Exhibit No.:	
Issues:	*Prudence, Plant in Service*
Witness:	*Merciel*
Type of Exhibit:	*Rebuttal Testimony*
Sponsoring Party:	*MO PSC Staff*
Case No.:	*WR-2000-281*
	SR-2000-282

MISSOURI PUBLIC SERVICE COMMISSION

UTILITY OPERATIONS DIVISION

REBUTTAL TESTIMONY

of

JAMES A. MERCIEL, JR.

Missouri-American Water Company

CASE NOS. WR-2000-281 and SR-2000-282

Jefferson City, Missouri
May 4, 2000

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Missouri-American Water Company

INTRODUCTION

Q. Please state your name and business address.

A. James A. Merciel, Jr., P. O. Box 360, Jefferson City, Missouri, 65102.

Q. Are you the same James A. Merciel, Jr. who submitted direct testimony in this case?

A. Yes, I am.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of this rebuttal testimony is to respond to the direct testimony of Office of the Public Counsel witness Mr. Ted L. Biddy, and intervenors (Ag Processing et al) witness Dr. Charles D. Morris, regarding the "prudence or reasonableness" of a decision by Missouri American Water Company (Company) to construct a new groundwater treatment facility in its St. Joseph service district in a new location (referred to herein as the New Plant), versus either refurbishing what was the existing facility (referred to herein as the Old Plant), or rebuilding at the Old Plant site. My testimony will also describe the status of new construction projects undertaken by the Company as observed by the Staff; and to recommend an adjustment

for plant components within the New Plant that I believe result in "excess capacity."

PRUDENCE

Q. Do you agree with Mr. Biddy's concept of using estimated plant upgrade costs that are based upon an evaluation the Company completed in 1991 for the Old Plant as a reasonable way of comparing the New Plant costs that were incurred for construction?

A. No, because the 1991 evaluation only contemplated replacement of certain Old Plant components. I consider those selected replacements as minimum upgrading that the facility desperately needed in order to meet drinking water standards, and to eliminate operating problems and safety concerns that should not exist, not the least of which is a demonstrated risk of flooding due to Missouri River high water levels.

Another reason the 1991 evaluation costs should not be used, in my opinion, is that the proposal did not meet the standards of the Missouri Department of Natural Resources (DNR). The key issue in connection with DNR requirements is the loading rate on the "superpulsator clarifiers." The Company designed, and conducted pilot tests, to use this type of clarifier at a loading rate of 4 gallons per minute (GPM) per square foot. "Loading rate" refers to the volume of flowing water in relation to the amount of surface area on which solids may settle. Although the pilot tests indicated this loading

rate would work, DNR only approved a loading rate of 3 GPM per square foot, meaning that DNR would not approve the clarifiers as proposed by the Company for the proposed treatment capacity of 30 million gallons per day (MGD). It appears to me that an additional clarifier unit would be needed for the design capacity of 30 MGD. Although I take the position that 30 MGD is not needed today, it is important to consider this capacity for long term planning, and when comparing this alternative with other 30 MGD alternatives. I would expect that the cost of an additional superpulsator clarifier and building addition could be more than one million dollars. Mr. Biddy did not take this into consideration in his testimony while comparing this alternative to the New Plant with a 30 MGD capacity.

Q. Do you agree with Mr. Biddy that the Old Plant can be "flood proofed" with approximately $128,000 of levee improvements, referring to protection from flooding of the Missouri River?

A. No. The levee improvements would provide additional protection, but in my opinion would not "flood proof" the Old Plant. There would still be a significant risk of flooding at the plant site, along with associated damage and the risk of a water supply failure. I have two specific concerns related to flooding. One is the pump building, which houses electric pumps and motors that transport river water to the treatment facility, and pumps and motors that send treated water to the distribution system. This building, its floor and pits, and the pump motors are located below the flood elevation.

Another concern is the elevation of the sand filters. While the plant was shut down due to the Missouri River flood of 1993, the river water rose to within about six inches of the tops of the filter walls. The sand surface of the filters was of course well below the water level. Had river water topped the walls flooding the sand filters they would have had to have been cleaned of mud and debris, perhaps extending the time to re-start the plant, and certainly adding to the cost of cleaning and re-starting.

