Appendix A – "DLYPAR" Files from the City of Loveland WWTP

OLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/INHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
1/1/03	8.4	2.0	4.8	14.9	7.37	364.0	388.0	25.50	7.02	15.7	6.50	29.90	12.70	16.00	7.05	<.05	10.00
1/2/03	8.0	1.8	4.8	13.9	7.35	343.0	355.0	24.40	7.14	13.3	6.40	30.70		16.70	6.44	<.05	6.00
1/3/03	7.9	1.8	4.9	14.4	7.52	337.0	316.0		7.09	14.5	6.10	28.00	11.50	15.30		<.05	
1/4/03	8.0	1.8	5.1	14.4	7.57	343.0	329.0		7.10	14.4	6.30	28.20		15.40		<.05	412.00
1/5/03	8.5	1.8	5.1	13.4	7.50	332.0	353.0	24.40	7.15	13.9	6.00	28.70		15.80	5.57	<.05	400.00
1/6/03	8.8	1.8	5.1	15.0	7.54	345.0	336.0	24.90	7.33	14.7	6.10	28.40	12.30	12.80	3.00	<.05	8.00
1/7/03	8.6	1.8	4.9	14.4	7.43	346.0	373.0	24.90	7.13	15.2	6.00	31.20		15.40	7.65	<.05	100.00
1/8/03	7.8	1.8	4.7	14.9	7.37	294.0	345.0	25.60	7.01	14.7	6.40	32.80	13.70	17.10	5.82	<.05	113.00
1/9/03	7.8	1.8	4.8	14.4	7.43	330.0	351.0	24.80	6.91	13.9	5.80	42.80		21.90	8.56	<.05	350.00
1/10/03	7.4	1.7	4.8	13.9	7.50	338.0	358.0		7.02	13.8	6.40	41.80		18.52		<.05	32.00
1/11/03	8.4	1.7	5.0	13.2	7.41	357.0	339.0		6.81	13.9	6.40	44.30		19.79		<.05	40.00
1/12/03	8.0	1.8	5.1	12.9	7.43	354.0	347.0	23.40	6.90	14.0	6.50	38.40		19.20	9.11	<.05	16.00
1/13/03	8.0	1.7	5.0	14.5	7.40	352.0	387.0	26.20	7.11	13.4	6.60	38.10	15.50	20.26	9.61	<.05	10.00
1/14/03	7.4	1.7	4.6	14.1	7.47	323.0	364.0	28.20	6.88	14.3	6.30	45.90		27.11	7.03	<.05	35.00
1/15/03	7.6	1.8	4.8	13.0	7.48	295.0	306.0	28.60	6.98	13.7	6.00	42.00	20.40	23.60	8.97	<.05	100.00
1/16/03	7.6	1.8	4.8	14.2	7.43	328.0	372.0	23.20	6.79	13.0	6.60	40.30		20.00	5.32	<.05	184.00
1/17/03	7.6	1.7	4.9	15.0	7.53	332.0	323.0		6.70	14.4	7.10	39.60	15.20	16.65		<.05	303.00
1/18/03	9.0	1.8	5.1	13.6	7.48	383.0	356.0		6.94	13.7	7.70	42.40		23.55		<.05	6400.00
1/19/03	9.2	1.7	5.0	13.1	7.54	321.0	418.0	22.30	6.93	13.0	5.70	42.20		17.60	4.89	<.05	
1/20/03	8.2	1.8	5.1	13.6	7.58	370.0	437.0	21.50	6.85	13.8	6.50	46.40		22.25	4.51	<.05	
1/21/03	7.5	1.8	4.9	14.0	7.60	334.0	266.0	24.30	6.76	13.1	6.30	38.20		18.25	3.30	<.05	135.00
1/22/03	7.6	1.7	4.7	12.7	7.53	309.0	254.0	28.40	6.66	13.5	6.30	44.50	15.70	21.52	5.73	<.05	340.00
1/23/03	7.7	1.8	4.8	12.7	7.55	311.0	346.0	24.20	6.90	12.1	6.00	45.00		22.12	6.99	<.05	55.00
1/24/03	7.8	1.8	4.9	13.4	7.45	338.0	326.0		6.84	14.0	6.80	44.10	16.70	21.16		<.05	19.00
1/25/03	8.8	1.8	5.0	15.0	7.52	368.0	254.0		6.80	13.7	6.60	54.50		25.20		<.05	43.00
1/26/03	9.2	1.8	5.1	14.9	7.36	309.0	258.0	25.60	6.69	14.1	6.70	56.20		27.90	5.88	<.05	31.00
1/27/03	8.0	1.7	5.0	13.8	7.46	273.0	314.0	25.90	7.04	13.6	6.50	43.40	15.60	21.05	4.96	<.05	84.00
1/28/03	7.5	1.7	4.8	13.6	7.52	290.0	270.0	27.70	6.94	13.9	6.30	47.50		24.25	5.21	<.05	104.00
1/29/03	7.6	1.7	4.8	13.1	7.41	320.0	254.0	25.70	6.90	14.8	6.30	49.60	16.90	23.01	5.29	<.05	51.00
1/30/03	8.0	1.9	4.8	14.0	7.57	280.0	363.0	25.60	6.68	14.3	7.10	48.30		23.60	5.03	<.05	60.00
1/31/03	7.7	1.5	4.6	14.3	7.49	227.0	121.0		6.87	14.4	6.60	46.50		18.76		<.05	98.00
2/1/03	9.1	2.0	5.1	15.3	7.37	305.0	227.0		6.76	15.3	6.50	32.60		22.57		<.05	
2/2/03	8.9	1.9	5.2	12.7	7.29	305.0	189.0	27.40	6.71	14.7	6.60	32.60		15.30	4.26	<.05	3200.00
2/3/03	7.5	2.0	5.1	14.3	7.41	253.0	226.0	27.50	7.04	11.7	6.60	28.00	9.20	14.40	3.06	<.05	13.00
2/4/03	7.6	1.8	4.7	13.0	7.47	272.0	256.0	28.70	6.77	13.0	6.60	29.20		16.50	2.93	<.05	720.00
2/5/03	7.4	1.7	4.7	13.2	7.44	302.0	296.0	27.30	6.56	14.6	5.80	29.90	12.10	15.50	3.70	<.05	3900.00
2/6/03	7.8	1.8	4.7	13.6	7.53	339.0	287.0	27.10	6.57	13.5	6.90	29.90		15.30	4.13	<.05	4700.00
2/7/03	7.9	1.8	4.8	12.7	7.41	284.0	269.0		6.53	13.0	7.00	28.60	10.10	14.30		<.05	2300.00
2/8/03	9.2	1.9	5.1	18.5	7.50	329.0	245.0		6.49	12.6	7.50	28.90		14.60		<.05	1167.00
2/9/03	9.2	1.8	5.0	13.2	7.41	354.0	289.0	25.70	6.56	13.1	7.60	27.40		13.40	6.38	<.05	50.00
2/10/03	8.3	1.7	5.0	14.4	7.49	303.0	293.0	24.90	6.91	12.6	6.90	23.40	6.00	14.00	5.55	<.05	4.00
2/11/03	8.8	1.7	4.8	12.9	7.41	268.0	278.0	24.80	6.91	12.9	7.00	25.70		14.20	6.68	<.05	8.00
2/12/03	7.8	1.7	4.8	13.5	7.43	292.0	277.0	25.80	6.89	12.8	7.00	22.20	8.80	14.20	6.94	<.05	7.00
2/13/03	7.7	1.8	4.7	13.2	7.47	288.0	266.0	26.30	6.79	13.3	6.70	24.30		16.40	10.35	<.05	5.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD	EFF BOD W/INHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COU
2/14/03	8.0	1.9	4.8	13.0	7.42	260.0	276.0		6.77	13.2	6.90	18.20		13.30		<.05	2.00
2/15/03	8.7	1.9	5.0	12.5	7.46	302.0	292.0		6.77	13.0	6.70	23.30		13.40		<.05	2.00
2/16/03	8.6	1.7	5.0	12.4	7.39	274.0	285.0	25.00	6.93	13.4	7.20	16.50		13.60	14.40	<.05	0.00
2/17/03	8.1	1.8	5.1	14.2	7.50	277.0	296.0	24.90	7.01	13.2	7.60	17.00	9.30	13.80	14.20	<.05	0.00
2/18/03	7.9	1.7	4.9	12.7	7.50	351.0	320.0	25.00	7.15	12.4	7.30	20.50		12.60	11.80	<.05	0.00
2/19/03	7.7	1.6	4.8	13.0	7.61	305.0	292.0	26.00	7.14	13.2	6.20	21.30	10.20	14.60	15.00	<.05	3.00
2/20/03	7.6	1.7	4.8	13.6	7.43	269.0	287.0	25.10	7.06	13.5	6.90	24.20		12.30	15.30	<.05	1.00
2/21/03	8.0	1.6	4.8	13.3	7.37	326.0	241.0		7.17	13.4	6.40	17.40	8.20	10.80		<.05	1.00
2/22/03	9.2	1.8	5.0	12.7	7.48	348.0	273.0		7.15	13.4	7.90	21.10		10.30		<.05	5.00
2/23/03	8.9	1.8	5.0	12.4	7.60	348.0	300.0	24.20	7.11	12.6	8.10	21.50		7.54	13.70	<.05	5.00
2/24/03	7.8	1.8	4.8	12.6	7.52	353.0	345.0	30.00	7.38	10.9	8.20	19.30	8.50	8.19	14.40	<.05	3.00
2/25/03	7.8	1.6	4.7	13.0	7.46	317.0	270.0	26.10	7.34	11.3	7.10	22.70		9.58	12.60	<.05	3.00
2/26/03	7.4	1.9	4.8	13.7	7.47	294.0	298.0	24.60	7.19	14.1	7.50	22.40	6.60	10.20	10.60	<.05	3.00
2/27/03	7.4	1.9	4.7	13.6	7.54	341.0	294.0	26.90	7.27	14.0	6.80	26.90		10.10	9.46	<.05	6.00
2/28/03	7.6	1.6	4.7	12.7	7.55	327.0	208.0		7.26	13.5	7.60	21.60	6.40	9.74		<.05	7.00
3/1/03	9.0	1.9	5.1	12.1	7.61	329.0	233.0		7.19	13.0	7.60	36.30		14.30		<.05	10.00
3/2/03	8.6	2.0	5.0	11.9	7.41	309.0	219.0	26.50	7.16	13.2	7.30	60.20		24.80	4.96	<.05	13.00
3/3/03	8.0	1.9	5.1	14.9	7.49	273.0	225.0	26.40	7.26	13.0	7.30	46.10	10.00	21.30	7.02	<.05	21.00
3/4/03	7.4	1.8	4.7	12.5	7.55	339.0	229.0	29.00	7.40	12.7	6.80	33.40		11.80	6.54	<.05	26.00
3/5/03	7.4	1.8	4.8	12.6	7.56	315.0	247.0	28.40	7.29	12.3	7.10	34.10	7.30	13.20	8.03	<.05	14.00
3/6/03	8.0	1.9	4.9	13.6	7.49	320.0	287.0	26.60	7.20	14.4	6.80	39.00		15.10	7.47	<.05	28.00
3/7/03	8.0	1.8	4.9	13.5	7.49	318.0	272.0		7.28	13.5	7.20	60.20		24.30		<.05	31.00
3/8/03	8.6	1.9	4.8	12.4	7.42	308.0	281.0		7.11	13.8	6.60	77.20	28.30	64.30		<.05	14.00
3/9/03	9.0	1.7	4.9	12.2	7.63	265.0	273.0	25.50	7.13	13.5	6.40	74.10		70.30	4.71	<.05	26.00
3/10/03	8.0	1.8	4.9	14.3	7.45	317.0	283.0	26.80	7.37	13.0	7.40	40.40	6.10	25.50	4.36	<.05	5.00
3/11/03	7.9	1.7	4.8	13.5	7.58	273.0	217.0	25.90	7.25	13.6	7.00	59.30		41.60	3.47	<.05	22.00
3/12/03	7.6	1.9	4.7	14.6	7.39	284.0	244.0	27.10	7.18	14.8	7.30	66.20	25.50	65.20	3.87	<.05	53.00
3/13/03	7.8	1.8	4.6	13.7	7.59	271.0	210.0	28.20	7.26	14.3	6.40	116.00		92.60	4.18	<.05	67.00
3/14/03	8.5	1.7	4.7	14.4	7.59	298.0	230.0		7.30	14.9	6.60	142.00	48.70	145.00		<.05	62.00
3/15/03	8.8	1.6	4.8	14.5	7.46	342.0	254.0		6.98	16.1	7.20	NR		201.00		<.05	72.00
3/16/03	8.5	1.8	4.8	13.1	7.57	314.0	245.0	27.30	7.12	15.5	5.70	138.00		150.00	5.44	<.05	100.00
3/17/03	7.7	1.7	5.0	15.5	7.40	267.0	262.0	26.40	7.29	14.9	7.10	109.00	34.50	118.00	5.34	<.05	235.00
3/18/03	8.9	2.5	5.7	13.5	7.46	287.0	225.0	23.30	7.35	13.7	4.90	149.00		223.00	6.36	<.05	8.00
3/19/03	12.7	2.4	5.7	13.0	7.56	262.0	255.0	21.50	7.05	12.9	2.90	151.00	41.00	123.00	9.26	<.05	128.00
3/20/03	9.2	2.9	6.2	12.7	7.55	300.0	242.0	20.10	7.28	13.6	6.50	114.50		81.40	10.00	<.05	0.00
3/21/03	9.2	3.1	6.3	13.2	7.50	230.0	268.0		7.14	13.4	7.20	98.00	29.10	87.00		<.05	2.00
3/22/03	10.7	3.1	5.7	12.6	7.59	242.0	285.0		7.26	13.6	6.90	101.00		84.10		<.05	20.00
3/23/03	10.0	3.2	5.4	12.5	7.52	205.0	236.0	19.50	7.37	14.0	6.90	102.00		52.00	6.55	<.05	148.00
3/24/03	9.8	3.1	6.3	13.6	7.54	210.0	202.0	20.00	7.46	13.7	6.90	73.90	67.00	36.30	6.51	<.05	2680.00
3/25/03	9.6	3.1	6.1	13.4	7.47	209.0	183.0	18.60	7.42	13.3	6.40	68.70		24.80	6.21	<.05	92.00
3/26/03	8.8	3.2	5.8	13.8	7.55	185.0	219.0	21.30	7.30	13.6	6.50	37.20		17.50	7.86	<.05	0.00
3/27/03	8.9	3.0	5.6	13.0	7.69	229.0	179.0	20.50	7.35	13.7	7.30	49.20		17.10	6.46	<.05	0.00
3/28/03	8.6	2.8	5.6	14.0	7.60	158.0	196.0		7.33	13.3	7.70	35.20		12.80		<.05	0.00
3/29/03	9.6	2.6	5.8	12.2	7.58	223.0	210.0		7.23	13.0	6.00	53.20		19.20		<.05	33.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD	EFF BOD W/NH3B	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
3/30/03	9.8	2.5	5.7	12.5	7.57	232.0	231.0	24.00	7.28	13.3	7.90	53.60		21.80	7.38	<.05	2.00
3/31/03	8.9	2.5	5.6	15.1	7.54		233.0	20.90	7.24	14.2	7.60			32.60	6.68	<.05	1.00
4/1/03	8.9	2.5	5.5	13.9	7.63		236.0	23.40	7.21	14.6	7.40			14.30	5.27	<.05	24.00
4/2/03	8.8	2.4	5.3	13.8	7.59	267.0	241.0	22.10	7.17	15.2	7.20	33.60	7.60	10.60	6.06	<.05	6.00
4/3/03	8.8	2.3	5.2	14.9	7.60	250.0	248.0	24.90	7.21	15.5	6.60	33.60		10.40	7.39	<.05	2.00
4/4/03	8.9	2.4	5.3	13.5	7.60	273.0	218.0		7.27	14.5		18.10		5.98		<.05	3.00
4/5/03	9.7	2.4	5.5	13.0	7.54	228.0	263.0		7.15	13.7	7.10	16.50	6.90	8.36		<.05	1.00
4/6/03	9.6	2.5	5.3	12.0	7.56	253.0	298.0	21.80	7.29	14.1	7.10	25.20		7.68	10.20	<.05	0.00
4/7/03	8.4	2.4	5.4	14.8	7.59	275.0	308.0	27.60	7.44	15.9	7.10	17.50		5.98	8.37	<.05	0.00
4/8/03	8.4	2.3	5.2	13.6	7.55	293.0	304.0	21.10	7.55	13.6	7.20	18.60		5.78	8.51	<.05	2.00
4/9/03	8.4	2.2	5.2	13.3	7.56	242.0	273.0	21.20	7.35	13.3	6.90	18.40	5.20	5.11	7.50	<.05	0.00
4/10/03	8.4	2.2	5.1	14.2	7.57	263.0	281.0	21.00	7.17	15.1	7.00	19.20		5.64	8.64	<.05	1.00
4/11/03	8.4	2.1	5.2	14.0	7.56	264.0	245.0		7.18	15.7	6.20	21.70		5.72		<.05	1.00
4/12/03	9.3	2.1	5.2	14.3	7.63	297.0	245.0		7.13	16.4	6.00	26.60		7.05		<.05	5.00
4/13/03	9.3	2.1	5.3	13.7	7.51	285.0	262.0	21.20	7.05	15.8	7.20	24.30		7.86	3.17	<.05	2.00
4/14/03	8.5	2.1	5.3	14.3	7.49	265.0	250.0	22.60	7.11	15.7	6.70	22.60	7.30	6.18	2.07	<.05	4.00
4/15/03	8.6	2.1	5.1	15.8	7.38	238.0	244.0	23.30	6.83	17.5	6.80	19.20		6.18	2.26	<.05	33.00
4/16/03	8.4	2.2	5.3	15.4	7.61	253.0	253.0	23.30	7.21	15.5	6.40	19.70	5.70	5.93	2.22	<.05	23.00
4/17/03	8.4	2.2	5.1	14.3	7.52	266.0	237.0	22.30	7.04	14.8	6.30	16.90		4.31	2.26	<.05	11.00
4/18/03	8.7	2.3	5.2	14.3	7.56	295.0	243.0		7.02	16.1	6.30	19.40		5.68		<.05	16.00
4/19/03	9.4	2.2	5.4	13.8	7.46	297.0	217.0		7.00	15.8	6.40	19.90		5.29		<.05	15.00
4/20/03	9.7	2.2	5.4	13.8	7.49	301.0	254.0	23.60	7.05	15.2	6.60	17.20		5.60	3.41	<.05	22.00
4/21/03	8.6	2.1	5.3	15.0	7.40	242.0	241.0	24.20	7.26	15.3	6.50	16.20	6.30	4.97	2.87	<.05	17.00
4/22/03	8.2	2.1	5.2	14.6	7.48	274.0	226.0	23.50	7.16	15.2	6.30	19.10		6.71	1.93	<.05	112.00
4/23/03	8.2	2.3	5.4	15.1	7.50	231.0	351.0	19.60	6.89	16.4	6.30	26.10	7.70	9.89	2.82	<.05	371.00
4/24/03	9.6	3.8	7.1	14.7	7.45	233.0	318.0	17.20	6.92	15.8	6.00	22.90		7.18	2.70	<.05	72.00
4/25/03	9.2	3.1	6.2	14.5	7.49	321.0	400.0		7.20	15.4	6.60	15.90	5.50	5.34		<.05	4.00
4/26/03	10.2	2.8	6.1	14.2	7.54	259.0	287.0		6.99	15.6	6.40	17.90		4.70		<.05	8.00
4/27/03	10.2	2.5	6.0	13.9	7.46	277.0	303.0	18.20	7.07	15.6	5.90	14.20		4.62	2.15	<.05	900.00
4/28/03	8.8	2.6	6.0	15.9	7.49	245.0	341.0	18.20	7.02	16.2	6.00	11.40	4.80	4.79	1.76	<.05	600.00
4/29/03	9.2	2.6	5.7	15.3	7.55	288.0	310.0	18.50	7.15	15.8	5.20	14.40		5.30	1.56	<.05	420.00
4/30/03	9.4	2.6	5.7	15.0	7.58	214.0	413.0	16.00	6.90	15.8	6.80			6.31	2.08	<.05	350.00
5/1/03	9.4	2.7	5.7	15.6	7.47	236.0	300.0	18.00	6.95	16.6	6.20	15.20		5.53	2.12	<.05	26.00
5/2/03	9.1	2.6	5.7	15.0	7.50	299.0	223.0		7.15	14.5	5.20	17.60	6.80	4.80		<.05	9.00
5/3/03	9.7	2.5	5.7	14.4	7.47	263.0	260.0		6.96	16.2	6.10	18.50		5.15		<.05	49.00
5/4/03	9.7	2.5	5.7	14.5	7.49	303.0	326.0	17.90	7.02	16.5	6.80	19.40		5.21	3.97	<.05	31.00
5/5/03	9.4	2.5	5.7	16.4	7.47	292.0	353.0	18.50	6.96	16.5	6.80	18.60	7.60	5.66	2.66	<.05	10.00
5/6/03	8.6	2.5	5.3	15.4	7.43	268.0	347.0	17.10	6.98	16.3	6.70	20.70		6.76	2.36	<.05	175.00
5/7/03	9.2	2.4	5.4	15.0	7.53	345.0	363.0	17.30	7.16	15.5	6.60	23.20	6.50	6.55	2.20	<.05	1300.00
5/8/03	8.8	2.6	5.5	15.5	7.62	304.0	357.0	17.90	7.12	16.1	6.00	16.90		5.42	2.12	<.05	493.00
5/9/03	8.8	2.4	5.5	14.3	7.42	287.0	322.0		7.03	15.0	7.40	15.60	5.50	4.74		<.05	63.00
5/10/03	14.2	4.0	8.4	13.4	7.39	254.0	481.0		7.02	15.3	5.60	23.70		7.12		<.05	26.00
5/11/03	11.1	4.0	7.6	13.1	7.56	256.0	300.0	15.50	7.11	14.4	6.30	14.30		4.54	3.84	<.05	14.00
5/12/03	10.3	3.8	7.0	14.5	7.50	262.0	315.0	17.00	7.28	14.7	7.30	13.20	4.90	3.84	3.96	<.05	10.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/INHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL CCU
5/13/03	9.8	3.3	6.5	16.2	7.35	271.0	316.0	14.90	7.49	15.9	6.10	13.60		4.53	4.52	<.05	5.00
5/14/03	9.6	3.2	6.3	15.7	7.63	264.0	318.0	16.00	7.23	16.9	6.30	11.10	3.90	3.74	6.36	<.05	2.00
5/15/03	9.6	3.2	6.2	16.7	7.54	297.0	306.0	16.20	7.29	16.8	6.30	11.80		3.60	7.83	<.05	3.00
5/16/03	9.6	3.2	6.1	15.5	7.52	265.0	335.0		7.31	17.2	5.30	12.10		3.18		<.05	2.00
5/17/03	10.0	3.0	6.3	15.5	7.45	287.0	206.0		7.30	17.6	6.50	14.20		4.20		<.05	2.00
5/18/03	9.8	3.1	6.2	14.7	7.50	258.0	247.0	18.60	7.29	16.7	6.50	13.40		3.95	7.89	<.05	3.00
5/19/03	9.0	2.8	6.3	15.9	7.50	229.0	243.0	20.50	7.86	16.3	6.90	15.60	4.70	3.56	6.11	<.05	3.00
5/20/03	9.4	3.9	6.1	15.4	7.43	250.0	220.0	20.00	7.06	16.4	6.30	13.50	4.70	3.68	4.99	<.05	21.00
5/21/03	9.9	3.2	6.2	15.5	7.36	242.0	204.0	17.60	7.11	16.7	6.50	13.30	4.30	4.65	2.56	< 05	28.00
5/22/03	9.7	3.1	6.2	15.4	7.50	265.0	255.0	19.00	6.99	17.0	6.80	13.10		4.23	1.35	<.05	49.00
5/23/03	9.8	3.0	6.2	15.8	7.51		237.0		6.99	17.3	6.10			5.34		<.05	1360.00
5/24/03	9.9	3.0	6.3	15.0	7.45	255.0	234.0		7.00	17.3	6.30	14.20		4.54		<.05	1040.00
5/25/03	9.8	3.1	6.1	15.7	7.43	275.0	280.0	15.70	7.02	18.0	6.30	10.70		5.22	1.08	<.05	6900.00
5/26/03	10.1	3.0	6.4	15.1	7.53	221.0	207.0	18.70	6.99	17.2	6.30	14.40	7.60	8.59	1.49	<.05	1538.00
5/27/03	9.2	3.0	6.4	15.5	7.45	213.0	173.0	19.10	6.99	17.3	5.90	8.80		3.55	0.61	<.05	43.00
5/28/03	9.4	3.2	6.2	16.0	7.41	209.0	169.0	18.20	7.02	17.7	6.30	9.30	4.30	3.56	0.60	<.05	820.00
5/29/03	9.4	3.2	6.4	16.3	7.47	220.0	202.0	19.70	6.89	18.0	6.50	10.50		6.07	0.61	< 05	420.00
5/30/03	10.0	3.1	6.2	15.6	7.50	236.0	180.0		7.05	17.3	7.50	9.20	4.00	3.66		<.05	500.00
5/31/03	10.6	3.4	6.7	15.3	7.44	219.0	169.0		6.68	17.7	6.40	11.10		3.17		< 05	3740.00
6/1/03	10.6	3.4	6.7	15.5	7.42	237.0	233.0	22.40	6.89	17.9	6.40	12.30		3.91	1.06	< 05	1538.00
6/2/03	9.8	3.3	6.6	15.3	7.35	330.0	226.0	20.40	7.05	17.0	6.80	11.20	4.40	3.76	0.56	< 05	48000.00
6/3/03	9.4	3.2	6.4	15.8	7.38	255.0	194.0	20.00	6.93	17.4	6.30	14.50		4.40	0.41	< 05	50000.00
6/4/03	13.2	3.2	6.5	15.8	7.35	226.0	192.0	20.40	6.97	17.4	5.80	17.00	13.80	5.90	0.41	< 05	40000.00
6/5/03	9.8	3.4	6.6	15.4	7.50	234.0	206.0	20.70	7.10	16.3	5.90	15.60		5.88	0.45	< 05	27000.00
6/6/03	6.7		4.4	15.3	7.44	211.0	185.0		6.85	16.7	7.30	11.20		5.70		< 05	643.00
6/7/03	10.5	3.2	6.7	15.3	7.55	241.0	179.0		7.06	16.3	6.10	11.30		4.62		< 05	71.00
6/8/03	10.0	3.1	6.3	15.3	7.47	217.0	206.0	18.20	6.97	16.5	7.10	13.30		4.83	0.41	< 05	0.00
6/9/03	9.3	3.2	6.6	16.9	7.39	236.0	247.0	19.50	7.16	17.3	5.90	10.60	4.00	4.82	0.19	<.05	1060.00
6/10/03	9.2	3.4	6.5	15.7	7.40	280.0	197.0	19.00	6.84	17.7	6.40	8.30		4.35	0.16	<.05	98.00
6/11/03	9.5	3.4	6.4	16.4	7.36	269.0	220.0	19.70	6.76	17.5	5.40	9.10	6.70	4.95	0.15	< 05	49.00
6/12/03	9.4	3.5	6.5	16.0	7.41	253.0	226.0	18.20	6.79	17.3	6.20	7.90		5.03	0.11	< 05	41.00
6/13/03	9.2	3.3	6.6	16.2	7.55	257.0	267.0		6.83	17.5	6.80	9.60	4.20	7.53		< 05	94.00
6/14/03	10.0	3.5	6.5	15.8	7.44	219.0	212.0		6.67	17.9	6.30	9.40		6.66		<.05	142.00
6/15/03	9.7	3.4	6.3	15.7	7.38	223.0	197.0	19.80	6.63	17.6	6.10	10.70		5.33	0.44	<.05	165.00
6/16/03	9.2	3.4	6.5	16.5	7.45	229.0	226.0	24.40	6.67	18.2	6.10	11.40	5.30	7.29	0.37	<.05	660.00
6/17/03	9.4	3.5	6.6	16.3	7.43	242.0	540.0	15.30	6.55	17.8	5.60	9.90		5.73	0.21	<.05	116.00
6/18/03	12.8	5.2	8.3	16.5	7.41	196.0	529.0	15.00	6.95	18.0	6.20	8.30	3.50	4.64	0.19	<.05	600.00
6/19/03	11.2	5.8	8.7	16.4	7.39	175.0	245.0	13.80	6.93	17.6	7.00	7.00		4.24	0.13	<.05	760.00
6/20/03	10.3	4.6	7.8	16.6	7.42	246.0	237.0		7.13	17.7	6.20	9.40	3.40	4.90		<.05	44.00
6/21/03	10.8	4.4	7.7	16.0	7.44	188.0	237.0		6.83	17.6	5.70	8.90		4.54		<.05	55.00
6/22/03	10.4	4.0	7.0	15.9	7.48	206.0	214.0	13.70	6.89	17.6	7.00	8.50		6.01	0.37	<.05	35.00
6/23/03	10.2	3.8	7.4	16.5	7.48	191.0	195.0	14.30	6.84	18.0	6.50	6.90	3.10	3.66	0.17	<.05	135.00
6/24/03	9.4	4.0	7.1	16.7	7.51	225.0	198.0	17.10	7.13	17.6	5.60	6.00		5.14	0.11	<.05	52.00
6/25/03	10.0	3.9	6.8	16.2	7.37	182.0	201.0	16.50	6.82	16.9	6.40	11.10	3.60	8.20	0.13	<.05	44.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/INHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
6/26/03	9.8	3.9	7.0	16.1	7.34	177.0	187.0	16.00	6.98	16.9	5.70	10.30		5.74	0.12	<.05	42.00
6/27/03	10.2	3.8	6.8	16.3	7.39	219.0	221.0		7.10	17.3	7.10	8.00	3.30	5.46		<.05	34.00
6/28/03	10.0	3.7	7.0	16.6	7.35	238.0	223.0		7.28	16.2	5.80	8.60		5.91		<.05	19.00
6/29/03	10.2	3.5	6.8	16.6	7.42	247.0	246.0	19.00	6.87	16.3	7.00	9.70		6.82	0.16	<.05	31.00
6/30/03	10.6	3.8	6.9	17.4	7.38	237.0	231.0	18.20	6.81	16.4	7.00	11.30	4.90	8.84	0.12	<.05	45.00
7/1/03	9.7	3.9	6.9	17.3	7.48	211.0	250.0	13.70	6.86	16.9	6.60	16.10		8.57	0.11	<.05	21.00
7/2/03	10.6	3.8	7.0	17.2	7.50	244.0	229.0	15.20	6.89	19.0	6.00	14.70	4.70	9.07	0.10	<.05	40.00
7/3/03	11.4	4.0	7.2	17.6	7.34	206.0	232.0	15.80	7.00	19.8	6.40	15.50		7.90	0.11	<.05	150.00
7/4/03	12.2	4.0	7.1	17.1	7.32	186.0	175.0		6.89	19.6	5.50	10.90	5.10	7.76		<.05	52.00
7/5/03	10.0	4.0	6.7	16.9	7.44	164.0	164.0		6.88	18.9	6.10	13.90		10.12		<.05	50.00
7/6/03	9.9	3.8	6.9	17.0	7.43	201.0	169.0	14.80	6.89	18.8	6.30	17.00		9.36	0.09	<.05	47.00
7/7/03	10.7	3.8	7.3	17.6	7.36	17.5	162.0	16.90	7.09	18.8	5.80	16.20	5.70	11.00	0.06	<.05	140.00
7/8/03	10.2	3.8	7.0	17.4	7.41	204.0	208.0	15.60	6.96	19.1	5.70	14.60		12.30	0.06	<.05	91.00
7/9/03	9.2	3.9	6.9	17.6	7.28	204.0	185.0	14.70	7.03	19.2	5.70	12.70	4.80	11.30	0.08	<.05	86.00
7/10/03	9.8	3.9	6.9	17.5	7.35	168.0	214.0	13.50	7.03	19.1	5.60	11.10		8.88	0.09	<.05	55.00
7/11/03	12.4	4.0	7.1	17.8	7.48	182.0	222.0		6.93	19.2	7.70	12.70	5.40	11.40		<.05	30.00
7/12/03	10.3	4.0	7.0	17.4	7.39	191.0	240.0		6.92	19.4	6.90	14.30		9.57		<.05	44.00
7/13/03	10.0	3.7	6.7	17.8	7.50	170.0	154.0	20.10	7.01	20.0	5.20	15.30		10.99	0.11	<.05	41.00
7/14/03	9.6	3.8	6.8	17.9	7.41	182.0	218.0	13.40	6.86	19.4	6.10	14.00	5.50	14.80	0.09	<.05	78.00
7/15/03	9.4	3.7	6.6	18.5	7.45	214.0	231.0	11.04	6.92	20.0	6.10	14.60		14.30	0.09	<.05	290.00
7/16/03	9.6	3.8	6.9	18.2	7.42	227.0	175.0	19.40	6.97	19.6	6.20	15.00	5.70	13.50	0.07	<.05	200.00
7/17/03	9.0	3.5	6.7	18.1	7.40	282.0	232.0	18.20	6.92	19.7	6.30	18.20		13.30	0.12	<.05	40.00
7/18/03	10.0	3.6	6.8	18.6	7.40	249.0	272.0		6.86	20.0	5.60	15.00	6.30	9.55		<.05	42.00
7/19/03	10.4	3.8	6.7	18.4	7.39	233.0	210.0		6.89	20.3	6.60	11.30		9.11		<.05	195.00
7/20/03	11.1	3.7	6.9	18.3	7.36	224.0	393.0	16.20	6.87	20.3	6.10	11.00		6.79	0.25	<.05	215.00
7/21/03	9.8	3.6	7.0	18.4	7.35	239.0	171.0	16.90	7.03	19.9	5.50	9.60	4.30	6.07	0.13	<.05	150.00
7/22/03	9.4	3.6	6.7	18.4	7.37	202.0	192.0	17.20	6.83	20.0	6.30	7.90		4.38	0.16	<.05	136.00
7/23/03	9.5	3.7	6.5	18.5	7.40	175.0	160.0	18.50	6.82	20.0	5.70	8.60	3.20	5.88	0.18	<.05	160.00
7/24/03	9.0	3.6	6.5	18.5	7.40	201.0	178.0	21.90	7.23	20.0	5.40	5.70		5.13	0.21	<.05	183.00
7/25/03	9.2	3.4	6.3	18.9	7.39	204.0	153.0		7.01	21.0	6.20	3.60		1.71		<.05	144.00
7/26/03	9.7	3.3	6.4	18.8	7.36	186.0	255.0		6.89	20.8	5.60	5.80		4.09		<.05	143.00
7/27/03	9.6	3.3	6.4	18.6	7.35	257.0	280.0	15.20	6.88	20.9	6.30	6.90		4.89	0.12	<.05	187.00
7/28/03	9.4	3.3	6.5	19.1	7.41	250.0	255.0	15.40	6.89	20.4	6.60	8.90	3.70	5.59	0.14	<.05	440.00
7/29/03	9.5	3.4	6.7	19.1	7.48	261.0	291.0	17.30	7.10	20.7	5.30	6.60	3.50	5.56	0.10	<.05	460.00
7/30/03	9.6	3.6	6.6	19.6	7.45	269.0	288.0	15.60	7.05	21.0	6.20	6.90	3.20	6.26	0.17	<.05	260.00
7/31/03	9.6	3.6	6.7	19.9	7.49	226.0	256.0	17.50	6.98	20.7	5.80	6.80	3.00	5.79	0.19	<.05	620.00
8/1/03	9.6	3.4	6.6	20.3	6.95	213.0	207.0		7.42	18.9	7.80	6.70	3.30	5.13		<.05	253.00
8/2/03	10.2	3.6	6.7	18.6	7.29	178.0	276.0		6.94	20.2	7.00	5.20		4.56		<.05	210.00
8/3/03	10.0	3.4	6.6	18.8	7.39	267.0	177.0	18.40	6.93	20.5	6.30	6.20		3.76	0.12	<.05	250.00
8/4/03	9.6	3.1	6.6	19.0	7.35	156.0	230.0	16.10	6.96	20.7	5.70	6.80	2.50	3.42	0.16	<.05	
8/5/03	9.0	3.2	6.3	19.6	7.53	213.0	264.0	15.50	7.14	20.7	5.80	6.20		3.66	0.10	<.05	150.00
8/6/03	9.0	3.2	6.3	19.2	7.28		257.0	15.60	6.68	20.7	5.80	6.40	2.60	3.30	0.12	<.05	215.00
8/7/03	8.9	3.2	6.2	19.3	7.39	206.0	228.0		6.92	20.9	5.70	6.00		3.15		<.05	190.00
8/8/03	9.0	3.2	6.2	19.3	7.35	214.0	217.0		6.90	20.9	5.40	6.80	2.40	3.11		<.05	145.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/INHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
8/9/03	9.6	3.1	6.2	19.1	7.43	263.0	265.0		6.86	20.7	7.20	6.40		3.30		<.05	140.00
8/10/03	9.6	3.0	6.2	19.1	7.40	229.0	265.0	16.50	6.90	20.8	5.90	6.70		3.45	0.14	<.05	70.00
8/11/03	9.2	3.0	6.3	19.1	7.19	225.0	269.0	16.50	6.82	21.0	6.10	6.50	2.50	3.85	0.09	<.05	200.00
8/12/03	9.4	3.0	6.2	19.7	7.30	257.0	288.0	15.90	7.10	20.8	5.80	6.70		4.83	0.10	<.05	230.00
8/13/03	8.7	3.0	6.0	19.5	7.29	222.0	304.0	15.90	6.94	20.5	6.00	6.10	2.50	4.70	0.09	<.05	195.00
8/14/03	9.0	3.0	6.1	19.2	7.32	246.0	274.0	15.70	7.06	20.1	6.70	7.10		4.53	0.08	<.05	175.00
8/15/03	9.0	3.0	6.2	19.4	7.35	221.0	234.0		6.87	20.6	6.10	6.60	3.70	5.58		<.05	100.00
8/16/03	9.6	3.0	6.1	19.3	7.37	260.0	253.0		6.82	20.7	6.50	7.10		6.74		<.05	123.00
8/17/03	10.0	3.0	6.3	19.4	7.34	265.0	228.0	17.20	6.85	20.9	6.20	6.50		6.40	0.06	<.05	91.00
8/18/03	9.0	3.0	6.0	19.5	7.26	202.0	228.0	21.80	6.75	20.6	5.50	6.10	3.60	5.70	0.09	<.05	103.00
8/19/03	9.0	3.0	6.1	19.9	7.30	247.0	242.0	19.60	6.75	19.9	6.00	6.90		3.90	0.07	<.05	58.00
8/20/03	8.8	3.1	6.0	19.2	7.38	215.0	228.0	21.40	6.95	20.6	5.50	6.80	3.90	7.51	0.12	<.05	113.00
8/21/03	8.9	3.1	6.2	19.8	7.26	227.0	201.0	20.20	6.86	21.0	5.30	10.10		6.70	0.13	<.05	56.00
8/22/03	9.2	3.1	6.3	19.6	7.25	198.0	202.0		6.89	20.7	6.70	8.70	4.80	5.28		<.05	58.00
8/23/03	9.8	3.0	6.2	19.5	7.39	349.0	230.0		6.84	20.9	5.30	9.50		5.75		<.05	54.00
8/24/03	10.4	3.0	6.4	19.5	7.40	294.0	351.0	15.70	6.85	21.0	5.30	9.90		6.92	0.10	<.05	59.00
8/25/03	9.6	3.2	6.6	19.7	7.37	293.0	404.0	16.30	6.78	21.1	5.40	8.40	5.10	5.10	0.07	<.05	55.00
8/26/03	9.8	3.2	6.4	20.2	7.44	294.0	322.0	15.50	7.00	20.8	5.90	9.20		5.44	0.07	<.05	235.00
8/27/03	9.4	3.3	6.3	19.9	7.42	307.0	323.0	16.50	7.11	20.9	5.80	9.00	4.40	5.80	0.08	<.05	130.00
8/28/03	9.3	3.6	6.4	19.9	7.37	307.0	290.0	15.80	7.06	20.8	5.90	8.50		5.85	0.13	<.05	205.00
8/29/03	8.9	3.3	6.2	19.6	7.35	324.0	475.0		6.95	20.6	7.20	8.50	4.10	7.40		<.05	140.00
8/30/03	11.0	4.5	7.7	19.2	7.45	230.0	360.0		6.81	20.7	5.80	8.90		7.60		<.05	1000.00
8/31/03	11.0	4.6	7.9	19.1	7.38	225.0	238.0	12.40	6.99	20.1	6.00	8.70		5.63	0.07	<.05	620.00
9/1/03	11.4	3.8	7.6	18.6	7.34	316.0	274.0	14.80	7.17	19.8	6.30	8.70	4.10	5.10	0.20	<.05	205.00
9/2/03	10.5	3.7	6.9	19.7	7.38	226.0	253.0	12.90	7.06	20.2	5.70	7.40		5.30	0.06	<.05	840.00
9/3/03	9.8	3.6	6.8	19.9	7.38	245.0	245.0	14.60	7.16	20.6	5.60	8.30	3.20	5.96	0.09	<.05	460.00
9/4/03	10.1	3.6	6.8	19.9	7.45	229.0	291.0	14.70	7.14	20.0	5.90	8.20		5.51	0.06	<.05	145.00
9/5/03	9.9	3.6	6.7	19.6	7.48	240.0	225.0		7.08	20.6	6.60	8.00	2.60	5.40		<.05	250.00
9/6/03	10.4	3.5	6.7	19.4	7.41	238.0	262.0		7.18	20.7	6.50	8.00		5.34		<.05	125.00
9/7/03	10.6	3.6	6.8	19.4	7.42	290.0	305.0	15.90	7.06	20.6	5.90	7.70		7.21	0.16	<.05	175.00
9/8/03	10.0	3.4	6.8	19.5	7.46	349.0	245.0	16.40	6.98	20.5	5.90	7.30	2.80	5.93	0.06	<.05	52.00
9/9/03	9.7	3.4	6.5	19.6	7.39	247.0	269.0	16.60	7.16	19.9	6.00	8.50		6.13	0.07	<.05	235.00
9/10/03	9.7	3.5	6.4	19.4	7.44	257.0	291.0	16.20	7.31	19.7	5.80	7.60	2.90	6.00	0.06	<.05	940.00
9/11/03	10.0	3.4	6.5	19.1	7.34	252.0	193.0	20.90	7.19	19.0	6.20	7.10		5.65	0.11	<.05	4000.00
9/12/03	9.7	3.1	6.4	18.6	7.39	254.0	271.0		5.94	18.7	5.70	7.10	2.90	5.40		<.05	354.00
9/13/03	10.5	3.1	6.4	18.4	7.47	274.0	257.0		7.10	19.4	5.80	7.70		5.90		<.05	540.00
9/14/03	10.7	3.0	6.5	18.4	7.46	271.0	234.0	17.70	7.08	18.9	6.40	8.40		6.60	0.19	<.05	700.00
9/15/03	9.5	3.1	6.6	18.7	7.48		311.0	16.10	7.01	18.8	5.40	6.60	3.00	5.20	0.07	<.05	980.00
9/16/03	9.4	3.0	6.1	18.7	7.40	322.0	360.0	15.80	7.18	18.8	6.50	7.70		7.10	0.05	<.05	125.00
9/17/03	9.5	3.0	6.1	19.1	7.47	313.0	299.0	19.10	7.08	19.6	5.50	7.40	2.70	6.50	0.07	<.05	88.00
9/18/03	9.2	3.1	6.3	17.9	7.50	233.0	206.0	21.30	7.19	17.6	5.50	6.80		6.80	0.07	<.05	86.00
9/19/03	9.4	2.9	6.1	17.9	7.37	253.0	183.0		7.15	17.6	5.80	8.80	3.60	6.99		<.05	104.00
9/20/03	10.6	3.0	6.2	18.6	7.48	269.0	230.0		6.97	19.7	7.10	8.70		7.39		<.05	165.00
9/21/03	10.2	2.9	6.1	19.0	7.49	281.0	275.0	16.70	6.99	19.6	6.50	10.60		14.40	0.13	<.05	470.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD	EFF BOD W/INHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
9/22/03	9.4	2.8	6.3	19.2	7.45	259.0	274.0	19.10	6.95	20.0	5.90	8.20	3.60	7.58	0.10	<.05	44.00
9/23/03	9.3	2.8	5.8	19.6	7.39	255.0	291.0	17.90	7.10	20.4	6.30	8.80		7.33	0.07	<.05	168.00
9/24/03	9.0	2.8	5.6	20.2	7.39	248.0	249.0	20.10	6.93	20.3	6.40	7.00	3.00	6.82	0.12	<.05	430.00
9/25/03	9.2	2.7	5.7	18.7	7.41	229.0	241.0	18.80	6.90	18.6	5.40	6.40		5.61	0.08	<.05	86.00
9/26/03	9.5	2.8	5.7	18.6	7.50	266.0	248.0		6.95	19.5	6.10	7.20	3.60	5.71		<.05	54.00
9/27/03	10.4	2.8	5.8	18.6	7.41	260.0	247.0		6.83	18.6	6.00	8.40		7.74		<.05	39.00
9/28/03	10.0	2.5	5.8	18.5	7.42	270.0	292.0	20.10	6.91	18.5	5.30	12.10		15.40	0.23	<.05	44.00
9/29/03	9.1	2.5	5.8	17.9	7.37	251.0	255.0	21.80	6.83	18.4	5.40	12.40	5.50	8.27	0.08	<.05	14.00
9/30/03	8.8	2.8	5.6	18.3	7.42	249.0	222.0	22.00	7.05	17.7	5.70	11.50		8.64	0.13	<.05	68.00
10/1/03	8.8	2.5	5.6	18.2	7.47	304.0	239.0	26.10	6.83	17.5	5.60	10.40	4.80	11.00	0.11	<.05	56.00
10/2/03	9.1	2.5	5.6	18.5	7.35	241.0	256.0	21.60	6.78	18.5	6.00	10.00		6.88	0.07	<.05	40.00
10/3/03	10.4	2.5	5.6	19.2	7.35	246.0	183.0		6.85	19.6		10.10	4.20	7.24		<.05	24.00
10/4/03	10.1	2.5	5.7	18.5	7.26	285.0	247.0		6.83	18.9	5.70	9.30		8.12		<.05	44.00
10/5/03	10.2	2.4	5.7	19.3	7.46	262.0	266.0	22.20	6.95	19.9	6.40	12.80		8.44	0.50	<.05	3.00
10/6/03	9.2	2.3	5.6	18.6	7.47	265.0	255.0	21.00	7.01	19.0	6.40	10.90	6.10	7.93	0.19	<.05	2.00
10/7/03	9.0	2.2	5.5	18.7	7.45	293.0	251.0	22.80	6.80	19.2	6.40	11.60		9.65	0.07	<.05	41.00
10/8/03	8.9	2.3	5.5	19.3	7.37	244.0	230.0	23.40	6.83	19.8	5.90	11.10	4.40	10.40	0.07	<.05	82.00
10/9/03	8.8	2.4	5.5	19.3	7.39	274.0	220.0	23.30	6.90	19.0	6.10	12.50		11.00	0.06	<.05	130.00
10/10/03	9.2	2.4	5.3	19.3	7.44	260.0	336.0		6.87	19.2	6.30	11.10	4.50	9.65		<.05	116.00
10/11/03	10.0	2.4	5.5	18.2	7.55	250.0	277.0		6.81	19.0	6.50	13.50		12.80		<.05	186.00
10/12/03	10.0	2.4	5.5	17.9	7.45	259.0	257.0	22.20	6.80	18.3	6.00	13.10		12.30	0.18	<.05	136.00
10/13/03	8.6	2.4	5.6	18.6	7.43	257.0	304.0	22.80	6.80	19.0	5.60	14.90	6.50	13.40	0.08	<.05	35.00
10/14/03	8.7	2.3	5.5	17.8	7.49	272.0	257.0	21.00	6.98	17.5	4.60	14.40		12.40	0.05	<.05	71.00
10/15/03	8.7	2.2	5.2	17.6	7.43	237.0	230.0	21.30	6.88	17.5	6.10	16.20		15.40	0.10	<.05	71.00
10/16/03	8.9	2.4	5.3	18.0	7.36	264.0	263.0	21.60	6.74	17.9	5.50	12.40		8.99	0.09	<.05	51.00
10/17/03	8.6	2.3	5.4	18.4	7.37	255.0	226.0		6.76	18.1	7.20	11.70	5.70	9.24		<.05	59.00
10/18/03	9.6	2.2	5.5	18.0	7.44	316.0	315.0		6.76	18.7	5.60	9.90		10.20		<.05	135.00
10/19/03	9.8	2.1	5.4	18.0	7.39	331.0	423.0	15.60	6.81	18.9	6.00	10.50		8.75	0.15	<.05	50.00
10/20/03	8.4	2.2	5.3	18.9	7.37	261.0	332.0	24.60	6.66	19.3	6.40	9.00	4.00	10.80	0.09	<.05	4.00
10/21/03	8.4	2.1	5.3	18.4	7.41	405.0	437.0	19.20	6.77	19.1	5.40	9.10		10.00	0.07	<.05	52.00
10/22/03	8.8	2.2	5.2	18.4	7.36	266.0	274.0	22.20	6.66	18.5	6.00	6.10		8.03	0.10	<.05	36.00
10/23/03	8.4	2.2	5.1	18.8	7.35	249.0	253.0	23.10	6.59	18.8	5.80	9.60		8.78	0.07	<.05	50.00
10/24/03	10.4	2.2	5.2	18.6	7.37	344.0	267.0		6.68	17.5	6.70	6.70	4.00	7.19		<.05	32.00
10/25/03	9.6	1.9	5.2	18.4	7.50	300.0	241.0		6.84	18.2	5.90	10.10		8.54		<.05	35.00
10/26/03	9.6	1.9	5.6	15.2	7.56	292.0	290.0	22.50	6.90	17.2	5.40	9.40		8.20	0.23	<.05	35.00
10/27/03	8.6	2.1	5.3	18.3	7.56	272.0	289.0	24.60	6.60	17.6	5.70	9.00	4.60	7.93	0.09	<.05	24.00
10/28/03	8.5	2.0	5.2	18.2	7.38	267.0	258.0	27.40	7.03	18.4	5.40	7.70		13.40	0.17	<.05	69.00
10/29/03	8.4	2.3	5.1	18.2	7.49	276.0	274.0	22.30	6.78	18.9	5.50	6.00	3.30	5.37	0.09	<.05	58.00
10/30/03	8.1	2.0	4.9	18.2	7.45	330.0	305.0	28.80	6.63	16.3	5.70	6.10		5.61	0.23	<.05	116.00
10/31/03	8.4	2.0	5.1	17.1	7.56	301.0	223.0		6.79	16.2	7.50	7.40	3.70	6.40		<.05	104.00
11/1/03	9.8	2.2	5.2	17.4	7.55	411.0	395.0		6.77	17.0	6.70	8.40		6.10		<.05	80.00
11/2/03	9.4	2.2	5.3	17.4	7.51	383.0	286.0		6.83	17.7	6.20	9.70		6.00	0.23	<.05	92.00
11/3/03	8.6	2.2	5.4	15.6	7.49	242.0	260.0	24.60	6.66	17.4	6.20	6.40	3.20	4.08	0.11	<.05	5.00
11/4/03	8.6	2.2	5.2	17.9	7.45	201.0	242.0	24.90	6.88	17.0	6.50	7.80		5.05	0.09	<.05	152.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF SOD W/NH3B	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
11/5/03	8.1	2.1	5.0	17.6	7.44	289.0	287.0	25.60	6.76	16.9	6.20	7.50	3.50	4.80	0.10	<.05	90.00
11/6/03	7.9	2.2	5.0	17.6	7.40	277.0	268.0	25.50	6.68	17.3	6.40	7.80		5.00	0.07	<.05	136.00
11/7/03	8.4	2.2	5.2	18.3	7.43	309.0	261.0	25.10	6.66	17.9	6.30	6.60	2.90	5.44		<.05	89.00
11/8/03	9.4	2.1	5.4	17.6	7.52	339.0	364.0		6.83	18.8	6.50	7.10		4.72		<.05	105.00
11/9/03	9.2	2.0	5.3	17.2	7.47	357.0	326.0		6.75	17.7	6.50	9.30		5.60	0.22	<.05	85.00
11/10/03	8.4	2.0	5.4	18.0	7.49	306.0	303.0	23.00	6.80	16.8	6.10	7.50	3.20	4.78	0.09	<.05	31.00
11/11/03	8.2	2.2	5.1	16.8	7.45	306.0	305.0	24.30	6.83	16.7	6.50	8.50		4.88	0.07	<.05	92.00
11/12/03	8.2	2.0	4.9	17.5	7.33	332.0	342.0	23.70	6.52	17.1	6.20	9.80	4.10	6.67	0.05	<.05	305.00
11/13/03	8.3	2.0	4.9	17.6	7.33	295.0	237.0	27.50	6.50	17.1	6.60	8.20		6.71	0.07	<.05	184.00
11/14/03	8.6	2.0	5.0	17.2	7.42	225.0	239.0		6.52	17.1	6.80			8.40		<.05	217.00
11/15/03	9.6	2.0	5.2	16.8	7.42	205.0	249.0		6.52	17.5	6.30	11.00		7.21		<.05	92.00
11/16/03	9.0	1.9	5.3	16.9	7.26	311.0	277.0	26.50	6.51	17.4	6.60	15.60		8.92	0.51	<.05	56.00
11/17/03	8.4	2.0	5.1	16.8	7.34	277.0	267.0	23.00	6.68	16.0	6.10	12.50	5.20	7.70	0.14	<.05	26.00
11/18/03	8.0	1.8	5.0	16.8	7.34	331.0	243.0	26.00	6.46	15.6	5.60	9.60		6.81	0.14	<.05	58.00
11/19/03	8.0	2.0	4.9	17.2	7.31	350.0	228.0	28.20	6.45	15.7	5.40	11.50	4.90	5.16	0.13	<.05	172.00
11/20/03	8.1	1.9	4.8	17.4	7.32	298.0	247.0	26.20	6.56	17.1	5.70	10.80		6.48	0.10	<.05	100.00
11/21/03	9.0	1.8	4.9	17.0	7.29		232.0		6.46	16.1	5.40			6.25		<.05	60.00
11/22/03	8.9	1.9	5.1	16.1	7.43	399.0	311.0		6.49	15.0	6.60	13.80	9.50	10.60		<.05	99.00
11/23/03	9.3	1.8	5.2	15.0	7.25	339.0	258.0	27.00	6.50	14.0	6.00	19.10		12.40	1.31	<.05	4.00
11/24/03	8.1	1.9	5.2	15.1	7.20	287.0	433.0	27.90	6.54	13.7	6.20	15.50	6.70	9.76	0.40	<.05	7.00
11/25/03	8.0	1.9	5.0	16.0	7.42	343.0	293.0	27.00	6.58	14.1	5.70	13.30		6.89	0.23	<.05	36.00
11/26/03	8.3	2.0	5.0	16.0	7.48		252.0		6.71	15.0	6.20			6.99		<.05	450.00
11/27/03	10.1	2.0	5.2	16.0	7.08	414.0	363.0	24.90	6.58	13.8	6.40	13.50	7.00	7.50	0.84	<.05	47.00
11/28/03	8.8	1.9	4.8	15.5	7.20	364.0	248.0		6.54	13.6	6.50	15.00	7.70	7.00		<.05	4.00
11/29/03	9.2	2.1	5.0	15.9	7.41	325.0	237.0		6.49	15.9	6.30	16.40		8.61		<.05	3200.00
11/30/03	9.4	2.0	5.1	15.7	7.54	344.0	242.0	20.90	6.52	15.8	6.20	18.80		8.13	1.05	<.05	
12/1/03	8.2	1.9	5.1	16.6	7.23	320.0	298.0	25.90	6.56	15.7	5.10	14.20	6.00	7.24	0.52	<.05	1155.00
12/2/03	8.0	1.8	5.0	16.5	7.36	297.0	292.0	25.10	6.50	15.6	6.10	12.70		7.17	0.15	<.05	2520.00
12/3/03	8.4	2.0	4.9	17.2	7.36	318.0	280.0	26.60	6.53	15.6	6.50	11.60	6.00	7.15	0.15	<.05	3200.00
12/4/03	8.0	2.0	4.9	16.4	7.34	372.0	270.0	26.00	6.57	15.0	6.30	11.90		8.65	0.22	<.05	6400.00
12/5/03	8.0	2.0	5.0	16.3	7.28	345.0	256.0		6.52	15.4	6.70	15.60	7.40	8.06		< 05	13000.00
12/6/03	9.1	2.0	5.0	15.6	7.54	302.0	247.0		6.53	14.1	6.00	16.80		8.05		< 05	1667.00
12/7/03	9.0	2.1	5.3	15.6	7.50	409.0	270.0	27.40	6.49	15.9	5.20	19.00		8.44	1.04	< 05	477.00
12/8/03	7.9	2.0	5.3	16.8	7.47	286.0	243.0	25.70	6.67	15.5	6.30	14.90	7.40	7.34	0.67	<.05	3633.00
12/9/03	7.6	2.0	4.9	15.6	7.23	300.0	227.0	28.30	6.65	14.6	5.20	17.30		7.32	0.72	<.05	5467.00
12/10/03	8.0	2.1	4.7	14.7	7.42	286.0	236.0	30.80	6.59	14.3	6.30	14.70	7.70	6.58	0.59	< 05	7800.00
12/11/03		grit basin down		15.0	7.44	305.0	231.0	27.60	6.55	14.8	6.20	20.40		8.10	0.66	<.05	
12/12/03	8.0	2.0	4.9	15.1	7.34	356.0	247.0		6.52	15.6	6.30	20.90	9.50	9.47		<.05	
12/13/03	9.0	2.0	5.2	14.7	7.38	344.0	256.0		6.46	15.4	7.20	26.50		8.68		<.05	
12/14/03	8.3	2.0	5.2	15.1	7.44	452.0	698.0	29.30	6.50	14.2	6.80	23.90		7.75	3.64	<.05	31.00
12/15/03	8.0	2.0	5.1	16.7	7.38	379.0	253.0	27.50	6.72	15.7	6.20	20.00	5.30	5.98	3.44	<.05	1.00
12/16/03	7.8	2.0	5.0	15.7	7.20	343.0	250.0	31.20	6.72	16.0	5.70	17.70		8.51	2.11	<.05	112.00
12/17/03	8.2	2.0	4.9	15.5	7.27	349.0	275.0	25.40	6.46	17.5	6.50	15.20	5.60	8.00	2.00	<.05	312.00
12/18/03	8.2	2.0	4.9	15.6	7.21	258.0	279.0	27.10	6.50	15.5	5.90	24.30		9.31	2.41	<.05	440.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD	EFF BOD W/NHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
12/19/03	8.2	1.9	5.1	14.9	7.31		251.0		6.46	15.6	6.10			10.60		<.05	2000.00
12/20/03	9.2	1.8	5.2	15.0	7.36	354.0	254.0		6.56	14.6	6.40	20.60	9.60	7.75		<.05	
12/21/03	8.8	1.9	5.2	14.8	7.31	362.0	257.0	27.00	6.76	14.7	6.50	18.40		8.01	3.32	<.05	547.00
12/22/03	8.3	1.8	5.2	16.3	7.45	401.0	300.0	24.70	6.79	17.3	6.40	17.20	7.30	7.75	3.39	<.05	31.00
12/23/03	8.5	1.9	5.2	14.9	7.29	328.0	282.0	27.50	6.46	15.3	5.60	21.60		10.40	3.81	<.05	
12/24/03	9.2	2.1	5.4	14.7	7.21		261.0		6.63	14.8	6.30			10.90		<.05	4550.00
12/25/03	8.3	2.0	4.7	16.4	7.43	351.0	295.0	30.20	6.73	17.0	6.20	18.20		12.50	3.48	<.05	700.00
12/26/03	9.0	2.0	4.9	14.2	7.38	343.0	275.0		6.62	13.4	6.30	29.90	13.50	18.10		<.05	416.00
12/27/03	9.4	1.8	5.0	14.1	7.43	287.0	234.0		6.75	14.1	6.40	16.00		9.51		<.05	8.00
12/28/03	8.5	1.9	5.0	14.3	7.48	297.0	227.0	26.90	6.75	13.8	6.90			7.88	6.83	<.05	5.00
12/29/03	8.4	1.8	5.0	15.9	7.54	325.0	219.0	26.00	6.86	14.0	7.10	16.70	7.90	9.57	6.90	<.05	9.00
12/30/03	8.2	2.0	5.0	14.8	7.50	264.0	260.0	27.50	6.63	14.9	6.10	16.50		8.23	6.39	<.05	
12/31/03	8.2	2.0	5.1	15.3	7.43	270.0	239.0	26.20	6.86	15.8	6.70	22.20		9.56	6.53	<.05	92.00

