

Appendix 1H - Life Cycle Alternatives Cost

**Guam Waterworks Authority
 Regs/Safety issue
 Alternatives Net Present Value Analysis**

	Agency:	Risk Premium	Sensitivity Adjustments (%)			Results (\$000s)	
			Benefits	Capital Costs	Running Costs	Capital Cost	30-yr NPV
	Guam Waterworks Authority						
<i>Project/Problem:</i>	Regs/Safety issue						
Alternative 1	Do Nothing (FF)						(\$611,012)
Alternative 2	Transmission Lines					\$214,000	(\$834,017)
Alternative 3	Water Tanks at Well Sites (FF)					\$16,500	(\$619,760)
Alternative 4	Water Tanks/Treatment at Well Sites					\$106,500	(\$714,480)
Alternative 5	Collector Wells					\$115,250	(\$538,639)
Alternative 6	Reroute Delivery line for CT time					\$150,000	(\$739,007)
Alternative 7	(not used)						
Alternative 8	(not used)						
Alternative 9	(not used)						
Alternative 10	(not used)						
Alternative 11	(not used)						
Alternative 12	(not used)						
<i>Year of analysis:</i>	2006						
<i>Escalation rate:</i>	3.00%						
<i>Discount rate:</i>	6.00%						

Appendix 1H - Life Cycle Alternatives Cost

Alternative 2 - Transmission Lines

Guam Waterworks Authority
 Regs/Safety issue
 Life Cycle Alternative Cost Analysis (\$000s)

From Summary Sheet:	Risk adjustments (+/- percent):
Year of analysis: 2006	Benefits: <input type="text"/>
Escalation rate: 3.00%	Capital costs: <input type="text"/>
Discount rate: 6.00%	Running costs: <input type="text"/>

	Year																														
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Expressed in 2006 dollars, unescalated																															
Capital Outlays																															
Construction	124,000																														
Treatment Plants at Wells					90,000																										
Other																															
Other																															
Other																															
Total capital outlays	124,000				90,000																										
Benefits:																															
Other																															
Other																															
Other																															
Total benefits																															
Annual Running Costs:																															
Chemicals	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	
Water Purchase	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	
Labor/Benefits	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	
O&M Booster Pumps	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	2,640	
Surface Water Treatment	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
Power Purchases	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	7,200	
Equipment Rental/Contract Svc	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Other																															
Total running costs	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	20,840	
R&R Costs:																															
Line Replacement	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	
Chemical Risk	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
Regs/Fine																															
Other																															
Other																															
Total refurbishments	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	10,030	
Net Benefit/(cost)	(154,870)	(30,870)	(30,870)	(30,870)	(120,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)	(30,870)		

