SUPPLEMENTAL INFORMATION TO THE DESKTOP EVALUATION OF ALTERNATIVE TECHNOLOGIES - FINAL REPORT

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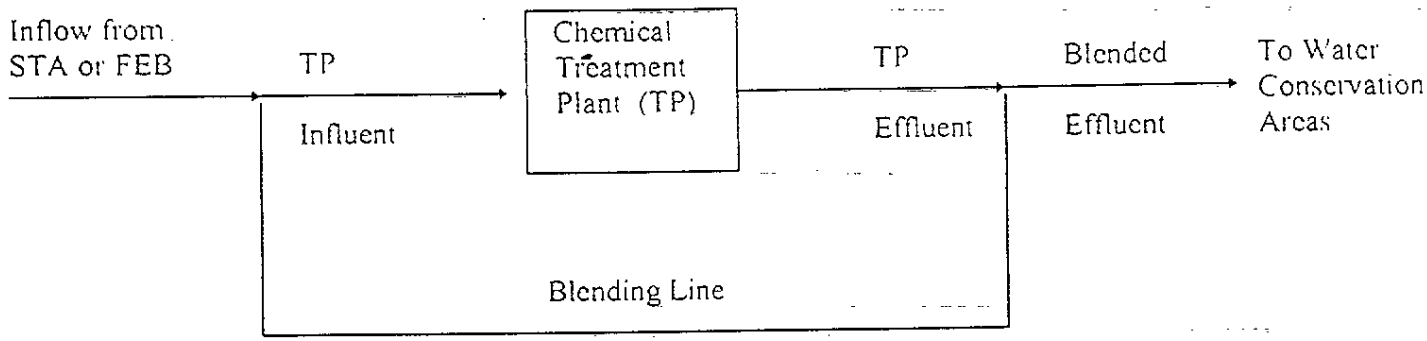
September 13, 1996

SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

The following pages summarize chemical treatment plant blending information for each of the 8 treatment trains modeled in the Desktop Evaluation of Treatment Technology Alternatives. The diagram below defines terms used in the summary tables.



SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

STORMWATER TREATMENT AREAS

Parameter	Influent/Effluent P Concentration									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Stormwater Treatment Area										
Total Flow Bypassed, MG	0	0	0	-	-	0	0	0	-	-
STA Effluent P Concentration, ppb	50	40	30	-	-	50	40	30	-	-
STA Effluent P Load, thousand lbs	282	223	166	-	-	282	223	166	-	-
Chemical Treatment Plant										
Total Flow Volume Blended with TP Effluent, MG										
% Total Inflow Blended with TP Effluent										
Number of Days Blending Occurs										
Total Discharge Days										
% Total Discharge Days										
Blending Line P Concentration, ppb										
TP Effluent P Concentration, ppb										
Average Blended Effluent P Concentration, ppb										
Total P Blended with TP Effluent, lbs										
Total P Blended, % of Total P Discharged										

SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

MANAGED WETLANDS

Parameter	Influent/Effluent P Concentration									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Chemical Treatment Plant										
Total Flow Bypassed to STA, MG	292282	292282	292282	-	-	452851	452851	452851	-	-
% Total Inflow Bypassed to STA	42.3	42.3	42.3	-	-	65.5	65.5	65.5	-	-
Number of Days Bypass to STA Occurs	664	664	664	-	-	1275	1275	1275	-	-
Total Discharge Days	2749	2749	2749	-	-	2794	2794	2794	-	-
% Total Discharge Days	24.2	24.2	24.2	-	-	45.6	45.6	45.6	-	-
Bypass P Concentration to STA, ppb	135	135	135	-	-	81	81	81	-	-
Treatment Plant Effluent P Concentration, ppb	31	31	31	-	-	20	20	20	-	-
Blended Effluent P Concentration to STA, ppb	75	75	75	-	-	60	60	60	-	-
Total P Bypassed to STA, lbs	329244	329244	329244	-	-	306259	306259	306259	-	-
Total P Bypassed to STA, % of Total P Discharged	76.1	76.1	76.1	-	-	88.5	88.5	88.5	-	-
Stormwater Treatment Area										
Total Flow Bypassed, MG	0	0	0	-	-	0	0	0	-	-
STA Effluent P Concentration, ppb	50	40	30	-	-	50	40	30	-	-
STA Effluent P Load, thousand lbs	277	223	166	-	-	282	223	166	-	-

SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

CHEMICAL TREATMENT/DIRECT FILTRATION

Parameter	Influent/Effluent P Concentration									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Stormwater Treatment Area										
Total Flow Bypassed, MG	-	-	-	-	-	-	-	-	-	-
STA Effluent P Concentration, ppb	-	-	-	-	-	-	-	-	-	-
STA Effluent P Load, lbs	-	-	-	-	-	-	-	-	-	-
Chemical Treatment Plant										
Total Flow Volume Blended with TP Effluent, MG	224920	169924	115366	60707	5752	401483	307871	215085	121636	27857
% Total Inflow Blended with TP Effluent	32.5	24.6	16.7	8.8	0.8	58.1	44.5	31.3	17.6	4.0
Number of Days Blending Occurs	477	341	226	130	17	1074	702	457	243	59
Total Discharge Days	2731	2688	2627	2589	2476	2819	2766	2724	2666	2555
% Total Discharge Days	17.5	12.7	8.6	5.0	0.7	38.1	25.4	16.8	9.1	2.3
Blending Line P Concentration, ppb	135	135	135	135	135	81	81	81	81	81
TP Effluent P Concentration, ppb	9	9	9	9	9	7	7	7	7	7
Average Blended Effluent P Concentration, ppb	50	40	30	20	10	50	40	30	20	10
Total P Blended with TP Effluent, lbs	253255	191322	129752	68193	6445	271519	208210	145460	82261	18839
Total P Blended, % of Total P Discharged	87.8	83.0	75.0	58.9	11.1	94.1	90.3	83.9	71.2	32.6

SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

STA/DIRECT FILTRATION

Parameter	Influent/Effluent P Concentration									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Stormwater Treatment Area										
Total Flow Bypassed, MG	0	0	0	0	0	0	0	0	0	0
STA Effluent P Concentration, ppb	50	50	50	50	50	50	50	50	50	50
STA Effluent P Load, thousand lbs	277	277	277	277	277	282	282	282	282	282
Chemical Treatment Plant										
Total Flow Volume Blended with TP Effluent, MG	664665	512914	368184	213143	61759	676572	524895	370314	218234	61960
% Total Inflow Blended with TP Effluent	100.0	76.1	54.2	31.0	8.8	100.0	76.9	54.0	31.5	8.9
Number of Days Blending Occurs	1900	1310	841	439	114	2170	1402	886	453	127
Total Discharge Days	1900	3642	3432	3111	2402	2170	3578	3344	2885	2452
% Total Discharge Days	100.0	36.0	24.5	14.1	4.7	100.0	39.2	26.5	15.7	5.2
Blending Line P Concentration, ppb	50	50	50	50	50	50	50	50	50	50
TP Effluent P Concentration, ppb	6	6	6	6	6	6	6	6	6	6
Average Blended Effluent P Concentration, ppb	50	40	30	20	10	50	40	30	20	10
Total P Blended with TP Effluent, lbs	277062	213870	154272	90055	26531	282154	219116	154992	91839	26202
Total P Blended, % of Total P Discharged	100	96.5	91.0	79.3	45.2	100	96.6	90.8	79.5	45.1

SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

CHEMICAL TREATMENT/HIGH RATE SETTLING

Parameter	Influent/Effluent P Concentration									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Stormwater Treatment Area										
Total Flow Bypassed, MG	-	-	-	-	-	-	-	-	-	-
STA Effluent P Concentration, ppb	-	-	-	-	-	-	-	-	-	-
STA Effluent P Load, lbs	-	-	-	-	-	-	-	-	-	-
Chemical Treatment Plant										
Total Flow Volume Blended, with TP Effluent MG	156684	94881	32065	-	-	360424	254658	148611	43143	-
% Total Inflow Blended with TP Effluent	22.6	13.7	4.6	-	-	52.1	36.8	21.5	6.2	-
Number of Days Blending Occurs	315	185	72	-	-	922	564	295	90	-
Total Discharge Days	2678	2662	2501	-	-	2913	2846	2668	2569	-
% Total Discharge Days	11.8	6.9	2.9	-	-	31.7	19.8	11.1	3.5	-
Blending Line P Concentration, ppb	135	135	135	-	-	81	81	81	81	-
TP Effluent P Concentration, ppb	25	25	25	-	-	16	16	16	16	-
Average Blended Effluent P Concentration, ppb	50	40	30	-	-	50	40	30	20	-
Total P Blended with TP Effluent, lbs	176239	106493	35893	-	-	243751	172223	100505	29177	-
Total P Blended, % of Total P Discharged	61.2	46.0	20.6	-	-	84.7	74.7	58.1	25.1	-

SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

STA/HIGH RATE SETTLING

Parameter	Influent/Effluent P Concentration									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Stormwater Treatment Area										
Total Flow Bypassed, MG	0	0	0	0	-	0	0	0	0	-
STA Effluent P Concentration, ppb	50	50	50	50	-	50	50	50	50	-
STA Effluent P Load, thousand lbs	277	277	277	277	-	282	282	282	282	-
Chemical Treatment Plant										
Total Flow Volume Blended with TP Effluent, MG	664665	491046	316487	141639	-	676572	499563	322103	144017	-
% Total Inflow Blended with TP Effluent	100.0	72.7	46.5	20.4	-	100.0	73.1	46.8	20.7	-
Number of Days Blending Occurs	1900	1232	718	295	-	2170	1335	742	283	-
Total Discharge Days	1900	3598	3370	2847	-	2170	3532	3224	2644	-
% Total Discharge Days	100.0	34.2	21.3	10.4	-	100.0	37.8	23.0	10.7	-
Blending Line P Concentration, ppb	50	50	50	50	-	50	50	50	50	-
TP Effluent P Concentration, ppb	12	12	12	12	-	12	12	12	12	-
Average Blended Effluent P Concentration, ppb	50	40	30	20	-	50	40	30	20	-
Total P Blended with TP Effluent, lbs	277062	205018	132820	60235	-	282154	208656	135005	60774	-
Total P Blended, % of Total P Discharged	100	92.1	78.8	52.3	-	100	92.1	78.8	52.4	-

SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

CHEMICAL TREATMENT/DAF-FILTRATION

Parameter	Influent/Effluent P Concentration									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Stormwater Treatment Area										
Total Flow Bypassed, MG	-	-	-	-	-	-	-	-	-	-
STA Effluent P Concentration, ppb	-	-	-	-	-	-	-	-	-	-
STA Effluent P Load, lbs	-	-	-	-	-	-	-	-	-	-
Chemical Treatment Plant										
Total Flow Volume Blended with TP Effluent, MG	224920	169924	115366	60707	5752	401483	307871	215085	121636	27857
% Total Inflow Blended with TP Effluent	32.5	24.6	16.7	8.8	0.8	58.1	44.5	31.3	17.6	4.0
Number of Days Blending Occurs	477	341	226	130	17	1074	702	457	243	59
Total Discharge Days	2731	2688	2627	2589	2476	2819	2766	2724	2666	2555
% Total Discharge Days	17.5	12.7	8.6	5.0	0.7	38.1	25.4	16.8	9.1	2.3
Blending Line P Concentration, ppb	135	135	135	135	135	81	81	81	81	81
TP Effluent P Concentration, ppb	9	9	9	9	9	7	7	7	7	7
Average Blended Effluent P Concentration, ppb	50	40	30	20	10	50	40	30	20	10
Total P Blended with TP Effluent, lbs	253255	191322	129752	68193	6445	271519	208210	145460	82261	18839
Total P Blended, % of Total P Discharged	87.8	83.0	75.0	58.9	11.1	94.1	90.3	83.9	71.2	32.6

SUMMARY OF CHEMICAL TREATMENT PLANT BLENDING INFORMATION

STA/DAF-FILTRATION

Parameter	Influent/Effluent P Concentration									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Stormwater Treatment Area										
Total Flow Bypassed, MG	0	0	0	0	0	0	0	0	0	0
STA Effluent P Concentration, ppb	50	50	50	50	50	50	50	50	50	50
STA Effluent P Load, thousand lbs	277	277	277	277	277	282	282	282	282	282
Chemical Treatment Plant										
Total Flow Volume Blended with TP Effluent, MG	664665	512914	368184	213143	61759	676572	524895	370314	218234	61960
% Total Inflow Blended with TP Effluent	100.0	76.1	54.2	31.0	8.8	100.0	76.9	54.0	31.5	8.9
Number of Days Blending Occurs	1900	1310	841	439	114	2170	1402	886	453	127
Total Discharge Days	1900	3642	3432	3111	2402	2170	3578	3344	2885	2452
% Total Discharge Days	100.0	36.0	24.5	14.1	4.7	100.0	39.2	26.5	15.7	5.2
Blending Line P Concentration, ppb	50	50	50	50	50	50	50	50	50	50
TPlant Effluent P Concentration, ppb	6	6	6	6	6	6	6	6	6	6
Average Blended Effluent P Concentration, ppb	50	40	30	20	10	50	40	30	20	10
Total P Blended with TP Effluent, lbs	277062	213870	154272	90055	26531	282154	219116	154992	91839	26202
Total P Blended, % of Total P Discharged	100	96.5	91.0	79.3	45.2	100	96.6	90.8	79.5	45.1

Treatment System Effluent Quality Prior to Blending (Influent P=150 ppb)

Parameter	Unit	STAs[a]	Direct Filtration	STA - Direct Filtration	High-Rate Settling	STA-High Rate Settling	Dissolved Air Flotation	STA-Dissolved Air Flotation	Managed Wetlands[a]		
									50 ppb	40 ppb	30 ppb
Nutrients:											
Total phosphorus	ug/L	50	9	6	25	12	9	6	50	40	30
Ammonia nitrogen	ug/L	51	440	51	440	51	440	51	274	179	49
Total Kjeldahl nitrogen	ug/L	2100	970	761	1169	927	970	761	1702	1610	1483
Nitrate nitrogen	ug/L	35	450	35	450	35	450	35	274	173	35
Nitrite nitrogen	ug/L	1	70	1	70	1	70	1	40	23	0
Total nitrogen	ug/L	2136	1490	797	1669	963	1490	797	2016	1806	1518
Metals:											
Aluminum	ug/L	20	42	9	64	11	42	9	84	53	9
Copper	ug/L	3	3	4	3	4	3	4	3.6	3.9	4.4
Iron	ug/L	36	582	574	2524	2487	582	574	1192	771	193
Manganese	ug/L	27	70	73	71	75	70	73	55	61	69
Mercury (total)	ug/L	9.10E-04	5.2E-04	2.7E-04	6.9E-04	3.5E-04	5.1E-4	2.7E-04	9.6E-04	7.8E-04	5.2E-04
Mercury (methyl)	ug/L	6.00E-05	1.2E-04	5.1E-05	1.3E-04	5.2E-05	1.2E-4	5.1E-05	1.0E-04	7.7E-05	4.0E-04
Zinc	ug/L	3	3	2	3	2	3	2	2	1	0
Ions:											
Sulfate	mg/L	55	63	55	63	55	63	55	60	58	55
Silica	mg/L	8	6	6	7	7	6	6	7	7	7
Chloride	mg/L	157	165	188	165	188	165	188	162	168	177
Calcium	mg/L	75	84	84	84	84	84	84	80	80	80
Magnesium	mg/L	23	23	23	23	23	23	23	23	24	24
Sodium	mg/L	107	90	107	90	107	90	107	97	101	107
Potassium	mg/L	7	7	7	7	7	7	7	7	8	8
Others:											
Alkalinity as $CaCO_3$	mg/L	246	221	226	221	226	221	226	232	233	235
pH	s.u.	7.3	7	7	7	7	7	7	7	7	7
Specific conductance	umho/cm	1022	1025	1081	1025	1081	1025	1081	1023	1037	1057
Total dissolved solids	mg/L	697	699	737	699	737	699	737	698	707	721
Total organic carbon	mg/L	41	22	24	24	26	22	24	31	31	32

[a] Treated effluent is not blended with bypassed flow

Treatment System Effluent Quality Prior to Blending (Influent P=90 ppb)

Parameter	Unit	STAs[a]	Direct Filtration	STA - Direct Filtration	High-Rate Settling	STA-High Rate Settling	Dissolved Air Flotation	STA-Dissolved Air Flotation	Managed Wetlands[a]		
									50 ppb	40 ppb	30 ppb
Nutrients:											
Total phosphorus	ug/L	50	7	6	16	12	7	6	50	40	30
Ammonia nitrogen	ug/L	20	160	20	160	20	160	20	122	76	18
Total Kjeldahl nitrogen	ug/L	2100	144	761	1131	927	144	761	1938	1802	1630
Nitrate nitrogen	ug/L	10	250	10	250	10	250	10	189	114	20
Nitrite nitrogen	ug/L	0	70	0	70	0	70	0	51	29	0
Total nitrogen	ug/L	2110	464	771	1451	937	464	771	2178	1946	1650
Metals:											
Aluminum	ug/L	7	106	13	106	13	106	13	77	46	7
Copper	ug/L	3	4	4	4	5	4	4	4.5	5	5.6
Iron	ug/L	12	576	573	2494	2483	576	573	980	605	129
Manganese	ug/L	20	96	71	68	73	96	71	36	42	49
Mercury (total)	ug/L	7.40E-04	5.1E-04	2.1E-04	5.5E-04	2.8E-04	5.1E-04	2.1E-04	1.0E-03	7.8E-04	4.9E-04
Mercury (methyl)	ug/L	4.80E-05	1.2E-04	4.6E-05	9.8E-05	4.2E-05	1.2E-04	4.6E-05	1.0E-04	7.1E-05	3.3E-05
Zinc	ug/L	2	2	1	2	1	2	1	2	1	0
Ions:											
Sulfate	mg/L	64	73	64	73	64	73	64	71	68	64
Silica	mg/L	22	18	18	18	18	18	18	21	21	21
Chloride	mg/L	214	214	245	214	245	214	245	204	215	229
Calcium	mg/L	81	90	90	90	90	90	90	85	85	85
Magnesium	mg/L	26	26	26	26	26	26	26	26	27	27
Sodium	mg/L	142	119	142	119	142	119	142	125	132	141
Potassium	mg/L	10	10	10	10	10	10	10	10	11	12
Others:											
Alkalinity as $CaCO_3$	mg/L	261	255	261	255	261	255	261	269	271	273
pH	s.u.	7.2	7	7	7	7	7	7	7	7	7
Specific conductance	umho/cm	1119	1114	1177	1114	1177	1114	1177	1095	1115	1141
Total dissolved solids	mg/L	763	760	803	760	803	760	803	746	760	778
Total organic carbon	mg/L	43	28	25	30	27	28	25	37	38	39

