Southern States Utilities

BEFORE THE

FLORIDA PUBLIC SERVICE COMMISSION

DOCKET NO. 950495 - WS

APPLICATION FOR A GENERAL RATE INCREASE

VOLUME I
BOOK 14 OF 22

MINIMUM FILING REQUIREMENTS
PREFILED DIRECT TESTIMONY

Containing

ROBERT C. EDMUNDS, P.E.

DIRECT TESTIMONY OF ROBERT C. EDMUNDS, P.E.

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

ON BEHALF OF

SOUTHERN STATES UTILITIES, INC.

DOCKET NO. 950495-WS

Q. WHAT IS YOUR NAME AND BUSINESS ADDRESS?

A. My name is Robert C. Edmunds, P.E. My business address is Jones Edmunds & Associates, Inc., 730 N. Waldo Road, Gainesville, Florida 32601.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am Executive Vice President and Chief of Project Design at Jones Edmunds & Associates, Inc.

Q. WHAT IS YOUR EDUCATIONAL BACKGROUND AND WORK EXPERIENCE?

A. I graduated from the University of Florida with a B.C.E. in Civil Engineering in 1968 and an M.C.E. in Engineering in 1975. Before becoming a founding member of Jones Edmunds in 1974, I was the Manager of Plant Design at Black, Crow & Eidness, which is now CH2M Hill, in Gainesville, Florida. I am a registered professional engineer in the States of Florida, Georgia, Kentucky, Alabama, North Carolina, South Carolina, Pennsylvania, New York and Ohio. I am also a certified general contractor in the State of Florida.

I have planned, analyzed, and designed water supply, transmission, and distribution facilities of many types: those serving residential developments, multi-million dollar pipelines spanning hundreds of miles, and specialized water and fire protection facilities for launch pads at

Kennedy Space Center. My clients have included private utilities, cities, counties, and other governmental agencies.

My recent experience relative to my testimony in this case includes serving as project manager or engineer on several large scale projects for which I directed extensive hydraulic modeling. For instance, I served as project engineer for Pinellas County's comprehensive master plan for its water system. For this project, I directed a complete hydraulic analysis for maximum day, peak hour, fire flow, and other conditions for water supply, transmission, and distribution facilities serving commercial, industrial, and residential customers throughout the entire county, and I completed conceptual designs for additional supply, storage, transmission, and distribution facilities throughout the county. I also served as project manager for the West Coast Regional Water Supply Authority's master plan for the Brandon, Florida, water system. For this project, I directed extensive hydraulic modeling for the primarily residential and commercial demands of the system and completed the conceptual design of facilities and improvements needed to meet demand for the 1988-2005 planning period, including the addition of a fifteen million gallon per day wellfield and treatment plant. I also served as project engineer for Hillsborough County's evaluation of its 20-year master plan for its water system. For this project, I performed extensive hydraulic modeling for the commercial, industrial, and residential demand of the system through the 20-year planning period and completed conceptual designs for supply, transmission, and distribution main additions throughout south-central Hillsborough County.

Q. **WHAT ARE YOUR PROFESSIONAL AFFILIATIONS?**

A. I am a participating member of the American Society of Civil Engineers, the American Water Resources Association, the American Water Works Association, and several other professional societies and associations.

Q. **HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION?**

A. No.

Q. **HAVE YOU PREVIOUSLY TESTIFIED BEFORE A STATE OR FEDERAL REGULATORY AGENCY OR IN A STATE OR FEDERAL COURT AS AN EXPERT IN THE AREA OF WATER TRANSMISSION AND DISTRIBUTION FACILITY ANALYSIS AND DESIGN?**

A. Yes, I have testified as an expert in the area of water transmission and distribution facilities analysis, design, and construction on several occasions in both court and administrative proceedings. For example, I recently testified as an expert on the subject of transmission and distribution facilities design before a Division of Administrative Hearings Hearing Officer in a case concerning a request by the West Coast Regional Water Supply Authority for a 45 million gallon per day consumptive use permit. I also testified as the plaintiff's chief expert in a suit brought by Pinellas County against several parties for claims arising from pipeline deterioration.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. For this case, Southern States prepared hydraulic models of its water transmission and distribution facilities in Citrus Springs, Marion Oaks, Pine Ridge, and Sunny Hills. The purpose of my testimony is to inform the Commission of the basic tenets of hydraulic modeling and of the use of this modeling in designing and evaluating transmission and distribution facilities. I will also testify that hydraulic modeling is the most accurate way of evaluating the demands placed on transmission and distribution facilities.

