Exhibit No.:	
Issues:	Facility Additions, Joplin Production Improvements
Witness:	Alan J. DeBoy
Exhibit Type:	Direct
Sponsoring Party:	Missouri-American Water Company
Case No.:	WR.2007.XXXX, SR.2007.XXXX
Date:	December 15, 2006

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. WR.2007.XXXX
SR.2007.XXXX

DIRECT TESTIMONY

OF

ALAN J. DEBOY

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-2007-XXXX CASE NO. SR-2007-XXX

AFFIDAVIT OF ALAN J. DEBOY

Alan J. DeBoy, being first duly sworn, deposes and says that he is the witness who sponsors the accompanying testimony entitled "Direct Testimony of Alan J. DeBoy"; 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.

Al. J. DeBoy

Alan J. DeBoy

State of Missouri
County of St. Louis, City
SUBSCRIBED and sworn to
Before me this 11th day of December 2006.

Susan A. Moynihan

Notary Public

My commission expires: 12-9-08

SUSAN A. MOYNIHAN
Notary Public - Notary Seal
STATE OF MISSOURI
City of St. Louis
My Commission Expires: Dec. 9, 2008

DIRECT TESTIMONY
ALAN J DEBOY
MISSOURI-AMERICAN WATER COMPANY
CASE NO. WR.2007.XXXX
SR.2007.XXX

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DIRECT TESTIMONY

Alan J. DeBoy

WITNESS INTRODUCTION

Q. State your name and business address.

A. Alan J. DeBoy, 727 Craig Rd., St. Louis, MO 63141.

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

A. I am employed by American Water Company as Central Region Director, Engineering. The Central Region includes the operations of Missouri-American Water Company ("MAWC" or "Company").

Q. What is your educational background?

A. I received my Bachelor of Science degree in Civil Engineering from Purdue University in 1981. Also, I received my Master of Business Administration degree from Indiana Wesleyan University in 1997.

Q. Are you a licensed professional engineer?

A. Yes, I am a licensed professional engineer in the States of Delaware, Kentucky, Indiana, Michigan, Ohio and Pennsylvania.

Q. Please describe your business experience in the water utility industry.

A. From 1981 to 1988, I was employed by General Waterworks Corporation holding a variety of engineering positions that entailed engineering responsibilities in the States of Indiana, Delaware and Pennsylvania. During that period, I was promoted to positions having increasing responsibility for planning, design and construction of waterworks facilities at a number of operating systems of that company. From 1988 to 1993, I was employed by Avatar Utilities Inc. ("Avatar"). My employment with Avatar culminated in my holding the position of Senior Vice President for Indiana Cities Water Corporation ("Indiana Cities"). In that position, I was responsible for Indiana Cities' engineering and operations in Indiana. In 1993, I accepted the position of Director-Engineering with Indiana-American upon its acquisition of Indiana Cities. In July 2000, I was promoted to Vice President, Engineering with Indiana-American. In 2004, I was promoted to American Water, Central Region Director, Engineering. This is the position I currently hold.

Q. What is the purpose of your testimony?

A. The purpose of this testimony is to present the Company's facility additions that have been completed since MAWC's last rate case. I will also describe significant production improvements that are planned in Joplin.

FACILITY ADDITIONS

Q. What were MAWC's total capital investment expenditures in 2003, 2004, 2005 and 2006?

A. Annual capital expenditures are indicated in the table below:

	2003	2004	2005	YTD thru June 2006
Brunswick	172,485	91,072	178,454	176,454
Cedar Hill	-	-	428,144	482,890
Jefferson City	797,217	982,040	1,201,483	229,367
Joplin	7,207,214	4,576,821	3,387,106	2,169,669
Mexico	523,599	528,444	620,598	496,281
Platte County	2,164,090	1,462,385	1,669,756	1,059,546
St. Charles	5,894,916	3,387,752	3,428,015	1,618,433
St. Joseph	3,995,133	1,326,938	2,127,930	710,387
St. Louis County	36,503,573	31,240,247	29,631,089	20,856,031
Warrensburg	729,214	513,071	769,366	424,066
Warren Cnty Water	-	(2,975)	935,862	25,583
Warren Cnty Sewer	-	68,153	486,357	447,521
Corporate	23,714	3,129,726	2,385,849	1,257,435
TOTAL	58,011,155	47,303,673	47,250,010	29,953,663

Q. **Please list the significant capital projects completed that are included in this proceeding.**

A. Significant individual projects at each district are as follows:

Cedar Hill

- Waste Water Treatment Plant Improvements

Jefferson City District

- Rehabilitate Circular Presettling Basin
- River Intake Pumps and Piping Improvements
- Replace 14" Transmission Main along McCarty St.

