Exhibit No.:	
Issues:	Tank Painting Tracker Adjustment, St. Louis County Fire Hydrant Lead Based Paint Abatement and Repainting Project, New Treatment Processes Related Electricity Cost Adjustment, Lost Water Adjustment
Witness:	Frank L. Kartmann
Exhibit Type:	Rebuttal CORRECTED REDACTED
Sponsoring Party:	Missouri-American Water Company
Case No.:	WR-2008-0311 SR-2008-0312
Date:	October 3, 2008

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. WR-2008-0311
CASE NO. SR-2008-0312

REBUTTAL TESTIMONY

OF

FRANK L. KARTMANN

ON BEHALF OF

MISSOURI-AMERICAN WATER COMPANY

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

IN THE MATTER OF MISSOURI-AMERICAN WATER COMPANY FOR AUTHORITY TO FILE TARIFFS REFLECTING INCREASED RATES FOR WATER AND SEWER SERVICE	)))))	**CASE NO. WR-2008-0311** **CASE NO. SR-2008-0312**

AFFIDAVIT OF FRANK L. KARTMANN

Frank L. Kartmann, being first duly sworn, deposes and says that he is the witness who sponsors the accompanying testimony entitled "Corrected Rebuttal Testimony of Frank L. Kartmann"; that said testimony and schedules were prepared by him and/or under his direction and supervision; that if inquires were made as to the facts in said testimony and schedules, he would respond as therein set forth; and that the aforesaid testimony and schedules are true and correct to the best of his knowledge.

Frank L. Kartmann

State of Missouri
County of St. Louis
SUBSCRIBED and sworn to
Before me this 3rd **day of** October **2008.**

Notary Public

My commission expires:

Staci A. Olsen
Notary Public - Notary Seal
State of Missouri
St. Charles County
Commission # 05519210
My Commission Expires: March 20, 2009

CORRECTED REBUTTAL TESTIMONY
FRANK L. KARTMANN
MISSOURI-AMERICAN WATER COMPANY
CASE NO.WR-2008-0311
CASE NO.SR-2008-0312

TABLE OF CONTENTS

CORRECTED REBUTTAL TESTIMONY
OF
FRANK L. KARTMANN

I. WITNESS INTRODUCTION

Q. STATE YOUR NAME AND BUSINESS ADDRESS?

A. Frank Kartmann, 727 Craig Road, St. Louis, Missouri 63141.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am Vice President of Operations for Missouri-American Water Company ("MAWC" or the "Company").

Q. ARE YOU THE SAME FRANK KARTMANN THAT PROVIDED DIRECT TESTIMONY IN THIS CASE?

A. Yes.

II. TANK PAINTING TRACKER ADJUSTMENT

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY ON THIS ISSUE?

A. My rebuttal testimony will address statements in the Staff Report -- Cost of Service concerning the Tank Painting Tracker, as well as the direct testimony on this subject provided by Missouri Industrial Energy Consumers (MIEC) witness Brian C. Collins.

Q. ON PAGE 40 OF THE STAFF REPORT -- COST OF SERVICE, STAFF RECOMMENDS THAT THE TANK PAINTING TRACKER SHOULD CONTINUE AT THE CURRENT ANNUAL LEVEL OF $1,000,000. DOES THE COMPANY AGREE WITH THIS RECOMMENDATION?

A. No.

Q. WOULD YOU PLEASE SUMMARIZE YOUR DIRECT TESTIMONY EXPLAINING WHY THE TANK PAINTING TRACKER LEVEL SHOULD NOT CONTINUE AT AN ANNUAL LEVEL OF $1,000,000?

A. Yes. The Company conducted an analysis of the life expectancies of all of its interior and exterior tank coatings. This involved impacts on coating life expectancies such as type of coating, whether it exists as an interior or exterior coating, the environments to which these coatings are exposed, the type of surface that is coated (i.e., riveted steel verses welded steel), current coating condition, whether the existing coating would be over coated or removed or replaced and whether the coating is lead containing. This analysis resulted in the assignment of a life expectancy of each coating on each tank in the Company's districts. Following this exercise, an estimated price, in 2007 dollars to either overcoat or replace each coating was determined.

The Company utilized this information to calculate the average interior and exterior coating life expectancies and replacement cost. The Company next calculated the average number of interior and exterior painting projects to determine average annual tank painting expense. In 2007 dollars, the average annual tank painting expense was determined to be approximately $1,600,000.

This analysis is more thoroughly described in my direct testimony beginning on page 20.

Q. ON PAGE 20 OF THE STAFF REPORT – COST OF SERVICE, THE STAFF STATES, "THE TRACKER WAS IN EFFECT FOR THE LAST TWO MONTHS OF THE TEST YEAR IN THIS CASE. AS OF MARCH 31, 2008, THE TRACKER HAS PRODUCED A REGULATORY LIABILITY OF $401,737." ON PAGE 40 OF THE STAFF REPORT -- COST OF SERVICE, STAFF FURTHER STATES, "HOWEVER, WITH THE NEW TANK PAINTING TRACKER ONLY BEING IN EFFECT FOR TWO MONTHS OF

THE TEST YEAR, THE STAFF WOULD RECOMMEND CONTINUING THE TRACKER AT THE $1,000,000 ANNUAL LEVEL." DO YOU AGREE WITH STAFF'S RECOMMENDATION?

A. No. The true-up date in this case is expected to be September 30, 2008. Thus, actual expenditures as of this date, as adjusted for new contracts, are relevant for purposes of setting the annual level of the tracker going forward.

Q. HOW DOES THE TRACKER MECHANISM OPERATE?

A. The tracker was established in the Company's last rate case in order to provide adequate funds for MAWC to undertake the extensive tank paint program I have discussed. To the extent MAWC spends less than the amount of the tracker included in rates (currently $1,000,000), the customer is protected by setting up a regulatory liability that will flow back to customers over time. This provides assurance that the Company will utilize those funds accordingly for the tank painting program. If the Company spends more than the authorized tracker amount, a regulatory asset is established that should be recovered by the Company over time.

Q. WHY IS IT IMPORTANT THEN THAT THE AUTHORIZED AMOUNT OF THE TRACKER BE COMMENSURATE WITH THE ANNUAL LEVEL OF EXPENDITURES?

A. The existence of the tracker is important as a protection for both the customer and MAWC. It is intended to act as a balancing mechanism to insure that the costs of the tank painting program and only the costs of that program, are appropriately recovered. If the tracker is set substantially below the level of annual expenditures, however, the regulatory asset will continue to grow from year to year and future customers will be expected to pay for costs that should be borne by existing customers. The converse would be true if actual tank painting were below the tracker level on an ongoing basis. In this case, we know that both current and future expenditure will exceed the existing tracker base amount of $1,000,000.

Q. WHAT IS THE LEVEL OF 2008 TANK PAINTING EXPENSE THE COMPANY HAS INCURRED IN 2008?

A. As of September 22, 2008, the Company has incurred $1,064,072.65, of tank painting expense in 2008.

Q. WHERE DOES THIS FALL WITH RESPECT TO THE ANNUAL LEVEL OF THE TANK PAINTING TRACKER?

A. The Company has incurred tank painting expense in 2008, as of September 22, 2008, that is in excess of the tracker by $64,072.65.