DLYPAR Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/INHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
1/1/04	8.4	2.2	4.9	14.6	7.35	309.0	233.0	28.20	6.76	15.1	7.00	19.80		11.40	6.74	<.05	700.00
1/2/04	8.4	2.0	5.0	14.5	7.42	311.0	287.0		6.77	15.3	6.60	23.00	10.20	12.90		<.05	50.00
1/3/04	8.4	1.9	5.1	13.5	7.51	371.0	223.0		6.70	14.3	7.30	22.10		10.90		<.05	64.00
1/4/04	8.4	1.9	5.2	14.0	7.59	323.0	238.0	27.50	6.80	14.3	6.60	24.70		11.10	7.03	<.05	31.00
1/5/04	7.0	1.8	5.0	14.4	7.45	396.0	289.0	32.70	6.90	12.8	5.80	28.80		16.70	9.25	<.05	190.00
1/6/04	7.1	1.8	4.4	14.7	7.57	516.0	236.0	27.90	6.97	14.4	6.70	18.40		9.52	12.10	<.05	21.00
1/7/04	7.6	2.1	4.9	13.6	7.41	293.0	221.0	27.90	6.86	13.6	6.70	17.50	7.10	10.30	11.40	<.05	20.00
1/8/04	7.6	2.0	5.0	14.9	7.47	320.0	297.0	29.60	6.92	15.4	6.70	19.60		11.40	11.10	<.05	20.00
1/9/04	7.6	1.8	5.1	14.1	7.50	318.0	233.0		6.90	15.1	6.40	18.80	7.40	11.30		<.05	22.00
1/10/04	9.0	2.0	5.2	13.5	7.40	333.0	259.0		6.90	14.1	6.50	19.70		9.92		<.05	15.00
1/11/04	8.6	1.9	5.2	13.5	7.45	314.0	262.0	26.90	6.92	14.7	6.80	20.30		11.80	10.50	<.05	7.00
1/12/04	7.8	1.8	5.2	14.8	7.41	280.0	216.0	27.90	7.06	14.0	5.90	19.70	10.10	10.30	10.80	<.05	5.00
1/13/04	7.4	1.7	4.9	14.1	7.38	306.0	249.0	26.00	7.15	14.6	6.40	27.70		10.70	10.40	<.05	21.00
1/14/04	7.4	1.9	4.9	14.2	7.54	342.0	349.0	26.30	7.12	13.9	5.30	27.50	12.30	10.60	9.83	<.05	41.00
1/15/04	7.6	1.9	4.9	14.6	7.43	377.0	207.0	26.10	7.04	14.2	6.70	36.20		10.50	7.87	<.05	200.00
1/16/04	7.7	1.8	4.9	13.7	7.45	303.0	209.0		6.81	15.0	6.20	31.70	13.10	10.10		<.05	174.00
1/17/04	9.2	1.9	5.1	13.4	7.27	312.0	276.0		6.76	14.3	6.70	32.60		11.70		<.05	220.00
1/18/04	8.7	1.8	5.0	13.3	7.44	320.0	319.0	29.70	6.86	13.9	6.70	21.40		11.40	8.28	<.05	93.00
1/19/04	8.2	1.8	5.1	14.7	7.50	339.0	284.0	25.50	7.13	13.8	6.90	22.60	7.80	8.03	7.43	<.05	8.00
1/20/04	7.2	1.8	4.9	13.9	7.56	329.0	250.0	29.30	7.04	14.8	6.80	21.60		7.61	6.37	<.05	18.00
1/21/04	7.4	1.8	4.8	14.0	7.55	350.0		30.90	6.75	14.2	5.80	21.20		7.77	6.47	<.05	14.00
1/22/04	7.2	1.7	4.7	13.4	7.41	368.0	343.0	27.60	7.13	13.4	6.60	19.30		6.07	6.25	<.05	9.00
1/23/04	7.3	1.8	4.8	13.1	7.59	325.0	249.0		6.77	13.9	6.70	22.60	9.70	6.74		<.05	16.00
1/24/04	9.0	1.9	5.0	14.0	7.58	335.0	229.0		6.80	14.5	7.60	22.60		8.39		<.05	8.00
1/25/04	8.6	2.0	5.0	13.1	7.49	306.0	246.0	28.20	69.83	14.1	8.20	22.20		7.92	5.71	<.05	23.00
1/26/04	7.4	1.8	5.0	13.5	7.54	367.0	246.0	27.90	6.92	13.4	6.10	19.10	7.80	7.09	5.32	<.05	5.00
1/27/04	7.2	1.7	4.8	13.7	7.52	340.0	259.0	26.90	6.76	13.8	6.50	27.70		6.86	5.01	<.05	11.00
1/28/04	7.0	2.0	4.6	13.5	7.35	287.0	238.0	29.70	6.56	13.6	5.60	28.20	10.10	9.99	4.09	<.05	17.00
1/29/04	7.4	1.8	4.6	14.4	7.41	346.0	218.0	30.50	6.56	14.8	8.10	27.30		11.82	3.86	<.05	117.00
1/30/04	7.4	1.7	4.8	13.4	7.65	275.0	195.0		6.62	15.1	7.20	29.70	12.90	10.90		<.05	320.00
1/31/04	8.4	1.8	4.9	13.0	7.53	331.0	236.0		6.61	14.5	7.70	28.80		11.10		<.05	1740.00
2/1/04	8.5	1.9	5.1	12.4	7.53	310.0	241.0	27.70	6.78	13.7	6.20	25.80		10.50	2.16	<.05	61.00
2/2/04	8.6	1.7	5.1	12.6	7.45	338.0	240.0	31.10	6.77	13.6	6.40	20.90	9.30	9.59	1.81	<.05	11.00
2/3/04	7.0	1.8	4.7	14.0	7.60	311.0	220.0	30.80	6.63	13.6	7.00	26.70		10.80	1.60	<.05	99.00
2/4/04	6.9	2.0	4.7	14.3	7.51	288.0	215.0	29.70	6.62	14.8	6.60	26.70	10.90	11.70	1.33	<.05	360.00
2/5/04	6.8	1.8	4.7	13.8	7.46	272.0	221.0	31.10	6.57	14.3	6.40	33.30		12.30	1.23	<.05	279.00
2/6/04	8.7	1.7	4.8	13.3	7.48	323.0	236.0		6.51	14.3	7.60	24.40	9.00	9.00		<.05	807.00
2/7/04	8.4	1.8	4.9	11.7	7.50	338.0	305.0		6.49	13.0	6.40	31.90		15.50		<.05	500.00
2/8/04	8.2	1.8	5.0	12.4	7.48	303.0	250.0	27.10	6.70	12.7	6.30	62.70		27.10	3.19	<.05	70.00
2/9/04	7.7	1.8	5.0	13.5	7.55	308.0	305.0	31.80	6.90	12.6	6.50	28.50	11.60	15.30	1.66	<.05	5.00
2/10/04	7.6	1.6	4.8	12.8	7.52	326.0	248.0	32.30	6.45	12.7	6.70	23.40			0.59	<.05	70.00
2/11/04	7.2	1.8	4.7	15.0	7.62	390.0	263.0	30.70	6.47	15.2	6.40	33.40	13.90	16.20	1.89	<.05	630.00
2/12/04	7.2	1.7	4.6	12.3	7.56	311.0	293.0	31.40	6.57	12.2	5.80	32.30		19.00	5.04	<.05	
2/13/04	7.6	1.6	4.8	13.2	7.50	246.0	230.0		6.59	13.8	7.60	27.90	13.10	16.60		<.05	122.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/ANHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
2/14/04	9.3	1.8	5.1	12.4	7.57	328.0	254.0		6.49	12.9	6.70	24.60		10.40		<.05	260.00
2/15/04	6.8	1.8	5.0	12.7	7.48	292.0	291.0	26.10	6.45	15.1	6.90	23.40		9.84	1.26	<.05	16.00
2/16/04	6.4	1.7	5.1	13.7	7.51	474.0	405.0	26.10	6.75	13.7	6.80	19.20	8.30	9.24	1.26	<.05	3.00
2/17/04	8.0	1.7	4.9	14.6	7.53	307.0	253.0	28.30	6.47	13.7	6.60	20.00		6.46	0.84	<.05	22.00
2/18/04	8.0	1.8	4.8	13.5	7.49	348.0	278.0	29.90	6.49	17.2	7.00	29.80	12.80	14.12	1.01	<.05	38.00
2/19/04	7.5	1.7	4.7	13.9	7.39	305.0	239.0	23.80	6.56	19.0	7.20	23.00		6.67	0.42	<.05	32.00
2/20/04	8.0	1.8	4.8	13.5	7.46	328.0	261.0		6.47	18.2	6.80	19.80	8.30	7.66		<.05	14.00
2/21/04	9.4	1.8	5.0	12.6	7.50	355.0	259.0		6.46	15.4	7.10	19.00		7.52		<.05	6.00
2/22/04	9.0	1.6	5.0	12.8	7.49	340.0	291.0	27.30	6.61	14.1	6.60	17.70		8.25	3.18	<.05	1.00
2/23/04	8.0	1.7	5.0	14.4	7.55	312.0	274.0	28.50	6.83	14.2	6.60	15.60	7.40	7.92	3.98	<.05	1.00
2/24/04	7.6	1.7	4.8	14.4	7.46	347.0	243.0	26.30	7.05	15.1	6.70	14.60		7.80	4.64	<.05	1.00
2/25/04	7.4	1.8	4.8	15.3	7.43	345.0	293.0	29.10	7.03	15.8	8.10	11.40	6.70	8.18	5.35	<.05	2.00
2/26/04	7.6		4.7	13.3	7.49	366.0	294.0	27.80	6.85	14.5	7.60	12.80		9.53	5.69	<.05	0.00
2/27/04	7.7	1.7	4.8	13.8	7.59	354.0	283.0		7.13	13.4	6.60	16.80		11.22		<.05	3.00
2/28/04	9.0	1.8	4.9	12.8	7.50	344.0	249.0		6.92	14.6	7.20	19.50	9.70	11.03		<.05	0.00
2/29/04	8.5	1.7	5.0	13.0	7.52	297.0	247.0	25.50	7.05	14.5	7.40	26.90		8.08	7.74	<.05	1.00
3/1/04	7.6	1.8	4.9	14.9	7.55	267.0	248.0	26.30	7.35	13.1	6.90	23.30	7.80	7.66	7.26	<.05	1.00
3/2/04	7.7	1.7	4.7	14.5	7.67	252.0	210.0	27.20	7.05	14.7	6.40	15.90		6.05	4.99	<.05	1.00
3/3/04	7.9	1.7	4.6	15.1	7.54	290.0	246.0	27.30	7.11	16.2	6.80	19.80	4.90	5.21	4.19	<.05	1.00
3/4/04	7.9	1.8	4.6	14.2	7.54	329.0	277.0	30.60	6.85	15.0	6.50	17.00		6.29	2.77	<.05	11.00
3/5/04	7.6	1.9	5.0	13.3	7.57	322.0	308.0		6.78	13.9	7.60	19.10	4.60	7.21		<.05	6.00
3/6/04	9.6	1.9	5.1	12.9	7.56	296.0	297.0		6.72	13.6	6.90	20.60		6.54		<.05	7.00
3/7/04	9.0	1.7	5.0	11.7	7.56	326.0	250.0	26.50	6.74	13.4	7.10	18.80		6.50	3.11	<.05	6.00
3/8/04	8.0	1.6	5.0	15.4	7.53	294.0	306.0	31.10	7.00	15.4	8.50	16.50	5.60	9.97	2.10	<.05	9.00
3/9/04	8.2	1.6	4.7	15.0	7.61	356.0	256.0	26.90	6.92	16.1	6.60	18.00		6.76	1.57	<.05	120.00
3/10/04	8.0	2.0	4.7	14.2	7.63	333.0	299.0	29.20	6.88	15.2	6.10	16.60	4.70	5.38	1.50	<.05	860.00
3/11/04	8.0	1.8	4.6	15.5	7.53	320.0	316.0	27.10	6.55	14.5	7.10	16.80		9.24	2.10	<.05	400.00
3/12/04	8.2	1.7	4.8	14.0	7.64	337.0	293.0		6.77	14.7	8.10	12.70	4.50	5.16		<.05	220.00
3/13/04	9.2	1.7	5.0	13.4	7.60	345.0	280.0		6.80	15.2	6.60	15.30		5.49		<.05	14.00
3/14/04	9.1	1.6	4.9	13.5	7.59	308.0	317.0	27.20	6.89	14.6	7.20	11.40		4.10	5.41	<.05	7.00
3/15/04	8.0	1.7	4.9	15.3	7.50	282.0	254.0	26.77	6.96	15.5	5.60	12.30	3.80	5.15	5.57	<.05	4.00
3/16/04	7.9	1.7	4.7	14.1	7.62	337.0	298.0	33.00	7.09	15.5	7.10	13.90		4.73	5.95	<.05	4.00
3/17/04	7.9	1.6	4.6	15.4	7.57	229.0	278.0	28.60	7.04	14.9	6.30	13.90	4.50	5.38	5.71	<.05	10.00
3/18/04	7.9	1.6	4.6	15.7	7.47	317.0	266.0	26.50	6.81	15.6	7.00	25.30		9.63	4.93	<.05	13.00
3/19/04	7.7	1.7	4.7	14.0	7.54	301.0	279.0		7.00	15.8	6.30	17.50	4.60	5.58		<.05	23.00
3/20/04	8.7	1.5	4.7	14.4	7.58	314.0	305.0		7.14	16.5	7.80	18.90		5.10		<.05	7.00
3/21/04	8.6	1.6	4.7	13.8	7.61	310.0	252.0	28.60	7.13	14.9	7.20	14.90		5.64	6.98	<.05	14.00
3/22/04		1.5	5.9	15.6	7.56	270.0	230.0	32.20	7.04	15.4	6.70	17.20	6.40	7.33	8.58	<.05	20.00
3/23/04	6.0		5.6	17.6	7.49	297.0	200.0	31.00	7.19	17.0	6.40	17.40		6.46	4.81	<.05	21.00
3/24/04	7.0	1.6	4.5	16.2	7.52	291.0	226.0	27.70	6.97	17.9	6.50	16.40	5.60	7.63	3.73	<.05	105.00
3/25/04	7.0	1.6	4.3	17.8	7.47	252.0	209.0	31.60	7.01	18.5	6.70	19.70		7.10	4.22	<.05	603.00
3/26/04	7.2	1.5	4.30	16.2	7.55	308.0	233.0		7.14	16.9	7.00	16.00	7.10	5.78		<.05	
3/27/04	8.2	1.6	4.50	14.6	7.63	293.0	224.0		6.99	16.8	6.80	16.60		7.00		<.05	27.00
3/28/04	8.1	1.6	4.70	13.8	7.51	275.0	175.0	25.50	7.07	15.1	7.00	19.20		6.24	5.55	<.05	15.00

DLYPAR Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/INHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
3/29/04	7.7	1.5	4.60	15.1	7.57	241.0	224.0	26.90	7.07	14.7	6.80	15.90	6.30	6.73	5.99	<.05	47.00
3/30/04	7.9	1.4	4.60	14.0	7.45	298.0	228.0	29.10	7.12	14.8	6.30	18.40		8.44	5.50	<.05	49.00
3/31/04	7.6	1.5	4.40	15.3	7.51	302.0	207.0	32.60	7.01	15.9	3.30	28.30	13.90	11.20	5.78	<.05	268.00
4/1/04	7.6	1.6	4.30	15.4	7.52	317.0	214.0	30.80	6.91	16.5	6.20	33.40		12.20	4.74	<.05	3280.00
4/2/04	7.6	1.5	4.60	15.5	7.61	262.0	220.0		7.12	15.3	6.50	55.40		12.60		<.05	6900.00
4/3/04	8.6	1.5	4.60	14.2	7.54	337.0	234.0		7.16	15.9	6.20	65.20		13.00		<.05	13200.00
4/4/04	8.5	1.7	4.50	14.7	7.66	368.0	284.0	26.30	7.25	15.1	6.00	54.00		9.43	7.91	<.05	420.00
4/5/04	7.6	1.5	4.60	14.8	7.43	315.0	241.0	26.90	7.04	15.6	6.40	31.90	14.70	7.71	7.25	<.05	20.00
4/6/04	7.4	1.5	4.50	15.7	7.57	309.0	210.0	29.90	7.22	16.6	5.80	15.50		4.62	9.78	<.05	11.00
4/7/04	7.4	1.4	4.40	15.9	7.28	299.0	262.0	27.40	6.93	16.1	5.80	16.80	7.50	6.32	10.60	<.05	10.00
4/8/04	8.4	1.5	4.40	15.8	7.21	298.0	215.0	30.60	6.83	16.2	6.00	13.00		4.67	13.50	<.05	3.00
4/9/04	7.2	1.5	4.50	14.1	7.19	358.0	242.0		6.90	16.1	5.70	15.90	7.40	4.95		<.05	2.00
4/10/04	9.5	2.0	5.40	13.4	7.35	341.0	318.0		6.83	14.6	6.70	18.50		6.23		<.05	1.00
4/11/04	9.0	1.7	5.30	14.3	7.50	344.0	277.0	32.70	7.25	14.3	6.60	23.50		5.40	14.00	<.05	0.00
4/12/04	8.2	1.9	5.20	13.9	7.44	281.0	302.0	28.90	7.43	15.2	6.00	16.90	7.20	4.54	13.10	<.05	1.00
4/13/04	8.1	1.8	4.90	14.3	7.46	399.0	355.0	26.80	7.26	15.4	6.10	19.30		5.14	12.10	<.05	1.00
4/14/04	7.9	1.6	4.70	15.2	7.44	332.0	250.0	30.60	7.25	17.0	5.60	16.20	5.20	4.70	12.40	<.05	1.00
4/15/04	7.4	1.7	4.60	14.9	7.45	283.0	192.0	31.30	7.28	15.7	6.00	23.20		4.64	12.80	<.05	15.00
4/16/04	7.6	1.7	4.70	15.0	7.53	295.0	239.0		7.31	16.2	6.10	19.00	7.50	5.22		<.05	35.00
4/17/04	8.6	1.7	4.70	15.5	7.59	322.0	280.0		7.28	16.5	7.00	16.90		5.90		<.05	13.00
4/18/04	8.2	1.7	4.90	15.0	7.55	313.0	310.0	26.30	7.25	16.9	5.60	17.90		5.96	9.26	<.05	10.00
4/19/04	8.0	1.6	4.90	14.9	7.59	282.0	272.0	31.60	7.29	15.7	5.90	21.60	7.30	5.54	10.60	<.05	9.00
4/20/04	8.2	1.7	4.70	16.5	7.58	347.0	268.0	30.60	7.39	16.3	6.30	16.60		5.18	11.10	<.05	6.00
4/21/04	7.2	1.5	4.70	14.9	7.47	323.0	244.0	31.60	7.37	16.0	5.80	17.20	5.30	5.27	11.70	<.05	6.00
4/22/04	7.8	1.7	4.70	15.4	7.46	324.0	309.0	32.10	7.29	15.8	6.80	16.90		3.59	10.50	<.05	3.00
4/23/04	7.6	1.8	4.90	14.9	7.48	400.0	276.0		7.30	14.7	6.40	25.20	5.70	5.72		<.05	6.00
4/24/04	8.9	1.7	5.10	14.4	7.57	365.0	235.0		7.26	14.7	5.60	18.70		4.33		<.05	
4/25/04	9.0	1.7	4.80	14.7	7.55	336.0	377.0	29.50	7.17	15.4	7.20	24.00		4.57	5.51	<.05	
4/26/04	8.0	1.6	5.10	16.1	7.50	355.0	336.0	31.60	7.12	16.3	5.70	25.40	8.50	4.56	3.95	<.05	36.00
4/27/04	7.8	1.8	4.70	16.0	7.50	365.0	346.0	29.29	7.15	16.4	5.60	20.90		4.12	2.20	<.05	237.00
4/28/04	7.7	1.7	4.50	17.4	7.48	300.0	277.0	31.80	7.00	18.7	5.30	23.80	10.20	4.47	1.90	<.05	12675.00
4/29/04	7.8	1.7	4.50	15.9	7.59	371.0	347.0	51.30	6.95	16.9	5.50	29.60		5.98	2.78	<.05	
4/30/04	7.6	1.7	4.90	15.2	7.55	291.0	235.0	31.30	6.63	15.6	5.90	25.00	13.40	6.00	3.25	<.05	460.00
5/1/04	9.0	1.8	5.00	14.8	7.59	273.0	228.0	29.30	6.72	14.7	5.80	20.90		7.92	3.99	<.05	25.00
5/2/04	8.6	1.8	5.00	14.9	7.52	320.0	226.0	27.40	6.73	15.7	6.10	10.40		2.83	3.67	<.05	
5/3/04	8.2	1.7	4.90	16.0	7.35	320.0	198.0	30.60	6.97	15.6	7.20	12.00	5.60	3.06	3.52	<.05	1.00
5/4/04	8.0	1.7	4.60	17.3	7.46	360.0	184.0	32.50	6.71	19.0	5.90	9.00		3.41	2.96	<.05	76.00
5/5/04	8.2	1.7	4.70	17.0	7.42	359.0	188.0	33.00	6.89	20.2	5.80	13.40	6.00	3.68	3.44	<.05	21.00
5/6/04	8.0	1.7	4.50	18.1	7.42	322.0	221.0	32.50	6.93	17.9	5.70	11.90		4.44	3.18	<.05	11.00
5/7/04	8.2	1.6	4.60	15.6	7.46	334.0	264.0	29.90	6.68	17.0	5.80	13.40	7.90	4.18	2.82	<.05	1200.00
5/8/04	8.8	1.7	4.90	15.3	7.51	310.0	214.0		6.91	17.1	5.70	12.60		4.91		<.05	32400.00
5/9/04	8.2	1.8	4.90	15.2	7.50	315.0	221.0	30.80	7.04	17.2	5.80	14.30	6.00	3.57	4.38	<.05	3200.00
5/10/04	8.6	1.9	5.00	16.5	7.43	250.0	197.0	27.60	6.86	17.1	6.20	14.40	5.50	4.49	4.40	<.05	0.00
5/11/04	8.3	1.8	5.00	16.5	7.37	7.5	243.0	28.30	6.98	16.0	5.50	13.70		4.80	3.64	<.05	155.00

OLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD	EFF BOD W/NITR	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
5/12/04	8.3	1.7	4.90	16.3	7.46	245.0	245.0	29.00	6.95	16.7	5.40	14.00	5.60	5.96	4.33	<.05	43.00
5/13/04	8.4	2.3	5.40	15.6	7.49	28.0	241.0	24.70	6.95	17.3	6.50	15.50		4.50	4.45	<.05	22.00
5/14/04	8.4	2.2	5.30	15.9	7.56	292.0	237.0		6.93	16.5	5.70	16.50		3.65		<.05	33.00
5/15/04	9.4	2.2	5.30	15.2	7.45	304.0	280.0		6.97	16.3	5.80	17.70		4.93		<.05	52.00
5/16/04	8.8	2.1	5.30	14.9	7.46	324.0	268.0	24.10	6.92	16.5	5.60	18.60		5.62	3.95	<.05	43.00
5/17/04	8.4	2.0	5.20	16.2	7.40	312.0	262.0	24.60	7.12	17.4	6.10	22.20	7.90	6.17	4.95	<.05	108.00
5/18/04	8.2	2.0	5.10	16.1	7.45	267.0	261.0	29.20	7.03	17.6	5.70	20.60		26.31	5.55	<.05	4.00
5/19/04	8.1	2.1	5.00	16.7	7.43	352.0	241.0	27.40	7.02	18.0	5.50	21.30	9.60	7.64	3.68	<.05	18.00
5/20/04	8.4	2.0	5.00	16.9	7.46	338.0	249.0	25.20	7.05	17.6	6.00	25.60		7.88	2.15	<.05	68.00
5/21/04	8.0	2.2	5.30	16.4	7.50	250.0	219.0		7.03	17.7	5.60	21.70	10.30	6.04		<.05	220.00
5/22/04	8.2	2.2	5.30	16.0	7.47	255.0	249.0		6.90	17.8	5.60	27.20		5.92		<.05	9640.00
5/23/04	9.0	2.2	5.30	15.6	7.48	316.0	241.0	24.90	6.93	16.9	5.40	34.50		9.86	2.70	<.05	
5/24/04	8.4	2.0	5.60	16.5	7.47	278.0	250.0	24.50	7.04	17.1	5.60	17.50		6.22	2.67	<.05	31.00
5/25/04	8.1	2.2	5.50	15.9	7.43	328.0	273.0	24.50	6.86	16.6	5.80	19.70		5.83	2.32	<.05	58.00
5/26/04	8.6	2.5	5.30	16.7	7.46	303.0	213.0	25.60	6.96	17.4	5.50	18.50	6.90	7.74	1.40	<.05	54.00
5/27/04	8.6	2.3	5.30	16.2	7.52	289.0	234.0	22.80	6.96	17.5	4.90			4.69	0.69	<.05	75.00
5/28/04	8.2	2.2	5.30	16.4	7.48		229.0		6.85	17.8	5.30			3.60		<.05	2080.00
5/29/04	8.7	2.3	5.50	16.3	7.46	274.0	304.0		6.86	18.1	6.90	9.30		3.57		<.05	
5/30/04	8.8	2.4	5.30	15.6	7.59	290.0	248.0	24.20	6.83	16.3	7.10	10.20		3.56	0.34	<.05	2360.00
5/31/04	9.4	2.3	5.40	15.9	7.44	284.0	287.0	25.90	6.77	16.4	7.50	10.60	4.20	4.12	0.77	<.05	1483.00
6/1/04	8.4	2.2	5.40	16.0	7.46	310.0	282.0	20.60	6.74	17.1	7.30	10.30		4.42	0.26	<.05	43.00
6/2/04	8.0	2.2	5.20	16.5	7.44	302.0	307.0	23.30	7.08	17.5	7.10	8.40	4.00	3.54	0.11	<.05	180.00
6/3/04	8.0	2.3	5.10	19.2	7.35	313.0	256.0	23.30	6.86	18.4	6.90	9.60		3.86	0.06	<.05	6240.00
6/4/04	8.0	2.2	5.30	17.3	7.43	381.0	294.0	23.20	6.87	18.9	7.00	11.60	5.30	4.04	0.09	<.05	286.00
6/5/04	8.4	2.2	5.20	17.4	7.32	330.0	273.0	22.50	6.83	19.0	7.00	11.20		5.16	0.27	<.05	350.00
6/6/04	8.3	2.4	5.30	17.1	7.36	293.0	254.0	23.90	6.72	19.2	5.60	11.40		4.93	0.55	<.05	380.00
6/7/04	8.3	2.6	5.80	16.8	7.49	269.0	322.0	24.50	6.93	19.6	5.90	10.00	4.30	4.70	3.28	<.05	140.00
6/8/04	8.2	2.8	5.60	17.4	7.47	238.0	215.0	24.30	6.89	18.9	6.80	8.00		4.76	0.20	<.05	93.00
6/9/04	8.6	2.8	5.80	17.7	7.51	305.0	190.0	26.10	6.84	16.6	6.10	8.10	6.70	4.22	0.21	<.05	111.00
6/10/04	8.4	2.8	5.80	17.1	7.38	212.0	208.0	27.80	6.65	18.6	6.20	8.90		4.51	0.22	<.05	62.00
6/11/04	8.5	3.0	5.90	18.1	7.45	271.0	212.0		6.74	18.2	6.30	9.60	3.40	5.74		<.05	35.00
6/12/04	9.6	3.0	5.90	17.2	7.49	242.0	252.0		6.87	18.1	6.20	8.70		4.94		<.05	41.00
6/13/04	9.2	3.0	5.90	16.8	7.43	313.0	211.0	19.60	6.91	17.6	6.10	8.60		3.89	0.50	<.05	20.00
6/14/04	8.4	2.9	5.90	16.6	7.45	234.0	213.0	22.20	6.92	16.0	5.50	7.00	2.70	3.86	0.28	<.05	13.00
6/15/04	9.0	3.1	6.00	17.1	7.45	288.0	217.0	19.90	6.80	16.7	6.60	5.80		3.23	0.21	<.05	44.00
6/16/04	8.4	3.1	6.10	16.9	7.40	247.0	215.0	20.90	7.08	16.3	6.50	11.00	4.10	5.80	0.28	<.05	32.00
6/17/04	8.6	3.2	6.30	17.3	7.38	274.0	247.0	20.30	6.84	18.8	6.60	11.10		5.03	0.12	<.05	84.00
6/18/04	10.2	4.0	7.10	17.2	7.31	232.0	196.0		6.87	18.2	5.80	11.70	5.00	5.28		<.05	254.00
6/19/04	10.4	3.8	6.90	16.6	7.43	213.0	163.0		6.87	17.3	6.70	11.70		5.76		<.05	320.00
6/20/04	10.0	3.5	6.70	16.9	7.41	237.0	207.0	20.00	6.79	18.5	6.40	10.60		4.29	0.51	<.05	180.00
6/21/04	9.9	3.5	7.00	17.5	7.37	248.0	218.0	20.10	6.95	18.3	5.60	9.60	3.00	5.37	0.52	<.05	62.00
6/22/04	9.2	3.7	7.50	16.9	7.50	221.0	204.0	18.20	6.85	17.7	6.40	8.90		4.56	0.40	<.05	121.00
6/23/04	9.0	3.2	5.60	17.3	7.49	203.0	207.0	22.80	7.15	18.4	6.60	10.40	2.60	4.33	0.15	<.05	340.00
6/24/04	9.0	3.6	6.40	18.2	7.46	252.0	223.0	18.10	7.15	19.3	6.10	8.20		4.90	0.13	<.05	26.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD	EFF BOD W/NH3B	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
6/25/04	9.0	3.3	6.40	17.1	7.52	220.0	205.0		6.97	18.3	5.80	6.80		4.31		<.05	60.00
6/26/04	10.2	3.4	6.50	17.1	7.53	220.0	212.0		6.96	18.6	6.00	7.00		3.93		<.05	66.00
6/27/04	9.8	3.3	6.50	17.0	7.51	262.0	223.0	19.00	6.99	18.5	6.00	8.50		3.55	0.60	<.05	49.00
6/28/04	9.6	3.3	6.50	17.1	7.48	258.0	223.0	19.30	7.12	18.6	5.80	5.90	3.00	5.75	0.35	<.05	31.00
6/29/04	9.0	3.2	6.30	17.3	7.43	189.0	203.0	21.50	7.22	18.8	7.10	7.50		7.00	0.09	<.05	86.00
6/30/04	9.2	3.3	6.40	18.2	7.54	253.0	190.0	21.60	7.37	18.8	7.30	7.10		7.20	0.21	<.05	38.00
7/1/04	8.9	3.3	6.50	17.5	7.51	217.0	218.0	20.70	7.32	19.6	7.50	8.20	4.30	8.68	0.21	UV	96.00
7/2/04	9.1	3.2	6.40	17.3	7.49	237.0	209.0		7.34	18.9	7.50	7.90	3.90	10.40		UV	21.00
7/3/04	9.6	3.4	6.40	17.3	7.45	270.0	223.0		7.20	18.8	6.50	7.30		9.13		UV	17.00
7/4/04	9.9	3.4	6.30	17.1	7.48	247.0	245.0	20.10	7.21	18.9	7.40	7.20		9.47	0.91	UV	87.00
7/5/04	10.1	3.4	6.50	18.3	7.56	262.0	249.0	21.40	7.26	19.5	8.70	9.20	4.60	10.74	1.54	UV	5.00
7/6/04	9.7	3.4	6.60	19.6	7.46	253.0	220.0	16.80	7.47	20.5	7.30	8.40		8.86	0.74	UV	15.00
7/7/04	8.8	3.5	6.60	18.4	7.40	231.0	205.0	16.30	7.24	19.7	7.90	7.40	4.30	9.42	0.44	UV	24.00
7/8/04	9.0	3.6	6.40	17.9	7.47	221.0	219.0	22.10	7.23	19.5	7.80	7.20		8.69	0.36	UV	22.00
7/9/04	9.4	3.5	6.60	17.6	7.48	222.0	2332.0		7.13	19.3	7.10	6.30	4.20	9.08		UV	880.00
7/10/04	10.0	3.7	6.50	17.6	7.42	252.0	198.0		7.07	19.5	7.80	6.30		9.33		UV	33.00
7/11/04	9.6	3.6	6.40	17.6	7.45	280.0	288.0	14.80	7.20	19.2	7.50	9.40		7.10	0.75	UV	204.00
7/12/04	9.4	3.3	6.50	18.5	7.36	228.0	342.0	15.10	7.10	19.5	8.00	6.80	3.60	5.66	0.31	UV	35.00
7/13/04	8.8	3.5	6.40	20.5	7.10	230.0	243.0	15.90	6.96	20.5	7.40	5.60		5.73	0.14	UV	69.00
7/14/04	8.9	3.6	6.50	19.3	7.35	239.0	219.0	17.80	7.15	20.9	9.70	5.40		6.13	0.22	UV	29.00
7/15/04	9.2	3.5	6.50	19.5	7.33	212.0	220.0	18.10	7.13	20.9	7.20	4.50		4.60	0.17	UV	10.00
7/16/04	9.4	3.4	6.60	18.4	7.37	219.0	212.0		6.99	20.2	6.90	4.90	2.80	5.24		UV	13.00
7/17/04	10.0	3.6	6.60	18.7	7.42	215.0	184.0		7.04	20.1	7.40	5.60		5.44		UV	11.00
7/18/04	9.6	3.5	6.50	18.3	7.46	232.0	211.0	19.90	7.05	20.2	7.60	5.50		5.25	0.19	UV	7.00
7/19/04	9.6	3.4	6.70	19.4	7.07	215.0	183.0	20.10	7.02	20.2	7.00	5.70	3.20	4.44	0.20	UV	14.00
7/20/04	9.5	3.4	6.40	20.3	7.31	204.0	222.0	20.00	7.14	20.3	7.30	8.20		5.89	0.36	UV	42.00
7/21/04	9.2	3.2	6.20	19.1	7.31	266.0	241.0	22.90	7.13	20.1	7.20	4.40	2.80	5.58	0.13	UV	61.00
7/22/04	10.6	3.3	6.80	18.7	7.36	184.0	262.0	16.90	7.08	20.5	7.20	4.60		5.69	0.19	UV	17.00
7/23/04	10.0	4.5	7.90	18.9	7.40	190.0	212.0		7.04	19.1	8.70			4.07		<.05	11.00
7/24/04	11.4	4.7	7.90	18.3	7.53		162.0		7.32	18.2	7.40			4.15		<.05	2.00
7/25/04	10.8	4.2	7.40	18.6	7.47	255.0	216.0	14.90	7.40	19.4	7.60			3.78	0.05	<.05	7.00
7/26/04	10.2	4.0	7.50	19.8	7.47	213.0	228.0	17.00	7.25	20.1	7.80	3.50	1.90	4.06	0.05	<.05	27.00
7/27/04	10.0	4.0	7.20	18.8	7.49	209.0	221.0	15.60	7.31	20.3	7.80	3.90		4.18	0.12	<.05	17.00
7/28/04	9.7	4.0	7.20	18.8	7.49	221.0	230.0	14.50	7.22	19.7	7.30	4.00	2.00	5.43	0.04	<.05	120.00
7/29/04	10.0	4.0	7.10	19.5	7.47	224.0	231.0	15.10	7.29	20.3	7.20	3.80		4.48	0.05	<.05	130.00
7/30/04	10.2	4.0	7.10	18.5	7.44	228.0	237.0		7.41	19.9	7.30	3.10		3.98		<.05	8.00
7/31/04	10.7	3.9	7.30	18.3	7.54	232.0	228.0		7.38	19.3	7.20	4.00		3.91		<.05	8.00
8/1/04	10.6	3.8	7.10	18.0	7.49	243.0	211.0	14.40	7.36	19.5	7.50	2.90		3.30	0.05	<.05	11.00
8/2/04	9.8	3.9	7.10	20.0	7.34	227.0	223.0	13.90	7.34	20.1	7.50	2.60	1.70	2.91	0.08	<.05	
8/3/04	9.6	3.9	7.00	19.5	7.46	202.0	250.0	18.50	7.50	20.9	7.30			3.91	0.06	<.05	112.00
8/4/04	9.5	3.7	6.80	19.6	7.45	191.0	209.0	15.30	7.36	20.7	7.60	2.90	1.50	4.54	0.06	<.05	48.00
8/5/04	9.5	3.8	6.90	19.3	7.45	232.0	231.0	13.60	7.42	21.0	7.70	4.50		4.75	1.29	<.05	5.00
8/6/04	9.8	3.8	7.00	18.9	7.49	213.0	217.0		7.32	20.3	7.10	3.10	1.80	4.88		<.05	9.00
8/7/04			6.80	18.6	7.40	223.0	243.0		7.31	19.9	7.30	3.10		4.51		<.05	6.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/NH3B	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
8/8/04	10.0	3.3	6.60	18.5	7.41	221.0	265.0	16.30	7.32	19.9	7.60	3.40		4.49	0.06	<.05	5.00
8/9/04	9.5	3.5	6.70	19.0	7.31	203.0	226.0	15.70	7.37	20.1	7.40	3.40	1.50	4.62	0.06	<.05	2.00
8/10/04	9.3	3.1	6.50	18.9	7.40	233.0	197.0	20.70	7.31	20.4	6.20	3.20		4.03	0.05	<.05	
8/11/04	9.2	3.2	6.40	19.1	7.40	191.0	165.0	18.50	7.34	20.1	7.50	3.70	1.80	5.35	0.05	<.05	6.00
8/12/04	9.4	3.3	6.50	18.5	7.34	235.0	275.0	16.30	7.28	19.1	7.30	3.20		4.82	0.05	<.05	21.00
8/13/04	9.4	3.2	6.40	18.6	7.37	251.0	325.0		7.27	19.2	7.10	3.30		4.45		<.05	28.00
8/14/04	10.0	3.6	6.70	18.0	7.67	280.0	323.0		7.18	19.6	7.00	3.30		5.50		<.05	5.00
8/15/04	9.9	3.4	6.50	19.1	7.51	310.0	409.0	9.94	7.20	20.0	7.00	3.50		4.29	0.10	<.05	5.00
8/16/04	9.4	3.5	6.80	19.2	7.29	213.0	249.0	17.70	7.22	20.2	7.10	3.50	3.30	5.11	0.04	<.05	11.00
8/17/04	9.3	3.5	6.50	19.1	7.33	258.0	185.0	22.50	7.22	20.2	7.10	3.90		4.84	0.08	<.05	21.00
8/18/04	10.4	3.2	6.30	19.4	7.35	220.0	204.0	22.10	7.22	20.5	7.40	3.40	1.60	6.87	0.07	<.05	14.00
8/19/04	9.8	4.3	7.80	19.0	7.45	241.0	210.0	16.50	7.25	20.0	7.50	4.00		6.53	0.04	<.05	14.00
8/20/04	10.2	4.1	7.20	19.0	7.43	235.0	199.0		7.34	19.7	8.60	3.50	1.90	3.74		UV	280.00
8/21/04	10.9	3.8	7.20	18.9	7.48	228.0	172.0		7.33	19.7	7.40	3.50		4.06		UV	500.00
8/22/04	10.2	3.7	7.10	19.1	7.50	231.0	192.0	20.90	7.39	20.0	7.30	3.60		3.95	0.06	UV	112.00
8/23/04	9.9	3.7	7.20	19.9	7.24	178.0	199.0	18.40	7.27	20.4	7.00	0.10		4.00	0.05	UV	21.00
8/24/04	9.4	3.5	6.90	20.0	7.56	229.0	224.0	20.50	7.31	20.0	7.10	3.20		5.00	0.05	UV	50.00
8/25/04	9.8	3.4	6.60	19.5	7.46	196.0	236.0	19.70	7.36	20.3	7.50	3.40	2.00	6.30	0.06	UV	144.00
8/26/04	9.4	3.2	6.50	19.5	7.46	242.0	226.0	19.70	7.35	20.3	6.90	3.50		5.00	0.03	UV	7.00
8/27/04	9.4	3.6	7.00	19.6	7.42	212.0	201.0		7.50	19.7	6.70	2.90	2.50	4.17		UV	11.00
8/28/04	10.5	3.5	7.00	19.0	7.38		206.0		7.22	19.0	7.90	3.80		5.48		UV	17.00
8/29/04	10.5	3.4	7.00	20.0	7.52	255.0	206.0	15.20	7.46	19.4	7.80	4.30		5.00	0.11	UV	3.00
8/30/04	9.9	3.4	6.90	19.3	7.40	193.0	193.0	18.80	7.35	19.6	7.60	4.40	2.50	5.30	0.10	UV	2.00
8/31/04	9.9	3.3	6.60	19.9	7.42	186.0	187.0	18.80	7.33	19.6	7.20	5.60		6.70	0.05	UV	6.00
9/1/04	9.7	3.5	6.60	19.4	7.39	215.0	174.0	16.30	7.26	20.1	7.20	4.20	2.30	4.76	0.11	UV	544.00
9/2/04	9.8	3.3	6.60	19.5	7.47	262.0	309.0	20.60	7.35	20.1	6.80	4.60		5.66	0.07	UV	43.00
9/3/04	9.5	3.3	6.60	19.0	7.49	199.0	232.0		7.24	20.2	7.60	4.90	2.90	6.77		UV	14.00
9/4/04	10.2	3.2	6.50	19.5	7.23	214.0	232.0		7.23	20.4	7.60	4.90		5.86		UV	5.00
9/5/04	10.0	3.7	6.60	19.3	7.27	232.0	202.0	17.10	7.27	19.3	8.70	4.20		5.61	0.07	UV	6.00
9/6/04	10.5	3.1	6.50	18.9	7.32	226.0	229.0	18.00	7.43	19.0	8.70	9.00	3.60	9.30	0.19	UV	4.00
9/7/04	9.5	3.1	6.70	19.9	7.33	187.0	227.0	17.30	7.27	20.4	6.80	6.00		7.66	0.05	UV	111.00
9/8/04	9.4	3.2	6.30	19.6	7.44	188.0	231.0	18.00	7.26	19.8	8.00	6.70	3.60	6.78	0.04	UV	1200.00
9/9/04	9.4	3.2	6.30	19.3	7.38	308.0	223.0	17.00	7.27	19.9	7.10	6.70		7.04	0.05	UV	13.00
9/10/04	10.2	3.2	6.30	19.4	7.34	166.0	232.0		7.23	20.4	6.90	5.70	3.20	6.56		UV	53.00
9/11/04	10.0	3.2	6.70	18.9	7.47	197.0	215.0		7.20	19.5		5.40		6.77		UV	403.00
9/12/04	10.0	3.0	6.40	18.9	7.46	226.0	259.0	17.10	7.19	19.8	7.40	6.20		6.41	0.01	UV	177.00
9/13/04	9.2	3.0	6.50	20.3	7.45	267.0	257.0	19.80	7.31	20.5	6.90	6.30	3.20	6.40	0.09	UV	36.00
9/14/04	9.4	3.2	6.40	20.8	7.08	197.0	221.0	16.30	6.92	21.2	6.80	6.10		7.28	0.07	UV	512.00
9/15/04	9.2	2.9	6.20	19.8	7.44	160.0	236.0	21.80	7.09	19.3	7.20	6.30	3.70	7.96	0.13	UV	60.00
9/16/04	9.5	3.0	5.50	18.9	7.41	220.0	256.0	18.70	7.34	18.6	6.80	6.50		7.58	0.07	UV	32.00
9/17/04	9.4	2.8	7.00	18.5	7.38		235.0		7.08	19.2	7.90			6.30		UV	380.00
9/18/04	10.2	2.9	6.20	18.6	7.25		245.0		7.15	19.3	9.30			7.10		UV	390.00
9/19/04	9.3	2.8	6.20	19.1	7.45	233.0	241.0	17.90	7.27	20.0	7.20	6.00		6.34	0.05	UV	60.00
9/20/04	11.4	2.9	6.20	19.2	7.34	194.0	243.0	18.30	7.25	19.5	7.90	4.40	2.80	4.46	0.05	UV	792.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/NH3B	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
9/21/04	9.4	2.9	6.30	19.4	7.44	236.0	247.0	16.10	7.25	20.3	7.00	4.50		4.90	0.06	UV	706.00
9/22/04	9.9	3.3	6.60	18.5	7.44	176.0	190.0	22.00	7.23	19.2	7.00	3.50	2.60	4.67	0.10	UV	11.00
9/23/04	10.1	3.2	6.60	17.9	7.52	178.0	208.0	18.10	7.30	17.5	7.20	4.00		3.62	0.05	UV	21.00
9/24/04	9.4	3.1	6.40	18.6	7.36	212.0	177.0		7.10	17.9	6.60	3.90	2.60	4.35		UV	4.00
9/25/04	10.5	3.1	6.60	18.3	7.50	218.0	211.0		7.22	18.6	8.00	4.10		4.76		UV	6.00
9/26/04	10.3	3.1	6.50	18.3	7.45	104.0	222.0	19.50	7.12	18.7	7.20	3.00		3.63	0.09	UV	13.00
9/27/04	9.5	3.0	6.60	18.8	7.43	187.0	220.0	18.40	7.34	18.7	7.40	3.50	1.80	4.27	0.07	UV	20.00
9/28/04	9.5	3.4	6.70	19.1	7.47	190.0	208.0	16.00	7.33	19.4	7.10	4.10		4.31	0.09	UV	29.00
9/29/04	9.7	3.3	6.40	18.6	7.50	173.0	221.0	20.30	7.35	18.0	7.00	3.30	2.00	3.81	0.08	UV	256.00
9/30/04	9.6	3.2	6.30	20.7	7.47	265.0	276.0	15.90	7.27	20.7	6.90	2.70		4.31	0.08	UV	10.00
10/1/04	10.0	4.5	7.40	18.2	7.55	193.0	196.0		7.19	18.2	7.80	3.30		4.26		UV	5.00
10/2/04	11.2	3.3	7.00	17.5	7.47	208.0	269.0		7.41	17.1	7.40	3.20		5.20		UV	16.00
10/3/04	10.5	3.2	6.90	17.5	7.51	236.0	239.0	17.50	7.35	18.0	7.40	3.50		5.53	0.06	UV	8.00
10/4/04	10.0	3.1	6.70	18.0	7.50	228.0	231.0	16.90	7.44	18.1	7.40	4.00	2.60	5.38	0.05	UV	15.00
10/5/04	9.6	3.3	6.60	18.0	7.47	258.0	213.0	19.60	7.29	18.4	8.60	3.70		5.89	0.05	UV	106.00
10/6/04	9.6	3.4	6.60	18.5	7.43	186.0		19.40	7.33	18.6	7.70	3.40	2.10	4.44	0.02	UV	11.00
10/7/04	9.8	3.6	6.60	17.7	7.42	245.0	179.0	19.50	7.22	17.8	6.70	3.40		5.08	0.04	UV	17.00
10/8/04	9.6	3.2	6.50	18.0	7.42	368.0	465.0		7.31	18.1		3.20	2.10	4.52		UV	9.00
10/9/04	10.4	3.2	6.60	17.4	7.44	212.0	183.0		7.24	17.8	8.90	3.80		4.25		UV	4.00
10/10/04	10.5	3.2	6.50	17.6	7.45	208.0	176.0	18.00	7.03	17.8	7.30	3.40		4.88	0.06	UV	12.00
10/11/04	9.6	3.1	6.70	17.8	7.43	196.0	177.0	21.80	7.31	18.0	7.80	5.50	3.60	5.00	0.08	UV	1340.00
10/12/04	9.2	3.0	6.60	17.6	7.47	186.0	172.0	26.40	7.32	17.7	7.10	4.80		5.29	0.09	UV	15.00
10/13/04	9.1	3.2	6.40	18.2	7.50	179.0	161.0	27.40	7.13	17.6	8.20	3.40		5.26	0.07	UV	6.00
10/14/04	9.4	3.2	6.30	17.0	7.44	205.0	200.0	18.90	7.26	17.3	7.40	3.10		4.18	0.06	UV	5.00
10/15/04	9.2	3.2	6.50	17.5	7.49	231.0	196.0		7.16	17.9	8.50	5.20		4.10		UV	4.00
10/16/04	10.5	3.1	6.50	17.0	7.58	168.0	195.0		7.15	16.7	8.40	3.50	2.10	5.47		UV	7.00
10/17/04	10.4	3.0	6.50	17.6	7.50	319.0	225.0	16.80	7.37	17.9	9.50	3.80		5.46	0.05	UV	76.00
10/18/04	9.6	3.0	6.50	18.2	7.41	209.0	208.0	19.50	7.32	17.6	9.10	3.70		4.41	0.04	UV	5.00
10/19/04	9.3	3.0	6.30	17.9	7.48	190.0	231.0	19.80	7.19	17.9	9.00	3.30	1.90	5.18	0.09	UV	6.00
10/20/04	9.20	3.00	6.30	18.50	7.65	196.00	283.00	23.20	7.16	17.40	9.00	1.00		5.17	0.04	UV	7.00
10/21/04	9.4	2.9	6.10	17.8	7.59	288.0	302.0	20.10	7.27	17.6	7.40	4.80		6.71	0.11	UV	5.00
10/22/04	9.2	2.8	6.40	17.3	7.50	245.0	209.0		7.17	16.3	7.70	5.10		6.45		UV	64.00
10/23/04	10.5	2.8	6.20	17.8	7.42	233.0	210.0		7.20	16.5	7.90	5.20		7.02		UV	6.00
10/24/04	10.1	3.1	6.30	16.9	7.53	227.0	222.0	15.90	7.16	16.9	7.40	5.40		7.03	0.04	UV	3.00
10/25/04	9.0	3.0	6.30	17.8	7.67	197.0	212.0	19.10	7.38	16.9	7.40	6.00	2.90	7.76	0.07	UV	14.00
10/26/04	8.8	2.7	6.10	17.1	7.49	209.0	226.0	19.10	7.13	16.5	7.20	7.40		10.00	0.05	UV	16.00
10/27/04	8.6	2.7	6.00	17.4	7.49	178.0	196.0	17.60	7.29	17.2	7.20	4.30	4.30	9.41	0.04	UV	25.00
10/28/04	9.0	2.7	6.00	17.3	7.52	218.0	231.0	19.50	7.15	16.8	7.10	6.70		9.13	0.05	UV	9.00
10/29/04	9.8	2.7	5.90	17.4	7.45	218.0	223.0		7.06	16.9	8.90	7.50	4.00	9.80		UV	8.00
10/30/04	9.9	2.5	5.90	16.6	7.54	215.0	223.0		7.12	16.3	7.80	8.30		11.10		UV	11.00
10/31/04	10.0	2.5	6.20	16.5	7.56	181.0	244.0	20.70	7.17	16.4	8.70	8.50		11.56	0.05	UV	16.00
11/1/04	8.8	2.5	5.8	16.6	7.50	234.0	212.0	24.20	7.27	16.2	8.90	10.10	4.40	14.80	0.06	UV	16.00
11/2/04	8.9	2.5	5.7	17.3	7.66	203.0	253.0	21.00	7.27	16.1	8.30	9.30		13.40	0.04	UV	5.00
11/3/04	8.8	2.4	6.3	17.4	7.50	212.0	241.0	21.10	7.21	16.8	8.30	11.00	5.20	14.60	0.06	UV	9.00

DLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/NHIB	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
11/4/04	8.2	2.4	4.9	16.8	7.50	256.0	219.0	21.90	7.22	16.5	8.00	8.60		13.00	0.06	uv	10.00
11/5/04	9.0	2.3	5.6	17.4	7.71	265.0	247.0		7.25	17.0	7.60	8.90	3.30	9.94		uv	8.00
11/6/04	9.6	2.4	5.8	16.5	7.54	252.0	262.0		7.20	16.1	8.50	7.30		9.03		uv	7.00
11/7/04	9.8	2.4	5.7	16.1	7.46		330.0	38.20	7.25	15.8	8.60			8.30	0.03	uv	7.00
11/8/04	9.0	2.2	5.8	17.1	7.50	234.0	269.0	25.70	7.24	16.9	7.30	6.90	3.30	8.34	0.07	uv	7.00
11/9/04	8.8	2.4	5.6	17.2	7.53	246.0	295.0	21.60	7.22	17.1	6.00	5.10		6.92	0.05	uv	6.00
11/10/04	8.4	2.4	5.5	17.7	7.54	231.0	279.0	22.30	7.20	17.7	8.50	5.10	2.50	5.92	0.05	uv	11.00
11/11/04	8.4	2.4	5.7	17.0	7.43	240.0	297.0	23.90	7.12	15.6	7.20	4.70		6.05	0.08	uv	9.00
11/12/04	8.8	2.3	5.4	16.4	7.52	351.0	293.0		7.01	16.7	8.60	4.70	2.20	7.13		uv	7.00
11/13/04	9.7	2.4	5.5	16.2	7.62	188.0	111.0		7.19	15.8	8.90	4.70		5.72		uv	6.00
11/14/04	9.6	2.4	5.8	14.9	7.65	244.0	234.0	28.60	7.30	15.0	7.70	5.40		6.08	0.09	uv	10.00
11/15/04	8.9	2.2	5.5	16.6	7.57	221.0	225.0	26.90	7.24	15.8	8.20	6.20	2.50	5.46	0.06	uv	14.00
11/16/04	8.6	2.3	5.6	16.6	7.45	220.0	259.0	26.50	7.40	17.4	7.70	6.50		5.48	0.05	uv	11.00
11/17/04	8.2	2.3	5.4	16.8	7.49	205.0	246.0	29.70	7.18	15.7	8.10	5.00	2.90	5.97	0.03	uv	13.00
11/18/04	8.2	2.1	5.3	16.6	7.41	267.0	243.0	27.00	7.13	15.7	7.10	5.00		5.45	0.07	uv	14.00
11/19/04	8.6	2.2	5.5	16.0	7.59	223.0	250.0		7.06	15.5	8.20	4.10	2.60	4.65		uv	51.00
11/20/04	9.3	2.2	5.6	15.5	7.54	275.0	260.0		7.17	15.7	7.50	6.10		5.34		uv	2.00
11/21/04	9.7	2.4	5.8	15.4	7.53	264.0	225.0	24.60	7.13	15.2	8.30	5.80		5.22	0.05	uv	11.00
11/22/04	8.9	2.4	5.9	15.5	7.44	233.0	248.0	28.30	7.22	15.2	7.60	4.80	2.60	5.57	0.05	uv	16.00
11/23/04	8.6	2.2	5.4	16.5	7.48	341.0	229.0	23.50	7.15	16.4	7.20	5.00		5.36	0.08	uv	14.00
11/24/04	9.1	2.3	5.6	16.6	7.47	286.0	240.0	26.70	7.02	15.5	7.90	5.90	2.60	5.54	0.05	uv	21.00
11/25/04	10.9	2.5	5.9	15.9	7.45	321.0	259.0	23.40	7.12	15.3	7.90	5.60		4.90	0.04		14.00
11/26/04	9.0	2.6	5.5	16.1	7.48	279.0	193.0		7.16	15.4	7.50	4.50	2.50	4.34		uv	7.00
11/27/04	9.6	2.5	5.6	14.7	7.54	261.0	211.0		7.08	14.6	7.80	5.20		4.85		uv	7.00
11/28/04	9.2	2.6	5.7	15.2	7.46	254.0	188.0	27.20	7.31	14.7	7.70	5.40		5.06	0.04	uv	12.00
11/29/04	8.2	2.6	5.7	15.3	7.45	270.0	197.0	25.50	7.22	14.9	7.90	6.30	3.40	5.06	0.05	uv	14.00
11/30/04	8.4	2.4	5.7	14.9	7.54	323.0	295.0	24.30	7.23	13.9	7.90	7.70		5.46	0.04	uv	17.00
12/1/04	8.6	2.5	5.6	14.6	7.43	25.4	249.0	24.90	7.05	15.8	8.60	5.00	2.60	5.71	0.05	uv	14.00
12/2/04	8.8	2.5	5.5	14.6	7.46	243.0	218.0	26.50	6.97	14.6	8.50	5.50		5.66	0.06	uv	18.00
12/3/04	9.4	2.5	6.1	18.2	7.58	286.0	206.0		7.23	15.5	8.20	5.10	3.00	5.89		uv	22.00
12/4/04	9.9	2.5	6.1	15.2	7.51		217.0		7.17	15.2	10.10			8.04		uv	9.00
12/5/04	10.0	2.8	6.1	15.6	7.54	278.0	232.0	24.80	7.03	15.7	9.30	5.60		5.73	0.03	uv	11.00
12/6/04	9.3	2.6	6.0	15.8	7.46	255.0	222.0	24.90	6.99	15.3	8.60	4.60	1.90	5.13	0.07	uv	22.00
12/7/04	8.9	2.6	5.7	15.1	7.49	306.0	213.0	26.50	7.06	15.1	9.90	6.20		3.50	0.09	uv	17.00
12/8/04	8.4	2.4	5.6	15.9	7.47	256.0	242.0	28.50	7.19	15.7	8.30	4.50	2.50	5.50	0.12	uv	14.00
12/9/04	8.4	2.3	5.6	16.4	7.59	240.0	235.0	25.40	7.26	17.1	7.90	4.40		4.50	0.05	uv	9.00
12/10/04	8.9	2.4	5.6	15.2	7.44	254.0	223.0		7.11	15.6	8.90	4.30	2.50	4.32		uv	9.00
12/11/04	9.7	2.3	5.8	14.9	7.51	269.0	231.0		7.15	15.3	8.70	4.40		3.67		uv	7.00
12/12/04	9.6	2.2	5.7	14.8	7.47	287.0	198.0	26.90	7.05	15.5	10.30	4.50		3.03	0.06	uv	3.00
12/13/04	8.7	2.3	5.5	15.0	7.51	254.0	220.0	27.70	7.17	15.6	8.30	4.10	2.40	3.50	0.05	uv	7.00
12/14/04	8.7	2.4	5.5	16.0	7.49	277.0	219.0	25.70	7.26	15.3	8.50	4.70		4.13	0.06	uv	2.00
12/15/04	8.4	5.3	5.5	15.2	7.54	264.0	200.0	27.90	7.11	14.6	8.50	3.90	2.50	3.35	0.06	uv	3.00
12/16/04	8.3	2.4	5.4	15.3	7.55	265.0	229.0	27.90	7.20	15.4	8.20	4.30		3.66	0.05	uv	4.00
12/17/04	8.6	2.3	5.5	14.4	7.48	249.0	229.0		7.09	14.0	7.90	4.00	2.20	3.78		uv	19.00

CLYPAR

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/ NHIB	EFF TSS	EFF NH3		CL2 RESID	FECAL COLI
12/18/04	9.9	2.3	5.7	15.2	7.38	290.0	270.0		7.03	13.4	6.00	4.70		5.80		uv		4.00
12/19/04	9.6	2.2	5.8	14.7	7.42	264.0	241.0	27.20	7.18	12.9	6.00	4.80		4.00	0.07	uv		5.00
12/20/04	8.9	2.3	5.6	16.5	7.48	274.0	256.0	25.80	7.31	15.6	7.40	4.20		4.20	0.05	uv		3.00
12/21/04	8.6	2.3	5.5	15.1	7.42	280.0	235.0	26.70	7.25	15.3	7.60	3.90	1.90	4.01	0.07	uv		5.00
12/22/04	8.2	2.4	5.3	14.6	7.53	264.0	261.0	26.90	7.13	15.2	7.70	4.60	2.40	4.32	0.45	uv		6.00
12/23/04	8.4	2.2	5.3	13.9	7.64	350.0	252.0	29.60	7.11	15.9	7.50	5.70		5.47	0.12	uv		6.00
12/24/04	13.1	2.4	5.7	13.5	7.55	337.0	288.0		7.11	14.3	7.50	5.80	2.70	4.45		uv		5.00
12/25/04	8.8	2.2	5.2	15.4	7.50	323.0	291.0		7.27	15.4	7.60	5.70		4.25		uv		
12/26/04	9.6	2.3	5.5	13.5	7.45	296.0	253.0	28.60	7.08	15.3	7.50	7.00		6.63	0.43	uv		10.00
12/27/04	9.0	2.3	5.6	16.4	7.52	270.0	236.0	26.40	7.28	17.6	7.40	7.30	4.00	6.73	0.12	uv		15.00
12/28/04	8.3	2.4	5.6	14.4	7.50	294.0	224.0	26.80	7.10	15.4	7.90	7.80		7.86	0.06	uv		13.00
12/29/04	8.8	2.3	5.4	14.7	7.48	222.0	181.0	28.30	7.14	16.8	7.80	6.30	3.30	8.13	0.08	uv		7.00
12/30/04	8.3	2.4	5.5	15.3	7.46	263.0	176.0	28.00	7.30	16.0	7.60	7.50		8.65	0.08	uv		7.00
12/31/04	9.6	2.2	5.8	14.8	7.50	333.0	269.0		7.27	13.0	7.70	9.80	5.20	12.50		uv		2.00

Appendix B – Pro2D Model Calibration Results

Date	Max MGD	Min MGD	TOT MGD	INF Temp(C)	INF pH	INF BOD5	INF TSS	INF NH3	EFF pH	EFF Temp(C)	EFF D.O.	EFF BOD5	EFF BOD W/NH3B	EFF TSS	EFF NH3	CL2 RESID	FECAL COLI
9/20/04	11.4	2.9	6.2	19.2	7.34	194	243	18.3	7.25	19.5	7.9	4.4	2.60	4.46	0.05	uv	702
9/21/04	9.4	2.9	6.3	19.4	7.44	236	247	18.1	7.26	20.3	7.0	4.5		4.90	0.06	uv	706
9/22/04	9.9	3.3	6.6	16.5	7.44	176	190	22.0	7.23	19.2	7.0	3.5	2.60	4.67	0.10	uv	11
9/23/04	10.1	3.2	6.6	17.9	7.52	176	208	18.1	7.30	17.5	7.2	4.0		3.82	0.05	uv	21
9/24/04	9.4	3.1	6.4	18.5	7.36	212	177		7.10	17.9	8.6	3.9	2.60	4.35		uv	4
9/25/04	10.5	3.1	6.6	18.3	7.50	216	211		7.22	18.6	8.0	4.1		4.76		uv	6
9/26/04	10.3	3.1	6.5	18.3	7.45	194	222	19.5	7.12	18.7	7.2	3.0		3.63	0.09	uv	13
Average	10.1	3.1	6.5	18.6	7.44	188	214	19.2	7.21	18.8	7.6	3.9	2.7	4.34	0.07		209
10/9/04	10.4	3.2	6.6	17.4	7.44	212	183		7.24	17.9	8.9	3.6		4.25		uv	4
10/10/04	10.6	3.2	6.6	17.5	7.45	205	176	18.0	7.03	17.8	7.3	3.4		4.88	0.06	uv	12
10/11/04	9.6	3.1	6.7	17.5	7.43	195	177	21.8	7.31	18.0	7.8	5.5	3.5	5.00	0.06	uv	1340
10/12/04	9.2	3.0	6.6	17.8	7.47	186	172	25.4	7.32	17.7	7.1	4.8		5.29	0.09	uv	15
10/13/04	9.1	3.2	6.4	18.2	7.50	179	181	27.4	7.13	17.5	6.2	3.4		6.26	0.07	uv	6
10/14/04	9.4	3.2	6.3	17.3	7.44	206	200	18.3	7.26	17.3	7.4	3.1		4.18	0.06	uv	5
10/15/04	9.2	3.2	6.5	17.3	7.49	231	196		7.19	17.9	8.5	5.2		4.10		uv	4
Average	9.6	3.2	6.5	17.5	7.46	203	181	22.5	7.21	17.7	7.9	4.2	3.6	4.85	0.07		195
11/22/04	8.9	2.4	5.9	15.5	7.44	233	246	28.3	7.22	15.2	7.6	4.8	2.6	5.57	0.05	uv	18
11/23/04	8.6	2.2	5.4	16.5	7.46	341	229	23.6	7.18	16.4	7.2	5.0		5.36	0.06	uv	14
11/24/04	9.1	2.3	5.6	16.3	7.47	286	240	26.7	7.02	15.5	7.9	5.9	2.6	6.54	0.05	uv	21
11/25/04	10.9	2.5	5.9	15.9	7.45	321	289	23.4	7.12	15.3	7.9	5.6		4.90	0.04		14
11/26/04	9.0	2.5	5.5	16.1	7.48	279	193		7.18	15.4	7.8	4.5	2.5	4.34		uv	7
11/27/04	9.6	2.5	5.6	14.7	7.54	261	211		7.08	14.6	7.8	5.2		4.85		uv	7
11/28/04	9.2	2.6	5.7	15.2	7.46	254	166	27.2	7.31	14.7	7.7	5.4		5.08	0.04	uv	12
Average	9.3	2.4	5.7	15.5	7.47	282	228	25.9	7.16	15.3	7.7	5.2	2.6	5.23	0.05		13
12/23/04	8.4	2.2	5.3	13.9	7.64	350	252	29.6	7.11	15.9	7.5	5.7		5.47	0.12	uv	6
12/24/04	13.1	2.4	5.7	13.5	7.55	337	288		7.11	14.3	7.5	5.8	2.7	4.45		uv	5
12/25/04	8.6	2.2	5.2	15.4	7.50	323	291		7.27	15.4	7.6	5.7		4.25		uv	
12/26/04	9.6	2.3	5.6	13.5	7.45	295	253	26.6	7.08	15.3	7.5	7.0		6.63	0.43	uv	10
12/27/04	9.0	2.3	5.6	16.4	7.52	270	236	26.4	7.26	17.5	7.4	7.3	4.0	6.73	0.12	uv	15
12/28/04	8.8	2.4	5.6	14.4	7.50	294	224	26.8	7.10	15.4	7.9	7.8		7.86	0.06	uv	13
12/29/04	8.6	2.3	5.4	14.7	7.48	222	181	26.3	7.14	16.6	7.8	6.3	3.3	8.13	0.06	uv	7
Average	9.5	2.3	5.5	14.5	7.52	299	246	27.9	7.16	15.8	7.6	5.5	3.3	6.22	0.16		9

Date	AVG ATC	AVG BASIN VOLUME	TOTAL RETURN FLOW	AVG SOS	AVG SSC	TOTAL WASTE FLOW	AVG SSV	AVG VSC	TOT KSF	PREVIOUS UNITS PSU	PREVIOUS SLG AGE PSA	PRIMARY SLG CONC PSC	AER. BASIN MLSS	AER. BASIN MLVSS	RET. SLUDGE MLSS	RET. SLUDGE MLVSS	AER. BASIN D.O.	TOT AIR FLOW	CHLORINE USAGE	SO2 USAGE	DAILY KWH USAGE
09/20/04	3.1	2.4	4.02	16.6	6.2	0.084	180	52	0.0018	5.62	13.25	23	2043	83.91	4983	81.89	5.6	5447			15205
09/21/04	3.1	2.4	4.09	16.4	7.0	0.086	195	50	0.0040	5.21	14.24	16	2050		5286		4.5	2838			15604
09/22/04	3.3	2.4	3.99	16.1	7.0	0.097	200	50	0.0022	5.37	13.69	21	2270		5220		4.6	4096			13249
09/23/04	3.5	2.4	5.99	16.4	6.7	0.110	195	50	0.0041	6.01	12.20	21	2100		5013		5.1	4072			13314
09/24/04	3.2	2.4	4.06	15.4	6.0	0.105	170	47	0.0025	5.47	13.17	21	1570		4543		5.2	3791			12921
09/25/04	2.7	2.4	4.07	15.4	6.1	0.106	170	50	0.0043	5.42	13.19	19	1853		4517		5.1	4551			13051
09/26/04	2.5	2.4	4.03	14.9	6.1	0.104	175	50	0.0039	5.13	13.69	19	1920		4750		4.5	4403			13429
Average	3.1	2.4	4.04	15.9	6.4	0.098	184	50	0.0033	5.46	13.35	20	2031	83.91	4901	81.89	4.9	4166			13825
10/09/04	2.8	2.4	4.27	16.0	5.8	0.099	170	54	0.0033	4.88	12.70	16	1897		4373		5.1	3728			17000
10/10/04	2.8	2.4	4.23	16.3	5.6	0.098	185	56	0.0034	5.05	12.25	20	1953		4467		4.8	4375			17000
10/11/04	3.5	2.4	4.35	16.5	6.1	0.101	195	54	0.0025	4.86	12.65	21	1583	86.55	4500	83.70	4.6	3985			18000
10/12/04	2.8	2.4	4.40	15.7	6.1	0.099	200	59	0.0031	5.14	11.92	21	1893		4563		4.6	3843			17000
10/13/04	2.9	2.4	4.33	15.7	6.4	0.099	200	58	0.0045	5.14	11.91	20	1870		4370		4.8	3957			17000
10/14/04	3.1	2.4	5.13	15.5	5.6	0.102	195	55	0.0043	5.07	12.69	19	1953		4170		4.8	3812			17000
10/15/04	3.0	2.4	4.98	15.3	5.3	0.100	195	52	0.0039	5.33	11.55	20	1957		4353		5.2	3932			17000
Average	3.0	2.4	4.53	16.0	5.8	0.100	191	55	0.0036	5.07	12.15	20	1901	86.55	4402	83.70	4.8	3968			18557
11/22/04	3.1	2.4	4.67	16.5	5.9	0.119	195	48	0.0018	4.95	11.59	19	2019	84.57	4193	84.18	4.0	4320			13909
11/23/04	3.1	2.4	4.71	15.9	4.7	0.115	190	50	0.0030	5.16	11.04	20	2017		4023		4.1	3473			10861
11/24/04	3.2	2.4	4.74	16.7	5.3	0.115	185	48	0.0036	5.35	10.79	17	2119		4227		3.9	3797			12568
11/25/04	3.0	2.4	4.65	16.7	5.3	0.115	185	50	0.0038	5.22	9.51	19	2003		4586		4.6	4635			13498
11/26/04	3.0	2.4	4.77	17.0	5.5	0.119	195	50	0.0025	5.12	11.52	25	1956		4226		4.4	4079			13256
11/27/04	3.1	2.4	4.64	17.0	5.7	0.120	195	50	0.0022	4.91	11.68	27	2009		4186		4.2	3786			12753
11/28/04	3.1	2.4	4.69	16.6	5.8	0.116	200	52	0.0023	5.14	11.24	14	1963	83.68	4483	84.71	3.9	3793			12815
Average	3.1	2.4	4.72	16.2	5.4	0.112	192	50	0.0027	5.27	11.08	20	2016	84.13	4278	84.45	4.2	4012			12806
12/23/04	3.2	2.4	5.59	16.3	6.2	0.155	295	54	0.0088	4.19	9.43	20	1980		4283		3.9	3869			12591
12/24/04	3.3	2.4	11.16	16.7	6.0	0.155	270	55	0.0086	5.16	7.63	21	1919		4295		3.8	4639			12972
12/25/04	3.1	2.4	11.10	16.4	6.4	0.165	315	56	0.0085	4.88	8.05	36	1959		3745		3.9	4165			12063
12/26/04	3.3	2.4	11.38	16.5	5.9	0.164	320	57	0.0099	5.03	7.90	16	1853		4149		4.1	4492			12572
12/27/04	3.0	2.4	10.89	16.4	6.2	0.100	345	56	0.0041	4.79	8.23	30	2010	84.48	4395	85.20	4.1	4898			13006
12/28/04	3.3	2.4	11.28	16.5	6.3	0.144	353	56	0.0131	5.22	7.58	43	2076		4053		4.4	4558			12990
12/29/04	3.5	2.4	11.11	16.5	6.0	0.137	425	57	0.0017	5.33	7.90	40	2063		3503		4.2	4290			12516
Average	3.3	2.4	10.36	16.5	6.1	0.146	332	56	0.0075	4.94	8.15	30	1977	84.48	4060	85.20	4.1	4444			12692

Date	PRIM SLUDGE GALLONS	PRIM SLUDGE TS%	PRIM SLUDGE VS%	THICK. SLUDGE GALLONS	THICK. SLUDGE TS%	THICK. SLUDGE VS%	SLUDGE DRAWN (LBS/M)	DIG #1 SLUDGE LEVEL	DIG #1 COVER LEVEL	DIG #2 SLUDGE LEVEL	DIG #2 COVER LEVEL	METHANE CO2 OUT CONTENT	DIG TESTED #1 OR #2	DIG TS%	DIG VS%	DIGESTER DIG ALKALIN.	DIGESTER VOL ACIDS	DIG pH	SLUDGE OUT TS%	SLUDGE OUT VS%
9/20/04	41986	4.05	91.01	1793	3.06	74.55	65000	24.40	95.00	21.60	66.00		1	1.47	71.43	2040	110	6.98		
9/21/04	42390	1.97	84.61	3990	3.09	81.74	65000	24.40	95.00	21.30	64.00	48.00	1	1.47	69.77	1920	225	7.09	0.77	68.97
9/22/04	40125	2.85	81.65	2249	3.03	80.80		24.40	95.00	21.80	66.00		1	1.34	66.57	2040	327	6.77		
9/23/04	38305	2.68	81.43	4097	2.92	80.41	64500	24.50	95.00	23.60	95.00		1	1.42	68.09	2100	217	6.67		
9/24/04	39449	2.75	89.02	2523	2.85	81.10	64500	24.50	95.00	21.20	64.00		1	1.49	70.44	2300	512	6.47		
9/25/04	41952	2.88	82.89	4262	3.16	81.98	52000	24.50	95.00	29.80	82.00		1	1.67	75.83	2000	842	6.41		
9/26/04	37493	2.63	84.55	3861	2.96	80.41		24.50	95.00	21.10	63.00		1	1.74	66.37	2240	559	6.48		
Average	40200	2.78	83.17	3255	3.03	80.11	70200	24.45	95.00	21.86	65.71	48.00	1	1.51	70.70	2091	386	6.70	0.77	68.97
10/9/04	37878	1.91	80.00	3321	3.22	77.91		24.50	95.00	19.80	73.00		1	2.01	72.73	2500	538	6.74		
10/10/04	35428	3.14	82.14	3410	3.25	78.57		24.50	95.00	21.00	64.00		1	1.91	64.92	2480	551	6.79		
10/11/04	37159	2.66	86.54	2512	3.10	79.93	65000	24.40	95.00	23.20	92.00		1	1.74	70.00	2360	522	6.91	1.38	70.83
10/12/04	38443	2.64	85.11	3089	3.23	81.69	71500	24.40	95.00	22.10	87.00	38.00	1	1.60	72.52	2420	412	6.92		
10/13/04	37244	2.57	83.15	4457	1.84	82.35	104000	24.40	95.00	21.80	86.00		1	1.86	68.03	2500	426	6.93		
10/14/04	38102	2.54	87.50	4317	3.02	86.41	58500	24.40	95.00	19.50	76.00		1	1.59	77.55	2340	316	6.84	1.55	70.00
10/15/04	38703	2.61	79.61	3389	3.14	77.61	65000	24.40	95.00	19.30	76.00		1	1.43	70.73	2360	250	6.86	1.51	69.52
Average	37280	2.58	83.39	3572	2.93	80.60	72800	24.43	95.00	20.81	80.00	38.00	1	1.73	71.57	2423	438	6.85	1.58	69.78
11/22/04	42855	3.19	82.69	1819	3.07	85.18	91000	24.40	96.00	24.20	96.00		1	1.36	70.21	2640	37	7.05		
11/23/04	43945	2.65	87.36	3928	3.17	84.62	78000	24.40	96.00	21.60	85.00		1	1.27	72.09	2420	50	7.06		
11/24/04	33637	2.56	86.75	3584	2.50	83.16	91000	24.40	96.00	21.50	86.00		1	1.25	70.91	2640	41	7.06	1.21	73.77
11/25/04	44012	2.51	82.72	3548	3.14	85.71		24.40	96.00	18.90	74.00		1	1.21	72.88	2560	27	7.22		
11/26/04	43970	3.62	77.59	2300	3.18	86.21	91000	24.40	96.00	20.00	84.00		1	1.36	74.42	2660	55	7.02		
11/27/04	43970	3.67	85.71	2219	2.99	83.91		24.40	96.00	18.70	74.00		1	1.36	73.91	2540	55	6.95		
11/28/04	46627	2.03	85.48	2280	3.11	82.56		24.50	96.00	21.10	83.00		1	1.33	77.55	2640	50	6.95		
Average	43005	2.97	84.06	2697	3.02	84.67	87750	24.41	96.00	20.86	83.43	#DIV/0!	1	1.31	73.14	2517	45	7.04	1.21	73.77
12/20/04	48025	2.62	81.82	8769	3.03	81.93	32500	24.40	95.00	18.40	70.00		1	1.28	63.54	2550	50	7.20		
12/21/04	54862	2.33	83.52	5596	2.52	89.71		24.40	95.00	19.60	77.00		1	1.13	80.49	2600	41	7.22		
12/22/04	52335	4.39	84.00	8672	2.76	85.87		24.40	95.00	21.80	85.00		1	0.95	79.49	2880	46	7.17		
12/23/04	50247	2.20	84.85	9937	2.61	82.72		24.40	95.00	24.30	97.00		1	1.20	66.57	2940	50	7.19		
12/27/04	59667	5.28	83.54	4104	2.96	90.00	104000	25.10	98.00	23.10	89.00		1	1.91	73.17	2630	37	7.29		
12/28/04	53036	5.04	84.52	13683	2.53	82.72	105302	24.40	95.00	23.50	89.00	39.00	1	1.30	62.75	2650	23	7.32	1.35	66.67
12/29/04	69075	5.08	85.26	18084	2.58	84.34	114400	24.40	95.00	20.60			1	1.20	66.67	2680	44	7.25		
Average	54956	3.56	83.96	9708	2.87	85.33	88301	24.50	95.43	21.77	86.33	39.00	1	1.15	70.40	2578	42	7.23	1.35	66.67

Date	AVG BASIN VOLUME	AER. BASIN MLSS	TOTAL WASTE FLOW	RET. SLUDGE MLSS	TOT MGD	EFF TSS	CALC MCRT	PREVIOUS SLG AGE PSA	TOTAL RETURN FLOW	CALC % RETURN	THICK. SLUDGE GALLONS	THICK. SLUDGE TS%	THICK. SLUDGE PPD	WAS PPD	PERCENT WAS CAPTURE
9/20/04	2.40	2043	0.084	4983	6.2	4.46	11.00	14.24	4.02	64.8%	1793	3.06	458	3491	13.1%
9/21/04	2.40	2050	0.086	5286	6.3	4.90	10.15	13.69	4.09	64.9%	3990	3.09	1028	3791	27.1%
9/22/04	2.40	2270	0.097	5220	6.6	4.67	10.15	12.20	3.99	60.5%	2245	3.03	567	4223	13.4%
9/23/04	2.40	2100	0.110	5010	6.6	3.62	6.76	13.17	3.99	60.5%	4097	2.92	998	4596	21.7%
9/24/04	2.40	1970	0.105	4543	6.4	4.35	9.38	13.19	4.05	63.4%	2523	2.96	623	3978	15.7%
9/25/04	2.40	1863	0.105	4517	6.6	4.76	8.77	13.59	4.07	61.7%	4282	3.16	1128	3993	28.3%
9/26/04	2.40	1920	0.104	4750	6.5	3.63	8.51	12.75	4.03	62.0%	3561	2.96	953	4120	23.1%
Average	2.40	2031	0.099	4901	6.5	4.34	9.59	13.26	4.04	62.5%	3256	3.03	822	4028	20.6%
10/9/04	2.40	1897	0.099	4373	6.6	4.25	9.69	12.25	4.27	64.7%	3321	3.22	892	3611	24.7%
10/10/04	2.40	1853	0.096	4467	6.6	4.86	9.48	12.55	4.23	64.1%	3412	3.25	925	3651	25.3%
10/11/04	2.40	1863	0.101	4500	6.7	5.00	9.17	11.92	4.38	65.4%	2512	3.10	649	3791	17.1%
10/12/04	2.40	1893	0.099	4583	6.6	5.29	9.31	11.91	4.40	66.7%	3089	3.23	832	3784	22.0%
10/13/04	2.40	1873	0.099	4370	6.4	6.26	9.52	12.09	4.33	67.7%	4457	1.54	572	3608	15.9%
10/14/04	2.40	1963	0.102	4170	6.3	4.18	10.44	11.58	5.13	81.4%	4347	3.02	1087	3547	30.7%
10/15/04	2.40	1967	0.103	4353	6.5	4.10	9.35	12.03	4.98	76.6%	3599	3.14	1021	3739	27.3%
Average	2.40	1901	0.100	4402	6.5	4.85	9.68	12.06	4.53	69.5%	3572	2.93	854	3676	23.3%
11/22/04	2.40	2010	0.119	4193	5.9	5.57	9.08	11.04	4.87	82.5%	1619	3.07	415	4161	10.0%
11/23/04	2.40	2017	0.115	4023	5.4	5.35	9.56	10.79	4.71	87.2%	3028	3.17	801	3858	20.7%
11/24/04	2.40	2110	0.115	4227	5.6	6.54	9.70	9.51	4.74	84.6%	3584	2.50	747	4054	18.4%
11/25/04	2.40	2003	0.115	4586	5.9	4.90	8.65	11.52	4.65	78.8%	3648	3.14	955	4398	21.7%
11/26/04	2.40	1956	0.113	4226	5.5	4.34	8.92	11.66	4.77	86.7%	2500	3.18	663	4194	15.8%
11/27/04	2.40	2050	0.125	4196	5.6	4.65	8.53	11.24	4.64	82.9%	2219	2.99	553	4374	12.6%
11/28/04	2.40	1983	0.116	4493	5.7	5.06	8.66	11.35	4.69	82.3%	2280	3.11	591	4347	13.6%
Average	2.40	2018	0.118	4278	5.7	5.23	9.12	11.05	4.72	83.6%	2697	3.02	675	4198	16.1%
12/23/04	2.40	1930	0.159	4283	5.3	5.47	6.70	7.63	5.59	105.5%	8769	3.03	2221	5680	39.1%
12/24/04	2.40	1910	0.155	4296	5.7	4.45	5.64	8.06	11.16	195.8%	6596	2.52	1386	5553	25.0%
12/25/04	2.40	1950	0.165	3746	5.2	4.25	7.32	7.90	11.10	213.5%	8572	2.76	1973	5155	38.3%
12/26/04	2.40	1853	0.164	4146	5.5	6.63	6.22	8.23	11.38	206.9%	9937	2.61	2163	5671	38.1%
12/27/04	2.40	2010	0.100	4366	5.6	6.73	10.12	7.89	10.89	194.5%	4104	2.55	875	3666	23.9%
12/28/04	2.40	2076	0.144	4053	5.6	7.66	7.65	7.90	11.28	201.4%	13083	2.53	2761	4867	56.7%
12/29/04	2.40	2083	0.137	3503	5.4	8.13	9.45	6.29	11.11	205.7%	16864	2.59	3759	4002	94.2%
Average	2.40	1977	0.146	4060	5.5	6.22	7.77	7.99	10.36	188.0%	9706	2.67	2164	4942	45.0%

Facility Operating Parameters					
Item		Value			Value
Influent Wastewater	(Metric)	(Metric)	(Metric=US*K)	(US)	(US)
Flow	m3/day			MG/day	
Design Average		24,603	3785		6.500
Design Diurnal Peak		24,603	3785		6.500
Design Peaking Factor for WW Diurnal flow		1.0	1		1.0
Design Peaking Factor for WW Diurnal loads		1.0	1		1.0
Carbonaceous Five-Day Biochemical Oxygen Demand ($CBOD_5$)					
Design Average Concentration	mg/L	188	1	mg/L	188
Design Average Mass Loading	kg/day	4,621	0.4536	lb/day	10,188
Design Diurnal Peak Mass Loading	kg/day	4,621	0.4536	lb/day	10,188
Total Suspended Solids (TSS)					
Design Average Concentration	mg/L	214	1	mg/L	214
Design Average Mass Loading	kg/day	5,260	0.4536	lb/day	11,597
Design Diurnal Peak Mass Loading	kg/day	5,260	0.4536	lb/day	11,597
Volatile Suspended Solids (VSS)					
Percent VSS	%	83%	1	%	83%
Design Average Concentration	mg/L	178	1	mg/L	178
Design Average Mass Loading	kg/day	4,389	0.4536	lb/day	9,676
Design Diurnal Peak Mass Loading	kg/day	4,389	0.4536	lb/day	9,676
Total Kjeldahl Nitrogen (TKN as N)					
Design Average Concentration	mg/L	30	1	mg/L	29.8
Design Average Mass Loading	kg/day	732	0.4536	lb/day	1,613
Design Diurnal Peak Mass Loading	kg/day	732	0.4536	lb/day	1,613
Ammonia-Nitrogen (NH_3-N as N)					
Design Average Concentration	mg/L	19	1	mg/L	19.2
Design Average Mass Loading	kg/day	472	0.4536	lb/day	1,040
Design Diurnal Peak Mass Loading	kg/day	472	0.4536	lb/day	1,040
Total Phosphorus (as P)					
Design Average Concentration	mg/L	4.50	1	mg/L	4.5
Design Average Mass Loading	kg/day	111	0.4536	lb/day	244
Design Diurnal Peak Mass Loading	kg/day	111	0.4536	lb/day	244
Alkalinity (as $CaCO_3$)					
Design Average Concentration	mg/L	150	1	mg/L	150
Design Average Mass Loading	kg/day	3,687	0.4536	lb/day	8,129
Design Diurnal Peak Mass Loading	kg/day	3,687	0.4536	lb/day	8,129
Hydrogen Sulfide (H_2S)					
Design Average Concentration	mg/L	6	1	mg/L	6
Design Average Mass Loading	kg/day	147	0.4536	lb/day	325
Design Diurnal Peak Mass Loading	kg/day	147	0.4536	lb/day	325
Primary Clarifiers: Yes					
Primary Clarifiers?	Yes	1			
Total Area	m2	888	0.0929	sq.ft.	9,556
Overflow Rate	m/day		0.040747	gpd-sq.ft.	
Average		28	0.040747		690
Diurnal Peak		28	0.040747		690
Percent of COD filtrate that is colloidal	None	40%	1	%	40%
TSS Removal Efficiency at Average Conditions	%	65%	1	%	65%
TSS Removal Efficiency at Diurnal Peak Conditions	%	65%	1	%	65%
Primary Sludge Concentration	mg/L	27,800	1	mg/L	27,800