Expressed in escalated dollars with sensitivity adjustments																														
Capital Outlays																														
Construction	124,000																													
Treatment Plants at Wells					101,296																									
Other																														
Other																														
Other																														
Total capital outlays	124,000				101,296																									
Benefits:																														
Other																														
Other																														
Other																														
Total benefits																														
Annual Running Costs:																														
Chemicals	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626	1,674	1,724	1,776	1,830	1,884	1,941	1,999	2,059	2,121
Water Purchase	6,400	6,592	6,790	6,993	7,203	7,419	7,642	7,871	8,107	8,351	8,601	8,859	9,125	9,399	9,681	9,971	10,270	10,578	10,896	11,222	11,559	11,906	12,263	12,631	13,010	13,400	13,802	14,216	14,643	15,082
Labor/Benefits	2,100	2,163	2,228	2,295	2,364	2,434	2,508	2,583	2,660	2,740	2,822	2,907	2,994	3,084	3,176	3,272	3,370	3,471	3,575	3,682	3,793	3,907	4,024	4,145	4,269	4,397	4,529	4,665	4,805	4,949
O&M Booster Pumps	2,640	2,719	2,801	2,885	2,971	3,060	3,152	3,247	3,344	3,445	3,548	3,654	3,764	3,877	3,993	4,113	4,236	4,364	4,494	4,629	4,768	4,911	5,059	5,210	5,367	5,528	5,693	5,864	6,040	6,221
Surface Water Treatment	400	412	424	437	450	464	478	492	507	522	538	554	570	587	605	623	642	661	681	701	722	744	766	789	813	838	863	889	915	943
Power Purchases	7,200	7,416	7,638	7,868	8,104	8,347	8,597	8,855	9,121	9,394	9,676	9,966	10,265	10,573	10,891	11,217	11,554	11,901	12,258	12,625	13,004	13,394	13,796	14,210	14,636	15,075	15,527	15,993	16,473	16,967
Equipment Rental/Contract Svc	1,200	1,236	1,273	1,311	1,351	1,391	1,433	1,476	1,520	1,566	1,613	1,661	1,711	1,762	1,815	1,870	1,926	1,983	2,043	2,104	2,167	2,232	2,299	2,368	2,439	2,513	2,588	2,666	2,746	2,828
Other																														
Total running costs	20,840	21,465	22,109	22,772	23,456	24,159	24,884	25,631	26,399	27,191	28,007	28,847	29,713	30,604	31,522	32,468	33,442	34,445	35,479	36,543	37,639	38,769	39,932	41,130	42,363	43,634	44,943	46,292	47,680	49,111
R&R Costs:																														
Line Replacement	10,000	10,300	10,609	10,927	11,255	11,593	11,941	12,299	12,668	13,048	13,439	13,842	14,258	14,685	15,126	15,580	16,047	16,528	17,024	17,535	18,061	18,603	19,161	19,736	20,328	20,938	21,566	22,213	22,879	23,566
Chemical Risk	30	31	32	33	34	35	36	37	38	39	40	42	43	44	45	47	48	50	51	53	54	56	57	59	61	63	65	67	69	71
Regs/Fine																														
Other																														
Other																														
Total refurbishments	10,030	10,331	10,641	10,960	11,289	11,628	11,976	12,336	12,706	13,087	13,479	13,884	14,300	14,729	15,171	15,626	16,095	16,578	17,075	17,588	18,115	18,659	19,219	19,795	20,389	21,001	21,631	22,280	22,948	23,636
Net escalated benefit/(cost)	(154,870)	(31,796)	(32,750)	(33,732)	(136,040)	(35,787)	(36,860)	(37,966)	(39,105)	(40,278)	(41,487)	(42,731)	(44,013)	(45,334)	(46,694)	(48,094)	(49,537)	(51,023)	(52,554)	(54,131)	(55,755)	(57,427)	(59,150)	(60,925)	(62,752)	(64,635)	(66,574)	(68,571)	(70,	

Appendix 1H - Life Cycle Alternatives Cost

Alternative 3 - Water Tanks at Well Sites (FF)

From Summary Sheet:	Risk adjustments (+/- percent):
Year of analysis	2006
Escalation rate	3.00%
Discount rate	6.00%
	Benefits
	Capital costs
	Running costs

Guam Waterworks Authority
 Regs/Safety issue
 Life Cycle Alternative Cost Analysis (\$000s)

	Year																														
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Expressed in 2006 dollars, unescalated																															
Capital Outlays																															
Tank Construction	15,000																														
Land	1,500																														
Other																															
Other																															
Other																															
Total capital outlays	16,500																														
Benefits:																															
Other																															
Other																															
Other																															
Total benefits																															
Annual Running Costs:																															
Chemicals	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	
Water Purchase	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	
Labor/Benefits	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	
O&M Booster Pumps	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	
Surface Water Treatment	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
Power Purchases	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	
Equipment Rental/Contract	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Other																															
Total running costs	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	19,420	
R&R Costs:																															
Line Replacement	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	
Chemical Risk	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	
Regs/Fine																															
Other																															
Other																															
Total refurbishments	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	
Net Benefit/(cost)	(46,070)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	(29,570)	