[a] Treated effluent is not blended with bypassed flow

Table 4.1-2. Predicted Effluent Water Quality For Stormwater Treatment Areas with Influent P = 150 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			150/50	150/40	150/30	150/20	150/10
Nutrients:							
Total phosphorus	ug/L	150	50	40	30		
Ammonia nitrogen	ug/L	440	50	50	50		
Total Kjeldahl nitrogen	ug/L	2700	2100	2100	2100		
Nitrate nitrogen	ug/L	450	40	40	40		
Nitrite nitrogen	ug/L	70	1	1	1		
Total nitrogen	ug/L	3220	2140	2140	2140		
Metals:							
Aluminum	ug/L	297	20	20	20		
Copper	ug/L	2	3	3	3		
Iron	ug/L	358	36	36	36		
Manganese	ug/L	17	27	27	27		
Mercury (total)	ug/L	2.2E-03	9.1E-04	9.1E-04	9.1E-04		
Mercury (methyl)	ug/L	2.0E-04	6.0E-05	6.0E-05	6.0E-05		
Zinc	ug/L	5	3	3	3		
Ions:							
Sulfate	mg/L	63	55	55	55		
Silica	mg/L	27	27	27	27		
Chloride	mg/L	134	157	157	157		
Calcium	mg/L	75	75	75	75		
Magnesium	mg/L	23	23	23	23		
Sodium	mg/L	90	107	107	107		
Potassium	mg/L	7	7	7	7		
Others:							
Alkalinity as $CaCO_3$	mg/L	241	246	246	246		
pH	s.u.	7	7	7	7		
Specific conductance	umho/cm	966	1022	1022	1022		
Total dissolved solids	mg/L	659	697	697	697		
Total organic carbon	mg/L	38	41	41	41		

[a] Source: Everglades Nutrient Removal Project 1995 Monitoring Report published by the South Florida Water Management District. P concentrations are influent/effluent concentrations evaluated in this study.

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Table 4.1-3. Predicted Effluent Water Quality For Stormwater Treatment Areas with Influent P = 90 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			90/50	90/40	90/30	90/20	90/10
Nutrients:							
Total phosphorus	ug/L	90	50	40	30		
Ammonia nitrogen	ug/L	160	20	20	20		
Total Kjeldahl nitrogen	ug/L	2700	2100	2100	2100		
Nitrate nitrogen	ug/L	250	10	10	10		
Nitrite nitrogen	ug/L	70	0	0	0		
Total nitrogen	ug/L	3020	2110	2110	2110		
Metals:							
Aluminum	ug/L	100	7	7	7		
Copper	ug/L	2	3	3	3		
Iron	ug/L	100	12	12	12		
Manganese	ug/L	12	20	20	20		
Mercury (total)	ug/L	1.8E-03	7.4E-04	7.4E-04	7.4E-04		
Mercury (methyl)	ug/L	1.6E-04	4.8E-05	4.8E-05	4.8E-05		
Zinc	ug/L	3	2	2	2		
Ions:							
Sulfate	mg/L	73	64	64	64		
Silica	mg/L	22	22	22	22		
Chloride	mg/L	183	214	214	214		
Calcium	mg/L	81	81	81	81		
Magnesium	mg/L	26	26	26	26		
Sodium	mg/L	119	142	142	142		
Potassium	mg/L	10	10	10	10		
Others:							
Alkalinity as $CaCO_3$	mg/L	275	281	281	281		
pH	s.u.	7	7	7	7		
Specific conductance	umho/cm	1056	1119	1119	1119		
Total dissolved solids	mg/L	720	763	763	763		
Total organic carbon	mg/L	40	43	43	43		

[a] Source: Unpublished water quality data (except P concentrations) for period August 1994 - August 1995 at sample station G252C, South Florida Water Management District.

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Table 4.1-4. Effect of Stormwater Treatment Areas on Water Quality

Parameter	Unit	Concentration change caused by treatment	Ratio of effluent concentration to concentration in EAA raw water
Nutrients:			
Total phosphorus	ug/L	100	0.333
Ammonia nitrogen	ug/L	-389	0.116
Total Kjeldahl nitrogen	ug/L	-600	0.778
Nitrate nitrogen	ug/L	-415	0.078
Nitrite nitrogen	ug/L	-69	0.014
Total nitrogen	ug/L	-1,084	0.663
Metals:			
Aluminum	ug/L	-277	0.067
Copper	ug/L	1	1.500
Iron	ug/L	-322	0.101
Manganese	ug/L	10	1.588
Mercury (total)	ug/L	-1.3E-03	0.414
Mercury (methyl)	ug/L	-1.4E-04	0.300
Zinc	ug/L	-2	0.600
Ions:			
Sulfate	mg/L	-8	0.873
Silica	mg/L	0	1.000
Chloride	mg/L	23	1.172
Calcium	mg/L	0	1.000
Magnesium	mg/L	0	1.000
Sodium	mg/L	17	1.189
Potassium	mg/L	0	1.000
Others:			
Alkalinity as $CaCO_3$	mg/L	5	1.021
pH	s.u.	0	1.000
Specific conductance	umho/cm	56	1.058
Total dissolved solids	mg/L	38	1.058
Total organic carbon	mg/L	3	1.079

Table 4.2-2. Predicted Effluent Water Quality For Managed Wetlands with Influent P = 150 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			150/50	150/40	150/30	150/20	150/10
Nutrients:							
Total phosphorus	ug/L	150	50	40	30		
Ammonia nitrogen	ug/L	440	270	180	50		
Total Kjeldahl nitrogen	ug/L	2700	1700	1610	1480		
Nitrate nitrogen	ug/L	450	270	170	40		
Nitrite nitrogen	ug/L	70	40	20	0		
Total nitrogen	ug/L	3220	2020	1810	1520		
Metals:							
Aluminum	ug/L	297	84	53	9		
Copper	ug/L	2	3.6	3.9	4.4		
Iron	ug/L	358	1192	771	193		
Manganese	ug/L	17	55	61	69		
Mercury (total)	ug/L	2.2E-03	9.6E-04	7.8E-04	5.3E-04		
Mercury (methyl)	ug/L	2.0E-04	1.0E-04	7.7E-05	4.0E-05		
Zinc	ug/L	5	2	1	0		
Ions:							
Sulfate	mg/L	63	60	58	55		
Silica	mg/L	27	25	25	25		
Chloride	mg/L	134	162	168	177		
Calcium	mg/L	75	80	80	80		
Magnesium	mg/L	24	23	24	24		
Sodium	mg/L	90	97	101	107		
Potassium	mg/L	7	7	8	8		
Others:							
Alkalinity as $CaCO_3$	mg/L	241	232	233	235		
pH	s.u.	7	7	7	7		
Specific conductance	umho/cm	966	1023	1037	1057		
Total dissolved solids	mg/L	659	698	707	721		
Total organic carbon	mg/L	38	31	31	32		

[a] Source: Everglades Nutrient Removal Project 1995 Monitoring Report published by the South Florida Water Management District.
P concentrations are influent/effluent concentrations evaluated in this study

