishing system is installed, the owner of the premises generally receives a reduction in his fire insurance rates. Such reduction will obviously depend upon the extent to which compliance has been made with the previously mentioned standards and any other special or local requirements. In order to determine if the system is satisfactory, the plans and specifications should be submitted to the insurance rating organization in the state or to the insurance carrier. Through this procedure, counsel on the installation that will make it possible for the property owner to gain maximum benefits possible from the fire service connection can be obtained.

QUESTIONS

1. a. What is the required fire flow and duration for a municipality with a population of 4,000? Of 33,000? Of 65,000?

b. What residual pressure is required for these flows if fire department pumpers are available? If fire department pumpers are not available?

2. A city of 17,000 population has a maximum daily consumption of 3.5 mil gal. If the supply works can deliver to the distribution system at a 5.0-mgd rate, how much storage is needed on the distribution system to meet the requirements for adequate fire protection?

3. A city of 27,000 population has a maximum daily consumption of 5.5 mil gal. If four pumps are provided with capacities of 6, 6, 4, and 4 mgd, how much storage is needed on the distribution system to provide reliable fire protection with respect to pump capacity?

4. a. What is the hydrant distribution required in the principal business district of a city of 40,000 population?

b. If the fire flow required in residential districts is 1,500 gpm, what hydrant distribution is required?

c. Why is it advantageous to locate hydrants at street intersections?

5. a. Name five types of private fire-extinguishing systems that can be supplied through fire service connections.

b. Why is it advantageous to have such systems installed in accordance with the requirements of the state insurance rating organization or the insurance carrier?

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Standard Schedule for Grading Cities and Towns of the United States With Reference to Their Fire Defenses and Physical Conditions. National Board of Fire Underwriters, New York (1957).

Standards of the National Fire Protection Association and National Board of Fire Underwriters for:
- Centrifugal Fire Pumps
- Foam Extinguishing Systems
- Outside Protection (Yard Piping Supplying Water for Fire Extinguishment)
- Sprinkler Systems
- Standpipe and Hose Systems
- Water Spray Systems for Fire Protection
- Water Tanks for Private Fire Protection Service

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* These publications are available to AWWA members upon request from the National Board of Fire Underwriters, 85 John St., New York 38, N.Y.

CHAPTER 5

Civil I on

CIVIL defense participation is still another responsibility of the water utility. Actually, of course, the basic obligations involved are not additional ones, but the circumstances are such as to make them more difficult to fulfill at the very time that it becomes most important to fulfill them. The many new and complex problems associated with defense emergencies, therefore, demand the special attention of all water works operators and related responsible public officials. These problems are certainly the most difficult of all that water utility management must face, largely because many of the technical questions still remain unsolved and because the entire subject is constantly shifting and readjusting to fluctuations in international affairs and developments in the weapons of modern war. It is not properly within the scope of this manual to indoctrinate water utility personnel in the technical aspects of those problems, not only because this would be impossible in the space available, but because the rapidly changing nature of the situation itself precludes it.

During the past few years there has been marked intensification of effort in this field by both the water works profession and the many units of government concerned with water supply. This has been reflected in increased attention to civil defense subjects in the affairs of the AWWA and related organizations, in the greatly expanded civil defense research effort being carried on by governmental groups such as those at the Robert A. Taft Sanitary Engineering Center of the US Public Health Service, and in direct planning activities of the national and state civil defense organizations.

Special provision should be made by the water works profession to keep abreast of technical and other developments that have civil defense implications. Unless special measures to do this are taken it is unlikely that continued adequate attention will be paid to such matters by key water utility personnel who are already overloaded with the work of their daily responsibilities. Therefore, whether or not a community has an active, current civil defense program into which the water utility staff can fit, serious attention should be given, as a minimum, to making one person responsible for keeping in touch with developments. This individual should see that his utility is on mailing lists to receive all information perti-

Water Utility Management

AWWA MANUAL M5

American Water Works Association

6666 West Quincy Avenue, Denver, Colorado 80235

Foreword

In May 1953 the AWWA Committee on Education reported its findings of a survey concerning the quality of "short courses" as provided in various states at that time. A result was that the committee recommended that more emphasis be placed on in-service training for management.

