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.

WITNESS: Direct Testimony of Richard P. Redemann, P.E., Appearing on Behalf of the Staff of the Florida Public Service Commission.

DATE FILED: August 21, 2007

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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 1993. 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 was promoted to a Professional Engineer III in 2005.

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

A. Yes, I am currently licensed as 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 Florida Public Service 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. 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 overearings), 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 used and usefulness of the Aqua Utilities Florida, Inc. water and wastewater systems.

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

A. I reviewed the utility's minimum filing requirements (MFRs) and participated in staff meetings regarding the utility's filing in this case (Docket No. 060368-WS). I conducted an inspection of some of the Lake County systems and I have previously visited some of the other water and wastewater systems when they were owned by prior owners. I also 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, and some of the consumptive use permit (CUP) and water conservation rules for three of the Water

Management Districts (WMDs).

Q. Have you prepared a summary of your used and useful findings in this case?

A. Yes. EX__ RPR-2 includes a summary of my used and useful findings.

Q. Can you describe the basis for your recommended methodology for determining the used and usefulness of water and wastewater systems?

A. Yes. Utility systems should be designed prudently, with economies of scale in mind; however, existing customers should not be required to pay for future growth in excess of the statutory requirement (Section 367.081(2)(a)2, Florida Statutes (F.S.)). A used and useful adjustment is made to reduce rate base and expenses if a portion of those costs were incurred in anticipation of future customers. Rule 25-30.432, Florida Administrative Code, contains the method for determining the used and usefulness of wastewater treatment plants. Staff's proposed method for determining the used and usefulness of water treatment plants is currently under consideration in Docket No. 070183-WS, Proposed adoption of Rule 25-30.4325, F.A.C., Water Treatment Plant Used and Useful Calculations. (EX__ RPR-3). The Office of Public Counsel has petitioned for a hearing on the proposed rule.

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 has 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 current policy on used and useful calculations for water treatment systems. The proposed rule is designed to codify those policies.

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 fire flow, if provided, plus a growth allowance which is then divided by the firm reliable capacity of the wells.

Q. How should the peak demand be determined?

A. The peak 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. As an alternative, the next single maximum day without an unusual occurrence could be used. 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 provides for fire flow. A line break could exaggerate the maximum day. The peak day(s) are determined from the utility's monthly operating reports.

Q. Are there other considerations regarding the peak day for system with little or no storage?

A. Yes. If a system does not have a storage tank, the utility 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 for a system without storage is estimated by dividing the peak day 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 of 2.

Q. What is the basis for multiplying the peak day flows by 2 to estimate peak hour flows for water systems?

A. The peaking factor of 2 is based on the American Water Works Association (AWWA) Manual of Water Supply Practices, Distribution Network Analysis for Water Utilities, M32. According to the manual, the ratio of peak hour demand to maximum day demand has been observed to vary from 1.3-2.0:1.0. In addition, the Water Distribution Systems Handbook confirms these observations. (EX__ RPR-4)

Q. Has the Commission accepted using a single maximum day without any known anomalies and doubling the peak day to obtain the peak hour?

A. Yes. 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. 2d 1046 (Fla. 1st DCA 1998). There are many other cases including Order No. PSC-05-0442-PAA-WU, issued on April 25, 2005 in Docket No. 040254-WU (Keen), by Order No. PSC-

06-0378-PAA-WU, issued on May 8, 2006 in Docket No. 050449-WU (Dixie Groves), and Order No. PSC-07-0425-PAA-WU, issued on May 15, 2007 in Docket No. 060599-WU.

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

A. For systems that do not have adequate FDEP 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 AWWA M32 manual regarding average to peak hour flows.

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 Docket No. 020406-WU, by Order No. PSC-03-0008-PAA-WU, issued January 2, 2003.

Q. Is there an Aqua water treatment system where the 1.1 gpm should be used to estimate the needed water plant capacity?

A. Yes. The Imperial Mobile Terrace in Lake County. (EX__ RPR, p 3 of 7).

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 prudently 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 should maintain a record 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.

Q. Should an adjustment be made for excessive unaccounted for water?

A. Yes. 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 day 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.

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

A. The 10% allowance has been a long-standing Commission practice. In addition, I reviewed several American Water Works Association (AWWA) publications and some of the water management district rules related to consumptive use permits and water conservation that appears to support 10% as a reasonable amount of unaccounted for water. (EX__ RPR-5) Page 31 of the AWWA M32 Manual on Distribution Network Analysis for Water Utilities, published in 1989, states, "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." (EX__ RPR-6) The St. Johns River Water Management District Rule 12.2.5 on Consumptive Use Permits (CUPs) and water conservation requires the utility 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-7) The Southwest Florida Water Management District 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-8) The Northwest Florida Water Management District considers 10% a reasonable amount of unaccounted for water. The district does not have a specific rule, but relies on "reasonable and beneficial" test prescribed by Statute.

Q. Should an adjustment be made for unaccounted for water for these systems?

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% and 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. It is important to reduce the amount of unaccounted for water because water is a limited resource that should be protected.

Q. Should an adjustment be made for excessive unaccounted for water for any of the Aqua systems?

A. Yes. An adjustment for excessive unaccounted for water should be made for any of the Aqua systems with unaccounted for water in excess of 10%.

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.

Q. Should fire flow be included in the used and useful calculation for any of the Aqua systems?

A. Yes. However, there is conflicting information. There are discrepancies with Schedules F-3 and the maps. For example, for Imperial Mobile Terrace the F-3 Schedule indicates the required fire flow is 500 gpm, but the latest revised map dated 4/20/2007 shows no fire hydrants. The response to Staff Interrogatory 35 dated August 1, 2007, does not indicate that Imperial Mobile Terrace has any fire hydrants, and refers to the revised system maps. Based on the maps and a field inspection, the Valencia Terrace and Arredondo Farms systems appear to have fire hydrants, but those systems are not listed on the utility's response to Staff Interrogatory 35. However, Valencia Terrace is included on the utility's response to Production Of Document (POD) 11 showing fire hydrants. (EX__ RPR-9)

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 5 years after the end of the test year not to exceed 5% per year.

Q. Should a growth allowance be included for the Aqua systems?

A. Yes. However, I am unable to determine the appropriate amount of growth. According to staff witness Mr. Paul Stallcup, he cannot verify the customer bills or the growth projections at this time.

Q. Is a used and useful calculation made for water systems that do not have treatment facilities because they purchase water?

A. No. A used and useful calculation is not needed if there are no water treatment facilities.

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.

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, and in Docket No. 950495-WS, by Order No. PSC-96-1320-FOF-WS, issued October 30, 1996.

Q. How should firm reliable capacity be determined for those water systems that have more than one well and are not built out?

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" 1997 Edition, published by Heath Education Services. Paragraph 3.2.1.1 Source Capacity, states that, "The 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, "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." (EX__ RPR-10)

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; in Order No. PSC-96-1320-FOF-WS, issued October 30, 1996, in Docket No. 950495-WS; in Order No. PSC-93-0423-FOF-WS, issued March 22, 1993, in Docket No. 920199-WS; and in Order No. PSC-02-1449-PAA-WS, issued October 21, 2002, in Docket No. 011451-WS.

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.

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; Order No. PSC-02-0656-PAA-WU, issued May 14, 2002, in Docket No. 992015-WU; Order No. PSC-01-1574-PAA-WS, issued July 30, 2001, in Docket No.

000584-WS; Order No. PSC-00-1774-PAA-WU, issued September 27, 2000, in Docket No. 991627-WU; Order No. PSC-01-2385-PAA-WU, issued December 10, 2001 in Docket No. 010403-WU; and Order No. PSC-96-1320-FOF-WS, issued October 30, 1996, in Docket No. 950495-WS.

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 shall be considered 100 percent used and useful.

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.

Q. Have you compared this practice with the used and useful finding with respect to storage in Order No. PSC-96-1320-FOF-WS, issued on September 30, 1996, in Docket No. 950495-WS?

A. Yes. For the 39 water systems with storage in that case the rule correlates very well. (EX__ RPR-11)

Q. Are there standards for sizing of storage tanks?

A. The Recommended Standards For Water Works, AWWA Water Distribution Systems Handbook and the Army Corps of Engineers Design of Small Water Systems Manual each recommend general guidelines for storage capacity; however, these are general guidelines. Including fire-flow demand in maximum-day demand is good engineering practice and is consistent with Section 1.1.5.b in Recommended Standards for Water Works. The AWWA Water Distribution Systems Handbook states that each state and province has its own standards for sizing tanks and recommends 25 percent of the total maximum day, plus fire storage plus emergency storage. Also referenced is the Texas State Standards which requires 200 gallons per connection. The Department of the Army's Engineering and Design of Small Water Systems Manual states "distribution storage facilities are to be used to meet peak demands (including fire flows), allow continued service when supply is interrupted, equalize system pressures, eliminate continuous pumping, and facilitate the use of economical pipe sizes. Salvo (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." (EX___RPR-12). 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. 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.

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. Consistent with my previous testimony regarding firm reliable capacity, removing the largest well is consistent with the "Recommended Standards for Water Works".

Q. Have you reviewed Aqua's used and useful calculations for its wastewater plants?

A. Yes. I have.

Q. Did the utility follow Rule 25-30.432, F.A.C., in calculating the used and usefulness of the utility's wastewater treatment plants?

A. No. The utility did not perform the used and useful calculations in accordance with Rule 25-30.432, F.A.C. The rule provides that the flow data used to calculate used and useful should be the same period or basis as the permitted capacity of the treatment facility. In addition, the rule provides that the Commission may consider other factors, including an allowance for growth pursuant to Section 367.081(2)(a)2, F.S., infiltration and inflow, whether the area served by the plant is built out, and whether flows have decreased due to conservation or a reduction in the number of customers. All of the utility's wastewater treatment plants are permitted on either an annual average daily flow, 12-month average daily flow, or three-month average daily flow basis. However, in the F-6 Schedules, the utility used a peak month to calculate the used and usefulness for each of the wastewater treatment plants which is inconsistent with the permitted capacity basis for each wastewater treatment plant. The utility's used and useful calculations resulted in higher used and useful findings than if the permitted basis had been used. No explanation was given as to why the rule was not used. (EX__ RPR-2, p 7)

Q. Does the utility have infiltration/inflow problems in any of the wastewater collection systems?

A. Yes. The utility has infiltration/inflow problems in some of its wastewater systems.

Q. What causes infiltration/inflow problems in a wastewater collection systems?

A. Infiltration results from groundwater entering a wastewater collection system through broken or defective pipe and joints. Inflow results from water entering a wastewater collection system through manholes and lift stations.