Table 4.2-3. Predicted Effluent Water Quality For Managed Wetlands with Influent P = 90 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			90/50	90/40	90/30	90/20	90/10
Nutrients:							
Total phosphorus	ug/L	90	50	40	30		
Ammonia nitrogen	ug/L	160	120	80	20		
Total Kjeldahl nitrogen	ug/L	2700	1940	1800	1630		
Nitrate nitrogen	ug/L	250	190	110	20		
Nitrite nitrogen	ug/L	70	50	30	0		
Total nitrogen	ug/L	3020	2180	1950	1650		
Metals:							
Aluminum	ug/L	100	77	46	7		
Copper	ug/L	3	4.5	5.0	5.6		
Iron	ug/L	100	980	605	129		
Manganese	ug/L	12	36	42	49		
Mercury (total)	ug/L	1.8E-03	1.0E-03	7.8E-04	4.9E-04		
Mercury (methyl)	ug/L	1.6E-04	1.0E-04	7.1E-05	3.3E-05		
Zinc	ug/L	3	2	1	0		
Ions:							
Sulfate	mg/L	73	71	68	64		
Silica	mg/L	22	21	21	21		
Chloride	mg/L	183	204	215	229		
Calcium	mg/L	81	85	85	85		
Magnesium	mg/L	26	26	27	27		
Sodium	mg/L	119	125	132	141		
Potassium	mg/L	10	10	11	12		
Others:							
Alkalinity as $CaCO_3$	mg/L	275	269	271	273		
pH	s.u.	7	7	7	7		
Specific conductance	umho/cm	1056	1094	1115	1141		
Total dissolved solids	mg/L	720	746	760	778		
Total organic carbon	mg/L	40	37	38	39		

[a] Source: Unpublished water quality data (except P concentrations) for period August 1994 - August 1995 at sample station G252C, South Florida Water Management District

Table 4.2-4. Effect of Managed Wetlands on Water Quality

Parameter	Unit	Concentration change caused by treatment	Ratio of effluent concentration to concentration in EAA raw water
Nutrients:			
Total phosphorus	ug/L	-120	0.200
Ammonia nitrogen	ug/L	-390	0.111
Total Kjeldahl nitrogen	ug/L	-1,217	0.549
Nitrate nitrogen	ug/L	-415	0.078
Nitrite nitrogen	ug/L	-70	0.000
Total nitrogen	ug/L	-1,700	0.472
Metals:			
Aluminum	ug/L	-288	0.030
Copper	ug/L	2.4	2.200
Iron	ug/L	-165	0.539
Manganese	ug/L	-52	4.050
Mercury (total)	ug/L	-1.7E-03	0.239
Mercury (methyl)	ug/L	-1.6E-04	0.200
Zinc	ug/L	5	0.000
Ions:			
Sulfate	mg/L	-8	0.873
Silica	mg/L	-2	0.926
Chloride	mg/L	34	1.321
Calcium	mg/L	5	1.067
Magnesium	mg/L	0	1.000
Sodium	mg/L	17	1.189
Potassium	mg/L	1	1.143
Others:			
Alkalinity as $CaCO_3$	mg/L	-6	0.975
pH	s.u.	0	1.000
Specific conductance	umho/cm	91	1.094
Total dissolved solids	mg/L	62	1.094
Total organic carbon	mg/L	-6	0.842

Table 4.3-2. Predicted Effluent Water Quality For Chemical Treatment/Direct Filtration with Influent P = 150 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			150/50	150/40	150/30	150/20	150/10
Nutrients:							
Total phosphorus	ug/L	150	50	40	30	20	9
Ammonia nitrogen	ug/L	440	440	440	440	440	440
Total Kjeldahl nitrogen	ug/L	2700	1490	1362	1234	1106	970
Nitrate nitrogen	ug/L	450	450	450	450	450	450
Nitrite nitrogen	ug/L	70	70	70	70	70	70
Total nitrogen	ug/L	3220	2010	1882	1754	1626	1490
Metals:							
Aluminum	ug/L	297	98	85	71	57	42
Copper	ug/L	2	3	3	3	3	3
Iron	ug/L	358	485	509	533	557	582
Manganese	ug/L	17	52	56	61	65	70
Mercury (total)	ug/L	2.2E-03	9.6.E-04	8.5.E-04	7.4.E-04	6.3.E-04	5.2.E-04
Mercury (methyl)	ug/L	2.0E-04	1.4.E-04	1.3.E-04	1.3.E-04	1.2.E-04	1.2.E-04
Zinc	ug/L	5	4	3	3	3	3
Ions:							
Sulfate	mg/L	64	63	63	63	63	63
Silica	mg/L	27	24	23	23	22	22
Chloride	mg/L	134	155	157	160	162	165
Calcium	mg/L	75	81	82	83	83	84
Magnesium	mg/L	24	23	23	23	23	23
Sodium	mg/L	90	90	90	90	90	90
Potassium	mg/L	7	7	7	7	7	7
Others:							
Alkalinity as $CaCO_3$	mg/L	241	227	226	224	223	221
pH	s.u.	7	7	7	7	7	7
Specific conductance	umho/cm	966	1006	1011	1015	1020	1025
Total dissolved solids	mg/L	659	686	689	692	696	699
Total organic carbon	mg/L	38	27	25	24	23	22

[a] Source: Everglades Nutrient Removal Project 1995 Monitoring Report published by the South Florida Water Management District.
P concentrations are influent/effluent concentrations evaluated in this study

Table 4.3-3. Predicted Effluent Water Quality For Chemical Treatment/Direct Filtration with Influent P = 90 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			90/50	90/40	90/30	90/20	90/10
Nutrients:							
Total phosphorus	ug/L	90	50	40	30	20	10
Ammonia nitrogen	ug/L	160	160	160	160	160	160
Total Kjeldahl nitrogen	ug/L	2700	1873	1650	1436	1213	990
Nitrate nitrogen	ug/L	250	250	250	250	250	250
Nitrite nitrogen	ug/L	70	70	70	70	70	70
Total nitrogen	ug/L	3020	2193	1970	1756	1533	1310
Metals:							
Aluminum	ug/L	100	65	53	42	31	19
Copper	ug/L	3	3	4	4	4	4
Iron	ug/L	100	287	355	421	489	558
Manganese	ug/L	12	34	42	50	58	66
Mercury (total)	ug/L	1.8E-03	1.1E-03	9.1E-04	7.6E-04	6.1E-04	4.5E-04
Mercury (methyl)	ug/L	1.6E-04	1.2E-04	1.1E-04	1.1E-04	1.0E-04	9.3E-05
Zinc	ug/L	3	3	2	2	2	2
Ions:							
Sulfate	mg/L	73	73	73	73	73	73
Silica	mg/L	22	20	20	19	18	18
Chloride	mg/L	183	196	200	204	208	212
Calcium	mg/L	81	85	86	87	89	90
Magnesium	mg/L	26	26	26	26	26	26
Sodium	mg/L	119	119	119	119	119	119
Potassium	mg/L	10	10	10	10	10	10
Others:							
Alkalinity as $CaCO_3$	mg/L	275	267	264	261	258	256
pH	s.u.	7	7	7	7	7	7
Specific conductance	umho/cm	1056	1080	1088	1096	1104	1112
Total dissolved solids	mg/L	720	737	742	747	753	758
Total organic carbon	mg/L	40	35	34	32	30	29

[a] Source: Unpublished water quality data (except P concentrations) for period August 1994 - August 1995 at sample station G252C, South Florida Water Management District.

Table 4.3-4. Effect of Chemical Treatment/Direct Filtration on Water Quality

Parameter	Unit	Concentration change caused by treatment	Ratio of effluent concentration to concentration in EAA raw water
Nutrients:			
Total phosphorus	ug/L	-141	0.060
Ammonia nitrogen	ug/L	0	1.000
Total Kjeldahl nitrogen	ug/L	-1,733	0.359
Nitrate nitrogen	ug/L	0	1.000
Nitrite nitrogen	ug/L	0	1.000
Total nitrogen	ug/L	-1,733	0.463
Metals:			
Aluminum	ug/L	255	0.141
Copper	ug/L	1	1.500
Iron	ug/L	224	1.626
Manganese	ug/L	53	4.102
Mercury (total)	ug/L	-1.7E-03	0.234
Mercury (methyl)	ug/L	-8.1E-05	0.594
Zinc	ug/L	2	0.555
Ions:			
Sulfate	mg/L	0	1.000
Silica	mg/L	-5	0.815
Chloride	mg/L	31	1.231
Calcium	mg/L	9	1.120
Magnesium	mg/L	0	1.000
Sodium	mg/L	0	1.000
Potassium	mg/L	0	1.000
Others:			
Alkalinity as $CaCO_3$	mg/L	-20	0.917
pH	s.u.	-0.29	0.960
Specific conductance	umho/cm	59	1.061
Total dissolved solids	mg/L	40	1.061
Total organic carbon	mg/L	-16	0.579

