Spreadsheet Number 1 - Flow Data
User Input Required

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1																									
2		MONTHLY FLOW: YEAR a - Volume Produced (Qi) and Volume Delivered (Qd)																							
3		01/a		02/a		03/a		04/a		05/a		06/a		07/a		08/a		09/a		10/a		11/a		12/a	
4	INDIVIDUAL SYSTEM NAME	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd
5	Claypool Hill	11101	6338	11325	6893	11332	4766	11249	6267	11754	6175	11514	7060	12044	6492	12184	9456	11557	6526	12263	6719	11686	7387	11343	5999
6	Raven/Doran	9263	7536	8810	7552	9450	6086	9232	7548	10536	8076	9748	7411	10140	6132	11010	6956	7869	6012	7981	6023	7823	5849	7757	4627
7	Boissevain	1422	1090	1228	923	1225	832	1447	1275	1224	1071	1235	1159	1422	986	1059	848	1070	847	1150	883	1020	819	1078	833
8	Amonate	270	252	338	392	333	287	284	278	267	299	304	617	345	345	294	395	270	280	268	268	235	235	246	246
9	Jewel Ridge	737	716	465	479	579	410	296	239	253	243	557	404	855	360	416	416	449	449	581	458	528	579	559	277
10	Bishop	479	450	431	487	466	379	479	510	492	584	532	589	560	412	603	585	500	603	508	508	528	545	501	508
11	Falls Mills	1766	1542	1770	1416	1386	954	1807	1384	1580	942	2239	2087	2453	973	1356	1158	1761	1142	1594	1499	1728	1304	2154	1610
12	Bluefield	630	633	1029	1531	542	415	688	876	762	811	735	661	681	423	1012	546	785	712	636	648	758	545	592	541
13	Tazewell	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
14	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
15	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
16	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
17	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
18	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
19	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
20	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
21	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
22	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
23	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
24	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input
25	MONTHLY SUBTOTALS	25667	18557	25396	19673	25313	14129	25482	18378	26869	18200	26864	19988	28500	16123	27934	20358	24261	16571	24981	17006	24306	17262	24229	14640
26	ANNUAL TOTALS																							309799	210886
27	ANNUAL TOTAL LOSSES																								98913

	A	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
1																										
2		MONTHLY FLOW: YEAR b - Volume Produced (Qi) and Volume Delivered (Qd)																								
3		01/b		02/b		03/b		04/b		05/b		06/b		07/b		08/b		09/b		10/b		11/b		12/b		
4	INDIVIDUAL SYSTEM NAME	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	Qi	Qd	
5	Claypool Hill	11101	6338	11325	6893	11332	4766	11249	6267	11754	6175	11514	7060	12044	6492	12184	9456	11557	6526	12263	6719	11686	7387	11343	5999	
6	Raven/Doran	9263	7536	8810	7552	9450	6086	9232	7548	10536	8076	9748	7411	10140	6132	11010	6956	7869	6012	7981	6023	7823	5849	7757	4627	
7	Boissevain	1422	1090	1228	923	1225	832	1447	1275	1224	1071	1235	1159	1422	986	1059	848	1070	847	1150	883	1020	819	1078	833	
8	Amonate	270	252	338	392	333	287	284	278	267	299	304	617	345	345	294	395	270	280	268	268	235	235	246	246	
9	Jewel Ridge	737	716	465	479	579	410	296	239	253	243	557	404	855	360	416	416	449	449	581	458	528	579	559	277	
10	Bishop	479	450	431	487	466	379	479	510	492	584	532	589	560	412	603	585	500	603	508	508	528	545	501	508	
11	Falls Mills	1766	1542	1770	1416	1386	954	1807	1384	1580	942	2239	2087	2453	973	1356	1158	1761	1142	1594	1499	1728	1304	2154	1610	
12	Bluefield	630	633	1029	1531	542	415	688	876	762	811	735	661	681	423	1012	546	785	712	636	648	758	545	592	541	
13	Tazewell	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
15	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
16	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
17	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
18	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
19	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
20	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
21	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
22	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
23	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
24	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	Input	
25	MONTHLY SUBTOTALS	25667	18557	25396	19673	25313	14129	25482	18378	26869	18200	26864	19988	28500	16123	27934	20358	24261	16571	24981	17006	24306	17262	24229	14640	
26	ANNUAL TOTALS																							309799	210886	
27	ANNUAL TOTAL LOSSES																								98913	

	A	B	C	D
28				
29	FLOW SUMMARY TABLE			
30	ANNUAL TOTALS	YR a	YR b	AVE.
31	PRODUCED (QI)	309799	309799	309799
32	DELIVERED (QD)	210886	210886	210886
33	LOSS (QL)	98913	98913	98913
34				

Exhibit 3.12. Example application run spreadsheet number 1.