Q. WHAT DOES THIS LEVEL OF TANK PAINTING EXPENSE INCURRED BY THE COMPANY THUS FAR IN 2008 COMBINED WITH THE RESULTS OF THE TANK PAINTING ANALYSIS CONDUCTED BY THE COMPANY INDICATE?

A. The combination of:

1. Painting tanks in the first year following the establishment of the tracker at a rate of expense greater than that of the tracker;
2. The Company's analysis that $1,600,000 in 2007 dollars is an appropriate level of tank painting to perform each year;
3. The Company's request in this case that the tank painting tracker be increased to a higher annual level; and,
4. The nature of a tracker in that it encourages the Company to conduct tank painting at a level of expense equal to the annual tracker level;

provides a strong indication that the Company will conduct tank painting at an annual level of expense equal to the annual level of the tracker and that the annual level of the tracker should be set at an expense level that supports the quantity of tank painting determined in the Company's analysis, which in 2007 dollars is $1,600,000.

Q. ON PAGE 40 OF THE STAFF REPORT -- COST OF SERVICE, WHAT POINT IS THE STAFF MAKING WHEN IT DESCRIBES THE COMPANY'S

2008 TANK PAINTING CONTRACTS AS HAVING A COMBINED VALUE OF SLIGHTLY OVER $1,000,000?

A. The Staff makes this statement immediately following its recommendation that the tracker continue at an annual value of $1,000,000, as if to state that contracts of a different value might have driven a different result.

Q. SIMILARLY, ON LINES 4 AND 5 OF PAGE 5 OF MIEC WITNESS BRIAN C. COLLINS' DIRECT TESTIMONY, HE CLAIMS THE COMPANY HAS NOT PROVIDED SUFFICIENT EVIDENCE THAT THE $1,600,000 WILL BE AN ONGOING LEVEL OF EXPENSE. DO YOU AGREE WITH THIS STATEMENT?

A. No. As described in my direct testimony and reiterated above, the Company has conducted an analysis of its tank coating life expectancies and replacement costs to arrive at an annual average tank painting expense of $1,600,000 in 2007 dollars. Further, the Company has fully executed contracts for its 2009 tank painting activity, which correspond to the annual quantity of tank painting supported by the analysis. Copies of these contracts are attached to this rebuttal testimony as **Schedules FLK-4a through 4f**.

Q. WHAT IS THE TOTAL VALUE OF THESE CONTRACTS?

A. These contracts have a total expense value of $1,673,245.67, not including taxes.

Q. WHY IS THE TOTAL OF THESE CONTRACTS GREATER THAN THE $1,600,000 VALUE PROPOSED IN YOUR DIRECT TESTIMONY?

A. As discussed in my direct testimony, the Company anticipated at the time of the submission of that testimony that increases in inputs such as labor, materials, and fuel would drive the cost to perform the average annual quantity of tank painting work supported by the Company's analysis above the estimates made at the time of that analysis in 2007 dollars. That is what has occurred to drive the 2009 contract value above $1,600,000.

Q. IN LIGHT OF THE ABOVE DISCUSSION, WHAT IS YOUR RECOMMENDATION FOR THE LEVEL OF THE TANK PAINTING TRACKER?

A. I recommend that the tank painting tracker be adjusted to a value of $1,700,000. After the inclusion of taxes on the value of these contracts, their total expense value will approximate $1,700,000.

III. ST. LOUIS COUNTY FIRE HYDRANT LEAD BASED PAINT ABATEMENT AND REPAINTING PROJECT

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY ON THIS ISSUE?

A. My rebuttal testimony will address MIEC witness Brian C. Collins' direct testimony regarding hydrant painting expense.

Q. ON LINES 16 THROUGH 19 ON PAGE 6 OF WITNESS COLLINS' DIRECT TESTIMONY, HE INDICATES THAT ACCORDING TO THE COMPANY IT DOES NOT HAVE CONTRACTS FOR HYDRANT PAINTING AND THAT IT HAS RECEIVED ONLY ONE PROPOSAL WITH RESPECT TO HYDRANT PAINTING. IS THIS STILL THE CASE?

A. No. Since the time of witness Collins' direct testimony, as anticipated in my direct testimony, the Company has received quotes from three painting contractors for the work of performing Environmental Protection Agency (EPA) and Missouri Department of Natural Resources (MDNR) regulatory compliant lead based paint abatement and disposal and repriming and repainting of those fire hydrants in the St. Louis County district with lead containing paint coatings. Copies of the quotes received for this work are attached as **Schedules FLK-5a through 5c**. In addition, as anticipated in my direct testimony, the Company has executed a contract with one of these

contractors for this work. A copy of this contract is attached as **Schedule FLK-6**.

Q. DID THE CONTRACTOR PRICE FOR THIS WORK CHANGE FROM THAT REPORTED IN YOUR DIRECT TESTIMONY?

A. Yes. The contract is for a price of * * per fire hydrant rather than the estimated unit price of $250 per hydrant that was provided in my direct testimony. Since the filing of the direct testimony, the Company has solicited and received price quotes from three painting contractors in order to establish a more accurate price for this work. Based on the assumption that this would be a three year project, the annual cost at * * per fire hydrant is * * rather than the estimated annual cost of $1,417,000 provided in my direct testimony.

Q. ON LINES 1 THROUGH 8 ON PAGE 7 OF WITNESS COLLINS' DIRECT TESTIMONY, HE CLAIMS THE COMPANY HAS NOT JUSTIFIED AN INCREASE IN HYDRANT PAINTING EXPENSE BECAUSE IT HAS NOT INCURRED ANY EXPENSE WITH RESPECT TO HYDRANT PAINTING IN THE TEST YEAR AND HAS NOT YET SIGNED CONTRACTS TO CONDUCT THE HYDRANT PAINTING. IS THIS INFORMATION CURRENTLY ACCURATE?

A. No. While not in the test year, but rather in the true up period in this case, the Company has conducted pilot hydrant lead based paint abatement, disposal, repriming and repainting projects with two of the three contractors having provided price quotes for this work. Furthermore, as stated above a contract for this work has been executed with one of these contractors for this project.

Q. WHAT WAS THE PURPOSE OF THE PILOT PROJECTS?

A. The purpose of these pilot projects was two-fold:

1. To allow the prospective painting contractors the opportunity to conduct several iterations of the work required to be done to these fire hydrants and thereby enable them to develop efficient quotes to be

supplied to the Company in its development of a contract for this work; and,

2. To enable the Company to observe the lead based paint removal/containment, surface preparation and repainting process and observe some examples of the finished product performed by these prospective contractors.

Q. IS THE COST OF THIS WORK KNOWN AND MEASURABLE?

A. Yes. The cost per fire hydrant is known, as evidenced by the contract in place for this work, and when combined with a number of fire hydrants is measureable.

Q. WHILE ONLY PILOT PROJECTS FOR THIS WORK HAVE BEEN CONDUCTED, WHAT ASSURANCE CAN THE COMPANY PROVIDE THAT THIS WORK WILL BE CONDUCTED GOING FORWARD FROM THIS CASE?

A. Like the tank painting tracker, a hydrant painting tracker could be established thereby encouraging the Company to perform the work and enabling Staff the opportunity to readily audit the Company's performance in completing this work. If the work is not completed in accordance with such a tracker, then appropriate action can be taken to balance rate recovery and actual expenses. An alternative to a hydrant painting tracker could be to simply increase the tank painting tracker (or rename it as the painting tracker) to include the expense associated with this hydrant painting work.