Facility Operating Parameters

Item		Value			Value
Secondary Treatment: Trickling Filter, Bioreactor & Clarifier					
		4			
Trickling Filter					
Coef. "k" in Velz Equation (English Units) =		0.03			0.030
Coef. "n" in Velz Equation =		0.50			0.50
Coef. "Theta" in Velz Equation =		1.035			1.035
Media Volume	m3	2,549	0.0283168	ft3	90,000
Media Depth	m	1.83	0.3048	ft	6
Media Specific surface area	m2/m3	49.21	0.3048	ft2/ft3	15
Recirculation Q (used in wetting Q = TF Influent Q+ recirculation)	m3/day	17,411	3785	MGD	4.600
TF Effluent Soluble BOD5	mg/L				
Average		50	1	days	50.4
Diurnal Peak		50	1	days	50.4
TF Effluent NH3-N	mg/L				
Average		23	1	days	22.8
Diurnal Peak		23	1	days	22.8
TF Solids Production in VSS (mg VSS in effluent/mg BOD5 rem)	mg/mg	0	1	mg/mg	-0.178
No Trickling Filter Clarifier is to be Configured					
Biological Process - Integrated with PBNR					
SRT	days	13.9	1	days	13.9
Nitrifier Minimum SRT (SRT_{min})	days	2.0	1	days	2.0
DO	mg/L	4.9	1	mg/L	4.9
Temperature in the Biological Process	oC	19.6	Special	oF	65.5
Simultaneous Denitrification	%	46%	1	%	46%
SVI	ml/g	188	1	ml/g	188
Biosolids Production Rates					
Net Yield (mg TSS/mg BOD_5)	mg/mg	1.11	1	lb/lb	1.11
Volatile Fraction	%	89.57%	1	%	89.57%
Active Fraction	%	26.43%	1	%	26.43%
Nitrifier Fraction	%	2.18%	1	%	2.18%
Nitrogen Content, NVSS	%	2.87%	1	%	2.87%
Phosphorus Content, PVSS	%	0.27%	1	%	0.27%
Process Oxygen Requirements					
Carbonaceous AOR/BOD5 - wt/wt	kg/kg	0.96	1	lb/lb	0.96
Total AOR/BOD% - wt/wt	kg/kg	1.88	1	lb/lb	1.88
AOR (wt/day)	kg/day			lb/day	
Average		3,761	0.4536		8,291
Diurnal Peak		4,176	0.4536		9,205
AOR	mg/L-hr			mg/L-hr	
Average		15	1		15
Diurnal Peak		16.3	1		16.3
Bioreactor					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
HRT	hr	10.4	1	hr	10.4
% non-aerobic	%	15%	1		15%
% aerobic	%	85%	1		85%
Average MLSS Concentration	mg/L	2,893	1	mg/L	2,893
Bioreactor Clarifier					
Total Area	m2	1,345	0.0929	sq.ft.	14,478
Overflow Rate	m/day			gpd-sq ft	
Average		18	0.040747		453
Diurnal Peak		18	0.040747		453
Effluent TSS	mg/L			mg/L	
Average		4	1		4.3
Diurnal Peak		4	1		4.3
Underflow Rate					
Average Flow Ratio	%	63%	1		63%
Average Rate	m/day	12	0.040747	gpd-sq.ft.	283
Peak Flow Ratio	%	63%	1		63%
Peak Rate	m/day	12	0.040747	gpd-sq.ft.	283
Solids Loading Rate	kg/m2-day		4.883	lb/day sq.ft.	
Average		66	4.883		13.6
Diurnal Peak		66	4.883		13.6
Limiting Solids Loading Rate	kg/m2-day	182	4.883	lb/day-sq.ft.	37
Return sludge rate at which limiting solids rate can be achieved					
RAS Flow Rate	m3/day	25369	3785	MGD	7
Percent of Influent to Bioreactor	%	1		%	1
Underflow Concentration	mg/L			mg/L	
Average		5,620	1		5,620
Diurnal Peak		5,642	1		5,642

Facility Operating Parameters						
Item		Value				Value
WAS Thickening	No	None				
WAS Thickener?		Yes	1			
Location of WAS Thickener recycle to plant: Headworks			1			
Solids Capture		%	20%	1	%	20%
Thickened Sludge Concentration		mg/L	30,300	1	mg/L	30,300
Hours/Day of Operation			24	1		24
Days/Week of Operation			7	1		7
Solids Digestion: Anaerobic Only						
Anaerobic Digestor						
Total Bioreactor Volume		m3	10,702	3785	MG	2.83
Active Bioreactor Volume		m3	8,027	3785	MG	2.12
SRT		days	45.4	1	days	45.4
Volatile Solids Loading - wt VSS/vol-day		kg/m3-day	0.52	16.06	lb/ft3-day	0.033
Volatile Solids Reduction		%	50%	1	%	50%
Methane Production		m3/day	1,056	0.0283	ft3/day	37298.6
Percent P Released that is Precipitated as Struvite		%	30%	1	%	30%
Digester Gas Methane Content		%	54%	1	%	54%
Digester Gas Production		m3/day	1,955	0.0283	ft3/day	69071.0
Digester Gas Production (vol/wt volatile solids destroyed)		m3/kg	0.93	0.06226	ft3/lb	14.9

Mass Balance for Average Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Trickling Filter Influent (TFI)	Trickling Filter Effluent (TFE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Thickened PSD (TPSD)	Combined Sludge (CS)	Aerobic Digester Effluent (ADE)	Anaerobic Digester Effluent (AnDE)	WAS Thickening Recycle (WSR)
Flow (gallons/day)	8,550,906	6,595,135	6,553,188	6,553,108	6,553,185	6,553,136	10,487,749	10,487,749	4,033,749	6,354,149	6,354,142	42,898	96,650	3,760	42,859	49,748	49,749	49,749	98,390
Carbonaceous BOD5 (lb/day)	10,179	10,795	6,572	6,572	4,411	4,411	41,606	31,898	31,082	50	50	4,123	769	158	4,123	4,279	4,279	9	913
Particulate	5,652	5,922	1,994	1,594	75	75	916	701	683	1	1	3,702	17	3	3,702	3,706	3,700	0	13
Heterotrophs	9	902	211	211	1,591	1,531	40,668	31,170	30,356	37	37	391	752	153	391	544	544	0	593
PAOs	0	0	0	0	0	0	8	4	4	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Filtrate	4,497	4,490	4,467	4,407	2,734	2,734	20	20	6	12	12	29	0	0	29	29	29	9	0
COD (lb/day)	21,594	26,399	14,498	14,489	11,302	11,372	329,757	234,620	227,782	1,451	1,451	11,858	5,958	1,142	11,070	13,040	13,040	6,912	4,497
Particulate Bio	6,923	8,348	3,132	3,132	118	118	1,642	1,259	1,227	1	1	5,816	30	6	5,810	5,822	5,822	106	24
Particulate Non-Bio	4,035	7,852	2,794	2,794	3,329	3,329	214,888	164,709	160,553	195	195	5,199	3,074	607	5,190	6,665	5,865	6,204	3,197
Heterotrophs	0	1,194	418	418	2,427	2,427	80,907	61,636	60,276	73	73	776	1,450	303	770	1,078	1,079	0	1,560
Autotrophs	0	98	34	34	0	0	6,547	5,006	4,907	6	6	64	120	25	64	89	88	0	99
PAOs	0	0	0	0	0	0	17	13	13	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Filtrate Bio	7,091	7,002	7,016	7,019	4,325	4,325	31	31	12	19	19	48	0	0	45	45	45	15	0
Filtrate Non-Bio	1,094	1,112	1,104	1,104	1,104	1,104	1,209	1,908	734	1,156	1,155	7	18	1	7	8	8	9	17
TSS (lb/day)	11,587	15,328	5,355	5,355	4,876	4,876	252,943	193,895	189,004	230	230	8,884	4,579	850	8,894	10,913	10,913	5,638	3,729
Biodegradable	7,393	7,413	2,595	2,595	89	89	1,360	1,043	1,017	1	1	4,819	25	5	4,819	4,024	4,804	154	20
Non-Biodegradable	4,194	6,944	2,395	2,305	2,769	2,731	179,210	127,374	133,909	193	193	4,449	3,315	673	4,449	5,122	5,122	5,285	2,842
Heterotrophs	0	969	346	346	2,011	2,011	66,833	51,201	48,939	61	61	643	1,238	251	643	894	894	0	993
Autotrophs	0	82	29	29	0	0	5,557	4,222	4,115	5	5	53	102	21	53	74	74	0	81
PAOs	0	0	0	0	0	0	14	11	11	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	15	14	14	0	0	0	0	0	0	0	0	0	0
VSS (lb/day)	8,667	12,086	4,605	4,530	4,136	4,135	222,890	170,803	166,502	202	200	8,426	4,124	837	8,426	9,260	9,252	4,819	3,288
Biodegradable	5,264	6,302	2,206	2,206	83	83	1,224	932	915	1	1	4,026	23	5	4,036	4,101	4,101	131	19
Non-Biodegradable	3,364	5,783	2,014	2,014	2,343	2,343	160,211	122,510	119,712	146	148	3,739	2,263	602	3,739	4,341	4,341	4,480	2,262
Heterotrophs	0	841	294	294	1,709	1,709	55,806	43,549	42,448	52	52	547	1,051	213	547	760	760	0	837
Autotrophs	0	69	24	24	0	0	4,081	3,585	3,495	4	4	45	87	18	45	63	63	0	69
PAOs	0	0	0	0	0	0	12	9	9	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	1,611	1,708	1,449	1,446	1,459	1,439	6,552	5,134	4,918	95	95	218	122	24	259	284	284	254	87
NH_3-N (lb-N/day)	1,046	1,040	1,033	1,033	1,248	1,249	32	32	12	19	19	7	0	0	7	7	7	152	0
Particulate Bio Org N	183	199	66	66	2	2	4	3	3	0	0	123	0	0	123	123	123	7	0
Non-Bio Part Org N	100	152	53	53	53	53	3,427	2,627	2,561	3	3	99	63	13	99	111	111	125	51
Heterotrophs	0	42	15	15	85	85	2,849	2,177	2,122	3	3	27	53	11	27	38	38	0	42
Autotrophs	0	3	1	1	0	0	234	179	175	0	0	2	4	1	2	3	3	0	3
PAOs	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	66	67	66	66	66	66	115	113	44	69	69	0	1	0	0	0	0	0	1
Soluble Bio Org N	215	215	215	215	5	5	0	0	10	0	0	1	0	0	1	1	1	0	0
NO_x-N (lb-N/day)	0	10	10	10	10	10	1,059	1,056	407	641	641	0	10	0	0	0	0	0	10
TP (lb-P/day)	244	270	191	191	191	191	2,010	1,602	1,414	153	153	81	35	7	81	87	87	87	25
Bio Particulate	60	50	22	22	1	1	1	1	1	0	0	41	0	0	41	41	41	1	0
Non-Bio Particulate	34	51	18	18	18	18	1,142	876	854	1	1	33	21	4	33	37	37	53	17
Heterotrophs	0	8	3	3	17	17	566	435	424	1	1	5	11	2	5	8	8	0	9
Autotrophs	0	1	0	0	0	0	47	36	35	0	0	0	1	0	0	1	1	0	1
PAOs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	0	0	0	0
Ortho-PO_4	147	149	148	148	156	156	250	250	95	151	151	1	2	0	1	1	1	33	2
Alkalinity (lb/day as $CaCO_3$)	8,121	8,156	8,106	8,105	8,106	8,105	4,040	4,043	1,556	2,449	2,449	53	38	1	53	55	55	547	37
H_2S (lb/day)	325	327	325	325	0	0	0	0	0	0	0	2	0	0	2	2	2	19	0
BOD_5 (mg/L)	187.6	195.0	122.1	120.1	80.7	80.7	475.8	364.9	924.2	0.9	0.94	11,524	924	4,932	0	10,979	10,979	24	786
COD (mg/L)	403.4	480.0	265.4	265.4	206.9	206.9	3,497.0	2,685.9	6,773.3	27.4	27.4	33,139	6,776	38,416	0	33,457	33,457	10,452	6,013
TSS (mg/L)	213.6	276.7	98.2	98.2	89.3	89.3	2,892.0	2,217.6	5,620.2	4.3	4.34	27,800	5,629	30,300	0	28,001	28,001	14,270	4,555
VSS (mg/L)	179.4	235.0	83.1	83.1	75.7	75.7	2,549.7	1,954.5	4,953.5	3.8	3.8	23,514	4,963	26,795	0	23,771	23,771	11,660	4,102
TKN (mg-N/L)	[illegible]	31.1	26.5	26.5	26.7	26.7	75.1	58.7	146.2	1.8	1.8	724	146	781	0	720	726	726	121
NH_3-N (mg-N/L)	19.2	18.9	18.6	18.9	22.8	22.8	0.4	0.4	0.4	0.4	0.37	18.9	0.4	0.4	0.0	17.4	17.4	389.0	0.4
NO_x-N (mg-N/L)	0.0	0.2	0.2	0.2	0.2	0.2	12.1	12.1	12.1	12.1	12.1	0.0	12.1	12.1	0.0	1.1	1.1	0.0	12.1
TP (mg-P/L)	4.5	4.9	3.5	3.5	3.5	3.5	23.0	18.3	42.0	2.9	2.9	225.0	42.0	224.1	0.0	224.2	224.2	224.2	35.3
Alkalinity (mg/L as $CaCO_3$)	148.4	148.4	148.4	148.4	148.4	148.4	46.2	46.0	46.2	46.2	46.2	148.4	46.2	46.2	0.0	140.1	140.1	1,388.4	46.2
H_2S (mg/L)	6.9	5.9	5.9	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	5.5	5.5	59.0	0.0

Mass Balance for Diurnal Peak Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Trickling Filter Influent (TFI)	Trickling Filter Effluent (TFE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS
Flow (m3/day)	[illegible]	6,695,193	6,380,197	5,653,197	6,353,197	6,353,197	10,848,945	10,848,945	4,495,748
Carbonaceous BOD (lb/day)	10,179	10,724	6,872	6,672	4,411	4,411	25,265	9,027	18,850
Particulate	5,682	5,690	1,994	1,996	75	75	0	8,270	0
Heterotrophs	0	642	211	211	1,561	1,561	25,257	5	18,947
PAOs	0	0	0	0	0	0	2	0	2
PHA	0	0	0	0	0	0	0	9	5
Filtrate	4,497	4,497	4,497	4,497	2,754	2,754	6	1,795	2
COD (lb/day)	21,984	25,296	14,498	14,496	11,302	11,302	310,851	393,757	232,584
Particulate Bio	6,223	8,846	3,132	3,132	116	116	0	0	0
Particulate Non-Bio	4,605	7,262	2,794	2,704	3,326	3,326	250,830	359,645	186,183
Heterotrophs	0	1,194	416	416	2,427	2,427	55,101	31,818	37,594
Autotrophs	0	98	34	34	0	0	6,191	5,202	6,144
PAOs	0	0	0	0	0	0	0	4	4
PHA	0	0	0	0	0	0	0	0	0
Filtrate Bio	7,081	7,052	7,016	7,016	4,325	4,325	5	5	3
Filtrate Non-Bio	1,094	1,112	1,104	1,104	1,104	1,104	1,795	198,812	690
TSS (lb/day)	11,387	16,328	5,385	5,205	4,877	4,877	255,831	172,449	192,604
Biodegradable	7,293	7,413	2,592	2,585	98	95	0	139,442	0
Non-Biodegradable	4,194	6,214	2,395	2,605	2,764	2,756	208,524	27,048	156,428
Heterotrophs	0	932	245	345	2,011	2,011	41,505	4,477	31,138
Autotrophs	0	32	28	20	0	0	5,785	3	5,091
PAOs	0	0	0	0	0	0	5	0	4
PHA	0	0	0	0	0	0	0	5,490	0
Poly-P	0	0	0	0	0	0	8	41	5
VSS (lb/day)	9,869	12,055	4,535	4,638	4,136	4,136	217,744	5,454	153,343
Biodegradable	6,284	6,302	2,209	2,200	80	80	0	3,773	0
Non-Biodegradable	3,594	5,753	2,014	2,014	2,243	2,243	176,889	1,232	132,545
Heterotrophs	0	911	294	294	1,709	1,709	20,282	221	20,457
Autotrophs	0	20	24	24	0	0	5,762	0	4,327
PAOs	0	0	0	0	0	0	4	106	3
PHA	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	1,311	1,328	1,443	1,446	1,445	1,449	7,324	1,508	5,297
NH_4-N (lb-N/day)	1,040	1,040	1,003	1,003	1,206	1,236	41	933	15
Particulate Bio Org N	167	150	58	55	2	1	0	0	0
Non-Bio Part Org N	102	152	53	53	53	53	4,026	277	3,622
Heterotrophs	0	42	12	12	80	80	1,194	210	1,323
Autotrophs	0	3	1	1	0	0	256	14	218
PAOs	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	59	57	56	56	55	55	105	2	41
Soluble Bio Org N	215	216	215	215	5	5	0	239	0
NO_x-N (lb-N/day)	0	10	10	10	10	10	1,101	2,632	423
TP (lb-P/day)	244	272	191	191	191	191	1,080	0	712
Bio Particulate	53	33	22	22	1	1	0	0	0
Non-Bio Particulate	34	51	18	18	18	18	338	0	291
Heterotrophs	3	4	3	3	17	17	353	3	255
Autotrophs	0	1	0	0	0	0	55	0	43
PAOs	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	5	5	2	0	2
Ortho-PO_4	147	149	148	148	156	156	208	0	111
Alkalinity (lb/day as $CaCO_3$)	8,121	8,159	8,105	8,105	8,105	8,105	2,292	0	687
H_2S (lb/day)	325	325	323	323	0	0	0	0	0
BOD_5 (mg/L)	187.6	192.3	122.1	122.1	80.7	80.7	284.9	91.1	556.0
COD (mg/L)	403.8	480.0	265.4	265.4	209.9	209.9	3,502.3	4,097.5	5,811.5
TSS (mg/L)	213.9	279.7	99.2	96.2	89.3	89.3	2,882.0	1,242.4	5,642.3
VSS (mg/L)	178.4	235.8	83.1	83.1	75.7	75.7	2,452.6	91.4	4,783.5
TKN (mg-N/L)	29.7	31.1	26.5	26.5	25.5	26.5	80.2	29.3	154.8
NH_4-N (mg-N/L)	19.2	18.8	18.9	19.8	22.5	22.5	0.5	19.2	0.3
NO_3-N (mg-N/L)	0.0	0.2	0.2	0.2	0.2	0.2	12.4	27.2	12.4
TP (mg-P/L)	0.0	0.0	0.0	3.5	3.5	3.5	12.3	0.0	20.8
Alkalinity (mg/L as $CaCO_3$)	149.8	148.4	148.4	148.4	148.4	148.4	29.2	0.0	29.2
H_2S (mg/L)	6.0	6.0	6.8	6.0	0.0	0.0	0.0	0.0	0.0

Constituent	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Thickned PSD (TPSD)	Combined Sludge (CS)	Aerobic Digester Effluent (ADE)	Anaerobic Digester Effluent (ANDE)	WAS Thickening Recycle (WSR)
Flow (m3/day)	6,435,564	6,409,364	42,969	93,630	3,757	42,069	45,748	46,749	45,749	[illegible]
Carbonaceous BOD (lb/day)	20	25	4,129	789	156	4,123	4,276	4,276	0	[illegible]
Particulate	0	0	3,702	17	1	3,702	3,755	3,700	0	[illegible]
Heterotrophs	22	22	391	752	150	391	544	544	0	329
PAOs	0	9	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Filtrate	3	3	29	0	0	29	22	22	0	0
COD (lb/day)	1,377	1,377	11,826	5,639	1,141	11,986	13,040	13,040	6,412	4,417
Particulate Bio	5	5	5,610	30	0	5,815	5,822	5,822	136	24
Particulate Non-Bio	228	229	5,185	3,874	807	5,180	5,935	5,085	6,204	3,167
Heterotrophs	46	46	770	1,422	300	776	1,079	1,079	0	1,169
Autotrophs	7	7	64	123	24	64	59	98	0	53
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	4	0	0	0	0	0
Filtrate Bio	5	5	45	0		45	46	46	15	0
Filtrate Non-Bio	1,000	1,000	7	18		7	8	9	5	17
TSS (lb/day)	234	234	9,254	4,078	950	9,504	10,913	10,913	5,505	3,728
Biodegradable	0	0	4,819	25	5	4,810	4,524	4,024	194	10
Non-Biodegradable	100	100	4,440	3,315	870	4,440	5,122	5,122	5,055	2,945
Heterotrophs	38	38	642	1,200	251	643	884	694	0	960
Autotrophs	8	5	53	102	21	53	74	74	0	51
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	0	0	0
VSS (lb/day)	186	192	8,422	4,174	807	8,420	9,255	9,255	4,018	3,210
Biodegradable	0	0	4,096	23	5	4,096	4,101	4,101	131	10
Non-Biodegradable	161	161	3,735	2,963	802	3,729	4,341	4,341	4,466	2,202
Heterotrophs	32	32	547	1,051	210	547	760	760	0	317
Autotrophs	5	5	45	87	18	45	63	63	0	45
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	97	97	259	122	24	259	284	284	254	77
NH_4-N (lb-N/day)	25	25	7	0	0	7	7	7	152	0
Particulate Bio Org N	0	0	123	0	0	123	123	123	7	0
Non-Bio Part Org N	4	4	99	62	13	99	111	111	125	51
Heterotrophs	3	0	27	22	11	27	29	36	0	12
Autotrophs	0	0	2	4	1	2	2	2	0	0
PAOs	0	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	65	65	0	1	5	0	0	0	0	1
Soluble Bio Org N	0	0	1	0	0	1	1	1	0	0
NO_x-N (lb-N/day)	608	608	0	10	0	0	0	0	0	0
TP (lb-P/day)	176	176	61	32	1	61	67	67	67	78
Bio Particulate	0	0	41	0	0	41	41	41	1	0
Non-Bio Particulate	0	0	33	21	4	33	37	37	53	17
Heterotrophs	0	0	5	11	0	5	6	6	0	5
Autotrophs	0	0	0	1	0	0	1	1	0	1
PAOs	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	0	0	0
Ortho-PO_4	176	176	1	2	0	1	1	1	23	2
Alkalinity (lb/day as $CaCO_3$)	1,574	1,574	53	35	1	53	53	55	342	37
H_2S (lb/day)	0	0	2	0	0	2	2	2	15	0
BOD_5 (mg/L)	9.5	9.5	11,504	924	4,082	0	10,979	10,271	24	789
COD (mg/L)	21.5	25.5	33,193	3,773	33,422	0	33,457	33,457	18,450	5,813
TSS (mg/L)	4.3	4.3	27,800	3,623	30,300	0	28,001	28,001	14,010	4,984
VSS (mg/L)	3.7	3.7	23,514	3,063	28,707	0	23,777	23,777	11,850	4,192
TKN (mg-N/L)	1.5	1.5	724	146	787	0	728	728	729	[illegible]
NH_4-N (mg-N/L)	0.5	0.3	18.9	0.4	0.4	0.0	17.4	17.4	560.0	0.4
NO_3-N (mg-N/L)	12.4	12.4	0.2	12.1	12.1	0.0	1.1	1.1	0.0	12.1
TP (mg-P/L)	3.3	3.3	225.9	42.6	213.8	0.0	224.1	224.2	[illegible]	23.2
Alkalinity (mg/L as $CaCO_3$)	23.2	28.2	146.4	45.2	48.2	0.0	140.1	140.1	1,360.4	49.2
H_2S (mg/L)	0.0	0.0	5.9	0.0	0.0	0.0	5.5	5.0	50.0	0.0

Summary Information			
Total MLSS Inventory	68,263 lbs	Total COD Removed	5,858 lbs/day
Total MLVSS Inventory	61,140 lbs	Food Applied to MLSS Inventory Ratio	0.10 COD/MLSS
MLSS/MLVSS Ratio	1.12	Aeration Information	
Total Required WAS Rate	4,918 lbs MLSS/day	Total AOR	9,725 lbs O2/day
or	4,410 lbs MLVSS/day	Total SOR	55,640 lbs O2/day
Observed Mass Yield	0.64 MVLSS/COD	Total Required Air Rate	5,883 scfm
		Simultaneous Denitrification	45.9%

	Component Concentrations	Units	Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Enter Reactor Number to use this Column of Data for the Original Guess				1	2	3	4	5	6	7	8					
S_{O2}	Dissolved Oxygen	mg O2/L	0.0	0.0	0.0	4.9	0.0	4.9	0.1	4.9							
S_F	Soluble Fermentable Substrates	mg COD/L	28.5	0.3	0.5	0.3	1.0	0.3	1.1	0.3							
S_A	Soluble Fermentation Products	mg COD/L	19.0	0.0	0.5	0.0	0.6	0.0	0.7	0.0							
S_I	Soluble Inerts	mg COD/L	20.2	21.8	21.8	21.8	21.8	21.8	21.5	21.8							
S_{NH4}	Soluble Ammonia N	mg N/L	22.8	0.4	7.89	0.2	5.2	0.3	4.3	0.4							
S_{N2}	Dissolved Nitrogen Gas	mg N/L	0.0	10.3	11.2	11.5	10.6	11.0	10.1	10.3							
S_{NO3}	Soluble Nitrate/Nitrite N	mg N/L	0.2	12.1	3.5	11.2	5.4	11.8	6.2	12.1							
S_{PO4}	Soluble Inorganic Phosphorus	mg P/L	2.8	2.9	2.8	2.5	2.8	2.9	2.9	2.9							
S_{ALK}	Alkalinity	moles/m³	3.0	0.9	2.1	1.0	1.7	1.0	1.5	0.9							
X_I	Inert Particulates	mg COD/L	50.8	4,774	3,136	3,142	3,046	3,351	1,582	1,564							
X_S	Slowly Biodegradable Substrate	mg COD/L	33.6	36.9	37.3	22.9	26.2	17.1	21.1	14.4							
X_H	Heterotrophic Organisms	mg COD/L	44.4	1,722	1,182	1,173	889	875	713	707							
X_{PAO}	Phosphate Accumulating Organisms	mg COD/L	0.0	0.4	0.3	0.3	0.2	0.2	0.2	0.2							
X_{PP}	Polyphosphate	mg P/L	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0							
X_{PHA}	PAO Storage Products	mg COD/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
X_{AUT}	Autotrophic Organisms	mg COD/L	0.0	147.7	98.2	97.1	72.0	72.6	57.8	58.3							
X_{TSS}	Total Suspended Solids (MLSS)	mg/L	115.5	5,620	3,714	3,392	2,775	2,700	2,220	2,218							
X_{MeOH}	Metal Hydroxides	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
X_{MeP}	Metal Phosphates	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
	MLVSS	mg COD/L		5,791	4,452	4,424	3,304	3,319	2,673	2,654							
	Oxygen Consumed	mg O2/(L-day)		[illegible]	0	500	211	421	232	393							
	Nitrate Consumed	mg NO3-N/(L-day)		[illegible]	195.0	2.5	134.3	1.9	104.3	1.6							
		Alkalinity Limited?															
	Reactor Information																
	Reactor Volume	gallons			141,375	601,125	141,375	601,125	141,375	601,125	0	0	0	0	0	0	0
	AOR, Biological	lbs O2/day			0	3,340	243	2,812	333	2,564	0	0	0	0	0	0	0
	AOR, Liquid	lbs O2/day			0	253	-250	337	-335	421	0	0	0	0	0	0	0
	Total AOR	lbs O2/day			0	3,593	-1	3,149	-2	2,985	0	0	0	0	0	0	0
	Aeration Alpha Value				0.50	0.60	0.50	0.60	0.50	0.60	0.60	0.50	0.60	0.50	0.50	0.60	0.50
	SOR/AOR Ratio				2.421	5.721	2.040	5.721	2.050	5.721	2.026	2.026	2.026	2.025	2.026	2.025	2.025
	SOR	lbs O2/day			0	20,555	-2	18,015	-3	17,075	0	0	0	0	0	0	0
	SOTE				25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
	Required Air Rate	SCFM			0	3,251	-4	2,676	-4	2,775	0	0	0	0	0	0	0
	Is Required Diffuser Density Too High?																
	Required Mixing Air @ 0.12 scfm/ft2	SCFM			0	244	0	244	0	244	0	0	0	0	0	0	0
	MLVSS	mg/L		5,004	3,327	3,306	2,464	2,475	1,993	1,993	0	0	0	0	0	0	0
	Flow Balance																
	Raw Feed Into Reactor	mgd	3.45		2.15		2.15		2.15								
	Flow from Previous Reactor	mgd				6.18	6.15	8.34	8.34	10.49							
	Recirculation Into Reactor	mgd															
	From Reactor																
	RAS Into Reactor	mgd		4.00	4.00												
	Other Flows Into Reactor	mgd	0.00														
	Effluent From Reactor	mgd			6.18	6.15	8.34	8.34	10.49	10.49							
	Waste Activated Sludge	mgd		0.105													

Select Units for Physical Plant Definition	
Metric (M) or US (U)?	u

Iron Addition Reactor:			1
Iron Addn?	Flow gpd	Xmech	Selk
FALSE	FALSE	FALSE	FALSE

Definition of the Physical Plant		PRO2D	
How many reactors (up to 42)	6		
Enter the Solids Retention Time (SRT)	13.9 Days	SRT	13.9
Enter the Average Total Flow Rate	6.65 mgd	% Anaerobic	85%
Enter the RAS Ratio (% of Plant Influent)	65%	% Anoxic	15%
	4.18 mgd	Temperature oC	19
Wastage Location - (A)t Reactors or Clarifier (U)/F	u	Total Volume gallons	2,927,500

Aeration Data		Est. Diffuser Design (Sanitaire Membranes)	
Aeration Basin Side Water Depth	16 feet	Design Condition	Ave
Maximum Water Temperature	25 °C	Est. Diffuser Air Rate	1.5 scfm/diffuser
BETA Correctional Factor	0.95	Peaking Capability	267%
Plant Altitude	4,500 feet	Estimated SOTE	36%
THETA - K_La Temp. Corr. Factor	1.024		

System Configuration			Reactor														
Component	Units	TOTAL	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reactor Volume	gallons	2,927,500	141,375	801,125	141,375	801,125	141,375	801,125									
Fraction	% of Total		5%	28%	5%	28%	5%	28%									
Dissolved Oxygen	mg/L			4.90		4.90		4.90									
Reactor Feed																	
Raw Feed	% of Total	100%	33%		33%		33%										
RAS	% of Total RAS	100%	100%														
Recirculation From Reactor	% of Raw Feed (Enter Number)																
Other Inflows (such as methanol, dewatering filtrate, or thickener return)																	
Flow	gpd																
S_{O2}	mg O_2/L																
S_f	mg COD/L																
S_A	mg COD/L																
S_I	mg COD/L																
S_{NH}	mg N/L																
S_{NO}	mg N/L																
S_{NO3}	mg N/L																
S_{PO4}	mg P/L																
S_{ALK}	moles/m3																
X_I	mg COD/L																
X_S	mg COD/L																
X_H	mg COD/L																
X_{PAO}	mg COD/L																
X_{PP}	mg P/L																
X_{PHA}	mg COD/L																
X_{AUT}	mg COD/L																
X_{TSS}	mg/L																
X_{MeOH}	mg/L																
X_{MeOH}	mg/L																

Facility Operating Parameters					
Item		Value			Value
Influent Wastewater	(Metric)	(Metric)	(Metric=US*F	(US)	(US)
Flow	m3/day			MG/day	
Design Average		24,603	3785		6.500
Design Diurnal Peak		24,603	3785		6.500
Design Peaking Factor for WW Diurnal flow		1.0	1		1.0
Design Peaking Factor for WW Diurnal loads		1.0	1		1.0
Carbonaceous Five-Day Biochemical Oxygen Demand ($CBOD_5$)					
Design Average Concentration	mg/L	203	1	mg/L	203
Design Average Mass Loading	kg/day	4,990	0.4536	lb/day	11,001
Design Diurnal Peak Mass Loading	kg/day	4,990	0.4536	lb/day	11,001
Total Suspended Solids (TSS)					
Design Average Concentration	mg/L	181	1	mg/L	181
Design Average Mass Loading	kg/day	4,449	0.4536	lb/day	9,806
Design Diurnal Peak Mass Loading	kg/day	4,449	0.4536	lb/day	9,806
Volatile Suspended Solids (VSS)					
Percent VSS	%	83%	1	%	83%
Design Average Concentration	mg/L	151	1	mg/L	151
Design Average Mass Loading	kg/day	3,712	0.4536	lb/day	8,184
Design Diurnal Peak Mass Loading	kg/day	3,712	0.4536	lb/day	8,184
Total Kjeldahl Nitrogen (TKN as N)					
Design Average Concentration	mg/L	35	1	mg/L	34.9
Design Average Mass Loading	kg/day	857	0.4536	lb/day	1,890
Design Diurnal Peak Mass Loading	kg/day	857	0.4536	lb/day	1,890
Ammonia-Nitrogen (NH_3-N as N)					
Design Average Concentration	mg/L	22	1	mg/L	22.5
Design Average Mass Loading	kg/day	553	0.4536	lb/day	1,219
Design Diurnal Peak Mass Loading	kg/day	553	0.4536	lb/day	1,219
Total Phosphorus (as P)					
Design Average Concentration	mg/L	4.50	1	mg/L	4.5
Design Average Mass Loading	kg/day	111	0.4536	lb/day	244
Design Diurnal Peak Mass Loading	kg/day	111	0.4536	lb/day	244
Alkalinity (as $CaCO_3$)					
Design Average Concentration	mg/L	150	1	mg/L	150
Design Average Mass Loading	kg/day	3,687	0.4536	lb/day	8,129
Design Diurnal Peak Mass Loading	kg/day	3,687	0.4536	lb/day	8,129
Hydrogen Sulfide (H_2S)					
Design Average Concentration	mg/L	6	1	mg/L	6
Design Average Mass Loading	kg/day	147	0.4536	lb/day	325
Design Diurnal Peak Mass Loading	kg/day	147	0.4536	lb/day	325
Primary Clarifiers (Yes)					
Primary Clarifiers?	Yes	1			
Total Area	m2	888	0.0929	sq.ft.	9,556
Overflow Rate	m/day		0.040747	gpd-sq.ft.	
Average		28	0.040747		691
Diurnal Peak		28	0.040747		691
Percent of COD filtrate that is colloidal	None	40%	1	%	40%
TSS Removal Efficiency at Average Conditions	%	65%	1	%	65%
TSS Removal Efficiency at Diurnal Peak Conditions	%	65%	1	%	65%
Primary Sludge Concentration	mg/L	25,800	1	mg/L	25,800

Facility Operating Parameters					
Item		Value			Value
Secondary Treatment: 1 Trickling Filter, Bioreactor & Clarifier					
		4			
Trickling Filter					
Coef. "K" in Velz Equation (English Units) =		0.03			0.030
Coef. "n" in Velz Equation =		0.50			0.50
Coef. "Theta" in Velz Equation =		1.035			1.035
Media Volume	m3	2,549	0.0283168	ft3	90,000
Media Depth	m	1.83	0.3048	ft	6
Media Specific surface area	m2/m3	49.21	0.3048	ft2/ft3	15
Recirculation Q (used in wetting Q = TF influent Q+ recirculation)	m3/day	17,411	3785	MGD	4.600
TF Effluent Soluble BOD5	mg/L				
Average		70	1	days	70.4
Diurnal Peak		70	1	days	70.4
TF Effluent NH3-N	mg/L				
Average		28	1	days	28.3
Diurnal Peak		28	1	days	28.0
TF Solids Production in VSS (mg VSS in effluent/mg BOD5 rem)	mg/mg	0	1	mg/mg	0.047
No Trickling Filter Clarifier is to be Configured					
Biological Process - Integrated with PBNR					
SRT	days	13.3	1	days	13.3
Nitrifier Minimum SRT (SRT_{min})	days	2.3	1	days	2.3
DO	mg/L	4.8	1	mg/L	4.8
Temperature in the Biological Process	oC	17.6	Special	oF	63.6
Simultaneous Denitrification	%	41%	1	%	41%
SVI	ml/g	203	1	ml/g	203
Biosolids Production Rates					
Net Yield (mg TSS/mg BOD_5)	mg/mg	0.85	1	lb/lb	0.85
Volatile Fraction	%	89.76%	1	%	89.76%
Active Fraction	%	30.95%	1	%	30.95%
Nitrifier Fraction	%	2.95%	1	%	2.95%
Nitrogen Content, N/VSS	%	2.94%	1	%	2.94%
Phosphorus Content, P/VSS	%	0.32%	1	%	0.32%
Process Oxygen Requirements					
Carbonaceous AOR/BOD5 - w/w	kg/kg	1.05	1	lb/lb	1.05
Total AOR/BOD% - w/w	kg/kg	1.98	1	lb/lb	1.98
AOR (w/day)	kg/day			lb/day	
Average		5,101	0.4536		11,245
Diurnal Peak		5,142	0.4536		11,336
AOR	mg/L-hr			mg/L-hr	
Average		20	1		20
Diurnal Peak		20.0	1		20.0
Bioreactor					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
HRT	hr	10.3	1	hr	10.3
% non-aerobic	%	15%	1		15%
% aerobic	%	85%	1		85%
Average MLSS Concentration	mg/L	2,721	1	mg/L	2,721
Bioreactor Clarifier					
Total Area	m2	1,345	0.0929	sq.ft.	14,476
Overflow Rate	m/day			gpd-sq.ft.	
Average		18	0.040747		453
Diurnal Peak		18	0.040747		453
Effluent TSS	mg/L			mg/L	
Average		5	1		4.9
Diurnal Peak		5	1		4.9
Underflow Rate					
Average Flow Ratio	%	70%	1		70%
Average Rate	m/day	13	0.040747	gpd-sq.ft.	315
Peak Flow Ratio	%	70%	1		70%
Peak Rate	m/day	13	0.040747	gpd-sq.ft.	315
Solids Loading Rate	kg/m2-day		4.883	lb/day-sq.ft.	
Average		66	4.883		13.6
Diurnal Peak		66	4.883		13.6
Limiting Solids Loading Rate	kg/m2-day	173	4.883	lb/day-sq.ft.	36
(return sludge rate at which limiting solids rate can be achieved					
RAS Flow Rate	m3/day	28309	3785	MGD	7
Percent of Influent to Bioreactor	%	1		%	1
Underflow Concentration	mg/L			mg/L	
Average		5,037	1		5,037
Diurnal Peak		5,041	1		5,041

Facility Operating Parameters

Item		Value			Value
WAS Thickening	No / None				
WAS Thickener?	Yes	1			
Location of WAS Thickener recycle to plant: Headworks		1			
Solids Capture	%	23%	1	%	23%
Thickened Sludge Concentration	mg/L	29,300	1	mg/L	29,300
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7
Solids Digestion: Anaerobic Only					
Anaerobic Digester					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
Active Bioreactor Volume	m3	8,027	3785	MG	2.12
SRT	days	47.6	1	days	47.6
Volatile Solids Loading - wt VSS/vol-day	kg/m3-day	0.47	16.06	lb/ft3-day	0.029
Volatile Solids Reduction	%	50%	1	%	50%
Methane Production	m3/day	943	0.0283	ft3/day	33324.4
Percent P Released that is Precipitated as Struvite	%	30%	1	%	30%
Digester Gas Methane Content	%	54%	1	%	54%
Digester Gas Production	m3/day	1,746	0.0283	ft3/day	61711.9
Digester Gas Production (vol/wt volatile solids destroyed)	m3/kg	0.93	0.06226	ft3/lb	14.9

Mass Balance for Average Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Trickling Filter Influent (TFI)	Trickling Filter Effluent (TFE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Thickened PSD (TPSD)	Combined Sludge (CS)	Aerobic Digester Effluent (ADE)	Anaerobic Digester Effluent (AnDE)	WAS Thickening Recycle (WSR)
Flow (gallon/day)	6,500,000	6,504,585	6,504,564	6,504,364	6,504,364	6,564,364	11,127,892	11,127,892	4,567,704	6,456,176	6,456,176	40,221	108,550	4,364	40,221	44,585	44,585	44,585	104,586
Carbonaceous BOD$_5$ (lb/day)	10,991	11,670	8,387	6,657	5,898	5,566	48,821	38,009	37,057	57	57	3,803	885	206	3,803	3,809	3,809	0	678
Particulate	4,500	4,822	1,585	1,658	148	140	1,122	672	652	1	1	3,134	20	5	3,134	3,139	3,139	0	10
Heterotrophs	0	803	232	232	1,685	1,665	47,674	37,000	36,149	49	49	431	604	201	431	632	632	0	663
PAOs	0	0	0	0	0	0	6	5	5	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Filtrate	6,130	6,185	6,143	6,146	3,929	3,352	29	28	12	17	17	38	0	0	20	38	38	6	5
COD (lb/day)	22,446	26,809	16,330	16,330	12,945	12,945	365,853	238,447	231,465	1,459	1,459	13,580	5,527	1,284	10,350	11,644	11,644	5,727	6,247
Particulate Bio	7,547	7,575	2,851	2,851	232	232	2,008	1,563	1,525	2	2	4,904	34	8	4,924	4,932	4,932	164	25
Particulate Non-Bio	4,064	6,825	2,360	2,389	2,944	2,944	165,593	154,643	150,751	205	205	4,438	3,600	839	4,430	5,278	5,278	5,517	2,751
Heterotrophs	0	1,318	459	459	2,594	2,594	94,255	73,271	71,571	22	58	552	1,709	305	552	1,250	1,250	0	1,311
Autotrophs	0	125	44	44	0	0	8,881	6,996	5,618	4	8	61	103	38	61	119	119	0	126
PAOs	0	0	2	0	0	0	15	14	14	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Filtrate Bio	8,710	8,710	9,554	9,554	6,061	6,051	45	45	19	27	27	59	0	0	59	59	59	14	0
Filtrate Non-Bio	1,122	1,140	1,133	1,130	1,133	1,133	1,921	1,921	760	1,119	1,119	7	19	1	7	8	8	8	19
TSS (lb/day)	9,800	13,310	4,559	4,558	4,761	4,761	252,434	194,441	121,922	20	20	8,851	4,378	1,060	8,851	9,717	9,717	4,897	3,509
Biodegradable	6,252	6,276	2,197	2,197	192	192	1,604	1,295	1,263	2	2	4,079	30	7	4,079	4,087	4,087	152	20
Non-Biodegradable	3,547	5,843	2,046	2,045	2,449	2,449	155,150	128,545	125,387	17	17	3,788	2,964	693	3,790	4,493	4,499	4,734	2,290
Heterotrophs	0	1,050	380	380	2,141	2,141	78,115	60,798	59,287	8	8	706	1,418	330	706	1,036	1,036	0	1,086
Autotrophs	0	103	39	39	0	0	7,441	5,790	5,548	6	6	67	135	31	67	98	99	0	103
PAOs	0	0	0	0	0	0	14	12	11	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	19	15	14	0	0	0	0	0	0	0	0	0	0
VSS (lb/day)	8,177	11,259	3,944	3,944	4,067	4,067	222,309	172,997	163,750	239	239	7,324	4,030	939	7,324	8,263	8,263	4,123	3,091
Biodegradable	5,015	6,339	1,868	1,868	163	163	1,498	1,160	1,127	2	2	3,465	27	6	3,465	3,475	3,475	128	21
Non-Biodegradable	2,852	4,821	1,722	1,722	2,074	2,074	145,079	115,290	112,453	151	153	3,190	2,484	625	3,190	3,824	3,824	3,994	2,039
Heterotrophs	0	823	320	323	1,820	1,820	69,389	51,070	50,402	69	69	600	1,204	280	600	880	880	0	923
Autotrophs	0	59	31	31	0	0	6,325	4,922	4,801	7	7	57	115	27	57	84	84	0	88
PAOs	0	0	0	0	0	0	13	10	10	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	1,888	1,962	1,753	1,753	1,767	1,767	6,814	5,337	5,118	98	94	230	122	28	230	258	258	258	94
NH$_3$-N (lb-N/day)	1,219	1,219	1,211	1,211	1,560	1,560	28	35	10	22	22	7	0	0	7	7	7	141	0
Particulate Bio Org N	150	150	50	50	5	5	0	0	5	0	0	104	0	0	104	104	104	8	0
Non-Bio Part Org N	60	125	45	45	45	45	3,011	2,346	2,290	3	3	83	55	13	83	96	96	110	40
Heterotrophs	0	46	15	15	91	91	3,320	2,580	2,520	3	3	30	50	14	30	44	44	0	46
Autotrophs	0	4	2	2	0	0	316	245	240	0	0	3	6	1	3	4	4	0	4
PAOs	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	67	69	68	68	68	68	115	115	47	67	67	0	1	0	0	0	0	0	1
Soluble Bio Org N	357	357	355	355	0	0	0	0	0	0	0	2	0	0	2	2	2	0	0
NO$_x$-N (lb-N/day)	0	15	15	15	15	15	1,553	1,553	637	901	901	0	15	1	0	1	1	0	15
TP (lb-P/day)	244	271	201	201	201	201	2,024	1,606	1,437	187	187	70	34	7	70	77	77	77	27
Bio Particulate	53	52	19	18	2	2	1	1	1	0	0	35	0	0	35	35	35	1	0
Non-Bio Particulate	29	43	15	15	15	15	1,000	752	760	1	1	25	15	4	25	32	32	48	14
Heterotrophs	0	0	3	3	18	18	654	517	504	1	1	6	72	2	0	9	9	0	9
Autotrophs	0	1	0	0	0	0	53	45	48	0	0	1	1	0	1	1	1	0	1
PAOs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0
Ortho-PO$_4$	102	165	164	164	160	166	266	294	110	165	165	1	3	0	1	1	1	30	3
Alkalinity (lb/day as CaCO3)	8,121	8,130	8,081	8,081	8,761	8,001	940	840	385	545	545	50	8	0	50	50	50	503	9
H$_2$S (lb/day)	325	327	329	329	0	0	0	0	0	0	0	2	0	0	2	2	2	19	0
BOD$_5$ (mg/L)	202.9	211.8	147.4	147.4	103.9	103.9	520.3	409.3	974.2	1.3	1.20	10,744	974	5,605	0	10,247	10,247	24	776
COD (mg/L)	414.2	484.7	299.4	298.4	236.5	236.5	3,935.6	2,570.2	6,035.3	27.0	27.0	39,995	6,080	35,200	0	31,320	31,320	15,394	4,860
TSS (mg/L)	180.9	241.7	85.1	85.1	87.4	87.4	2,721.0	2,117.4	5,037.4	4.0	4.65	25,900	5,027	29,300	0	26,143	26,143	13,281	4,023
VSS (mg/L)	150.5	204.6	72.1	72.1	74.1	74.1	2,330.3	1,864.7	4,430.2	4.3	4.3	21,842	4,436	25,803	0	22,230	22,230	11,093	3,545
TKN (mg-N/L)	34.8	36.0	32.0	32.0	32.3	32.3	73.5	57.5	134.5	1.8	1.8	686	135	775	0	694	694	694	108
NH$_3$-N (mg-N/L)	22.5	22.1	22.1	22.1	28.3	28.3	0.4	0.4	0.4	0.4	0.41	22.1	0.4	0.4	0.0	20.0	20.0	373.6	0.4
NO$_x$-N (mg-N/L)	0.0	0.3	0.3	0.3	0.3	0.3	16.7	16.7	16.7	16.7	16.7	0.3	16.7	16.7	0.0	1.8	1.8	0.0	16.7
TP (mg-P/L)	4.5	4.9	3.7	3.7	3.7	3.7	21.8	17.3	37.9	3.1	3.1	209.4	37.6	205.0	0.0	208.1	208.1	208.1	30.2
Alkalinity (mg/L as CaCO3)	149.9	147.7	147.7	147.7	147.7	147.7	10.1	10.1	10.1	10.1	10.1	147.7	10.1	10.1	0.0	134.2	134.2	1,353.2	10.1
H$_2$S (mg/L)	6.0	6.0	5.9	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	5.4	5.4	50.0	0.0