Q. Then do you believe it is not prudent to keep this facility in service as it existed, even if additional flood protection measures were in place?

A. That is correct. Even with additional flood protection measures, a risk of flooding exists if the plant components are located at a lower elevation than flood waters. One of the goals of the New Plant was to eliminate this situation, and I believe it was reasonable and prudent for the company to decide to essentially reconstruct a new facility, whether that be on the Old Plant site or at a new location.

Q. Is it possible to construct a facility at the Old Plant site that would be completely protected from being flooded?

A. Yes, it is possible. DNR requirements are that new facilities must be constructed above the elevation of a flood of record, which at present is the 1993 flood. Although reconstruction of the Old Plant would technically not be a "new facility," and thus

not subject to this requirement, it is nevertheless reasonable, in my opinion, that any facility constructed by the Company to serve the St. Joseph district should meet this requirement, in order to assure continued service to the customers in St. Joseph and the surrounding area. This means that any and all plant components that might have been constructed in an effort to refurbish or replace plant components at the Old Plant site would need to have been either constructed on a substantial amount of fill material, or built using relatively tall structures.

Q. If the Old Plant had been upgraded prior to the 1993 flood, as contemplated in the 1991 proposal, then would flood protection measures similar to what Mr. Biddy advocates have been appropriate?

A. Yes. If the Old Plant had been upgraded prior to the flood, then a substantial, relatively new investment would presently be located in the flood area, and there would be a need to protect that investment as best as could be done. In addition, if the improvements as proposed in 1991 had been constructed and were to exist today, then I believe that after the flood it would have been appropriate for the Company to have gone beyond the scope of the 1991 proposal, and improved levees and replaced the pump building so that it would be more flood-resistant. Although this would have been prudent, and in my opinion necessary, the action and costs recommended by Mr. Biddy would not accomplish this important goal. However, since none of this investment was made prior to the 1993 flood, and a need

to improve or replace essentially the entire Old Plant has been identified, I think it was reasonable and prudent for the Company to take advantage of the situation and construct the New Plant in a location where operation and access during flooding is not an issue.

Q. Do you agree with Mr. Biddy's assessment of the usability of County Line Road, and the road that is located along the railroad tracks next to the Old Plant site?

A. No. Although the road next to the Old Plant may have at one time been a county-maintained road that extended north, and turned to the east to become County Line Road, direct field observations by the Staff indicate that that is not the case today. Approximately one mile north of the plant site the road is blocked off with an iron gate. Visual observations reveal that part of the route of the road is below the railroad grade, meaning it is below flood elevation. Reportedly, according to the camp ranger at Camp Geiger, a Boy Scout camp, the road route is private property, and is also blocked by another iron gate at another location. I assume that the road may have ceased to be used as a public roadway when Interstate 229 was constructed, severing County Line Road. I think it is possible, however, for a roadway to be constructed that would be usable for the old plant site, but it would involve obtaining property or a right-of-way, and considerably more improvement work than the two culverts Mr. Biddy proposes, adding more dollars to Mr. Biddy's estimate.

Q. Do you agree that the dollar amounts Dr. Morris states on page 10 at lines 17 and 20 of his direct testimony are appropriate to compare a project at the Old Plant site with the New Plant?

A. No. The figures that were presented in Case No. WA-97-46, for the purpose of comparing various alternatives for water supply and treatment facilities in St. Joseph were $63.3 million for non-phased construction and $70.5 million for phased construction of a surface water facility at the Old Plant site. The figure for the then-proposed New Plant was $63.7 million. These numbers are from the *St. Joseph Water Treatment Plant Economic Evaluation of Improvement Alternatives*, dated Feb 1996, and the *Summary of Project Costs*, which were included in the feasibility study filed by the Company in that case. These costs are expressed in 1995 dollars. Dr. Morris stated on page 11 of his direct testimony, with regard to a number he used for the cost of renovation of the Old Plant, that the Company included a possible future cost of residuals handling. However, that is not true; the dollar figures in the feasibility study did not include residuals handling.