Q. WITNESS COLLINS, ON LINES 5 THROUGH 8 ON PAGE 7 OF HIS DIRECT TESTIMONY, GOES ON TO STATE THAT "...THE COMPANY HAS NOT MADE A COMPELLING ARGUMENT THAT THE HYDRANT PAINTING IS NECESSARY SINCE IT STATES THAT IT WILL ONLY HAVE THE HYDRANT PAINTING WORK PERFORMED IF ITS PROJECTED HYDRANT PAINTING EXPENSE IS APPROVED BY THE COMMISSION

PRIOR TO THE WORK BEING PERFORMED." DO YOU AGREE WITH WITNESS COLLIN'S CHARACTERIZATION OF THIS MATTER?

A. No, I do not. As addressed in my direct testimony, proper treatment necessitates that these fire hydrant paint coatings be completely removed and replaced with a new prime coat and finish coat of non-lead containing materials. Removing the lead based paint coat requires a relatively expensive process involving containment and disposal of the spent materials that is compliant with EPA and MDNR regulations on the process of removal and disposal of lead based paint.

Q. IS THIS LEAD BASED PAINT REMOVAL AND DISPOSAL PROCESS A ONE-TIME PROCESS?

A. Yes, It is a multi-year project but a one-time process for each of these hydrants that once performed will allow in the future, as necessary, for the more conventional surface preparation and repainting processes involving scraping and/or wire brushing to affect removal of loose paint, then followed by spot priming and repainting with a brush. The latter process is by comparison less expensive.

Q. WHAT IS THE SIGNIFICANCE OF THIS BEING A ONE-TIME PROCESS?

A. Other than the indication that this relatively expensive process is fortunately not without end, it points to the flaw in witness Collin's direct testimony on lines 9 through 13 of page 7 where he claims the frequency of the Company's recent rate cases reduces the risk of non-recovery associated with hydrant painting expense, if the Company does in fact perform the hydrant painting prior to receiving recovery of the expense. The fact that this is a one-time activity associated with the fire hydrants, means recovery by the Company of the associated expense may not occur, especially if the frequency of the Company's rate cases is not as witness Collins predicts. It is likely that some parties would object to after-the-fact recovery, arguing that the program is non-recurring. The Company's proposal is a fair mechanism to allow recovery of necessary costs, while insuring that customers will pay dollar for

dollar only those costs actually incurred to remove lead based paint, prime and repaint hydrants.

Q. WHY CAN'T THE COMPANY SIMPLY PRIME AND PAINT OVER THE EXISTING LEAD BASED COATING AND THEREBY AVOID CREATING EPA AND MDNR LEAD BASED PAINT CONTAINMENT AND DISPOSAL REGULATORY COMPLIANCE RELATED ISSUES?

A. The existing coatings can be primed and painted over, but such an overcoat will not last for more than a year and further creates a poor appearance. Attached to this rebuttal testimony as **Schedule FLK-7a** is a photograph of a fire hydrant with a compromised lead based paint coating that was simply overcoated approximately one year before the photograph was taken. In other words, to prevent violation of the EPA's and MDNR's regulations on the abatement of lead based paint, no scraping or wire brushing of the original lead based paint coating, in its failing state, was conducted prior to repainting. As one can see, the fire hydrant's appearance is poor with rust streaks running down the hydrant barrel and rust coming through the over coat from underneath. It does not produce satisfactory results to avoid the lead based paint removal and disposal issues and simply over coat a compromised coating. It is necessary that the lead based paint coating first be properly removed and that such removal and disposal be performed in compliance with the EPA and MDNR regulations relating to lead based paint abatement.

Q. IS THERE ANYTHING ELSE YOU WOULD LIKE TO DISCUSS ON THIS MATTER?

A. Yes. Attached to this rebuttal testimony is **Schedule FLK–7b**, which is a photograph of one of the Company's fire hydrants with a compromised lead based paint coating. Also attached are **Schedules FLK-7c and FLK-7d**, which are photographs from one of the pilot projects. **Schedule FLK-7c** captures the point in time during the hydrant painting process just after the hydrant has been sand blasted down to bare metal and the containment structure has been removed and just before the priming process begins.

Schedule FLK-7d is a photograph of a repainted hydrant that was prepared for painting by first removing via sand blasting down to bare metal the original lead based paint coating.

Q. IS THERE A DIFFERENCE IN THE APPEARANCE OF THE FIRE HYDRANTS SHOWN IN SCHEDULE FLK-7A AND SCHEDULE FLK-7D?

A. There is a dramatic difference in appearance with the fire hydrant shown in **Schedule FLK-7d** having a like new appearance, which was the fire hydrant that underwent the process of complete removal of the original lead based paint coating verses the fire hydrant shown in **Schedule FLK-7a**, which was simply the result of the overcoating of an unprepared lead containing original paint coating. More importantly, it is expected that the paint on the hydrant shown in **Schedule FLK-7d** will last for many years, whereas the hydrant shown on **Schedule FLK-7a** will require annual maintenance.

IV. NEW TREATMENT PROCESSES RELATED ELECTRICITY COST ADJUSTMENTS

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY ON THIS ISSUE?

A. My rebuttal testimony will address the fact that Staff has not made an adjustment to test year electrical power expense to reflect the additional electrical power expense associated with new water treatment processes at the Company's treatment plants. I will further update my testimony to make it current.

Q. CAN YOU PLEASE BRIEFLY REVIEW THE NEW WATER TREATMENT PROCESSES AND THEIR RELIANCE ON ELECTRICAL ENERGY?

A. Yes. Beginning on line 18 of page 13 and extending through line 3 on page 15 of my direct testimony is a discussion of the purpose and associated operating cost of the new Ultra Violet (UV) disinfection process installed at the Joplin water treatment plant. In summary, this UV disinfection process has

been installed to lower the risk of public health concerns from Cryptosporidium in the source water. Cryptosporidium is resistant to chlorine disinfection, so UV was installed to provide inactivation of this pathogen.

At the Joplin and St. Louis County South and Meramec plants, sodium hypochlorite generating systems have been installed. Beginning on line 9 of page 16 and extending through line 20 of page 18 of my direct testimony is a discussion of the purpose and associated operating cost of the new sodium hypochlorite generating systems. In summary, these sodium hypochlorite systems have been installed because the Joplin and St. Louis County South and Meramec plants are located among residential neighborhoods. The chlorine gas feed systems, which until recently were the chlorine disinfection treatment processes used at these plants, required the presence of several ton containers of liquid chlorine on the sites of these treatment plants. Substituting that process at these plants with the sodium hypochlorite disinfection treatment process, which by comparison requires the presence of sodium chloride (table salt) on the sites of these plants, eliminates the risk of off-site consequences to the surrounding neighborhoods as the result of a chlorine gas leak from a chlorine ton container or anywhere along the chlorine feed process.

Q. DO THESE TREATMENT PROCESSES REPRESENT ADDITIONS OF ELECTRICAL DEMAND TO THE WATER TREATMENT PROCESSES AT THESE PLANTS?

A. Yes.

Q. WHAT IS REQUIRED TO CORRECT STAFF'S CALCULATION OF ELECTRICAL ENERGY EXPENSE RECOVERY?

A. Staff needs to add to its current proposed electrical power expense recovery the additional electrical expense of operating these water treatment systems.

