COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE APPLICATION OF MONROE COUNTY WATER DISTRICT FOR AUTHORIZATION TO ENTER AN ASSISTANCE AGREEMENT WITH THE KENTUCKY INFRASTRUCTURE AUTHORITY AND FOR A CERTIFICATE OF PUBLIC CONVENIENCE TO CONSTRUCT A WATER TREATMENT FACILITY, ELEVATED STORAGE TANK, AND WATER TRANSMISSION AND DISTRIBUTION MAINS	**)**	**CASE NO. 2015-00315**

DIRECT TESTIMONY OF
ROBERT D. STIGALL
STIGALL ENGINEERING ASSOCIATES, INC.

Filed: March 16, 2016

Q. Please state your name, position, and business address.

A. My name is Robert D. Stigall. I am President of Stigall Engineering Associates, Inc., a consulting engineering firm. My business address is 4117 Hillsboro Pike, Suite 206, Nashville, Tennessee.

Q. Briefly describe your educational and professional background.

A. I hold a bachelor's degree in civil engineering from Vanderbilt University. I am licensed as a professional engineer in the states of Tennessee and Kentucky. I am an active member of the Tennessee Association of Utility Districts, Tennessee Society of Professional Engineers, Tennessee Gas Association and the National Society of Professional Engineers. A professional resume, which contains a more complete list of my memberships, my work experience, and my professional recognitions, is attached to my testimony as Exhibit RDS-1.

Q. Are you currently engaged by Monroe County Water District ("Monroe District")?

A. Yes. My consulting firm has performed engineering services for Monroe District since prior to 2007. In July 2007, Monroe District's Board of Commissioners selected my firm to design and oversee the construction of the facilities for which Monroe District now seeks a certificate of public convenience and necessity ("Proposed Facilities").

Q. In his testimony, Mr. Mark Williams describes Monroe District's water supply problems and its efforts to solve those problems. Do you agree with his description of these problems and the efforts to resolve them?

A. Yes. Mr. Williams accurately describes the nature of the problems that Monroe District currently faces and has faced for several years and the efforts that the water district has undertaken to find a solution.

Q. Did you prepare a report on these problems?

A. Yes. In 2008, I prepared a preliminary engineering report regarding Monroe District's water supply problems. I subsequently revised that report in April 2010.

Q. Is the preliminary engineering report that you prepared attached to Monroe District's Application as Exhibit 11?

A. A copy of a revised edition of the Preliminary Engineering Report is attached to the Application as Exhibit 11.

Q. What was the report's recommendation?

A. The report found that, among the available options available to resolve Monroe District's water supply needs, the most cost-effective and best long-term alternative was the construction of a water treatment plant that has a production capacity of 3.0 million gallons per day ("MGD") and that uses the Cumberland River as its water source.

Q. Please describe the Proposed Facilities.

A. Monroe District proposes to construct a 2.0 MGD water treatment facility; approximately 24,715 linear feet of 16-inch ductile iron, and 29,475 linear feet of 10-inch polyvinylchloride ("PVC") water main; and a 600,000 gallon elevated-water storage tank.

The Proposed Facilities will be constructed as three contracts. Contract I: Water Treatment Plant requires construction of the water treatment plant facilities to

be completed within 600 calendar days. The remaining contracts, Contract IIB: Water Lines and Contract IIIB: Elevated Storage Facility, require construction to be completed with 450 calendar days. Work on the contracts will be concurrent. The contracts will have the same work commencement date.

"Contract I: Water Treatment Plant" involves the construction of the proposed water treatment facility. This facility will have an initial capacity of 2.0 MGD, but can be expanded to 3.0 MGD. It will have Actiflo pre-treatment; three dual media rapid rate gravity filters with a maximum filtration rate of 873.3 gallons per minute ("gpm") per filter; a 250,000 gallon clearwell; two high service pumps capable of pumping 1,400 gpm; two raw water pumps with a pumping capacity of 1,400 gallons; a sludge filter press system; and other various appurtenances. The proposed water treatment facility's raw water intake will be on the Cumberland River at River Mile 393.7. A 12-inch PVC water line will run approximately 7,500 feet along Cloyd Williams Road in Monroe County from the raw intake to the proposed water treatment facility, which will be located one mile from the Cumberland River and above the 100 year flood elevation.