Q. On Pages 12, 13, 14 and 15 of his direct testimony, Dr. Morris outlines some improvements along with estimated costs that total $40.3 million. Do you agree with Dr. Morris on these estimated costs?

A. I have reservations about these estimated costs, based on comparing them to costs estimates others have presented. Dr. Morris'

estimates are, for the most part, very similar to the Company's estimates presented in WA-97-46. However, the Company had presented the estimates in 1995 dollars, and Dr. Morris is presenting them as 1999 dollars, which I believe is incorrect. It also appears that Dr. Morris contemplates quite a bit more construction work than Mr. Biddy contemplates (i.e. access, river intake, and pump building) for not much more money, which makes me skeptical. I also do not agree with the concept of comparing Dr. Morris' estimates, as presented, with the cost of the New Plant.

Q. Why is that comparison not appropriate?

A. Because of the difference in the changing drinking water standards for surface water supplies as compared with the standards for ground water supplies. In my opinion, the use of the New Plant, using ground water, provides better assurance that the water supply for the St. Joseph customers will meet the ever-changing drinking water standards for many years to come. However, drinking water standards associated with surface water supplies, such as the Old Plant, have been and are changing more rapidly than standards associated with ground water supplies. This was discussed in testimony from the Company, the Office of the Public Counsel, and the Staff, in Case No. WA-97-46. In my opinion, a realistic comparison of a choice between the New Plant with ground water, and a replacement for the Old Plant with surface water, needs to take into consideration possible future changes in surface water standards. Additionally, in

its feasibility study in Case No. WA-97-46, the Company included an amount for ozone treatment in its feasibility study. Dr. Morris did not include this amount, or any similar amount in his comparison. That would be fine if we were simply comparing the effect on the rates that will result from this current rate case only. However, when studying the choice between whether to construct the New Plant with ground water, or to construct a direct replacement for the Old Plant using surface water, consideration needs to be given to what could reasonably be expected to happen during the years that go well beyond the current rate case.

Q. In Case No. WA-97-46, did you take a position that the New Plant would have been more economical than a project undertaken at the Old Plant site?

A. No. In fact I stated that alternatives at the Old Plant site appear quite attractive when only economics are considered.

Q. Are there other factors besides economics that should be considered?

A. Yes, absolutely. Neither Mr. Biddy, nor Dr. Morris attempted to place any value whatsoever, one way or the other, on intangible benefits in selecting one type of facility over another. There are some benefits to using ground water rather than surface water, which were discussed in Case No. WA-97-46.

Q. Can you please give some examples of the benefits of using ground water over using river surface water?

A. Yes. Among the benefits of groundwater are consistent raw water characteristics, meaning the temperature, hardness, mineral content, organic content, and turbidity (cloudiness) are almost always constant, although there can be changes over a long period of time. However, all of these characteristics change drastically from day-to-day with river surface water.

Raw surface water temperature can vary more than thirty degrees. The speed of chemical reactions in the treatment process slows with lower temperatures meaning chemical feed rates must be varied. Also, since the temperature of the treated water going through the distribution system remains nearly the same as the raw water, cold winter temperatures could cause additional energy consumption in customers' water heaters, and could cause an increase in water main break events.

Organic material changes daily depending on rainfall or melting snow, as decaying plants in the watershed are washed into the river. Skillful treatment plant operators are able to anticipate adjustments to chemical feed rates that will be needed, based on temperatures and weather on previous days, and on whether the river is rising or falling. Organics can also create taste and odors in finished water if not treated as necessary. Organics in surface water are also responsible for what are referred to as disinfection by-products, which are compounds that are formed when organics react with the common disinfectant chlorine. Some of these compounds are considered

carcinogenic. This problem exists to a lesser extent in groundwater. Turbidity also changes from day-to-day, and these variations also cause a variation of turbidity in the finished water.

Control of turbidity is currently considered one of the best methods of treating for parasites such as cryptosporidium and lamblia giardia, which can cause moderate to severe illness in humans. These parasites are more commonly found in surface water rather than ground water.