Q. How do you determine that infiltration/inflow could be problem?

A. The total amount of water sold is compared to the amount of wastewater treated. I would expect the wastewater treated for the year to be less than the amount of water sold for the year, because of irrigation and other uses. The amount of infiltration/inflow can make this number higher.

Q. What do you believe is the appropriate method for estimating the amount of water returned as wastewater?

A. Typically, the Commission assumes 80% of residential water is returned as wastewater and 96% of general service water is returned as wastewater.

Q. What do you believe is the appropriate method for estimating the amount of infiltration/inflow?

A. Based on the Water Pollution Control Federation Manual of Practice No. 9, Design and Construction, the allowance for infiltration should be 500 gpd/inch-diameter/mile for all pipes. In addition, I recommend that an additional allowance of 10% of the water sold to be added for inflow.

Q. What adjustments would be made if infiltration/inflow is excessive?

A. The demand on the system should be reduced by the amount of excessive infiltration/inflow in calculating the used and usefulness of the wastewater treatment plant. In addition, an adjustment should be made to purchased sewage expense, if the utility purchases wastewater service and an adjustment to purchased power and chemicals for those systems with a wastewater treatment plant.

Q. Did the utility address infiltration/inflow in its MFRs?

A. No. The utility did not address infiltration/inflow in its MFRs; however, in response to Staff Interrogatory No. 46, 47, and 48, the utility indicated that 15% of wastewater treated was a reasonable allowance for infiltration/inflow for the Leisure Lakes system. (EX__ RPR-13)

Q. Do you agree with the utility's analysis?

A. No. If an infiltration/inflow problem exists, then an allowance based on a percentage of wastewater treated, which includes the infiltration/inflow, would not give a clear indication of the severity of the problem.

Q. From the formula detailed above, which systems have excess infiltration/inflow?

A. Beachers Point (53%), Florida Central Commerce Park (9%), Holiday Haven (5%), Jungle Den (48%), Park Manor (30%), Rosalie (58%), Summit Chase (20%), and Venetian Village (30%). (EX__ RPR-2)

Q. Should a growth factor be included in calculating wastewater used and useful?

A. Yes, but as previously discussed, I am unable to calculate growth at this time.

Q. Do you agree with the utility's used and useful calculations for its water distribution and wastewater collection systems?

A. No. As I testified earlier, the number of customers and growth projections could not be calculated.

Q. Can you explain the proper method of calculating the residential water distribution and wastewater collection system used and useful?

A. Yes. The numerator is the number of residential customers plus an allowance for growth divided by the denominator that is the number of residential lots.

Q. Can you explain the proper method of calculating the residential and commercial distribution and wastewater collection system used and useful?

A. Yes. The only difference is the number of commercial ERC needs to be considered. First, you calculate the Equivalent Residential Connection (ERC) gallonage per ERC then divide the flow per ERC from the total flow of the commercial customers. The numerator is the number of residential and commercial ERCs plus an allowance for growth divided by the denominator that is the number of residential and commercial lots in ERCs. If there are no empty commercial lots, the equation would not be affected. However, if there are many empty commercial lots, the commercial ERCs need to be estimated.

Q. Is there any thing else that needs to be considered when calculating the residential distribution and wastewater collection system used and useful?

A. Yes. Lots that have wells or that have septic tanks need to be considered. For the distribution systems and collection systems, the homes that are on multiple lots also need to be considered. It is also helpful to indicate any common areas such as a stormwater pond, park or other area that cannot be used. The age of the system, and the growth in the systems on the F schedules should also be taken into account when calculating the distribution and wastewater collection system used and useful. In addition, if the system was contributed by a developer, the used and useful would be 100%.

Q. What if the systems are builtout?

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 the system was designed prudently.

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; in Order No. PSC-99-0243-FOF-WU, issued February 9, 1999, in Docket No. 980726-WU; in Order No. PSC-00-0807-PAA-WU, issued April 25, 2000, in Docket No. 991290-WU; and in Order No. PSC-96-1320-FOF-WS, issued, October

30, 1996, in Docket No. 950495-WS.

Q. Are any of the water and wastewater areas served by the utility built out?

A. Yes. However, there is conflicting information as to whether some of the systems are built out. According to the MFR F-5 Schedules, 21 of the water treatment plants including purchased water systems were found by the utility to be 100% used and useful based on the system being fully developed, or built out. According to OPC's Interrogatory 10, 35 of these same water systems were built out. The Morningview system which is built out on both of these schedules shows 33 water customers, and shows no growth. The maps show conflicting information. The latest Morningview water map shows 40 water customers and 42 lots. There is no reconciliation of the 7 additional water customers. According to the MFR F-6 Schedules in the MFRs, 20 of the 21 wastewater treatment plants were found by the utility to be 100% used and useful based on the system being fully developed, including the Chuluota system which is experiencing such significant growth that the capacity of the wastewater plant was recently expanded from 100,000 gpd to 400,000 gpd. OPC's Interrogatory 10 shows only 6 of these same wastewater systems to be built out. (EX___ RPR-14)

Q. Do you agree with the conclusions in the testimony of Mr. John Guastella on used and useful for the water systems?

A. For the systems with only one well, yes. For the systems with multiple wells that are not built out, no. The used and useful amounts should be calculated as discussed earlier.

Q. Have you reviewed the testimony of Mr. Andrew T. Woodcock, P.E., M.B.A. on behalf of Public Counsel?

A. Yes. I will be providing comments on Mr. Woodcock's testimony related to firm reliable capacity, fire flow, storage, used and useful, and a system being built out.

Q. Do you agree with Mr. Woodcock's position concluding that a single well or high service pump has firm capacity?

A. No, I do not. This is not consistent with good engineering standards detailed in the "Recommended Standards for Water Works", 3.2.1.1 Source Capacity, which states that, "The total developed groundwater source capacity shall equal or exceed the design maximum day demand ... with the largest well out of service." and 6.3 Pumps, which states that, "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." With only one unit, there would be no firm reliable capacity. If a single component is out of service for maintenance or emergency repair, there would be no water. The purpose of a water system is to provide safe and reliable service.

Q. Do you agree with Mr. Woodcock's position on the allowance for fire flow?

A. No. The Commission has consistently recognized the need for fire flow protection and considers it in the determination of used and useful. While hopefully fires do not occur frequently, I believe that 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 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. Do you agree with Mr. Woodcock's position on evaluating used and useful for high service pumps and storage tanks separately?

A. No. Used and useful should only be evaluated on a component basis when some portion of the system is oversized relative to the size of other components. Almost all of these systems are small and the components are not oversized. For storage, Mr. Woodcock used a factor of .25, which is the absolute lowest possible number. In addition, good engineering practice as detailed in the AWWA Water Distribution Systems Handbook recommends adding fire storage plus emergency storage. Staff does not believe that storage capacity for any of the systems appear to be oversized. The utility used 2 times the maximum day and also concluded the storage systems were not oversized, therefore there is no need to evaluate used and useful for the storage tanks and high service pumps separately in this case. Florida has frequent hurricanes, lightning, 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. The Commission has recognized that one full day of storage may be needed for a system. See Order No. PSC-97-0847-FOF-WS, issued July 15, 1997, in Docket No. 960329-WS.

Q. Do you agree with Mr. Woodcock's position regarding infiltration/inflow for the Palm Port, Silver Lake Oaks, The Woods, and Village Water wastewater collection systems?

A. No. These systems do not appear to have excessive infiltration and inflow. Mr. Woodcock states he has not seen the detailed data concerning the collection lines and may update his testimony.

Q. Do you agree with Mr. Woodcock's statement that if the water distribution and wastewater collection systems were 100% used and useful, the water and wastewater plants should not necessarily be considered 100% used and useful?

A. No. Many of these water and wastewater systems were designed to service only a specific subdivision and are minimally sized. Based on the best engineering design criteria at that time (1950s-1980s), the subdivisions water distribution and wastewater collection systems along with the water treatment plant and wastewater treatment plants were designed as one complete unit. Consistent with my previous testimony, if the utility's service territory is builtout, there is no apparent potential for expansion in the surrounding area, and the plant itself is considered to be at the minimum size necessary to supply the existing needs of the customers, the treatment plant is fully utilized and 100% used and useful.

Q. Do you have anything further to add?

A. No. I do not.

RPR 1

RESUME

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.

<u>Wisconsin Department of Transportation, District 4, Wisconsin Rapids, WI</u>

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.

<u>Twin City Testing and Engineering Laboratory, Appleton and LaCrosse, WI</u>

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.