"Contract IIB: Water Lines" involves the construction of approximately 24,715 linear feet of 16-inch ductile iron water main and 29,475 linear feet of 10-inch PVC water main and modifications to the County House Road Pumping Station. Monroe District proposes to construct 21,600 feet of 16-inch ductile iron water main running from the proposed water treatment plant site to the site of the proposed elevated water storage tank and running parallel to Cloyd Williams Road. An additional 3,000 feet of 16-inch ductile iron water main will be constructed from the

storage tank site to the intersection of Cloyd Williams Road, Capp Harlan Road and Kentucky Highway 163. From this intersection, 7,000 feet of 10-inch PVC water main will be constructed along Capp Harlan Road to Monroe District's Persimmon Pumping Station. An additional 22,400 feet of 10-inch PVC water main will be constructed from the intersection to Monroe District's County House Road Storage Tank. This segment will first run along Kentucky Highway 163, then through approximately 6,000 feet of private property along acquired easements, and then along Kentucky Highway 1366.

"Contract IIIB: Elevated Storage Facility" involves the construction of a 600,000 gallons elevated water storage tank.

Q. Did you prepared or supervise the preparation of the plans and specifications for the Proposed Facilities.

A. Yes, I did. A copy of the plans and specifications for the Proposed Facilities is attached to Monroe District's Application. The table below shows where these documents appear in the Application.

Table I	
Exhibit	**Document**
3	Plans for Contract I: Water Treatment Plant
4	Specifications for Contract I: Water Treatment Plant
5	Plans for Contract IIB: Water Lines
6	Specifications for Contract IIB: Water Lines
7	Plans for Contract IIIB: Elevated Storage Facility
8	Specifications for Contract IIIB: Elevated Storage Facility

Q. Has the Kentucky Division of Water ("KDOW") approved the plans for the Proposed Facilities?

A. Yes. The KDOW has reviewed the plans and specifications for the Proposed Facilities and has approved them with respect to sanitary features of design. A copy

of the letters in which the KDOW stated its approval is set forth at Exhibits 14 through 16 of Monroe District's Application.

Q. Has Monroe District received all of the required permits from KDOW to proceed with the construction of the proposed facilities?

A. Yes. The KDOW has issued to Monroe District a Stream Construction Permit that authorizes Monroe District to construct a raw water intake in the Cumberland River. A copy of this permit is attached as Exhibit 17 to Monroe District's Application. The KDOW has also certified that the construction of the Proposed Facilities will not be result in the violation of applicable water quality standards. This certification is attached as Exhibit 18 to Monroe District's Application. Finally, the KDOW has issued a water withdrawal permit to Monroe District that permits the withdrawal of a maximum of 2.8 MGD from the Cumberland River. A copy of this permit is attached as Exhibit 19 to Application.

Q. What approval or permit, if any, has Monroe District yet to obtain in order to construct and operate the Proposed Facilities?

A. Monroe District requires a permit under 33 USC §§ 404 and 1344 to construct and deposit material into the Cumberland River and certain streams and waterways located between the proposed raw water intake and the proposed water treatment plant. Monroe District originally obtained the required permit from the U.S. Army Corps of Engineers ("USACE") in 2011, but the permit expired before Monroe District could obtain the necessary funding for the Proposed Facilities. On February 19, 2015, it applied for a new permit. Its application was considered completed as of September 1, 2015. Issuance of the required permit, however, has

been delayed because of negotiations between the USACE and certain agencies of Kentucky state government. A USACE representative recently advised me that these negotiations had been completed, a memorandum of agreement had been entered, and that the requested permit should be issued shortly. As soon as Monroe District receives this permit, it will file a copy of the permit with the Public Service Commission.

As some of the proposed water mains will be located in the right-of-way of state highways, KRS 177.106 requires Monroe District to obtain an encroachment permit from the Kentucky Highways Department prior to any excavation of those rights-of-way. As part of its application for an encroachment permit, Monroe District must agree to indemnify the Highways Department from all claims and demands arising out of proposed work and present evidence of such indemnification. This evidence consists of a certificate of insurance to cover the liability to the Highways Department, a payment bond to ensure payment of any penalties assessed to Monroe District, and a performance bond to guarantee the performance of the permitted work To avoid the expense of obtaining its own insurance or performance bond, Monroe District will rely upon those of the selected project contractor. Monroe District, however, cannot provide evidence of this insurance coverage or performance bond until it enters into a construction contract with that contractor. Reasonable business practice requires that Monroe District not assume the obligations of such a contract until the Public Service Commission has issued a certificate of public convenience and necessity for the proposed project. Hence, Monroe District cannot complete the application for the required encroachment permit until a certificate of public

convenience and necessity is issued for the project. As soon as the certificate is obtained, Monroe District will file a copy of the permit with the Public Service Commission. Monroe County has previously granted permission to Monroe District to located any proposed water mains in the right-of-way of county roads. A copy of the letter from Monroe County Judge Executive Tommy Willett granting such permission is attached to my testimony as Exhibit RDS-2.