Zebra mussels are mussel type crustacean animals that conglomerate on under-water surfaces including river water intake structures. They usually must be physically removed. These creatures were introduced into the American continent a number of years ago, and are apparently migrating and are being unintentionally transported throughout the continent. They do not yet exist at St. Joseph, but may be a problem at some point in the future.

Water treatment facilities, and plant operators, can be set up to deal with all of these problems associated with surface water. It is also true that many of these problems are not completely absent from groundwater. However, my point is that there is some value in minimizing these problems and risks, which the Company is able to do by using a ground water supply and treatment facilities.

Q. On page 18, line 3 of his direct testimony, Dr. Morris describes the Company's old surface water plant as one "which has been taken off line one time in its life by a flood." On page 22, line 18,

Dr. Morris describes the risk of flood as "less than two tenths of one percent, which is insignificant." Do you agree with Dr. Morris' assertion that the flood risk is not significant?

A. No. I disagree very strongly. I think the flood risk at the Old Plant site, however small others may wish to consider it, is very important to the customers of St. Joseph, who have been out of water due to flooding with no apparent negligence of anyone. This site, and any development upon it, will be subject to flooding no matter what protection measures are taken, and I do not think it is imprudent at all for the Company to use its capital resources to provide the best assurance that the water supply will not be affected by adverse river conditions in the future.

While the Company is currently under criticism for choosing to construct the New Plant, I believe that the Company would also be under harsh criticism if it had made a large capital investment in the flood area. This is a very important point because such an investment could very easily be termed foolish and imprudent, especially if an event topping the 1993 flood were to occur. The Company is in such a position that it must not allow this to happen, and for this reason, I think the flood issue is a very important factor in evaluating the prudence of the New Plant.

NEW PLANT IN SERVICE - ST. JOSEPH

Q. Did you tour and inspect the New Plant to verify that it is used and useful, and "in service"?

A. Yes, I along with other Staff members toured the facility on April 19 & 20, 2000 and made detailed observations.

Q. Is the New Plant in service?

A. Yes, it is in service and supplying water to the company's customers. However, even though the water treatment process functions for the most part are operable, construction was not totally complete.

Q. Please describe your observations of the plant.

A. I observed each pump at the wellfield to be operable. Production at the wellfield and water treatment at the treatment plant were observed, by various flow indicators, to be 21 MGD. I observed each major pump within the plant to run and pump water, with the distributive pumps observed to pump up to 28 MGD to the distribution system. One goal of the tour was to see if every chemical feeder was operable, however the ammonia feeder was not yet operational at the time of the tour. There was also a considerable amount of construction detail work that was being done at the time. This work appeared to be mostly building detail work, such as trim and finishing, and installing accessories such as fire extinguishers. My typed notes of the tour are attached to this testimony as Schedule 1. Since the costs associated with this plant are not yet finalized, the capital

costs to be included in rates will need to be addressed in the true-up portion of this case.

Q. In your opinion, did the Company prudently manage the design and construction of this facility?

A. Yes, except for an excess capacity issue that will be discussed herein, it appears to me that the Company oversaw a prudent design of the New Plant with respect to ultimate design capacity. This is based on my review of the design memorandum, the plans and observation of the nearly finished facility. Also, having reviewed contractor bid proposals and change orders, and having discussed a number of matters with some of the Company's engineers, it appears to me that the Company was prudent in selecting low bids and cost effective products. This is true not only with regard to the New Plant, but also with regard to the other new construction undertaken by the Company.