RPR 2

SUMMARY OF USED AND USEFUL

Exhibit No. ____RPR-2
Page 1 of 7

Docket No. 060368-WS
Aqua Water Systems with Purchased Water

	EUW
Beecher's Point	0.60%
Holiday Haven	
Jungle Den	
Kingswood	
Lake Osborne	
Oakwood	18.00%
Palm Terrace	
Village Water	4.30%

EUW - Excessive Unaccounted for Water

Docket No. 060368-WS
Aqua Water Systems with 1 Well

	EUW	FF GPM	Utility Comments from F-5 1st Revision + 2nd Revision	Utility U/U%	Prior U/U%	Recommended U/U%
48 Estates	12.10%		1 well = 100%	100%	100%	100%
Fern Terrace			1 well = 100%, Builtout	100%	100%	100%
Grand Terrace			1 well = 100%, Builtout	100%	100%	100%
Haines Creek			1 well = 100%, Builtout	100%	100%	100%
Harmony Homes			1 well = 100%, Builtout	100%	100%	100%
Morningview		500	1 well = 100%, Builtout	100%	100%	100%
Palms Mobile	49.80%		1 well = 100%	100%	100%	100%
Palm Port			1 well = 100%	100%	100%	100%
Quail Ridge		500	1 well = 100%, Builtout	100%	100%	100%
Ravenswood			1 well = 100%, Builtout	100%	100%	100%
River Grove			1 well = 100%, Builtout	100%	100%	100%
Rosalie Oaks			1 well = 100%, Builtout	100%	NA	100%
Silver Lake Oaks			1 well=100%, 2 wells=100%	100%	100%	100%
Stone Mountain	20.80%		1 well = 100%	100%	100%	100%
The Woods			1 well = 100%	100%	75%	100%
Wootens	10.50%		1 well = 100%	100%	100%	100%
Zephyr Shores			1 well = 100%	100%	100%	100%

EUW - Excessive Unaccounted for Water
FF - Fire Flow
GPM - Gallons Per Minute

Exhibit No. ____ RPR-2
Page 3 of 7

Docket No. 060368-WS
Aqua Water Systems with 2 or more wells and no storage (Gallons/Minute)

	FRC GPM	Peak Day GPM	EUW GPM	FF GPM	Growth	Utility Comments from F-5 1st Revision + 2nd Revision	Utility U/U%	Prior U/U%	Recommended U/U%
Arredondo	370	264				2 wells =100%	100%	100%	
Carlton Village	200	60	1.45			2 wells =100%	100%	100%	
E Lk Harris/Friendly Ctr	100	30				1 well =100%, 1 well =100%	100%	100%	
Gibsonia Estates	125	77			Builtout	2 wells =100%, Builtout	100%	NA	100%
Hobby Hills	150	54	2.47			2 wells =100%	100%	46%	
Imperial Mobile (1)	100	270			Builtout	2 wells =100%	100%	100%	100%
Kings Cove	225	133		500		2 wells =100%, Builtout	100%	100%	
Lake Gibson	375	257	8.06			2 wells =100%, Builtout	100%	NA	
Ocala Oaks (2)						Fully developed = 100%	100%	100%	
Orange Hill/Sugar	56	63			Builtout	2 wells =100%, Builtout	100%	NA	100%
Picciola Island	100	45	0.07			2 wells =100%	100%	100%	
Piney Wds/Spr Lk	140	56				1 well =100%	100%	100%	
Pomona Park	70	40				1 well =100%	100%	100%	
Skycrest	175	31		500	Builtout	2 wells =100%	100%	100%	100%
Summit Chase	630	50		500	Builtout	Fully developed = 100%	100%	NA	100%
Tangerine	250	132	10.01	500		2 wells =100%	100%	100%	
Valencia Terrace	250	88		500	Builtout	2 wells =100%	100%	100%	100%
Venetian Village	120	45	0.42			2 wells =100%	100%	100%	

FRC - Firm Reliable Capacity
EUW - Excessive Unaccounted for Water
FF - Fire Flow
GPM - Gallons Per Minute

(1) MORs unreliable, 1.1 GPM x 245 ERCs = 270 GPM
(2) Ocala Oaks includes 5 systems with one well and 7 systems with 2 or more wells. Unable to determine peak day or FRC.

Docket No. 060368-WS
Aqua Water Systems with 2 or more wells and storage (Gallons/Day)

	FRC GPD	Peak Day GPD	EUW GPD	FF GPD	Growth	Utility Comment	Utility U/U%	Prior U/U%	Recommended U/U%
Chuluota	900,000	651,700		60,000		2 wells =100%	100%	45%	
Hermits Cv/St Johns Hld	108,000	54,000				2 wells =100%	100%	100%	
Interlachen Lk/Park Manor	129,600	122,200	7,669			2 wells =100%	100%	67%	
Jasmine Lakes	561,000	610,000				Fully developed as planned	100%	100%	100%
Lk Josephine/Sebr Lk(1)	792,000	526,000				2 wells =100%, 2 wells = 100%	100%	88%	
Leisure Lakes	36,000	107,000	2,587			2 wells =100%	100%	100%	
SilverLk/WesternSh	1,386,000	2,200,000	6,237	60,000		1 well =100%, Builtout	100%	69%	
Sunny Hills	511,200	1,212,000	21,822	60,000		2 wells =100%	100%	100%	
Tomoka/Twin River	198,000	121,500				2 wells =100%	100%		
Welaka/Saratoga	54,720	45,900	119			1 well =100%	100%	58%	

(1) Based on Mark Charneski (FDEP) Sebring Lakes (2@400 gpm), Lake Josephine (250 gpm, 400gpm)

FRC - Firm Reliable Capacity
EUW - Excessive Unaccounted for Water
FF - Fire Flow
GPD - Gallons Per Day

Docket No. 060368-WS
Aqua Water Systems Storage Facilities (Gallons/Day)

	Capacity GPD	Peak Day GPD	EUW GPD	FF GPD	Growth	Utility Comment	Utility U/U%	Prior U/U%	Recommended U/U%
Chuluota	423,000	651,700		60,000			100%	66%	100%
Hermits Cv/St Johns Hld	22,500	54,000					100%	94%	100%
Interlachen Lk/Park Mano	27,000	122,000	7,669				100%	100%	100%
Jasmine Lakes	450,000	610,000					100%	100%	100%
Lk Josephine/Sebr Lk	28,800	526,000					100%	88%	100%
Leisure Lakes	9,000	107,000	2,587				100%	100%	100%
Palm Port	18,000	34,900					100%	100%	100%
River Grove	16,200	51,400					100%	100%	100%
SilverLk/WesternSh	58,500	2,200,000	6,237	60,000			100%	100%	100%
Silver Lake Oaks	11,700	16,000					100%	54%	100%
Sunny Hills	63,000	87,500	21,822	60,000			100%	100%	100%
Tomoka/Twin River	28,500	121,000						100%	100%
Welaka/Saratoga	40,000	45,900	119				100%	53%	100%
Wootens	1,000	8,960					100%	NA	100%

EUW - Excessive Unaccounted for Water
FF - Fire Flow
GPD - Gallons Per Day

Docket No. 060368-WS
Aqua Purchased Wastewater

	I/I
Beecher's Point	
Lake Gibson	
Zephyr Shores	

I/I - Infiltration and Inflow

Exhibit No. ____ RPR-2
Page 7 of 7

Docket No. 060368-WS
Aqua Wastewater Treatment Facilities

	Capacity	Demand	I/I	Growth	Utility Comments F-6 Revision 1	Utility U/U%	Prior U/U%	Recommended U/U%
Arredondo (1)	60,000	31,773			fully developed	100%	64.00%	
Chuluota (1)	400,000	95,233			fully developed	100%	43.50%	
Fl Central Comm Pk (1)	95,000	56,186			fully developed	100%	83.40%	
Holiday Haven (1)	25,000	20,600			fully developed	100%	52.13%	
Jasmine Lakes (2)	370,000	229,130			fully developed	100%	100.00%	
Jungle Den (1)	21,000	17,214			fully developed	100%	39.00%	
Kings Cove (1)	55,000	41,288			fully developed	100%	79.00%	
Leisure Lakes (1)	50,000	22,562			fully developed	100%	38.00%	
Morningview (1)	20,000	5,090			fully developed	100%	43.55%	
Palm Port (1)	30,000	15,290			fully developed	100%	57.68%	
Palm Terrace (2)	130,000	113,737		Builtout	fully developed	100%	100.00%	100.00%
Park Manor (1)	15,000	7,559			fully developed	100%	100.00%	
Rosalie Oaks (3)	15,000	30,000			fully developed	100%	NA	
Silver Lake Oaks (1)	12,000	5,219			fully developed	100%	60.75%	
South Seas (1)	264,000	45,967			fully developed	100%	100.00%	
Summit Chase (1)	54,000	29,348		Builtout	fully developed	100%	NA	100.00%
Sunny Hills (1)	50,000	18,195			fully developed	100%	60.00%	
The Woods (2)	15,000	9,707			fully developed	100%	87.00%	
Valencia Terrace (1)	80,000	37,753		Builtout	fully developed	100%	79.24%	100.00%
Venetian Village (1)	36,000	35,581			fully developed	100%	100.00%	
Village Water (1)	75,000	53,825				80%	NA	

(1) Permit based on annual average daily flow
(2) Permit based on 3 months average daily flow
(3) Permit based on 12 month average daily flow

I/I - Infiltration and Inflow

RPR 3

PROPOSED RULE 25-30.4325, F.A.C.

BEFORE THE PUBLIC SERVICE COMMISSION

In re: Proposed adoption of Rule 25-30.4325, F.A.C., Water Treatment Plant Used and Useful Calculations.	DOCKET NO. 070183-WS ORDER NO. PSC-07-0469-NOR-WS ISSUED: May 31, 2007

The following Commissioners participated in the disposition of this matter:

LISA POLAK EDGAR, Chairman
MATTHEW M. CARTER II
KATRINA J. McMURRIAN
NANCY ARGENZIANO
NATHAN A. SKOP

NOTICE OF RULEMAKING

BY THE COMMISSION:

NOTICE is hereby given that the Florida Public Service Commission, pursuant to Section 120.54, Florida Statutes, has initiated rulemaking to adopt new Rule 25-30.4325, Florida Administrative Code, relating to water treatment plant used and useful calculations.

The attached Notice of Rulemaking will appear in the June 8, 2007 edition of the Florida Administrative Weekly.

If timely requested, a hearing will be held at a time and place to be announced in a future notice.

Written requests for hearing and written comments or suggestions on the rule must be received by the Office of Commission Clerk, Florida Public Service Commission, 2540 Shumard Oak Blvd., Tallahassee, FL 32399-0862, no later than June 29, 2007.

By ORDER of the Florida Public Service Commission this 31st day of May, 2007.

/s/ Ann Cole
ANN COLE
Commission Clerk

This is an electronic transmission. A copy of the original signature is available from the Commission's website, www.floridapsc.com, or by faxing a request to the Office of Commission Clerk at 1-850-413-7118.