Q. Has Monroe District requested bids on the three contracts for the Proposed Facilities?

A. Yes. Monroe District requested and received bids on the construction of the Proposed Facilities. It opened bids on September 23, 2015. A copy of the certified bid tabulations and my recommendations is found in the Final Engineering Report, which is attached as Exhibit 12 to Monroe District's Application. A copy of the resolutions of Monroe District's Board of Commissioners authorizing the selection of lowest bidders can be found at Exhibits 23 through 25 of Monroe District's Application. Under the terms of request for bids, these bids could be withdrawn 90 days after bid submission. Each of the firms whose bid was selected, however, has extended the effective date of its bid to March 21, 2016. A copy of the notices of extension is found at Exhibits 20 through 22 of Monroe District's Application. Based upon the accepted bids, I estimate the total cost of the Proposed Facilities is $15,962,694.

Q. Did you prepare a detailed estimate of the property that Monroe District will acquire as a result of the proposed projects?

A. Yes. This estimate, arranged according to the Uniform System of Accounts for Class A/B Water Districts and Associations, is attached to Monroe District's Application as Exhibit 30.

Q. In his written testimony, Mr. Mark Williams has testified as to the need for the proposed water treatment plant. Do you agree with his reasoning?

A. Yes, I do.

Q. Mr. Williams did not explain the need for the proposed 600,000 gallon elevated water storage tank. Why is that facility needed?

A. The proposed 600,000 gallon elevated water storage tank serves two major purposes. First, the proposed water storage tank allows Monroe District to maintain an acceptable operating pressure for ductile iron pipe water transmission main that will transport water from the proposed water treatment plant to Monroe District's water distribution system. As shown in Exhibit RDS-3, an excerpt from the hydraulic calculations that were filed as Exhibit 13 to Monroe District's Application, the pressure on the proposed ductile iron transmission main at the proposed water treatment plant with the proposed tank is 272 pounds per square inch ("psi"). Monroe District proposes to use of 300 psi pipe and fittings. If the proposed water storage tank is not constructed, Monroe District must directly pump treated water from the proposed water treatment plant to its Persimmon Tank, which is the water district's northernmost water storage tank and the most distant from the proposed water treatment plant. The Persimmon Tank is nine miles from proposed water storage tank and sits at an elevation that is 119 feet higher than that of the proposed water storage tank (1238 feet mean sea level as compared to 1119 mean sea level). The resulting

pressure on the proposed ductile iron transmission main would be 558.1 psi, well in excess of the pipe's capability and that of the PVC mains that make up the water district's distribution system.[1] Simply put, without the proposed water storage tank, neither the proposed ductile iron pipe nor Monroe District's existing PVC pipes could withstand the required pressures.

Secondly, the proposed water storage tank will supply water to Monroe District's existing Persimmon and County House water storage tanks. The current supply sources for these storage tanks are booster pumps owned and operated by the Monroe County Water District. These booster pump stations are fed by water storage tanks that the City of Tompkinsville owns. Upon completion of the Proposed Facilities, Monroe District will not be purchasing water from Tompkinsville and its water distribution system will be valved off from the Tompkinsville water distribution system. These two Tompkinsville water storage tanks, therefore, must be replaced or Monroe District's existing booster stations will have no means of supply.

Q. Did you determine the cost of operating the Proposed Facilities upon their completion?

A. Yes, I did. Based upon my calculations, the approximate annual cost of operation of the Proposed Facilities is estimated be $328,141. A schedule of these costs is set forth in Exhibit 26 of Monroe District's Application.