Q. WHAT ARE THOSE ADDITIONAL ELECTRICAL ENERGY EXPENSES?

A. The annual additional electrical power expense to operate the Joplin plant's UV system was described on lines 18 through 22 of page 14 of my direct testimony as being $7,288. This was based on the electrical energy required per million gallons treated per the manufacturer's data sheet.

The annual additional power expense to operate the Joplin and St. Louis County South and Meramec plants' sodium hypochlorite feed systems was described on lines 3 through 10 of page 17 and lines 5 through 14 of page 18 of my direct testimony as being $35,955, $24,062, and $38,572, respectively.

Q. ARE THESE VALUES OF ADDITIONAL ELECTRICAL ENERGY EXPENSE KNOWN AND MEASUREABLE?

A. Yes, they are, based on energy requirements stated in the manufacturers' technical documentation. Further, measuring and calculating the minimum possible unit electrical energy input requirement to operate these treatment systems will produce the minimum known and measureable additional electrical energy cost.

Q. HOW DO YOU CALCULATE THE MINIMUM POSSIBLE UNIT ELECTRICAL ENERGY INPUT REQUIREMENT FOR THE UV DISINFECTION SYSTEM AT THE JOPLIN PLANT?

A. The minimum power consumption of the UV reactors installed at the Joplin plant has been documented by a third party.

Q. HOW IS THIS VALUE KNOWN?

A. As a requirement of the EPA's Long Term 2 Enhanced Surface Water Treatment Rule regulation governing the use of UV disinfection for drinking water, UV reactors must be validated by a third party to determine their operating characteristics and efficacy. The model of UV reactor installed at the Joplin plant has been validated by a third party. One outcome of this third party validation is the quantification of the minimum and maximum electrical

energy input required for operation of these UV reactors over a range of UV energy output from 60% to 100%.

Q. WHAT IS THE SIGNIFICANCE OF THE 60% TO 100% UV ENERGY OUTPUT RANGE?

A. Each UV reactor is equipped with thirty 240 watt lamps. All thirty lamps are energized when the unit is operating. The lamps can be operated over the range of 60% power to 100% power. The UV reactor is not able to operate at less than 60% of its maximum rated UV energy output.

Q. WHY IS THIS UV SYSTEM DESIGNED TO OPERATE OVER A RANGE OF UV ENERGY OUTPUTS?

A. The UV reactor system installed at the Joplin plant utilizes variable power ballasts to minimize energy consumption while assuring adequate disinfection. The UV output and energy requirements for a given disinfection goal vary depending on flow, the amount of UV energy absorbed by the water, and the condition of internal components such as lamps, sleeves, and UV intensity sensors. The programmable logic controller (PLC) controls the UV output based on flow, UV absorbance, and UV intensity measurements.

Q. HOW DOES THIS REVISED APPROACH TO CALCULATION OF THE ELECTRICAL ENERGY COST REQUIRED BY THE NEW UV DISINFECTION SYSTEM AT THE JOPLIN PLANT RESULT IN A KNOWN AND MEASURABLE ELECTRICAL ENERGY COST FOR THIS TREATMENT PROCESS?

A. By basing the calculation of the unit electrical energy input cost on the minimum rate of electrical energy at which this system will operate the Company in fact has calculated a minimum known and measurable electrical energy expense associated with the operation of this UV disinfection system.

Q. WHAT IS THE MINIMUM ANNUAL ELECTRICAL ENERGY COST THE COMPANY WILL INCUR FROM THE ADDITION OF THIS DISINFECTION SYSTEM TO THE JOPLIN PLANT?

A. Two units will operate continuously. The minimum daily cost of electricity for two units is multiplied by 365 days per year to obtain the annual cost of electricity for UV disinfection. The minimum daily cost is calculated by 2 units x 7.43 kW x 60% x 24 hrs x $0.0809 per kWhr = $17.31 per day. The minimum annual electricity cost is then $17.31 per day x 365 days per year = $6,318.15.

Q. HOW DO YOU CALCULATE THE MINIMUM POSSIBLE UNIT ELECTRICAL ENERGY INPUT REQUIREMENT FOR THE SODIUM HYPOCHLORITE TREATMENT SYSTEMS INSTALLED AT THE JOPLIN AND ST. LOUIS COUNTY SOUTH AND MERAMEC PLANTS?

A. The minimum energy requirement to prepare a pound of chlorine equivalent as sodium hypochlorite is known and measurable. Three phase alternating current at 480 volts is rectified to produce direct current (DC) power at a relatively low voltage. The direct current is applied to the electrolytic cells and sodium chloride solution to produce sodium hypochlorite.

With the sodium hypochlorite systems the amps and volts (which can be converted to unit electrical energy input) required by the sodium hypochlorite generator – the actual device that converts sodium chloride to sodium hypochlorite – during real-time operation is registered by the sodium hypochlorite system. The registered amps and volts data has been captured and converted to energy input, expressed as kWhr, as has the sodium hypochlorite output, expressed as pounds of chlorine equivalent. The resulting measured rate of energy input per pound of chlorine output is 1.76 Kwhr per pound of chlorine produced.

Q. WHY DOES THIS ANALYSIS PRODUCE A MINIMUM ELECTRICAL ENERGY INPUT REQUIREMENT FOR THE OPERATION OF THESE SYSTEMS?

A. Because the rate of energy input value stated above is the measured rate of electrical energy input value for only the chlorine generation piece of the sodium hypochlorite process. In other words, there are other sources of electrical energy demand within this process that are not individually measured during real time operation and for which the precise electrical efficiency is not known or is variable over time.

Q. WOULD YOU PLEASE DESCRIBE THESE OTHER SOURCES OF ELECTRICAL ENERGY DEMAND WITHIN THE SODIUM HYPOCHLORITE PROCESS?

A. Yes. Electrically at the beginning of the process and upstream of the actual sodium hypochlorite generator, is an alternating current (AC) to direct current (DC) converter known as a rectifier. This component is necessary, as the actual sodium hypochlorite generator requires DC current for its operation while electrical energy from the utility is delivered as AC. This rectifier is not 100% efficient in its conversion of AC to DC. In other words, a percentage of the electrical energy input to the rectifier is lost to inefficiencies such as the liberation of heat. The resulting electrical energy output from the rectifier becomes the electrical energy input to the actual sodium hypochlorite generator, which is identified by the value listed above. Therefore, this value stated above is conservative because it is net of the electrical energy lost due to rectifier inefficiencies.

Q. IS THERE ANY OTHER SOURCE OF ELECTRICAL ENERGY DEMAND WITHIN THESE SODIUM HYPOCHLORITE FEED SYSTEMS?

A. Yes. The sodium hypochlorite generator requires water as an electrolyte. In order for the conversion of sodium chloride to sodium hypochlorite to occur the water used in the process has to be of a minimum temperature. If the actual water temperature is below this minimum acceptable temperature then

electrical energy is required to power a water heater that increases the water temperature to an acceptable temperature.

Q. IS THE ELECTRICAL ENERGY REQUIRED TO POWER THE WATER HEATER INCLUDED IN THE VALUE LISTED ABOVE?

A. No. This is for two reasons. First, at the time this value was recorded the water used in the process was warm enough that additional heating of it was not required. Second, the electrical energy required to operate the water heater would vary with the starting temperature of the water which will change from season to season and from day to day within a season. Therefore, without operation of the water heater under an extended period of time to allow for the collection of real-time water heater electrical energy input requirements with changes in water temperature it is difficult to arrive at a known and measurable water heater electrical energy input unit value.

