

STEG Hybrid Operation and Maintenance costs

September 2, 2003: Meredith Tremel

Total Units of New Development				60	120	180	240	300	360	420	480	540	600	660	720	780		
Operational Costs	Duration(yrs)	Unit	Cost/Unit	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	
3:Existing Pump station replacement:	20	\$/ea	100,000						300,000									
4:Hybrid Pump station and lift station pump replacement	25	\$/ea	1,685															
5:Hybrid lift stations: Fail safe valve replacement	25	\$/ea	1,050															
6:Hybrid lift and pump stations: Replace hose &valve assemblies	25	\$/ea	53															
7:STEG tanks, pump station, and lift station:Replace risers & lids	50	\$/ea	265															
8:Replace STEG tanks	50	\$/ea	0															
9:Replace Hybrid lift and pump station control panel casing	12	\$/ea	300														600	
10:Replace lift and pump station control panel relays and contacts	7	\$/ea	40									80					40	
11:Replace STEG, lift, and pump station biotube vaults	30	\$/ea	255															
12:Replace pump station and lift station Floats	5	\$/ea	600						1,200						1,800			
13:hybrid Pump station Power	1	\$/yr	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	
14:Hybrid lift station Power	1	\$/yr	480	480	480	480	480	480	480	960	960	960	960	960	960	960	960	
15:Pump STEG, lift station, and pump station tanks	10	ea	200												12,000	12,000	12,000	
16:STEG Hybrid valve replacement on lines	50+																	
17:Force main/STEG line replacement	50+																	
18:460 Force main/STEG line maintenance	daily	\$/mi	631	6,789	7,015	7,241	7,467	7,693	7,918	8,144	8,370	8,596	8,822	9,048	9,274	9,500		
19:Additional Miss Utility locates in Tom's Creek Basin	daily	\$/mi	164	1,764	1,823	1,881	1,940	1,999	2,058	2,116	2,175	2,234	2,292	2,351	2,410	2,469		
Cost/year total (today's dollars)				10,173	10,458	10,742	11,027	311,311	12,796	12,361	12,725	12,930	13,214	27,299	25,784	26,708		
Maintenance costs	Type personnel		Time(hrs)	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	
20:Mapping Tanks	PE	ea tank	1		60	60	60	60	60	60	60	60	60	60	60	60	60	
21:Database creation, maintenance	PWAdmin	ea tank	0.25		40			15	15	15	30	30	30	45	45	45	60	
22:Education	PE	per yr	40		40	40	40	40	40	40	40	40	40	40	40	40	40	
23:Resident calls and responses:STEG	PWTech	ea tank	1		5	9	14	18	23	27	32	36	41	46	50	55	59	
24:Lift and pump station maintenance:																		
Pump replacement (pump and lift stations)	PWTech	ea station	1															
Fail safe valve replacement (lift stations)	PWTech	ea station	8															
Replace hose &valve assemblies	PWTech	ea station	1															
Replace risers & lids	PWTech	ea station	0															
Replace tanks	PWTech	ea station	0															
Replace control panel casing	PWTech	ea station	1														2	
Replace control panel relays and contacts	PWTech	ea station	1									2					1	
Replace biotube vault (lift, pump sta., STEG tank)	PWTech	ea station	1															
Replace Floats	PWTech	ea station	1							2					3			
Miscellaneous repairs	PWTech	ea yr	130							260	260	260	260	260	260	390	390	
Lift station inspection	PWPS	ea tank	0.5		260	260	260	260	260	260	390	390	390	390	390	390	390	
#STEG tank inspections		#						60	60	60	120	120	120	180	180	180	240	
25:time of STEG tank inspections	PWTech	ea tank	0.75					45	45	45	90	90	90	135	135	135	180	
26:Inspection of tank installation	PWTech	ea tank	4		240	240	240	240	240	240	240	240	240	240	240	240	240	
Man-hours required/year total					645	609	614	678	683	949	1,142	1,148	1,151	1,216	1,223	1,355	1,422	
P&E Man-hours required/year					100	100	100	100	100	100	100	100	100	100	100	100	100	
Public Works Man-hours required/year					545	509	514	578	583	849	1,042	1,048	1,051	1,116	1,123	1,255	1,322	
27:Public Works Man-hours cost					\$25.75/hr													
28:P&E man-hours cost					\$24.6/hr													
Total Cost for O&M Hybrid System						26,655	26,027	26,429	28,377	328,779	37,127	41,650	42,184	42,454	44,401	58,680	60,553	63,217
Future Value						27,455	27,613	28,880	31,938	381,144	44,332	51,224	53,437	55,393	59,671	81,227	86,334	92,836