In 1955 the committee published six short course outlines in *Willing Water.* To achieve the greatest benefit from the outlines, the committee prepared a manual that could be used as a text or studied independently by ambitious water works personnel.

In May 1956 the AWWA Board of Directors gave approval for the preparation of the special manual. Approximately 80 members participated in the project, each being carefully selected for his special knowledge.

In March 1979, after about six months of careful research and rewriting, the AWWA Management Division Board, acting as a committee of whole, completed the first revision and update of Manual M5, "Water Utility Management Practices."

For more detailed information on the subjects covered in each chapter, contact AWWA'S technical library staff to obtain current bibliographies on the specific subject.

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Chapter 4

Fire Protection

Public water supply systems generally provide water for fire protection. Although this responsibility is secondary to providing water for potable use, fire protection requirements have a very important influence on the design and operation of most systems. Fire protection furnished by water utilities falls into two broad classifications: (1) public protection, available directly from hydrants supplied by the public distribution system, and (2) private protection, provided through fire service connections to sprinkler, standpipe, or other special extinguishing systems or to private yard distribution systems supplying hydrants.

Municipal fire protection surveys were initiated by the National Board of Fire Underwriters (NBFU) in 1889 to assist cities in their fire protection problems. In 1904 the survey work was stepped up after a series of disastrous conflagrations occurred in several large cities. The results of each survey were reported to the municipal officials and insurance companies that comprised the membership of the NBFU. Although the reports were of value in stating the fire protection needs of the cities, no attempt was made to determine the relative degree of fire protection existing in one city when compared to another.

In 1916 the NBFU published the "Standard Schedule for Grading Cities and Towns of the United States" with reference to fire defenses and physical conditions. Application of this schedule enabled municipalities to be placed in one of ten relative fire protection classes. These classes could be used as a guide for fire insurance underwriting and also as a factor in determining fire insurance rates. This schedule was revised in 1922, 1930, 1942, and 1956, and amendments to the 1956 edition were issued in 1963 and 1964.

Shortly after publication of the last amendment, the NBFU joined two other insurance organizations to form the American Insurance Association (AIA) on Jan. 1, 1965. The municipal fire protection survey and grading work was carried on by AIA until Oct. 1, 1971 when the Municipal Survey Division of AIA was transferred to Insurance Services Office (ISO), a new multi-line insurance rating organization.

Since that time, the local insurance rating bureaus in 44 states have also become a part of ISO. The state offices of ISO continue to survey and grade the smaller communities in their respective states. In the remaining six states the smaller municipalities continue to be handled by independent bureaus as in the past. The larger cities, nationwide, remain the responsibility of municipal survey engineers assigned to the ISO home office (New York) and the regional offices (Chicago and San Francisco).

One objective of ISO is the development of more uniform, overall fire insurance rating practices on a nationwide basis.

Public Fire Protection

The most generally accepted standards for public fire protection are contained in the "Grading Schedule for Municipal Fire Protection" (1974 edition) published by the Insurance Services Office (ISO), 160 Water St., New York, NY 10038. To determine relative class, deficiency points are assigned for each feature of fire protection in which the municipality fails to meet the established standards. The total number of deficiency points assigned establishes the class. The maximum number of points is 5000, and there are ten possible classes, each class covering a range of 500 points; for example, a municipality with 1340 points is Third Class, one with 2760 points is Sixth Class. Four major phases of municipal fire protection are considered in the schedule, and the 5000 points are divided among them as shown in Table 4.1.

The 1950 points assigned to water supply represent 39 percent of the total, indicating the importance of water supply in relation to the overall fire protection of a municipality. There are ten possible classes for water supply, each class covering a range of 170 points; for example, a water supply with 250 points is Second Class and one with 1100 points is Seventh Class.

Fire Flow Requirements

Another important change in the schedule is the method of estimating required fire flow. The formula, based on population. included in the schedule since it was first published has been eliminated. The calculation was used as a guide for estimating the fire flow required in the principal business district. There are two reasons for this. First, although the formula had previously given good results, it was found that as cities become more decentralized, population becomes a less reliable indicator of the fire protection needs of the principal business district. Second, because emphasis on the principal business district was removed, a formula that provides a means of estimating the fire flow required in that district alone was unsatisfactory. This led to the development of the "Guide for Determination of Required Fire Flow" published by ISO, which can be used for estimating fire flow requirements in any portion of a municipality. The guide was introduced at the American Water Works Association (AWWA) Annual Conference in Chicago on Jun. 4, 1972.