(S E A L)

MA

Notice of Proposed Rule

PUBLIC SERVICE COMMISSION
RULE NO: RULE TITLE
25-30.4325: Water Treatment Plant Used and Useful Calculation
PURPOSE AND EFFECT: Docket No. 070183-WS - The purpose of this rule is to provide uniform standards for the calculation of the used and useful calculation for water treatment systems and storage facilities.
SUMMARY: The rule will formalize the Commission's practice in calculating used and useful percentages for water treatment plants and storage facilities in rate proceedings.
SUMMARY OF STATEMENT OF ESTIMATED REGULATORY COSTS: The SERC concluded that there should be no negative impact on other state and local government entities and no impact on small businesses. It also found that the rule will benefit water utilities and customers.
Any person who wishes to provide information regarding a statement of estimated regulatory costs, or provide a proposal for a lower cost regulatory alternative must do so in writing within 21 days of this notice.
SPECIFIC AUTHORITY: 350.127(2), 367.121(1)(f), FS
LAW IMPLEMENTED: 367.081(2), (3), FS
IF REQUESTED WITHIN 21 DAYS OF THE DATE OF THIS NOTICE, A HEARING WILL BE SCHEDULED AND ANNOUNCED IN FAW.
THE PERSON TO BE CONTACTED REGARDING THE PROPOSED RULE IS: Manuel Arisso, Office of General Counsel, 2540 Shumard Oak Blvd., Tallahassee, FL 32399-0850 (850) 413-6028.

THE FULL TEXT OF THE PROPOSED RULE IS:

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

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 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 __________.

NAME OF PERSON ORIGINATING PROPOSED RULE: Troy Rendell

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

DATE PROPOSED RULE APPROVED BY AGENCY HEAD: May 22, 2007

DATE NOTICE OF PROPOSED RULE DEVELOPMENT PUBLISHED IN FAW: Volume 32, Number 25, June 23, 2006

RPR 4

DISTRIBUTION NETWORK ANALYSIS FOR WATER UTILITIES

AWWA M32

AWWA WATER DISTRIBUTION SYSTEMS HANDBOOK

Distribution Network Analysis AWWA M32

AMERICAN WATER WORKS ASSOCIATION

MANUAL OF WATER SUPPLY PRACTICES

Distribution Network Analysis for Water Utilities

AWWA M32

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.

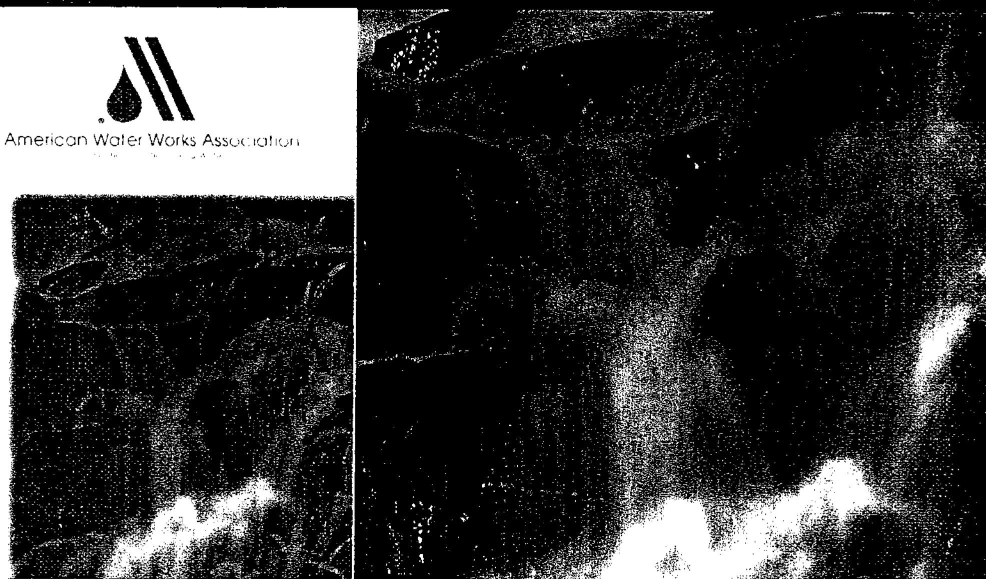
The most-limiting demand conditions for system storage are peak-hour demand, and maximum-day demand plus fire-flow demand.

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.

McGRAW-HILL HANDBOOKS

American Water Works Association



WATER DISTRIBUTION SYSTEMS HANDBOOK

LARRY W. MAYS

TABLE 3.5 Typical Service Pressure Criteria

Condition	*Service Pressure Criteria (psi)*
Maximum pressure	65–75
Minimum pressure during maximum day	30–40
Minimum pressure during peak hour	25–35
Minimum pressure during fires	20

Note: psi × 6.895 = kPa.

fire flows, commonly requires a minimum of 20 psi at the connecting fire hydrant used for fighting the fire. Table 3.5 presents typical service pressure criteria.

Peaking Coefficients

Water consumption changes with the seasons, the days of the week, and the hours of the day. Fluctuations are greater in (1) small than in large communities and (2) during short rather than during long periods of time. Variations in water consumption are usually expressed as ratios to the average day demand. These ratios are commonly called *peaking coefficients*. Peaking coefficients should be developed from actual consumption data for an individual community, but to assist the reader, Table 3.6 presents typical peaking coefficients.

Computer Models and System Modeling

Modeling water distribution systems with computers is a proved, effective, and reliable technology for simulating and analyzing system behavior under a wide range of hydraulic conditions. The network model is represented by a collection of pipe lengths interconnected in a specified topological configuration by node points, where water can enter and exit the system. Computer models utilize laws of conservation of mass and energy to determine pressure and flow distribution throughout the network. Conservation of mass dictates that for each node the algebraic sum of flows must equal zero. Conservation of energy requires that along each closed loop, the accumulated energy loss must be zero. These laws can be expressed as nonlinear algebraic equations in terms of either pressures (node formulation) or volumetric flow rates (loop and pipe formulation). The nonlinearity reflects the relationship between pipe flow rate and the pressure drop across its length. Due to the presence of nonlinearity in these equations, numerical solution methods are iterative. Initial estimated values of pressure or flow are repeatedly adjusted until the difference between two successive iterates is within an acceptable tolerance. Several numerical iterative solution techniques have been suggested, from which the Newtonian method is the most widely used. See chapter 9 for more details on modeling.

TABLE 3.6 Typical Peaking Coefficients

Ratio of Rates	*U.S. Range*	*Common Range*
Maximum day: average day	1.5–3.5:1	1.8–2.8:1
Peak hour: average day	2.0–7.0:1	2.5–4.0:1

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AWWA COMMITTEE REPORT: WATER ACCOUNTABILITY

Committee report: water accountability

Advances in technologies and expertise should make it possible to reduce lost and unaccounted-for water to less than 10 percent.

AWWA Leak Detection and Water Accountability Committee

Often, decision-makers in the water supply field are satisfied when they can account for 85 percent of the water they produce. Recognizing the problem of lost or nonrevenue-producing water and desiring to find solutions for member utilities, AWWA's Distribution and Plant Operations Division asked the Leak Detection and Water Accountability Committee to write this report, which recommends that because of increasing demand and higher operational costs, the goal for lost or nonrevenue-producing water should be less than 10 percent. The report also proposes that certain guidelines should be followed when the goal of 10 percent is not met.

Over the past several years, it [illegible] not [illegible]d to hear statements from water [illegible]t the country such as, "AWWA [illegible]rcent unaccounted-for water is acceptable" or "Our water loss is pretty close to the AWWA guidelines of 15 percent." In fact, AWWA has never adopted a policy or issued guidelines to the effect that 15 percent unaccounted-for water is acceptable. AWWA's Distribution and Plant Operations Division asked the National Committee on Leak Detection and Water Accountability to deter-

Water lost through leaks, underregistering meters, or water theft takes a financial toll on utility operation.

mine how this impression arose, to research the issue of unaccounted-for water, and to issue guidelines and recommendations that specifically address unaccounted-for water and effective water loss management for water utilities.

1957 report identified as source of figure

Apparently, the source of the frequently heard statement that AWWA accepts a 15 percent rate of unaccounted-for water is a committee report presented at the 1957 AWWA annual conference in Atlantic City, N.J., and subsequently published in JOURNAL AWWA.[1] The committee report states that unaccounted-for water "may vary from 10 to 15 percent in a well operated system where the consumption is between 100 and 125 gpcd [379 and 473 L/d]. Good performance is generally indicated by a metered ratio of 85–90 percent (unaccounted-for water of 10–15 percent) where the use of water is between 100 and 125 gpcd [379 and 473 L/d]." Since that article was published 39 years ago, two areas of water loss management—operating costs and technological resources—have undergone dramatic changes.

Operating costs increase. Virtually all costs of producing and distributing potable water have increased dramatically over the past 30 to 40 years—treatment plant expansions and improvements, development of additional water supplies, distribution system construction, energy charges (pumping costs), labor at all staff levels, regulatory compliance, restoration expenses, and so on. As the total cost of operation rises, the cost of unaccounted-for water also rises at a corresponding rate.

Technology developed to reduce water loss. Because of increasing costs of production, distribution, and unaccounted-for water, many technological advances aimed at reducing water loss have been developed. These include leak detection and pinpointing instruments, more accurate metering devices, instrumentation to test meter accuracy, rate-of-flow recording for meter sizing and typing, and data collection. In addition, a wide range of techniques and methodologies provide practical application of these advanced technologies to identify losses within a water system and to implement cost-effective corrective action.

Because of these significant advances, AWWA's Leak Detection and Water Accountability Committee recommends the goal for unaccounted-for water should be less than 10 percent.

Method given to determine "true" unaccounted-for water

The basic steps for quantifying the amount of water loss within a water system are as follows:

Regardless of the water system's size, water loss should be expressed in terms of actual volume, not as a percentage.

(1) Accurately determine the amount of water being produced or purchased and delivered to the distribution system for a 13-month period of operation. The production quantities are used to establish the base number against which all other calculations in the water accountability process will be made. It is therefore imperative that the production quantities be accurate. This requires annual accuracy testing of source meters.

(2) Determine the total amount of water sales for the same period of operation as measured by all meters in the system. This includes estimated accounts.