- Replace Mains along Dunklin and Hough Streets.

Joplin District

- 1 MG Elevated Storage Tank
- Shoal Creek Intake Raw Water Intake and Transmission Main Improvements
- 12" Airport Main
- 6th St. Main Relocations
- Fluoride System Additions

Mexico District

- 12" Main along Lakeview and US 54

Platte County District

- Source of Supply Main
- Quindaro Bend-Riverside Levee
- Northwest Storage & Pump Station Improvements

St. Charles District

- Transmission Main Improvements
- Several Main Relocations resulting from Public Works Improvements
- Ehlmann Road Pump Station Replacement

St. Joseph District

- Lime Softening System Addition
- King Hill Pump Station Improvements
- 16" Main Replacements along Lower Lake Road

St. Louis County District

- 24" Transmission Main along 109
- Several Main Relocations resulting from Public Works Improvements
- Transmission Main to C-1
- Central and North Plant Chlorine System Improvements
- SCADA Improvements
- Central Plant Clarifier Replacement
- Transmission Main to Kirkwood
- Central and North Plant Earthquake Damage Prevention Improvements
- Ross Pump Station Electrical Improvements
- Service Center Site and Building Improvements
- Central and North Plant Switchgear Replacements
- Central Plant Basin 3A Clarifier Equipment Replacement
- North Plant Clarifier Equipment Replacement
- South Plant Secondary Clarifier Replacement

Warrensburg District

- 1 MG Storage Tank
- Marr Road Distribution Improvements

Warren County

- Waste Water Treatment Plant Improvements
- 0.2 MG Storage Tank

<u>JOPLIN PRODUCTION IMPROVEMENTS</u>

Q. Are there any significant capital investment projects currently in progress?

A. Yes. There is a significant project underway in Joplin for production improvements.

Q. What is driving the need for the Joplin production improvements project?

A. The primary driver for the Joplin production improvements is addressing equipment and facility age and condition. Much of the Joplin production infrastructure was constructed in 1959. However, some items have been in service since the 1890s. Secondly, system demand is driving the need for additional treatment capacity. Finally, environmental regulation and source water quality information necessitates enhanced treatment technology.

Q. How is MAWC planning to address this need?

A. The Joplin production improvements projects will upgrade the surface water source of supply and treatment infrastructure. It is anticipated that these projects will be completed over a three year period at an estimated cost of $44 million.

Q. Would you provide some detail regarding existing infrastructure conditions and circumstances that drive the need for this project?

A. Yes. In the following section of my testimony, I will describe the current circumstances concerning the Shoal Creek Pump Station, Raw Water Transmission Piping, Surface Water Treatment Facilities, Distributive Pumping, Electrical System, Chemical Systems, Treatment Residuals and Process Control that support the need for these projects.

SHOAL CREEK PUMP STATION

The Shoal Creek Pump Station (SCPS) is the sole raw water pumping facility that delivers surface water from Shoal Creek to the Blendville Water Treatment Plant (BWTP). All four of the water pumps at SCPS are in poor condition and require replacement or complete rehabilitation. With all pumps operating, the maximum flow is approximately 17 million gallons per day (mgd).

The pumps are located in a building behind a flood protection levee and are approximately 1,000 feet from Shoal Creek. The pumps operate with a suction lift which requires a priming system to withdraw air from the pumps and suction piping. Due to the magnitude of vacuum priming required and the poor condition of pump packing, seals and shaft sleeves, along with potential poor piping joint seals, air is constantly drawn into the raw water piping and raw water pumps under the vacuum condition. It is consequently difficult to maintain pump prime and pump operation. Complete loss of prime has overwhelmed the priming system and has jeopardized continuity of water service on many occasions. The result is frequent overtime and after hours management supervision of emergency measures to restore prime and pump operations.