Q. IS THERE ANYTHING ELSE YOU WOULD LIKE TO ADD REGARDING THIS ANALYSIS?

A. Yes, electrical efficiency will decline as the electrolysis electrodes gradually degrade over time. Therefore, with time the unit electrical energy input values required for these systems will increase.

Q. WOULD YOU PLEASE PROVIDE THE ANNUAL ELECTRICAL ENERGY EXPENSE AT EACH OF THESE PLANTS CORRESPONDING TO THE UNIT ELECTRICAL ENERGY INPUT VALUE STATED ABOVE?

A. Yes. They are as follows:

1. Joplin plant $26,790.83
2. South plant $23,922.57
3. Meramec plant $30,315.07

Q. HOW DID YOU ARRIVE AT THESE ANNUAL ELECTRICAL ENERGY EXPENSE VALUES?

A. I arrived at these annual electrical energy expense values by multiplying the unit electrical energy input value stated above (in kWhr) by the pro forma quantity of sodium hypochlorite (expressed in pounds of chlorine equivalent) required at each of the three treatment plants, and multiplied those products by their respective electrical power rate (in $/kWhr), as filed in the Company's case.

Q. WOULD IT BE AN APPROPRIATE OUTCOME IN THIS RATE CASE, IF THE COMPANY WERE TO RECEIVE AN ALLOWABLE LEVEL OF OPERATING EXPENSE RATE RECOVERY FOR THESE NEW TREATMENT SYSTEMS AT THE PRO FORMA EXPENSE LEVELS LISTED ABOVE?

A. Yes. While the Company knows the actual annual electrical energy expense associated with these new treatment systems will be greater than the values listed above, these listed values represent the limits of what is known and measurable at this time.

V. LOST WATER ADJUSTMENT

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY ON THIS ISSUE?

A. The purpose of this section of my rebuttal testimony is to:

1. Respond to the statements in the Staff Report -- Cost Of Service relating to Staff's pro forma chemical, power, and purchased water expense as it relates to Staff's pro forma adjustment of system delivery. In addition, this section of my rebuttal testimony will respond to MIEC witness Michael Gorman's direct testimony on the matter of unaccounted for water (UFW).
2. Describe and clarify the confusion that often develops over the subject of UFW or non revenue water (NRW) or lost water and all their various subparts and how that confusion and resulting inconsistency is present in Staff's case.

3. Explain the arbitrary nature of Staff's approach to the determination of an acceptable level of water volume introduced into a distribution system beyond that volume that results in sales, and how Staff's approach results in inconsistent treatment from one distribution system evaluation to another.

4. Introduce and describe what is a far more thoughtful, relevant and consistent approach to conducting such evaluations.

5. Apply the approach in item 4 above to the Company's districts and show that these districts all have acceptable water volumes entering their distribution systems beyond that which results in sales.

Q. HOW DID STAFF DETERMINE THE PRO FORMA SYSTEM DELIVERY TO BE USED IN THE CALCULATION OF PRO FORMA POWER, CHEMICAL AND PURCHASED WATER EXPENSE IN THIS RATE CASE?

A. Staff calculated its pro forma water sales volume by district and then increased this amount by the lower of either the non revenue water (NRW) volume exhibited during the test year, or through the incorrect application of its 15 percent unaccounted for water (UFW) cap.

Q. WHAT DO YOU MEAN WHEN YOU STATE, "...THROUGH THE INCORRECT APPLICATION OF A 15 PERCENT UNACCOUNTED FOR WATER (UFW) CAP"?

A. On page 20 of the Staff Report -- Cost Of Service, Staff states, "'System Delivery' means water sales to customers plus water or line losses or water that are *'unaccounted for'* (emphasis added)." Mr. Boateng goes on to state, "It is a general, but unwritten policy of the Commission Staff that utilities take corrective actions to control the amount of water losses in their systems and limits *excess* (emphasis added) line loss to 15 percent, and that rate recovery of water losses be limited to a 15% loss factor." MIEC witness Gorman proposes a similar limitation on system delivery in his direct testimony.

In light of this, Staff argues for the limitation of the unaccounted for water (UFW) volume to 15 percent of the system delivery volume. Staff, as indicated in its work papers, applied this 15 percent factor as if it were to represent the entire water volume difference between the sales volume and the system delivery volume. In doing so, Staff displays what appears to be a misunderstanding of UFW and its relation to NRW. The entire volume difference between the sales and the system delivery is generally understood to equate to a volume of water identified as NRW. NRW and UFW are two very different volumes of water. UFW is a subset of NRW, while as referenced above, NRW is the entire water volume difference between sales and system delivery.

Q. WOULD YOU PLEASE FURTHER CLARIFY THE DIFFERENCE BETWEEN UFW AND NRW?

A. Yes. Within the universe of the NRW volume, there are portions that can be accounted for and portions that cannot be accounted for. For example, water lost through leaks in water mains and service lines that does not reach the ground surface, which is a form of non revenue water, is not able to be measured or estimated and is therefore considered to be unaccounted for. Water used from fire hydrants for fighting fires or filling street cleaners or cleaning storm sewer pipes or flushing water mains or storage tanks is non-revenue water, but is observable and/or able to be estimated or measured and is therefore considered as being able to be accounted for. There are other examples of accounted for NRW as well.

Q. HOW IS IT THEN THAT STAFF MISAPPLIED ITS 15 PERCENT FACTOR?

A. By its own definition of its 15 percent factor as an UFW factor or a factor to limit excess water loss, Staff's calculated caps on system delivery volumes should be the pro forma sales volume plus that volume represented by its 15 percent factor plus that volume represented by a different factor representing the accounted for volume of NRW. This method of calculation would have been consistent with Staff's statements on page 47 of the Staff Report -- Cost

Of Service describing Staff's "general, but unwritten policy" regarding its 15 percent loss factor.

Q. SINCE STAFF'S LOSS FACTOR OF 15 PERCENT REPRESENTS UFW, IF THE STAFF INSISTS ON CONTINUING TO APPLY ITS "GENERAL, BUT UNWRITTEN POLICY" THAT LIMITS RECOVERY ON LOST WATER, WHAT THEN IS AN APPROPRIATE FACTOR LIMITING NRW?

A. The American Waterworks Association (AWWA) 'Water Conservation Programs – A Planning Manual' states "Unbilled water can be less than 10 percent in a relatively new, well-managed system. It is not uncommon to find unbilled water to be over 20 percent in an older system." Furthermore, the Pennsylvania Public Utility Commission has adopted a Statement of Policy on water conservation that provides as follows: "Levels of unaccounted-for water should be kept within reasonable limits. Levels above 20% have been considered by the Commission to be excessive." 52 Pa. C.S. 65.20. Similarly, the Public Utilities Commission of Ohio requires a utility to report quarterly on the amount of its UFW (which is defined to exclude "water usage for fire fighting, flushing, and plant usage"), but to propose remedial actions only when UFW is 15% or above. Ohio Admin. Code 4901:1-15-20(C)(5). Therefore, based on these institutions' positions regarding appropriate factors relating to loss factors (both UFW and NRW) a NRW of 20% would appear reasonable within the limits of this approach to the evaluation of lost water.