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[1] Using Hazen-Williams Equation and assuming 2.0 MGD (1,388 GPM) through 9 miles of existing 10-inch line to Persimmon Tank (C=130):

$Hf = 0.002083\ L\ (100/C)^{1.85}\ GPM^{1.85}/10^{4.8655}$

$hf = 0.002083\ (47{,}520)\ (100/130)^{1.85}\ (1{,}388)^{1.85}/10^{4.8655}$

$hf = 0.002083\ (47{,}520)\ (0.615)\ (650{,}759/73{,}366)$

hf = 539.9 feet = 233.8 psi increase due to head loss through piping + 119 feet increase in elevation = 51.5 psi = 285.3 psi increase + 272.8 psi existing = 558.1 psi

Q. How did you determine these costs?

A. My estimate is based upon the actual operations of Crittenden-Livingston Water District's water treatment plant. I provide engineering services to that water district and had access to its water treatment plant's detailed records. That water treatment plant, although larger in scale than the water treatment plant that Monroe District proposes to build, is similar in design and uses the Cumberland River as its water source. Therefore, it is very representative of the proposed water treatment plant's expected operational costs. I adjusted Crittenden-Livingston Water District's actual operation costs to reflect to an average daily water production of 750,000 gallons, or an annual water production of 273.75 million gallons. This level of production is generally consistent with Monroe District's historic purchase of water from its present water supplier.

Q. Will this level of operating costs be lower than the present cost of purchasing water from Tompkinsville?

A. Yes. Tompkinsville presently charges a rate of $2.25 per 1,000 gallons. The annual purchased water expense for 273,750,000 at this rate is $615,938. Monroe District's cost of producing the water is only $328,141, or $287,797 less. These savings, however, do not reflect the additional debt service costs that Monroe District will incur to construct the Proposed Facilities.

Q. What is your recommendation concerning the Proposed Facilities?

A. The Proposed Facilities are absolutely necessary for Monroe District to provide safe, adequate, and reliable water service to its customers. I recommend that the

Commission grant Monroe District a certificate of public convenience and necessity to construct the Proposed Facilities.

Q. Does this conclude your testimony?

A. Yes.

VERIFICATION

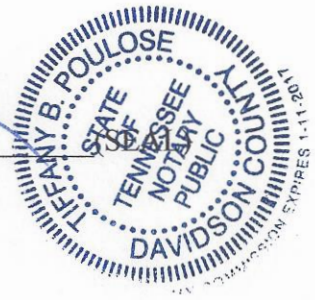
STATE OF TENNESSEE)
) **SS:**
COUNTY OF DAVIDSON)

The undersigned, **Robert D. Stigall**, being duly sworn, deposes and says that he has personal knowledge of the matters set forth in the foregoing testimony and that the answers contained therein are true and correct to the best of his information, knowledge and belief.

ROBERT D. STIGALL

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 16 day of March, 2016.

Notary Public



My Commission Expires:
01-11-2017

EXHIBITS TO THE DIRECT TESTIMONY OF ROBERT D. STIGALL

Exhibit	Document
RDS-1	Professional Resume of Robert D. Stigall
RDS-2	Letter from Monroe County Judge Executive Tommy Willett to Monroe County Water District Chairman Mark Williams (February 18, 2016)
RDS-3	Excerpt from Monroe County Water District Phase IX Water System Improvements Hydraulic Calculations (Page 10)

EXHIBIT RDS-1

R O B E R T D. S T I G A L L

4117 Hillsboro Pike, Suite 206 · Nashville, Tennessee 37215 · Telephone: 615.460.7515

Personal Resumé

Education:

Bachelor Degree Civil Engineering
Vanderbilt University - 1981

Professional Registrations:

- Tennessee Registration No. 18,048
- Kentucky Registration No. 15,006

Active Member of the following Associations:

- Tennessee Association of Utility Districts
- Tennessee Society of Professional Engineers
- National Society of Professional Engineers
- Tennessee Gas Association

Professional Recognition:

Started own Consulting Engineering firm and currently works with over 25 Municipalities, Utility Districts and Water Districts.

Nashville Chapter Director of National "MATHCOUNTS" program from 1988 – 1993.

Received the Nashville Chapter of the Tennessee Society of Professional Engineers *Young Engineer of the Year* award (1993)

State Director of National "MATHCOUNTS" program from 1994 – 1997.

Served on the Tennessee Gas Association Distribution Committee (1994)

President of the Nashville Chapter of the Tennessee Society of Professional Engineers (1997-1998)

Served as "Expert Witness" in Texas Eastern Pipeline versus Wright & Lopez lawsuit.