(3) Subtract the total amount of water sold from the total amount of water produced or purchased.

(4) Identify and quantify all other categories of water use in the system. It is recommended that all water use in the various categories be metered, so the

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water can be accurately accounted for instead of ending up in the unaccounted-for water category where it does not belong. If actual metering is not possible, every effort should be made to accurately estimate each type of water use to determine realistic usage quantities for each category.

The various categories of water use in a water system include bulk water sales (including construction), known leakage, tank (storage facility) drainage, storage tank overflows, line flushing, fire protection, bleeding or blowoff done during the winter or for taste and odor episodes, and municipal uses (sewer cleaning, street cleaning, golf course, parks and recreation facilities, hydrant flow tests, unknown miscellaneous uses, and all other nonrevenue uses).

(5) Subtract the total quantity of water use for the same period of operation for all of the identified categories in step 4 from the quantity of water remaining after step 3.

(6) The quantity of water that remains is the water system's true amount of unaccounted-for water. True unaccounted-for water consists of the following: unidentified leakage, meter inaccuracies, theft, underestimated accounts, improperly typed and sized meters, meter-reading errors, and accounting errors.

Additional Information

For additional information about leak detection and repair, consult the following AWWA or AWWA Research Foundation publications. Catalog numbers are in parentheses. To purchase copies, call the AWWA Bookstore at (303) 795-2449.

Leaks in Water Distribution Systems (20236)

Leak Detection and Water Loss Reduction (20194)

Leak Repair: After You Locate It (20022)

Introduction to Water Distribution: Vol. 3—Principals and Practices of Water Supply Operations Series (1951)

Water Audits and Leak Detection M36 (30036)

Water and Revenue Losses: Unaccounted-for Water (90531)

Express water loss in terms of volume

Regardless of the water system's size, water loss should be expressed in terms of actual volume, not as a percentage. This is necessary for the utility to be able to determine the true annual cost of unaccounted-for water. Consider the following example.

A water utility produces 2 mgd (7.6 ML/d) and has a true unaccounted-for water rate of 20 percent. The utility adds a large-volume user that uses 0.5 mgd (1.9 ML/d), which increases production to 2.5 mgd (9.5 ML/d). What happens to the 20 percent unaccounted-for water? It becomes 16 percent. Has the utility actually reduced its water loss and the associated costs of the loss?

Don't be misled by percentages. Measure performance with respect to unaccounted-for water strictly by comparing the volume of water lost with the volume that was lost in prior years. The "percentage unaccounted" so often used, although it is a convenient yardstick of comparison, can be misleading.

Convert water loss to dollar loss

The amount of water loss is more meaningful than the percentage of unaccounted-for water. When the total volume of unsold water is known, the utility can place a value on that water and determine the cost-effectiveness of implementing corrective action.

The simplest way to estimate the potential financial loss is to make two assumptions:

- All water loss results from underground pipe leakage.
- All water loss results from underregistering water meters.

Usually the least amount of financial loss would be related to underground leakage, because that amount of the loss depends on the direct production costs associated with producing that amount of water. Three components make up direct production costs: costs of raw water, energy costs (electricity), and treatment costs (chemicals). Therefore, the total volume of underground lost water is multiplied by the unit production rate (excluding labor) to determine the approximate financial loss to the utility.

Of course, the cost of underground leakage would be of greater value if leakage repairs eliminated the need for plant expansion.

Usually the most expensive water loss in the distribution system is caused by both underregistration of water meters and theft of water. This water loss has the highest potential value because it is "sellable" at the retail water rate. The total water loss volume related to underregistration and theft should be multiplied by the retail rate to determine the approximate lost revenue.

Experience dictates that total water loss in a system does not result from one cause but from several. Generally, a utility can split the difference between financial loss from leakage and from metering. The utility could then estimate how much money is being lost because of unaccounted-for water. The actual split will vary from one utility to another and will be determined by the age of meters, water quality, system pressure, age of pipe, and pipe material. For instance, if a utility has excellent water quality (e.g., minimal buildup of sand or minerals) and an aggressive meter-maintenance program, it will tend to weigh the cost factors toward production costs rather than retail rate. An example of determining the dollar value of unaccounted-for water is:

Total daily production: 1 mgd (3.8 ML/d)

Total known usage: 0.8 mgd (3 ML/d)

Difference: 0.2 mgd (0.8 ML/d)

Production costs: $0.30/1,000 gal ($0.08/1,000 L)

Average retail rate: $2.50/1,000 gal ($0.70/1,000 L)

To determine the minimum lost revenue, multiply 0.2 mgd (0.8 ML/d) of unmetered water by the production cost. If all unmetered water was lost through leakage, the direct cost to the utility would be $21,900.

To determine the maximum amount of financial loss to the water system, multiply the 0.2 mgd (0.8 ML/d) by the retail rate; the result is $182,500 per year. If all unmetered losses occurred in the area of underregistering water meters, the financial loss attributable to that condition would be nearly nine times that of the loss attributable to leakage.

If the utility knows what is causing distribution system water losses, it may want to weigh the cost factors toward either leakage or metering. For instance, it may be determined that metering is a greater problem than leakage by a factor of 2:1. The approximate cost of lost water in the system would then be $130,000 per year. When wastewater revenue loss is added to this example, the effect on the system is amplified. For many systems, this could be a significant loss.

Weigh the costs

After the utility has determined the annual cost (or cost range) of unaccounted-for water, management can make a more informed decision concerning the cost-effectiveness of corrective action. For example, if a utility is losing $100,000 per year because of unaccounted-for water and it has an aggressive meter accuracy testing and repair program, it can be reasonably sure most of the loss is attributable to leakage. If a leak detection and pinpointing survey of the distribution system will cost about $10,000, it is likely that such a survey will be cost-effective.

Likewise, if a utility is losing $100,000 per year in unaccounted-for water and it has recently conducted a comprehensive leakage detection and pinpointing survey, it can reasonably conclude that most of the loss is attributable to meter inaccuracies or underregistration. If a testing and repair program to determine meter accuracy will cost about $20,000, it would be cost-effective.

Regardless of the size of the water utility, determining the cost of loss should be conducted on a case-by-case basis. Each water system has unique characteristics and variables that must be considered when the cost of water loss is calculated for any given system—e.g., the quantity and the quality of the raw water, the number and size of commercial and industrial meters, the extent of pumping required (energy costs), and treatment costs.

Today's water system managers are faced with a variety of challenges to be met and problems to be solved. Drought, contamination, lack of available funding sources, increased regulations for water quality and monitoring, and aging distribution systems are among some of the issues that confront water utilities.

As the cost of producing and distributing potable water continues to escalate, it will be important for water system managers to implement effective water loss management programs. Excessive amounts of water loss or unaccounted-for water will not be tolerated by regulatory agencies or the general public as water rates continue to increase.

As the total cost of operation rises, the cost of unaccounted-for water also rises at a corresponding rate.

It is fortunate that the necessary technologies, expertise, and methodologies are available to identify and substantially reduce lost water and to reduce unaccounted-for water to a more acceptable and realistic level. As the twenty-first century approaches, the goal for unaccounted-for water should be less than 10 percent.

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RPR 6

DISTRIBUTION NETWORK ANALYSIS FOR WATER UTILITIES

AWWA MANUAL M 32

Distribution Network Analysis for Water Utilities

AWWA MANUAL M32

First Edition

FOUNDED 1881

American Water Works Association

Distribution Network Analysis AWWA M32

6666 West Quincy Ave.
Denver, CO 80235

Printed in USA

ISBN 0-89867-457-3

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

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ST. JOHNS RIVER WATER MANAGEMENT DISTRICT WATER CONSERVATION PLAN

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.

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SWFWMD WATER USE PERMIT INFORMATION MANUAL

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

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,

RPR 9

AQUA RESPONSE TO STAFF INTERROGATORY NO. 38 AND STAFF REQUEST FOR PRODUCTION OF DOCUMENT NO. 11

Leesburg, FL 34749
Phone: (352) 787-0980

Fire Flow

38. For all systems with fire hydrants, provide the number of hydrants located in each system. If there is a discrepancy with this information and the number of hydrants shown on the system maps, explain the discrepancy.

Response:

Water System	Number of Fire Hydrants
Grand Terrace	**12**
Kings Cove	**11**
Morningview	**2**
Quail Ridge	**10**
Silver Lake	**63**
Skycrest	**3**
Summit Chase	**7**
Tangerine	**7**
Sunny Hills	**7**
Chuluota	**73**

Please see attachment providing the locations of the Company's fire hydrants bate stamped at Pages 07319 – 07337 and Pages 07698 - 07701. System maps have been revised accordingly.

Supplemental Response: 08/01/2007
Response provided by witness:
John M. Lihvarcik, Vice President and Chief Operating Officer
1100 Thomas Avenue
Leesburg, FL 34749
Phone: (352) 787-0980

Storage

40. During the plant inspection by the staff engineer in April 2007, it was observed that neither of the two storage tanks were in use at Plant No. 2 in the Chuluota system. Explain why the storage tanks were not being used.

Aqua Utilities Florida, Inc.
Docket No. 060368-WS
Staff's Seventh Request for Production of Documents

23. For any system with fire hydrants, provide documentation supporting the local government fire flow requirement.

Response:
See below.