TABLE 4.1

Relative Values and Maximum Deficiency Points

Feature	Percent	Points
Water supply	39	1950
Fire department	39	1950
Fire service communications	9	450
Fire safety control	13	650
Total	100	5000

The period of time necessary to deliver the required fire flow is an important factor in water supply design because it often influences the size of the storage facilities needed. In the 1956 schedule a duration of 10 hr was specified for all fire flows of 2500 gpm or more. The duration required decreased progressively to 4 hr for fire flows of less than 1250 gpm with a further reduction from 4 to 2 hr for residential sections. In the new schedule the duration standards have been reduced as shown in Table 4.2 which indicates that 10 hr is now required only for fire flows of 10,000 gpm or greater and that the required duration decreases progressively to 2 hr for 2500 gpm or less.

Pressures

In most municipalities, the fire departments use pumpers to remove water from hydrants and deliver it through hose lines and nozzles to the fire. The purpose of the pumpers is to increase the pressure by a sufficient amount to overcome losses in hose lines and nozzles and to deliver a satisfactory stream on the fire. It is necessary, therefore, for the water distribution system to be able to deliver the required fire flow at a residual pressure sufficient to supply the pumpers properly. In order to have a positive pressure at the pumper suction inlet and at the same time overcome the losses in the hydrant branch, hydrant, and fire department suction hose, 20 psi is normally specified as the minimum residual pressure.

If fire department pumpers are not available or the fire department does not regularly use its pumpers, the water distribution system must be capable of delivering the required fire flow at much higher residual pressures. For large cities, the pressure required is 75 psi. For small municipalities requiring not more than 2500 gpm with more than ten buildings exceeding three stories in height, 60 psi is needed. In sparsely built residential areas or small village business districts with buildings of small area and not higher than two stories, 50 psi is required.

TABLE 4.2

Required Duration for Fire Flow

Required Fire Flow—gpm	Required Duration—h
10,000 and greater	10
9500	9
9000	9
8500	8
8000	8
7500	7
7000	7
6500	6
6000	6
5500	5
5000	5
4500	4
4000	4
3500	3
3000	3
2500 and less	2

The water supply section of the schedule includes fourteen items, each containing standards on a specific subject. Some of these items deal with the adequacy of the system, or the ability to meet the requirements under normal conditions. Other items deal with reliability, or the ability to meet the requirements under certain emergency or unusual conditions.

Adequacy of Supply Works

To be considered adequate under the schedule, a system should be capable of delivering the required fire flow with consumption at the maximum daily rate. The maximum daily consumption rate is the maximum amount of water consumed during any one day expressed as a rate over a 24-hr period.

The supply works, including sources of supply, intakes, suction lines, pumps, boilers, treatment works, and supply lines, should, in connection with the storage on the distribution system, be capable of delivering the maximum daily consumption rate plus the required fire flow. Because no two water systems are exactly alike, the specific methods employed to meet these requirements differ considerably. Overall techniques generally fall into one of three categories.

1. Provide supply works capacity to meet-the total requirements.
2. Provide supply works capacity equal to the maximum daily consumption rate with storage on the distribution system capable of meeting the required fire flow for the specified duration.
3. Provide supply works capacity in excess of the maximum daily consumption rate. Storage on the distribution system should be capable of supplying, for the specified duration, the difference between the total required rate and the capacity of the supply works.

Reliability of Supply Works

To comply with ISO standards, the supply works should be able to meet the requirements not only under normal conditions but also under emergency or unusual conditions. There are various ways in which the required reliability can be obtained, but it usually necessitates duplication of units or lines, or the provision of additional storage.

To evaluate the reliability of the source of supply, consideration is given to such factors as (1) the frequency and duration of droughts, (2) physical condition of dams and intakes, (3) danger from earthquakes, floods, forest fires, ice formations, (4) silting, and (5) clogging or increased salinity of wells. When these or similar factors interrupt or seriously reduce the supply for extended periods, then alternate supplies or special provisions are required to reduce the possibility of or effect of a change in flow.