The existing pump building structure is in fair condition with regular maintenance warranted. Existing utilities, including water service and natural gas service, require replacement if use of the building is continued. Poor ventilation resulting in high temperatures during summer operation also presents real risk for motor and control gear overheating.

An existing natural gas engine provides approximately 9 mgd of capacity during power outages but is not reliable due to the poor condition of engine controls. The SCPS receives power from two independent power supplies although manual switching is required on-site by the power utility. In recent years power utility switching responsiveness during power outages has decreased resulting in longer outage durations. The utility owned transformers provide 2,400 volts of supply, which requires an ungrounded system. The power utility does not stock spare 2,400 volt transformers because they have standardized on 4,160 volt systems. MAWC is informed that delivery of replacement 2,400 volt transformers may have a several week lead time.

RAW WATER TRANSMISSION PIPING

Three 11,000 foot long pipelines deliver raw surface water to the BWTP from the SCPS. With the existing pumps, and their current condition, the 16-inch, 20-inch and 24-inch pipelines do not have sufficient capacity to deliver more than 17 mgd to the BWTP. Previous attempts to clean the mains by pigging were not successful in sustaining improved hydraulic conditions. The original pipeline design did not incorporate any pipe cleaning concepts, i.e. pig insertion fitting, exit fittings, or gate valves.

The existing 16-inch main serves a dual purpose. It typically delivers raw water to the plant but is also removed from raw water service biannually and used in reverse to deliver residual solids from the plant to the Shoal Creek sludge lagoon. This practice is not ideal because sludge accumulates in basins until the biannual desludging. Settled water turbidity can be improved with a continuous desludging process. Removing the 16 inch main from raw water service also reduces raw water transmission capacity during the existing desludging operation.

SURFACE WATER TREATMENT FACILITIES

The BWTP is located on approximately 7 acres of land in a residential area in the City of Joplin. The majority of the treatment facilities were completed in 1959, while some of the oldest structures date back to the 1890's. The permitted rating of the plant was increased to 16 mgd in 1995 from 12 mgd without any significant improvements. No major improvements to the treatment process have been made since 1959. Electrification was completed in 1982 and some pumping improvements were made in 1982.

Plant operating capacity has increased in recent years. For example, the plant operated at approximately 94% capacity throughout July, 2005. In the past, when demands were lower, portions of the plant could be taken out of service for maintenance without significant impact. However, the increased year round reliance on the treatment plant has made it very difficult to reliably operate the treatment plant in its current condition.

The plant utilizes two pretreatment processes in series prior to filtration in accordance with Missouri Department of Natural Resources requirements. The first process is single stage flocculation which is performed in four steel tanks operating in parallel before sedimentation in a single shallow square shaped sedimentation basin. No rapid mix is provided to improve effectiveness of coagulation. The performance of the Sedimentation Basin is poor due to its square shape, poor flow distribution, high velocities, and lack of continuous desludging. The entire pretreatment process is removed from service biannually to enable removal of accumulated sludge.

The second stage of treatment is performed in four circular steel tanks, termed purification units, which are mostly buried. A central chamber within each tank provides hydraulic flocculation while sedimentation is accomplished in the clarifier section. Low head vertical turbine pumps located on the center inlet pipe of each purification unit are operated to overcome hydraulic losses in piping from the sedimentation basin to the purification units to operate at flow rates greater than 12 mgd. Loss of a single pump to failure or maintenance significantly reduces plant capacity. The pumps shear any preformed floc carrying over from the pretreatment sedimentation basin and do not aid in further flocculation. The purification units must be removed from service while settled solids are removed manually.

Each purification unit has a filter section along the entire perimeter of each unit. The filters are exposed to weather. Surface freezing is a problem in severe winters. Mudballs form in the filter over time and neither surface wash or air wash exist to improve mudball removal and filter cleaning accomplished by the existing water-only wash. A central valve chamber, located in the basement of the Control Building, allows access to valves and flow meters for each of the four purification units. The filter valves and actuators are in poor condition and result in difficult and unreliable operation of the purification unit filters.