Q. PUTTING ASIDE THE APPARENT CONFUSION BETWEEN UFW AND NRW, ARE THERE OTHER FACTORS THAT STAFF HAS FAILED TO CONSIDER?

A. Yes. In limiting recovery of lost water, Staff has failed to include an increase in recovery for the expense and capital investment cost of the additional active leakage control activity required to eliminate lost water volumes over the limits it has calculated.

Q. WOULD YOU PLEASE APPLY SOME NUMBERS TO THE ABOVE DISCUSSION TO FURTHER CLARIFY YOUR POINT AND PLACE SOME CONTEXT AROUND THIS MATTER?

A. Yes. Using Staff's pro forma sales volumes and 15 percent loss factor cap and the Company's test year NRW percent values for each of its districts, the Company calculated a difference between Staff's loss factor capped pro forma system delivery and what its uncapped (or only capped by the test year NRW values) pro forma system delivery volume would have been, on a consolidated Company basis, of approximately 4 BG. This represents a reduction in production expense of $885,000.

Q. **WHAT IS THE RELEVANCE OF THIS PRODUCTION EXPENSE REDUCTION TO THE DISCUSSION?**

A. The Company would have to be able to eliminate this 4 BG of system delivery volume through additional active leakage control expense and capital investment cost less than or at most equal to this production expense reduction of $885,000 or it should not be pursued.

Q. DID STAFF MAKE ANY ADJUSTMENT TO REFLECT THE ADDITIONAL EXPENSE AND CAPITAL INVESTMENT COST NECESSARY TO ACHIEVE THIS REDUCTION IN SYSTEM DELIVERY?

A. No.

Q. DOES THE COMPANY BELIEVE 4 BG OF SYSTEM DELIVERY CAN BE ELIMINATED FROM ITS DISTRICTS FOR $885,000 OF ADDITIONAL ACTIVE LEAKAGE CONTROL EXPENSE?

A. No.

Q. HOW THEN WOULD THE COMPANY PROPOSE THIS ISSUE BE ADDRESSED?

A. The Company would propose this issue be addressed as the Company addressed it in its filing. In its filing in this case the Company applied its

districts' test year NRW percent values to their pro forma sales volumes to arrive at pro forma system delivery volumes and production expense levels.

Q. IS THERE ANYTHING ELSE THAT MAKES THIS AN INAPPROPRIATE APPROACH TO ESTABLISHING AN ACCEPTABLE VOLUME OF LOST WATER FROM A DISTRIBUTION SYSTEM?

A. The fundamental flaw in this approach is its reliance on an erroneously implied correlation with a distribution system's sales volume for a reliable determination of an acceptable volume of water introduced into a distribution system over and above its sales volume. What is more, the lost water factor, as a fixed percentage, as it is applied by Staff, is deceiving in that it appears to produce consistent results in its application over time in a particular distribution system and across distribution systems. In fact, the lost water factor is nothing more than a fixed percentage of sales volume, which can vary greatly in a distribution system over time and from distribution system to distribution system and has no relationship to lost water volume, which ultimately is what should be measured and evaluated for its acceptability on a distribution system specific basis.

Q. COULD YOU PROVIDE A COUPLE OF EXAMPLES TO ILLUSTRATE YOUR POINT?

A. Yes. I will provide two examples to illustrate my point.

1. Assume there is a system identified as System "A" that has a sizable fraction of its customer base that conducts lawn watering. Further consider that in a wet year with cool temperatures there is little need for lawn watering, and as a result, the sales volume in System "A" in such a year is 10 billion gallons (BG). In a hot and dry year, however, System "A" experiences a sales volume of 15 BG. Based on the math applied in Staff's case, Staff would find that in each of those years a different system delivery volume would be acceptable. More precisely, using Staff's 15 percent loss factor, in the cool and wet year the

acceptable system delivery and lost water volumes would be as shown below:

Acceptable System Delivery Volume = sales volume / (1-0.15) = 10 BG / 0.85 = 11.765 BG
Acceptable Lost Water Volume = 11.765 BG – 10 BG = 1.765 BG

In the hot and dry year the acceptable system delivery and lost water volumes would be as shown below:

Acceptable System Delivery Volume = sales volume / (1-0.15) = 15 BG / 0.85 = 17.647 BG
Acceptable Lost Water Volume = 17.647 BG – 15 BG = 2.647 BG

As one can observe, while the loss factor percentage remains the same, just because the sales volume changed from one year to the next in a distribution system that is otherwise unchanged, the acceptable loss volume difference between these two years of 882 million gallons would also be considered acceptable by Staff. This defies logic when one considers that sales volumes have nothing to do with the volume of lost water.

2. Assume System "A" is compared to System "B". Systems "A" and "B" are identical in all ways except for their customer usage. In other words, both systems have the same number of miles of water main, same number of service line connections, same number of service lines, same average service line length from the water main to the curb stop and curb stop to meter, and the same average operating pressure. The only difference is System "A" has an annual sales volume of 10 BG and System "B" has an annual sales volume of 20 BG. Based on Staff's general, but unwritten policy it would calculate acceptable system delivery and lost water volumes for System "A" of:

Acceptable System Delivery Volume = Sales Volume / (1-0.15) = 10 BG / 0.85 = 11.765 BG

Acceptable Lost Water Volume = 11.765 BG – 10 BG = 1.765 BG

Similarly, for System "B" Staff would calculate acceptable system delivery and lost water volumes of:

Acceptable System Delivery Volume = Sales Volume / (1-0.15) = 20 BG / 0.85 = 23.529 BG

Acceptable Lost Water Volume = 23.529 BG – 20 BG = 3.529 BG

As one can observe, while the loss factor percentage remains the same in this example as well, for no other reason than a doubling of the sales volume from System "A" to System "B", the acceptable loss volume in System "B" was double that of System "A". Not only does this approach defy logic when one considers that sales volumes have nothing to do with the volume of lost water, but more importantly because this approach gives no consideration to those infrastructure attributes of a distribution system that directly correlate to the volume of leakage from a distribution system – miles of water main, number of service lines, service line connections, average length of service line from main to curb stop and curb stop to meter, and average system operating pressure. If Staff's approach based an acceptable volume of lost water on evaluation of these distribution system infrastructure attributes rather than doing so as a function of sales volumes, both Systems "A" and "B" would have been assigned the same volume of acceptable leakage, which is a more logical conclusion.

Q. IS LOST WATER A FUNCTION OF SALES VOLUME?

A. No. Lost water is a function of the infrastructure and operating pressure unique to each distribution system.

Q. SINCE STAFF'S APPROACH DOES NOT LEND ITSELF TO CONSIDERATION OF THE UNIQUE INFRASTRUCTURE ATTRIBUTES AND COMPONENTS OF A DISTRIBUTION SYSTEM THAT ARE DIRECTLY RELATED TO LEAKAGE, WHAT ALTERNATIVE PERFORMANCE INDICATOR DOES THE COMPANY RECOMMEND FOR EVALUATING WATER LOSS?