Q. Do you believe the New Plant is supplying good quality water to the customers in St. Joseph?

A. Yes, I do. However, I recognize this could be a debatable point among some of the St. Joseph customers. Some people are more sensitive to water characteristics than others. To a certain extent, I believe some customers who are somewhat sensitive, and who were accustomed to the treated river water, find the treated groundwater quite different, and in some cases objectionable. I have heard complaints about the water having bad taste, having an oil feel and

leaving an oily deposit, and forming a surface film in coffee and tea drinks. During my recent visit to St. Joseph, which was an overnight trip, I drank the water, went to a few restaurants, and brewed some tea. Without question, the coffee and tea surface film is an obvious issue, however I could not detect any other type of oily sensation. The surface film is somewhat commonly observed with hard water, and is worse in some water supplies than others. The Company reported to me that they are testing a phosphate solution additive, which is capable of reducing or eliminating some of the effects of hardness. At the time this testimony is being prepared I have no information on whether or not the phosphate has a positive effect.

During the plant tour, I had brought some samples of water from various other sources, and along with a sample from the New Plant had my Staff co-workers and some company people participate in a "taste test," sampling water from various code-marked containers. The conclusion of the test was that there was no taste or odor problem with the New Plant water at that time.

EXCESS CAPACITY - ST. JOSEPH

Q. Do you agree with Mr. Biddy's methodology in determining an adjustment for excess capacity?

A. No. Mr. Biddy simply took a water production number for only two years into the future, converted that to the percentage of the total water production design capability (30 MGD), and multiplied

the cost of the entire project by this figure. I do not believe that two years is far enough into the future for setting rates because it is not practical to expect utilities to increase capacity every two years. Also, I believe that only the incremental costs of excess capacity should be adjusted, not the entire plant cost. The reason for this is that many costs are unrelated to plant capacity. Examples of this are land acquisition, buildings and many components that would not be sized smaller for less capacity.

Q. Is it your opinion, however, that there is excess capacity at the new plant?

A. Yes.

Q. Please explain why.

A. The Company designed this facility for total "firm" treatment capacity of 30 MGD. "Firm" capacity means that the design capacity may be met with the largest unit of any major component out of service, such as a clarifier unit, a filter unit or a major pump. The limiting treatment component for this particular plant is the sand filter system. The sand filters were designed with a flow rate of 5.6 gallons per minute (GPM) per square foot of filter area. With one of the six (6) filters out of service, the filter area is 3,750 square feet. Multiplying that square footage by 5.6 GPM per square foot results in 21,000 GPM. This flow rate multiplied by 1,440 minutes per day and divided by one million converts to 30.2 MGD.

However, the Missouri Department of Natural Resources, which is the state agency that approves the design and construction of water treatment facilities, has approved the filters for at least a one-year trial period for a flow rate of only four (4) GPM per square foot. This means that until further action by the Department of Natural Resources, the filters have a firm capacity of only 21.6 MGD. This capacity number is calculated by multiplying 3,750 square feet by 4 gallons per minute per square foot, which is 15,000 GPM, then converting that number to 21.6 MGD. The 4 GPM per square foot flow rate is really not an absolute limit. It is acceptable practice to run filters at a greater flow rate than the design rate for short periods. Considering this, and considering that all six filters will likely be on line and available for use during high water demand periods, particularly while the plant is new, I conclude that the filters, even at a 4 GPM per square foot prescribed limitation, provide adequate capacity to meet what appears to be consistent peak day demands of 23 MGD. However, since the filter capacity is not yet 30 MGD, and peak day demand has been relatively consistent for a number of years at approximately 23 MGD, I think it would have been reasonable to size certain other plant components similar to the filter limitation, where practical.

Q. What plant components do you think could have been sized for less than 30 MGD?

A. Specifically, five (5) vertical wells at the wellfield, instead of seven (7), would be adequate; two (2) clarifiers, instead of three (3), could have been constructed; and three (3) 300 horsepower distributive pumps, instead of a total of four (4) distributive pumps, could have been installed. There are two (2) 300 horsepower units and two (2) 200 horsepower units actually in place. Finally, the clearwell could have been constructed as two (2) 750,000 gallon units rather than two (2) one million gallon units. I do not advocate that any different configuration of the plant should have been constructed, or any reduction of hydraulic flow capacity should have been constructed. Rather, I think that these components could have been easily added on within a few years as additional capacity is actually needed, and when additional approved filter capacity becomes available whether by approval of a greater flow rate, or the addition of more filter units.