The filter effluent is directed to an existing 900,000 gallon in ground clearwell. Only the upper third of the clearwell is useful storage because high service pumps break suction when the clearwell level declines below the top third. The existing clearwell was originally designed to be a sedimentation basin and was subsequently fitted with a flexible interior membrane liner for use as the clearwell.

DISTRIBUTIVE PUMPING

The BWTP has five horizontal centrifugal split case pumps, identified as numbers 6 - 10. Pump 6 was replaced in 1992 and is equipped with a natural gas driver only. The driver was recently overhauled and is in good operating condition. Pumps 8, 9, and 10 were installed in 1982 with completion of plant electrification and are in good operating condition. Pump 7 was installed in 1955 and is equipped with a similar age electric motor and a twin diesel engine driver. The diesel driver is in poor condition and requires significant work. The combined capacity of the gas driven pump 6 and the diesel driven pump 7 is 16 mgd. Operating efficiency of all pumps is unknown.

Pump discharge control valves and actuators have periodically failed and have required regular maintenance.

Operation of a vacuum priming system is required to operate the high service pumps because the pump suctions are not flooded and require suction lift. Though vacuum priming systems with low suction lift requirements can be reliable, the consequence of a brief failure of the system in Joplin can result in service delivery failure. In 2005 during maintenance work on the high service pump system, an approximate 20 minute failure in vacuum priming to the pumps resulted in low service pressure and a necessary system-wide boil advisory.

ELECTRICAL SYSTEM

The electrical service and main switchgear at the plant is in poor condition. The plant is served by a single electrical service and does not have a standby electrical generator. The conversion from steam to electric power occurred gradually over a period of years and was completed in 1982. However, much of the electrical system is in poor condition and does not have any spare capacity.

The main plant switchgear is in poor condition, has failed catastrophically in the past, and does not satisfy current electrical code requirements. Switchgear repair parts have not been commercially available for a number of years and repairs are difficult and time consuming. With plant operation at near maximum capacities, downtime for repair of the unreliable switchgear creates system wide service delivery risks. Because the electrical system and switchgear are maximum capacity they cannot support additional loads.

CHEMICAL SYSTEMS

The chemical systems are largely unchanged from the 1959 construction. There is no automation of any of the chemical systems.

The coagulant and lime feed process consist of manual delivery, and feed from 50 pound bags. The process is labor intensive, particularly when rainfall run-off events result in high turbidity raw water that creates demand for greater quantities of coagulant and lime feed. Reliance on 50 pound bagged chemicals is unusual for a plant of this type. Coagulant and lime feed rates peak during dynamic raw water quality conditions, challenging the plant operator to fill chemical hoppers while monitoring the treatment and production processes and systems. This operational difficulty presents increased risk for exceeding drinking water standards. The existing alum and lime chemical feed equipment are in poor condition, making accurate chemical additions impossible. The lack of a liquid coagulant system prevents alternative coagulants from being tested or used.

The BWTP utilizes chlorine gas as a disinfectant. Due to sporadic high chlorine demands, the chlorine storage room has been retrofitted with a chlorine evaporator. A second evaporator is needed for reliability, but adequate space is not available. When the single chlorine evaporator is out of service for maintenance, chlorine gas is used, but plant flows must be limited to provide adequate disinfection.

The BWTP water discharge pressure is usually less than 50 psi because of its high elevation relative to the service area. As a result adequate pressure is not available to operate the chlorine feeders through their full range. This creates challenging design and operating conditions.

Automatic shut-off valves have been installed in the chlorine storage room for the chlorine container connected to the evaporator. However, space is limited in the chlorine storage room and all but two chlorine containers must be stored outside. The location of the facility within a residential area and especially its proximity to the St. Johns Regional Hospital, makes chlorine gas safety a serious concern. Gaseous chlorine storage without scrubbers in this area presents health and safety risks should a chlorine release occur.

The existing aqua ammonia bulk storage tank does not have secondary containment and is located outside where it is more susceptible to damage by weather, accident, or vandalism. Potential leaks or spills from the bulk storage tank and from the discharge piping to the remotely located day tank are not contained.

An emergency filter aid system consisting of an Anionic Polymer A3333P has been set up for the four filters, but a permanent system that allows filter aid to be controlled and fed as needed to each of the filters is needed to improve filter performance during stressful conditions.