Water System	# of Fire Hydrants	Source of Information
Grand Terrace	12	Lake county Florida (Ord. No. 1996-42, § 1, 5-7-96; Ord. No. 2003-32, § 3, 4-22-03) 9.08.04 Standard Requirements. Fire Hydrants. Hydrants Shall comply with AWWA Standard C502, "Fire Hydrants for Ordinary Water Works Service",
Kings Cove	11	Lake county Florida (Ord. No. 1996-42, § 1, 5-7-96; Ord. No. 2003-32, § 3, 4-22-03) 9.08.04 Standard Requirements. Fire Hydrants. Hydrants Shall comply with AWWA Standard C502, "Fire Hydrants for Ordinary Water Works Service",
Morning-view	2	Lake county Florida (Ord. No. 1996-42, § 1, 5-7-96; Ord. No. 2003-32, § 3, 4-22-03) 9.08.04 Standard Requirements. Fire Hydrants. Hydrants Shall comply with AWWA Standard C502, "Fire Hydrants for Ordinary Water Works Service",
Quail Ridge	10	Lake county Florida (Ord. No. 1996-42, § 1, 5-7-96; Ord. No. 2003-32, § 3, 4-22-03) 9.08.04 Standard Requirements. Fire Hydrants. Hydrants Shall comply with AWWA Standard C502, "Fire Hydrants for Ordinary Water Works Service",
Silver Lake	63	Lake county Florida (Ord. No. 1996-42, § 1, 5-7-96; Ord. No. 2003-32, § 3, 4-22-03), 9.08.04 Standard Requirements. Fire Hydrants. Hydrants Shall comply with AWWA Standard C502, "Fire Hydrants for Ordinary Water Works Service",
Skycrest	3	Lake county Florida (Ord. No. 1996-42, § 1, 5-7-96; Ord. No. 2003-32, § 3, 4-22-03), 9.08.04 Standard Requirements. Fire Hydrants. Hydrants Shall comply with AWWA Standard C502, "Fire Hydrants for Ordinary Water Works Service",
Summit Chase	7	Lake county Florida (Ord. No. 1996-42, § 1, 5-7-96; Ord. No. 2003-32, § 3, 4-22-03) , 9.08.04 Standard Requirements. Fire Hydrants. Hydrants Shall comply with AWWA Standard C502, "Fire Hydrants for Ordinary Water Works Service",
Tangerine	7	Florida Fire Prevention Code, 2005 Edition; NFPA 101, Life Safety Code, 2003 Edition, Orange County Ordinance Chapter 18
Sunny Hills	7	Sec. 30-32. Codes and standards adopted. (1)*Uniform fire safety standards.* F.S. ch. 633, Fire Prevention and Control, and F.A.C. ch. 4A, Florida Fire Prevention Code. (2)*Minimum fire safety standards.* F.S. ch. 633, Fire Prevention and Control, and F.A.C. ch. 4A, Florida Fire Prevention Code. (3)*Standard Fire Prevention Code.* The minimum mandatory edition of the Standard Fire Prevention Code as adopted by the state. (4)*Life Safety Code.* The National Fire Protection Association, (NFPA) 101, "Life Safety Code" as adopted by the state fire marshal, and all addenda, appendices and standards referenced and incorporated in such code as if set out fully in this article. (Code 1986, § 12-22; Ord. No. 89-7, § 8, 12-21-1989; Ord. No. 95-7, § 1, 4-20-1995)
Chuluota	73	1997 Standard Fire Prevention Code as published by the Southern Building Code Congress International and the 1997 National Fire Protection Association Standard 101 Life Safety Code and FAC 4A-40, published by the State Fire Marshall. Not

		less than one copy of the adopted issue of the Life Safety Code, NFPA 101, as published by the National Fire Protection Association 1997 Edition;
Valencia Terrace	**11**	Lake county Florida (Ord. No. 1996-42, § 1, 5-7-96; Ord. No. 2003-32, § 3, 4-22-03) 9.08.04 Standard Requirements. Fire Hydrants. Hydrants Shall comply with AWWA Standard C502, "Fire Hydrants for Ordinary Water Works Service",

Response provided by witness:
John M. Lihvarcik
Vice-President and Chief Operating Officer
1100 Thomas Avenue
Leesburg, FL 34748
Phone: (352) 435-4028

RPR 10

RECOMMENDED STANDARDS FOR WATER WORKS

Recommended Standards For Water Works

GREAT LAKES UPPER MISSISSIPPI RIVER BOARD OF STATE PUBLIC HEALTH & ENVIRONMENTAL MANAGERS

WATER

1997

ILLINOIS IOWA MINNESOTA NEW YORK PENNSYLVANIA

INDIANA MICHIGAN MISSOURI OHIO WISCONSIN ONTARIO

Recommended Standards For Water Works

1997 Edition

Policies for the Review and Approval of Plans and Specifications for Public Water Supplies

A Report of the Committee of the Great Lakes--
Upper Mississippi River Board of State Public Health and Environmental Managers

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Phone: (518) 439-7286
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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.

3.2 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 shall equal or exceed the design maximum day demand and equal or exceed the design average 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.

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

After disinfection of each new, modified or reconstructed groundwater source, one or more water samples shall be submitted to a laboratory satisfactory to the reviewing authority for microbiological analysis with satisfactory results reported to such agency prior to placing the well into service.

6.2.6 Dehumidification

In areas where excess moisture could cause hazards to safety or damage to equipment, means for dehumidification should be provided.

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 Section 4.11.

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.

RPR 11

SUMMARY OF USED AND USEFUL STORAGE
DOCKET NO. 060368-WS

Docket No. 060368-WS

Docket No. 950495-WS; Southern States system with storage

	Uniform Plants	Total Water Storage Capacity + Hydro	Amount Unused	Max Day	Fire Flow	New Rule	New Rule Amount Unused
1	Amelia Island	1,000,000	0	2,110,842			
2	Apple Valley	1,000,000	0	960,000			
3	Beacon Hills	433,600	0	2,849,200			
4	Buena-Ventura	1,206,000	0	2,753,000			
5	Burnt Store	500,000	69,030	239,040	150,000	77.81%	111,450
6	Chuluota	150,000	0	488,000			
7	Citrus Springs	500,000	0	1,384,800			
8	Deltona Lakes	7,000,000	0	15,981,000			
9	Dol Ray Manor	8,000	0	66,600			
10	Druid Hills	30,000	0	299,000			
11	Fern Park	17,000	0	92,000			
12	Fountains	20,000	0	65,100			
13	Fox Run	50,000	0	69,000			
14	Hermits Cove	23,000	0	80,800			
15	Inter-Lachen	30,500	0	101,400			
16	Lake Ajay	15,000	0	105,070			
17	Lake Brantley	8,000	0	41,000			
18	Lake Harriett	25,000	0	140,000			
19	Lehigh	1,725,000	246,015	1,711,000	240,000	113.10%	
20	Leisure Lakes	20,000	0	66,000			
21	Marco Island	6,500,000	0	11,871,000			
22	Marco Shores	500,000	0	479,966			
23	Marion Oaks	1,000,000	0	1,058,000			
24	Meredith Manor	50,000	0	400,300			
25	Palm Port	18,000	0	41,700			
26	Pine Ridge Est.	15,000	0	124,000			
27	Piney Woods	45,000	1,750	112,967	0	251.04%	
28	Reming'n Green	15,000	0	87,780			
29	River Grove	15,000	0	49,100			
30	Silver Lk Oaks	12,000	5,010	15,700	0	130.83%	
31	Silver Lk/W. Shor	50,000	0	1,857,200			
32	St. Johns H'Lands	16,000	0	42,800			
33	Sugar Mill	500,000	70,605	200,000	300,000	100.00%	
34	Sugarmill Woods	500,000	0	2,806,000			
35	Sunny Hills #1/5	60,000	0	311,500			
36	Sunshine Parkwa	108,000	0	186,900			
37	Univy Shores	612,000	0	1,658,600			
38	Welaka	40,000	15,289	55,000			
39	Woodmere	455,000	0	1,479,000			
		24,272,100	407,699	52,440,365			111,450

407,699
24,272,100
1.68%

RPR 12

RECOMMENDED STANDARDS FOR
WATER WORKS

AWWA WATER DISTRIBUTION
SYSTEMS HANDBOOK

U S ARMY CORP OF ENGINEERS
DESIGN OF SMALL WATER SYSTEMS

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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1.0 GENERAL

All reports, final plans specifications, and design criteria should be submitted at least 60 days prior to the date on which action by the reviewing authority is desired. Environmental Assessments, and permits for construction, to take water, for waste discharges, for stream crossings, etc., may be required from other federal, state, or local agencies. Preliminary plans and the engineer's report should be submitted for review prior to the preparation of final plans. No approval for construction can be issued until final, complete, detailed plans and specifications have been submitted to the reviewing authority and found to be satisfactory. Documents submitted for formal approval shall include but not be limited to:

a. engineer's report, where pertinent,

b. summary of the design criteria,

c. operation requirements, where applicable,

d. general layout,

e. detailed plans,

f. specifications,

g. cost estimates.

h. water purchase contracts between water supplies, where applicable,

i. other information as required by reviewing authority.

Where the Design/Build construction concept is to be utilized, special consideration must be given to: designation of a project coordinator; close coordination of design concepts and submission of plans and necessary supporting information to the reviewing authority; allowance for project changes that may be required by the reviewing authority; and reasonable time for project review by the reviewing authority.

1.1 ENGINEER'S REPORT

The engineer's report for water works improvements shall, where pertinent, present the following information:

1.1.1 General information,

including

a. description of the existing water works and sewerage facilities,

b. identification of the municipality or area served,

c. name and mailing address of the owner or official custodian.

1.1.2 Extent of water works system,

including

a. description of the nature and extent of the area to be served,

b. provisions for extending the water works system to include additional areas,

c. appraisal of the future requirements for service, including existing and potential industrial, commercial, institutional, and other water supply needs.

1.1.3 Justification of project

Where two or more solutions exist for providing public water supply facilities, each of which is feasible and practicable, discuss the alternatives. Give reasons for selecting the one recommended, including financial considerations, operational requirements, operator qualifications, reliability, and water quality considerations.

1.1.4 Soil, groundwater conditions, and foundation problems,

including a description of

a. the character of the soil through which water mains are to be laid,

b. foundation conditions prevailing at sites of proposed structures,

c. the approximate elevation of ground water in relation to subsurface structures.

1.1.5 Water use data,

including

a. a description of the population trends as indicated by available records, and the estimated population which will be served by the proposed water supply system or expanded system 20 years in the future in five year intervals or over the useful life of critical structures/equipment,

→ b. present water consumption and the projected average and maximum daily demands, including fire flow demand (see Section 1.1.6),

c. present and/or estimated yield of the sources of supply,

d. unusual occurrences.