Q. COULD YOU BRIEFLY EXPLAIN THE PURPOSE OF HYDRAULIC MODELING?

A. Basically, hydraulic modeling is a means of evaluating the ability of designed or existing transmission and distribution facilities to transmit water safely and reliably under various demand conditions, including peak hour demand, maximum day demand, and fire flow conditions.

Q. DO GOVERNMENTAL REGULATIONS OR GENERALLY ACCEPTED DESIGN CRITERIA SPECIFICALLY REQUIRE SOME FORM OF HYDRAULIC MODELING TO EVALUATE THE ADEQUACY OF TRANSMISSION AND DISTRIBUTION

FACILITIES FOR A RESIDENTIAL COMMUNITY WATER SYSTEM PRIOR TO PERMITTING OR AT ANY OTHER TIME?

A. Over the last twenty-five to thirty years, regulations and generally accepted design criteria have undergone evolution, as has the sophistication of various modeling techniques. For instance, twenty-five to thirty years ago, which I am told is about the time the transmission and distribution facilities were designed for Southern States' Citrus Springs, Marion Oaks, Pine Ridge and Sunny Hills service locations, generally accepted engineering practice called for pipe sizes of four inches and larger within residential developments. Today, the generally accepted minimum line size for residential developments is six inches and larger, and some local government ordinances or regulations require eight inches and larger.

As a matter of accepted professional practice, design engineers rely on the guidance and direction provided in a number of authoritative publications and manuals addressing distribution facilities design in detail. DEP has incorporated some of these materials into its rules by reference. Specifically, I refer the Commission to the Recommended Standards For Water Works ("The Ten States' Standards"), a design manual incorporated by reference in Rule 62-555.330, F.A.C. In The Ten States' Standards, section 8, subsection 8.1, under the heading "Water Main Design," it states as follows:

8.1.1 Pressure. All water mains, including those not designed to provide fire protection, shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. The normal working pressure in the distribution system should be approximately 60 psi and not less than 35 psi.

8.1.2 Diameter. The minimum size of the water main for providing fire protection and serving fire hydrants shall be six-inch diameter. Larger size mains will be required if necessary to allow the withdrawal of the required fire flow while maintaining residual pressure specified in Section 8.1.1.

Rule 62-555.330, F.A.C., expressly states that DEP is to consider these criteria from The Ten States' Standards when evaluating permit applications to construct or alter distribution facilities.

In the way of providing an example of the local requirements which vary from jurisdiction to jurisdiction, I refer the Commission to Section 2 of Citrus County's Public Water System Design and Construction Standards, which states as follows:

A. General Design Criteria. A water distribution network analysis shall be required with all distribution submittals. The supplying utility shall provide the available pressure and flow at the proposed point of connection under the following flows to the proposed connection:

1. Estimated Peak Demand, as determined by the methods of AWWA publication M22, current edition, inclusive of any proposed irrigation facilities, and applicable criteria from Section I, herein, whichever is greater.

2. Fire Flow, as estimated by the criteria addressed in Section I, "Public Water Supply and Treatment Facilities."

Hydraulic modeling is the only reliable way of determining whether these design criteria are met. Several county review agencies have in recent years gone so far as to require a computer program's hydraulic model output as part of the permit application for a new water distribution system or the expansion of existing facilities. It should also be noted that, aside from these requirements, hydraulic modeling is an important tool used regularly by practicing professional engineers to evaluate the capabilities of utility facilities.

My understanding from Southern States' witness Terrero is that when Deltona Utilities, Inc. designed the transmission and distribution facilities for the locations I have referred to, it performed a Hardy-Cross analysis to evaluate the capacity of the facilities. The Hardy-Cross analysis is a type of hydraulic modeling, and its use as an aid in designing the referenced facilities would have been consistent with design requirements and practices at the time those facilities were designed. Hydraulic modeling today can be done by use of a Hardy-Cross analysis which, as evolved, can still produce a fairly reliable result, or by use of sophisticated computer programs available, such as Haestad Methods, Inc.'s Cybernet® computer software which Southern States has utilized in this case.

Q. **CAN YOU GENERALLY DESCRIBE HOW COMPUTERIZED HYDRAULIC MODELING IS PERFORMED FOR EXISTING WATER TRANSMISSION AND DISTRIBUTION FACILITIES SERVING A RESIDENTIAL COMMUNITY?**

A. As I indicated earlier, hydraulic modeling takes into consideration two basic categories of calculations: demand and capacity. It should also be kept in mind that transmission and distribution facilities will not only be evaluated on a network basis, but analyses are often made and needed on a component basis, where the demand and capacity of a part or portions of a network are examined based on their type and function.