Mass Balance for Diurnal Peak Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Trickling Filter Influent (TFI)	Trickling Filter Effluent (TFE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS
Flow (m3/day)	5,100,000	5,104,560	5,064,286	5,054,358	2,304,385	5,305,299	11,126,901	11,126,901	4,662,535
Carbonaceous BOD (kg/day)	10,091	11,570	8,081	8,067	5,681	5,690	45,260	8,004	35,141
Particulate	4,506	4,822	1,836	1,820	149	142	0	7,061	0
Heterotrophs	0	983	232	232	1,555	1,585	40,254	10	35,135
PAOs	0	0	0	0	0	0	4	0	3
PHA	0	0	0	0	0	0	9	12	0
Filtrate	5,185	6,195	5,149	5,148	3,850	3,850	8	1,921	3
COD (kg/day)	22,446	26,590	13,239	13,330	12,945	12,845	309,039	283,705	231,793
Particulate Bio	7,547	7,575	2,551	2,851	232	232	0	0	0
Particulate Non-Bio	4,064	6,825	2,339	2,288	2,944	2,944	203,542	31,500	154,612
Heterotrophs	0	1,311	459	459	2,564	2,584	81,477	56,975	69,467
Autotrophs	0	125	44	44	2	0	9,073	5,850	5,500
PAOs	0	0	0	0	0	0	10	8	10
PHA	0	0	0	0	0	0	0	0	0
Filtrate Bio	9,713	9,710	9,654	9,904	6,051	5,061	12	12	0
Filtrate Non-Bio	1,122	1,140	1,133	1,133	1,133	1,133	1,824	100,565	790
TSS (kg/day)	9,800	13,308	4,669	4,556	4,751	4,761	332,409	172,752	191,728
Biodegradable	6,253	5,270	2,197	2,197	192	192	0	111,577	0
Non-Biodegradable	3,547	5,943	2,045	2,045	2,448	2,448	180,072	60,191	128,428
Heterotrophs	0	1,068	350	359	2,141	2,141	75,739	4,972	57,570
Autotrophs	0	103	35	36	0	0	7,817	7	5,213
PAOs	0	0	0	0	0	0	11	0	9
PHA	0	0	0	0	0	0	0	6,022	0
Poly-P	0	0	0	0	0	0	16	43	12
VSS (kg/day)	8,177	11,268	3,844	3,844	4,037	4,007	214,200	3,878	182,108
Biodegradable	5,315	5,338	1,868	1,855	183	193	0	2,169	0
Non-Biodegradable	2,862	4,921	1,722	1,722	2,074	2,074	142,331	2,507	108,910
Heterotrophs	0	923	373	323	1,820	1,820	64,420	249	40,924
Autotrophs	0	85	31	31	0	0	6,590	0	4,354
PAOs	0	0	0	0	0	0	9	115	7
PHA	0	0	0	0	0	0	0	0	0
TKN (kg-N/day)	1,898	1,992	1,753	1,753	1,751	1,753	7,034	2,350	5,159
[illegible] (kg-N/day)	1,218	1,219	1,211	1,211	1,535	1,535	43	1,175	17
Particulate Bio Org N	150	160	59	59	5	5	0	0	0
Non-Bio Part Org N	86	125	45	45	45	45	3,855	315	3,534
Heterotrophs	0	45	16	16	91	91	3,221	501	2,447
Autotrophs	0	4	2	2	0	0	319	50	143
PAOs	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	67	68	58	68	68	58	115	4	47
Soluble Bio Org N	357	357	355	355	8	8	0	505	0
NOx-N (kg-N/day)	0	15	15	15	15	15	1,522	637	125
TP (kg-P/day)	244	270	201	201	201	201	1,423	0	774
Bio Particulate	33	56	19	19	0	2	0	0	0
Non-Bio Particulate	29	43	15	15	15	15	406	0	303
Heterotrophs	0	8	3	3	15	18	514	0	189
Autotrophs	0	1	0	0	0	0	54	0	45
PAOs	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	5	0	4
Ortho-PO4	152	165	154	154	156	156	306	0	125
Alkalinity (kg/day as CaCO3)	8,121	8,130	8,051	8,051	8,081	8,081	637	0	201
H2S (kg/day)	325	325	323	323	0	0	0	0	6
BOD5 (mg/L)	202.9	211.9	147.4	147.4	103.3	103.9	495.9	97.1	825.9
COD (mg/L)	416.2	484.7	238.4	238.4	238.5	226.5	3,209.2	3,014.4	6,054.1
TSS (mg/L)	180.9	241.7	80.1	85.1	87.4	87.4	2,721.0	1,552.3	5,040.8
VSS (mg/L)	160.9	204.6	72.1	72.1	74.1	74.1	2,209.1	64.5	4,277.6
TKN (mg-N/L)	34.8	35.8	32.0	32.0	32.1	32.0	32.0	22.3	132.2
NH3-N (mg-N/L)	22.5	22.3	22.1	22.1	28.0	28.0	6.5	12.7	0.5
NO3-N (mg-N/L)	0.0	0.3	0.3	0.3	0.3	0.3	16.4	6.9	19.4
TP (mg-P/L)	0.0	0.0	3.9	3.7	3.7	3.7	15.3	0.0	25.5
Alkalinity (mg/L as CaCO3)	149.5	147.7	147.7	147.7	147.7	147.7	6.9	0.0	6.9
H2S (mg/L)	6.0	5.9	5.8	5.8	0.0	0.0	6.6	0.0	0.0

Constituent	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Thickened PSD (TPSD)	Combined Sludge (CS)	Aerobic Digester Effluent (ADE)	Anaerobic Digester Effluent (ANDE)	WAS Thickening Recycle (WSR)
Flow (m3/day)	5,458,093	5,459,383	40,221	125,809	4,264	40,221	44,534	44,505	44,585	104,580
Carbonaceous BOD (kg/day)	52	52	3,502	885	209	3,503	3,609	3,592	8	579
Particulate	0	0	3,134	29	5	3,124	3,139	3,129	0	16
Heterotrophs	48	48	431	854	201	411	632	532	0	653
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Filtrate	5	5	38	0	0	38	38	35	2	0
COD (kg/day)	1,437	1,437	10,330	5,527	1,254	10,330	11,644	11,644	5,722	4,243
Particulate Bio	0	0	4,924	35	9	4,924	4,932	4,132	134	29
Particulate Non-Bio	211	211	4,429	3,908	533	4,420	5,275	5,275	5,517	2,761
Heterotrophs	55	55	852	1,797	398	852	1,250	1,250	0	1,311
Autotrophs	9	9	81	161	38	51	119	119	0	120
PAOs	0	0	0	6	0	0	0	0	0	0
PHA	0	0	0	3	2	0	0	0	0	0
Filtrate Bio	7	7	49	9	0	37	59	58	14	0
Filtrate Non-Bio	1,115	1,115	7	19	1	7	8	8	8	18
TSS (kg/day)	291	261	8,651	4,273	1,098	8,651	9,717	6,717	4,937	3,509
Biodegradable	0	0	4,379	33	7	4,079	4,067	4,387	150	27
Non-Biodegradable	175	172	3,788	2,984	836	3,788	4,496	4,700	4,784	2,298
Heterotrophs	76	76	706	1,413	330	706	1,035	1,758	0	1,030
Autotrophs	6	6	87	133	61	47	89	90	0	103
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	3	0	0	0	0	0	0
VSS (kg/day)	222	222	7,324	4,533	939	7,324	8,283	8,283	4,122	3,090
Biodegradable	0	0	3,458	27	8	3,468	3,475	3,475	128	21
Non-Biodegradable	149	145	3,180	2,584	625	3,153	3,824	3,824	3,994	2,052
Heterotrophs	67	67	620	1,264	205	650	860	669	0	323
Autotrophs	7	7	57	119	27	57	84	84	0	66
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
TKN (kg-N/day)	99	99	220	123	28	230	250	256	256	64
[illegible] (kg-N/day)	25	25	7	3	0	7	7	7	141	0
Particulate Bio Org N	0	0	104	0	0	104	104	104	0	0
Non-Bio Part Org N	4	4	83	55	13	23	90	90	110	42
Heterotrophs	3	3	30	60	14	30	44	44	0	46
Autotrophs	0	0	3	3	1	3	4	4	0	4
PAOs	0	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	67	67	0	1	0	0	0	0	0	1
Soluble Bio Org N	0	0	2	0	0	2	2	2	0	0
NOx-N (kg-N/day)	654	654	0	15	1	0	1	1	0	15
TP (kg-P/day)	176	176	70	34	7	70	77	77	77	27
Bio Particulate	0	0	35	0	0	35	35	35	1	0
Non-Bio Particulate	0	0	35	18	4	28	32	32	40	14
Heterotrophs	1	1	6	12	3	0	0	0	0	0
Autotrophs	0	0	1	1	0	1	1	1	0	1
PAOs	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	0	0	0
Ortho-PO4	177	177	1	0	0	1	1	1	36	0
Alkalinity (kg/day as CaCO3)	270	370	50	0	0	50	50	50	503	9
H2S (kg/day)	0	0	2	0	0	2	2	2	14	0
BOD5 (mg/L)	1.0	1.0	10,744	874	5,565	0	10,247	10,247	24	170
COD (mg/L)	20.7	25.7	35,690	6,085	35,290	0	31,528	31,520	15,394	4,569
TSS (mg/L)	4.5	4.9	25,600	5,037	30,305	0	26,140	28,143	13,281	4,024
VSS (mg/L)	4.1	4.5	21,842	4,406	35,806	0	22,230	22,330	11,090	3,544
TKN (mg-N/L)	1.8	1.8	650	120	775	0	594	594	594	106
NH3-N (mg-N/L)	0.5	0.5	22.1	0.4	0.4	0.0	20.0	20.0	378.9	0.4
NO3-N (mg-N/L)	19.4	16.4	0.0	10.7	16.7	0.0	1.9	1.9	0.0	16.7
TP (mg-P/L)	3.2	3.2	203.4	37.8	224.4	0.0	265.0	260.1	206.1	20.7
Alkalinity (mg/L as CaCO3)	0.8	0.9	147.7	10.1	10.1	0.0	134.2	134.2	1,203.3	10.1
H2S (mg/L)	0.0	0.0	5.9	0.0	0.0	0.0	5.4	5.4	52.6	0.0

Select Units for Physical Plant Definition	
Metric (M) or US (U):	u

Iron Addition Reactor:			1
Iron Added?	Flow gpd	Xmech	Salk
FALSE	FALSE	FALSE	FALSE

Definition of the Physical Plant		PRO2D	
How many reactors (vs to 42)	6		
Enter the Solids Retention Time (SRT)	13.3 Days	SRT	13.3
Enter the Average Total Flow Rate	6.56 mgd	% Aerobic	85%
Enter the RAS Ratio (% of Plant Influent)	70%	% Anoxic	15%
	4.55 mgd	Temperature oC	18
Wastage Location - (A)ll Reactors or Clarifier (U/F	u	Total Volume gallons	2,627,500

Aeration Data		Est. Diffuser Design (Sanitaire Membrane)	
Aeration Basin Side Water Depth:	18 feet	Design Condition:	Ave
Maximum Water Temperature:	25 °C	Est. Diffuser Air Rate	4.6 scfm/diffuser
BETA Correctional Factor:	0.95	Peaking Capability	267%
Plant Altitude:	4,500 feet	Estimated SOTE	36%
THETA - K_La Temp. Corr. Factor:	1.024		

System Configuration			Reactor														
Component	Units	TOTAL	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reactor Volume	gallons	2,627,500	141,375	601,125	141,375	601,125	141,375	601,125									
Fraction	% of Total		5%	26%	5%	26%	5%	26%									
Dissolved Oxygen	mg/L			4.60		4.60		4.60									
Reactor Feed																	
Raw Feed	% of Total	100%	33%		33%		33%										
RAS	% of Total RAS	100%	100%														
Recirculation	% of Raw Feed																
From Reactor	(Enter Number)																
Other inflows (such as methanol, dewatering filtrate, or thickener return)																	
Flow	gpd																
S_{O2}	mg O_2/L																
S_I	mg COD/L																
S_S	mg COD/L																
S_I	mg COD/L																
S_{NH}	mg N/L																
S_{NO}	mg N/L																
S_{ALK}	mg N/L																
S_{PO4}	mg P/L																
S_{MeOH}	moles/m3																
X_I	mg COD/L																
X_S	mg COD/L																
X_H	mg COD/L																
X_{PAO}	mg COD/L																
X_{PP}	mg P/L																
X_{PHA}	mg COD/L																
X_{AUT}	mg COD/L																
X_{TSS}	mg/L																
X_{MeOH}	mg/L																
X_{MeP}	mg/L																

Summary Information				
Total MLSS Inventory	64,207 lbs		Total COD Removed	8,849 lbs/day
Total MLVSS Inventory	57,532 lbs		Food Applied to MLSS Inventory Ratio	0.14 COD/MLSS
MLSS/MLVSS Ratio	1.11		*Aeration Information*	
Total Required WAS Rate	4,541 lbs MLSS/day		Total AOR	11,996 lbs O2/day
or	4,345 lbs MLVSS/day		Total SOR	64,349 lbs O2/day
Observed Mass Yield	0.49 MVLSS/COD		Total Required Air Rate	10,274 scfm
			Simultaneous Denitrification	41.4%

Component Concentrations			Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Enter Reactor Number to use this Column of Data for the Original Guess					1	2	3	4	5	6	7	#N/A					
S_{O2}	Dissolved Oxygen	mg O2/L	0.0	0.0	0.0	4.8	0.0	4.8	0.1	4.8							
S_F	Soluble Fermentable Substrates	mg COD/L	39.8	0.4	0.9	0.4	1.1	0.4	1.3	0.4							
S_A	Soluble Fermentation Products	mg COD/L	25.5	0.1	0.6	0.0	0.7	0.0	0.6	0.1							
S_I	Soluble Inerts	mg COD/L	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7							
S_{NH4}	Soluble Ammonia N	mg N/L	25.3	0.4	9.2	0.2	6.6	0.3	5.3	0.4							
S_{N2}	Dissolved Nitrogen Gas	mg N/L	0.0	11.6	12.7	13.0	12.4	12.8	11.7	11.2							
S_{NO3}	Soluble Nitrate/Nitrite N	mg N/L	0.3	16.7	6.7	15.9	9.9	16.2	11.5	16.7							
S_{PO4}	Soluble Inorganic Phosphorus	mg P/L	3.0	3.1	3.0	3.1	3.0	3.1	3.0	3.1							
S_{ALK}	Alkalinity	moles/m³	3.0	0.2	1.5	0.2	1.1	0.2	0.9	0.2							
X_I	Inert Particulates	mg COD/L	53.6	3,960	2,697	2,702	2,054	2,097	1,654	1,663							
X_S	Slowly Biodegradable Substrate	mg COD/L	48.5	40.1	41.5	25.4	28.6	19.3	24.2	16.3							
X_H	Heterotrophic Organisms	mg COD/L	47.2	1,581	1,294	1,277	992	973	796	781							
X_{PAO}	Phosphate Accumulating Organisms	mg COD/L	0.0	0.4	0.2	0.2	0.2	0.2	0.1	0.2							
X_{PP}	Polyphosphate	mg P/L	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0							
X_{PHA}	PAO Storage Products	mg COD/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
X_{AUT}	Autotrophic Organisms	mg COD/L	0.0	179.2	121.0	122.0	92.1	92.8	74.7	75.3							
X_{TSS}	Total Suspended Solids (MLSS)	mg/L	124.1	5,037	3,430	3,428	2,614	2,611	2,120	2,117							
X_{MeOH}	Metal Hydroxides	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
X_{MeP}	Metal Phosphates	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
	MLVSS	mg COD/L		6,364	4,154	4,127	3,139	3,143	2,559	2,549							
	Oxygen Consumed	mg O2/(L-day)		[illegible]	0	597	226	514	297	475							
	Nitrate Consumed	mg NO3-N/(L-day)		[illegible]	225.0	2.8	158.7	2.2	127.0	1.5							
			Alkalinity Limited?			WARNING		WARNING	WARNING	WARNING							

Reactor Information			Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reactor Volume		gallons			141,375	801,125	141,375	801,125	141,375	801,125	0	0	0	0	0	0	0
	AOR, Biological	lbs O2/day			0	3,569	267	3,437	351	3,173	0	0	0	0	0	0	0
	AOR, Liquid	lbs O2/day			0	270	-268	355	-352	459	0	0	0	0	0	0	0
Total AOR		lbs O2/day			0	4,260	-1	3,792	-1	3,917	0	0	0	0	0	0	0
	Aeration Alpha Value				0.50	0.60	0.60	0.60	0.60	0.50	0.50	0.60	0.60	0.60	0.50	0.60	0.60
	SOR/AOR Ratio				2.431	5.515	2.036	5.519	2.047	5.515	2.026	2.026	2.025	2.026	2.026	2.026	2.026
SOR		lbs O2/day			0	23,494	-2	20,913	-2	19,947	0	0	0	0	0	0	0
	SOTE				25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
Required Air Rate		SCFM			0	3,751	0	3,339	0	3,184	0	0	0	0	0	0	0
Is Required Diffuser Density Too High?																	
Required Mixing Air @ 0.12 scfm/ft2		SCFM			0	344	0	344	0	344	0	0	0	0	0	0	0
MLVSS		mg/L		4,522	3,097	3,077	2,355	2,344	1,908	1,801	0	0	0	0	0	0	0

Flow Balance			Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Flow Feed into Reactor		mgd	6.56		2.19		2.19		2.19								
Flow from Previous Reactor		mgd				6.75	6.75	8.94	8.94	11.13							
Recirculation into Reactor		mgd															
	From Reactor				[illegible]	[illegible]			[illegible]								
RAS into Reactor		mgd		4.56	4.56												
Other Flows into Reactor		mgd	0.00														
Effluent From Reactor		mgd			6.75	6.75	8.94	8.94	11.13	11.13							
Waste Activated Sludge		mgd		0.116													

Facility Operating Parameters					
Item		Value			Value
Influent Wastewater	(Metric)	(Metric)	(Metric>US*k)	(US)	(US)
Flow	m3/day			MG/day	
Design Average		21,576	3785		5.700
Design Diurnal Peak		21,576	3785		5.700
Design Peaking Factor for WW Diurnal flow		1.0	1		1.0
Design Peaking Factor for WW Diurnal loads		1.0	1		1.0
Carbonaceous Five-Day Biochemical Oxygen Demand ($CBOD_5$)					
Design Average Concentration	mg/L	282	1	mg/L	282
Design Average Mass Loading	kg/day	6,079	0.4536	lb/day	13,401
Design Diurnal Peak Mass Loading	kg/day	6,079	0.4536	lb/day	13,401
Total Suspended Solids (TSS)					
Design Average Concentration	mg/L	228	1	mg/L	228
Design Average Mass Loading	kg/day	4,915	0.4536	lb/day	10,835
Design Diurnal Peak Mass Loading	kg/day	4,915	0.4536	lb/day	10,835
Volatile Suspended Solids (VSS)					
Percent VSS	%	83%	1	%	83%
Design Average Concentration	mg/L	190	1	mg/L	190
Design Average Mass Loading	kg/day	4,101	0.4536	lb/day	9,041
Design Diurnal Peak Mass Loading	kg/day	4,101	0.4536	lb/day	9,041
Total Kjeldahl Nitrogen (TKN as N)					
Design Average Concentration	mg/L	40	1	mg/L	40.1
Design Average Mass Loading	kg/day	865	0.4536	lb/day	1,906
Design Diurnal Peak Mass Loading	kg/day	865	0.4536	lb/day	1,906
Ammonia-Nitrogen (NH_3-N as N)					
Design Average Concentration	mg/L	26	1	mg/L	25.9
Design Average Mass Loading	kg/day	558	0.4536	lb/day	1,231
Design Diurnal Peak Mass Loading	kg/day	558	0.4536	lb/day	1,231
Total Phosphorus (as P)					
Design Average Concentration	mg/L	4.50	1	mg/L	4.5
Design Average Mass Loading	kg/day	97	0.4536	lb/day	214
Design Diurnal Peak Mass Loading	kg/day	97	0.4536	lb/day	214
Alkalinity (as $CaCO_3$)					
Design Average Concentration	mg/L	150	1	mg/L	150
Design Average Mass Loading	kg/day	3,233	0.4536	lb/day	7,128
Design Diurnal Peak Mass Loading	kg/day	3,233	0.4536	lb/day	7,128
Hydrogen Sulfide (H_2S)					
Design Average Concentration	mg/L	6	1	mg/L	6
Design Average Mass Loading	kg/day	129	0.4536	lb/day	285
Design Diurnal Peak Mass Loading	kg/day	129	0.4536	lb/day	285
Primary Clarifiers — Yes					
Primary Clarifiers?	Yes	1			
Total Area	m2	888	0.0929	sq.ft.	9,556
Overflow Rate	m/day		0.040747	gpd-sq.ft	
Average		25	0.040747		610
Diurnal Peak		25	0.040747		610
Percent of COD filtrate that is colloidal	None	40%	1	%	40%
TSS Removal Efficiency at Average Conditions	%	65%	1	%	65%
TSS Removal Efficiency at Diurnal Peak Conditions	%	65%	1	%	65%
Primary Sludge Concentration	mg/L	29,700	1	mg/L	29,700

Facility Operating Parameters					
Item		Value			Value
Secondary Treatment: T Trickling Filter, Bioreactor & Clarifier					
		4			
Trickling Filter					
Coef. "k" in Velz Equation (English Units) =		0.03			0.030
Coef. "n" in Velz Equation =		0.50			0.50
Coef. "Theta" in Velz Equation =		1.035			1.035
Media Volume	m3	2,549	0.0283168	ft3	90,000
Media Depth	m	1.83	0.3048	ft	6
Media Specific surface area	m2/m3	49.21	0.3048	ft2/ft3	15
Recirculation Q (used in wetting Q = TF Influent Q+ recirculation)	m3/day	17,411	3785	MGD	4.600
TF Effluent Soluble BOD5	mg/L				
Average		102	1	days	101.9
Diurnal Peak		102	1	days	101.9
TF Effluent NH3-N	mg/L				
Average		31	1	days	31.4
Diurnal Peak		31	1	days	31.1
TF Solids Production in VSS (mg VSS in effluent/mg BOD5 rem)	mg/mg	0	1	mg/mg	0.153
No Trickling Filter Clarifier is to be Configured					
Biological Process - Integrated with PBNR					
SRT	days	11.6	1	days	11.6
Nitrifier Minimum SRT (SRT_{min})	days	2.7	1	days	2.7
DO	mg/L	4.8	1	mg/L	4.8
Temperature in the Biological Process	oC	15.8	Special	oF	60.5
Simultaneous Denitrification	%	55%	1	%	55%
SVI	mL/g	192	1	mL/g	192
Biosolids Production Rates					
Net Yield (mg TSS/mg BOD$_5$)	mg/mg	0.85	1	lb/lb	0.85
Volatile Fraction	%	89.77%	1	%	89.77%
Active Fraction	%	35.25%	1	%	35.25%
Nitrifier Fraction	%	2.37%	1	%	2.37%
Nitrogen Content, N/VSS	%	2.98%	1	%	2.98%
Phosphorus Content, P/VSS	%	0.36%	1	%	0.36%
Process Oxygen Requirements					
Carbonaceous AOR/BOD5 - w/w	kg/kg	1.02	1	lb/lb	1.02
Total AOR/BOD% - w/w	kg/kg	1.64	1	lb/lb	1.64
AOR (wt/day)	kg/day			lb/day	
Average		5,486	0.4536		12,095
Diurnal Peak		5,538	0.4536		12,208
AOR	mg/L-hr			mg/L-hr	
Average		21	1		21
Diurnal Peak		21.6	1		21.6
Bioreactor					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
HRT	hr	11.7	1	hr	11.7
% non-aerobic	%	15%	1		15%
% aerobic	%	85%	1		85%
Average MLSS Concentration	mg/L	3,072	1	mg/L	3,072
Bioreactor Clarifier					
Total Area	m2	1,345	0.0929	sq.ft.	14,476
Overflow Rate	m/day			gpd-sq.ft.	
Average		16	0.040747		400
Diurnal Peak		16	0.040747		400
Effluent TSS	mg/L			mg/L	
Average		5	1		5.2
Diurnal Peak		5	1		5.2
Underflow Rate					
Average Flow Ratio	%	84%	1		84%
Average Rate	m/day	14	0.040747	gpd-sq.ft.	334
Peak Flow Ratio	%	84%	1		84%
Peak Rate	m/day	14	0.040747	gpd-sq.ft.	334
Solids Loading Rate	kg/m2-day		4.883	lb/day-sq.ft.	
Average		74	4.883		15.1
Diurnal Peak		74	4.883		15.1
Limiting Solids Loading Rate	kg/m2-day	180	4.883	lb/day-sq.ft.	37
Return sludge rate at which limiting solids rate can be achieved					
RAS Flow Rate	m3/day	26369	3785	MGD	7
Percent of Influent to Bioreactor	%	1		%	1
Underflow Concentration	mg/L			mg/L	
Average		5,243	1		5,243
Diurnal Peak		5,247	1		5,247

Facility Operating Parameters					
Item		Value			Value
WAS Thickening	No				
WAS Thickener?	Yes	1			
Location of WAS Thickener recycle to plant: Headworks		1			
Solids Capture	%	16%	1	%	16%
Thickened Sludge Concentration	mg/L	30,200	1	mg/L	30,200
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7
Solids Digestion: Anaerobic Only					
Anaerobic Digester					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
Active Bioreactor Volume	m3	8,027	3785	MG	2.12
SRT	days	46.7	1	days	46.7
Volatile Solids Loading - wt VSS/vol-day	kg/m3-day	0.54	16.06	lb/ft3-day	0.034
Volatile Solids Reduction	%	50%	1	%	50%
Methane Production	m3/day	1,094	0.0283	ft3/day	38643.6
Percent P Released that is Precipitated as Struvite	%	30%	1	%	30%
Digester Gas Methane Content	%	54%	1	%	54%
Digester Gas Production	m3/day	2,025	0.0283	ft3/day	71562.3
Digester Gas Production (vol/wt volatile solids destroyed)	m3/kg	0.93	0.06226	ft3/lb	15.0

Mass Balance for Average Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Trickling Filter Influent (TFI)	Trickling Filter Effluent (TFE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Thickened PSD (TPSD)	Combined Sludge (CS)	Aerobic Digester Effluent (AOE)	Anaerobic Digester Effluent (AnDE)	WAS Thickening Recycle (WSR)
Flow (gal/day)	5,702,000	5,832,972	5,791,395	5,791,396	5,791,390	5,791,390	10,634,243	10,634,243	4,842,171	5,855,276	5,855,275	41,561	139,795	3,524	41,581	45,406	45,403	45,403	133,272
Carbonaceous BOD5 (lb/day)	13,339	14,492	10,767	10,267	7,347	7,347	56,557	47,699	46,520	87	87	4,225	1,314	212	4,225	4,436	4,433	9	1,103
Particulate	5,309	5,335	1,567	1,567	310	310	1,426	1,141	1,109	1	1	3,468	31	5	3,468	3,473	3,473	0	26
Heterotrophs	0	1,070	377	377	2,117	2,117	58,412	45,727	45,397	53	53	699	1,283	206	690	900	900	0	1,076
PAOs	0	0	0	0	0	0	8	4	4	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Filtrate	8,030	8,080	8,023	8,023	4,920	4,920	24	24	11	12	12	58	0	0	58	58	58	9	0
COD (lb/day)	26,856	32,927	20,506	20,520	16,405	16,405	330,440	234,548	255,095	1,049	1,049	12,361	7,232	1,160	12,361	13,521	13,521	8,554	4,072
Particulate Bio	8,237	9,354	2,934	2,934	497	497	2,501	2,049	1,989	2	2	5,459	56	9	5,459	5,459	5,455	239	47
Particulate Non-Bio	4,450	5,201	2,870	2,870	3,574	3,574	201,845	151,307	159,713	183	183	5,330	4,427	712	5,330	5,043	5,043	3,390	3,719
Heterotrophs	0	2,104	747	747	3,250	3,250	115,857	62,069	89,057	105	105	1,367	2,544	410	1,367	1,797	1,797	0	2,104
Autotrophs	0	144	50	50	0	0	7,807	6,245	9,061	7	7	80	171	28	93	121	121	0	144
PAOs	0	0	0	0	0	0	17	13	13	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Filtrate Bio	12,592	17,650	12,599	12,599	7,729	7,729	37	37	17	20	20	90	0	0	90	90	90	14	0
Filtrate Non-Bio	1,343	1,374	1,364	1,364	1,364	1,364	2,506	2,516	1,141	1,332	1,332	10	32	1	10	11	11	11	31
TSS (lb/day)	10,920	15,840	5,544	5,544	6,054	6,054	272,393	217,870	211,567	247	247	10,296	5,280	903	10,290	11,259	11,259	5,720	5,317
Biodegradable	5,997	5,946	2,431	2,431	400	400	2,122	1,697	1,649	2	2	4,515	47	8	4,515	4,523	4,523	198	39
Non-Biodegradable	3,910	7,008	2,492	2,452	2,920	2,920	197,736	131,501	130,562	152	152	4,554	3,085	593	4,564	5,147	5,147	5,501	3,095
Heterotrophs	0	1,768	619	619	2,096	2,096	95,986	75,763	74,507	87	87	1,149	2,109	329	1,149	1,469	1,467	0	1,768
Autotrophs	0	119	42	42	0	0	6,465	5,174	5,027	6	6	77	142	22	77	100	100	0	119
PAOs	0	0	0	0	0	0	14	11	11	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	17	15	13	0	0	0	0	0	0	0	0	0	0
VSS (lb/day)	9,083	12,439	4,704	4,704	5,151	5,151	229,366	191,484	185,003	217	217	8,726	5,256	846	8,735	9,582	9,582	4,790	4,402
Biodegradable	6,371	5,900	2,087	2,087	343	343	1,819	1,528	1,485	2	2	3,839	42	7	3,030	3,840	3,843	160	35
Non-Biodegradable	3,151	5,924	2,075	2,075	2,517	2,517	160,351	121,275	116,951	136	126	3,554	3,201	531	3,854	4,355	4,365	4,630	3,370
Heterotrophs	0	1,503	526	525	2,291	2,291	81,507	65,274	63,419	74	74	977	1,782	289	977	1,265	1,265	0	1,502
Autotrophs	0	101	35	35	0	0	5,489	4,393	4,273	5	5	65	121	19	65	85	85	0	101
PAOs	0	0	0	0	0	0	12	8	8	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0
TKN (lb-N/day)	1,905	2,043	1,758	1,758	1,764	1,794	7,550	3,039	5,767	109	109	275	160	26	275	301	301	301	127
NH_3-N (lb-N/day)	1,290	1,200	1,221	1,221	1,518	1,518	42	42	19	23	23	9	1	0	9	9	9	168	1
Particulate Bio Org N	116	178	62	62	10	10	13	8	8	0	0	115	0	0	115	115	115	0	0
Non-Bio Part Org N	55	142	52	52	52	52	2,842	2,354	2,287	3	3	97	85	10	97	107	107	126	54
Heterotrophs	0	75	26	26	115	115	4,080	3,264	3,171	4	4	49	90	14	49	63	63	0	75
Autotrophs	0	5	2	2	0	0	275	220	211	0	0	3	6	1	3	4	4	0	5
PAOs	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	81	82	82	82	82	82	150	150	55	80	80	1	2	0	1	1	1	1	2
Soluble Bio Org N	335	326	322	322	8	8	0	0	13	0	0	2	0	0	2	2	2	0	0
NO_x-N (lb-N/day)	0	10	10	15	10	18	1,268	1,268	577	674	674	0	16	0	0	1	1	0	16
TP (lb-P/day)	214	251	160	159	160	160	2,002	1,726	1,551	125	125	82	44	7	82	89	89	89	27
Bio Particulate	39	55	21	21	3	3	2	2	2	0	0	33	0	0	33	33	33	2	0
Non-Bio Particulate	32	55	17	17	17	17	981	785	762	1	1	32	27	3	32	35	35	53	15
Heterotrophs	0	15	5	5	23	23	816	653	634	1	1	10	18	3	10	13	13	0	15
Autotrophs	0	1	0	0	0	0	55	44	43	0	0	1	1	0	1	1	1	0	1
PAOs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	5	4	4	0	0	0	0	0	0	0	0	0	0
Ortho-PO_4	122	126	125	125	125	125	232	237	100	124	124	1	3	0	1	1	1	34	3
Alkalinity (lb/day as $CaCO_3$)	7,122	7,140	7,069	7,089	7,080	7,068	1,471	1,471	670	782	782	51	19	1	51	51	51	593	18
H_2S (lb/day)	255	267	265	259	0	0	0	0	0	0	0	2	0	0	2	2	2	19	0
BOD_5 (mg/L)	281.8	298.0	272.6	212.6	152.2	152.2	675.3	540.2	1,152.4	1.4	1.41	12,157	1,152	6,835	0	11,719	11,719	24	975
COD (mg/L)	565.2	677.1	425.6	425.9	339.8	339.9	3,727.1	2,967.3	6,341.4	35.0	35.0	35,097	6,341	38,308	0	35,719	35,719	17,578	3,477
TSS (mg/L)	227.8	325.7	114.8	114.8	125.5	125.9	3,072.0	2,457.4	5,243.2	5.21	5.22	29,700	5,243	30,207	0	29,742	29,742	15,138	4,528
VSS (mg/L)	190.1	270.5	97.4	97.4	106.7	106.7	2,569.9	2,159.8	4,608.3	4.5	4.6	25,199	4,608	28,542	0	25,312	25,312	12,675	3,975
TKN (mg-N/L)	40.1	42.0	36.6	36.5	36.5	36.9	84.9	58.1	142.9	2.3	2.2	794	143	812	0	796	796	796	124
NH_3-N (mg-N/L)	25.9	25.3	25.3	25.3	31.4	31.4	0.5	0.5	0.5	0.5	0.48	25.3	0.5	0.5	0.0	23.2	23.2	438.0	0.5
NO_x-N (mg-N/L)	0.0	0.3	0.3	0.3	0.3	0.3	14.3	14.3	14.3	14.3	14.3	0.3	14.0	14.3	0.0	1.5	1.5	0.0	14.3
TP (mg P/L)	4.5	5.3	3.5	3.3	3.5	3.5	20.8	18.4	38.4	2.7	2.7	235.2	38.4	250.3	0.0	233.3	233.3	233.8	35.5
Alkalinity (mg/L as $CaCO_3$)	148.9	146.8	146.6	146.8	146.8	146.8	16.6	16.6	16.6	16.6	16.6	146.6	16.6	16.6	0.0	135.9	135.9	1,568.5	16.6
H_2S (mg/L)	0.0	5.9	5.6	5.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	0.0	5.4	5.4	50.0	0.0

Mass Balance for Diurnal Peak Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Trickling Filter Influent (TFI)	Trickling Filter Effluent (TFE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)
Flow (m3/day)	5,760,000	5,832,972	5,791,392	5,791,392	5,791,392	5,791,392	10,492,[illegible]	10,632,[illegible]
Carbonaceous BOD (lb/day)	13,360	14,491	9,297	10,257	7,347	7,347	57,501	9,504
Particulate	5,309	5,335	1,567	1,667	310	310	0	8,274
Heterotrophs	0	1,076	377	377	2,117	2,117	57,509	8
PAOs	0	0	0	0	0	0	4	0
PHA	0	0	0	0	0	0	0	0
Filtrate	8,050	8,060	8,023	8,023	4,920	4,920	8	2,505
COD (lb/day)	25,858	32,570	20,565	20,565	15,405	10,409	330,951	402,684
Particulate Bio	2,337	6,324	2,034	2,034	487	487	0	0
Particulate Non-Bio	4,459	9,701	2,670	2,670	2,574	2,574	209,502	137,030
Heterotrophs	0	2,194	747	707	2,230	2,230	114,077	75,605
Autotrophs	0	144	50	50	0	0	7,642	5,106
PAOs	0	0	0	0	0	0	11	7
PHA	0	0	0	0	0	0	0	0
Filtrate Bio	12,009	12,030	12,509	12,558	7,729	7,729	15	10
Filtrate Non-Bio	1,343	1,374	1,304	1,284	1,304	1,384	2,500	186,050
TSS (lb/day)	10,825	16,639	5,544	5,534	5,064	5,064	272,321	191,891
Biodegradable	5,007	8,546	2,431	2,431	403	403	0	116,350
Non-Biodegradable	5,818	7,090	2,452	2,452	2,386	2,956	171,229	54,200
Heterotrophs	0	5,759	619	619	2,390	2,096	34,513	4,419
Autotrophs	0	119	42	42	0	0	6,460	0
PAOs	0	0	0	0	0	0	8	0
PHA	0	0	0	0	0	0	0	5,792
Poly-P	0	0	0	0	0	0	13	40
VSS (lb/day)	8,033	13,439	4,704	4,704	5,151	5,151	221,325	8,740
Biodegradable	5,571	5,903	2,097	2,097	343	343	0	3,101
Non-Biodegradable	3,161	5,923	2,075	2,075	2,517	2,517	145,458	3,213
Heterotrophs	0	1,503	526	526	2,201	2,281	30,330	221
Autotrophs	0	101	35	35	0	0	5,523	0
PAOs	0	0	0	0	0	0	8	150
PHA	0	0	0	0	0	0	0	0
TKN (lb-N/day)	1,698	2,043	1,708	1,729	1,700	1,709	8,443	2,500
NH_3-N (lb-N/day)	1,230	1,258	1,221	1,221	1,500	1,500	48	1,322
Particulate Bio Org N	170	170	62	67	50	50	0	0
Non-Bio Part Org N	95	140	52	52	52	52	3,951	270
Heterotrophs	0	75	26	26	115	115	4,017	143
Autotrophs	0	5	2	2	0	0	270	44
PAOs	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	81	82	82	82	82	82	150	3
Soluble Bio Org N	328	323	327	372	9	9	0	256
NO_x-N (lb-N/day)	0	16	16	15	16	15	1,239	-2,544
TP (lb-P/day)	244	251	185	159	169	159	1,592	0
Bio Particulate	59	59	21	21	0	0	0	0
Non-Bio Particulate	32	50	17	17	17	17	474	0
Heterotrophs	0	15	5	5	23	23	502	0
Autotrophs	0	1	0	0	0	0	55	0
PAOs	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	4	0
Ortho-PO_4	123	123	125	125	125	125	256	0
Alkalinity (lb/day as $CaCO_3$)	7,122	7,140	7,089	7,089	7,089	7,080	-2,544	0
H_2S (lb/day)	285	285	283	233	0	0	9	0
BOD_5 (mg/L)	281.0	289.9	212.6	212.6	132.2	132.2	643.9	99.3
COD (mg/L)	585.2	677.1	426.9	425.9	330.8	339.9	3,723.3	4,541.9
TSS (mg/L)	227.8	325.7	114.8	114.8	125.6	125.6	3,077.0	2,164.7
VSS (mg/L)	190.1	279.4	87.4	93.4	100.7	100.7	2,002.5	73.1
TKN (mg-N/L)	40.1	47.0	35.8	35.8	36.8	36.8	95.2	29.9
NH_3-N (mg-N/L)	25.9	25.3	25.2	25.3	31.1	31.1	0.5	14.9
NO_x-N (mg-N/L)	0.0	0.3	0.3	0.3	0.3	0.3	14.0	-23.1
TP (mg-P/L)	0.0	0.0	0.0	3.5	3.5	3.5	18.0	0.0
Alkalinity (mg/L as $CaCO_3$)	149.9	148.8	145.8	145.8	145.8	145.8	-23.1	0.0
H_2S (mg/L)	6.0	5.8	5.9	5.9	0.0	0.0	0.0	0.0

Constituent	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Thickened PSD (TPSD)	Combined Sludge (CS)	Aerobic Digester Effluent (ADE)	Anaerobic Digester Effluent (ANDE)	WAS Thickening Recycle (WSR)
Flow (m3/day)	4,641,[illegible]	5,659,534	[illegible]	41,681	133,734	3,8[illegible]	41,681	45,4[illegible]	45,40[illegible]	45,40[illegible]	102,91[illegible]
Carbonaceous BOD (lb/day)	44,754	56	56	4,225	1,314	212	4,327	4,435	4,456	0	1,109
Particulate	0	0	0	3,468	31	3	3,466	3,413	3,473	0	26
Heterotrophs	44,728	52	52	699	1,283	209	699	900	900	0	1,076
PAOs	5	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0
Filtrate	4	4	4	56	0	0	53	55	68	0	0
COD (lb/day)	355,587	1,036	1,036	12,301	7,232	1,150	12,301	13,027	13,027	1,854	8,072
Particulate Bio	0	0	0	5,450	55	9	5,450	5,439	5,439	235	17
Particulate Non-Bio	90,906	151	151	5,330	4,427	713	5,330	6,013	6,043	5,393	3,715
Heterotrophs	98,724	102	102	1,387	2,344	213	1,387	1,777	1,787	0	2,134
Autotrophs	6,106	7	7	93	171	28	93	121	121	0	144
PAOs	6	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0
Filtrate Bio	0	7	7	87	0	0	50	50	50	14	0
Filtrate Non-Bio	1,141	1,333	1,333	10	32	1	10	11	11	11	71
TSS (lb/day)	271,759	247	247	10,290	6,950	952	10,290	11,259	11,259	6,730	5,077
Biodegradable	0	0	0	4,515	47	5	4,515	4,623	4,623	155	39
Non-Biodegradable	133,220	155	155	4,554	3,893	590	4,554	5,147	5,147	6,631	2,955
Heterotrophs	73,505	86	86	1,140	2,176	337	1,140	1,439	1,466	0	1,738
Autotrophs	5,064	4	4	77	142	23	77	100	100	0	119
PAOs	7	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0
Poly-P	10	0	0	0	0	0	0	0	0	0	0
VSS (lb/day)	179,614	210	210	8,703	5,255	846	8,732	9,532	9,582	4,706	4,439
Biodegradable	0	0	0	3,639	42	7	3,639	3,846	3,846	182	35
Non-Biodegradable	110,137	132	132	3,654	3,301	531	3,654	4,295	4,295	4,929	2,770
Heterotrophs	62,452	73	73	877	1,772	282	877	1,235	1,205	0	1,232
Autotrophs	4,226	5	5	60	121	19	60	35	35	0	101
PAOs	0	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	6,503	113	113	275	153	25	275	331	331	301	137
NH_3-N (lb-N/day)	22	25	25	9	1	0	9	9	9	166	1
Particulate Bio Org N	0	0	0	115	0	0	115	115	115	6	0
Non-Bio Part Org N	3,023	4	4	97	66	10	97	127	127	125	54
Heterotrophs	2,124	4	4	49	90	14	49	53	53	0	70
Autotrophs	215	0	0	3	0	1	3	4	4	0	5
PAOs	0	0	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	88	83	80	1	2	0	1	1	1	1	2
Soluble Bio Org N	10	0	0	2	0	0	2	2	2	0	0
NO_x-N (lb-N/day)	564	660	660	0	18	0	0	1	1	0	15
TP (lb-P/day)	1,155	137	137	82	44	7	82	89	89	60	37
Bio Particulate	0	0	0	38	0	0	38	38	38	2	0
Non-Bio Particulate	309	0	0	32	27	3	32	35	35	53	15
Heterotrophs	325	1	1	10	16	3	10	13	13	0	15
Autotrophs	43	0	0	1	1	0	1	1	1	0	1
PAOs	0	0	0	0	0	0	0	0	0	0	0
Poly-P	3	0	0	0	0	0	0	0	0	0	0
Ortho-PO_4	116	130	130	1	3	0	1	1	1	34	0
Alkalinity (lb/day as $CaCO_3$)	-903	-1,058	-1,058	51	10	1	51	51	51	590	18
H_2S (lb/day)	0	0	0	0	0	0	0	2	2	16	0
BOD_5 (mg/L)	1,108.3	1.2	1.2	12,160	1,152	6,936	0	11,710	11,710	24	506
COD (mg/L)	8,035.6	34.7	34.7	35,057	6,541	36,350	0	35,719	35,719	17,579	5,477
TSS (mg/L)	5,247.2	5.2	5.2	29,700	5,243	30,203	0	29,742	29,742	15,136	4,925
VSS (mg/L)	4,457.2	4.4	4.4	25,199	4,606	26,544	0	25,312	25,312	12,675	3,977
TKN (mg-N/L)	161.1	2.4	2.4	782	143	873	0	720	765	765	124
NH_3-N (mg-N/L)	0.5	0.5	0.5	25.3	0.5	0.5	0.0	23.2	23.2	408.6	5.5
NO_x-N (mg-N/L)	14.0	14.0	14.0	0.3	14.0	14.3	0.0	1.5	1.5	0.0	14.3
TP (mg-P/L)	26.6	2.9	2.9	235.2	33.4	205.2	0.0	233.8	233.8	333.9	37.4
Alkalinity (mg/L as $CaCO_3$)	-20.1	-23.1	-23.1	149.8	15.0	15.5	0.0	135.9	135.9	1,500.5	15.6
H_2S (mg/L)	0.0	0.0	0.0	5.9	0.0	0.0	0.0	5.4	5.4	50.0	0.0

Select Units for Physical Plant Definition	
Metric (M) or US (U)	u

Iron Addition Reactor:			1
Iron Addn?	Flow gpd	Xmtch	Salk
FALSE	FALSE	FALSE	FALSE

Definition of the Physical Plant		PRO2D	
How many reactors (up to 42)	6		
Enter the Solids Retention Time (SRT)	11.6 Days	SRT	11.6
Enter the Average Total Flow Rate	5.79 mgd	% Aerobic	85%
Enter the RAS Ratio (% of Plant Influent)	84%	% Anoxic	15%
	4.84 mgd	Temperature oC	15
Wastage Location - (A)ll Reactors or Clarifier (U)F	u	Total Volume gallons	2,827,500

Aeration Data		Est. Diffuser Design (Sanitaire Membranes)	
Aeration Basin Side Water Depth:	16 feet	Design Condition	Ave
Maximum Water Temperature:	25 °C	Est. Diffuser Air Rate	1.5 scfm/diffuser
BETA Correctional Factor:	0.95	Peaking Capability	267%
Plant Altitude:	4,900 feet	Estimated SOTE	35%
THETA - K,a Temp. Corr. Factor:	1.024		

System Configuration			Reactor														
Component	Units	TOTAL	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reactor Volume	gallons	2,827,500	141,375	801,125	141,375	801,125	141,375	801,125									
Fraction	% of Total		5%	28%	5%	28%	5%	28%									
Dissolved Oxygen	mg/L			4.50		4.50		4.50									
Reactor Feed																	
Raw Feed	% of Total	100%	33%		33%		33%										
RAS	% of Total RAS	100%	100%														
Recirculation From Reactor	% of Raw Feed (Enter Number)																
Other inflows (such as methanol, dewatering filtrate, or thickener return)																	
Flow	gpd																
S_{so}	mg COD/L																
S_f	mg COD/L																
S_a	mg COD/L																
S_i	mg COD/L																
S_{NH}	mg N/L																
S_{no}	mg N/L																
S_{PO4}	mg P/L																
S_{ALK}	moles/m3																
X_i	mg COD/L																
X_s	mg COD/L																
X_H	mg COD/L																
X_{STO}	mg COD/L																
X_{PAO}	mg P/L																
X_{MeOH}	mg COD/L																
X_{MeP}	mg COD/L																
X_{TSS}	mg/L																
X_{VSS}	mg/L																
X_{ISS}	mg/L																

Summary Information			
Total MLSS Inventory	72,489 lbs	Total COD Removed	11,456 lbs/day
Total MLVSS Inventory	65,072 lbs	Food Applied to MLSS Inventory Ratio	0.16 COD/MLSS
MLSS/MLVSS Ratio	1.11	Aeration Information	
Total Required WAS Rate	6,232 lbs MLSS/day	Total AOR	12,494 lbs O2/day
or	5,594 lbs MLVSS/day	Total SOR	65,913 lbs O2/day
Observed Mass Yield	0.49 MLVSS/COD	Total Required Air Rate	11,002 scfm
		Simultaneous Denitrification	54.8%