Table 4.4-2. Predicted Effluent Water Quality For STA-Chemical Treatment/Direct Filtration with Influent P =150 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			150/50	150/40	150/30	150/20	150/10
Nutrients:							
Total phosphorus	ug/L	150	50	40	31	20	9
Ammonia nitrogen	ug/L	440	51	51	51	51	51
Total Kjeldahl nitrogen	ug/L	2700	2100	1802	1512	1193	853
Nitrate nitrogen	ug/L	45	35	35	35	35	35
Nitrite nitrogen	ug/L	70	1	1	1	1	1
Total nitrogen	ug/L	3220	2136	1838	1548	1229	889
Metals:							
Aluminum	ug/L	297	20	18	15	13	10
Copper	ug/L	2	3	3	3	4	4
Iron	ug/L	358	36	156	272	400	537
Manganese	ug/L	17	27	37	47	58	70
Mercury (total)	ug/L	2.2E-03	9.1.E-04	7.7.E-04	6.3.E-04	4.8.E-04	3.1.E-04
Mercury (methyl)	ug/L	2.0E-04	6.0.E-05	5.8.E-05	5.6.E-05	5.4.E-05	5.1.E-05
Zinc	ug/L	5	3	3	3	2	2
Ions:							
Sulfate	mg/L	64	55	55	55	55	55
Silica	mg/L	27	27	26	25	24	22
Chloride	mg/L	134	157	164	171	178	186
Calcium	mg/L	75	75	77	79	81	83
Magnesium	mg/L	24	23	23	23	23	23
Sodium	mg/L	90	107	107	107	107	107
Potassium	mg/L	7	7	7	7	7	7
Others:							
Alkalinity as $CaCO_3$	mg/L	241	246	242	237	232	227
pH	s.u.	7	7	7	7	7	7
Specific conductance	umho/cm	966	1022	1035	1048	1062	1077
Total dissolved solids	mg/L	659	697	706	715	724	734
Total organic carbon	mg/L	38	41	37	34	29	25

[a] Source: Everglades Nutrient Removal Project 1995 Monitoring Report published by the South Florida Water Management District.
P concentrations are influent/effluent concentrations evaluated in this study

Table 4.4-3. Predicted Effluent Water Quality For STA - Chemical Treatment/Direct Filtration with Influent P = 90 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			90/50	90/40	90/30	90/20	90/10
Nutrients:							
Total phosphorus	ug/L	90	50	40	30	20	10
Ammonia nitrogen	ug/L	160	20	20	20	20	20
Total Kjeldahl nitrogen	ug/L	2700	2100	1802	1491	1179	867
Nitrate nitrogen	ug/L	250	10	10	10	10	10
Nitrite nitrogen	ug/L	70	0	0	0	0	0
Total nitrogen	ug/L	3020	2110	1812	1501	1189	877
Metals:							
Aluminum	ug/L	100	7	8	10	11	13
Copper	ug/L	3	3	3	3	4	4
Iron	ug/L	100	12	137	267	398	528
Manganese	ug/L	12	20	31	43	55	67
Mercury (total)	ug/L	1.8E-03	7.4E-04	6.2E-04	5.0E-04	3.8E-04	2.6E-04
Mercury (methyl)	ug/L	1.6E-04	4.8E-05	4.6E-05	4.5E-05	4.3E-05	4.1E-05
Zinc	ug/L	3	2	2	2	1	1
Ions:							
Sulfate	mg/L	73	64	64	64	64	64
Silica	mg/L	22	22	21	20	19	18
Chloride	mg/L	183	214	221	228	235	243
Calcium	mg/L	81	81	83	85	87	89
Magnesium	mg/L	26	26	26	26	26	26
Sodium	mg/L	119	142	142	142	142	142
Potassium	mg/L	10	10	10	10	10	10
Others:							
Alkalinity as $CaCO_3$	mg/L	275	281	277	272	267	263
pH	s.u.	7	7	7	7	7	7
Specific conductance	umho/cm	1056	1119	1132	1145	1159	1172
Total dissolved solids	mg/L	720	763	772	781	791	800
Total organic carbon	mg/L	40	43	39	35	31	26

[a] Source: Unpublished water quality data (except P concentrations) for period August 1994 - August 1995 at sample station G252C, South Florida Water Management District.

Table 4.4-4. Effect of STA - Chemical Treatment/Direct Filtration on Water Quality

Parameter	Unit	Concentration change caused by treatment	Ratio of effluent concentration to concentration in EAA raw water
Nutrients:			
Total phosphorus	ug/L	-144	0.040
Ammonia nitrogen	ug/L	-389	0.116
Total Kjeldahl nitrogen	ug/L	-1,939	0.282
Nitrate nitrogen	ug/L	-415	0.078
Nitrite nitrogen	ug/L	-69	0.014
Total nitrogen	ug/L	-2,423	0.248
Metals:			
Aluminium	ug/L	-288	0.030
Copper	ug/L	2	2.000
Iron	ug/L	216	1.603
Manganese	ug/L	59	4.294
Mercury (total)	ug/L	-1.9E-03	0.122
Mercury (methyl)	ug/L	-1.5E-04	0.254
Zinc	ug/L	3	0.400
Ions:			
Sulfate	mg/L	-8	0.873
Silica	mg/L	-5	0.815
Chloride	mg/L	54	1.403
Calcium	mg/L	9	1.120
Magnesium	mg/L	0	1.000
Sodium	mg/L	17	1.189
Potassium	mg/L	0	1.000
Others:			
Alkalinity as $CaCO_3$	mg/L	-15	1.104
pH	s.u.	-0.29	0.960
Specific conductance	umho/cm	115	1.119
Total dissolved solids	mg/L	78	1.118
Total organic carbon	mg/L	14	0.632

Table 4.5-2. Predicted Effluent Water Quality For Chemical Treatment/High Rate Settling with Influent P = 150 ppb

Parameter	Unit	Influent Concentration*	Predicted Effluent Water Quality For Influent/Effluent Levels				
			150/50	150/40	150/30	150/20	150/10
Nutrients:							
Total phosphorus	ug/L	150	50	40	30		
Ammonia nitrogen	ug/L	440	440	440	440		
Total Kjeldahl nitrogen	ug/L	2700	1483	1356	1221		
Nitrate nitrogen	ug/L	450	450	450	450		
Nitrite nitrogen	ug/L	70	70	70	70		
Total nitrogen	ug/L	3220	2003	1876	1741		
Metals:							
Aluminum	ug/L	297	98	84	70		
Copper	ug/L	2	4	4	4		
Iron	ug/L	358	2026	2227	2441		
Manganese	ug/L	17	58	63	69		
Mercury (total)	ug/L	2.2E-03	9.5.E-04	8.4.E-04	7.3.E-04		
Mercury (methyl)	ug/L	2.0E-04	1.4.E-04	1.3.E-04	1.3.E-04		
Zinc	ug/L	5	3	3	3		
Ions:							
Sulfate	mg/L	64	63	63	63		
Silica	mg/L	27	24	24	23		
Chloride	mg/L	134	158	161	164		
Calcium	mg/L	75	82	83	84		
Magnesium	mg/L	24	23	23	23		
Sodium	mg/L	90	90	90	90		
Potassium	mg/L	7	7	7	7		
Others:							
Alkalinity as $CaCO_3$	mg/L	241	225	224	222		
pH	s.u.	7	7	7	7		
Specific conductance	umho/cm	966	1012	1017	1023		
Total dissolved solids	mg/L	659	690	694	698		
Total organic carbon	mg/L	38	27	26	24		

* Source: Everglades Nutrient Removal Project 1995 Monitoring Report published by the South Florida Water Management District.
P concentrations are influent/effluent concentrations evaluated in this study

Table 4.5-3. Predicted Effluent Water Quality For Chemical Treatment/High Rate Settling with Influent P = 90 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			90/50	90/40	90/30	90/20	90/10
Nutrients:							
Total phosphorus	ug/L	90	50	40	30	20	
Ammonia nitrogen	ug/L	160	160	160	160	160	
Total Kjeldahl nitrogen	ug/L	2700	1953	1763	1572	1382	
Nitrate nitrogen	ug/L	250	250	250	250	250	
Nitrite nitrogen	ug/L	70	70	70	70	70	
Total nitrogen	ug/L	3020	2273	2083	1892	1702	
Metals:							
Aluminum	ug/L	100	103	104	105	106	
Copper	ug/L	3	3	4	4	4	
Iron	ug/L	100	1242	1612	1983	2353	
Manganese	ug/L	12	37	46	56	65	
Mercury (total)	ug/L	1.8E-03	1.1E-03	9.1E-04	7.6E-04	6.1E-04	
Mercury (methyl)	ug/L	1.6E-04	1.2E-04	1.1E-04	1.1E-04	1.0E-04	
Zinc	ug/L	3	3	2	2	2	
Ions:							
Sulfate	mg/L	73	73	73	73	73	
Silica	mg/L	22	20	19	19	18	
Chloride	mg/L	183	198	203	207	212	
Calcium	mg/L	81	85	87	88	89	
Magnesium	mg/L	26	26	26	26	26	
Sodium	mg/L	119	119	119	119	119	
Potassium	mg/L	10	10	10	10	10	
Others:							
Alkalinity as $CaCO_3$	mg/L	275	265	262	259	256	
pH	s.u.	7	7	7	7	7	
Specific conductance	umho/cm	1056	1084	1093	1102	1111	
Total dissolved solids	mg/L	720	739	745	752	758	
Total organic carbon	mg/L	40	35	34	32	31	

[a] Source: Unpublished water quality data (except P concentrations) for period August 1994 - August 1995 at sample station G252C, South Florida Water Management District.