	A	B	C	D	F
1	***Spreadsheet Number 2 - Cost Data*** ***User Input Required***				
2		**ANNUAL FIXED COSTS - MANUAL**			
3	**COST CATEGORY**	**YR a**	**YR b**		
4	**Fixed Plant**	**$283,045**	**$283,045**		
5	**Administrative & Contract**	**$276,291**	**$276,291**		
6	**Input**	**Input**	**Input**		
7	**Input**	**Input**	**Input**		
8	**Input**	**Input**	**Input**		
9	**Input**	**Input**	**Input**		
10	**Input**	**Input**	**Input**		
11	**Input**	**Input**	**Input**		
12	**Input**	**Input**	**Input**		
13	**Input**	**Input**	**Input**		
14	**Input**	**Input**	**Input**		
15	**Input**	**Input**	**Input**		
16	**FIXED TOTALS - MANUAL**	**$559,336**	**$559,336**		
17	**FIXED PW TOTALS - MANUAL**	**$644,335**	**$644,335**		
18	**FIXED PW AVERAGE - MANUAL**		**$644,335**		
19					
20		**TOTAL FIXED COSTS - REMOTE**			
21	**COST CATEGORY**	**Cost**	**Life**	**Present**	
22	**Tank Units**	**$96,000**	**7**	**$13,714**	
23	**Booster Station Units**	**$32,000**	**7**	**$4,571**	
24	**Base Computer, Etc.**	**$30,000**	**7**	**$4,286**	
25	**Design**	**$64,000**	**7**	**$9,143**	
26	**Installation**	**$64,000**	**7**	**$9,143**	
27	**SparesUpdates**	**$31,600**	**7**	**$4,514**	
28	**FIXED PW TOTAL - PRESENT**			**$45,371**	
29					
30	**FIXED PW TOTAL - REMOTE**			**$689,707**	
31					
32		**ANNUAL VARIABLE COSTS - MANUAL**			
33	**COST CATEGORY**	**YR a**	**YR b**		
34	**Water Treatment**	**$642,803**	**$642,803**		
35	**O & M**	**$20,042**	**$20,042**		
36	**Miscellaneous & Unclassified**	**$4,766**	**$4,766**		
37	**Input**	**Input**	**Input**		
38	**Input**	**Input**	**Input**		
39	**Input**	**Input**	**Input**		
40	**Input**	**Input**	**Input**		
41	**Input**	**Input**	**Input**		
42	**Input**	**Input**	**Input**		
43	**Input**	**Input**	**Input**		
44	**VARIABLE TOTALS**	**$667,611**	**$667,611**		
45	**VARIABLE PW TOTALS**	**$722,644**	**$722,644**		
46	**VARIABLE PW AVERAGE**		**$722,644**		
47					
48					

Exhibit 3.13. Example appliction run spreadsheet number 2.

	A	B	C	E
1	***Spreadsheet Number 3 - Manual Mode Variable Cost Parameter (Vm) Spreadsheet Calculation***			
2		**ANNUAL VALUES**		
3		**YR a**	**YR b**	
4	**VOLUME DELIVERED**	**210886**	**210886**	
5	**VARIABLE COST**	**722644**	**722644**	
6	**ANNUAL UNIT VARIABLE COST**	**3.43**	**3.43**	
7				
8	**MANUAL MODE VARIABLE COST PARAMETER**	**3.43**		
9				
10				
11				
12				
13				
14				
15				
16				

Exhibit 3.14. Example application run spreadsheet number 3.

Spreadsheet Number 4 - Remote Mode Variable Cost Parameter (Vr)
User Input Required
Spreadsheet Calculations