A. The Company recommends the application of the Infrastructure Leakage Index (ILI) performance indicator. This performance indicator is an output of the International Water Association/American Waterworks Association (IWA/AWWA) best practice water audit methodology developed during the period 1997 – 2000. This methodology is also recommended as a best management practice by the AWWA Water Loss Committee. This methodology features robust performance indicators that allow for an objective gauging of loss levels. The development of this methodology drew on the best practices of the various water auditing approaches used around the world and crafted them into a single, standard best management practice methodology that could be applied across the differing system characteristics. This method advances the concept that all water should be quantified, via measurement or estimate, as either authorized consumption or losses. Hence, no water is "unaccounted-for". The performance indicators, ILI being of primary focus, included in this methodology give a reliable assessment of water loss standing from operational, financial, and water resource management perspectives. They are effective in evaluating current standing, benchmarking with other utilities and loss reduction target setting.

Q. WOULD YOU PLEASE EXPLAIN OF WHAT THE AUDIT CONSISTS?

A. Yes. The water audit consists of identifying the following component volumes of the water that enters a distribution system:

1. Water supplied (system delivery);
2. Billed authorized consumption: metered;
3. Billed authorized consumption: unmetered;
4. Unbilled authorized consumption: metered;

5. Unbilled authorized consumption: unmetered;
6. Apparent losses: meter under-registration;
7. Apparent losses: systematic data transfer error;
8. Apparent losses: data policy/procedure impacts;
9. Apparent losses: unauthorized consumption; and,
10. Current Annual Real Losses (CARL): total losses less apparent losses where total losses is equal to NRW less all authorized consumption, billed and unbilled.

Measurement or estimation of each of these water volumes allows for more refined analysis of the drivers of loss from a distribution system and understanding of what actions, if any, should be taken to reduce those losses. Quantification of CARL excludes authorized unbilled consumption, which, while it is not revenue generating, is not considered to be a real loss. This is important to appreciate, as under the old methodologies authorized unbilled consumption was one of the sources of confusion over the definitional and mathematical differences between the terms UFW and NRW.

Q. HAS THE COMPANY COMPLETED SUCH AUDITS OF ITS DISTRIBUTION SYSTEMS?

A. Yes. A water audit was completed for each of the Company's systems based on 2007 data. Completing these audits also required the Company to develop a water volume accounting spreadsheet that allowed for the quantification of these various volumes by month for each district. From these water volume accounting spreadsheets and the audits, the Company was able to calculate each district's ILI performance indicator.

Q. WOULD YOU PLEASE DESCRIBE THE ILI PERFORMANCE INDICATOR?

A. Yes. The ILI is a performance indicator designed for reliable benchmarking of leakage standing among water utilities. This indicator is the ratio of CARL (quantified in the water audit) to a term identified as the Unavoidable Annual Real Losses (UARL). The ILI can also be used as a target setting

mechanism with respect to establishing distribution system specific acceptable volumes of leakage. ILI is expressed mathematically as follows:

ILI = CARL / UARL

Q. WOULD YOU PLEASE ELABORATE ON THE DEFINITION OF UARL?

A. Yes. The UARL is a reference minimum level of leakage that is determined in a system specific-manner for a water utility. UARL represents a distribution system's theoretical low limit of leakage that could be achieved if all of today's best leakage management efforts could be exerted. The equation used to calculate a distribution system's UARL is as follows:

UARL (gallons) = (5.41Lm + 0.15Nc + 7.5Lc) x P,

where

Lm = length of water mains, miles

Nc = number of service connections

Lc = total length of private service connection pipe, miles = Nc x average distance from curb stop to meter

P = average pressure in the system, psi

Q. WHAT IS THE ORIGIN OF THE COEFFICIENTS ASSOCIATED WITH THE VARIABLES OF THE UARL EQUATION?

A. As stated in the '10th Draft (FINAL) Water Loss Control Committee Review AWWA M36 Publication Rewrite Water Audits and Loss Control Programs,' document dated May 9, 2007, "The Water Loss Task Force obtained data from dozens of world class systems and observed the rate at which new leaks arise despite having comprehensive leakage controls in place. From this data, allowances were created for various leak types under response times typical of strong leakage management operations. The allowances were developed for three leak types: background leakage, reported leakage, and unreported leakage...An allowance for each leakage type was assigned for key infrastructure components." These allowances are the coefficients of the variables in the UARL equation listed above.

Q. IF THE COMPANY WAS ABLE TO CALCULATE THE ILI FOR EACH OF ITS DISTRICTS, THEN IT MUST HAVE BEEN ABLE TO CALCULATE EACH DISTRICT'S UARL. HOW WAS THIS PERFORMED?

A. At a district level, the Company determined from its records the approximate miles of main and number of service line connections. The average service line distance between the curb stop and meter was estimated as was the average operating pressure. These values were then substituted for their respective variables in the UARL equation to arrive at a UARL value for each district.

Q. WHAT WERE THE 2007 ILI VALUES CALCULATED FOR EACH OF THE COMPANY'S DISTRICTS?

A. The Company's districts' 2007 ILI values are listed below.

1.	St. Louis County	3.73
2.	St. Joseph	4.65
3.	Parkville Water	1.25
4.	Warrensburg	2.56
5.	Brunswick	1.33
6.	St. Charles County	1.02
7.	Mexico	1.98
8.	Joplin	2.63
9.	Jefferson City	2.62
10.	Warren County Water	0.94

Q. HOW DOES ONE CHARACTERIZE AN ILI VALUE?

A. The best way to do this is by using one of the values listed above as an example. In the case of Jefferson City, for example, its ILI value of 2.62 represents a current level of real losses 2.62 times greater than the technical low (UARL) level that could be achieved, in theory, if all possible leakage interventions were successfully applied.

Q. WHAT CAN BE CONCLUDED REGARDING THE ACCEPTABILITY OF THE COMPANY'S DISTRICT'S LEVELS OF 2007 ANNUAL REAL LOSSES FROM THE ILI VALUES LISTED ABOVE?

A. Answering that question requires review of a distribution system's ILI value in the context of the AWWA Water Loss Committee – Leakage Management Target-Setting Guidelines table, a copy of which has been included with this rebuttal testimony as **Schedule FLK-8**. This table suggests approximate target levels using the ILI, water resources, operational and financial considerations that utilities typically encounter.

Q. WHAT ARE THE STEPS ASSOCIATED IN CONDUCTING THIS EVALUATION?

A. There are two steps described as follows:

1. Evaluate the current ILI value: consider whether the current ILI value is acceptable under the circumstances encountered by the district. For example, if the ILI value for a district were greater than 8.0 **Schedule FLK-8** advises that the volume of real losses that translates into that ILI not be considered an acceptable target volume. All of the Company's districts have ILI values far less than 8.
2. Identify a target ILI range from **Schedule FLK-8** based upon the Water Resources, Operational and Financial Considerations statements listed. In other words, based on the circumstances described under these three categories of considerations, compare the conditions of the district being evaluated to find the considerations descriptions that most closely represent the conditions in the district. Considering for a moment all the Company's districts except for the St. Louis County and St. Joseph districts, their calculated ILI values are all less than 3.0. Based on having ILI values less than 3.0 and considering the considerations descriptions in **Schedule FLK-8** associated with ILI values ranging from 1.0 to 3.0, one would reasonably conclude that these district's existing ILI values are less than or equal to what a reasonable target would indicate they need to be.

With respect to the St. Louis County and St. Joseph districts, comparing their water resources, operational and financial conditions with the Water Resources, Operational and Financial Considerations statements found in **Schedule FLK-8** one concludes that the considerations statements that are most consistent with those districts' conditions correspond to target ILI ranges that bracket or are greater than these districts' current ILI values.