TREATMENT RESIDUALS

Spent backwash water is piped to an on-site waste water holding basin for settling and returns to the raw water piping for recycle through the treatment plant. Sludge accumulates in the waste water holding basin along with the accumulated solids during bi-annual manual basin cleaning operations. All sludge removal is manual. The holding basin has capacity for two filter backwashes. Filter runs of less than 48 hours create difficulty because of the limited holding basin and recycle capacity, though recycling could be eliminated.

Sludge removal is manual in each stage of the treatment plant, which results in significant impacts to plant operation. The lack of continuous solids removal in the Sedimentation Basin degrades its performance as velocities increase with the accumulation of solids. The bi-annual sludge removal process impacts the entire plant operation. For example, the spent backwash basin is used as an intermediate holding tank during de-sludging operations, and filters cannot be backwashed during that time. Manual cleaning results in significant process downtimes, i.e. a week at a time for the presedimentation basin. Process downtimes result in reduced plant capacity, poorer treatment performance, and increased risk for service delivery failure or exceedance of drinking water standards.

PROCESS CONTROL

Instrumentation is limited and there is essentially no automation at the BWTP. Continuous water quality instrumentation is limited which makes it difficult to operate the facility during rapidly changing conditions. The operational difficulty presents increased risk for exceeding drinking water standards. The existing 200 square foot laboratory is inadequate with multiple purposes such as wet chemistry, compliance microbiological testing, and also houses all of the plant computer controls. There is insufficient counter space for the testing being performed. The facility requires significant upgrading, including improved electrical service, lighting and HVAC.

ENVIRONMENTAL REGULATIONS

The EPA promulgated the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) on January 5, 2006 addressing pathogenic microorganisms inactiviation. The purpose of this regulation is to reduce illness linked with Cryptosporidium and other pathogenic microorganisms in drinking water. A source water assessment has indicated the presence of Cryptosporidium in Shoal Creek, which is the source of supply for the Joplin plant.

INCREASED CAPACITY

In conjunction with the extensive rehabilitation efforts, the treatment facility capacity will be increased by 5 mgd. The increased production capacity is projected to satisfy demands through 2021, or 13 years after completion of the improvements project.

Q. **Please list the Joplin production improvements components that are in progress of being designed or constructed, which address the needs listed above.**

A. The following text provides descriptions for each of the Joplin production improvements project.

Improvements to Surface Water Intake and Pump Station at Shoal Creek

Construction of a new pump station adjacent to Shoal Creek equipped with submerged vertical turbine pumps and accessible motors in a pump building enclosure elevated four ft. above the 100 year flood elevation or above the 500 year flood elevation. The existing horizontal centrifugal pumps and pump station would be retired. Electrical switchgear would remain behind the flood protection levee and power would be supplied via underground conduit to the new pump station.

This alternative eliminates the suction lift requirement and the necessary vacuum priming system along with the operational difficulties and system failures that have recurred with that condition. The new pump station with flooded pump suction and new piping will improve service delivery reliability.

Also included are two 30" intake with submerged passive profile screen and 30" suction pipeline to provide reduced intake piping head losses for the projected flows. The new intakes and piping will result in higher pumping water levels and greater available drawdown at projected flows in the new pump station. The two new intake cribs will be fitted with wire intake screens to improve exclusion of debris. A compressed air type cleaning system will be installed for each intake.

The new pump station will be designed and constructed to deliver 22-23 mgd and be sized to accommodate future pump additions to expand capacity as system demands increase.

The two independent power supplies from two substations supplying the existing pump station will be maintained. The existing 2,400 volt electrical system will be retired and replaced with a grounded 4,160 volt system to be compatible with the existing power utility standard and stocking practice. A 4160 volt transformer and parallel electric gear will be installed to provide power service continuity from the dual power utility feeds when one feed is out of service. The need for a generator sized to provide auxiliary backup power will be incorporated in the event of complete power utility service failure.

IMPROVEMENTS TO RAW WATER PIPING

An 11,000 foot long, 30-inch diameter raw water main is proposed to increase the raw water transmission capacity to 28 mgd. The transmission main will be designed such that it can be cleaned/pigged. The existing 16-inch raw water transmission main will be dedicated solely to residuals transfer from BWTP to the lagoon(s) at Shoal Creek.