Table 4.5-4. Effect of High-Rate Settling on Water Quality

Parameter	Unit	Concentration change caused by treatment	Ratio of effluent concentration to concentration in EAA raw water
Nutrients:			
Total phosphorus	ug/L	-126	0.167
Ammonia nitrogen	ug/L	0	1.000
Total Kjeldahl nitrogen	ug/L	-1,531	0.433
Nitrate nitrogen	ug/L	0	1.000
Nitrite nitrogen	ug/L	0	1.000
Total nitrogen	ug/L	-1,531	0.525
Metals:			
Aluminum	ug/L	-233	0.216
Copper	ug/L	2	2.000
Iron	ug/L	2,166	7.051
Manganese	ug/L	54	4.161
Mercury (total)	ug/L	-1.5E-03	0.312
Mercury (methyl)	ug/L	-7.4E-05	0.632
Zinc	ug/L	-2	0.619
Ions:			
Sulfate	mg/L	0	1.000
Silica	mg/L	-4	0.852
Chloride	mg/L	31	1.228
Calcium	mg/L	9	1.125
Magnesium	mg/L	0	1.000
Sodium	mg/L	0	1.000
Potassium	mg/L	0	1.000
Others:			
Alkalinity as $CaCO_3$	mg/L	-20	0.917
pH	s.u.	-0.29	0.960
Specific conductance	umho/cm	59	1.061
Total dissolved solids	mg/L	40	1.061
Total organic carbon	mg/L	-14	0.632

Table 4.6-2. Predicted Effluent Water Quality For STA - Chemical Treatment/High Rate Settling with Influent P = 150 ppb

Parameter	Units	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			150/50	150/40	150/30	150/20	150/10
Nutrients:							
Total phosphorus	ug/L	150	50	40	30	20	
Ammonia nitrogen	ug/L	440	51	51	51	51	
Total Kjeldahl nitrogen	ug/L	2700	2100	1802	1492	1169	
Nitrate nitrogen	ug/L	450	35	35	35	35	
Nitrite nitrogen	ug/L	70	1	1	1	1	
Total nitrogen	ug/L	3220	2136	1838	1528	1205	
Metals:							
Aluminum	ug/L	297	20	18	15	13	
Copper	ug/L	2	2	3	3	4	
Iron	ug/L	358	36	658	1307	1981	
Manganese	ug/L	17	27	39	52	65	
Mercury (total)	ug/L	2.2E-03	9.1E-04	7.7E-04	6.2E-04	4.6E-04	
Mercury (methyl)	ug/L	2.0E-04	6.0E-05	5.8E-05	5.6E-05	5.3E-05	
Zinc	ug/L	5	3	3	2	2	
Ions:							
Sulfate	mg/L	64	55	55	55	55	
Silica	mg/L	27	27	26	25	24	
Chloride	mg/L	134	157	165	173	182	
Calcium	mg/L	75	75	77	80	82	
Magnesium	mg/L	24	23	23	23	23	
Sodium	mg/L	90	107	107	107	107	
Potassium	mg/L	7	7	7	7	7	
Others:							
Alkalinity as $CaCO_3$	mg/L	241	246	241	236	230	
pH	s.u.	7	7	7	7	7	
Specific conductance	umho/cm	966	1022	1037	1053	1069	
Total dissolved solids	mg/L	659	697	707	718	729	
Total organic carbon	mg/L	38	41	37	33	29	

[a] Source: Everglades Nutrient Removal Project 1995 Monitoring Report published by the South Florida Water Management District.
P concentrations are influent/effluent concentrations evaluated in this study

Table 4.6-3. Predicted Effluent Water Quality For STA - Chemical Treatment/High Rate Settling with Influent P = 90 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			90/50	90/40	90/30	90/20	90/10
Nutrients:							
Total phosphorus	ug/L	90	50	40	30	20	
Ammonia nitrogen	ug/L	160	20	20	20	20	
Total Kjeldahl nitrogen	ug/L	2700	2100	1802	1492	1169	
Nitrate nitrogen	ug/L	250	10	10	10	10	
Nitrite nitrogen	ug/L	70	0	0	0	0	
Total nitrogen	ug/L	3020	2110	1812	1502	1179	
Metals:							
Aluminum	ug/L	100	7	9	10	12	
Copper	ug/L	3	4	4	5	5	
Iron	ug/L	100	12	640	1293	1973	
Manganese	ug/L	12	20	33	47	62	
Mercury (total)	ug/L	1.8E-03	7.4E-04	6.2E-04	5.0E-04	3.8E-04	
Mercury (methyl)	ug/L	1.6E-04	4.8E-05	4.6E-05	4.5E-05	4.3E-05	
Zinc	ug/L	3	2	2	1	1	
Ions:							
Sulfate	mg/L	73	64	64	64	64	
Silica	mg/L	22	22	21	20	19	
Chloride	mg/L	183	214	222	230	239	
Calcium	mg/L	81	81	83	86	88	
Magnesium	mg/L	26	26	26	26	26	
Sodium	mg/L	119	142	142	142	142	
Potassium	mg/L	10	10	10	10	10	
Others:							
Alkalinity as $CaCO_3$	mg/L	275	281	276	271	265	
pH	s.u.	7	7	7	7	7	
Specific conductance	umho/cm	1056	1119	1134	1149	1165	
Total dissolved solids	mg/L	720	763	773	784	795	
Total organic carbon	mg/L	40	43	39	35	30	

[a] Source: Unpublished water quality data (except P concentrations) for period August 1994 - August 1995 at sample station G252C, South Florida Water Management District.

Table 4.6-4. Effect of STA - High-Rate Settling on Water Quality

Parameter	Unit	Concentration change caused by treatment	Ratio of effluent concentration to concentration in EAA raw water
Nutrients:			
Total phosphorus	ug/L	-138	0.080
Ammonia nitrogen	ug/L	-389	0.116
Total Kjeldahl nitrogen	ug/L	-1,773	0.343
Nitrate nitrogen	ug/L	-415	0.078
Nitrite nitrogen	ug/L	-69	0.014
Total nitrogen	ug/L	-2,257	0.299
Metals:			
Aluminum	ug/L	-286	0.037
Copper	ug/L	2	2.000
Iron	ug/L	2,129	6.947
Manganese	ug/L	58	4.431
Mercury (total)	ug/L	-1.9E-03	0.158
Mercury (methyl)	ug/L	-1.5E-04	0.259
Zinc	ug/L	-3	0.389
Ions:			
Sulfate	mg/L	-8	0.873
Silica	mg/L	-4	0.852
Chloride	mg/L	54	1.400
Calcium	mg/L	9	1.125
Magnesium	mg/L	0	1.000
Sodium	mg/L	17	1.189
Potassium	mg/L	0	1.000
Others:			
Alkalinity as $CaCO_3$	mg/L	-15	0.938
pH	s.u.	-0.29	0.960
Specific conductance	umho/cm	115	1.119
Total dissolved solids	mg/L	78	1.118
Total organic carbon	mg/L	-12	0.684

Table 4.7-2. Predicted Effluent Water Quality For Chemical Treatment/DAF/Filtration with Influent P = 150 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			150/50	150/40	150/30	150/20	150/10
Nutrients:							
Total phosphorus	ug/L	150	50	40	30	20	10
Ammonia nitrogen	ug/L	440	440	440	440	440	440
Total Kjeldahl nitrogen	ug/L	2700	1490	1362	1234	1106	970
Nitrate nitrogen	ug/L	450	450	450	450	450	450
Nitrite nitrogen	ug/L	70	70	70	70	70	70
Total nitrogen	ug/L	3220	2010	1882	1754	1626	1490
Metals:							
Aluminum	ug/L	297	98	85	71	57	42
Copper	ug/L	2	3	3	3	3	3
Iron	ug/L	358	485	509	533	557	582
Manganese	ug/L	17	52	56	61	65	70
Mercury (total)	ug/L	2.2E-03	9.6E-04	8.5E-04	7.4E-04	6.3E-04	5.2E-04
Mercury (methyl)	ug/L	2.0E-04	1.4E-04	1.3E-04	1.3E-04	1.2E-04	1.2E-04
Zinc	ug/L	5	4	3	3	3	3
Ions:							
Sulfate	mg/L	64	63	63	63	63	63
Silica	mg/L	27	24	23	23	22	22
Chloride	mg/L	134	155	157	160	162	165
Calcium	mg/L	75	81	82	83	83	84
Magnesium	mg/L	24	23	23	23	23	23
Sodium	mg/L	90	90	90	90	90	90
Potassium	mg/L	7	7	7	7	7	7
Others:							
Alkalinity as $CaCO_3$	mg/L	241	227	226	224	223	221
pH	s.u.	7	7	7	7	7	7
Specific conductance	umho/cm	966	1006	1011	1015	1020	1025
Total dissolved solids	mg/L	659	686	689	692	696	699
Total organic carbon	mg/L	38	27	25	24	23	22

[a] Source: Everglades Nutrient Removal Project 1995 Monitoring Report published by the South Florida Water Management District.
P concentrations are influent/effluent concentrations evaluated in this study.