Expressed in escalated dollars with sensitivity adjustments																															
Capital Outlays																															
Tank Construction	15,000																														
Land	1,500																														
Other																															
Other																															
Other																															
Total capital outlays	16,500																														
Benefits:																															
Other																															
Other																															
Other																															
Total benefits																															
Annual Running Costs:																															
Chemicals	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626	1,674	1,724	1,776	1,830	1,884	1,941	1,999	2,059	2,121	
Water Purchase	6,400	6,592	6,790	6,993	7,203	7,419	7,642	7,871	8,107	8,351	8,601	8,859	9,125	9,399	9,681	9,971	10,270	10,578	10,896	11,222	11,559	11,906	12,263	12,631	13,010	13,400	13,802	14,216	14,643	15,082	
Labor/Benefits	2,100	2,163	2,228	2,295	2,364	2,434	2,508	2,583	2,660	2,740	2,822	2,907	2,994	3,084	3,176	3,272	3,370	3,471	3,575	3,682	3,793	3,907	4,024	4,145	4,269	4,397	4,529	4,665	4,805	4,949	
O&M Booster Pumps	2,420	2,493	2,567	2,644	2,724	2,805	2,890	2,976	3,066	3,158	3,252	3,350	3,450	3,554	3,660	3,770	3,883	4,000	4,120	4,243	4,371	4,502	4,637	4,776	4,919	5,067	5,219	5,376	5,537	5,703	
Surface Water Treatment	400	412	424	437	450	464	478	492	507	522	538	554	570	587	605	623	642	661	681	701	722	744	766	789	813	838	863	889	915	943	
Power Purchases	6,000	6,180	6,365	6,556	6,753	6,956	7,164	7,379	7,601	7,829	8,063	8,305	8,555	8,811	9,076	9,348	9,628	9,917	10,215	10,521	10,837	11,162	11,497	11,842	12,197	12,563	12,940	13,328	13,728	14,139	
Equipment Rental/Contract	1,200	1,236	1,273	1,311	1,351	1,391	1,433	1,476	1,520	1,566	1,613	1,661	1,711	1,762	1,815	1,870	1,926	1,983	2,043	2,104	2,167	2,232	2,298	2,368	2,439	2,513	2,588	2,666	2,746	2,828	
Other																															
Total running costs	19,420	20,003	20,603	21,221	21,857	22,513	23,188	23,884	24,601	25,339	26,099	26,882	27,688	28,519	29,374	30,256	31,163	32,098	33,061	34,053	35,075	36,127	37,211	38,327	39,477	40,661	41,881	43,137	44,432	45,765	
R&R Costs:																															
Line Replacement	10,000	10,300	10,609	10,927	11,255	11,593	11,941	12,299	12,668	13,048	13,439	13,842	14,258	14,685	15,126	15,580	16,047	16,528	17,024	17,535	18,061	18,603	19,161	19,736	20,328	20,938	21,566	22,213	22,879	23,566	
Chemical Risk	150	155	159	164	169	174	179	184	190	196	202	208	214	220	227	234	241	248	255	263	271	279	287	296	305	314	323	333	343	353	
Regs/Fine																															
Other																															
Other																															
Total refurbishments	10,150	10,455	10,768	11,091	11,424	11,767	12,120	12,483	12,858	13,243	13,641	14,050	14,471	14,906	15,353	15,813	16,288	16,776	17,280	17,798	18,332	18,882	19,448	20,032	20,633	21,252	21,889	22,546	23,222	23,919	
Net escalated benefit/(cost)	(46,070)	(30,457)	(31,371)	(32,312)	(33,281)	(34,280)	(35,308)	(36,367)	(37,458)	(38,582)	(39,740)	(40,932)	(42,160)	(43,425)	(44,727)	(46,069)	(4														

Appendix 1H - Life Cycle Alternatives Cost

Alternative 4 - Water Tanks/Treatment at Well Sites

From Summary Sheet:	Risk adjustments (+/- percent):
Year of analysis	Benefits
Escalation rate	Capital costs
Discount rate	Running costs

Guam Waterworks Authority
 Regs/Safety issue
 Life Cycle Alternative Cost Analysis (\$000s)

	Year																														
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Expressed in 2006 dollars, unescalated																															
Capital Outlays																															
Tank Construction	15,000																														
Land	1,500																														
Treatment Plants					90,000																										
Other																															
Other																															
Total capital outlays	16,500				90,000																										
Benefits:																															
Other																															
Other																															
Total benefits																															
Annual Running Costs:																															
Chemicals	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900
Water Purchase	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	
Labor/Benefits	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	
O&M Booster Pumps	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	
Surface Water Treatment	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
Power Purchases	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	6,600	
Equipment Rental/Contract	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Other																															
Total running costs	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	20,130	
R&R Costs:																															
Line Replacement	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	
Chemical Risk	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	
Regs/Fine																															
Other																															
Other																															
Total refurbishments	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	
Net Benefit/(cost)	(46,780)	(30,280)	(30,280)	(30,280)	(120,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	(30,280)	