Component Concentrations			Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Enter Reactor Number to use the Column of Data for the Original Guess					1	2	3	4	5	6	7	8					
S_O	Dissolved Oxygen	mg O2/L	0.0	0.0	0.0	4.8	0.0	4.8	0.1	4.8							
S_F	Soluble Fermentable Substrates	mg COD/L	57.6	0.4	1.0	0.3	1.2	0.3	1.4	0.4							
S_A	Soluble Fermentation Products	mg COD/L	38.4	0.1	0.7	0.0	0.7	0.0	0.9	0.1							
S_I	Soluble Inerts	mg COD/L	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3							
S_{NH}	Soluble Ammonia N	mg N/L	34.4	0.5	8.97	0.3	6.7	0.4	5.5	0.5							
S_{N2}	Dissolved Nitrogen Gas	mg N/L	0.0	17.3	18.3	18.7	17.9	18.1	17.1	17.3							
S_{NO}	Soluble Nitrate/Nitrite N	mg N/L	0.3	14.3	4.4	13.3	7.2	13.7	9.2	14.3							
S_{PO4}	Soluble Inorganic Phosphorus	mg P/L	2.6	2.6	2.5	2.7	2.5	2.5	2.6	2.6							
S_{ALK}	Alkalinity	mole/m³	2.9	0.3	1.5	0.4	1.3	0.4	1.0	0.3							
X_I	Inert Particulates	mg COD/L	74.0	3,852	2,798	2,804	2,192	2,203	1,517	1,518							
X_S	Slowly Biodegradable Substrate	mg COD/L	74.1	43.3	54.5	32.3	40.5	26.7	33.6	23.1							
X_H	Heterotrophic Organisms	mg COD/L	57.4	2,231	1,624	1,605	1,272	1,261	1,052	1,045							
X_{PAO}	Phosphate Accumulating Organisms	mg COD/L	0.0	0.3	0.2	0.2	0.2	0.2	0.1	0.2							
X_{PP}	Polyphosphate	mg P/L	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0							
X_{PHA}	PAO Storage Products	mg COD/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
X_{AUT}	Autotrophic Organisms	mg COD/L	0.0	153.3	107.3	108.4	84.4	85.2	69.7	70.4							
X_{TSS}	Total Suspended Solids (MLSS)	mg/L	178.7	5,243	3,807	3,780	2,967	2,970	2,460	2,457							
X_{MeOH}	Metal Hydroxides	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
X_{MeP}	Metal Phosphates	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
	MLVSS	mg COD/L		6,312	4,584	4,550	3,566	3,575	2,972	2,959							
	Oxygen Consumed	mg O2/(L-day)		[illegible]	0	641	227	557	291	516							
	Nitrate Consumed	mg NO3-N/(L-day)		[illegible]	282.0	3.3	206.8	2.7	173.0	2.4							
			Alkalinity Limited?			WARNING		WARNING		WARNING							
Reactor Information																	
	Reactor Volume	gallons			141,375	601,125	141,375	601,125	141,375	601,125	0	0	0	0	0	0	0
	AOR, Biological	lbs O2/day			0	4,286	256	3,723	343	3,447	0	0	0	0	0	0	0
	AOR, Liquid	lbs O2/day			0	271	-259	346	-344	420	0	0	0	0	0	0	0
	Total AOR	lbs O2/day			0	4,560	-1	4,069	-1	3,867	0	0	0	0	0	0	0
	Aeration Alpha Value				0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	SOR/AOR Ratio				2.431	5.515	2.037	5.515	2.044	5.515	2.026	2.026	2.026	2.026	2.026	2.026	2.026
	SOR	lbs O2/day			0	25,148	-1	22,439	-2	21,330	0	0	0	0	0	0	0
	SOTE				25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
	Required Air Rate	SCFM			0	4,015	0	3,582	0	3,405	0	0	0	0	0	0	0
	Is Required Diffuser Density Too High?																
	Required Mixing Air @ 0.12 scfm/ft2	SCFM			0	344	0	344	0	344	0	0	0	0	0	0	0
	MLVSS	mg/L		4,737	3,416	3,393	2,661	2,667	2,218	2,206	0	0	0	0	0	0	0
Flow Balance																	
	Raw Feed into Reactor	mgd	5.79		1.53		1.53		1.53								
	Flow from Previous Reactor	mgd				5.77	6.77	8.70	1.76	10.83							
	Recirculation into Reactor	mgd															
	From Reactor				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]							
	RAS into Reactor	mgd		4.54	4.54												
	Other Flows Into Reactor	mgd	0.00														
	Effluent From Reactor	mgd			5.77	6.77	8.70	8.70	10.83	10.83							
	Waste Activated Sludge	mgd		0.142													

Facility Operating Parameters					
Item		Value			Value
Influent Wastewater	(Metric)	(Metric)	(Metric*US*K)	(US)	(US)
Flow	m3/day			MG/day	
Design Average		20,818	3785		5.500
Design Diurnal Peak		20,818	3785		5.500
Design Peaking Factor for WW Diurnal flow		1.0	1		1.0
Design Peaking Factor for WW Diurnal loads		1.0	1		1.0
Carbonaceous Five-Day Biochemical Oxygen Demand ($CBOD_5$)					
Design Average Concentration	mg/L	299	1	mg/L	299
Design Average Mass Loading	kg/day	6,219	0.4536	lb/day	13,710
Design Diurnal Peak Mass Loading	kg/day	6,219	0.4536	lb/day	13,710
Total Suspended Solids (TSS)					
Design Average Concentration	mg/L	246	1	mg/L	246
Design Average Mass Loading	kg/day	5,117	0.4536	lb/day	11,280
Design Diurnal Peak Mass Loading	kg/day	5,117	0.4536	lb/day	11,280
Volatile Suspended Solids (VSS)					
Percent VSS	%	83%	1	%	83%
Design Average Concentration	mg/L	205	1	mg/L	205
Design Average Mass Loading	kg/day	4,269	0.4536	lb/day	9,412
Design Diurnal Peak Mass Loading	kg/day	4,269	0.4536	lb/day	9,412
Total Kjeldahl Nitrogen (TKN as N)					
Design Average Concentration	mg/L	43	1	mg/L	43.2
Design Average Mass Loading	kg/day	899	0.4536	lb/day	1,983
Design Diurnal Peak Mass Loading	kg/day	899	0.4536	lb/day	1,983
Ammonia Nitrogen (NH_3-N as N)					
Design Average Concentration	mg/L	28	1	mg/L	27.9
Design Average Mass Loading	kg/day	580	0.4536	lb/day	1,279
Design Diurnal Peak Mass Loading	kg/day	580	0.4536	lb/day	1,279
Total Phosphorus (as P)					
Design Average Concentration	mg/L	4.50	1	mg/L	4.5
Design Average Mass Loading	kg/day	94	0.4536	lb/day	206
Design Diurnal Peak Mass Loading	kg/day	94	0.4536	lb/day	206
Alkalinity (as $CaCO_3$)					
Design Average Concentration	mg/l	150	1	mg/L	150
Design Average Mass Loading	kg/day	3,120	0.4536	lb/day	6,878
Design Diurnal Peak Mass Loading	kg/day	3,120	0.4536	lb/day	6,878
Hydrogen Sulfide (H_2S)					
Design Average Concentration	mg/L	6	1	mg/L	6
Design Average Mass Loading	kg/day	125	0.4536	lb/day	275
Design Diurnal Peak Mass Loading	kg/day	125	0.4536	lb/day	275
Primary Clarifiers (Yes)					
Primary Clarifiers?	Yes	1			
Total Area	m2	886	0.0929	sq.ft.	9,556
Overflow Rate	m/day		0.040747	gpd-sq.ft.	
Average		24	0.040747		600
Diurnal Peak		24	0.040747		600
Percent of COD filtrate that is colloidal	None	40%	1	%	40%
TSS Removal Efficiency at Average Conditions	%	65%	1	%	65%
TSS Removal Efficiency at Diurnal Peak Conditions	%	65%	1	%	65%
Primary Sludge Concentration	mg/L	35,600	1	mg/L	35,600

Facility Operating Parameters					
Item		Value			Value
Secondary Treatment: # Bioreactor & Clarifier					
		1			
Trickling Filter					
Coef. "K" in Velz Equation (English Units) =		0.03			0.030
Coef. "n" in Velz Equation =		0.50			0.50
Coef. "Theta" in Velz Equation =		1.035			1.035
Media Volume	m3	2,549	0.0283168	ft3	90,000
Media Depth	m	1.83	0.3048	ft	6
Media Specific surface area	m2/m3	49.21	0.3048	ft2/ft3	15
Recirculation Q (used in wetting Q = TF Influent Q+ recirculation)	m3/day	17,411	3785	MGD	4.600
TF Effluent Soluble BOD5	mg/L				
Average		N/A	1	days	N/A
Diurnal Peak		N/A	1	days	N/A
TF Effluent NH3-N	mg/L				
Average		N/A	1	days	N/A
Diurnal Peak		N/A	1	days	N/A
TF Solids Production in VSS (mg VSS in effluent/mg BOD5 rem)	mg/mg	N/A	1	mg/mg	N/A
No Trickling Filter Clarifier is to be Configured					
Biological Process - Integrated with PBNR					
SRT	days	8.4	1	days	8.4
Nitrifier Minimum SRT (SRT_{min})	days	3.1	1	days	3.1
DO	mg/L	4.8	1	mg/L	4.8
Temperature in the Biological Process	oC	14.5	Special	oF	58.1
Simultaneous Denitrification	%	76%	1	%	76%
SVI	mL/g	332	1	mL/g	332
Biosolids Production Rates					
Net Yield (mg TSS/mg BOD_5)	mg/mg	0.63	1	lb/lb	0.63
Volatile Fraction	%	88.90%	1	%	88.90%
Active Fraction	%	51.09%	1	%	51.09%
Nitrifier Fraction	%	2.89%	1	%	2.89%
Nitrogen Content, N/VSS	%	3.79%	1	%	3.79%
Phosphorus Content, P/VSS	%	0.52%	1	%	0.52%
Process Oxygen Requirements					
Carbonaceous AOR/BOD5 - wt/wt	kg/kg	1.06	1	lb/lb	1.06
Total AOR/BOD% - wt/wt	kg/kg	1.46	1	lb/lb	1.46
AOR (wt/day)	kg/day			lb/day	
Average		6,817	0.4536		15,248
Diurnal Peak		7,129	0.4536		15,717
AOR	mg/L-hr			mg/L-hr	
Average		27	1		27
Diurnal Peak		27.8	1		27.8
Bioreactor					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
HRT	hr	11.9	1	hr	11.9
% non-aerobic	%	15%	1		15%
% aerobic	%	85%	1		85%
Average MLSS Concentration	mg/L	2,347	1	mg/L	2,347
Bioreactor Clarifier					
Total Area	m2	1,345	0.0929	sq.ft.	14,476
Overflow Rate	m/day			gpd-sq.ft.	
Average		16	0.040747		394
Diurnal Peak		16	0.040747		394
Effluent TSS	mg/L			mg/L	
Average		6	1		6.2
Diurnal Peak		6	1		6.2
Underflow Rate					
Average Flow Ratio	%	189%	1		189%
Average Rate	m/day	30	0.040747	gpd-sq.ft.	744
Peak Flow Ratio	%	189%	1		189%
Peak Rate	m/day	30	0.040747	gpd-sq.ft.	744
Solids Loading Rate	kg/m2-day		4.883	lb/day-sq.ft.	
Average		96	4.883		19.6
Diurnal Peak		96	4.883		19.6
Limiting Solids Loading Rate	kg/m2-day	122	4.883	lb/day-sq.ft.	25
Return sludge rate at which limiting solids rate can be achieved					
RAS Flow Rate	m3/day	26369	3785	MGD	7
Percent of Influent to Bioreactor	%	1		%	1
Underflow Concentration	mg/L			mg/L	
Average		3,090	1		3,090
Diurnal Peak		3,099	1		3,099

Facility Operating Parameters					
Item		Value			Value
WAS Thickening	No / None				
WAS Thickener?	Yes	1			
Location of WAS Thickener recycle to plant: Headworks		1			
Solids Capture	%	45%	1	%	45%
Thickened Sludge Concentration	mg/L	26,700	1	mg/L	26,700
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7
Solids Digestion: Anaerobic Only					
Anaerobic Digester					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
Active Bioreactor Volume	m3	8,027	3785	MG	2.12
SRT	days	47.1	1	days	47.1
Volatile Solids Loading - wt VSS/vol-day	kg/m3-day	0.59	16.06	lb/ft3-day	0.037
Volatile Solids Reduction	%	54%	1	%	54%
Methane Production	m3/day	1,298	0.0283	ft3/day	45853.7
Percent P Released that is Precipitated as Struvite	%	30%	1	%	30%
Digester Gas Methane Content	%	54%	1	%	54%
Digester Gas Production	m3/day	2,403	0.0283	ft3/day	84914.3
Digester Gas Production (vol/wt volatile solids destroyed)	m3/kg	0.93	0.06226	ft3/lb	14.9

Mass Balance for Average Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Trickling Filter Influent (TFI)	Trickling Filter Effluent (TFE)	Bioreactor Influent (BI)	Avg Mixed Liquor (ML)	Secondary Influent (SI)	RAS
Flow (gal/day)	5,500,000	5,731,493	5,609,219	5,609,219	5,609,219	5,699,219	16,672,351	16,672,351	10,772,575
Carbonaceous BOD (lb/day)	13,896	14,515	10,451	10,451	10,451	10,451	103,987	91,382	89,564
Particulate	5,527	5,504	1,947	1,947	1,947	1,847	5,457	3,349	2,977
Heterotrophs	0	1,280	378	378	378	378	106,480	88,385	89,542
PAOs	0	0	0	0	0	0	8	7	7
PHA	0	0	0	0	0	0	0	0	0
Filtrate	8,371	8,172	8,126	8,125	8,125	8,125	42	42	28
COD (lb/day)	27,332	31,715	20,294	20,294	20,294	20,294	354,512	339,190	330,300
Particulate Bio	9,590	9,746	3,091	3,091	3,091	3,091	6,182	5,409	5,330
Particulate Non-Bio	4,674	5,444	2,255	2,255	2,255	2,255	154,145	144,714	141,376
Heterotrophs	0	2,125	747	747	747	747	183,721	175,186	171,155
Autotrophs	0	121	42	42	42	42	11,240	9,909	9,559
PAOs	0	0	0	0	0	0	24	21	20
PHA	0	0	0	0	0	0	0	0	0
Filtrate Bio	12,891	12,832	12,760	12,760	12,760	12,760	69	69	43
Filtrate Non-Bio	1,376	1,436	1,428	1,428	1,428	1,428	4,127	4,127	2,809
TSS (lb/day)	11,270	14,726	5,158	5,158	5,158	5,158	322,263	284,114	277,560
Biodegradable	7,191	7,245	2,536	2,535	2,535	2,530	5,127	4,520	4,415
Non-Biodegradable	4,079	5,522	1,998	1,998	1,998	1,998	143,141	126,196	123,205
Heterotrophs	0	1,769	619	619	619	619	164,640	145,150	141,802
Autotrophs	0	100	35	35	35	35	9,312	8,210	8,020
PAOs	0	0	0	0	0	0	19	17	17
PHA	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	22	20	19
VSS (lb/day)	9,424	12,384	4,338	4,338	4,338	4,338	277,786	244,904	239,255
Biodegradable	6,112	6,162	2,157	2,157	2,157	2,157	4,915	4,358	3,975
Non-Biodegradable	3,231	4,540	1,625	1,625	1,625	1,625	128,358	110,456	107,917
Heterotrophs	0	1,304	525	528	525	525	139,944	123,378	120,532
Autotrophs	0	85	30	30	30	30	7,916	6,979	6,817
PAOs	0	0	0	0	0	0	17	15	14
PHA	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	1,901	2,104	1,634	1,634	1,634	1,634	11,329	10,030	9,097
NH_4-N (lb-N/day)	1,275	1,279	1,272	1,272	1,272	1,272	56	65	42
Particulate Bio Org N	182	180	65	65	65	65	165	145	142
Non-Bio Part Org N	96	126	48	45	45	45	3,481	3,352	2,981
Heterotrophs	0	75	26	26	26	26	6,867	5,769	6,027
Autotrophs	0	4	1	1	1	1	390	349	341
PAOs	0	0	0	0	0	0	1	1	1
Non-Bio Sol Org N	53	86	86	86	86	86	249	248	182
Soluble Bio Org N	336	338	335	335	335	335	2	2	1
NO_x-N (lb-N/day)	0	15	15	15	15	15	1,041	1,241	891
TP (lb-P/day)	206	229	159	159	159	159	2,866	2,340	2,499
Bio Particulate	51	63	21	21	21	21	16	14	14
Non-Bio Particulate	33	45	16	16	16	16	1,154	1,017	994
Heterotrophs	0	15	5	5	5	5	1,366	1,204	1,295
Autotrophs	0	1	0	0	0	0	79	70	68
PAOs	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	7	6	6
Ortho-PO_4	112	110	110	116	110	110	304	304	100
Alkalinity (lb/day as $CaCO_3$)	6,872	7,021	6,982	6,982	6,982	6,982	10,657	10,552	6,966
H_2S (lb/day)	275	276	276	276	276	276	0	0	0
BOD_5 (mg/L)	283.7	310.1	220.0	220.0	220.0	220.0	757.2	667.0	897.1
COD (mg/L)	591.1	663.7	427.1	427.1	427.1	427.1	2,799.9	2,472.1	3,677.8
TSS (mg/L)	245.3	335.4	108.8	108.8	108.8	108.8	2,346.5	2,046.0	3,090.3
VSS (mg/L)	205.1	259.4	91.3	91.3	91.3	91.3	2,022.6	1,763.2	2,664.0
TKN (mg-N/L)	43.2	44.0	36.5	33.8	38.6	34.6	82.5	73.0	108.0
NH_3-N (mg-N/L)	27.9	26.8	26.8	26.8	26.8	26.6	0.5	0.5	0.5
NO_3-N (mg-N/L)	0.0	0.3	0.3	0.3	0.3	0.3	7.6	7.6	7.9
TP (mg-P/L)	4.5	5.0	3.3	3.3	3.3	3.3	21.6	19.3	27.7
Alkalinity (mg/L as $CaCO_3$)	149.9	146.2	146.2	146.9	146.2	146.0	77.6	77.6	77.6
H_2S (mg/L)	6.1	5.8	5.8	5.8	5.8	5.8	0.0	0.0	0.0

Constituent	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Thickened PSD (TPSD)	Combined Sludge (CS)	Aerobic Digester Effluent (AOE)	Anaerobic Digester Effluent (AnOE)	WAS Thickening Recycle (WSR)
Flow (gal/day)	5,455,457	5,455,457	32,216	214,318	12,706	32,216	45,002	45,002	45,002	231,392
Carbonaceous BOD (lb/day)	105	105	4,385	2,031	614	4,385	5,278	5,278	5	1,117
Particulate	3	3	3,817	68	30	3,817	3,847	3,647	0	37
Heterotrophs	88	88	702	1,982	832	702	1,585	1,585	0	1,480
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Filtrate	14	14	16	1	0	45	46	46	9	1
COD (lb/day)	1,720	1,720	11,427	7,461	3,349	11,427	14,757	14,707	8,616	4,145
Particulate Bio	5	5	5,085	127	54	5,685	5,739	5,739	366	66
Particulate Non-Bio	144	144	4,199	3,200	1,413	4,199	5,632	5,632	8,237	1,703
Heterotrophs	174	174	1,356	3,562	1,717	1,356	3,135	3,135	0	2,135
Autotrophs	10	10	79	220	98	79	177	177	0	121
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Filtrate Bio	27	22	72	1	0	72	72	72	14	1
Filtrate Non-Bio	1,397	1,397	8	61	3	0	11	11	11	68
TSS (lb/day)	250	253	9,576	6,295	2,833	9,576	12,412	12,412	5,627	3,362
Biodegradable	4	5	4,710	130	15	4,710	4,755	4,755	295	55
Non-Biodegradable	120	126	3,054	2,796	1,236	3,054	4,913	4,913	5,532	1,326
Heterotrophs	145	145	1,150	3,216	1,447	1,150	2,597	2,597	0	1,769
Autotrophs	8	8	65	182	32	65	147	147	0	100
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	0	0	0
VSS (lb/day)	244	244	5,059	5,426	2,442	5,059	10,498	10,498	4,796	2,754
Biodegradable	4	4	4,005	90	11	4,005	4,046	4,045	251	50
Non-Biodegradable	110	110	3,018	2,446	1,131	3,018	4,119	4,119	4,546	1,146
Heterotrophs	123	123	977	2,734	1,220	977	2,207	2,207	0	1,503
Autotrophs	7	7	55	155	70	55	125	125	0	85
PAOs	0	0	0	0	5	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	114	114	270	220	97	270	307	307	287	123
NH_4-N (lb-N/day)	22	22	7	1	0	7	7	7	200	1
Particulate Bio Org N	0	0	120	3	1	120	122	122	12	2
Non-Bio Part Org N	3	3	88	88	30	88	119	119	149	37
Heterotrophs	0	0	48	107	55	48	110	110	0	75
Autotrophs	0	0	3	8	3	3	0	0	0	4
PAOs	0	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	82	82	0	4	0	0	1	1	1	1
Soluble Bio Org N	1	1	2	0	0	2	2	2	0	0
NO_x-N (lb-N/day)	345	345	0	15	1	0	1	1	0	15
TP (lb-P/day)	102	102	89	55	74	89	104	104	104	33
Bio Particulate	0	0	40	0	0	40	40	40	3	0
Non-Bio Particulate	1	1	29	23	12	29	40	40	81	12
Heterotrophs	1	1	10	27	12	10	22	22	0	15
Autotrophs	0	0	1	2	1	1	1	1	0	1
PAOs	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	0	0	0
Ortho-PO_4	101	104	1	5	0	1	1	1	40	4
Alkalinity (lb/day as $CaCO_3$)	3,528	3,528	40	158	8	40	40	49	735	150
H_2S (lb/day)	0	0	2	0	0	0	0	2	10	0
BOD_5 (mg/L)	2.3	2.31	16,220	597	5,612	0	14,008	14,008	24	579
COD (mg/L)	37.8	37.8	42,442	3,676	31,540	0	39,358	39,359	17,640	2,147
TSS (mg/L)	6.2	6.22	35,690	3,000	25,720	0	33,080	33,083	15,531	1,790
VSS (mg/L)	5.4	5.4	27,999	2,854	23,045	0	27,981	27,981	12,734	1,346
TKN (mg-N/L)	2.5	2.5	1,003	108	915	0	978	978	976	54
NH_3-N (mg-N/L)	5.5	0.47	26.8	0.5	6.5	0.0	19.3	19.3	546.2	0.5
NO_3-N (mg-N/L)	7.5	7.6	0.3	7.6	7.6	0.0	2.4	2.4	0.0	7.9
TP (mg-P/L)	2.3	2.3	298.5	27.7	223.3	0.0	276.5	276.9	275.9	17.0
Alkalinity (mg/L as $CaCO_3$)	77.6	77.6	148.9	77.6	77.9	0.0	127.3	127.3	1,900.2	77.6
H_2S (mg/L)	0.0	0.0	5.8	0.0	0.0	0.0	4.1	4.1	50.0	0.0

Mass Balance for Diurnal Peak Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Tertiary Filter Influent (TFI)	Tertiary Filter Effluent (TFE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS
Flow (m3/day)	5,300,000	5,739,427	5,699,222	5,699,222	5,699,222	5,699,222	19,470,759	19,470,752	13,771,530
Carbonaceous BOD (lb/day)	13,993	14,815	10,451	10,451	10,451	10,451	97,720	13,217	99,010
Particulate	5,527	5,564	1,947	1,947	1,947	1,947	0	9,093	0
Heterotrophs	0	1,060	378	378	378	378	94,687	33	85,991
PAOs	0	0	0	0	0	0	11	0	10
PHA	0	0	0	0	0	0	0	17	0
Filtrate	8,171	8,172	8,129	8,129	8,129	8,129	23	4,127	19
COD (lb/day)	27,562	21,715	22,294	22,294	22,294	22,294	393,761	375,360	332,759
Particulate Bio	3,687	8,740	3,061	3,061	3,061	3,061	0	0	0
Particulate Non-Bio	4,674	6,444	2,255	2,255	2,255	2,255	172,097	132,460	151,040
Heterotrophs	0	2,135	747	747	747	747	197,152	144,000	110,000
Autotrophs	0	121	42	42	42	42	10,314	7,634	8,097
PAOs	0	0	0	0	0	0	34	25	29
PHA	0	0	0	0	0	0	0	0	0
Filtrate Bio	12,831	12,832	12,780	12,787	12,780	12,780	37	34	24
Filtrate Non-Bio	1,378	1,428	1,428	1,428	1,428	1,428	4,127	236,276	2,699
TSS (lb/day)	11,270	14,737	5,158	5,159	5,158	5,158	322,232	260,112	277,089
Biodegradable	7,191	7,249	2,535	2,535	2,535	2,535	0	110,446	0
Non-Biodegradable	4,079	5,622	1,986	1,989	1,989	1,989	150,270	122,494	129,632
Heterotrophs	0	1,769	619	619	619	619	160,241	6,404	140,899
Autotrophs	0	100	35	35	35	35	8,546	21	7,271
PAOs	0	0	0	0	0	0	28	0	24
PHA	0	0	0	0	0	0	0	10,742	0
Poly-P	0	0	0	0	0	0	39	44	33
VSS (lb/day)	9,404	12,394	4,338	4,338	4,338	4,338	271,405	10,847	224,110
Biodegradable	6,112	6,162	2,157	2,157	2,157	2,157	0	3,638	0
Non-Biodegradable	3,291	4,943	1,825	1,825	1,825	1,825	120,279	6,170	105,968
Heterotrophs	0	1,594	520	520	520	520	138,840	320	119,794
Autotrophs	0	65	30	30	30	30	7,203	1	6,200
PAOs	0	0	0	0	0	0	24	249	21
PHA	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	1,951	2,104	1,634	1,634	1,634	1,634	12,138	5,878	10,399
Org-N (lb-N/day)	1,279	1,279	1,272	1,272	1,272	1,272	94	2,930	62
Particulate Bio Org N	183	185	65	65	65	53	0	0	0
Non-Bio Part Org N	99	126	48	48	49	49	4,490	1,345	3,873
Heterotrophs	0	75	26	23	23	23	6,942	1,224	5,956
Autotrophs	0	4	1	1	1	1	380	54	310
PAOs	0	0	0	0	0	0	1	0	1
Non-Bio Sol Org N	83	85	86	86	86	86	245	11	152
Soluble Bio Org N	338	338	336	333	333	335	0	294	10
NO_3-N (lb-N/day)	0	15	15	15	15	15	1,034	-7,114	677
TP (lb-P/day)	206	239	155	159	159	157	3,283	0	2,779
Bio Particulate	61	51	21	21	21	21	0	0	0
Non-Bio Particulate	33	45	16	16	16	16	1,520	0	1,316
Heterotrophs	0	15	5	5	5	5	1,388	0	1,194
Autotrophs	0	1	0	0	0	0	73	0	63
PAOs	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	12	0	10
Ortho-PO_4	112	110	110	110	110	110	224	0	192
Alkalinity (lb/day as $CaCO_3$)	6,672	7,021	6,962	6,962	6,962	6,962	-7,134	0	-4,888
H_2S (lb/day)	275	275	273	273	273	273	0	0	0
BOD_5 (mg/L)	390.7	310.1	220.0	220.0	220.0	220.0	726.2	8.6	957.8
COD (mg/L)	601.1	603.7	427.1	427.1	427.1	427.1	2,816.9	3,011.4	3,705.4
TSS (mg/L)	245.5	306.4	108.5	108.5	108.5	108.5	2,348.6	1,621.4	3,099.2
VSS (mg/L)	205.1	258.4	91.3	91.3	91.3	91.3	1,976.5	77.5	2,807.0
TKN (mg-N/L)	43.2	44.0	38.5	38.6	38.9	38.0	89.4	42.9	115.8
NH_3-N (mg-N/L)	27.9	26.8	26.8	26.8	26.8	26.8	0.7	21.4	0.7
NO_3-N (mg-N/L)	0.0	0.3	0.0	0.3	0.3	0.3	7.5	-52.0	7.5
TP (mg-P/L)	0.0	0.0	0.0	3.3	3.3	3.3	24.0	0.0	30.9
Alkalinity (mg/L as $CaCO_3$)	149.9	146.6	146.6	146.6	146.6	146.6	-52.0	0.0	-52.0
H_2S (mg/L)	9.9	5.8	5.8	5.8	5.8	5.8	0.0	0.0	0.0

Constituent	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Thickened PSD (TPSD)	Combined Sludge (CS)	Aerobic Digester Effluent (ACE)	Anaerobic Digester Effluent (ANDE)	WAS Thickening Recycle (WSR)
Flow (m3/day)	5,472,913	5,472,913	32,279	244,315	12,724	22,279	45,003	45,003	45,003	221,591
Carbonaceous BOD (lb/day)	58	58	4,385	2,031	914	4,365	5,278	5,278	0	1,157
Particulate	0	0	3,917	65	30	2,017	3,847	3,847	0	37
Heterotrophs	20	65	702	1,883	883	702	1,585	1,585	0	1,050
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Filtrate	9	9	46	1	0	46	48	46	9	1
COD (lb/day)	1,739	1,720	11,421	7,491	3,349	11,421	14,787	14,787	6,019	4,145
Particulate Bio	0	0	6,085	121	54	6,085	5,739	5,739	258	46
Particulate Non-Bio	154	154	4,193	6,206	1,442	4,193	5,632	5,632	9,227	1,760
Heterotrophs	174	174	1,289	3,082	1,747	1,289	3,135	3,135	0	2,132
Autotrophs	8	8	79	239	96	79	177	177	0	121
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Filtrate Bio	12	12	72	5	0	72	72	72	14	1
Filtrate Non-Bio	1,371	1,371	8	61	3	8	11	11	11	56
TSS (lb/day)	234	234	9,579	6,295	2,832	9,579	12,412	12,412	3,927	3,402
Biodegradable	0	0	4,710	100	45	4,710	4,755	4,755	225	66
Non-Biodegradable	132	132	3,854	2,796	1,256	3,854	4,913	4,913	5,530	1,539
Heterotrophs	144	144	1,150	3,210	1,447	1,150	2,397	2,397	0	1,759
Autotrophs	9	8	65	162	87	65	147	147	0	100
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	0	0	0
VSS (lb/day)	239	232	8,059	1,426	2,442	5,059	10,480	10,488	4,795	2,994
Biodegradable	0	0	4,005	90	41	1,005	4,046	4,046	251	59
Non-Biodegradable	110	110	3,018	2,445	1,101	3,018	4,119	4,118	4,543	1,340
Heterotrophs	122	122	977	1,734	1,230	977	2,207	2,207	0	1,560
Autotrophs	0	8	55	100	75	55	125	125	0	85
PAOs	0	0	0	0	0	0	0	0	0	0
PHA	0	0	0	0	0	0	0	0	0	0
TKN (lb-N/day)	124	124	279	220	81	279	387	387	307	121
Org-N (lb-N/day)	31	31	7	1	0	7	7	7	200	1
Particulate Bio Org N	0	0	120	2	1	120	122	122	13	2
Non-Bio Part Org N	4	4	58	58	30	85	110	119	149	0
Heterotrophs	8	6	42	137	60	49	110	110	0	75
Autotrophs	0	0	3	5	0	3	8	0	0	4
PAOs	0	0	0	0	0	0	0	0	0	0
Non-Bio Sol Org N	80	82	0	4	0	0	1	1	1	0
Soluble Bio Org N	0	0	2	0	0	2	2	2	0	0
NO_3-N (lb-N/day)	344	344	0	15	1	0	1	1	0	15
TP (lb-P/day)	100	100	50	55	24	50	104	104	104	50
Bio Particulate	0	0	40	0	0	40	40	40	0	0
Non-Bio Particulate	1	1	25	23	10	29	40	40	91	12
Heterotrophs	1	1	10	27	12	10	22	22	0	15
Autotrophs	0	0	1	2	1	1	1	1	0	1
PAOs	0	0	0	0	0	0	0	0	0	0
Poly-P	0	0	0	0	0	0	0	0	0	0
Ortho-PO_4	98	98	1	5	0	1	1	1	40	4
Alkalinity (lb/day as $CaCO_3$)	-2,071	-2,071	45	158	6	40	48	48	720	150
H_2S (lb/day)	0	0	2	0	0	2	2	2	12	0
BOD_5 (mg/L)	2.1	2.1	16,229	997	8,012	0	14,010	14,007	24	350
COD (mg/L)	37.7	37.3	42,442	3,676	31,540	0	38,350	38,350	17,840	2,147
TSS (mg/L)	9.2	9.2	35,800	2,090	25,700	0	32,053	33,060	12,531	1,790
VSS (mg/L)	5.2	5.2	29,633	1,664	23,017	0	27,952	27,981	12,784	1,549
TKN (mg-N/L)	2.7	2.7	1,000	106	915	0	978	978	976	64
NH_3-N (mg-N/L)	0.7	0.7	26.5	0.6	0.5	0.0	18.3	10.3	508.9	0.5
NO_3-N (mg-N/L)	7.5	7.5	0.3	7.0	7.9	0.0	2.4	2.4	0.0	7.6
TP (mg-P/L)	2.2	2.2	298.5	27.7	221.7	0.0	276.8	276.0	218.0	17.3
Alkalinity (mg/L as $CaCO_3$)	-52.0	-52.0	146.6	77.9	77.5	0.0	127.5	127.5	1,930.5	77.5
H_2S (mg/L)	0.0	0.0	5.6	0.0	0.0	0.0	4.1	4.1	30.0	0.0

Select Units for Physical Plant Definition	
Metric (M) or US (U)	u

Iron Addition Reactor:			1
Iron Addn?	Flow pnd	Xm-ech	Salk
FALSE	FALSE	FALSE	FALSE

Definition of the Physical Plant		PRO2D	
How many reactors (up to 42)	6		
Enter the Solids Retention Time (SRT)	8.4 Days	SRT	8.4
Enter the Average Total Flow Rate	5.70 mgd	% Aerobic	85%
Enter the RAS Ratio (% of Plant Influent)	100%	% Anoxic	15%
	10.77 mgd	Temperature oC	15
Wastage Location - (A)t Reactors or Clarifier (U)/F	u	Total Volume gallons	2,827,500

Aeration Data		Est. Diffuser Design (Sanitaire Membranes)	
Aeration Basin Side Water Depth:	15 feet	Design Condition	Ave
Maximum Water Temperature:	25 °C	Est. Diffuser Air Rate	1.5 scfm/diffuser
BETA Correctional Factor:	0.95	Peaking Capability	267%
Plant Altitude:	4,900 feet	Estimated SOTE	36%
THETA - K_La Temp. Corr. Factor:	1.024		

System Configuration			Reactor														
Component	Units	TOTAL	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reactor Volume	gallons	2,827,500	141,375	801,125	141,375	801,125	141,375	801,125									
Fraction	% of Total		5%	28%	5%	28%	5%	28%									
Dissolved Oxygen	mg/L			4.80		4.80		4.80									
Reactor Feed																	
Raw Feed	% of Total	100%	33%		33%		33%										
RAS	% of Total RAS	100%	100%														
Recirculation	% of Raw Feed																
From Reactor	(Enter Number)																
Other Inflows (such as methanol, dewatering filtrate, or thickener return)																	
Flow	mgd																
S_{DO}	mg O_2/L																
S_I	mg COD/L																
S_S	mg COD/L																
S_I	mg COD/L																
S_{NH}	mg N/L																
S_{NO}	mg N/L																
S_{ND}	mg N/L																
S_{PO4}	mg P/L																
S_{ALK}	moles/m3																
X_I	mg COD/L																
X_S	mg COD/L																
X_H	mg COD/L																
X_{PAO}	mg COD/L																
X_{PP}	mg P/L																
X_{PHA}	mg COD/L																
X_{AUT}	mg COD/L																
X_{TSS}	mg/L																
X_{VSS}	mg/L																
X_{ISS}	mg/L																

Summary Information			
Total MLSS Inventory	55,373 lbs	Total COD Removed	15,605 lbs/day
Total MLVSS Inventory	49,229 lbs	Food Applied to MLSS Inventory Ratio	0.20 COD/MLSS
MLSS/MLVSS Ratio	1.12	Aeration Information	
Total Required WAS Rate	6,584 lbs MLSS/day	Total AOR	15,037 lbs O2/day
or	5,850 lbs MLVSS/day	Total SOR	54,589 lbs O2/day
Observed Mass Yield	0.35 MLVSS/COD	Total Required Air Rate	13,906 scfm
		Simultaneous Denitrification	79.2%

	Component Concentrations		Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	Enter Reactor Number to use the Column of Data for the Original Guess				1	2	3	4	5	6	7	8					
S_{O2}	Dissolved Oxygen	mg O/L	0.0	0.0	0.0	4.8	0.1	4.8	0.1	4.9							
S_F	Soluble Fermentable Substrates	mg COD/L	96.7	0.4	1.9	0.4	1.3	0.4	2.0	0.4							
S_A	Soluble Fermentation Products	mg COD/L	64.5	0.1	1.4	0.1	1.2	0.1	1.3	0.1							
S_I	Soluble Inerts	mg COD/L	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1							
S_{NH}	Soluble Ammonia N	mg N/L	26.6	0.5	4.62	0.4	3.5	0.4	3.4	0.5							
S_{N2}	Dissolved Nitrogen Gas	mg N/L	0.0	24.0	25.1	25.4	24.1	26.0	24.1	24.2							
S_{NO3}	Soluble Nitrate/Nitrite N	mg N/L	0.3	7.5	2.1	6.7	3.4	7.1	4.6	7.6							
S_{PO4}	Soluble Inorganic Phosphorus	mg P/L	2.4	2.2	2.2	2.2	2.2	2.3	2.2	2.2							
S_{ALK}	Alkalinity	mole/m³	2.9	1.6	2.2	1.6	2.1	1.6	2.0	1.6							
X_I	Inert Particulates	mg COD/L	47.5	1,574	1,346	1,349	1,180	1,182	1,052	1,054							
X_S	Slowly Biodegradable Substrate	mg COD/L	171.8	55.3	74.1	49.0	62.4	43.2	55.7	39.7							
X_H	Heterotrophic Organisms	mg COD/L	15.7	1,902	1,833	1,632	1,430	1,430	1,275	1,276							
X_{PAO}	Phosphate Accumulating Organisms	mg COD/L	0.0	0.2	0.2	0.2	0.2	0.2	0.1	0.2							
X_{PP}	Polyphosphate	mg P/L	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0							
X_{PHA}	PAO Storage Products	mg COD/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
X_{AUT}	Autotrophic Organisms	mg COD/L	0.9	107.8	91.7	92.4	80.4	80.0	71.7	72.2							
X_{TSS}	Total Suspended Solids (MLSS)	mg/L	198.0	3,090	2,854	2,646	2,332	2,319	2,080	2,069							
X_{MeOH}	Metal Hydroxides	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
X_{MeP}	Metal Phosphates	mg/L		0.0	0.0	0.0	0.0	0.0	0.0	0.0							
	MLVSS	mg COD/L		3,547	3,144	3,122	2,750	2,797	2,495	2,442							
	Oxygen Consumed	mg O2/(L-day)		[illegible]	0	738	424	556	460	531							
	Nitrate Consumed	mg NO3-N/(L-day)		[illegible]	396.8	4.3	275.1	3.8	241.8	3.6							
			Alkalinity Limited?														
Reactor Information																	
	Reactor Volume	gallons			141,375	801,125	141,375	801,125	141,375	801,125	0	0	0	0	0	0	0
	AOR, Biological	lbs O2/day			0	4,937	550	4,453	572	4,219	0	0	0	0	0	0	0
	AOR, Liquid	lbs O2/day			0	506	-551	576	-574	546	0	0	0	0	0	0	0
	Total AOR	lbs O2/day			0	5,444	-1	5,029	-1	4,565	0	0	0	0	0	0	0
	Aeration Alpha Value				0.50	0.60	0.50	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	SOR/AOR Ratio				2.431	5.515	2.043	5.513	2.049	5.515	2.026	2.026	2.026	2.026	2.026	2.026	2.026
	SOR	lbs O2/day			0	30,027	-2	27,736	-3	25,540	0	0	0	0	0	0	0
	SOTE				25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
	Required Air Rate	SCFM			0	4,784	0	4,428	0	4,265	0	0	0	0	0	0	0
	Is Required Diffuser Density Too High?																
	Required Mixing Air @ 0.12 scfm/ft2	SCFM			0	244	0	244	0	244	0	0	0	0	0	0	0
	MLVSS	mg/L		2,747	2,368	2,352	2,074	2,061	1,848	1,825	0	0	0	0	0	0	0
Flow Balance																	
	Raw Feed into Reactor	mgd	5.70		1.90		1.90		1.90								
	Flow from Previous Reactor	mgd				12.67	12.67	14.57	14.57	16.47							
	Recirculation into Reactor	mgd															
	From Reactor																
	RAS into Reactor	mgd		10.77	10.77												
	Other Flows into Reactor	mgd	0.00														
	Effluent From Reactor	mgd			12.67	12.67	14.57	14.57	16.47	16.47							
	Waste Activated Sludge	mgd		0.256													

Appendix C – Pro2D Model Capacity Evaluation Results

Facility Operating Parameters					
Item		Value			Value
Influent Wastewater	(Metric)	(Metric)	(Metric=US*k)	(US)	(US)
Flow	m3/day			MG/day	
Design Average		31,416	3785		8.300
Design Diurnal Peak		53,369	3785		14.100
Design Peaking Factor for WW Diurnal flow		1.7	1		1.7
Design Peaking Factor for WW Diurnal loads		1.3	1		1.3
Carbonaceous Five-Day Biochemical Oxygen Demand ($CBOD_5$)					
Design Average Concentration	mg/L	300	1	mg/L	300
Design Average Mass Loading	kg/day	9,416	0.4536	lb/day	20,759
Design Diurnal Peak Mass Loading	kg/day	12,241	0.4536	lb/day	26,987
Total Suspended Solids (TSS)					
Design Average Concentration	mg/L	264	1	mg/L	264
Design Average Mass Loading	kg/day	8,286	0.4536	lb/day	18,268
Design Diurnal Peak Mass Loading	kg/day	10,772	0.4536	lb/day	23,748
Volatile Suspended Solids (VSS)					
Percent VSS	%	80%	1	%	80%
Design Average Concentration	mg/L	211	1	mg/L	211
Design Average Mass Loading	kg/day	6,629	0.4536	lb/day	14,614
Design Diurnal Peak Mass Loading	kg/day	8,618	0.4536	lb/day	18,999
Total Kjeldahl Nitrogen (TKN as N)					
Design Average Concentration	mg/L	39	1	mg/L	39
Design Average Mass Loading	kg/day	1,226	0.4536	lb/day	2,703
Design Diurnal Peak Mass Loading	kg/day	1,594	0.4536	lb/day	3,514
Ammonia-Nitrogen (NH_3-N as N)					
Design Average Concentration	mg/L	25	1	mg/L	25
Design Average Mass Loading	kg/day	791	0.4536	lb/day	1,744
Design Diurnal Peak Mass Loading	kg/day	1,028	0.4536	lb/day	2,267
Total Phosphorus (as P)					
Design Average Concentration	mg/L	4.50	1	mg/L	4.5
Design Average Mass Loading	kg/day	141	0.4536	lb/day	311
Design Diurnal Peak Mass Loading	kg/day	184	0.4536	lb/day	405
Alkalinity (as $CaCO_3$)					
Design Average Concentration	mg/L	150	1	mg/L	150
Design Average Mass Loading	kg/day	4,708	0.4536	lb/day	10,380
Design Diurnal Peak Mass Loading	kg/day	6,121	0.4536	lb/day	13,493
Hydrogen Sulfide (H_2S)					
Design Average Concentration	mg/L	6	1	mg/L	6
Design Average Mass Loading	kg/day	188	0.4536	lb/day	415
Design Diurnal Peak Mass Loading	kg/day	245	0.4536	lb/day	540
Primary Clarifiers Yes					
Primary Clarifers?	Yes	1			
Total Area	m2	888	0.0929	sq.ft.	9,556
Overflow Rate	m/day		0.040747	gpd-sq.ft.	
Average		36	0.040747		886
Diurnal Peak		61	0.040747		1,494
Chemical Compound Applied to Primary Influent None		1			
Percent of COD filtrate that is colloidal	%	40%	1	%	40%
TSS Removal Efficiency at Average Conditions	%	65%	1	%	65%
TSS Removal Efficiency at Diurnal Peak Conditions	%	55%	1	%	55%
Primary Sludge Concentration	mg/L	29,200	1	mg/L	29,200

Facility Operating Parameters					
Item		Value			Value
Secondary Treatment: E Bioreactor & Clarifier					
Biological Process - Integrated with PBNR					
SRT	days	10.1	1	days	10.1
Nitrifier Minimum SRT (SRT_{min})	days	4.4	1	days	4.4
DO	mg/L	2.5	1	mg/L	2.5
Temperature in the Biological Process	oC	12.5	Special	oF	54.5
Simultaneous Denitrification	%	82%	1	%	82%
SVI	mL/g	150	1	mL/g	150
Biosolids Production Rates					
Net Yield (mg TSS/mg BOD_u)	mg/mg	0.69	1	lb/lb	0.69
Volatile Fraction	%	79.28%	1	%	79.28%
Active Fraction	%	45.90%	1	%	45.90%
Nitrifier Fraction	%	1.53%	1	%	1.53%
Nitrogen Content, N/VSS	%	6.32%	1	%	6.32%
Phosphorus Content, P/VSS	%	2.25%	1	%	2.25%
Process Oxygen Requirements					
Carbonaceous AOR/BOD5 - w/w	kg/kg	1.06	1	lb/lb	1.06
Total AOR/BOD% - wt/wt	kg/kg	1.32	1	lb/lb	1.32
AOR (wt/day)	kg/day			lb/day	
Average		9,377	0.4536		20,673
Diurnal Peak		12,544	0.4536		27,654
AOR	mg/L-hr			mg/L-hr	
Average		37	1		37
Diurnal Peak		48.8	1		48.8
Bioreactor					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
HRT	hr	8.1	1	hr	8.1
% non-aerobic	%	15%	1		15%
% aerobic	%	85%	1		85%
Average MLSS Concentration	mg/L	4,636	1	mg/L	4,636
Bioreactor Clarifier					
Total Area	m2	2,017	0.0929	sq.ft.	21,714
Overflow Rate	m/day			gpd-sq.ft.	
Average		16	0.040747		387
Diurnal Peak		27	0.040747		654
Effluent TSS	mg/L			mg/L	
Average		20	1		20
Diurnal Peak		30	1		30
Underflow Rate					
Average Flow Ratio	%	100%	1		100%
Average Rate	m/day	16	0.040747	gpd-sq.ft.	387
Peak Flow Ratio	%	75%	1		75%
Peak Rate	m/day	20	0.040747	gpd-sq.ft.	491
Solids Loading Rate	kg/m2-day		4.883	lb/day-sq.ft.	
Average		104	4.883		21.4
Diurnal Peak		155	4.883		31.6
Limiting Solids Loading Rate	kg/m2-day	210	4.883	lb/day-sq.ft.	43
Return sludge rate at which limiting solids rate can be achieved					
RAS Flow Rate	m3/day	42554	3785	MGD	11
Percent of Influent to Bioreactor	%	1		%	1
Underflow Concentration	mg/L			mg/L	
Average		6,470	1		6,470
Diurnal Peak		7,539	1		7,539

Facility Operating Parameters					
Item		Value			Value
WAS Thickening	Yes / None				
WAS Thickener?	Yes	1			
Location of WAS Thickener recycle to plant: Headworks		1			
Solids Capture	%	45%	1	%	45%
Thickened Sludge Concentration	mg/L	30,000	1	mg/L	30,000
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7
Solids Digestion: Anaerobic Only					
		2			
Anaerobic Digester					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
Active Bioreactor Volume	m3	8,027	3785	MG	2.12
SRT	days	25.7	1	days	25.7
Volatile Solids Loading - wt VSS/vol-day	kg/m3-day	0.90	16.06	lb/ft3-day	0.056
Volatile Solids Reduction	%	54%	1	%	54%
Methane Production	m3/day	1,975	0.0283	ft3/day	69773.9
Percent P Released that is Precipitated as Struvite	%	30%	1	%	30%
Dewatering	No	2			
Location of Dewatering recycle to plant: N/A		3			
Solids Capture	%	85%	1	%	85%
Thickened Sludge Concentration	%	18%	1	%	18%
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7