Table 4.7-3. Predicted Effluent Water Quality For Chemical Treatment/DAF/Filtration with Influent P = 90 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			90/50	90/40	90/30	90/20	90/10
Nutrients:							
Total phosphorus	ug/L	90	50	40	30	20	10
Ammonia nitrogen	ug/L	160	160	160	160	160	160
Total Kjeldahl nitrogen	ug/L	2700	1873	1650	1436	1213	990
Nitrate nitrogen	ug/L	250	250	250	250	250	250
Nitrite nitrogen	ug/L	70	70	70	70	70	70
Total nitrogen	ug/L	3020	2193	1970	1756	1533	1310
Metals:							
Aluminum	ug/L	100	103	103	104	105	106
Copper	ug/L	3	3	4	4	4	4
Iron	ug/L	100	287	355	421	489	558
Manganese	ug/L	12	34	42	50	58	66
Mercury (total)	ug/L	1.8E-03	1.1E-03	9.1E-04	7.6E-04	6.1E-04	4.5E-04
Mercury (methyl)	ug/L	1.6E-04	1.2E-04	1.1E-04	1.1E-04	1.0E-04	9.3E-05
Zinc	ug/L	3	3	2	2	2	2
Ions:							
Sulfate	mg/L	73	73	73	73	73	73
Silica	mg/L	22	20	20	19	18	18
Chloride	mg/L	183	203	210	216	223	230
Calcium	mg/L	81	85	86	87	89	90
Magnesium	mg/L	26	26	26	26	26	26
Sodium	mg/L	119	119	119	119	119	119
Potassium	mg/L	10	10	10	10	10	10
Others:							
Alkalinity as $CaCO_3$	mg/L	275	267	264	261	258	256
pH	s.u.	7	7	7	7	7	7
Specific conductance	umho/cm	1056	1080	1088	1096	1104	1112
Total dissolved solids	mg/L	720	737	742	747	753	758
Total organic carbon	mg/L	40	35	34	32	30	29

[a] Source: Unpublished water quality data (except P concentrations) for period August 1994 - August 1995 at sample station G252C, South Florida Water Management District.

Table 4.7-4. Effect of Chemical Treatment/Dissolved-Air Flotation/Filtration on Water Quality

Parameter	Unit	Concentration change caused by treatment	Ratio of effluent concentration to concentration in EAA raw water
Nutrients:			
Total phosphorus	ug/L	-141	0.060
Ammonia nitrogen	ug/L	0	1.000
Total Kjeldahl nitrogen	ug/L	-1,733	0.359
Nitrate nitrogen	ug/L	0	1.000
Nitrite nitrogen	ug/L	0	1.000
Total nitrogen	ug/L	-1,733	0.463
Metals:			
Aluminum	ug/L	255	0.141
Copper	ug/L	1	1.500
Iron	ug/L	224	1.626
Manganese	ug/L	53	4.102
Mercury (total)	ug/L	-1.7E-03	0.234
Mercury (methyl)	ug/L	-8.1E-05	0.594
Zinc	ug/L	2	0.555
Ions:			
Sulfate	mg/L	0	1.000
Silica	mg/L	-5	0.815
Chloride	mg/L	31	1.231
Calcium	mg/L	9	1.120
Magnesium	mg/L	0	1.000
Sodium	mg/L	0	1.000
Potassium	mg/L	0	1.000
Others:			
Alkalinity as $CaCO_3$	mg/L	-20	0.917
pH	s.u.	0	0.960
Specific conductance	umho/cm	59	1.061
Total dissolved solids	mg/L	40	1.061
Total organic carbon	mg/L	-16	0.579

Table 4.8-2. Predicted Effluent Water Quality For STA - Chemical Treatment/DAF/Filtration with Influent P = 150 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			150/50	150/40	150/30	150/20	150/10
Nutrients:							
Total phosphorus	ug/L	150	50	40	31	20	9
Ammonia nitrogen	ug/L	440	51	51	51	51	51
Total Kjeldahl nitrogen	ug/L	2700	2100	1802	1512	1193	853
Nitrate nitrogen	ug/L	45	35	35	35	35	35
Nitrite nitrogen	ug/L	70	1	1	1	1	1
Total nitrogen	ug/L	3220	2136	1838	1548	1229	889
Metals:							
Aluminum	ug/L	297	20	18	15	13	10
Copper	ug/L	2	3	3	3	4	4
Iron	ug/L	358	36	156	272	400	537
Manganese	ug/L	17	27	37	47	58	70
Mercury (total)	ug/L	2.2E-03	9.1.E-04	7.7.E-04	6.3.E-04	4.8.E-04	3.1.E-04
Mercury (methyl)	ug/L	2 0E-04	6.0.E-05	5.8 E-05	5.6 E-05	5.4.E-05	5.1.E-05
Zinc	ug/L	5	3	3	3	2	2
Ions:							
Sulfate	mg/L	64	55	55	55	55	55
Silica	mg/L	27	27	26	25	24	22
Chloride	mg/L	134	157	164	171	178	186
Calcium	mg/L	75	75	77	79	81	83
Magnesium	mg/L	24	23	23	23	23	23
Sodium	mg/L	90	107	107	107	107	107
Potassium	mg/L	7	7	7	7	7	7
Others:							
Alkalinity as $CaCO_3$	mg/L	241	246	242	237	232	227
pH	s u.	7	7	7	7	7	7
Specific conductance	umho/cm	966	1022	1035	1048	1062	1077
Total dissolved solids	mg/L	659	697	706	715	724	734
Total organic carbon	mg/L	38	41	37	34	29	25

[a] Source: Everglades Nutrient Removal Project 1995 Monitoring Report published by the South Florida Water Management District.
P concentrations are influent/effluent concentrations evaluated in this study

Table 4.8-3. Predicted Effluent Water Quality For STA - Chemical Treatment/DAF/Filtration with Influent P = 90 ppb

Parameter	Unit	Influent Concentration[a]	Predicted Effluent Water Quality For Influent/Effluent Levels				
			90/50	90/40	90/30	90/20	90/10
Nutrients:							
Total phosphorus	ug/L	90	50	40	30	20	10
Ammonia nitrogen	ug/L	160	20	20	20	20	20
Total Kjeldahl nitrogen	ug/L	2700	2100	1802	1491	1179	867
Nitrate nitrogen	ug/L	250	10	10	10	10	10
Nitrite nitrogen	ug/L	70	0	0	0	0	0
Total nitrogen	ug/L	3020	2110	1812	1501	1189	877
Metals:							
Aluminum	ug/L	100	7	8	10	11	13
Copper	ug/L	3	3	3	3	4	4
Iron	ug/L	100	12	137	267	398	528
Manganese	ug/L	12	20	31	43	55	67
Mercury (total)	ug/L	1.8E-03	7.4E-04	6.2E-04	5.0E-04	3.8E-04	2.6E-04
Mercury (methyl)	ug/L	1.6E-04	4.8E-05	4.6E-05	4.5E-05	4.3E-05	4.1E-05
Zinc	ug/L	3	2	2	2	1	1
Ions:							
Sulfate	mg/L	73	64	64	64	64	64
Silica	mg/L	22	22	21	20	19	18
Chloride	mg/L	183	214	221	228	235	243
Calcium	mg/L	81	81	83	85	87	89
Magnesium	mg/L	26	26	26	26	26	26
Sodium	mg/L	119	142	142	142	142	142
Potassium	mg/L	10	10	10	10	10	10
Others:							
Alkalinity as $CaCO_3$	mg/L	275	281	277	272	267	263
pH	s.u.	7	7	7	7	7	7
Specific conductance	umho/cm	1056	1119	1132	1145	1159	1172
Total dissolved solids	mg/L	720	763	772	781	791	800
Total organic carbon	mg/L	40	43	39	35	31	26

[a] Source: Unpublished water quality data (except P concentrations) for period August 1994 - August 1995 at sample station G252C, South Florida Water Management District.