Q. Do you have an estimate of the value of these components?

A. Yes. The total dollar amount is $2,271,756. An outline of my calculations of these disallowances is attached to this testimony as Schedule 2. I recommend that this capital cost be excluded for ratemaking purposes in this case.

PLANT IN SERVICE - OTHER SERVICE AREAS

Q. What other new facilities besides the St. Joseph plant have been, or are being placed into service?

A. There are new major facilities in the Company's Warrensburg, Mexico, Platte County and Joplin districts.

Q. Would you please describe the new facilities in Warrensburg?

A. The Warrensburg plant now has ozone treatment to address hydrogen sulfide odors, and a phosphate sequestering agent to reduce the scaling effect caused by the hardness of the water. These issues were the subject of complaints in the Company's previous rate case, and were also the subject of Case No. WO-98-203, which was a case initiated by the Commission to investigate those complaints. On April 19, 2000, I observed the new facilities as in-service and operating, however the contractor is still working on ground restoration and removal of retired plant structures.

Q. Would you please describe the new facilities in Mexico?

A. On April 28, 2000, I visited the Mexico water treatment plant which is being refurbished and expanded from 3 MGD to 4.5 MGD. The improvements consist of a new lime feed building with two new feeders to replace the old single unit, and a facility to receive and store bulk lime instead of sacks of lime; a new mixing chamber and flocculator to replace the old unit; two replacement concrete settling basins to replace the old units; the addition of a third sand filter unit, and the addition of a filter surface wash system; and the addition of a fourth high service pump, which pumps finished water into the system. New controls and monitors for most components are

also being installed. Also, an additional well has been constructed along with a raw water main to connect it to the plant. These new facilities are in service and operating, but again finishing work such as basin railings, building trim and ground restoration are not complete. Along with the new construction, the underdrain of one of the two existing plant sand filters is being renovated, and was out of service at the time of my visit.

Q. Would you please describe the new facilities in Platte County?

A. A new water tank and booster station in the Platte County service district was observed to be in operation by the Staff on May 23, 2000.

Q. Would you please describe the new facilities in Joplin?

A. The local manager of the Joplin service district reported to the Staff within the past few days that the new well has been placed on line, however, the Staff has not yet had the opportunity to observe this facility.

Q. Do you have a recommendation with regard to the capital costs associated with these projects?

A. Yes. First, I intend to verify the completion of process components such as the ammonia feed in St. Joseph, the sand filter in Mexico, and the new well in Joplin, as well as other non-process items such as railings, monitors, and building and grounds as soon as practical. To the extent that work is finished and process components

are operational by the true-up cut off date in this case, I recommend the capital costs associated with the new facilities that are in service be included for ratemaking, with the exception of the excess capacity adjustment for the St. Joseph plant.

Q. Would you please summarize your rebuttal testimony?

A. Yes. It is my opinion that the positions taken by Mr. Ted L. Biddy and Dr. Charles D. Morris regarding the prudence of construction of the St. Joseph groundwater plant are unrealistic, flawed and incomplete, and not sufficiently forward-looking. With the exception of noted components, the projects undertaken by the Company in St. Joseph, Warrensburg, Mexico and Platte County are used and useful and in service. The Staff will verify the operation of the Joplin well, re-inspect those components in St. Joseph and Mexico found to be non-operational, and observe other non-process construction work that is now in progress. Work that is completed and in service by the true-up cut off date of this case may be included for ratemaking purposes, however certain components of the new St. Joseph plant are of excess capacity and an appropriate value of those components should be disallowed in this rate case.