	VARIABLE OR PARAMETER	
INSTRUCTIONS and CLARIFICATIONS	**Symbol/Formula**	**Value**
Spreadsheet Calculation - Remote Mode Loss Factor: This factor describes the maximum potential loss reduction attributible to remote monitoring. It is equal to the total loss in the manual mode - QL. This spreadsheet imports QL from spreadsheet number 1.	**FL = QL**	**98913**
USER INPUT REQUIRED - Remote Mode Extent Factor: This factor describes the the extent of remote monitoring planned for the water sytem as a fraction of the maximum potential loss reduction. Typically, a system will incorporate remote monitoring at one of two general extents: either all major system components such as tanks, pump stations, etc. or all major system components and strategic distribution conduit locations. For major system components a factor value range is 0.20 to 0.40, with 0.30 typical; for major components and conduits a factor value range is 0.45 to 0.85, with 0.65 typical. USER MUST ESTIMATE THESE VALUES BASED UPON SYSTEM AND MONITORING CONFIGURATION. Input must be in the form 0.XX - two digits to the right of a decimal.	**FX = USER INPUT**	**0.30**
USER INPUT REQUIRED - Manual Mode Frequency: User must input the average frequency of system component monitoring with manual monitoring. Units are number of monitoring events (per unit time) and must be the same units as Remote Mode Frequency, below. USER INPUTS NUMBER ONLY, such as 1 representing one monitoring event per day.	**Tm = USER INPUT**	**1**
USER INPUT REQUIRED - Remote Mode Frequency: User must input the average frequency of system component monitoring with remotel monitoring. Units are number of monitoring events (per unit time) and must be the same units as Manual Mode Frequency, above. USER INPUTS NUMBER ONLY, such as 12 representing twelve monitoring events per day; 12 events per day should be the maximum value, representing essentially real-time monitoring.	**Tr = USER INPUT**	**12**
Spreadsheet Calculation - Remote Mode Frequency Factor: This factor, calculated from the remote and manual monitoring frequencies above, describes system water loss reduction attributible to increased monitoring frequency.	**FT = 1 - (Tm/Tr)**	**0.92**
Spreadsheet Calculation - Remote Mode Annual Volume Delivered: This is the simulated volume of water delivered with remote monitoring - Qr, based upon the volume delivered with manual moinitoring - Qm (Qm = QD) and the adjustment factors, above.	**Qr = Qm + (FL*FX*FT)**	**238087**
Spreadsheet Importation - Manual Mode Variable Cost Parameter: This spreadsheet imports Vm from spreadsheet number 3.	**Vm**	**3.43**
Spreadsheet Calculation - Remote Mode Variable Cost Parmeter: The remorte mode variable cost parmeter is calculated by adjusting the manual mode variable cost parameter by the ratio of the annual volumes delivered. This is the primary model parameter.	**Vr = Vm (Qm/Qr)**	**3.04**

Exhibit 3.15. Example applicatoin run spreadsheet number 4.

Sprteadsheet Number 5 - Cost Simulation Spreadsheet Calculations

		DEPENDENT VARIABLE OR PARAMETER							
Simulation Flow Delivered		**Fixed Cost**		**Variable Cost Parameter**		**Variable Cost**		**Total Cost**	
Fraction QD	**Gallons/Year**	**Manual**	**Remote**	**Manual**	**Remote**	**Manual**	**Remote**	**Manual**	**Remote**
0Q	0	$644,335	$689,707	3.43	3.04	$0	$0	$644,335	$689,707
.1Q	21089	$644,335	$689,707	3.43	3.04	$72,264	$64,008	$716,599	$753,715
.2Q	42177	$644,335	$689,707	3.43	3.04	$144,529	$128,017	$788,864	$817,723
.3Q	63266	$644,335	$689,707	3.43	3.04	$216,793	$192,025	$861,128	$881,731
.4Q	84355	$644,335	$689,707	3.43	3.04	$289,057	$256,033	$933,393	$945,740
.5Q	105443	$644,335	$689,707	3.43	3.04	$361,322	$320,041	$1,005,657	$1,009,748
.6Q	126532	$644,335	$689,707	3.43	3.04	$433,586	$384,050	$1,077,921	$1,073,756
.7Q	147620	$644,335	$689,707	3.43	3.04	$505,851	$448,058	$1,150,186	$1,137,765
.8Q	168709	$644,335	$689,707	3.43	3.04	$578,115	$512,066	$1,222,450	$1,201,773
.9Q	189798	$644,335	$689,707	3.43	3.04	$650,379	$576,075	$1,294,714	$1,265,781
Q	210886	$644,335	$689,707	3.43	3.04	$722,644	$640,083	$1,366,979	$1,329,789
1.01Q	212995	$1,288,670	$1,379,413	3.43	3.04	$729,870	$646,484	$2,018,540	$2,025,897
1.1Q	231975	$1,288,670	$1,379,413	3.43	3.04	$794,908	$704,091	$2,083,578	$2,083,504
1.2Q	253064	$1,288,670	$1,379,413	3.43	3.04	$867,172	$768,099	$2,155,843	$2,147,512
1.3Q	274152	$1,288,670	$1,379,413	3.43	3.04	$939,437	$832,108	$2,228,107	$2,211,521
1.4Q	295241	$1,288,670	$1,379,413	3.43	3.04	$1,011,701	$896,116	$2,300,371	$2,275,529
1.5Q	316329	$1,288,670	$1,379,413	3.43	3.04	$1,083,965	$960,124	$2,372,636	$2,339,537
1.6Q	337418	$1,288,670	$1,379,413	3.43	3.04	$1,156,230	$1,024,132	$2,444,900	$2,403,546
1.7Q	358507	$1,288,670	$1,379,413	3.43	3.04	$1,228,494	$1,088,141	$2,517,164	$2,467,554
1.8Q	379595	$1,288,670	$1,379,413	3.43	3.04	$1,300,759	$1,152,149	$2,589,429	$2,531,562
1.9Q	400684	$1,288,670	$1,379,413	3.43	3.04	$1,373,023	$1,216,157	$2,661,693	$2,595,570
2Q	421773	$1,288,670	$1,379,413	3.43	3.04	$1,445,287	$1,280,166	$2,733,957	$2,659,579