Expressed in escalated dollars with sensitivity adjustments

Capital Outlays																															
Tank Construction	15,000																														
Land	1,500																														
Treatment Plants					101,296																										
Other																															
Other																															
Total capital outlays	16,500				101,296																										
Benefits:																															
Other																															
Other																															
Total benefits																															
Annual Running Costs:																															
Chemicals	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626	1,674	1,724	1,776	1,830	1,884	1,941	1,999	2,059	2,121	
Water Purchase	6,400	6,592	6,790	6,993	7,203	7,419	7,642	7,871	8,107	8,351	8,601	8,859	9,125	9,399	9,681	9,971	10,270	10,578	10,896	11,222	11,559	11,906	12,263	12,631	13,010	13,400	13,802	14,216	14,643	15,082	
Labor/Benefits	2,100	2,163	2,228	2,295	2,364	2,434	2,508	2,583	2,660	2,740	2,822	2,904	2,994	3,084	3,176	3,272	3,370	3,471	3,575	3,682	3,793	3,907	4,024	4,145	4,269	4,397	4,529	4,665	4,805	4,949	
O&M Booster Pumps	2,530	2,606	2,684	2,765	2,848	2,933	3,021	3,112	3,205	3,301	3,400	3,502	3,607	3,715	3,827	3,942	4,060	4,182	4,307	4,436	4,569	4,707	4,848	4,993	5,143	5,297	5,456	5,620	5,788	5,962	
Surface Water Treatment	400	412	424	437	450	464	478	492	507	522	538	554	570	587	605	623	642	661	681	701	722	744	766	789	813	838	863	889	915	943	
Power Purchases	6,600	6,798	7,002	7,212	7,428	7,651	7,881	8,117	8,361	8,612	8,870	9,136	9,410	9,692	9,983	10,283	10,591	10,909	11,236	11,573	11,920	12,278	12,646	13,026	13,416	13,819	14,234	14,661	15,100	15,553	
Equipment Rental/Contract	1,200	1,236	1,273	1,311	1,351	1,391	1,433	1,476	1,520	1,566	1,613	1,661	1,711	1,762	1,815	1,870	1,926	1,983	2,043	2,104	2,167	2,232	2,298	2,368	2,439	2,513	2,588	2,666	2,746	2,828	
Other																															
Total running costs	20,130	20,734	21,356	21,997	22,656	23,336	24,036	24,757	25,500	26,265	27,053	27,865	28,701	29,562	30,448	31,362	32,303	33,272	34,270	35,298	36,357	37,448	38,571	39,728	40,920	42,148	43,412	44,715	46,056	47,438	
R&R Costs:																															
Line Replacement	10,000	10,300	10,609	10,927	11,255	11,593	11,941	12,299	12,668	13,048	13,439	13,842	14,258	14,685	15,126	15,580	16,047	16,528	17,024	17,535	18,061	18,603	19,161	19,736	20,328	20,938	21,566	22,213	22,879	23,566	
Chemical Risk	150	155	159	164	169	174	179	184	190	196	202	208	214	220	227	234	241	248	255	263	271	279	287	296	305	314	323	333	343	353	
Regs/Fine																															
Other																															
Other																															
Total refurbishments	10,150	10,455	10,768	11,091	11,424	11,767	12,120	12,483	12,858	13,243	13,641	14,050	14,471	14,906	15,353	15,813	16,288	16,776	17,280	17,798	18,332	18,882	19,448	20,032	20,633	21,252	21,889	22,546	23,222	23,919	
Net escalated benefit/(cost)	(46,780)	(31,188)	(32,124)	(33,088)	(135,376)	(35,103)	(36,156)	(37,241)	(38,358)	(39,509)	(40,694)	(41,915)	(43,172)	(44,467)	(45,801)	(47,175)	(48,591)	(50,048)	(51,550)	(53,096)	(54,689)	(56,330)	(58,020)	(59,760)	(61,553)	(63,400)	(65,302)	(67,261)	(69,278)	(71,357)	

Life cycle cost analysis

PVs in 2006	(46,780)	(29,423)	(28,5
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Appendix 1H - Life Cycle Alternatives Cost

Alternative 6 - Reroute Delivery Line for CT Time

From Summary Sheet:	Risk adjustments (+/- percent):
Year of analysis	Benefits
Escalation rate	Capital costs
Discount rate	Running costs

Guam Waterworks Authority
 Regs/Safety issue
 Life Cycle Alternative Cost Analysis (\$000s)

	Year																														
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	
Expressed in 2006 dollars, unescalated																															
Capital Outlays																															
Pipe Construction	60,000																														
Treatment Plants					90,000																										
Other																															
Other																															
Other																															
Total capital outlays	60,000				90,000																										
Benefits:																															
Other																															
Other																															
Other																															
Total benefits																															
Annual Running Costs:																															
Chemicals	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900	
Water Purchase	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	6,400	
Labor/Benefits	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	
O&M Booster Pumps	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	
Surface Water Treatment	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
Power Purchases	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	
Equipment Rental/Contract	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
Other																															
Total running costs	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	
R&R Costs:																															
Line Replacement	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	
Chemical Risk	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	
Regs/Fine																															
Other																															
Other																															
Total refurbishments	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	10,150	
Net Benefit/(cost)	(89,350)	(29,350)	(29,350)	(29,350)	(119,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	(29,350)	