1.1.6 Flow requirements,

including

a. hydraulic analyses based on flow demands and pressure requirements (See Section 8.1.1)

b. fire flows, when fire protection is provided, meeting the recommendations of the Insurance Services Office or other similar agency for the service area involved.

1.1.7 Sources of water supply

Describe the proposed source or sources of water supply to be developed, the reasons for their selection, and provide information as follows:

1.1.7.1 Surface water sources,

including

a. hydrological data, stream flow and weather records,

b. safe yield, including all factors that may affect it,

c. maximum flood flow, together with approval for safety features of the spillway and dam from the appropriate reviewing authority,

d. description of the watershed, noting any existing or potential sources of contamination (such as highways, railroads, chemical facilities, etc.) which may affect water quality,

e. summarized quality of the raw-water with special reference to fluctuations in quality, changing meteorological conditions, etc.

f. source water protection issues or measures that need to be considered or implemented.

1.1.7.2 Groundwater sources,

including

a. sites considered,

b. advantages of the site selected,

c. elevations with respect to surroundings,

d. probable character of formations through which the source is to be developed,

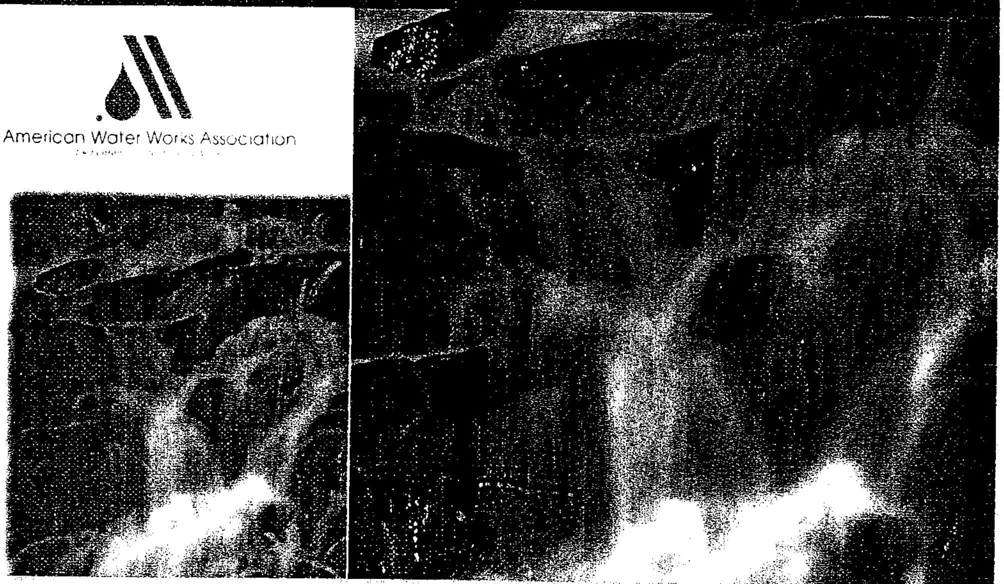
e. geologic conditions affecting the site, such as anticipated interference between proposed and existing wells,

f. summary of source exploration, test well depth, and method of construction; placement of liners or screen; test pumping rates and their duration; water levels and specific yield; water quality,

g. sources of possible contamination such as sewers and sewerage facilities, highways, railroads, landfills, outcroppings of consolidated water-bearing formations, chemical facilities, waste disposal wells, etc.

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 in 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 limits, and site constraints. This can result in tanks that cause disinfectant residual problems.

Two overall approaches to sizing a tank are available: regulatory-driven design and functional design. Both are illustrated below.

10.6.2 Standards-Driven Sizing

Each state and province has its own standards for sizing tanks. For example, the "Ten State Standards" (Recommended Standards for Water Works, 1992) states the following:

> Fire flow requirements established by the appropriate state Insurance Services Office should be satisfied where fire protection is provided....
> The minimum storage capacity (or equivalent capacity) for systems not providing fire storage shall be equal to the average daily consumption. This requirement may be reduced when the source and treatment facilities have sufficient capacity with standby power to supplement peak demands in the system.

Another example is the Texas State Standards (Texas Department of Health, 1988), which devotes up to four pages of text to a description of volume sizing, depending on the size of the system and the nature of the source. The key points in the Texas standards for systems with more than 50 connections are the following: "Total storage capacity of 200 gallons per connection must be provided... Elevated storage in the amount of 100 gallons per connection is required for systems with over 2,500 connections." If more than 18,800 m^3 (5 million gal) of storage are required, utilities can substitute ground storage, pumping, and auxiliary power.

Hydropneumatic tanks can be sized on the basis of 20 gal per connection (with ground tank available) or 50 gal per connection (no ground tanks at source) (Texas Department of Health, 1988).

Sizing also can be determined on the basis of providing a reasonable number of pump starts: "The gross volume of the hydropneumatic tank, in gallons, should be at least ten times the capacity of the largest pump, rated in gallons per minute" (Ten State Standards, 1992).

Other states and provinces have variations on these standards. All these standards leave considerable discretion to the design engineer to provide storage and to regulators to accept the design.

10.6.3 Functional Design

Although the appropriate regulatory standards must be met, it also is helpful to examine why the volume is required. This involves summing up the storage required for each of the recognized purposes: (1) equalization, (2) fire protection, and (3) emergencies other than fires. Cesario (1995) referred to these three types of storage as supply, fire, and reserve, respectively. Each type is discussed in more detail below.

10.6.3.1 Equalization Storage. *Equalization storage* is used to enable the source and pumping facilities to operate at a predetermined rate, depending on the utility's preference. Some options for operating pumping facilities include the following:

1. Operate at a constant rate to simplify operation and reduce demand charges.

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*(1) 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

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STAFF INTERROGATORIES NOS. 46, 47, AND 48

The consultant found no leaks in the distribution system. Additionally, the testing of the meters revealed that there was no problem with the meters.

(c) the associated cost, and

Consultant fees were approximately $1514.00

(d) any steps the utility has taken or intends to take to resolve the problem.

The Company will continue to investigate for potential leaks and water theft.

Supplemental Response: 08/01/2007
Response provided by witness:
John M. Lihvarcik, Vice President and Chief Operating Officer
1100 Thomas Avenue
Leesburg, FL 34749
Phone: (352) 787-0980

Infiltration and Inflow

46. Schedules E-13s and F-2 indicate that more gallons of wastewater were treated than water sold for Beechers Point, Florida Central Commerce Park, Holiday Haven, Jungle Den, Leisure Lakes, Palm Port, Park Manor, Rosalie, Silver Lake Oaks, Summit Chase, The Woods, Venetian Village, and Village Water. For each of these systems, describe:

Response:

Florida Central Commerce Park: Aqua Utilities Florida does not provide potable water to this site. The Wastewater billing is based on the potable water meter readings.

(a) the steps taken to identify the source of the infiltration or inflow,

In general, the Company has an on-going program for finding sources of I/I. The Company periodically drives or walks the collection system looking for leaky manhole covers and clean- outs with missing or broken covers. If it is determine that excessive I/I exists the utility takes additional steps such as smoke testing and "TVing" the collection system

(b) the corrective action that would be needed to reduce the amount of infiltration or inflow,

The corrective actions required are dependent upon the type of problem causing I/I and can be as simple as replacing a cleanout cap, installing a manhole lid liner such as RainGuard, or can be as complex as lining existing pipes and manholes with products such as Insitu-Form. In extreme cases where an aged collection system has been determined to be in need of replacement then, a major construction effort is required to design, permit, and construct an entire system or section of a system.

(c) the associated cost, and

Please see response to (b).

(d) any steps the utility has taken or intends to take to resolve the problem.

The Company has an on-going I/I program and does correct all excessive I/I situations.
In accordance with the Florida Department of Environmental Protection's Guideline for preparing an Operation and Maintenance performance Report:
"As a guideline, I/I should be considered excessive if:
1. Domestic wastewater plus infiltration exceeds 120 gallons per capita per day (gpcd) during periods of high ground water, or
2. The total daily flow during a storm exceeds 275 gpcd, or
3. There are operational problems, such as surcharges, bypasses, overflows, or poor treatment performance, resulting from hydraulic overloading of the treatment works or the collection and transmission facilities during storm events.

The I/I conditions in the sewer system should be determined by analyzing the preceding year's flow records. If adequate flow data is not available, flow data should be obtained by conducting flow monitoring at a single point at the treatment plant during high ground water periods and also during rainstorms. Where there is a likelihood of excessive I/I in a portion of the collection system, that portion should be monitored separately. If treatment plant problems, untreated bypasses or discharges, or overflows do not result from excessive I/I, a simple statement of this fact should be included in the report. If treatment plant problems, untreated bypasses or discharges, or overflows result from excessive I/I, the report should include recommendations for a sewer system evaluation study and schedules for conducting the study and making necessary repairs."

47. For each system that had more gallons of wastewater treated than water sold, provide the number of feet and the diameter of gravity mains in the collection systems.

Response:

SYSTEM	LENGTH (l.f.)	DIAMETER OF MAIN
Beechers Point	1590	8" Vitrified Clay
Florida Central Commerce Park	10,148	8" PVC
Holiday Haven	9,928	8" PVC
Jungle Den	5,200	8" PVC
Leisure Lakes	13,089	8" PVC
Palm Port	9,186	8"/6" Vitrified Clay
Park Manor	1,364	8" Vitrified Clay
Rosalie	4,306	8"
Silver Lake Oaks	1,640	8" PVC
Summit Chase	6,014	8" PVC
The Woods	4,892	Unknown
Venetian Village	8,061	8" PVC
Village Water	17,258	8" PVC

Supplemental Response: 08/01/2007
Response provided by witness:
John M. Lihvarcik, Vice President and Chief Operating Officer
1100 Thomas Avenue
Leesburg, FL 34749
Phone: (352) 787-0980

48. Identify the source or basis relied on in making an adjustment of 15% wastewater treated for infiltration and inflow for the Leisure Lakes wastewater system (MFR Schedule F-6, Revision 2).