BLENDVILLE WTP IMPROVEMENTS

The rehabilitation of the existing treatment facilities have been identified on a prioritized basis in order to improve reliability and simultaneously prepare for future capacity expansion(s).

The lack of available property within the treatment plant boundary necessitated the acquisition of four improved residential lots that total approximately two acres adjacent to the south and west of the BWTP for the proposed Chemical Building and plant expansion.

Pretreatment and Filtration – Existing Plant

Operation of the existing flocculation, sedimentation basin, and purification units will be maintained. A static mixer or alternate mixing process will be provided for coagulant addition. A permanent filter aid system will be constructed for the existing filters. The existing filter valves, flow meters, and controls will be replaced.

Chemical Building and Mixing Improvements

A chemical building will be constructed to house a raw water flow control valve, flow meter, bulk storage of chemicals, day tanks, transfer pump, chemical metering pumps, feed piping and controls, and static mixer if it is selected as the mixing process. Chemicals include liquid coagulant, liquid lime, chlorine/sodium hypochlorite, powdered activated carbon, fluosilicic acid and aqua ammonia.

Bulk storage for liquid coagulant is proposed. Bulk storage for lime slurry is also proposed. Purchase of lime slurry will allow peak feed rates that are necessary during run-off events while avoiding the capital cost and operational difficulties associated with storing bulk hydrated lime when lime usage is minimal.

Chlorination improvements will consist of on-site generation of sodium hypochlorite. This alternative to chlorine gas addresses safety concerns associated with the residential areas around the plant site.

Additional chemical system improvements include powdered activated carbon to control seasonal tastes and odors and a filter aid polymer system to improve filter performance under stressed conditions.

Transfer Pumping and UV Facilities

Cryptosporidium monitoring in the source of supply has indicated that additional disinfection will be required at BWTP to meet the requirements of LT2ESWTR. With the Cryptosporidium levels measured to date, an additional 1.0 log of Cryptosporidium removal/inactivation will be required. It is proposed to install UV disinfection in this Phase I improvements in advance of required regulatory implementation schedule.

The company proposes to integrate the UV facilities downstream of filtration. A transfer pumping step is proposed at BWTP to provide adequate head for the UV disinfection process and to enable full use of the existing clearwell. Presently, only the top third of the existing 900,000 gallon clearwell is available as useful storage because the existing high service pumps located above the clearwell operate with suction lift and a vacuum priming system and are not capable of operating at greater suction lifts created by greater drawdown in the clearwell. The transfer pump building will be sized to house future high service pump capacity expansion.

Clearwater Storage and High Service Pumping

The Company proposes to construct one 1,000,000 gallon ground storage tank for additional finished water storage and improved service delivery reliability. The tank will be a ground tank located to ensure a positive head on the existing high service pumps. Positive head on the pump suctions will eliminate the need for a vacuum priming system and also enable full use of the existing clearwell.

Pump 7 and the diesel driver will be replaced with a new pump, electrical motor, and gas powered generator. The generator will be sized to power pump 7, the transfer pumps, and other necessary, plant ancillary loads.

New pump discharge control valves and associated piping will be installed to replace the existing valves in poor operating condition.

The existing high service pumps #7 and #10 will be replaced to provide approximately 22 MGD of reliable pumping capacity. Future expansion of high service pump capacity will be accomplished by replacing an existing pump with one of greater capacity.

Electrical Improvements

The existing 480 volt electrical service will be replaced and upgraded to accommodate the projected loads of the facilities. The existing switchgear will be replaced. A diesel powered generator will be installed to provide auxiliary electrical power for distributive pumps, transfer pumps, UV, and ancillary loads during power interruptions so that 12 MGD can be delivered to the system

Process Control

A new instrumentation and control system will be installed at BWTP to monitor and control the raw water pumping facilities, treatment processes, and allow monitoring of the distribution system. Each of the facilities will include flow meters, pressure transmitters, level transmitters and other baseline type monitoring equipment to allow the operations staff to monitor and control facilities at BWTP and Shoal Creek facilities. Continuous water quality monitoring equipment will also be provided to track water quality trends. Filter operation, including backwash sequence will be operated through the control system. The distribution system will also be monitored from BWTP.