Q. IN SUMMARY, WHAT DO YOU CONCLUDE REGARDING THE COMPANY'S DISTRICTS' CURRENT ILI VALUES COMPARED TO THE TARGET ILI RANGES FOUND IN THE AWWA WATER LOSS COMMITTEE – LEAKAGE MANAGEMENT TARGET-SETTING GUIDELINES TABLE?

A. Every district has a current ILI value that either falls within or is below (better than) the target range appropriate for it based on the Company's evaluation of the conditions of each of its districts in the context of the categories of considerations found in the AWWA Water Loss Committee – Leakage Management Target-Setting Guidelines table.

Q. WHAT CONCLUSIONS DO YOU DRAW FROM THE ILI METHOD WITH RESPECT TO THE COMPANY'S DISTRICTS' PRO FORMA SYSTEM DELIVERY VALUES?

A. The ILI method is a much more thoughtful and rigorous approach to evaluating real losses from a distribution system. This method makes such evaluations based on the factors that are related to real losses and the ILI method recognizes these factors differ from distribution system to distribution system and reflects that in its output. Based on the ILI values for each of the Company's districts and the evaluation of those values in the context of the AWWA Water Loss Committee – Leakage Management Target-Setting Guidelines table, it is the Company's position that the test year, and therefore its pro forma, system delivery values in its filing represent acceptable and reasonable distribution system performance.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

This attachment is deemed Highly Confidential.

This attachment is deemed Highly Confidential.

This attachment is deemed Highly Confidential.

This attachment is deemed Highly Confidential.

This attachment is deemed Highly Confidential.

This attachment is deemed Highly Confidential.

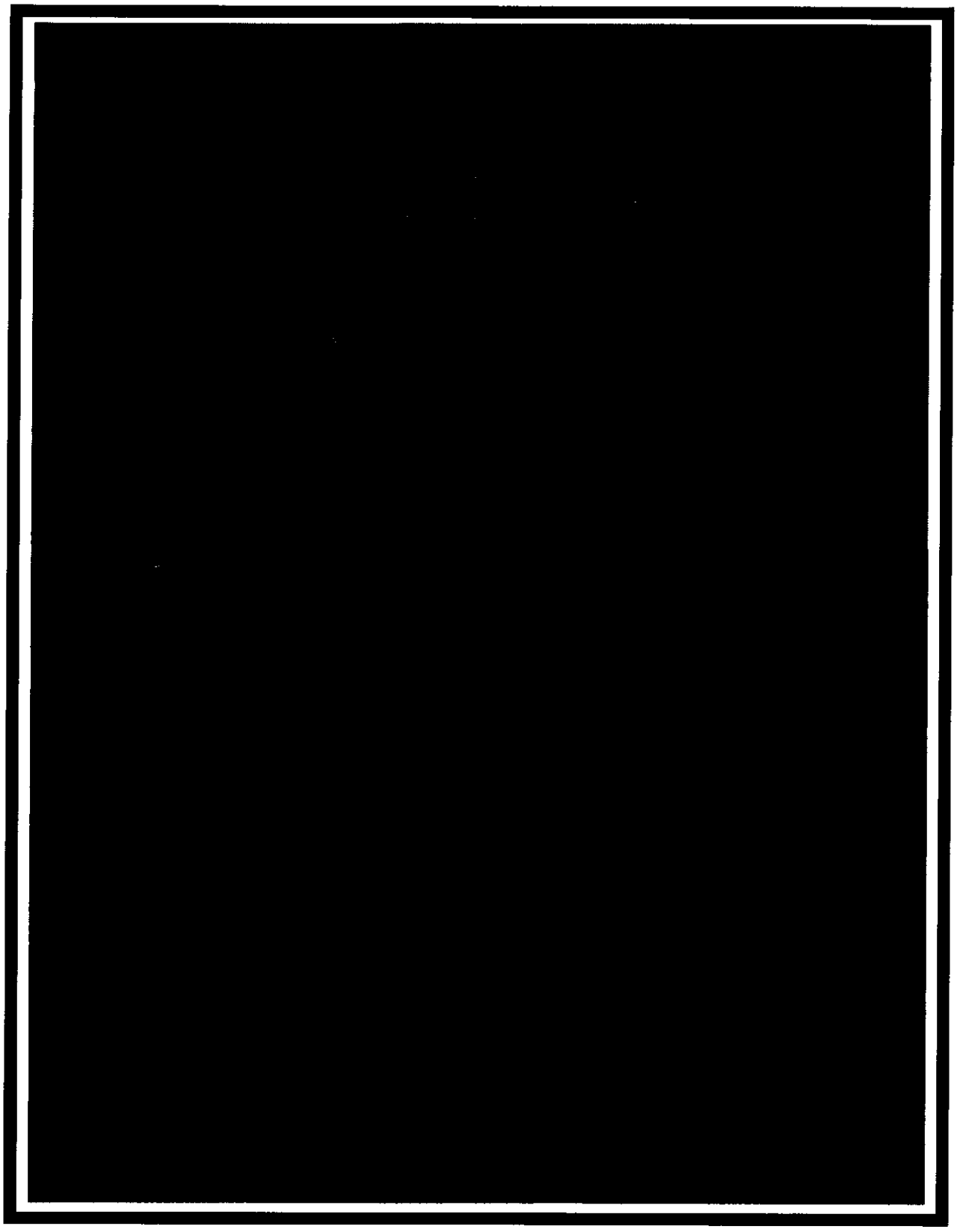
This attachment is deemed Highly Confidential.

This attachment is deemed Highly Confidential.

This attachment is deemed Highly Confidential.

This attachment is deemed Highly Confidential.

Schedule FLK-7a



Schedule FLK-7b

Schedule FLK-7c

Schedule FLK-7d

Table 5.2 AWWA Water Loss Control Committee – Leakage Management Target-setting Guidelines[3]

Guidelines for Use of the Basic Infrastructure Leakage Index as a Preliminary Leakage Target-setting Tool (In lieu of having a determination of the system-specific Economic Level of Leakage)			
Target ILI Range	Water Resources Considerations	Operational Considerations	Financial Considerations
1.0 – 3.0	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand	Water resources are costly to develop or purchase Ability to increase revenues via water rates is greatly limited due to regulation or low ratepayer affordability
3.0 – 5.0	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term planning	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place	Water resources can be developed or purchased at reasonable expense Periodic water rate increases can be feasibly effected and are tolerated by the customer population
5.0 – 8.0	Water resources are plentiful, reliable and easily extracted	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages	Cost to purchase or obtain/treat water is low, as are rates charged to customers
Greater than 8.0	While operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 – other than as an incremental goal to a smaller long-term target – is discouraged.		
Less than 1.0	In theory, an ILI value less than 1.0 is not possible. If the calculated Infrastructure Leakage Index (ILI) is just under 1.0, world class leakage control is indicated. If the water utility is consistently applying comprehensive leakage management controls then this ILI value validates the program's effectiveness. However, if strict leakage management controls are not in place, the low ILI value might be attributed to a flaw in a portion of the water audit data, which is causing the real losses to be understated. If the calculated ILI value is less than 1.0 and only cursory leakage management controls are utilized, then the low ILI value should be considered preliminary until it is validated by field measurements via the bottom-up approach.		