The first step typically performed for a hydraulic model of existing facilities is the preparation of a schematic representation of the supply, transmission, and distribution facilities. This schematic is prepared using lines and dots representing pipes and nodes respectively. Nodes are locations in the existing piping network where water is added (supply), where water is removed (demand), and where two or more pipes intersect, including all joints where pipe diameters change. Essentially, the schematic is the framework for the capacity side of the evaluation. The next step would be to define demands to be assigned to the nodes in the model. Supply, transmission, and distribution facilities serving a residential community must, by regulation and accepted practice, be designed to meet maximum day, peak hour, and fire flow conditions. Accordingly, demand data reflecting these conditions is determined and, along with any other required information, is entered into the program input data file. The model is then compiled and the output data file created.

Q. WHAT IS YOUR TESTIMONY RELATIVE TO THE HYDRAULIC MODELING DONE IN SUPPORT OF SOUTHERN STATES' RATE APPLICATION?

A. As explained in detail by Southern States' witness Bliss, Southern States has conducted hydraulic modeling analyses for Southern States' transmission and distribution facilities in Citrus Springs, Marion Oaks, Pine Ridge and Sunny Hills. The computer software Southern States used to perform its modeling, Cybernet®, is very well regarded by and widely used in the industry and, in my experience, produces very reliable results. Further, it is my professional opinion that hydraulic modeling is the preferred and the most accurate way of evaluating the demands placed on water transmission and distribution facilities.

Q. **HAVE YOU HAD THE OPPORTUNITY TO REVIEW ANY FLORIDA PUBLIC SERVICE COMMISSION ORDERS ADDRESSING THE SUBJECT OF THE USED AND USEFULNESS OF TRANSMISSION AND DISTRIBUTION FACILITIES FOR RATEMAKING PURPOSES?**

A. Yes, Southern States has provided me copies of the order issued in Southern State's 1992 consolidated rate case -- that order was issued on March 22, 1993, in Commission Docket No. 920199-WS -- and a copy of an order in a consolidated General Development Utilities, Inc. rate case -- that order was issued March 30, 1993, in Commission Dockets Nos. 920733-WS and 920734-WS. I have reviewed the used and useful portions of both of those orders.

Q. **ASSUMING BOTH OF THOSE ORDERS ARE REPRESENTATIVE OF COMMISSION DETERMINATIONS OF USED AND USEFUL FOR WATER TRANSMISSION AND DISTRIBUTION FACILITIES, WHAT IS YOUR OPINION OF THE RELATIONSHIP BETWEEN THE RATEMAKING CONCEPT OF USED AND USEFUL AND THE ENGINEERING REQUIREMENTS FOR TRANSMISSION AND DISTRIBUTION FACILITIES?**

A. There does not seem to be a direct relationship between the two. It appears that in an attempt to allocate costs between current and future connections, the Commission would not adequately consider the criteria which a utility must follow in designing the facilities which serve both current and future connections. As a design engineer, the ramifications of the Commission's methodology are a matter of concern to me. The Commission's methodology can make it difficult for me to recommend to a private utility that its facilities be designed in accordance with regulatory requirements and accepted design criteria -- as I have a professional obligation to do -- when the Commission's allocation methodology poses an economic disincentive for the utility to construct adequately designed facilities (so as to avoid the risk of not recovering the associated investment) and an economic disincentive for the utility to take advantage of economies of scale.

Q. **HAS THIS TYPE OF QUANDARY PRESENTED ITSELF IN THE COURSE OF YOUR ADVISING CLIENTS WHO ARE NOT REGULATED BY THE FLORIDA PUBLIC SERVICE COMMISSION?**

A. Although cost pressures frequently come into play, I can think of no instance where those pressures acted as such a direct disincentive for proper design and utilization of economies of scale as the used and useful methodology presented in these Commission orders potentially does.

Q. **IS IT YOUR TESTIMONY THAT HYDRAULIC MODELING WILL MORE ACCURATELY REFLECT THAT PORTION OF PLANT ACTUALLY UTILIZED BY CURRENT CONNECTIONS THAN**

DOES THE COMMISSION'S METHOD?

A. Yes, I believe hydraulic modeling is considerably more accurate and is preferable to the method described in the orders I have reviewed. The method used by the Commission, referred to as the lot count method, does not provide an accurate representation of or consider the demands placed on transmission and distribution facilities by current connections. Current connections utilize that portion of the transmission and distribution facilities which are required to meet the existing demand conditions placed on the facilities by those connections. Hydraulic modeling will clearly demonstrate this demand.

Q. **OTHER THAN A GENERALLY INACCURATE RECOGNITION OF THE DEMAND PLACED ON THE FACILITIES BY CURRENT CONNECTIONS, WHAT OTHER SPECIFIC PROBLEMS DO YOU PERCEIVE WITH THE COMMISSION'S METHODOLOGY?**

A. From a design engineer's point of view, the Commission's method fails to recognize that transmission and distribution facilities must accommodate fire flow and must be designed and sized to accommodate fire flow. Further, the Commission's methodology can also, depending on the manner of its application, ignore the current connections' utilization of looped lines.