Exhibit 3.16. Example application run spreadsheet number 5.

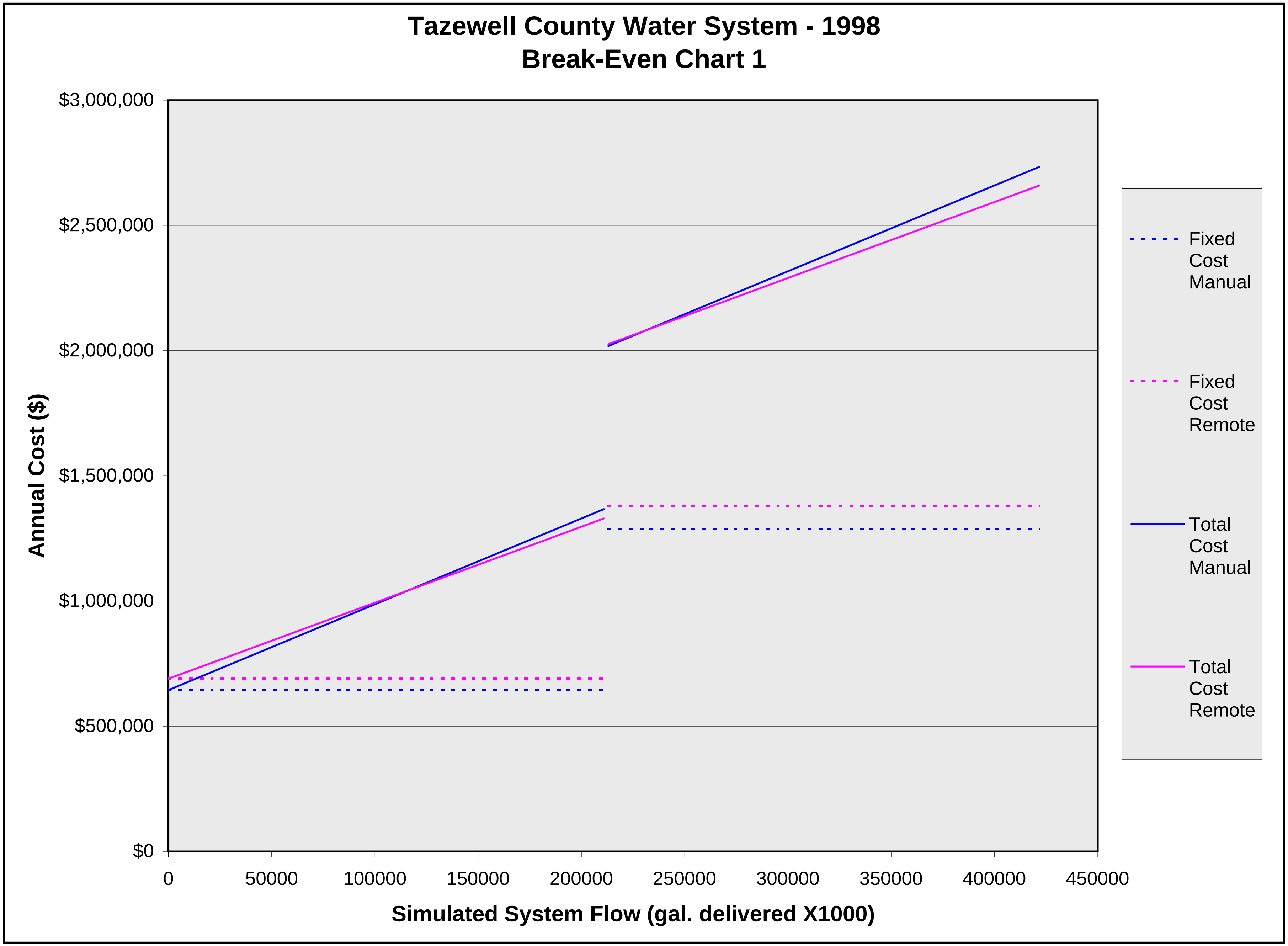

Exhibit 3.17. Example applicatoin break-even chart 1.