Mass Balance for Average Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Combined Sludge (CS)	Anaerobic Digester Effluent (AnDE)	WAS Thickening Recycle (WSR)
Flow (gal/day)	8,405,000	8,464,259	8,391,285	8,395,956	16,759,908	16,759,908	8,399,154	8,224,707	8,210,599	69,374	175,107	17,602	82,077	87,377	159,104
Carbonaceous BOD5 (lb/day)	20,741	22,527	15,694	15,694	156,010	122,938	122,790	437	142	6,633	2,707	1,215	8,660	24	1,489
Particulate	8,582	6,561	3,031	3,031	8,190	5,568	5,722	17	4	5,525	113	54	5,583	0	86
Heterotrophs	0	1,419	499	496	147,651	105,499	102,535	342	75	921	2,149	967	1,700	0	1,102
PAOs	0	283	100	100	29,066	21,218	20,722	63	15	185	437	134	320	0	223
PHA	0	4	1	1	381	277	295	1	0	2	5	2	5	0	5
Filtrate	12,159	12,159	12,050	12,055	91	91	45	44	44	94	1	0	94	24	1
COD (lb/day)	41,734	45,806	30,740	30,740	722,941	517,906	500,621	3,065	2,525	18,125	10,303	4,710	22,836	10,432	5,793
Particulate Bio	12,477	13,818	4,766	4,735	14,076	10,468	10,243	31	8	6,632	214	96	6,948	879	117
Particulate Non-Bio	7,227	10,326	3,579	3,579	309,281	220,977	215,811	553	153	6,647	4,501	2,025	8,673	9,581	2,475
Heterotrophs	0	2,500	881	881	292,019	208,646	203,770	617	154	1,822	4,250	1,912	3,725	0	2,337
Autotrophs	0	122	43	43	12,080	9,050	8,654	27	7	79	185	83	162	0	102
PAOs	0	663	233	238	89,860	63,510	62,027	192	47	551	1,294	582	1,137	0	711
PHA	0	10	3	3	1,032	737	720	2	1	6	15	7	13	0	8
Filtrate Bio	19,050	19,066	17,947	18,947	142	142	71	70	70	147	1	0	146	39	1
Filtrate Non-Bio	2,072	2,109	2,121	2,121	4,244	4,244	2,123	2,078	2,076	17	41	4	21	71	40
TSS (lb/day)	18,282	24,484	8,559	8,559	649,317	463,947	453,112	1,371	343	13,915	9,453	4,252	20,107	10,041	6,197
Biodegradable	11,155	11,283	3,949	3,940	12,101	9,059	9,485	26	6	7,334	177	60	7,413	776	97
Non-Biodegradable	7,089	9,958	3,469	3,459	300,246	214,530	209,525	524	159	6,479	4,372	1,960	8,446	9,319	2,403
Heterotrophs	0	2,194	768	756	225,490	163,290	159,447	483	121	1,426	3,325	1,496	2,922	0	1,829
Autotrophs	0	95	33	33	9,926	7,094	6,928	21	5	62	144	65	127	0	79
PAOs	0	668	234	234	69,591	49,695	48,535	147	37	434	1,012	455	889	0	557
PHA	0	6	2	2	619	442	432	1	0	4	9	4	8	0	5
Poly P	0	271	95	95	28,023	20,027	19,766	60	15	176	412	185	359	0	227
VSS (lb/day)	15,602	19,258	6,789	6,735	499,379	350,812	348,478	1,050	264	12,609	7,268	3,270	15,679	7,315	2,997
Biodegradable	9,421	9,595	3,359	3,359	10,945	7,820	7,639	20	5	6,207	159	72	6,309	610	85
Non-Biodegradable	5,111	7,283	2,549	2,549	225,039	161,506	157,736	477	119	4,734	3,293	1,485	6,214	6,654	1,839
Heterotrophs	0	1,865	653	650	194,217	138,771	135,530	410	103	1,212	2,827	1,272	2,464	0	1,555
Autotrophs	0	81	28	28	8,439	6,030	5,889	18	4	53	123	55	108	0	68
PAOs	0	568	199	199	59,116	42,261	41,254	125	31	369	860	387	755	0	473
PHA	0	5	2	2	619	442	432	1	0	4	9	4	8	0	5
TKN (lb-N/day)	2,700	3,024	2,423	2,473	33,066	24,330	23,325	491	435	631	488	216	816	870	271
NH_4-N (lb-N/day)	1,742	1,747	1,734	1,734	519	516	260	254	254	13	5	1	14	455	3
Particulate Bio Org N	360	202	134	134	259	183	179	1	0	245	4	2	250	71	2
Non-Bio Part Org N	204	268	101	101	8,712	6,225	6,079	19	5	187	127	57	244	310	70
Heterotrophs	0	170	59	59	17,655	12,636	12,341	37	9	110	257	116	226	0	142
Autotrophs	0	7	3	3	758	549	536	2	0	5	11	5	10	0	6
PAOs	0	52	18	18	5,360	3,844	3,757	11	3	34	79	35	69	0	43
Non-Bio Sol Org N	150	171	170	170	309	309	170	166	166	1	3	0	2	2	3
Soluble Bio Org N	205	205	203	206	2	2	1	1	1	3	2	0	2	0	0
NO_x-N (lb-N/day)	0	5	5	5	519	516	258	252	252	0	3	1	1	0	5
TP (lb-P/day)	311	445	262	232	13,027	9,390	9,132	85	38	162	201	90	272	272	111
Bio Particulate	95	95	33	33	40	28	25	0	0	52	1	0	62	9	0
Non-Bio Particulate	11	72	25	25	2,170	1,550	1,520	5	1	47	32	14	61	175	17
Heterotrophs	0	20	7	7	2,026	1,450	1,435	4	1	12	33	13	26	0	16
Autotrophs	0	1	0	0	89	64	62	0	0	1	1	1	1	0	1
PAOs	0	6	2	2	620	447	437	1	0	4	9	4	8	0	5
Poly P	0	84	29	29	8,769	6,268	6,110	19	5	54	128	57	112	0	70
Ortho-PO_4	165	165	164	164	63	63	31	31	31	1	1	0	1	140	1
Alkalinity (lb/day as CaCO3)	10,370	10,526	10,444	10,474	15,675	15,676	7,838	7,772	7,709	81	165	18	97	1,074	149
H_2S (lb/day)	415	415	415	421	0	0	0	0	0	3	0	0	2	34	0
$cBOD_5$ (mg/L)	296.7	319.2	224.1	224.1	1,028.1	949.1	1,853.3	6.4	2.4	12,538	1,853	8,091	11,722	35	1,132
COD (mg/L)	596.9	592.5	439.0	439.0	5,164.9	3,697.0	7,191.0	50.4	39.4	33,255	7,191	33,220	33,251	15,230	4,392
TSS (mg/L)	263.8	347.3	122.4	122.4	4,636.0	3,372.5	6,472.2	20.0	5.0	25,200	6,472	30,000	26,325	14,671	2,941
VSS (mg/L)	211.0	274.9	97.0	97.0	3,565.4	2,547.5	4,975.1	15.4	3.8	22,134	4,975	23,072	23,124	10,648	3,031
TKN (mg-N/L)	39.0	42.9	34.5	34.5	240.4	173.2	333.0	7.2	6.4	1,102	333	1,522	1,085	1,199	205
NH_4-N (mg-N/L)	25.2	24.8	24.8	24.8	3.7	3.7	3.7	3.7	3.7	24.8	3.7	3.7	20.4	662.7	3.7
NO_x-N (mg-N/L)	0.0	0.1	0.1	0.1	3.7	3.7	3.7	3.7	3.7	0.1	3.7	3.7	0.9	0.0	3.7
TP (mg-P/L)	4.5	6.3	3.7	3.7	92.7	70.0	137.3	0.9	0.6	283.0	137.3	606.1	396.0	396.0	84.0
Alkalinity (mg/L as CaCO3)	149.9	149.2	149.2	149.2	113.3	113.3	113.3	113.3	113.3	149.2	113.3	113.3	141.0	2,438.1	113.3
H_2S (mg/L)	6.0	5.9	5.9	6.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0	4.7	50.0	0.0

Mass Balance for Diurnal Peak Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Combined Sludge (CS)	Anaerobic Digester Effluent (ANDE)	WAS Thickening Recycle (WSR)
Flow (m3/day)	14,400,000	14,274,763	14,205,920	14,205,920	24,860,342	24,860,342	10,654,432	13,992,027	13,975,124	68,374	175,187	14,422	79,796	82,377	160,763
Carbonaceous BOD5 (kg/day)	26,950	24,875	21,612	21,612	272,740	135,202	190,299	1,017	354	6,833	2,797	1,021	7,650	24	1,245
Particulate	11,157	11,223	5,050	5,050	0	19,220	0	0	0	5,620	119	54	5,589	0	60
Heterotrophs	0	1,769	769	764	218,405	118,122	160,518	788	203	921	2,149	967	1,662	0	1,182
PAOs	0	124	60	60	55,230	2,064	28,491	201	57	185	437	0	186	0	0
PHA	0	3	1	1	1,086	65	742	4	1	2	6	0	2	0	0
Filtrate	15,806	15,807	15,731	15,731	42	4,621	18	23	23	54	1	0	54	24	1
COD (kg/day)	54,501	62,098	42,852	42,962	1,036,818	1,316,553	710,573	5,605	3,929	19,126	10,503	4,121	22,248	10,409	5,074
Particulate Bio	17,620	17,608	7,937	7,937	0	0	0	0	0	8,951	214	96	8,949	870	177
Particulate Non-Bio	2,438	11,935	5,821	5,821	422,337	282,103	292,942	1,531	510	9,647	4,501	2,025	8,073	9,501	2,476
Heterotrophs	0	3,380	1,521	1,521	427,567	253,355	295,274	1,529	520	1,522	4,253	1,912	3,725	0	2,307
Autotrophs	0	137	62	62	14,401	8,525	10,036	92	17	79	185	83	102	0	102
PAOs	0	401	131	151	185,318	92,427	119,214	602	201	555	1,284	0	555	0	0
PHA	0	7	3	3	7,828	1,235	2,010	11	4	6	15	0	6	0	0
Filtrate Bio	24,521	24,820	24,720	24,702	65	45,103	28	37	37	147	1	0	148	29	1
Filtrate Non-Bio	2,725	2,790	2,735	2,755	4,621	624,388	2,066	2,714	2,711	11	44	4	20	27	41
TSS (kg/day)	33,729	32,470	13,714	13,714	950,854	553,192	569,545	3,550	1,197	15,855	9,450	3,507	19,520	10,041	4,405
Biodegradable	14,516	14,513	8,576	8,576	0	321,985	0	0	0	7,334	177	82	7,410	728	87
Non-Biodegradable	9,212	12,580	5,591	5,601	335,923	215,555	275,928	1,442	481	9,479	4,370	1,595	8,446	9,313	2,403
Heterotrophs	0	2,560	1,212	1,212	314,589	7,340	247,120	1,292	431	1,425	3,326	1,456	2,872	7	1,329
Autotrophs	0	122	49	49	11,931	78,560	8,316	43	14	62	144	65	127	0	79
PAOs	0	314	141	141	128,357	1,238	90,101	471	157	431	1,012	0	434	0	0
PHA	0	4	2	2	1,733	28,187	1,205	6	2	4	9	0	4	0	0
Poly-P	0	163	73	73	67,322	577	46,915	245	83	173	432	0	170	0	0
VSS (kg/day)	18,982	24,630	11,084	11,084	873,863	27,610	608,014	3,183	1,061	12,007	7,268	2,874	15,416	7,313	3,519
Biodegradable	12,330	12,420	5,592	5,592	0	3,540	0	0	0	6,237	159	72	6,309	619	66
Non-Biodegradable	6,644	9,552	4,298	4,208	410,635	10,265	314,058	1,641	547	4,734	5,290	1,450	5,214	6,594	1,859
Heterotrophs	0	2,255	1,030	1,030	351,460	262	210,052	1,098	366	1,212	2,627	1,272	2,434	0	1,534
Autotrophs	0	92	42	42	10,142	7,154	7,066	37	12	53	123	55	106	0	68
PAOs	0	267	120	120	109,953	385	76,629	400	133	363	860	0	369	0	0
PHA	0	4	2	2	1,733	0	1,205	6	2	4	9	0	4	0	0
TKN (kg-N/day)	3,511	3,832	3,229	3,229	19,904	41,506	26,909	651	558	601	485	160	711	919	228
NH_4-N (kg-N/day)	2,265	2,270	2,259	2,259	577	23,704	241	323	324	12	5	0	14	459	5
Particulate Bio Org N	494	496	223	223	0	0	0	0	0	243	4	2	200	31	2
Non-Bio Part Org N	259	366	165	165	12,512	2,211	5,720	46	15	157	127	57	244	319	70
Heterotrophs	0	176	80	80	15,270	2,164	10,602	53	18	113	227	115	226	0	147
Autotrophs	0	7	3	3	507	72	353	2	1	5	11	5	10	0	6
PAOs	0	24	11	11	10,012	352	6,978	36	12	34	79	0	34	0	4
Non-Bio Sol Org N	218	221	220	220	366	14,392	166	217	217	1	4	0	2	2	3
Soluble Bio Org N	268	268	267	297	0	93	0	0	0	2	0	0	2	0	0
NO_x-N (kg-N/day)	0	5	5	5	627	390	252	350	352	3	5	0	0	3	5
TP (kg-P/day)	404	510	347	347	29,009	0	20,177	159	87	162	201	29	270	272	36
Bio Particulate	123	124	56	56	0	0	0	0	0	62	1	0	52	5	0
Non-Bio Particulate	55	93	42	42	3,704	0	2,644	14	5	47	32	14	51	126	17
Heterotrophs	0	24	11	11	3,014	0	2,101	11	4	13	30	10	28	0	15
Autotrophs	0	1	0	0	101	0	71	0	0	1	1	1	1	0	1
PAOs	0	3	1	1	1,164	0	811	4	1	4	9	0	4	0	0
Poly-P	0	50	23	23	20,843	0	14,526	75	25	54	128	0	54	0	0
Ortho-PO_4	219	215	214	214	93	0	40	52	52	1	1	0	1	140	1
Alkalinity (kg/day as $CaCO_3$)	13,462	13,534	13,565	13,568	693	0	297	393	389	81	185	14	85	1,674	132
H_2S (kg/day)	539	539	537	537	0	0	0	0	0	3	0	0	3	34	0
BOD_5 (mg/L)	220.4	242.6	152.5	152.5	1,315.9	653.1	2,139.8	8.7	3.0	12,525	1,553	2,489	11,803	35	931
COD (mg/L)	493.6	521.7	352.9	352.9	4,997.7	6,325.0	6,112.2	55.5	34.3	35,260	7,191	34,269	53,430	15,202	3,785
TSS (mg/L)	201.5	255.1	115.8	115.8	4,636.0	[illegible]	7,538.5	30.0	10.0	29,200	6,479	36,000	29,343	14,521	3,250
VSS (mg/L)	161.3	207.0	93.6	93.6	4,216.2	133.2	6,550.3	27.0	9.1	23,134	4,976	22,944	23,211	10,649	2,626
TKN (mg-N/L)	29.9	32.2	27.3	27.3	186.5	200.3	303.0	5.6	5.0	1,102	333	1,520	1,114	1,159	170
NH_4-N (mg-N/L)	19.3	19.1	19.1	19.1	2.8	160.1	2.5	2.9	2.8	24.8	3.7	3.7	21.0	652.7	3.7
NO_3-N (mg-N/L)	0.0	0.0	0.0	0.0	3.0	3.3	3.0	3.0	3.0	0.1	3.7	3.7	0.7	0.0	3.7
TP (mg-P/L)	3.0	3.0	3.0	2.9	140.0	0.0	227.0	1.4	0.7	333.6	137.5	238.1	315.3	396.0	25.5
Alkalinity (mg/L as $CaCO_3$)	114.7	114.6	114.5	114.5	3.3	0.0	3.3	3.3	3.3	149.2	112.3	113.0	142.7	2,428.1	113.0
H_2S (mg/L)	4.6	4.5	4.5	4.5	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	4.6	50.0	0.0

Select Units for Physical Plant Definition	
Metric (M) or US (U)	u

Iron Addition Reactor:			1
Iron Addn?	Flow gpd	Xmech	Solk
FALSE	FALSE	FALSE	FALSE

Definition of the Physical Plant		PRO2D	
How many reactors (up to 42)	6		
Enter the Solids Retention Time (SRT)	10.1 Days	SRT	10.1
Enter the Average Total Flow Rate	8.40 mgd	% Aerobic	85%
Enter the RAS Ratio (% of Plant Influent)	100%	% Anoxic	15%
	8.40 mgd	Temperature oC	13
Wastage Location - (A)ll Reactors or Clarifier (U)/F	u	Total Volume gallons	2,827,500

Aeration Data		Est. Diffuser Design (Sanitaire Membranes)	
Aeration Basin Side Water Depth:	15 feet	Design Condition:	MM
Maximum Water Temperature:	25 °C	Est. Diffuser Air Rate	2.5 scfm/diffuser
BETA Correctional Factor:	0.95	Peaking Capability	160%
Plant Altitude:	4,900 feet	Estimated SOTE	34%
THETA - K_La Temp. Corr. Factor	1.024		

System Configuration			Reactor														
Component	Units	TOTAL	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reactor Volume	gallons	2,827,500	141,375	601,125	141,375	601,125	141,375	601,125									
Fraction	% of Total		5%	28%	5%	28%	5%	28%									
Dissolved Oxygen	mg/L			2.50		2.50		2.50									
Reactor Feed																	
Raw Feed	% of Total	100%	15%		15%		70%										
RAS	% of Total RAS	100%	100%														
Recirculation	% of Raw Feed																
From Reactor	Enter Number																
Other Inflows (such as methanol, dewatering filtrate, or thickener return)																	
Flow	gpd																
S_{O2}	mg O_2/L																
S_S	mg COD/L																
S_A	mg COD/L																
S_I	mg COD/L																
S_{NH}	mg N/L																
S_{NO}	mg N/L																
S_{ND}	mg N/L																
S_{PO4}	mg P/L																
S_{ALK}	moles/m3																
X_H	mg COD/L																
X_{AP}	mg COD/L																
X_I	mg COD/L																
X_{PAO}	mg COD/L																
X_{PP}	mg P/L																
X_{PHA}	mg COD/L																
X_{AUT}	mg COD/L																
X_{TSS}	mg/L																
X_{MeOH}	mg/L																
X_{MeP}	mg/L																

Summary Information		
Total MLSS Inventory	105,395 lbs	
Total MLVSS Inventory	85,586 lbs	
MLSS/MLVSS Ratio	1.25	
Total Required WAS Rate	10,531 lbs MLSS/day	
	or	8,583 lbs MLVSS/day
Observed Mass Yield	0.34 MVLSS/COD	

Total COD Removed	24,994 lbs/day
Feed Applied to MLSS Inventory Ratio	0.23 COD/MLSS
Aeration Information	
Total AOR	20,125 lbs O2/day
Total SOR	60,816 lbs O2/day
Total Required Air Rate	9,705 scfm
Simultaneous Denitrification	82.2%

Component Concentrations			Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
Enter Reactor Number to use this Column of Data for the Original Guess					1	2	3	4	5	6	7
S_{O2}	Dissolved Oxygen	mg O2/L	0.0	0.0	0.0	2.5	0.0	2.5	0.0	2.5	
S_F	Soluble Fermentable Substrates	mg COD/L	37.4	0.8	1.8	0.4	1.0	0.4	16.5	0.8	
S_A	Soluble Fermentation Products	mg COD/L	54.9	0.2	1.5	0.0	0.5	0.0	12.5	0.2	
S_I	Soluble Inerts	mg COD/L	30.3	30.3	30.3	30.3	30.3	30.3	30.3	30.3	
S_{NH}	Soluble Ammonia N	mg N/L	24.8	3.7	6.79	0.4	3.9	0.2	8.7	2.7	
S_{N2}	Dissolved Nitrogen Gas	mg N/L	0.0	17.0	17.5	18.0	20.3	21.1	18.3	17.0	
S_{NO}	Soluble Nitrate/Nitrite N	mg N/L	0.1	3.7	0.2	5.5	1.5	4.3	0.2	3.7	
S_{PO}	Soluble Inorganic Phosphorus	mg P/L	2.3	0.4	5.0	0.1	0.7	0.1	5.7	0.4	
S_{ALK}	Alkalinity	moles/m³	3.0	2.3	2.5	1.5	2.4	2.0	2.6	2.3	
X_I	Inert Particulates	mg COD/L	51.1	3,032	2,668	2,694	2,396	2,356	1,576	1,576	
X_S	Slowly Biodegradable Substrate	mg COD/L	176.3	146.3	147.9	92.1	89.1	67.7	104.0	74.9	
X_H	Heterotrophic Organisms	mg COD/L	14.0	2,910	2,531	2,534	2,248	2,243	1,471	1,490	
X_{PAO}	Phosphate Accumulating Organisms	mg COD/L	4.3	885.7	770.7	776.4	687.4	686.4	447.7	453.4	
X_{PP}	Polyphosphate	mg P/L	0.4	87.4	71.4	78.7	67.5	68.2	39.8	44.7	
X_{PHA}	PAO Storage Products	mg COD/L	0.0	10.3	21.7	3.6	5.3	0.9	13.3	5.3	
X_{AUT}	Autotrophic Organisms	mg COD/L	0.9	126.4	109.9	110.7	98.6	99.3	64.1	64.7	
X_{TSS}	Total Suspended Solids (MLSS)	mg/L	215.4	5,470	5,046	5,518	4,997	4,971	3,300	3,312	
X_{MeOH}	Metal Hydroxides	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
X_{MeP}	Metal Phosphates	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	MLVSS	mg COD/L		7,150	6,288	6,211	5,529	5,492	3,575	3,656	
	Oxygen Consumed	mg O2/(L-day)		[illegible]	0	1,046	185	705	193	1,143	
	Nitrate Consumed	mg NO3-N/(L-day)		[illegible]	207.5	13.9	273.8	9.7	319.1	14.4	
				Alkalinity Limited?							

Reactor Information			Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
	Reactor Volume	gallons			141,375	801,125	141,375	801,125	141,375	801,125	0
	AOR, Biological	lbs O2/day			0	6,989	200	4,711	227	7,643	0
	AOR, Liquid	lbs O2/day			0	207	-200	226	-227	349	0
Total AOR		lbs O2/day			0	7,196	0	4,937	0	7,992	0
	Aeration Alpha Value				0.60	0.60	0.60	0.60	0.60	0.60	0.60
	SOR/AOR Ratio				2.431	3.022	2.032	3.022	2.029	3.022	2.026
SOR		lbs O2/day			0	21,747	0	14,920	-1	24,150	0
	SOTE				25%	25%	25%	25%	25%	25%	25%
Required Air Rate		SCFM			0	3,472	0	2,382	0	3,855	0
Is Required Diffuser Density Too High?											
Required Mixing Air @ 0.12 scfm/ft2		SCFM			0	344	0	344	0	344	0
MLVSS		mg/L		5,130	4,490	4,449	3,961	3,934	2,632	2,626	0

Flow Balance		Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
Raw Feed into Reactor	mgd	8.40		1.20		1.32		5.88		
Flow from Previous Reactor	mgd				9.60	9.60	10.92	10.92	16.80	
Recirculation Into Reactor	mgd									
From Reactor				(0)	(0)	(0)	(0)	(0)	(0)	
RAS into Reactor	mgd		8.40	8.40						
Other Flows Into Reactor	mgd	0.00								
Effluent From Reactor	mgd			9.60	9.60	10.92	10.92	16.80	16.80	
Waste Activated Sludge	mgd		0.201							

Facility Operating Parameters					
Item		Value			Value
Influent Wastewater	(Metric)	(Metric)	(Metric=US*k)	(US)	(US)
Flow	m3/day			MG/day	
Design Average		41,257	3785		10.900
Design Diurnal Peak		71,347	3785		18.850
Design Peaking Factor for WW Diurnal flow		1.7	1		1.7
Design Peaking Factor for WW Diurnal loads		1.3	1		1.3
Carbonaceous Five-Day Biochemical Oxygen Demand ($CBOD_5$)					
Design Average Concentration	mg/L	245	1	mg/L	245
Design Average Mass Loading	kg/day	10,099	0.4536	lb/day	22,264
Design Diurnal Peak Mass Loading	kg/day	13,129	0.4536	lb/day	28,943
Total Suspended Solids (TSS)					
Design Average Concentration	mg/L	213	1	mg/L	213
Design Average Mass Loading	kg/day	8,786	0.4536	lb/day	19,370
Design Diurnal Peak Mass Loading	kg/day	11,422	0.4536	lb/day	25,181
Volatile Suspended Solids (VSS)					
Percent VSS	%	80%	1	%	80%
Design Average Concentration	mg/L	170	1	mg/L	170
Design Average Mass Loading	kg/day	7,029	0.4536	lb/day	15,496
Design Diurnal Peak Mass Loading	kg/day	9,138	0.4536	lb/day	20,144
Total Kjeldahl Nitrogen (TKN as N)					
Design Average Concentration	mg/L	31	1	mg/L	32
Design Average Mass Loading	kg/day	1,299	0.4536	lb/day	2,864
Design Diurnal Peak Mass Loading	kg/day	1,689	0.4536	lb/day	3,724
Ammonia-Nitrogen (NH_3-N as N)					
Design Average Concentration	mg/L	20	1	mg/L	20
Design Average Mass Loading	kg/day	838	0.4536	lb/day	1,848
Design Diurnal Peak Mass Loading	kg/day	1,090	0.4536	lb/day	2,402
Total Phosphorus (as P)					
Design Average Concentration	mg/L	4.50	1	mg/L	4.5
Design Average Mass Loading	kg/day	185	0.4536	lb/day	409
Design Diurnal Peak Mass Loading	kg/day	241	0.4536	lb/day	532
Alkalinity (as $CaCO_3$)					
Design Average Concentration	mg/L	150	1	mg/L	150
Design Average Mass Loading	kg/day	6,183	0.4536	lb/day	13,631
Design Diurnal Peak Mass Loading	kg/day	8,038	0.4536	lb/day	17,720
Hydrogen Sulfide (H_2S)					
Design Average Concentration	mg/L	6	1	mg/L	6
Design Average Mass Loading	kg/day	247	0.4536	lb/day	545
Design Diurnal Peak Mass Loading	kg/day	322	0.4536	lb/day	709
Primary Clarifiers Yes					
Primary Clarifiers?	Yes	1			
Total Area	m2	888	0.0929	sq.ft.	9,556
Overflow Rate	m/day		0.040747	gpd-sq.ft.	
Average		47	0.040747		1,155
Diurnal Peak		81	0.040747		1,989
Chemical Compound Applied to Primary Influent	None	1			
Percent of COD filtrate that is colloidal	%	40%	1	%	40%
TSS Removal Efficiency at Average Conditions	%	60%	1	%	60%
TSS Removal Efficiency at Diurnal Peak Conditions	%	50%	1	%	50%
Primary Sludge Concentration	mg/L	38,400	1	mg/L	38,400

Facility Operating Parameters					
Item		Value			Value
Secondary Treatment: 6 Bioreactor & Clarifier					
Biological Process - Integrated with PSNR					
SRT	days	9.2	1	days	9.2
Nitrifier Minimum SRT (SRT_{min})	days	5.4	1	days	5.4
DO	mg/L	2.0	1	mg/L	2.0
Temperature in the Biological Process	oC	14.0	Special	oF	57.2
Simultaneous Denitrification	%	85%	1	%	85%
SVI	mL/g	150	1	mL/g	150
Biosolids Production Rates					
Net Yield (mg TSS/mg BOD_5)	mg/mg	0.68	1	lb/lb	0.68
Volatile Fraction	%	73.85%	1	%	73.85%
Active Fraction	%	47.17%	1	%	47.17%
Nitrifier Fraction	%	1.72%	1	%	1.72%
Nitrogen Content, N/VSS	%	6.70%	1	%	6.70%
Phosphorus Content, P/VSS	%	3.56%	1	%	3.56%
Process Oxygen Requirements					
Carbonaceous AOR/BOD5 - wt/wt	kg/kg	1.05	1	lb/lb	1.05
Total AOR/BOD% - wt/wt	kg/kg	1.32	1	lb/lb	1.32
AOR (wt/day)	kg/day			lb/day	
Average		9,851	0.4536		21,717
Diurnal Peak		12,582	0.4536		27,737
AOR	mg/L-hr			mg/L-hr	
Average		38	1		38
Diurnal Peak		49.0	1		49.0
Bioreactor					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
HRT	hr	6.2	1	hr	6.2
% non-aerobic	%	15%	1		15%
% aerobic	%	85%	1		85%
Average MLSS Concentration	mg/L	4,340	1	mg/L	4,340
Bioreactor Clarifier					
Total Area	m2	2,017	0.0929	sq.ft.	21,714
Overflow Rate	m/day			gpd-sq.ft.	
Average		21	0.040747		506
Diurnal Peak		36	0.040747		873
Effluent TSS	mg/L			mg/L	
Average		20	1		20
Diurnal Peak		30	1		30
Underflow Rate					
Average Flow Ratio	%	100%	1		100%
Average Rate	m/day	21	0.040747	gpd-sq.ft.	506
Peak Flow Ratio	%	75%	1		75%
Peak Rate	m/day	27	0.040747	gpd-sq.ft.	655
Solids Loading Rate	kg/m2-day		4.883	lb/day-sq.ft.	
Average		143	4.883		29.3
Diurnal Peak		216	4.883		44.2
Limiting Solids Loading Rate	kg/m2-day	210	4.883	lb/day-sq.ft.	43
Return sludge rate at which limiting solids rate can be achieved					
RAS Flow Rate	m3/day	42554	3785	MGD	11
Percent of Influent to Bioreactor	%	1		%	1
Underflow Concentration	mg/L			mg/L	
Average		6,809	1		6,809
Diurnal Peak		7,943	1		7,943
Yes	None				

Facility Operating Parameters					
Item		Value			Value
WAS Thickening	Yes / None				
WAS Thickener?	Yes	1			
Location of WAS Thickener recycle to plant: Headworks		1			
Solids Capture	%	85%	1	%	85%
Thickened Sludge Concentration	mg/L	30,000	1	mg/L	30,000
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7
Solids Digestion: Anaerobic Only					
		2			
Anaerobic Digester					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
Active Bioreactor Volume	m3	8,027	3785	MG	2.12
SRT	days	29.0	1	days	29.0
Volatile Solids Loading - wt VSS/vol-day	kg/m3-day	0.93	16.06	lb/ft3-day	0.058
Volatile Solids Reduction	%	59%	1	%	59%
Methane Production	m3/day	2,214	0.0283	ft3/day	78233.1
Percent P Released that is Precipitated as Struvite	%	30%	1	%	30%
Dewatering	No	2			
Location of Dewatering recycle to plant: N/A		3			
Solids Capture	%	85%	1	%	85%
Thickened Sludge Concentration	%	18%	1	%	18%
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7

Mass Balance for Average Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Combined Sludge (CS)	Anaerobic Digester Effluent (AnDE)	WAS Thickening Recycle (WSR)
Flow (gallons/day)	10,830,000	11,040,578	10,999,147	10,999,147	22,030,576	22,030,576	11,030,436	10,836,340	10,876,212	41,431	164,098	31,659	73,090	73,090	132,445
Carbonaceous BOD5 (lb/day)	22,241	23,046	10,391	10,391	231,355	151,725	151,456	559	155	6,654	2,707	2,391	8,954	19	405
Particulate	10,211	10,245	4,099	4,066	5,865	7,080	6,950	20	5	6,147	104	55	6,239	0	19
Heterotrophs	0	531	250	250	182,592	145,702	143,130	414	104	379	2,100	1,515	2,194	0	320
PAOs	0	137	55	55	38,753	31,727	31,132	20	23	82	486	396	478	0	70
PHA	0	1	0	0	173	135	136	0	0	0	2	2	2	0	0
Filtrate	12,030	12,031	11,956	11,965	68	68	34	34	34	45	1	0	45	19	0
COD (lb/day)	44,005	47,032	31,394	31,394	862,055	687,126	674,607	4,157	2,725	15,207	10,080	8,559	24,143	10,245	1,553
Particulate Bio	16,031	16,094	6,436	6,436	15,875	12,674	12,430	36	9	9,657	184	150	9,810	958	26
Particulate Non-Bio	6,871	8,053	3,225	3,225	343,725	271,416	269,919	765	105	4,338	4,022	3,419	8,257	9,239	503
Heterotrophs	0	1,249	500	500	360,937	291,156	253,121	219	205	740	4,223	3,500	4,339	0	634
Autotrophs	0	91	24	24	17,549	14,010	13,755	40	10	36	203	175	211	0	31
PAOs	0	412	165	165	118,590	94,997	93,337	270	68	247	1,397	1,183	1,430	0	209
PHA	0	2	1	1	459	375	350	1	3	1	3	5	5	0	1
Filtrate Bio	16,852	18,893	16,822	16,822	107	107	54	53	53	71	1	0	71	31	1
Filtrate Non-Bio	2,200	2,229	2,220	2,220	4,442	4,442	2,221	2,185	2,185	8	33	5	13	15	27
TSS (lb/day)	19,303	22,139	8,843	8,843	796,102	633,575	624,436	1,837	452	13,284	8,319	7,915	21,132	10,450	1,397
Biodegradable	12,042	12,563	4,033	4,610	11,919	3,910	9,349	27	7	7,250	139	119	7,367	727	21
Non-Biodegradable	7,215	8,549	3,420	3,420	357,956	285,776	280,793	812	203	5,130	4,187	3,560	8,690	9,751	529
Heterotrophs	0	977	391	391	282,424	225,475	221,534	641	160	586	3,305	2,509	3,395	0	496
Autotrophs	0	48	19	19	13,731	10,963	10,771	31	8	29	161	137	165	0	24
PAOs	0	322	129	129	93,107	74,332	73,030	211	53	193	1,089	925	1,119	0	163
PHA	0	1	0	0	282	225	221	1	0	1	3	3	3	0	0
Poly-P	0	127	51	51	36,603	29,287	28,775	83	21	76	429	365	441	0	64
VSS (lb/day)	15,482	17,517	7,007	7,007	587,902	469,373	461,159	1,334	334	10,510	6,979	5,948	16,257	8,750	1,032
Biodegradable	10,837	10,975	4,350	4,350	10,727	5,564	8,414	24	6	6,525	124	107	6,631	634	19
Non-Biodegradable	4,645	5,429	2,172	2,172	226,579	182,591	177,729	514	129	3,257	2,651	2,254	5,511	8,131	398
Heterotrophs	0	879	352	352	254,181	202,928	199,331	577	144	528	2,974	2,528	3,050	0	446
Autotrophs	0	43	17	17	12,358	9,866	9,694	28	7	26	145	123	149	0	22
PAOs	0	290	116	116	83,795	66,899	65,730	190	48	174	981	835	1,007	0	147
PHA	0	1	0	0	282	225	221	1	0	1	3	3	3	0	0
TKN (lb-N/day)	2,982	3,304	2,542	2,542	40,455	32,477	31,538	469	401	462	479	396	859	659	74
NH_4-N (lb-N/day)	1,845	1,849	1,842	1,842	412	412	206	202	203	[illegible]	5	1	6	470	2
Particulate Bio Org N	432	435	174	174	297	237	233	1	0	261	0	3	264	65	1
Non-Bio Part Org N	151	216	87	87	2,293	7,417	7,292	21	5	131	109	92	223	312	10
Heterotrophs	0	76	30	30	21,590	17,452	17,147	50	12	45	255	217	263	0	38
Autotrophs	0	4	1	1	1,063	848	834	2	1	2	12	11	13	0	2
PAOs	0	25	10	10	7,208	5,752	5,650	16	4	15	84	72	87	0	13
Non-Bio Sol Org N	179	178	178	178	355	355	178	175	175	1	0	1	1	1	2
Soluble Bio Org N	222	220	219	219	2	2	1	1	1	1	3	0	1	0	0
NO_x-N (lb-N/day)	0	0	0	0	477	477	238	235	235	0	4	1	1	0	3
TP (lb-P/day)	409	436	347	347	23,319	18,620	18,278	73	33	142	279	232	374	374	41
Bio Particulate	103	109	43	43	49	39	38	0	0	65	1	0	66	12	0
Non-Bio Particulate	41	54	22	22	2,032	1,854	1,822	5	1	30	27	23	55	157	4
Heterotrophs	0	24	10	10	6,926	5,530	5,433	16	4	14	81	69	83	0	12
Autotrophs	0	1	0	0	337	269	264	1	0	1	4	3	4	0	1
PAOs	0	8	3	3	2,263	1,820	1,791	5	1	5	27	23	27	0	4
Poly-P	0	39	16	16	11,357	9,067	8,929	26	6	24	133	113	130	0	20
Ortho-PO_4	251	254	252	253	41	41	21	20	20	1	0	0	1	190	0
Alkalinity (lb/day as $CaCO_3$)	13,519	13,758	13,700	13,700	21,725	21,725	10,833	10,791	10,590	52	162	31	83	1,530	131
H_2S (lb/day)	545	547	545	545	0	0	0	0	0	2	0	0	2	30	0
BOD_5 (mg/L)	244.3	250.4	178.2	175.8	1,251.4	1,007.1	1,976.7	5.2	1.5	19,263	1,979	5,715	14,695	32	365
COD (mg/L)	464.3	510.6	342.4	342.4	4,790.1	2,757.0	7,359.4	46.0	30.2	45,105	7,353	32,340	39,621	16,809	1,326
TSS (mg/L)	213.0	240.2	96.4	95.4	4,340.3	3,456.1	6,809.1	20.0	5.0	38,400	6,808	30,000	34,762	17,221	1,266
VSS (mg/L)	170.1	190.3	76.4	75.4	3,205.3	2,559.0	5,025.5	14.5	3.7	30,427	5,029	22,155	26,044	11,000	935
TKN (mg-N/L)	31.3	32.6	27.7	27.7	220.7	177.1	347.9	5.2	4.4	1,339	344	1,501	1,409	1,405	67
NH_4-N (mg-N/L)	20.3	20.1	20.1	20.1	2.2	2.2	2.2	2.2	2.2	20.1	2.2	2.2	12.4	750.9	2.2
NO_x-N (mg-N/L)	0.0	0.0	0.0	0.0	2.6	2.6	2.6	2.6	2.6	0.0	2.6	2.6	1.1	0.0	2.6
TP (mg-P/L)	4.5	5.3	3.8	3.8	127.1	101.5	199.2	0.8	0.4	411.4	199.2	877.3	613.2	613.2	37.2
Alkalinity (mg/L as $CaCO_3$)	149.9	149.3	149.3	149.5	118.4	118.4	118.4	118.4	118.4	152.5	118.4	118.4	136.0	2,768.6	118.4
H_2S (mg/L)	6.0	5.9	5.9	6.0	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0	3.4	50.0	0.0

Mass Balance for Diurnal Peak Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Combined Sludge (CS)	Anaerobic Digester Effluent (ANDE)	WAS Thickening Recycle (WSR)
Flow [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	43,431	[illegible]	79,485	67,9[illegible]	73,090	[illegible]
CBOD (kg/day)	23,518	27,164	27,664	22,844	354,190	219,664	272,141	1,719	791	6,654	2,707	1,909	6,567	19	308
Particulate	12,279	13294	6,647	6,647	0	12,305	5	0	0	5,147	104	88	6,225	0	25
Heterotrophs	0	1011	556	556	271,336	200,133	212,792	1,004	354	379	2,136	1,815	2,194	0	320
PAOs	0	218	109	109	83,748	1,116	60,857	322	104	82	465	0	57	0	0
PHA	0	1	1	1	527	911	413	7	1	0	2	0	0	0	0
Filtrate	15,640	15,640	15,560	15,503	580	5,947	243	328	325	45	1	0	45	19	0
COD (kg/day)	27,256	51,927	44,523	44,503	1,300,162	1,744,565	1,023,255	3,465	5,066	15,607	10,058	7,347	22,954	10,243	1,324
Particulate Bio	20,251	20,879	10,440	10,440	0	0	0	0	0	9,667	185	156	9,812	952	26
Particulate Non-Bio	6,936	10,865	5,434	5,434	497,592	395,855	293,254	1,046	945	4,838	4,022	3,419	5,257	9,290	660
Heterotrophs	0	2,000	1,000	1,000	530,565	321,624	420,852	2,099	720	749	4,223	3,380	4,331	0	634
Autotrophs	0	73	37	37	15,001	8,931	12,471	92	21	35	205	175	211	0	31
PAOs	0	661	329	329	250,580	159,598	199,605	990	377	247	1,392	0	247	0	0
PHA	0	4	2	2	1,427	680	1,119	6	2	5	5	0	1	0	0
Filtrate Bio	24,2[illegible]	24,561	24,59[illegible]	24,501	911	78,851	390	515	510	71	1	0	71	31	1
Filtrate Non-Bio	2,880	2,891	2,594	2,584	6,047	789,521	2,163	2,856	2,853	5	32	4	14	15	22
TSS (kg/day)	25,155	25,459	14,729	14,729	1,200,643	845,287	941,848	4,886	1,605	13,264	8,315	6,424	19,551	10,493	1,109
Biodegradable	15,654	15,675	7,838	7,838	0	340,360	0	0	0	7,250	139	119	7,358	727	21
Non-Biodegradable	9,504	11,428	5,719	5,719	499,675	250,452	354,292	1,917	533	5,139	4,139	3,560	3,699	9,757	628
Heterotrophs	0	1,522	761	761	402,057	3,578	315,855	1,575	525	560	3,365	2,406	3,391	0	490
Autotrophs	0	56	28	28	11,825	140,549	9,359	47	16	20	161	137	161	0	24
PAOs	0	510	255	255	190,350	632	150,339	757	256	180	1,059	0	181	0	0
PHA	0	2	1	1	659	58,152	671	3	1	1	3	0	1	0	0
Poly-P	0	256	128	128	96,765	1,432	77,461	306	129	79	408	0	75	0	0
VSS (kg/day)	20,127	23,539	11,784	11,784	984,545	57,051	772,186	3,851	1,224	10,510	6,879	5,911	15,527	5,755	864
Biodegradable	14,099	14,108	7,054	7,054	0	14,752	0	0	0	6,925	125	107	6,831	654	19
Non-Biodegradable	6,026	7,600	3,800	3,800	433,640	28,916	340,255	1,597	506	3,257	2,855	2,284	5,551	6,101	398
Heterotrophs	0	1,359	655	655	352,571	855	284,360	1,418	473	528	2,974	2,328	3,036	0	445
Autotrophs	0	50	25	25	13,744	12,121	8,429	42	14	20	145	123	145	0	22
PAOs	0	459	229	229	170,535	494	135,454	690	230	174	981	0	174	0	0
PHA	0	2	1	1	655	0	671	3	1	1	3	0	1	0	0
TKN (kg-N/day)	3,720	3,897	3,437	3,437	72,473	64,970	59,304	1,120	744	492	470	324	787	839	62
NH_4-N (kg-N/day)	2,400	2,433	2,386	2,340	1,163	42,445	472	624	620	7	3	9	7	470	3
Particulate Bio Org N	564	564	282	282	0	0	0	0	0	281	5	3	254	59	1
Non-Bio Part Org N	242	307	154	154	18,453	5,726	14,473	22	24	131	150	92	222	312	15
Heterotrophs	0	131	65	65	34,257	5,771	25,435	147	47	45	256	217	207	0	38
Autotrophs	0	5	2	2	1,074	244	245	4	1	2	12	11	10	0	2
PAOs	0	38	20	20	15,182	3,840	11,907	53	20	15	54	0	10	0	0
Non-Bio Sol Org N	229	231	231	231	404	24,412	173	229	228	1	3	0	1	1	2
Soluble Bio Org N	286	286	286	266	0	42	0	0	0	1	0	0	1	0	0
NO_3-N (kg-N/day)	0	3	3	3	410	12,759	175	339	332	0	4	1	1	0	3
TP (kg-P/day)	531	656	597	597	52,200	0	41,702	243	194	142	273	85	231	374	17
Bio Particulate	141	141	70	70	0	0	0	0	0	55	1	0	64	19	0
Non-Bio Particulate	60	53	42	42	7,149	0	5,600	28	9	33	27	23	55	157	4
Heterotrophs	0	32	19	19	10,287	0	8,070	40	13	14	91	59	80	0	12
Autotrophs	0	1	1	1	305	0	232	1	5	1	4	3	4	0	1
PAOs	0	12	6	6	4,510	0	3,770	19	6	5	27	0	6	0	0
Poly-P	0	79	40	40	30,578	0	23,082	120	40	24	133	0	24	0	0
Ortho-PO_4	330	330	329	329	62	0	27	35	33	1	0	0	1	195	0
Alkalinity (kg/day as $CaCO_3$)	17,703	17,847	17,654	17,604	12,799	0	5,409	7,220	7,215	57	167	25	71	1,598	130
H_2S (kg/day)	705	705	705	704	0	0	0	0	0	0	0	0	3	30	0
BOD_5 (mg/L)	164.0	190.4	144.5	144.5	1,257.6	796.0	2,354.5	11.0	5.1	19,280	1,970	6,520	15,117	32	283
COD (mg/L)	354.0	390.8	252.3	287.3	4,129.0	6,308.6	8,935.1	34.1	32.4	45,135	7,358	33,170	40,539	16,500	1,154
TSS (mg/L)	180.1	180.0	93.2	93.2	4,340.0	3,056.7	7,942.7	20.0	13.0	38,400	8,600	30,600	35,124	17,221	1,919
VSS (mg/L)	126.1	148.2	74.5	74.6	3,559.1	206.3	6,515.2	24.5	3.2	30,427	5,026	22,465	27,411	11,085	777
TKN (mg-N/L)	23.7	25.0	21.7	21.7	262.0	397.2	474.5	7.2	5.0	1,329	344	1,199	1,389	1,409	54
NH_3-N (mg-N/L)	15.2	15.2	15.2	15.2	4.0	150.0	4.0	4.0	4.0	20.1	2.2	2.2	13.1	750.9	2.2
NO_3-N (mg-N/L)	0.0	0.0	0.0	0.0	1.5	44.1	1.5	1.5	1.5	0.0	2.6	2.0	1.0	0.0	2.5
TP (mg-P/L)	3.3	0.0	3.0	3.2	192.3	0.0	351.8	1.5	2.7	411.4	158.3	424.2	420.1	513.2	15.0
Alkalinity (mg/L as $CaCO_3$)	112.7	112.6	112.6	112.6	45.1	0.0	45.1	45.1	45.1	149.5	118.4	115.4	107.4	2,788.8	114.4
H_2S (mg/L)	4.5	4.5	4.5	4.5	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.0	3.6	50.0	0.0

Select Units for Physical Plant Definition	
Metric (M) or US (U)	u

Iron Addition Reactor:		1	
Iron Add'n?	Flow gpd	Xmech	Salk
FALSE	FALSE	FALSE	FALSE

Definition of the Physical Plant		PRO2D	
How many reactors (up to 42)	6		
Enter the Solids Retention Time (SRT)	9.2 Days	SRT	9.2
Enter the Average Total Flow Rate	11.00 mgd	% Aerobic	85%
Enter the RAS Ratio (% of Plant Influent)	100%	% Anoxic	15%
	11.00 mgd	Temperature oC	14
Wastage Location - (A)ll Reactors or Clarifier (U)F	u	Total Volume gallons	2,827,500

Aeration Data		Est. Diffuser Design (Sanitaire Membrane)	
Aeration Basin Side Water Depth	16 feet	Design Condition	MM
Maximum Water Temperature:	25 °C	Est. Diffuser Air Rate	2.5 scfm/diffuser
BETA Correctional Factor:	0.95	Peaking Capability	150%
Plant Altitude	4,900 feet	Estimated SOTE	34%
THETA - Kla Temp. Corr. Factor	1.024		

System Configuration			Reactor															
Component	Units	TOTAL	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reactor Volume	gallons	2,827,500	141,375	801,125	141,375	801,125	141,375	801,125										
Fraction	% of Total		5%	28%	5%	28%	5%	28%										
Dissolved Oxygen	mg/L			2.00		2.00		2.00										
Reactor Feed																		
Raw Feed	% of Total	100%	20%		30%		40%											
RAS	% of Total RAS	100%	100%															
Recirculation	% of Raw Feed																	
From Reactor	Enter Number																	
Cube Inflows (such as methanol, dewatering filtrate, or thickener return)																		
Flow	gpd																	
S_{co}	mg O_2/L																	
S_s	mg COD/L																	
S_{ip}	mg COD/L																	
S_I	mg COD/L																	
S_{NH4}	mg NH$_4$																	
S_{n2}	mg N$_2$																	
S_{NO3}	mg NO$_3$																	
S_{PO4}	mg PO$_4$																	
S_{Alk}	moles HCO$_3$																	
X_s	mg COD/L																	
X_{ip}	mg COD/L																	
X_I	mg COD/L																	
X_{mech}	mg COD/L																	
X_{PP}	mg PO$_4$																	
X_{PHA}	mg COD/L																	
X_{AUT}	mg COD/L																	
X_{TSS}	mg/L																	
X_{VSS}	mg/L																	
X_{VSS}	mg/L																	

Summary Information			
Total MLSS Inventory	102,417 lbs	Total COD Removed	25,822 lbs/day
Total MLVSS Inventory	75,693 lbs	Food Applied to MLSS Inventory Ratio	0.25 COD/MLSS
MLSS/MLVSS Ratio	1.35	Aeration Information	
Total Required WAS Rate	11,133 lbs MLSS/day	Total AOR	20,956 lbs O2/day
or	8,224 lbs MLVSS/day	Total SOR	57,567 lbs O2/day
Observed Mass Yield	0.32 MVLSS/COD	Total Required Air Rate	9,250 scfm
		Simultaneous Denitrification	65.2%

Component Concentrations			Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
Enter Reactor Number to use this Column of Data for the Original Goals					1	2	3	4	5	6	7
S_{O2}	Dissolved Oxygen	mg O2/L	0.0	0.0	0.0	2.0	0.0	2.0	0.0	2.0	
S_F	Soluble Fermentable Substrates	mg COD/L	73.9	0.3	3.6	0.4	2.3	0.4	4.3	0.5	
S_A	Soluble Fermentation Products	mg COD/L	48.3	0.1	4.1	0.1	1.4	0.0	2.6	0.1	
S_I	Soluble Inerts	mg COD/L	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2	
S_{NH4}	Soluble Ammonia N	mg N/L	20.1	2.2	6.72	1.3	4.6	1.3	4.9	2.2	
S_{N2}	Dissolved Nitrogen Gas	mg N/L	0.0	14.9	13.4	14.5	14.6	15.3	14.4	14.9	
S_{NO3}	Soluble Nitrate/Nitrite N	mg N/L	0.0	2.5	0.1	4.3	0.6	3.4	0.5	2.6	
S_{PO4}	Soluble Inorganic Phosphorus	mg P/L	2.8	0.3	7.7	0.2	2.0	0.1	2.3	0.2	
S_{ALK}	Alkalinity	moles/m³	3.0	2.4	2.7	2.2	2.6	2.2	2.6	2.4	
X_I	Inert Particulates	mg COD/L	35.2	2,940	2,273	2,276	1,856	1,858	1,484	1,496	
X_S	Slowly Biodegradable Substrate	mg COD/L	152.3	135.3	138.4	95.3	104.0	76.3	90.1	60.1	
X_H	Heterotrophic Organisms	mg COD/L	5.4	3,087	2,375	2,382	1,943	1,947	1,565	1,571	
X_{PAO}	Phosphate Accumulating Organisms	mg COD/L	1.8	1,017.7	783.0	783.9	642.5	644.3	516.0	517.5	
X_{PP}	Polyphosphate	mg P/L	0.2	97.1	67.9	75.2	59.9	61.6	47.4	49.4	
X_{PHA}	PAO Storage Products	mg COD/L	0.0	4.3	20.7	4.8	5.4	2.0	5.7	2.0	
X_{AUT}	Autotrophic Organisms	mg COD/L	0.3	150.1	115.5	116.2	94.5	95.0	76.0	76.4	
X_{TSS}	Total Suspended Solids (MLSS)	mg/L	152.7	6,806	5,252	5,259	4,306	4,294	3,489	3,466	
X_{MeOH}	Metal Hydroxides	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
X_{MeP}	Metal Phosphates	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	MLVSS	mg COD/L		7,335	5,703	5,692	4,646	4,623	3,746	3,733	
	Oxygen Consumed	mg O2/(L-day)		2467283	0	1,211	200	919	246	671	
	Nitrate Consumed	mg NO3-N/(L-day)		164052	193.8	19.2	357.1	14.0	348.7	12.8	
		Alkalinity Limited?									