In the Control Building, the existing wet chemistry laboratory will be renovated to provide appropriate counter space, casework, storage, lighting, and HVAC. A separate bacteriological laboratory will be constructed in a portion of the space previously occupied by the chlorine equipment. The operator's computer control station will be removed from the wet chemistry lab and placed in a new control room. Electrical supply and HVAC will be renovated in the Control Building.

Treatment Residuals

Basin blowdown, filter backwash, and other treatment residual streams will be transferred to the Shoal Creek lagoon(s) by gravity through the existing 16" raw water main. The 16 inch main will be converted from raw water service to permanent residuals handling service.

A second lagoon will be constructed at Shoal Creek to allow for filter wash water storage and clarification prior to release to Shoal Creek. Final disposal of treatment residuals will continue to be through land application.

The existing filter washwater basin at BWTP will continue to serve as a surge basin. Water that is not recycled to the head of the plant will be directed to the 16" residuals transmission main and the Shoal Creek lagoons.

Distribution System Improvements

Distribution system improvements will be constructed to enable delivery of well water from existing wells into the main zone of the distribution system to enable total available source of supply capacity to be delivered to the service area. The scope of necessary improvements will be fully detailed in the design phase.

Treatment Capacity Improvements

Treatment capacity improvements will be constructed on property adjacent to the new chemical building. Flocculation, sedimentation and filtration facilities shall be run parallel with the existing BWTP. The facilities shall share common raw water supplies but have separate chemical mixing. The filter effluent lines from the new train shall go directly to the clear well and the transfer pump station and the UV disinfection.

The plant shall be designed with a planned future treatment capacity considered.

Flocculation and Clarification

Proposed are additional flocculation and clarification improvements. Note: the MDNR requires two stages of treatment (mixing, flocculation and sedimentation) in series for surface water, so each mgd train will consist of two stages in series.

Stage one shall be two stages of flocculation followed by plate settlers with automated sludge removal. Stage two shall be identical to the first stage. Proposed arrangement is two basins in parallel with a common wall. Effluent of the first stage will be returned to the second stage. Inlet can be directed to either stage and either can be by-passed.

Filtration

It is proposed to construct additional filtration. Filter rate shall be designed for a filtration rate of 4 gpm/sf, in two separate filters. These shall be cast in place gravity box filters with granular duel media anthracite and sand. The filter shall be equipped with air wash and simultaneous water wash for rates of 20 gpm/sf.

Housing

Due to the relatively small size of the flocculation and sedimentation facilities and desire for improved security and prevention of basin ice cover, the basins and filters shall be enclosed within a building.

Q. Were other alternatives considered in addressing the needs listed above?

A. Yes. All of the following options and their variations were evaluated. Each of these options were concluded to be higher life cycle cost options that would result in higher rate impact to customers.

- Rehabilitate and expand BWTP using same treatment scheme as existing along with new Aldrich units.
- Rehabilitate and expand BWTP using tube settlers and other pumping arrangement options.
- Rehabilitate and expand BWTP using actiflow and submerged membranes
- Rehabilitate and expand BWTP using MF/UF membranes
- Construct new MGD conventional plant

- Rehabilitate existing BWTP and build new 10 MGD conventional plant on Center Creek
- Rehabilitate existing BWTP and build new 10 MGD conventional plant on Shoal Creek
- Rehabilitate existing plant and build new 10 MGD conventional plant on Spring River

Q. What is the estimated overall cost of the Joplin production improvements?

A. The current cost estimate for this project is $44 million.

Q. Are any of the Joplin production improvements components included in this rate filing?

A. Yes. Some of the improvements are necessary for current operations and will be put into service upon completion. The project components associated with the Shoal Creek intake replacement, raw water pump station replacement and new raw water transmission main fit into this category.

Q. What is the estimated cost of the project components that are included in this rate filing and when are they expected to be complete?

A. The estimated cost for these project components is $10,000,000. It is expected that these improvements will be placed in service in April 2007.

Q. When is it anticipated that the entirety of the Joplin Production Plant projects will be completed?

A. December 2008.

Q. Does this conclude your testimony?

A. Yes.