To evaluate the reliability of pumping capacity, the standard also analyzes the ability of the supply works to deliver the maximum daily consumption rate plus the required fire flow with one and two pumps out of service. The pumps considered out of service are those that would cause the maximum reduction in delivery to the system. Because these pumps are not necessarily those having the highest rated capacities, a careful study of all pump capacities and operating characteristics is necessary.

The previous schedule in which the deficiencies on each lift were determined with one and two pumps out and then added together to obtain the total deficiency has been changed. It should be noted now that although each pumping lift is considered in the deficiency evaluation, a deficiency will only be assigned for the most serious condition with either one or two pumps out of service.

The treatment works are required to have sufficient capacity so that, with one filter or other treatment unit out of service, the system can deliver the maximum daily consumption rate plus the fire flow. Overloads based on operating records may be considered in meeting these requirements. Storage in clear wells at the plant and on the distribution system not only improves the reliability of the plant but also enables the plant to operate at more uniform rates.

Supply lines, including those in and around pumping stations, treatment works, and those which extend into the distribution system as principal arteries, should be arranged and valved so that a break will not prevent the system from delivering the fire flow for the specified number of hours during a period of five days with consumption at the maximum daily rate. The locations at which a break would have the most serious effect are usually in pump suction or discharge headers. A simple arrangement of suction and discharge piping for four pumps is shown in Fig. 4.1. A study of this figure will indicate that not more than one pump can be put out of service by a single break.

As far as supply works piping is concerned, ISO standards require that valves be installed in such a way that the repair of any valve will not interrupt or seriously reduce the supply. In the arrangement shown in Fig. 4.1 the repair of any valve will not put more than two pumps out of service. An arrangement of this type, with a valve between each pump connection, provides a reasonable degree of reliability.

The power used to drive the various units in the supply works must be reliable. It is required that electric power be supplied over at least two lines, preferably underground. Equipment must be arranged so that a failure in any line, or repair or replacement of an electric-power device will not prevent the system from delivering the fire flow for the required number of hours during a period of two days with

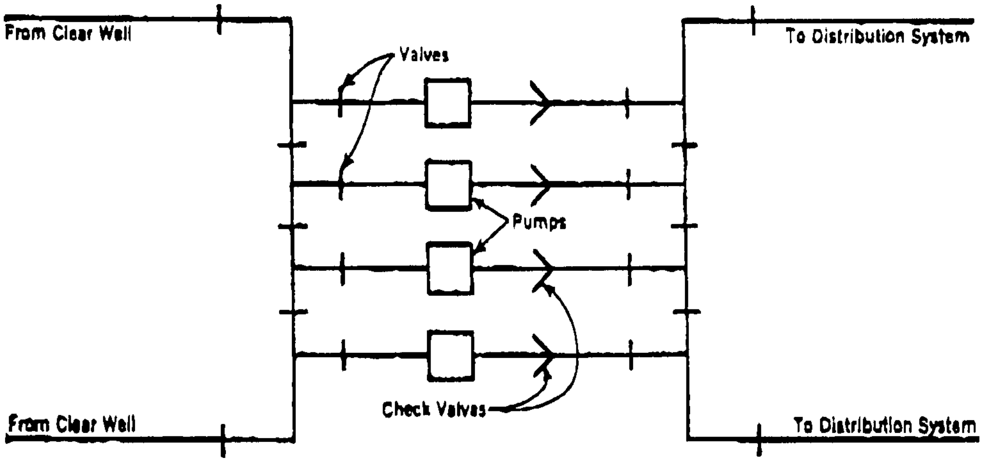

Figure 4.1 Simple Arrangement of Suction and Discharge Piping for Four Pumps

consumption at the maximum daily rate. Bus bars supplying pump motors should be duplicated or divided so that this requirement can be met. In order to offset unreliable features in electric-power supply, pumps may be provided with auxiliary internal combustion engines, or electric generators driven by such engines may be installed. Additional storage on the distribution system may also be used.

When steam is used, it is required that, if 25 percent of capacity (or at least one boiler) is out of service, the remaining boiler capacity must be adequate to operate the equipment and pumps necessary for the system to deliver the fire flow for the required number of hours during a period of five days with consumption at the maximum daily rate.