Q. **WHAT PARTICULAR CONCERNS DO YOU HAVE REGARDING FIRE FLOW?**

A. The design criteria and regulations I referred to earlier require that if fire flow is provided to a service area, the transmission and distribution facilities serving that area must be designed and sized to accommodate the applicable level of fire flow. This requirement is supported by the fundamental design principle that a water utility system's ability to provide reliable fire flow is only as effective as the weakest link in the withdrawal-to-delivery sequence. If the distribution lines were not designed and sized so as to accommodate peak demands plus fire flow, the utility's ability to provide reliable fire flow would be diminished. Using a hydraulic analysis as the basis for the used and useful allocation is preferable not only because hydraulic considerations for fire flow are a design requirement, but also because the hydraulic analysis will accurately portray that portion of the transmission and distribution facilities necessary to provide those connections with adequate and reliable fire flow. The Commission's lot count methodology is fundamentally flawed because it does not -- or cannot -- recognize the demand for fire flow placed on transmission and distribution facilities by current connections.

Q. **YOU HAVE SAID YOU REVIEWED THE COMMISSION'S 1993 GDU RATE CASE ORDER. DO YOU DISAGREE WITH THE COMMISSION'S REFUSAL TO RECOGNIZE FIRE FLOW FOR TRANSMISSION AND DISTRIBUTION LINES IN THAT ORDER?**

A. Yes. I believe the Commission's refusal to recognize fire flow for distribution lines simply because fire flow is considered a function of water storage is incorrect for the reasons I have just stated. Moreover, storage will not serve to put out a fire if the transmission and distribution lines are too small to handle the flow.

Q. **DO YOU HAVE ANY PARTICULAR COMMENTS WITH REGARD TO LINE LOOPING?**

A. Yes. From my experience, sound system design for residential service areas requires line looping in order to improve pressure and the continuity of quality water service throughout a distribution network. That portion of transmission and distribution facilities attributable to looping is utilized by current connections for these purposes. Under the Commission's method, portions of the transmission and distribution facilities utilized to loop the system are not subjected to direct analysis and therefore could, by using the lot count methodology, not be considered. Conversely, with hydraulic modeling, lines used for looping purposes may be specifically analyzed.

Q. **YOU MENTIONED A DISINCENTIVE FOR PROPER DESIGN POSED BY THE COMMISSION'S LOT COUNT METHOD. COULD YOU ELABORATE WHAT YOU MEAN?**

Yes. The non-recognition of the fire flow demands placed on transmission and distribution lines, for example, brings the disincentive for proper design clearly into focus. The lot count method sends an economic signal to the regulated utility to reduce its line sizes, despite design requirements to accommodate fire flow, so the utility will decrease the risk of not recovering the investment associated with proper design. The disincentive against sizing lines to meet maximum day and peak hour requirements is the same. I believe that this disincentive would be abated if the Commission used a hydraulic analysis to determine used and useful for transmission and distribution facilities.

Q. YOU ALSO MENTIONED ECONOMIES OF SCALE. IN YOUR EXPERIENCE, DO UTILITIES AND OTHER WATER SUPPLIERS GENERALLY PREFER TO CONSTRUCT TRANSMISSION AND DISTRIBUTION FACILITIES IN ORDER TO TAKE ADVANTAGE OF ECONOMIES OF SCALE?

A. Yes. Utilities and water suppliers take advantage of economies of scale by bulk purchasing materials, taking advantage of the time value of money, competitively bidding projects, parallelling water lines with other utility facilities, and minimizing other costs such as contractor mobilization costs, permitting costs, pressure testing, bacteriological testing and engineering costs. By taking advantage of available economies of scale, utilities and water suppliers can provide water at a lower per unit cost, and that lower per unit cost is in the long term best interests of the parties paying for the facilities.

Q. IS IT YOUR TESTIMONY THAT THE COMMISSION'S LOT

COUNT METHODOLOGY FOR DETERMINING USED AND USEFUL DISCOURAGES UTILITIES FROM TAKING ADVANTAGE OF THESE ECONOMIES?

A. Yes. The lot count methodology would act as a disincentive to taking advantage of economies of scale. To illustrate, under the lot count method, a water utility regulated by the Commission is discouraged from installing water lines concurrent with the electric, telephone, or other utility facilities laid by county, city, or other entities despite the fact that the water utility could save money on construction by doing so. Again, I think a hydraulic analysis would pose less of a disincentive.

Q. DO YOU HAVE ANYTHING FURTHER TO ADD?

A. No.