Expressed in escalated dollars with sensitivity adjustments																															
Capital Outlays																															
Pipe Construction	60,000																														
Treatment Plants					101,296																										
Other																															
Other																															
Other																															
Total capital outlays	60,000				101,296																										
Benefits:																															
Other																															
Other																															
Other																															
Total benefits																															
Annual Running Costs:																															
Chemicals	900	927	955	983	1,013	1,043	1,075	1,107	1,140	1,174	1,210	1,246	1,283	1,322	1,361	1,402	1,444	1,488	1,532	1,578	1,626	1,674	1,724	1,776	1,830	1,884	1,941	1,999	2,059	2,121	
Water Purchase	6,400	6,592	6,790	6,993	7,203	7,419	7,642	7,871	8,107	8,351	8,601	8,859	9,125	9,399	9,681	9,971	10,270	10,578	10,896	11,222	11,559	11,906	12,263	12,631	13,010	13,400	13,802	14,216	14,643	15,082	
Labor/Benefits	2,100	2,163	2,228	2,295	2,364	2,434	2,508	2,583	2,660	2,740	2,822	2,907	2,994	3,084	3,176	3,272	3,370	3,471	3,575	3,682	3,793	3,907	4,024	4,145	4,269	4,397	4,529	4,665	4,805	4,949	
O&M Booster Pumps	2,200	2,266	2,334	2,404	2,476	2,550	2,627	2,706	2,787	2,871	2,957	3,045	3,137	3,231	3,328	3,428	3,530	3,636	3,745	3,858	3,973	4,093	4,215	4,342	4,472	4,606	4,745	4,887	5,033	5,184	
Surface Water Treatment	400	412	424	437	450	464	478	492	507	522	538	554	570	587	605	623	642	661	681	701	722	744	766	789	813	838	863	889	915	943	
Power Purchases	6,000	6,180	6,365	6,556	6,753	6,956	7,164	7,379	7,601	7,829	8,063	8,305	8,555	8,811	9,076	9,348	9,628	9,917	10,215	10,521	10,837	11,162	11,497	11,842	12,197	12,563	12,940	13,328	13,728	14,139	
Equipment Rental/Contract	1,200	1,236	1,273	1,311	1,351	1,391	1,433	1,476	1,520	1,566	1,613	1,661	1,711	1,762	1,815	1,870	1,926	1,983	2,043	2,104	2,167	2,232	2,298	2,368	2,439	2,513	2,588	2,666	2,746	2,828	
Other																															
Total running costs	19,200	19,776	20,369	20,980	21,610	22,258	22,926	23,614	24,322	25,052	25,803	26,577	27,375	28,196	29,042	29,913	30,810	31,735	32,687	33,667	34,677	35,718	36,789	37,893	39,030	40,201	41,407	42,649	43,928	45,246	
R&R Costs:																															
Line Replacement	10,000	10,300	10,609	10,927	11,255	11,593	11,941	12,299	12,668	13,048	13,439	13,842	14,258	14,685	15,126	15,580	16,047	16,528	17,024	17,535	18,061	18,603	19,161	19,736	20,328	20,938	21,566	22,213	22,879	23,566	
Chemical Risk	150	155	159	164	169	174	179	184	190	196	202	208	214	220	227	234	241	248	255	263	271	279	287	296	305	314	323	333	343	353	
Regs/Fine																															
Other																															
Other																															
Total refurbishments	10,150	10,455	10,768	11,091	11,424	11,767	12,120	12,483	12,858	13,243	13,641	14,050	14,471	14,906	15,353	15,813	16,288	16,776	17,280	17,798	18,332	18,882	19,448	20,032	20,633	21,252	21,889	22,546	23,222	23,919	
Net escalated benefit/(cost)	(89,350)	(30,231)	(31,137)	(32,072)	(134,329)	(34,025)	(35,045)	(36,097)	(37,180)	(38,295)	(39,444)	(40,627)	(41,846)	(43,101)	(44,395)	(45,726)	(47,098)	(48,511)	(49,966)	(51,465)	(