Table 4.8-4. Effect of STA - Dissolved Air Flotation/Filtration on Water Quality

Parameter	Unit	Concentration change caused by treatment	Ratio of effluent concentration to concentration in EAA raw water
Nutrients:			
Total phosphorus	ug/L	-144	0.040
Ammonia nitrogen	ug/L	-389	0.116
Total Kjeldahl nitrogen	ug/L	-1,939	0.282
Nitrate nitrogen	ug/L	-415	0.078
Nitrite nitrogen	ug/L	-69	0.014
Total nitrogen	ug/L	-2,423	0.248
Metals:			
Aluminum	ug/L	-288	0.030
Copper	ug/L	2	2.000
Iron	ug/L	216	1.603
Manganese	ug/L	56	4.294
Mercury (total)	ug/L	-1.9E-03	0.122
Mercury (methyl)	ug/L	-1.5E-04	0.254
Zinc	ug/L	3	0.400
Ions:			
Sulfate	mg/L	-8	0.873
Silica	mg/L	-5	0.815
Chloride	mg/L	54	1.403
Calcium	mg/L	9	1.120
Magnesium	mg/L	0	1.000
Sodium	mg/L	17	1.189
Potassium	mg/L	0	1.000
Others:			
Alkalinity as $CaCO_3$	mg/L	-15	1.104
pH	s.u.	-0.29	0.960
Specific conductance	umho/cm	115	1.119
Total dissolved solids	mg/L	78	1.118
Total organic carbon	mg/L	14	0.632

Table 4.5-1. Basis of Design and Cost Information for Chemical Treatment/High Rate Settling

Parameter	Influent/Effluent P Levels									
	150/50	150/40	150/30	150/20	150/10	90/50	90/40	90/30	90/20	90/10
Basis of Design										
Influent PS capacity, mgd	2330	2330	2330	0	0	2330	2330	2330	2330	0
Influent PS average flow, mgd	189	189	189	0	0	189	189	189	189	0
STA area, acres	0	0	0	0	0	0	0	0	0	0
FEB area, acres	1000	2000	3000	0	0	500	1000	1000	2000	0
Treatment plant influent PS capacity, mgd	290	330	453	0	0	131	182	302	470	0
Treatment plant influent PS average flow, mgd	147	164	182	0	0	91	120	149	178	0
Treatment plant land area, acres	31	34	38	0	0	19	25	31	37	0
Sludge disposal area, acres	309	344	382	0	0	191	252	313	374	0
Effluent PS capacity, mgd	2330	2330	2330	0	0	2330	2330	2330	2330	0
Effluent PS average flow, mgd	189	189	189	0	0	189	189	189	189	0
Total land area, acres	1,474	2,617	3,762	0	0	781	1,405	1,479	2,652	0
Capital Costs, $ million										
Influent pumping station	17.87	17.87	17.87	0.00	0.00	17.87	17.87	17.87	17.87	0.00
STA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STA seepage pump station	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FEB	8.25	16.50	24.75	0.00	0.00	4.13	8.25	8.25	16.50	0.00
FEB seepage pump station	0.21	0.42	0.63	0.00	0.00	0.11	0.21	0.21	0.42	0.00
Treatment plant influent pump station	2.78	3.16	4.34	0.00	0.00	1.26	1.75	2.90	4.51	0.00
Treatment plant	52.72	59.16	78.98	0.00	0.00	27.10	35.32	54.65	81.72	0.00
Sludge treatment and disposal	2.94	3.28	3.64	0.00	0.00	1.82	2.40	2.98	3.56	0.00
Effluent pump station	17.87	17.87	17.87	0.00	0.00	17.87	17.87	17.87	17.87	0.00
Subtotal	102.64	118.27	148.09	0.00	0.00	70.15	83.67	104.73	142.45	0.00
Construction contingencies (20 percent)	20.53	23.65	29.62	0.00	0.00	14.03	16.73	20.95	28.49	0.00
Subtotal, construction costs	123.17	141.93	177.71	0.00	0.00	84.18	100.40	125.68	170.94	0.00
Engineering (15 percent)	18.48	21.29	26.66	0.00	0.00	12.63	15.06	18.85	25.64	0.00
Land purchase - STA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Land purchase - FEB	3.85	7.70	11.55	0.00	0.00	1.93	3.85	3.85	7.70	0.00
Land purchase - treatment plant	0.12	0.13	0.15	0.00	0.00	0.07	0.10	0.12	0.14	0.00
Land purchase - sludge disposal	1.19	1.33	1.47	0.00	0.00	0.74	0.97	1.20	1.44	0.00
Total Capital Cost	146.81	172.38	217.53	0.00	0.00	99.55	120.38	149.71	205.86	0.00
Present Worth - Capital Cost	146.81	172.38	217.53	0.00	0.00	99.55	120.38	149.71	205.86	0.00
O&M Costs, $ million/yr										
Influent pumping station	0.52	0.52	0.52	0.00	0.00	0.52	0.52	0.52	0.52	0.00
STA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STA seepage pump station	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STA sampling and monitoring	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FEB	0.06	0.12	0.18	0.00	0.00	0.03	0.06	0.06	0.12	0.00
FEB seepage pump station	0.03	0.06	0.08	0.00	0.00	0.02	0.03	0.03	0.06	0.00
Treatment plant influent pump station	0.41	0.43	0.46	0.00	0.00	0.33	0.37	0.41	0.45	0.00
Chemicals	2.56	2.85	3.17	0.00	0.00	1.58	2.09	2.58	3.10	0.00
Sludge treatment and disposal	0.17	0.19	0.21	0.00	0.00	0.11	0.14	0.17	0.21	0.00
Other treatment plant O&M	0.59	0.66	0.73	0.00	0.00	0.36	0.48	0.60	0.71	0.00
Treatment plant sampling and monitoring	0.30	0.30	0.30	0.00	0.00	0.30	0.30	0.30	0.30	0.00
Effluent pump station	0.52	0.52	0.52	0.00	0.00	0.52	0.52	0.52	0.52	0.00
Total Annual O&M Cost	5.16	5.65	6.17	0.00	0.00	3.78	4.52	5.21	5.99	0.00
Present Worth - Annual O&M Cost	110.89	121.44	132.49	0.00	0.00	81.18	97.00	111.92	128.64	0.00
Present Worth - Replacement Costs, $million										
Influent pump station	1.68	1.68	1.68	0.00	0.00	1.68	1.68	1.68	1.68	0.00
STA seepage pump station	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FEB seepage pump station	0.04	0.08	0.12	0.00	0.00	0.02	0.04	0.04	0.08	0.00
Treatment plant influent pump station	0.52	0.59	0.81	0.00	0.00	0.24	0.33	0.54	0.85	0.00
Chemical feed system	0.77	0.87	1.16	0.00	0.00	0.40	0.52	0.80	1.20	0.00
Other major treatment plant equipment	8.76	9.83	13.12	0.00	0.00	4.50	5.87	9.06	13.58	0.00
Sludge treatment and disposal	0.49	0.55	0.60	0.00	0.00	0.30	0.40	0.50	0.59	0.00
Effluent pump station	1.68	1.68	1.68	0.00	0.00	1.68	1.68	1.68	1.68	0.00
Total Present Worth - Replacement Costs	13.93	15.27	19.17	0.00	0.00	8.81	10.50	14.31	19.64	0.00
Salvage Value, $ million										
Influent pump station demolition cost	(3.57)	(3.57)	(3.57)	0.00	0.00	(3.57)	(3.57)	(3.57)	(3.57)	0.00
STA seepage pump station demolition cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FEB seepage pump station demolition cost	(0.04)	(0.08)	(0.13)	0.00	0.00	(0.02)	(0.04)	(0.04)	(0.08)	0.00
Treatment plant influent pump station demolition cost	(0.56)	(0.63)	(0.87)	0.00	0.00	(0.25)	(0.35)	(0.58)	(0.90)	0.00
Treatment plant demolition cost	(10.54)	(11.83)	(15.80)	0.00	0.00	(5.42)	(7.06)	(10.93)	(16.34)	0.00
Effluent pump station demolition cost	(3.57)	(3.57)	(3.57)	0.00	0.00	(3.57)	(3.57)	(3.57)	(3.57)	0.00
STA restoration cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FEB restoration cost	(2.00)	(2.83)	(3.46)	0.00	0.00	(1.41)	(2.00)	(2.00)	(2.83)	0.00
Sludge land restoration cost	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STA land value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FEB land value	3.85	7.70	11.55	0.00	0.00	1.93	3.85	3.85	7.70	0.00
Treatment plant land value	0.12	0.13	0.15	0.00	0.00	0.07	0.10	0.12	0.14	0.00
Sludge land value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Salvage Value	(18.32)	(14.69)	(15.71)	0.00	0.00	(12.26)	(12.66)	(16.73)	(19.46)	0.00
Present Worth - Salvage Value	(2.30)	(2.07)	(2.21)	0.00	0.00	(1.72)	(1.78)	(2.35)	(2.74)	0.00
50 - Year Present Worth, $ million										
Capital Cost	146.81	172.38	217.53	0.00	0.00	99.55	120.38	149.71	205.86	0.00
O&M Cost	110.89	121.44	132.49	0.00	0.00	81.18	97.00	111.92	128.64	0.00
Replacement Cost	13.93	15.27	19.17	0.00	0.00	8.81	10.50	14.31	19.64	0.00
Salvage Value	2.30	2.07	2.21	0.00	0.00	1.72	1.78	2.35	2.74	0.00
Total	273.93	311.15	371.41	0.00	0.00	191.26	229.67	278.29	356.89	0.00
Present worth, $/million gallons treated	79.42	90.21	107.68	0.00	0.00	55.45	66.58	80.68	103.47	0.00
Present worth, $/pound P removed	95.22	98.33	107.59	0.00	0.00	166.22	159.68	161.24	177.23	0.00