Q. Does this conclude your testimony at this time?

A. Yes.

St. Joseph Treatment Plant
Tour Notes

James A. Merciel, Jr.
Reuttal Testimony
WR-2000-281

St. Joseph Plant 4/20/00
Running 21 mgd including .9mgd recycle water
finishing work in hallways, etc being done

3 US Filter clarifiers in service -- transition steps not finished, lighting protection not done

Raw water turbidity	0.56		
pH	7.07		
temp	49		
venturi flowmeter	21.1 mgd		

Provision for a fourth clarifier to be added in the future

evaluation: Clarifiers		105 feet diamter
		3.5 feet dia center column
		8649 settling area each
	30 MGD	0.80 gpm per sqft
	1 out of svc	1.20 gpm per sqft

Potassium permangenate not being run now. Mixer and pumps test run ok
Caustic soda, chlorine, ferric fed at rapid mix
Lime feeders in rapid mix room, 1 run, 1 test run ok

Polymers- 2 clarifier feeds using Calgon 675
1 filter aid, Calgon 652 test run ok
waste feeder, Calgon 692 ok

Carbon feed operational, goes to rapid mix

Recycle water turbidity	2.99
Clarifier turbidity	0.61

Caustic feeds to rapid mix, but also can feed before filters

Fluoride feed ok

Chlorine regulators 2 for pre-clarifiers, 1 on, 1 off
2 for post clarifiers, 1 on, 1off
pre filter off
Chlorine room feeders ok

Ammonia feeders not in service, issue on feeder size -- to be replaced

Filters, 6 twin filters,	4500 sq feet			
	evaluation:	1 out of svc	3750	5.6 gpm/sq ft
Of each of the 6 filters, each twin (1/2 filter) dimensions			15	25

St. Joseph Treatment Plant
Tour Notes

James A. Merciel, Jr.
Reuttal Testimony
WR-2000-281

Each twin filter is backwashed separately

air backwash aid is operational

Filter turbidity monitors

1	0.062	2	0.080
3	0.125	4	0.037
5	0.043	6	0.040

Plant effluent	Turb	0.07
	pH	7.33
Iron (check in lab)		0.018

Caterpillar Generator test run ok

Distributive pumps 3 and 4 running, 3 is variable speed
1 and 2 test run ok provision for a 5th pump

	per dataplate
1 200hp	5560 gpm
2 300hp	9730 gpm
3 200hp	5560 gpm
4 300hp	9730 gpm

at hi service venturi 21.2 mgd 3 and 4
28.6 mgd with 1,2,3

Waste facility 2 clarifiers
2 Process clarifier blowdown pumps
2 Residual discharge - 1 out of service for repair
2 Recycle water pumps

Chlorine scrubber test run ok
Lime bulk feed compressors, 1 run and 1 test run ok.

St. Joseph Wellfield
Tour Notes

James A. Merciel, Jr.
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St. Joseph well field

4/19/00

Vertical wells		Rosemount flow totalizers	
	1 running	2670 gpm	3.84 mgd
	2 running	2680	
	3 switched on	2340	indicated negative flow when off, needs calibration
	4 running	2550	
	5 switched on	2660	
	6 switched on	2660	
	7 switched on	2620	
Horizontal well			
	1 switched on	4650 gpm	6.70 mgd
	2 running variable	3460	
	3 switched on	4640	
4 running well pumps		11360 gpm	16.36 mgd

On 4/20, plant records for 4/19 evening showed approx 16 mgd with peaks of 21 mgd

total of all well pumps	30930 gpm	44.54 mgd
6 vert and 1 horiz	20160 gpm	29.03 mgd

2 Caterpillar diesel generators ran and powered wellfield

St. Joseph Plant
Recommended Excess Capacity Disallowance

James A. Merciel, Jr.
Rebuttal Testimony
WR-2000-281

Historical usage from plant records

	Pumped to system actual		Total production actual	
7/20/91	24,628,000	2.8%	25,328,000	gpd total production including plant use water
	actual		estimates	
1994 peak	21,204,000		21,790,023	
1995 peak	22,125,000		22,736,477	
1999 peak	21,880,000		22,484,706	

use 23 mgd

Filters 5.6 gpm/sqft 4 gpm/sqft initial approval

Of each of the 6 filters, each twin (1/2 filter) dimensions are 15 25 feet

375 sq ft

times 12 4500 sq ft total

Filters, 6 twin filters, 4500 sq feet
at 30 mgd 4.63 gpm/sqft

1 out of service 3750 sq feet
5.56 gpm/sqft

Filters, 6 twin filters, 4500 sq feet
at 23 mgd 3.55 gpm/sqft

1 out of service 3750 sq feet
4.26 gpm/sqft

NO EXCESS FILTER CAPACITY AT CURRENTLY APPROVED FILTER RATE

Wellfield

7 vertical wells	2650	gpm capacity of each vertical well
3 horiz pumps	4650	gpm capacity of each horizontal well pump