Steam piping, boiler feed lines, fuel piping (gas or oil lines to boilers as well as gas, oil, or gasoline lines to internal combustion engines), and air lines to wells should be arranged so that a failure in any line or the repair or replacement of a necessary device will not prevent delivery of fire flow for the required number of hours during a period of two days with consumption at maximum daily rate.

In providing reliable power for the various units of the supply works, due consideration should be given to wash water pumps, chemical feed machines, mixing apparatus, power-operated valves, and other appurtenances.

Pumping stations and other important structures should not contain combustible material in their construction. When located within the same structure, sections containing pumps, boilers, high-potential electric power equipment, filters, laboratories, shops, storage, offices, garages, and other important equipment or functions should be separated by fire-resistant partitions or fire walls. Openings in fire wall should be provided with at least one standard fire door; openings in other fire-resistant partitions should be provided with wired-glass, metal frame doors or windows as a minimum.

All electrical equipment should be installed in accordance with the National Electrical Code. All hazards, including those introduced by boiler-plant operations, internal combustion engines, storage and handling of fuel and lubricating oils, and heating devices, should be properly safeguarded. Suitable fire extinguishers, inside standpipes with small hose, and outside hydrants should be provided. If the building is remote from a fire station, hose should be provided at the hydrants.

Distribution System

The standards for supply mains require that arteries and secondary feeders extend throughout the system. These should be of sufficient size, considering their length and the character of the sections served, to deliver fire flow and consumption demands to all areas. They should be properly spaced (usually about 3000 ft apart) and looped so that no large areas are dependent upon single mains.

The gridiron of minor distribution mains should consist of mains at least 6 in. in diameter arranged so that the lengths on the long sides of blocks between intersecting mains do not exceed 600 ft. When longer lengths of 6-in. pipe are necessary, 8-in. or larger intersecting mains are required. If street layout and topography are not well adapted to this arrangement, or dead ends and poor gridding are unavoidable, then 8-in. pipe should be the minimum main size.

In high-value districts, the minimum size should be 8 in. with intersecting mains in each street. Mains 12 in. or larger should be used on the principal streets and for all lines that are not connected to other mains at intervals close enough for proper mutual support.

Valves

To isolate sections of main in the event of a break or in connection with construction or repair work, ISO standards require that the system be equipped with an adequate number of properly located valves. Supply lines should be valved at least once a mile and interconnections between such lines should have two valves. Arterial mains require valves at not more than ¼-mi intervals. Connections to the smaller mains of the distribution system should be arranged and valved so that a break or repair in any of the smaller mains does not necessitate the shutdown of an artery. Exclusive of arterial mains, valves should be installed so that shutoff lengths do not exceed 500 ft in high-value districts and 800 ft in residential districts.

If valves are to be used effectively during an emergency, they must be maintained properly. This requires a program of regular annual inspections for all valves and more frequent inspections of the large and important valves, including those at pumping stations, treatment works, and reservoirs. During the inspections the valves should be operated and any necessary repairs made. Even though the valve mechanism itself may be in good operating condition, regular inspections frequently reveal that (1) the valve box has been paved over, (2) the box has shifted so that the valve key cannot be placed on the operating nut, or (3) the box is filled with dirt.

Since any of these defects could delay operation during an emergency, they have an effect on the fire rating. Inspections sometimes also reveal closed valves where they should be open, thus preventing full capacity use of the mains in the system. Suitable valve records should be maintained indicating inspections, operations, condition, and repairs.

Hydrants

All water used for public fire protection must be delivered through hydrants; therefore, a sufficient number should be provided on the distribution system. The number of hydrants needed in any area depends upon the fire flow required. Table 4.3 gives the hydrant distribution required for fire flows of 1000 to 12,000 gpm; the average area served for intermediate fire flows not given in the table may be interpolated. Street intersections are the best locations for hydrants, since hose can usually be stretched in any of four directions from a pumper connected to a hydrant at an intersection. It is good practice, therefore, to place at least one hydrant at each intersection and to add intermediate hydrants, when necessary, to attain standard distribution. In high-value districts requiring large fire flows and numerous hydrants, two or more hydrants are generally used at an intersection.