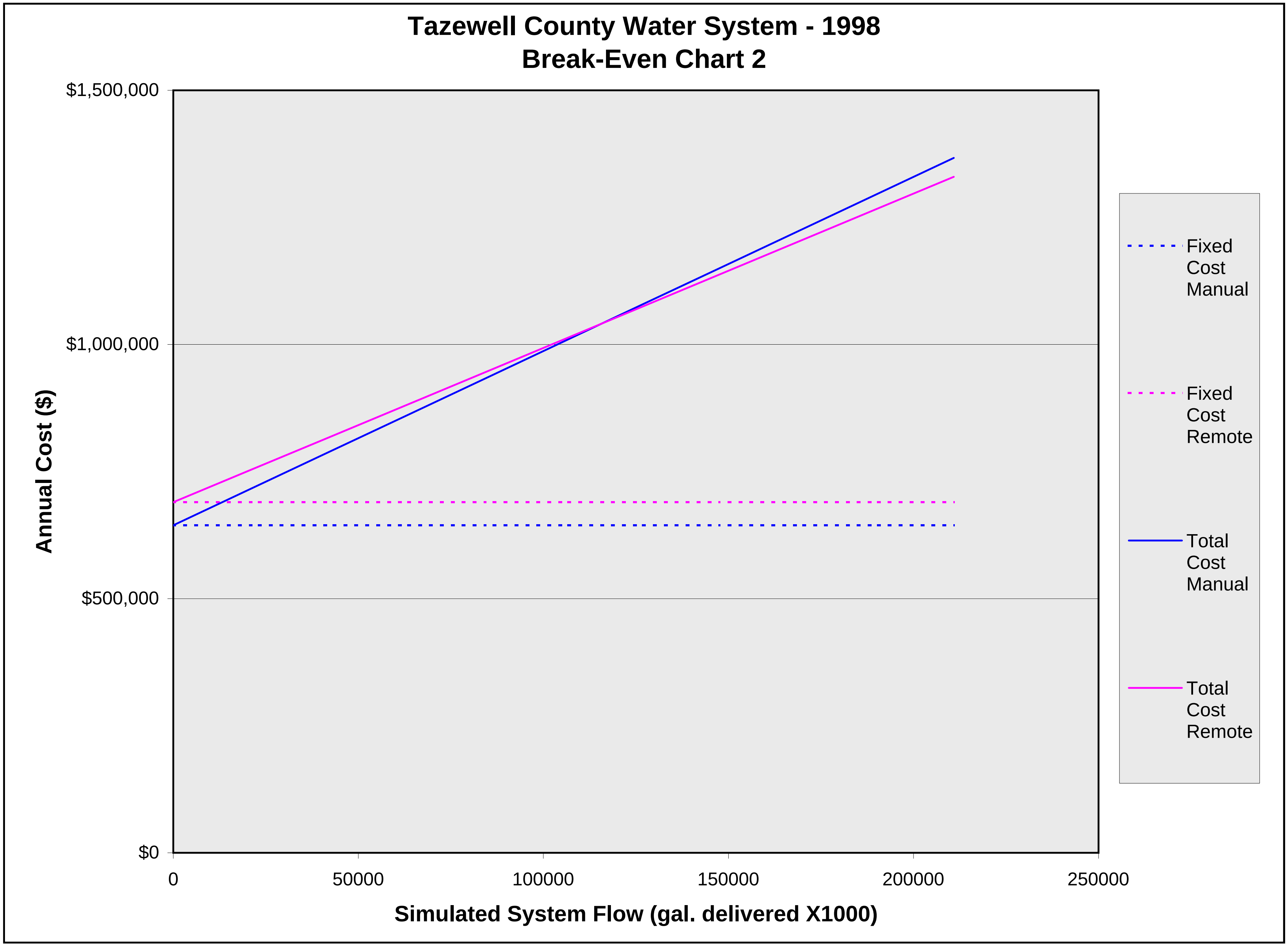

Exhibit 3.18. Example application break-even chart 2.