Response:

It is our judgment that absent a costly study, 15% I&I is a reasonable level to include in the wastewater treatment calculation, in addition to an estimated "return" water based on water usage. It is AUF's recollection that in past cases, the FPSC has accepted 15% I&I as reasonable. For Leisure Lakes, AUF found an estimated 30% I&I, the relationship of treated wastewater to 85% (return) of water usage, and made an adjustment to reduce the I&I to 15%

Response provided by witness:
John F. Guastella
Guastella Associates, Inc.
6 Beacon Street, Suite 410
Boston, MA 02108
Phone : (617) 423-3030

49. Is the analysis of infiltration and inflow for Leisure Lakes consistent with the method described in wastewater treatment plant design and construction manuals such as Water Pollution Control Federation of Practice, Design, and Construction?

Response:
There was no special I & I study performed. Please see response to Interrogatory No. 48

Response provided by witness:
John F. Guastella
Guastella Associates, Inc.
6 Beacon Street, Suite 410
Boston, MA 02108
Phone : (617) 423-3030

50. Would an analysis of infiltration based on the length and size of gravity mains be a reasonable alternative to basing infiltration on a percentage of wastewater treated?

Response:
This method is dependent upon the specific characteristics of the system.

Supplemental Response: 08/01/2007
Response provided by witness:
John M. Lihvarcik, Vice President and Chief Operating Officer
1100 Thomas Avenue
Leesburg, FL 34749
Phone: (352) 787-0980

RPR 14

AQUA RESPONSE TO OPC INTERROGATORY NO. 10

Aqua Utilities Florida, Inc.
Docket No. 060368-WS
OPC'S First Set of Interrogatories

Attachment to Response to Interrogatory No. 10

10. Please state the year in which the Company expects each of its water and wastewater territory(ies) to be built out.

<u>**Response:**</u>
The attached spread sheet projects growth for each water and wastewater system which is not built-out and no growth for those that are currently built-out. We do not prepare projections to determine when the systems will be totally built-out.
[Pgs. 01762 – 01763]

Response provided by:
John M. Lihvarcik, Vice-President and Chief Operating Officer
1100 Thomas Avenue
Leesburg, FL 34749
Phone: 352-787-0980

WATER System	County	Actual 2005	GROWTH PROJECTIONS 2006	2007	2008	2009	2010	2011	Total	
Arredondo Estates	Alachua	217	0	0	0	0	0	0	217	built-out
Arredondo Farms	Alachua	304	3	2	2	2	2	2	317	
Aqua - Sarasota	Sarasota	4500	100	155	190	190	195	308	5,638	
Haines Creek	Lake	108	0	0	0	0	0	0	108	built-out
Lake Osborne	Palm Beach	466	0	0	0	0	0	0	466	built-out
Ravenswood	Lake	43	0	0	0	0	0	0	43	built-out
Rosalie Oaks	Polk	92	2	2	0	0	0	0	96	
The Woods	Sumter	64	1	1	1	1	1	1	70	
48 Estates	Lake	77	1	2	2	2	2	2	88	
Kings Cove	Lake	205	1	0	0	0	0	0	206	built-out
Summit Chase	Lake	218	0	0	0	0	0	0	218	built-out
Jasmine Lakes	Pasco	1536	0	0	0	0	0		1,536	built-out
Lake Josephine	Highlands	545	8	8	8	8	9	8	594	
Ocala Oaks	Marion	1726	45	45	45	45	45	45	1,996	
Peace River	Hardee	94	0	2	2	2	2	2	104	
Sebring Lakes	Highlands	66	3	3	3	3	3	3	84	
Village Water	Polk	175	0	4	0	0	0	0	179	built-out
Kingswood - W	Brevard	59	0	0	0	0	0	0	59	built-out
Oakwood - W	Brevard	201	0	0	0	0	0	0	201	built-out
Leisure Lakes - W	Highlands	282	1	1	1	1	1	1	288	
Carlton Village - W	Lake	202	16	10	10	10	10	10	268	
East Lake Harris Estates	Lake	175	0	0	0	0	0	0	175	
Fern Terrace	Lake	124	0	0	0	0	0	0	124	
Friendly Center	Lake	30	0	20	20	60	60	60	250	
Grand Terrace	Lake	110	0	0	0	0	0	0	110	built-out
Hobby Hills	Lake	98	0	0	0	0	0	0	98	built-out
Holiday Haven	Lake	121	0	0	0	0	0	0	121	built-out
Imperial Mobile Terrace	Lake	246	0	0	0	0	0	0	246	built-out
Morningview	Lake	33	0	0	0	0	0	0	33	built-out
Palms Mobile Home Park	Lake	59	0	0	0	0	0	0	59	built-out
Picciola Island	Lake	137	3	5	5	5	5	5	165	
Piney Woods	Lake	171	0	0	0	0	0	0	171	built-out
Quail Ridge	Lake	82	2	4	4	4	4	4	104	
Silver Lake Estates	Lake	1128	10	5	5	5	5	5	1,163	
Skycrest	Lake	115	0	0	0	0	0	0	115	built-out
Stone Mountain	Lake	9	0	0	0	0	0	0	9	built-out
Valencia Terrace	Lake	337	0	0	0	0	0	0	337	built-out
Venetian Village	Lake	147	4	4	4	4	4	4	171	
Western Shores	Lake	426	17	20	20	20	20	20	543	
Tangerine	Orange	257	15	15	50	50	50	50	487	
Palm Terrace	Pasco	1164	0	0	0	0	0	0	1,164	built-out
Zephyr Shores	Pasco	496	0	0	0	0	0	0	496	built-out
Gibsonia Estates	Polk	180	3	8	9	0	0	0	200	
Lake Gibson Estates	Polk	813	4	0	0	0	0	0	817	
Orange Hill	Polk	167	0	0	0	0	0	0	167	built-out
Sugar Creek	Polk	67	0	0	0	0	0	0	67	built-out
Beecher's Point	Putnam	51	0	0	0	0	0	0	51	built-out
Hermits Cove	Putnam	174	3	4	4	4	4	4	197	
Interlachen Lake Estates	Putnam	242	2	0	0	0	0	0	244	
Palm Port	Putnam	105	1	2	2	2	2	2	116	
Park Manor	Putnam	30	0	0	0	0	0	0	30	built-out
Pomona Park	Putnam	158	0	0	0	0	0	0	158	built-out
River Grove	Putnam	106	0	0	0	0	0	0	106	built-out
Saratoga Habour	Putnam	49	2	2	2	2	2	2	61	
Silver Lake Oaks	Putnam	39	0	0	0	0	0	0	39	built-out
St Johns Highlands	Putnam	94	0	0	0	0	0	0	94	built-out
Welaka	Putnam	96	0	0	0	0	0	0	96	built-out
Wootens	Putnam	28	0	0	0	0	0	0	28	built-out
Chuluota	Seminole	1253	60	75	50	50	50	50	1,588	
Harmony Homes	Seminole	59	0	0	0	0	0	0	59	built-out
Jungle Den	Putnam	113	0	0	0	0	0	0	113	built-out
Tomoka	Volusia	266	0	0	0	0	0	0	266	built-out
Sunny Hills	Washington	475	55	50	75	100	100	100	955	
		21210	**362**	**449**	**514**	**570**	**576**	**688**	**24,369**	

WASTEWATER System	County	2005	GROWTH PROJECTIONS 2006	2007	2008	2009	2010	2011	Total	
Arredondo Farms	Alachua	304	3	2	2	2	2	2	317	
Rosalie Oaks	Polk	92	2	2	0	0	0	0	96	
The Woods	Sumter	59	1	1	1	1	1	1	65	
Kings Cove	Lake	198	1	0	0	0	0	0	199	
Summit Chase	Lake	217	0	0	0	0	0	0	217	
Jasmine Lakes	Pasco	1526	2	0	0	0	0	0	1,528	
Peace River	Hardee	92	0	2	2	2	2	2	102	
South Seas	Lee	64	0	0	0	0	0	0	64	built-out
Village Water	Polk	33	0	4	0	0	0	0	37	
Leisure Lakes	Highlands	279	0	1	1	1	1	1	284	
Holiday Haven	Lake	107	0	0	0	0	0	0	107	
Morningview	Lake	32	1	0	0	0	0	0	33	
Valencia Terrace	Lake	332	0	0	0	0	0	0	332	
Venetian Village	Lake	94	2	3	4	4	4	4	115	
Palm Terrace	Pasco	1012	0	0	0	0	0	0	1,012	built-out
Zephyr Shores	Pasco	495	1	0	0	0	0	0	496	
Lake Gibson Estates	Polk	314	2	0	0	0	0	0	316	
Beecher's Point	Putnam	17	1	0	0	0	0	0	18	
Palm Port	Putnam	105	1	2	2	2	2	2	116	
Park Manor	Putnam	30	0	0	0	0	0	0	30	built-out
Silver Lake Oaks	Putnam	39	0	0	0	0	0	0	39	built-out
Chuluota	Seminole	541	62	30	75	50	50	50	858	
Florida Central Commerce Park	Seminole	54	0	0	0	0	0	0	54	built-out
Jungle Den	Putnam	134	0	0	0	0	0	0	134	built-out
Sunny Hills	Washington	172	4	10	20	30	30	30	296	
		6342	83	57	107	92	92	92	6,865	

BEFORE THE PUBLIC SERVICE COMMISSION

In re: 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. 060368-WS DATED: AUGUST 21, 2007

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the DIRECT TESTIMONY OF RICHARD P. REDEMANN has been served by U.S. Mail to Kenneth A. Hoffman and Marsha E. Rule, Esquires, Rutledge, Ecenia, Purnell & Hoffman, P. A., P.O. Box 551, Tallahassee, FL 32302-0551, on behalf of AQUA UTILITIES FLORIDA, INC., and that a true and correct copy thereof has been furnished to the following by U. S. Mail, this 21st day of August, 2007:

Stephen Burgess & Stephen Reilly, Esquires
Office of Public Counsel
c/o The Florida Legislature
111 W. Madison Street, Room 812
Tallahassee, FL 32399-1400

Cecilia Bradley, Esquire
Office of the Attorney General
The Capitol – PL01
Tallahassee, FL 32399-1050

ROSANNE GERVASI
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