The standards require that hydrants be able to deliver 600 gpm with a loss of not more than 2.5 psi in the hydrant and a total loss of not more than 5 psi between the street main and outlet. One 4½-in. and two 2½-in. outlets should be provided, but one 2½-in. outlet may be omitted if the fire department normally uses the large outlets. Connections to the main should be at least 6 in. in diameter and gated.

If hydrants are to be properly maintained, a regular inspection program is necessary. Inspections should be made semiannually and after each use. During these inspections the hydrant should be operated, checked for leaks and proper drainage, and lubricated as required. Proper records of inspections, conditions, and repairs should be maintained.

Separated Zones of Service

Topography makes it necessary to provide more than one pressure zone of distribution in many municipalities. In the application of the schedule, these zones are considered individually from the standpoint of providing adequate and reliable fire protection. The various factors previously discussed, including pumping capacity, storage, power supply, construction of pumping stations, arterial mains, and minor distribution lines are of importance, especially if these zones involve large portions of the municipality. When supply is available from one zone to another by opening normally closed valves, such emergency supplies may be of considerable value in meeting demands. In arranging service limits, the creation of dead ends by closing valves should be kept to a minimum, especially where the lines are 6 in. or smaller in size.

Private Fire Protection

Private protection is provided from the public distribution system through fire service connections supplying sprinkler, standpipe, water spray, foam, and yard hydrant systems. Standards for these special fire-extinguishing systems have been prepared by the National Fire Protection Association and have been adopted by many insurance organizations, including the ISO. Certain portions of these standards deal with the water supplies for these systems. The flows and pressures

TABLE 4.3

Standard Hydrant Distribution

Fire Flow Required—*gpm*	Average Area per Hydrant—*sq ft*
1000 or less	160,000
1500	150,000
2000	140,000
2500	130,000
3000	120,000
3500	110,000
4000	100,000
4500	95,000
5000	90,000
5500	85,000
6000	80,000
6500	75,000
7000	70,000
7500	65,000
8000	60,000
8500	57,000
9000	55,000
10,000	50,000
11,000	45,000
12,000	40,000

needed depend upon the type of system and its individual characteristics as well as the type of occupancy it is to protect. Requirements are somewhat general in nature, but the specific requirements for any installation can be obtained from the insurance rating organization in the state or from the insurance carrier.

Fire service connections are required to extend from the public distribution system directly to the fire-extinguishing system with no intermediate connections for domestic use. No connections should be made to any portion of an extinguishing system to provide domestic supply. Although practice differs, many water utilities in the US require meters on fire service connections. When meters are used, they should comply with C703, "AWWA Standard for Cold-Water Meters—Fire Service Type." Detector check valves with a metered bypass are frequently used; these devices accurately measure small flows, but do not measure the large flows used during fires. They are intended for use by those water utilities that do not wish to charge for water used during fires, but do wish to control unauthorized use of water through fire service connections.

In order to supply some fire-extinguishing systems properly, it is necessary to install special fire pumps. It may also be necessary to improve the supply by the installation of ground storage as suction for the pumps or elevated storage on the private system. Standards of the National Fire Protection Association are available for such installations.

Leaders in the water utility field feel strongly that a special charge should be made by the utility for private fire protection services. Such a service places the responsibility on the water utility to install pumps, distribution mains, and related facilities sufficient to supply the private fire hydrants and sprinkler heads although they are used only in emergencies.

In all fire-extinguishing systems that receive their supply from a public distribution system, care must be taken to prevent any contamination of the public supply. Cross connections should not be made between non-potable sources of supply and private fire-extinguishing systems supplied through fire service connections by public water systems. All fire-extinguishing systems should be installed to comply with the requirement of the health authorities having jurisdiction.

When a private fire-extinguishing system is installed, the owner of the premises generally receives a reduction in his fire insurance rates. Such reduction will obviously depend upon the extent to which compliance has been made with the previously mentioned standards and any other special or local requirements. In order to determine if the system is satisfactory, the plans and specifications should be submitted to the insurance rating organization in the state or to the insurance carrier. Through this procedure, counsel can be obtained on the installation making it possible for the property owner to gain the maximum benefits possible from the fire service connection.