

APPENDIX B

Life-Cycle Cost Sensitivity Analyses

Lebanon WTP Life Cycle Analysis
Sensitivity to Interest and Inflation Rates

Condition	Input Rates		Conventional Media		Membrane Filtration		Comments	(Membrane Values) - (Conventional Values)		= ((Memb) - (Conv)) / (Conv) * 100	
	Interest Rate	Inflation Rate	Annual O&M	Net Present Value	Annual O&M	Net Present Value		Annual O&M	Net Present Value	Annual O&M	Net Present Value
Base	7%	5%	\$960,000	\$30,000,000	\$1,000,000	\$30,200,000	7% interest and 5% inflation are values currently recommended by CH2M HILL economists	\$40,000	\$200,000	4%	1%
Lower both rates	6%	4%	\$880,000	\$30,000,000	\$890,000	\$30,200,000	Lowering both rates decreases annual O&M but does not change the NPV	\$10,000	\$200,000	1%	1%
Lower just inflation	7%	3%	\$790,000	\$28,000,000	\$790,000	\$28,100,000	Lowering just inflation rate has greater impact on membrane option, bringing costs closer together	\$0	\$100,000	0%	0%
Lower just interest	6%	5%	\$980,000	\$31,200,000	\$1,010,000	\$31,500,000	Lowering just interest slightly increases annual O&M and results in more substantial increase in NPV	\$30,000	\$300,000	3%	1%
Raise both rates	8%	6%	\$1,020,000	\$30,000,000	\$1,050,000	\$30,200,000	Raising both rates increases annual O&M and brings them slightly closer together; no change in NPV	\$30,000	\$200,000	3%	1%
Raise just inflation	7%	6%	\$1,050,000	\$31,200,000	\$1,090,000	\$31,500,000	Not much relative change in annual O&M or NPV	\$40,000	\$300,000	4%	1%
Raise just interest	8%	5%	\$950,000	\$29,000,000	\$950,000	\$29,100,000	Increasing just interest rate has greater impact on membrane option, bringing costs closer together	\$0	\$100,000	0%	0%

Lebanon WTP Life Cycle Analysis
Sensitivity to Labor Time

Condition	Conventional Media			Membrane Filtration			(Membrane Values) - (Conventional Values)	
	Labor Hours Per Week	Annual O&M	Net Present Value	Labor Hours Per Week	Annual O&M	Net Present Value	Annual O&M	Net Present Value
Base (2 FTE for conventional and 1 FTE for membrane)	80	\$960,000	\$30,000,000	40	\$1,000,000	\$30,200,000	\$40,000	\$200,000
Increased labor for membrane option (2 FTE for each treatment option)	80	\$960,000	\$30,000,000	80	\$1,100,000	\$31,400,000	\$140,000	\$1,400,000
Increased labor for conventional option (3 FTE for conventional and 1 FTE for membrane)	120	\$1,070,000	\$31,200,000	40	\$1,000,000	\$30,200,000	(\$70,000)	(\$1,000,000)

Lebanon WTP Life Cycle Analysis
Sensitivity to Membrane Replacement Frequency

Condition			Membrane Filtration			(Membrane Values) - (Conventional Values)		= ((Memb) - (Conv)) / (Conv) * 100	
	Annual O&M	Net Present Value	Membrane Replacement Frequency (years)	Annual O&M	Net Present Value	Annual O&M	Net Present Value	Annual O&M	Net Present Value
Base	\$960,000	\$30,000,000	10	\$1,000,000	\$30,200,000	\$40,000	\$200,000	4%	1%
Shorter membrane life	\$960,000	\$30,000,000	8	\$1,020,000	\$30,400,000	\$60,000	\$400,000	6%	1%
Longer membrane life	\$960,000	\$30,000,000	12	\$1,000,000	\$30,100,000	\$40,000	\$100,000	4%	0%
Longer membrane life	\$960,000	\$30,000,000	15	\$980,000	\$29,900,000	\$20,000	(\$100,000)	2%	0%

Lebanon WTP Life Cycle Analysis
Sensitivity to Electrical Power Costs

Condition	Electrical Rate (\$/KWH) ¹	Conventional Media		Membrane Filtration		(Membrane Values) - (Conventional Values)		= ((Memb) - (Conv)) / (Conv) * 100	
		Annual O&M	Net Present Value	Annual O&M	Net Present Value	Annual O&M	Net Present Value	Annual O&M	Net Present Value
Base	\$0.11	\$960,000	\$30,000,000	\$1,000,000	\$30,200,000	\$40,000	\$200,000	4%	1%
Increased electrical rate	\$0.13	\$990,000	\$30,600,000	\$1,070,000	\$31,000,000	\$80,000	\$400,000	8%	1%
Increased electrical rate	\$0.15	\$1,020,000	\$31,100,000	\$1,120,000	\$31,900,000	\$100,000	\$800,000	10%	3%

Notes:

1. Electrical rate represents an "all in" cost, accounting for demand charge and use charge.