EXHIBIT RDS-2

Tommy Willett
MONROE COUNTY JUDGE EXECUTIVE
200 N. Main St. Suite C
Tompkinsville, KY 42167
OFFICE (270)487-5505 HOME (270)487-8616

February 18, 2016

Mark Williams, Chairman
Monroe County Water District
205 Capp Harlan Road
Tompkinsville, Kentucky 42167

Mr. Williams:

It is with pleasure to offer Monroe County Water District permission to install waterlines on county right of ways in all of Monroe County. The availability of water service to all residence of Monroe County is a valuable and needed asset. If I can assist Monroe County Water District in any capacity, please contact me.

Sincerely,

Tommy Willett
County Judge Executive

EXHIBIT RDS-3

	(gpm)	(ft)	(ft)	(ft)	(psi)
CLOYD WILL	----	1117.46	998.50	118.96	51.55
COUNTY HOU	----	1145.49	1009.00	136.49	59.14
J-1	0.00	1115.23	1028.00	87.23	37.80
J-10	0.00	1145.49	1020.00	125.49	54.38
J-11	0.00	1158.55	960.00	198.55	86.04
J-12	0.00	1163.50	785.00	378.50	164.02
J-13	0.00	1059.42	950.00	109.42	47.41
J-14	0.00	1065.19	780.00	285.19	123.58
J-15	0.00	1068.33	780.00	288.33	124.94
J-16	0.00	1078.03	915.00	163.03	70.64
J-17	0.00	1081.05	850.00	231.05	100.12
J-18	0.00	1105.77	990.00	115.77	50.17
J-19	0.00	1287.29	1030.00	257.29	111.49
J-2	0.00	1115.71	1000.00	115.71	50.14
J-20	0.00	1285.77	1050.00	235.77	102.17
J-21	0.00	1273.80	1050.00	223.80	96.98
J-22	0.00	1289.78	1005.00	284.78	123.41
J-23	0.00	1208.39	1090.00	118.39	51.30
J-24	0.00	1208.59	1090.00	118.59	51.39
J-25	0.00	1235.88	1060.00	175.88	76.21
J-26	0.00	1255.57	1020.00	235.57	102.08
J-27	0.00	1264.88	1070.00	194.88	84.45
J-28	0.00	1275.04	1050.00	225.04	97.52
J-29	0.00	1165.41	530.00	635.41	275.35
J-3	0.00	1292.01	1025.00	267.01	115.71
J-30	0.00	1169.55	530.00	639.55	277.14
J-31	0.00	1150.69	565.00	585.69	253.80
J-32	0.00	1137.16	900.00	237.16	102.77
J-33	0.00	1139.50	860.00	279.50	121.12
J-34	0.00	1264.54			
J-35	0.00	1117.47	1000.00	117.47	50.90
J-36	37.50 (0.25)	1145.48	1009.00	136.48	59.14
J-37	52.00 (0.25)	1117.46	998.50	118.96	51.55
J-38	82.00 (0.25)	1208.38			
J-39	0.00	1262.67	1070.00	192.67	83.49
J-4	0.00	1298.54	1010.00	288.54	125.03
J-40	0.00	1252.70	1040.00	212.70	92.17
J-41	0.00	1232.84	1070.00	162.84	70.57
J-42	0.00	1213.51	1130.00	83.51	36.19
J-43	0.00	1218.78	1130.00	88.78	38.47
J-5	0.00	1306.17	1040.00	266.17	115.34
J-6	0.00	1309.36	1050.00	259.36	112.39
J-7	0.00	1315.49	1000.00	315.49	136.71
J-8	0.00	1318.18	1021.00	297.18	128.78
J-9	0.00	1327.32	1040.00	287.32	124.51
PERSIMMON	----	1208.38	1115.00	93.38	40.47
I-Pump-1	0.00	1057.55			
O-Pump-2	0.00	1329.96	995.00	334.96	145.15
I-Pump-3	0.00	549.98	540.00	9.98	4.33
R-2	----	550.00			
O-Pump-1	0.00	1168.45			
I-Pump-2	0.00	1103.70	995.00	108.70	47.10
O-Pump-3	0.00	1169.69	540.00	629.69	272.86

PRESSURE AT WATER PLANT PUMPING TO NEW 600,000 GALLON TANK

MAXIMUM AND MINIMUM VALUES

PRESSURES

JUNCTION NUMBER	MAXIMUM PRESSURES (psi)	JUNCTION NUMBER	MINIMUM PRESSURES (psi)