Run	6 wells 2 horizontals		
Produces	25200 gpm	36.3 mgd	
Run	4 wells 2 horizontals		
Produces	19900 gpm	28.7 mgd	
Run	4 wells 1 horizontals		
Produces	15250 gpm	22.0 mgd	
Run	5 wells 0 horizontals		
Produces	13250 gpm	19.1 mgd	

TWO VERTICAL WELLS MAY BE DISALLOWED FOR EXCESS CAPACITY

Vertical wells, total	$ 675,000	7 wells		
(rounded up to account for electrical, controls, pipe, etc.	$ 96,429	each		
		2 wells	**$**	**192,857**

Estimated cost - well pumps	$ 800,000			
7 300	$ 22,222	cost per 100 hp		
3 500				
		600 hp disallowance	**$**	**133,333**

Distributive Pumps

1 200hp	5560 gpm	8.0	
2 300hp	9730 gpm	14.0	
3 200hp	5560 gpm	8.0	
4 300hp	9730 gpm	14.0	
			observed flows
calculated flows:	3 and 4	22.0	21.2 mgd 3 and 4
	1, 2 and 3	30.0	28.6 mgd with 1,2,3
	1 and 3	16.0	
	2 and 4	28.0	

ONE 200 HP MAY BE DISALLOWED IF THE REMAINING 200 HP WERE REPLACED WITH A 300 HP

Using the same cost as well pumps,			
	100 hp disallowance	**$**	**22,222**

St. Joseph Plant
Recommended Excess Capacity Disallowance

James A. Merciel, Jr.
Rebuttal Testimony
WR-2000-281

Clearwell

30 mgd	23 mgd
611000 CT	468433 CT
341600 wash	250000 wash
48000 plant	48000 plant
900000 eq	690000 eq

1,900,600	gallons	1,456,433	gallons	say two	750,000 units
				instead of two	1,000,000 units
					500,000 gallon disallowance

At a cost of $ 1.00 per gallon **$ 500,000**

Clarifiers

1 gpm/sqft
90 minutes detention
105 feet diamter — 22 feet water depth
3.5 feet dia center column
8649 settling area each — 1,423,343 gallon volume each

30 MGD		
3 in service	0.80 gpm per sqft	205 minutes detention
2 in service	1.20 gpm per sqft	137 minutes detention
23 MGD		
2 in service	0.92 gpm per sqft	178 minutes detention
1 in service	1.85 gpm per sqft	89 minutes detention

ONE CLARIFIER COULD BE DISALLOWED FOR EXCESS CAPACITY

At a cost of $ 1.00 per gallon **$ 1,423,343**

TOTAL RECOMMENDED EXCESS CAPACITY DISALLOWANCE **$ 2,271,756**

BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF MISSOURI

In the Matter of Missouri-American Water Company's Tariff Sheets Designed to Implement General Rate Increases for Water and Sewer Service Provided to Customers in the Missouri Service Area of the Company.	)	Case No. WR-2000-281 Case No. SR-2000-282

AFFIDAVIT OF JAMES A. MERCIEL, JR.

STATE OF MISSOURI)
) ss
COUNTY OF COLE)

James A. Merciel, Jr., of lawful age, on his oath states: that he has participated in the preparation of the foregoing Rebuttal Testimony, in question and answer form, consisting of 21 pages and 2 Schedules, to be presented in the above case; that he has knowledge of the matters set forth in such answers; and that such answers are true to the best of his knowledge and belief.

James A. Merciel, Jr.

Subscribed and sworn to before me this 4th day of May 2000.

Notary Public

My commission expires

SHARON S WILES
NOTARY PUBLIC STATE OF MISSOURI
COLE COUNTY
MY COMMISSION EXP. AUG. 23,2002