840	900	960	1020	1080	1140	1200	1260	1320	1380	1440	1500	1560	1620	1680	1740	1800	1860	1920	1980	2040	2100	2160	2220	2280	
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
100,000						300,000					300,000								100,000						
												3,370							1,685				1,685		
												2,100							1,050				1,050		
												106							53				53		
					300						900							600					1,200		
80					80					80				120		80				160		80			
		1,800		600			1,800		600	600		1,800		600	600		15,810	15,300	15,300	15,300	15,300	15,300	15,555	15,300	
																	2,400		600	600		2,400		1,200	
1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	
1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,920	1,920	1,920	1,920	1,920	1,920	1,920	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,880	2,880	2,880	2,880	
12,000	12,000	12,000	12,000	12,000	12,000	12,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	36,000	
9,726	9,952	10,177	10,403	10,629	10,855	11,081	11,307	11,533	11,759	11,985	12,211	12,436	12,662	12,888	13,114	13,340	13,566	13,792	14,018	14,244	14,470	14,695	14,921	15,147	
2,527	2,586	2,645	2,703	2,762	2,821	2,880	2,938	2,997	3,056	3,114	3,173	3,232	3,291	3,349	3,408	3,467	3,525	3,584	3,643	3,701	3,760	3,819	3,878	3,936	
26,833	127,198	29,202	27,687	28,571	28,556	328,621	43,105	41,670	42,474	42,759	343,344	50,104	43,133	44,377	44,742	44,347	75,441	75,004	73,101	73,545	173,550	79,102	75,574	75,604	
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
60	60	75	75	75	90	90	90	105	105	105	120	120	120	135	135	135	150	150	150	165	165	165	180	180	
40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	
64	68	73	78	82	87	91	96	100	105	109	114	119	123	128	132	137	141	146	150	155	160	164	169	173	
													2						1				1		
												16							8				8		
												2							1				1		
					1						3							2					4		
	2					2		2					3		2					4		2			
			3		1			3		1	1		3		1	1		58	60	60	60	60	60	61	60
390	390	390	390	390	390	520	520	520	520	520	520	650	650	650	650	650	650	650	780	780	780	780	780	780	
520	520	520	520	520	520	520	650	650	650	650	650	650	650	780	780	780	780	780	780	780	910	910	910	910	
240	240	300	300	300	360	360	360	420	420	420	480	480	480	540	540	540	600	600	600	660	660	660	720	720	
180	180	225	225	225	270	270	270	315	315	315	360	360	360	405	405	405	450	450	450	495	495	495	540	540	
240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240	
1,554	1,560	1,626	1,628	1,633	1,698	1,833	1,969	2,032	2,036	2,040	2,107	2,262	2,246	2,439	2,445	2,447	2,575	2,586	2,711	2,780	2,910	2,930	2,984	2,985	
100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
1,454	1,460	1,526	1,528	1,533	1,598	1,733	1,869	1,932	1,936	1,940	2,007	2,162	2,146	2,339	2,345	2,347	2,475	2,486	2,611	2,680	2,810	2,830	2,884	2,885	
37,436	37,605	39,293	39,334	39,477	41,139	44,630	48,121	49,757	49,849	49,966	51,680	55,660	55,263	60,221	60,390	60,430	63,741	64,012	67,246	69,011	72,347	72,877	74,256	74,296	
2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	2,460	
66,729	167,263	70,956	69,480	70,508	72,155	375,710	93,686	93,887	94,783	95,185	397,484	108,224	100,855	107,058	107,592	107,237	141,642	141,476	142,806	145,016	248,357	154,439	152,290	152,360	
100,934	260,590	113,863	114,841	120,035	126,525	678,575	174,283	179,897	187,063	193,492	832,243	233,396	224,029	244,942	253,548	260,292	354,116	364,313	378,770	396,170	698,842	447,607	454,619	468,473	

2390	2456											
39	40	41	42	43	44	45	46	47	48	49	50	
	300,000					300,000						
1,685						1,685	1,685					
1,050						1,050	1,050					
53						53	53					
				900						1,500		
		200		80					240		80	
15,300	15,300	15,555	15,555	15,300	15,300	15,300	15,300	15,300	15,555	15,300	15,300	
600		2,400		1,200	600	600	2,400		1,200	600	600	
1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	
2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	
36,000	36,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	
15,373	15,599	15,599	15,599	15,599	15,599	15,599	15,599	15,599	15,599	15,599	15,599	
3,995	4,054	4,054	4,054	4,054	4,054	4,054	4,054	4,054	4,054	4,054	4,054	
78,076	374,973	89,828	87,228	89,153	87,573	390,361	92,161	86,973	88,668	89,073	87,653	

4,176,892

39	40	41	42	43	44	45	46	47	48	49	50	
110	66											
180	195	195	208	212	205	205	205	205	205	205	205	
40	40	40	40	40	40	40	40	40	40	40	40	
182	187	190	190	190	190	190	190	190	190	190	190	
1						1	1					
8						8	8					
1						1	1					
				3						5		
		5		2					7		2	
60	60	61	61	60	60	60	60	60	61	60	60	
1		4		2	1	1	4		2	1	1	
780	910	910	910	910	910	910	910	910	910	910	910	
910	910	910	1,040	1,040	1,040	1,040	1,040	1,040	1,040	1,170	1,170	
720	780	780	830	846	818	818	818	818	818	818	818	
540	585	585	623	635	614	614	614	614	614	614	614	
440	264											
3,253	3,217	2,900	3,071	3,093	3,059	3,069	3,072	3,058	3,068	3,194	3,191	
150	106	40	40	40	40	40	40	40	40	40	40	
3,103	3,111	2,860	3,031	3,053	3,019	3,029	3,032	3,018	3,028	3,154	3,151	
79,893	80,099	73,645	78,048	78,615	77,739	77,997	78,074	77,714	77,971	81,216	81,138	2,617,211
3,690	2,608	984	984	984	984	984	984	984	984	984	984	109,618

161,659 457,680 164,457 166,260 168,752 166,296 469,342 171,219 165,671 167,623 171,273 169,775 6,903,720 Present Value
511,979 1,492,969 552,559 575,376 601,518 610,549 1,774,861 666,905 664,653 692,660 728,973 744,279 18,500,225 Future Value