Reactor Information		Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
Reactor Volume	gallons			141,375	801,125	141,375	801,125	141,375	801,125	0
AOR, Biological	lbs O2/day			0	8,098	236	6,142	250	5,826	0
AOR, Liquid	lbs O2/day			0	139	-237	251	-251	364	0
Total AOR	lbs O2/day			0	8,236	0	6,433	-1	6,190	0
Aeration Alpha Value				0.60	0.60	0.60	0.60	0.60	0.60	0.60
SOR/AOR Ratio				2.431	2.751	2.031	2.751	2.031	2.751	2.025
SOR	lbs O2/day			0	22,537	-1	17,700	-1	17,032	0
SOTE				25%	25%	25%	25%	25%	25%	25%
Required Air Rate	SCFM			0	3,662	0	2,826	4	2,719	0
Is Required Diffuser Density Too High?										
Required Mixing Air @ 0.12 scfm/ft2	SCFM			0	244	0	244	0	244	0
MLVSS	mg/L		5,527	3,905	3,860	3,186	3,170	2,549	2,559	0

Flow Balance		Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
Raw Feed into Reactor	mgd	11.00		3.30		3.30		4.40		
Flow from Previous Reactor	mgd				14.30	14.30	17.60	17.60	22.00	
Recirculation into Reactor	mgd									
From Reactor					(0)	[illegible]	[illegible]	(0)	(0)	
RAS into Reactor	mgd		11.00	11.00						
Other Flows into Reactor	mgd	2.00								
Effluent From Reactor	mgd			14.30	14.30	17.60	17.60	22.00	22.00	
Waste Activated Sludge	mgd		0.195							

Facility Operating Parameters					
Item		Value			Value
Influent Wastewater	(Metric)	(Metric)	(Metric=US*k)	(US)	(US)
Flow	m3/day			MG/day	
Design Average		39,743	3785		10.500
Design Diurnal Peak		67,752	3785		17.900
Design Peaking Factor for WW Diurnal flow		1.7	1		1.7
Design Peaking Factor for WW Diurnal loads		1.3	1		1.3
Carbonaceous Five-Day Biochemical Oxygen Demand ($CBOD_5$)					
Design Average Concentration	mg/L	272	1	mg/L	272
Design Average Mass Loading	kg/day	10,800	0.4536	lb/day	23,810
Design Diurnal Peak Mass Loading	kg/day	14,041	0.4536	lb/day	30,954
Total Suspended Solids (TSS)					
Design Average Concentration	mg/L	264	1	mg/L	264
Design Average Mass Loading	kg/day	10,476	0.4536	lb/day	23,096
Design Diurnal Peak Mass Loading	kg/day	13,619	0.4536	lb/day	30,025
Volatile Suspended Solids (VSS)					
Percent VSS	%	80%	1	%	80%
Design Average Concentration	mg/L	211	1	mg/L	211
Design Average Mass Loading	kg/day	8,381	0.4536	lb/day	18,477
Design Diurnal Peak Mass Loading	kg/day	10,895	0.4536	lb/day	24,020
Total Kjeldahl Nitrogen (TKN as N)					
Design Average Concentration	mg/L	33	1	mg/L	33
Design Average Mass Loading	kg/day	1,306	0.4536	lb/day	2,879
Design Diurnal Peak Mass Loading	kg/day	1,698	0.4536	lb/day	3,742
Ammonia-Nitrogen (NH_3-N as N)					
Design Average Concentration	mg/L	21	1	mg/L	21
Design Average Mass Loading	kg/day	842	0.4536	lb/day	1,857
Design Diurnal Peak Mass Loading	kg/day	1,095	0.4536	lb/day	2,414
Total Phosphorus (as P)					
Design Average Concentration	mg/L	4.50	1	mg/L	4.5
Design Average Mass Loading	kg/day	179	0.4536	lb/day	394
Design Diurnal Peak Mass Loading	kg/day	232	0.4536	lb/day	512
Alkalinity (as $CaCO_3$)					
Design Average Concentration	mg/L	150	1	mg/L	150
Design Average Mass Loading	kg/day	5,956	0.4536	lb/day	13,131
Design Diurnal Peak Mass Loading	kg/day	7,743	0.4536	lb/day	17,070
Hydrogen Sulfide (H_2S)					
Design Average Concentration	mg/L	6	1	mg/L	6
Design Average Mass Loading	kg/day	238	0.4536	lb/day	525
Design Diurnal Peak Mass Loading	kg/day	310	0.4536	lb/day	683
Primary Clarifiers Yes					
Primary Clarifers?	Yes	1			
Total Area	m2	888	0.0929	sq.ft.	9,556
Overflow Rate	m/day		0.040747	gpd-sq.ft.	
Average		46	0.040747		1,136
Diurnal Peak		78	0.040747		1,912
Chemical Compound Applied to Primary Influent	None	1			
Percent of COD filtrate that is colloidal	%	40%	1	%	40%
TSS Removal Efficiency at Average Conditions	%	65%	1	%	65%
TSS Removal Efficiency at Diurnal Peak Conditions	%	55%	1	%	55%
Primary Sludge Concentration	mg/L	29,200	1	mg/L	29,200

Facility Operating Parameters					
Item		Value			Value
Secondary Treatment: Bioreactor & Clarifier					
Biological Process - Integrated with PBNR					
SRT	days	4.3	1	days	4.3
Nitrifier Minimum SRT (SRT_{min})	days	1.9	1	days	1.9
DO	mg/L	2.5	1	mg/L	2.5
Temperature in the Biological Process	oC	20.0	Special	oF	68.0
Simultaneous Denitrification	%	84%	1	%	84%
SVI	mL/g	150	1	mL/g	150
Biosolids Production Rates					
Net Yield (mg TSS/mg BOD_5)	mg/mg	0.62	1	lb/lb	0.62
Volatile Fraction	%	79.05%	1	%	79.05%
Active Fraction	%	52.86%	1	%	52.86%
Nitrifier Fraction	%	1.39%	1	%	1.39%
Nitrogen Content, N/VSS	%	6.71%	1	%	6.71%
Phosphorus Content, P/VSS	%	2.42%	1	%	2.42%
Process Oxygen Requirements					
Carbonaceous AOR/BOD5 - wt/wt	kg/kg	0.93	1	lb/lb	0.93
Total AOR/BOD% - wt/wt	kg/kg	1.17	1	lb/lb	1.17
AOR (wt/day)	kg/day			lb/day	
Average		9,372	0.4536		20,662
Diurnal Peak		12,742	0.4536		28,090
AOR	mg/L-hr			mg/L-hr	
Average		36	1		36
Diurnal Peak		49.6	1		49.6
Bioreactor					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
HRT	hr	6.3	1	hr	6.3
% non-aerobic	%	15%	1		15%
% aerobic	%	85%	1		85%
Average MLSS Concentration	mg/L	2,641	1	mg/L	2,641
Bioreactor Clarifier					
Total Area	m2	2,017	0.0929	sq.ft.	21,714
Overflow Rate	m/day			gpd-sq.ft.	
Average		20	0.040747		496
Diurnal Peak		34	0.040747		837
Effluent TSS	mg/L			mg/L	
Average		20	1		20
Diurnal Peak		30	1		30
Underflow Rate					
Average Flow Ratio	%	100%	1		100%
Average Rate	m/day	20	0.040747	gpd-sq.ft.	496
Peak Flow Ratio	%	75%	1		75%
Peak Rate	m/day	26	0.040747	gpd-sq.ft.	628
Solids Loading Rate	kg/m2-day		4.883	lb/day-sq.ft.	
Average		86	4.883		17.6
Diurnal Peak		127	4.883		26.0
Limiting Solids Loading Rate	kg/m2-day	210	4.883	lb/day-sq.ft.	43
Return sludge rate at which limiting solids rate can be achieved					
RAS Flow Rate	m3/day	42554	3785	MGD	11
Percent of Influent to Bioreactor	%	1		%	1
Underflow Concentration	mg/L			mg/L	
Average		4,094	1		4,094
Diurnal Peak		4,773	1		4,773

Facility Operating Parameters					
Item		Value			Value
WAS Thickening	Yes / None				
WAS Thickener?	Yes	1			
Location of WAS Thickener recycle to plant: Headworks		1			
Solids Capture	%	45%	1	%	45%
Thickened Sludge Concentration	mg/L	30,000	1	mg/L	30,000
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7
Solids Digestion: Anaerobic Only					
		2			
Anaerobic Digester					
Total Bioreactor Volume	m3	10,702	3785	MG	2.83
Active Bioreactor Volume	m3	8,027	3785	MG	2.12
SRT	days	19.9	1	days	19.9
Volatile Solids Loading - wi VSS/vol-day	kg/m3-day	1.16	16.06	lb/ft3-day	0.072
Volatile Solids Reduction	%	55%	1	%	55%
Methane Production	m3/day	2,602	0.0283	ft3/day	91938.0
Percent P Released that is Precipitated as Struvite	%	30%	1	%	30%
Dewatering	No	2			
Location of Dewatering recycle to plant: N/A		3			
Solids Capture	%	85%	1	%	85%
Thickened Sludge Concentration	%	18%	1	%	18%
Hours/Day of Operation		24	1		24
Days/Week of Operation		7	1		7

Mass Balance for Average Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Combined Sludge (CS)	Anaerobic Digester Effluent (AnDE)	WAS Thickening Recycle (WSR)
Flow (gal/day)	9,500,000	10,369,259	10,774,449	10,774,449	21,551,437	21,551,437	10,776,778	10,492,349	10,314,547	83,809	373,369	22,931	105,740	100,740	350,435
Carbonaceous BOD5 (lb/day)	23,780	26,517	17,592	17,552	155,424	125,233	123,457	341	185	6,924	4,174	1,878	10,802	38	2,295
Particulate	10,860	10,961	3,836	3,820	6,317	5,069	4,897	23	6	7,125	179	76	7,201	0	93
Heterotrophs	0	2,172	760	760	123,764	99,707	95,939	452	113	1,412	3,324	1,496	2,909	0	1,822
PAOs	0	441	154	154	25,114	20,223	19,486	92	23	280	675	304	593	0	371
PHA	0	2	1	1	139	112	106	1	0	2	4	2	3	0	2
Filtrate	12,920	12,943	12,841	12,841	89	89	45	43	42	109	2	0	100	38	1
COD (lb/day)	48,953	55,304	35,088	35,088	531,777	420,415	410,901	4,420	2,974	23,218	14,234	6,370	29,560	13,244	7,863
Particulate Bio	17,009	17,298	6,033	6,033	11,343	9,138	8,790	41	10	11,205	305	137	11,342	1,503	168
Particulate Non-Bio	8,170	12,409	4,350	4,350	185,785	149,575	144,049	679	170	6,079	4,993	2,245	10,325	11,005	2,745
Heterotrophs	0	4,003	1,508	1,508	245,502	197,782	190,308	887	224	2,500	6,591	2,967	5,768	0	3,627
Autotrophs	0	145	52	52	8,477	6,789	6,533	31	6	96	225	102	198	0	124
PAOs	0	1,319	462	462	75,170	60,559	58,270	276	69	857	2,017	909	1,766	0	1,110
PHA	0	7	2	2	377	304	292	1	0	4	10	5	8	0	6
Filtrate Bio	20,330	20,322	20,165	20,165	140	140	70	65	65	157	2	0	157	60	2
Filtrate Non-Bio	2,440	2,503	2,513	2,513	5,029	5,029	2,514	2,427	2,425	22	87	5	25	25	82
TSS (lb/day)	23,076	31,388	10,956	10,956	474,510	382,276	367,831	1,704	434	20,402	12,743	5,735	26,138	12,751	7,510
Biodegradable	14,117	14,250	4,994	4,995	8,390	7,671	7,285	34	9	9,283	252	114	9,397	1,295	139
NonBiodegradable	8,958	12,293	4,272	4,272	185,704	149,607	143,964	679	170	7,033	4,983	2,245	10,179	11,456	2,743
Heterotrophs	0	3,371	1,180	1,180	192,099	154,759	148,911	702	176	2,191	5,159	2,322	4,513	0	2,838
Autotrophs	0	136	40	40	6,594	5,312	5,112	24	6	75	177	80	155	0	97
PAOs	0	1,332	351	351	58,519	47,285	45,395	213	54	571	1,564	711	1,382	0	869
PHA	0	4	1	1	226	182	175	1	0	2	5	2	4	0	3
Poly-P	0	379	133	133	21,670	17,458	16,798	78	20	246	587	262	508	0	323
VSS (lb/day)	16,461	24,813	8,654	8,654	362,252	291,797	280,772	1,324	331	16,128	9,725	4,376	20,505	9,207	5,351
Biodegradable	11,899	17,145	4,252	4,252	6,459	5,814	5,557	31	8	7,395	227	102	7,599	1,101	125
NonBiodegradable	5,461	5,820	3,057	3,057	134,832	108,460	104,364	492	123	5,733	3,615	1,627	7,360	8,101	1,988
Heterotrophs	0	2,665	1,002	1,003	160,284	131,545	126,575	597	149	1,352	4,366	1,974	3,335	0	2,412
Autotrophs	0	90	34	34	5,605	4,515	4,345	20	5	64	151	68	132	0	83
PAOs	0	577	307	307	49,995	40,273	38,755	183	45	570	1,343	604	1,174	0	733
PHA	0	4	1	1	225	182	175	1	0	3	0	3	5	0	3
TKN (lb-N/day)	7,875	3,332	2,546	2,545	25,995	21,075	19,968	416	346	705	692	307	1,098	1,092	385
NH3-N (lb-N/day)	1,895	1,860	1,646	1,646	267	257	123	123	120	14	5	0	10	640	4
Particulate Bio Org N	485	482	169	169	153	107	127	1	0	314	4	2	319	60	2
Non-Bio Part Org N	208	350	123	123	5,733	4,216	4,057	19	5	228	141	63	201	333	77
Heterotrophs	0	261	91	91	14,968	11,972	11,526	54	14	170	395	180	349	0	220
Autotrophs	0	8	3	3	510	411	395	2	0	6	14	6	12	0	5
PAOs	0	80	26	25	4,560	3,666	3,529	17	4	52	122	55	107	0	67
Non-Bio Sol Org N	197	203	201	225	492	402	221	194	194	2	2	0	2	2	2
Soluble Bio Org N	85	85	85	55	1	1	0	0	0	1	0	0	1	0	0
NOx-N (lb-N/day)	7	5	6	8	495	405	237	224	224	0	8	0	1	0	6
TP (lb-P/day)	594	578	336	326	10,403	8,372	8,257	57	78	240	279	125	360	305	154
Bio Particulate	120	121	42	42	24	27	25	0	0	78	1	0	79	11	1
Non-Bio Particulate	95	95	21	20	1,303	1,054	1,014	5	1	67	35	16	72	160	19
Heterotrophs	0	30	11	11	1,729	1,393	1,340	6	2	20	46	21	41	0	26
Autotrophs	0	1	0	0	59	48	45	0	0	1	2	1	1	0	1
PAOs	0	9	3	3	529	426	410	2	0	6	14	6	12	0	8
Poly-P	0	137	41	41	6,709	5,405	5,201	25	6	76	183	81	157	0	99
Ortho-PO_4	209	210	204	205	34	39	19	19	19	2	1	0	2	191	1
Alkalinity (lb/day as $CaCO_3$)	13,119	13,456	13,061	13,061	20,793	20,790	10,398	10,035	10,027	104	362	22	126	2,205	338
H_2S (lb/day)	523	529	525	503	0	0	0	0	0	4	0	0	4	44	0
BOD_5 (mg/L)	271.3	232.9	195.2	195.8	865.3	697.0	1,349.8	7.9	2.1	12,772	1,341	9,821	12,139	40	785
COD (mg/L)	559.1	644.1	390.5	390.6	2,852.7	2,390.0	4,571.7	51.0	34.3	33,330	4,572	33,323	33,250	14,694	2,691
TSS (mg/L)	263.3	345.7	122.2	122.2	2,640.3	2,127.6	4,094.4	20.0	5.0	29,300	4,094	30,000	29,372	14,329	2,569
VSS (mg/L)	210.9	274.1	96.7	96.7	2,015.9	1,624.0	3,125.3	15.3	3.8	23,080	3,125	22,899	23,043	10,344	1,831
TKN (mg-N/L)	32.9	36.8	28.3	28.3	144.7	117.3	222.3	4.8	4.0	1,124	222	1,635	1,227	1,227	132
NH_3-N (mg-N/L)	21.2	20.5	20.5	20.5	1.5	1.5	1.5	1.5	1.5	20.5	1.5	1.5	16.5	719.0	1.5
NO_x-N (mg-N/L)	0.1	0.1	0.1	0.1	2.6	2.6	2.6	2.6	2.6	0.1	2.6	2.6	0.0	0.0	2.6
TP (mg-P/L)	6.8	6.4	3.7	3.7	57.9	45.7	89.7	0.7	0.3	342.9	89.7	655.8	410.1	410.1	52.6
Alkalinity (mg/L as $CaCO_3$)	149.2	145.7	145.7	145.7	115.7	115.7	115.7	115.7	115.7	149.7	115.7	115.7	141.6	2,507.8	115.7
H_2S (mg/L)	6.0	5.9	5.9	5.9	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0	4.0	50.0	0.0

Mass Balance for Diurnal Peak Flow Conditions

Constituent	Raw Wastewater (RW)	Primary Influent (PI)	Primary Effluent (PE)	Bioreactor Influent (BI)	Ave Mixed Liquor (ML)	Secondary Influent (SI)	RAS	Secondary Effluent (SE)	Plant Effluent (PLE)	Primary Sludge (PSD)	WAS	Thickened WAS (TWAS)	Combined Sludge (CS)	Anaerobic Digester Effluent (ANDE)	WAS Thickening Recycle (WSR)
Flow (m3/day)	17,500,000	16,272,109	16,184,203	16,184,553	21,872,879	21,592,979	13,933,777	17,749,813	17,732,152	82,828	273,300	15,330	132,830	106,745	324,033
Carbonaceous BOD (lb/day)	26,926	33,775	24,371	24,371	216,214	114,430	157,030	1,421	400	8,924	4,174	1,372	10,497	33	1,920
Particulate	14,105	14,189	6,289	6,289	0	7,310	0	0	0	7,125	170	76	7,201	0	20
Heterotrophs	0	2,570	1,159	1,159	176,100	100,864	136,414	1,116	372	1,413	3,324	1,396	2,905	0	1,820
PAOs	0	476	79	79	41,746	614	32,337	203	85	286	575	0	286	0	0
PHA	0	1	1	1	269	110	224	2	1	2	4	0	3	0	0
Filtrate	15,021	15,692	15,742	15,742	70	5,636	30	29	39	100	2	0	102	33	1
COD (lb/day)	63,978	73,537	49,320	49,320	781,540	1,035,836	587,882	8,023	4,151	28,718	14,234	5,156	25,875	13,284	4,748
Particulate Bio	22,151	22,319	10,042	10,042	0	0	0	0	0	11,205	305	137	11,342	1,553	163
Particulate Non-Bio	11,927	15,820	7,119	7,119	271,666	208,937	210,256	1,721	574	8,078	4,250	2,243	10,329	11,805	2,745
Heterotrophs	0	5,110	2,300	2,300	349,330	235,137	273,295	2,213	133	2,800	6,594	2,767	5,764	0	1,621
Autotrophs	0	163	73	73	9,095	6,075	7,047	58	19	90	220	107	194	0	104
PAOs	0	526	228	228	124,552	78,737	95,785	792	394	657	2,019	0	557	0	0
PHA	0	3	1	1	753	379	607	5	2	4	10	0	4	0	0
Filtrate Bio	28,416	28,418	26,211	26,291	110	37,037	47	57	52	157	2	0	157	60	2
Filtrate Non-Bio	3,184	2,270	3,254	3,254	5,695	471,427	2,441	3,175	3,173	20	87	4	24	25	83
TSS (lb/day)	27,999	38,776	17,449	17,449	700,663	495,872	542,735	4,459	1,780	29,472	12,745	4,780	25,192	12,751	3,217
Biodegradable	16,352	18,481	8,321	8,321	0	290,755	0	0	0	9,252	232	114	9,391	1,295	137
Non-Biodegradable	11,646	15,480	6,966	6,969	258,422	196,132	200,950	1,643	548	7,903	4,969	2,246	10,173	11,456	2,743
Heterotrophs	0	4,087	1,830	1,830	282,425	5,192	224,189	1,834	611	2,191	3,150	2,322	4,513	0	2,838
Autotrophs	0	129	58	58	1,338	86,932	5,639	45	15	73	177	80	153	0	97
PAOs	0	413	186	186	97,772	379	75,734	614	204	971	1,580	0	971	0	0
PHA	0	2	1	1	470	23,731	364	3	1	3	8	0	3	0	0
Poly-P	0	194	87	87	45,035	654	35,566	282	97	245	582	0	245	0	0
VSS (lb/day)	23,059	31,063	13,989	13,989	585,172	23,137	453,270	3,738	1,235	15,125	9,720	3,771	19,599	9,202	1,909
Biodegradable	15,599	15,724	7,079	7,079	0	6,417	0	0	0	7,397	227	107	7,998	1,104	125
Non-Biodegradable	3,400	11,442	5,149	5,149	249,178	9,910	193,914	1,570	523	5,733	3,518	1,527	7,360	8,101	1,959
Heterotrophs	0	2,457	1,556	1,556	245,017	258	190,561	1,559	520	1,862	4,366	1,974	3,836	0	2,412
Autotrophs	0	110	50	50	5,407	6,097	4,883	41	14	64	151	68	132	0	83
PAOs	0	351	158	158	83,106	436	64,374	527	175	570	1,343	0	570	0	0
PHA	0	2	1	1	470	0	364	3	1	3	6	0	3	0	0
TKN (lb-N/day)	3,729	4,177	3,401	3,401	29,260	22,730	22,282	797	678	782	692	202	1,037	7,092	318
NH_3-N (lb-N/day)	2,412	2,417	2,405	2,405	554	15,350	280	385	384	14	5	0	19	840	4
Particulate Bio Org N	824	425	282	282	0	0	0	0	0	314	4	2	319	55	2
Non-Bio Part Org N	336	447	201	201	7,959	2,593	6,170	50	17	225	161	63	291	359	77
Heterotrophs	0	272	122	122	13,361	1,932	9,528	78	26	112	399	180	347	0	220
Autotrophs	0	8	4	4	320	57	245	2	1	6	14	6	12	0	8
PAOs	0	32	14	14	7,558	739	5,802	48	16	52	122	0	53	0	0
Non-Bio Sol Org N	255	262	260	260	456	11,452	126	254	254	2	7	0	2	2	7
Soluble Bio Org N	112	112	112	112	0	56	0	0	0	1	0	0	1	0	0
NO_3-N (lb-N/day)	0	6	6	6	535	8,309	223	290	293	0	0	0	0	0	0
TP (lb-P/day)	312	944	420	435	29,251	0	15,690	100	75	241	279	36	277	302	47
Bio Particulate	156	156	70	70	0	0	0	0	0	76	1	0	74	11	1
Non-Bio Particulate	54	114	51	51	2,567	0	1,938	16	5	57	35	16	73	183	19
Heterotrophs	0	36	16	16	2,450	0	1,900	16	5	22	45	21	41	0	26
Autotrophs	0	1	1	1	64	0	50	0	0	1	2	1	1	0	1
PAOs	0	4	2	2	850	0	682	5	2	5	14	0	5	0	0
Poly-P	0	60	27	27	14,253	0	11,040	90	30	75	190	0	75	0	0
Ortho-PO_4	272	272	271	271	58	0	25	32	22	2	1	0	2	597	1
Alkalinity (lb/day as $CaCO_3$)	17,350	17,401	17,316	17,316	2,369	0	3,037	4,895	4,893	104	350	15	122	2,285	342
H_2S (lb/day)	687	682	678	679	0	0	0	0	0	4	0	0	1	44	0
BOD_5 (mg/L)	207.2	221.7	160.8	160.8	622.5	431.3	1,485.4	9.5	3.4	17,772	1,341	9,310	12,243	43	551
COD (mg/L)	425.7	482.4	325.3	325.3	2,870.4	5,904.5	5,170.3	54.2	32.7	33,230	4,573	34,391	33,443	14,894	2,224
TSS (mg/L)	701.0	254.3	115.1	115.1	2,640.9	1,809.0	4,773.3	30.0	10.0	29,200	4,594	35,000	29,343	14,229	1,509
VSS (mg/L)	183.8	204.1	92.3	92.3	2,230.0	67.2	3,986.5	25.1	8.4	23,082	3,120	23,767	23,201	10,240	1,569
TKN (mg-N/L)	23.1	27.4	22.4	22.4	119.2	122.2	126.0	5.4	4.5	1,124	222	1,350	1,210	1,227	100
NH_3-N (mg-N/L)	15.2	15.9	15.9	15.9	2.5	61.6	2.5	2.5	2.5	20.3	1.5	1.5	17.9	719.0	1.5
NO_3-N (mg-N/L)	0.0	0.1	0.1	0.1	2.0	31.5	2.0	2.0	2.0	0.1	2.5	2.5	0.5	0.0	2.0
TP (mg-P/L)	0.0	0.0	0.0	2.8	76.4	3.5	138.0	1.1	0.5	342.5	89.7	228.7	323.3	417.1	15.9
Alkalinity (mg/L as $CaCO_3$)	114.2	114.2	114.2	114.2	31.5	3.5	31.5	31.5	31.5	145.7	115.7	115.7	142.3	2,567.5	115.7
H_2S (mg/L)	4.5	4.5	4.5	4.5	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	4.3	50.0	3.5

Select Units for Physical Plant Definition	
Metric (M) or US (U)	u

Iron Addition Reactor:			1
Iron Addn?	Flow gpd	Xmeon	Salk
FALSE	FALSE	FALSE	FALSE

Definition of the Physical Plant		PRO2D	
How many reactors (up to 42)	6		
Enter the Solids Retention Time (SRT)	4.3 Days	SRT	4.3
Enter the Average Total Flow Rate	10.77 mgd	% Anoxic	85%
Enter the RAS Ratio (% of Plant Influent)	100%	% Anoxic	15%
	10.77 mgd	Temperature oC	20
Wastage Location - (All Reactors or Clarifier (U)/F	u	Total Volume gallons	2,827,500

Aeration Data		Est. Diffuser Design (Sanitaire Membranes)	
Aeration Basin Side Water Depth	15 feet	Design Condition	MM
Maximum Water Temperature:	25 °C	Est. Diffuser Air Rate	2.5 scfm/diffuser
BETA Correctional Factor:	0.95	Peaking Capability	160%
Plant Altitude:	4,900 feet	Estimated SOTE	34%
THETA - K_La Temp. Corr. Factor:	1.024		

System Configuration			Reactor														
Component	Units	TOTAL	#1	#2	#3	#4	#5	#6	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Reactor Volume	gallons	2,827,500	141,375	801,125	141,375	801,125	141,375	801,125									
Fraction	% of Total		5%	28%	5%	28%	5%	28%									
Dissolved Oxygen	mg/L			2.50		2.50		2.50									
Reactor Feed																	
Raw Feed	% of Total	100%	30%		30%		40%										
RAS	% of Total RAS	100%	100%														
Recirculation	% of Raw Feed																
From Reactor	Enter Number																
Other Inflows (such as methanol, dewatering filtrate, or thickener return)																	
Flow	gpd																
S_{DO}	mg O_2/L																
S_I	mg COD/L																
S_A	mg COD/L																
S_F	mg COD/L																
S_{NH4}	mg N/L																
S_{ND}	mg N/L																
S_{NO3}	mg N/L																
S_{PO4}	mg P/L																
S_{ALK}	moles/mS																
X_I	mg COD/L																
X_S	mg COD/L																
X_H	mg COD/L																
X_{STO}	mg COD/L																
X_{MeP}	mg P/L																
X_{MeOH}	mg COD/L																
X_{MeM}	mg COD/L																
X_{AUT}	mg/L																
X_{PAO}	mg/L																
X_{TSS}	mg/L																

Summary Information

Total MLSS Inventory	62,316 lbs	Total COD Removed	26,181 lbs/day
Total MLVSS Inventory	49,255 lbs	Food Applied to MLSS Inventory Ratio	0.45 COD/MLSS
MLSS/MLVSS Ratio	1.26	Aeration Information	
Total Required WAS Rate	14,453 lbs MLSS/day	Total AOR	20,021 lbs O2/day
or	11,451 lbs MLVSS/day	Total SOR	60,502 lbs O2/day
Observed Mass Yield	0.41 MLVSS/COD	Total Required Air Rate	9,659 scfm
		Simultaneous Denitrification	50.5%

Component Concentrations

	Component	Units	Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
Enter Reactor Number to use this Column of Data for the Original Guess					1	2	3	4	5	5	7
S_{O2}	Dissolved Oxygen	mg O2/L	0.0	0.0	0.0	2.5	0.0	2.5	0.0	2.5	
S_F	Soluble Fermentable Substrates	mg COD/L	80.8	0.6	4.0	0.5	3.3	0.5	5.5	0.6	
S_A	Soluble Fermentation Products	mg COD/L	53.9	0.1	8.6	0.1	2.9	0.1	4.4	0.1	
S_I	Soluble Inerts	mg COD/L	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	
S_{NH4}	Soluble Ammonia N	mg N/L	20.5	1.5	9.00	0.8	4.1	0.9	4.5	1.5	
S_{N2}	Dissolved Nitrogen Gas	mg N/L	0.0	13.5	12.3	13.1	13.4	13.9	13.1	13.5	
S_{NO3}	Soluble Nitrate-Nitrite N	mg N/L	0.1	2.8	0.1	3.8	0.4	3.0	0.4	2.8	
S_{PO4}	Soluble Inorganic Phosphorus	mg P/L	2.3	0.2	6.9	0.2	2.2	0.1	2.1	0.2	
S_{ALK}	Alkalinity	moles/m³	3.0	2.3	2.9	2.2	2.9	2.2	2.6	2.3	
X_I	Inert Particulates	mg COD/L	48.4	1,690	1,245	1,249	1,024	1,027	831	830	
X_S	Slowly Biodegradable Substrate	mg COD/L	157.0	97.8	109.4	66.8	81.3	53.5	72.6	50.9	
X_H	Heterotrophic Organisms	mg COD/L	15.5	2,118	1,633	1,645	1,345	1,353	1,092	1,101	
X_{PAO}	Phosphate Accumulating Organisms	mg COD/L	5.1	648.6	500.0	507.5	413.8	416.6	334.6	337.0	
X_{PP}	Polyphosphate	mg P/L	0.5	57.9	38.7	45.1	35.1	37.1	28.2	30.1	
X_{PHA}	PAO Storage Products	mg COD/L	0.0	3.3	17.9	3.7	7.9	1.7	5.9	1.7	
X_{AUT}	Autotrophic Organisms	mg COD/L	0.0	72.7	56.0	59.7	46.2	45.9	37.4	37.8	
X_{TSS}	Total Suspended Solids (MLSS)	mg/L	200.1	4,594	3,125	3,160	2,623	2,613	2,032	2,128	
X_{MeOH}	Metal Hydroxides	mg/L	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
X_{MeP}	Metal Phosphates	mg/L	[illegible]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	MLVSS	mg COD/L		4,544	3,501	3,528	2,820	2,898	2,374	2,351	
	Oxygen Consumed	mg O_2/(L-day)		[illegible]	0	1,105	246	851	302	874	
	Nitrate Consumed	mg NO_3-N/(L-day)		[illegible]	191.1	14.4	327.1	10.5	312.0	10.3	
		Alkalinity Limited?									

Reactor Information

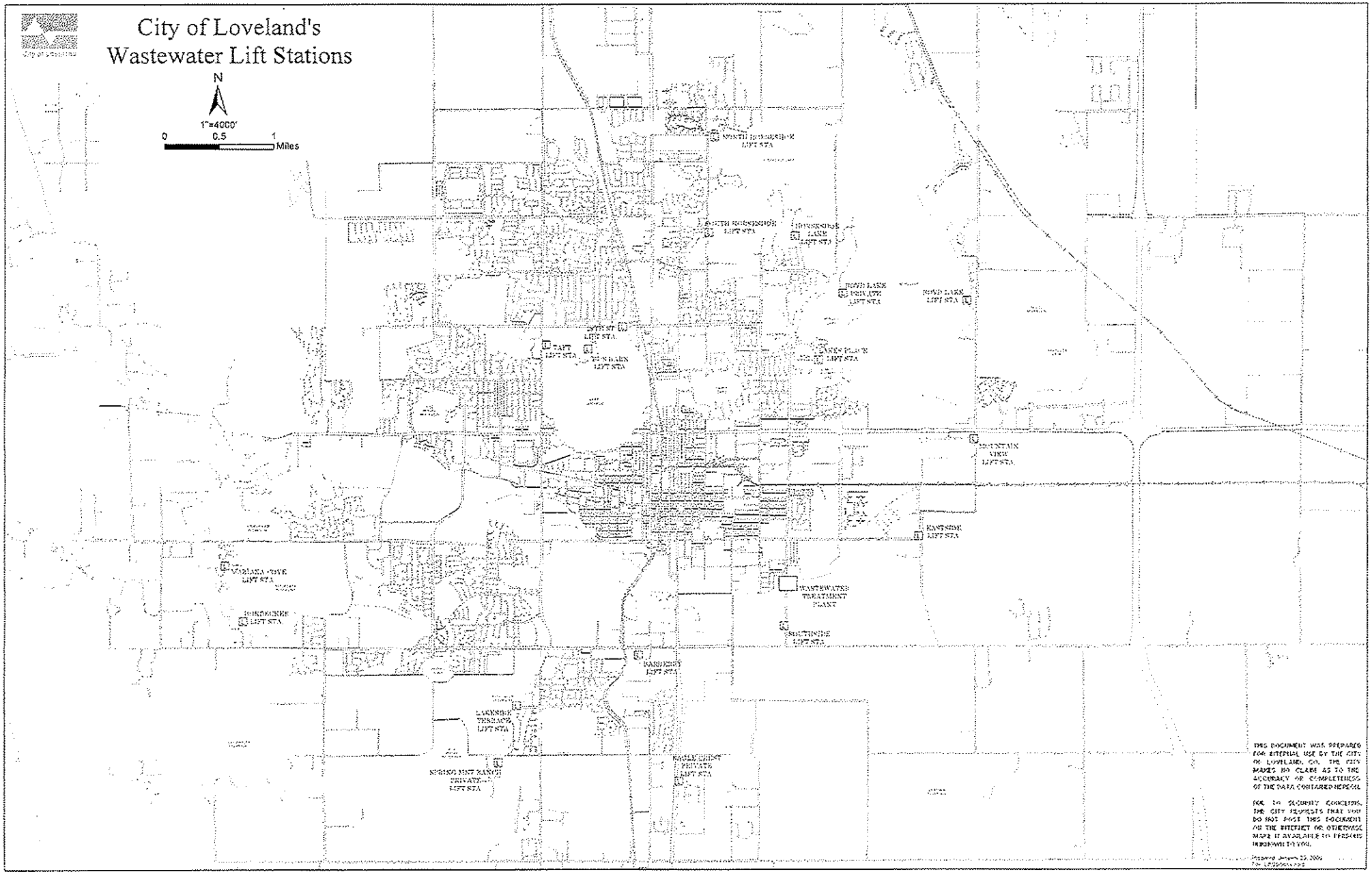
	Item	Units	Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
	Reactor Volume	gallons			141,375	601,125	141,375	601,125	141,375	601,125	0
	AOR, Biological	lbs O2/day			0	7,392	290	5,622	356	5,642	0
	AOR, Liquid	lbs O2/day			0	292	-290	357	-357	446	0
Total AOR		lbs O2/day			0	7,685	0	6,049	-1	5,286	0
	Aeration Alpha Value				0.50	0.60	0.60	0.60	0.60	0.60	0.60
	SOR/AOR Ratio				2.431	3.022	2.031	3.022	2.032	3.022	2.026
SOR		lbs O2/day			0	23,223	-1	18,281	-2	19,001	0
	SOTE				25%	25%	25%	25%	25%	25%	25%
Required Air Rate		SCFM			0	3,707	0	2,918	0	3,033	0
Is Required Diffuser Density Too High?											
Required Mixing Air @ 0.12 scfm/ft2		SCFM			0	244	0	244	0	244	0
MLVSS		mg/L		3,295	2,536	2,513	2,050	2,054	1,591	1,682	0

Flow Balance

Item	Units	Feed	RAS	#1	#2	#3	#4	#5	#6	#N/A
Raw Food into Reactor	mgd	10.77		3.23		3.23		4.31		
Flow from Previous Reactor	mgd				14.01	14.01	17.24	17.24	21.55	
Recirculation Into Reactor	mgd									
From Reactor										
RAS into Reactor	mgd		10.77	10.77						
Other Flows into Reactor	mgd	0.00								
Effluent From Reactor	mgd			14.01	14.01	17.24	17.24	21.55	21.55	
Waste Activated Sludge	mgd		0.424							

Attachment H

City of Loveland's Wastewater Lift Stations



Attachment I

SECTION VI - OPERATION AND MANAGEMENT

24. *Provide the following information for the facility. A current plan of operation which includes this information may be substituted.*

A. *A copy or description of the staffing plan for the facility, including the number of operators and their certification levels, and operating personnel coverage of the facility during weekdays, weekends, and holidays.*

The City's Water and Power Department is divided into three divisions: Business, Power Operations, and Water Utilities. Figure 1 illustrates the organization of the Department that has approximately 145 full time employees. Ralph Mullinix directs the Department. Mr. Mullinix reports to the City Manager who reports to the City Council.

All water and wastewater utilities are included in the Water Utilities Division. This Division also includes Engineering, Information Technology, Water Resources, Distribution/Collection, and Technical Services. Steve Adams became Manager of Water Utilities in 1998. Water and wastewater treatment is included in this division. Figure 2 illustrates the chain of command within the Wastewater Treatment group of the Water and Power Department. The following highlights those sections relevant to wastewater treatment.

Treatment Operations

Treatment Operations includes three groups: Water Treatment, Wastewater Treatment, and Water Quality. Michael McCrary is the interim manager of Treatment Operations and reports to Steve Adams.

The City of Loveland Wastewater Treatment Facility is staffed by a treatment manager (Michael McCrary as interim), a lead operator (Michael McCrary), four shift operators, one floating operator, two grounds and building maintenance persons, a part time chemist, one full time lab technician, and two part time lab technicians. This personnel level allows staffing at the facility from 7:00 A.M. to 11:00 P.M. every day of the year including weekends and holidays. On Thanksgiving and Christmas days, staffing may be decreased to 8:00 A.M. to 8:00 P.M if the current operating conditions allow.

The City of Loveland encourages all operators to attain the highest level of certification and therefore has no quota on the various classes of certified operators. At present the treatment manager, the lead operator, and two of the shift operators possess Class "A" Wastewater Operator Certificates. The other two shift operators possess a Class "C" Certificate. The floating operator holds a Class "D" certification. The grounds and building maintenance position is not required to possess a certification.

The Water Quality group provides laboratory and analytical support for both the City's water and wastewater treatment facilities. Mike Tesar is the Laboratory Coordinator for this group, and he reports to the Treatment

Manager. The Water Quality group is a support group for both treatment plants, providing analytical data and services for regulatory compliance. They also provide testing services for process control purposes, special studies, and occasional testing services for other divisions or entities. There are four full time positions in the Water Quality group.

Technical Services

Technical Services is responsible for all maintenance and repair on all the equipment and instrumentation at the City's water and wastewater treatment plants, and all pump and lift stations. Equipment and instrumentation maintenance and support is provided by Technical Services. Bruno Lopez is the Technical Services Superintendent and he reports to Steve Adams. The Technical Services section includes a supervisor and seven employees with various skills.

This organizational structure allows production and supports tasks to be more efficient and avoids the duplication that had occurred in the past.

B. *A discussion or outline of the emergency response program used at the facility. This discussion should include:*

1. *A description of alternate power sources.*

   Two separate electric sources, the East Substation and the Valley Substation serve the Wastewater Treatment Facility. The City is able to use either substation as the primary source of power and the other as backup. The City can also switch manually to either substation. The Disinfection Facility is provided with standby power generation that automatically provides back up power to critical facilities.

2. *A discussion of alarm systems installed at the facility, including any remote transmission of alarms.*

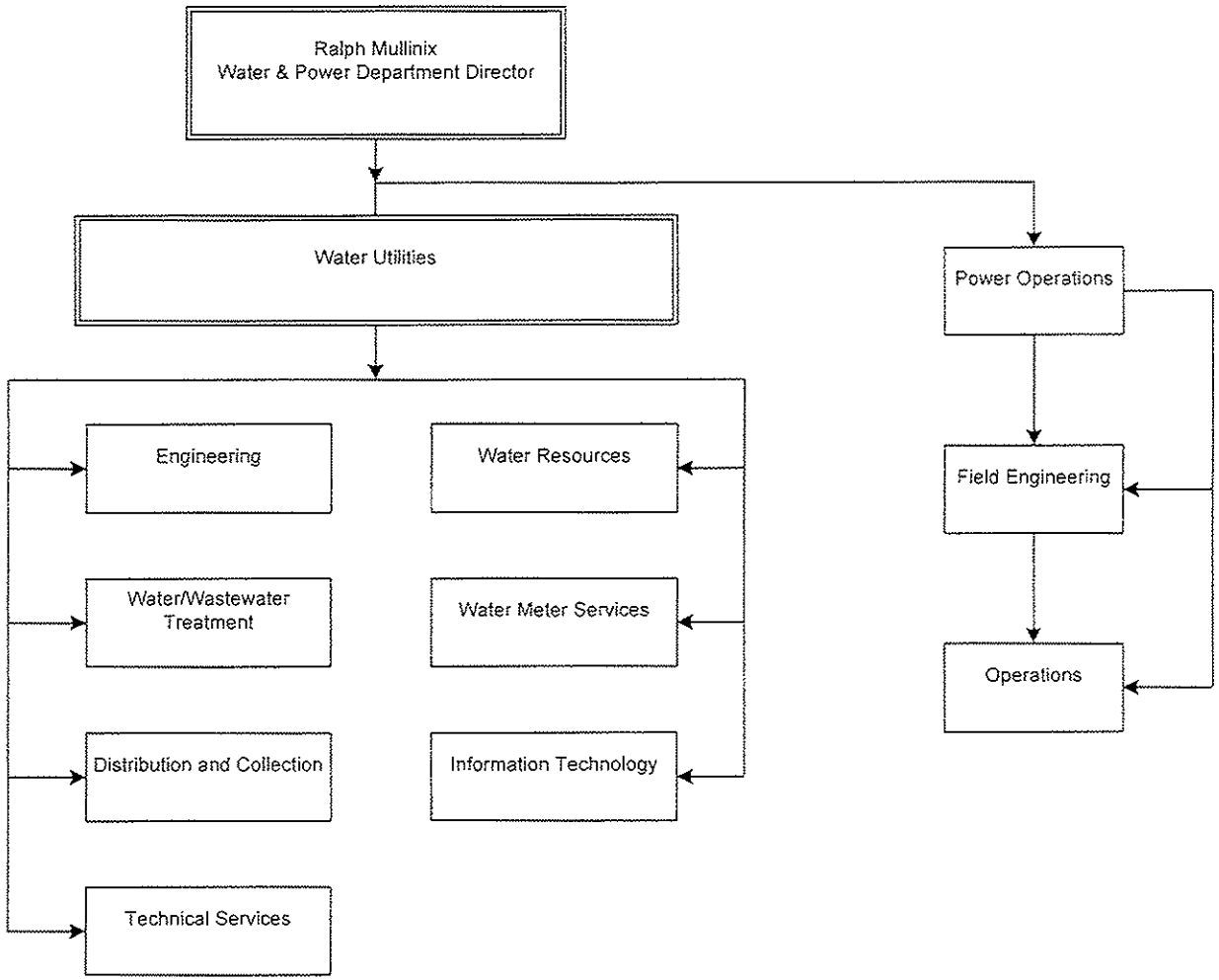
   Alarm points for motor failure, high and low wet well, and other abnormal conditions exist throughout all unit processes at the wastewater treatment plant and are connected to a central SCADA alarm system in the Administration Building. This system activates an alarm, which is audible throughout the facility grounds, and also a red flashing alarm on the master control building schematic indicating the location of the alarm. In the event the alarm is not acknowledged within five minutes, the SCADA alarm activates a WIN-911 system to call the water treatment plant operator who is on duty 24-hours per day. The water treatment plant operator calls and informs the appropriate operations staff of the specific alarm condition.

3. *A description of the chain of command in emergency situations. Provide any other information for emergency response.*

See Attachment J for the Emergency Response Plan. Figure 2 lists the Chain of Command for normal operations. This would also apply during an emergency. The Emergency Response Plan outlines the procedures and priorities for contacting City personnel in the case of an emergency.

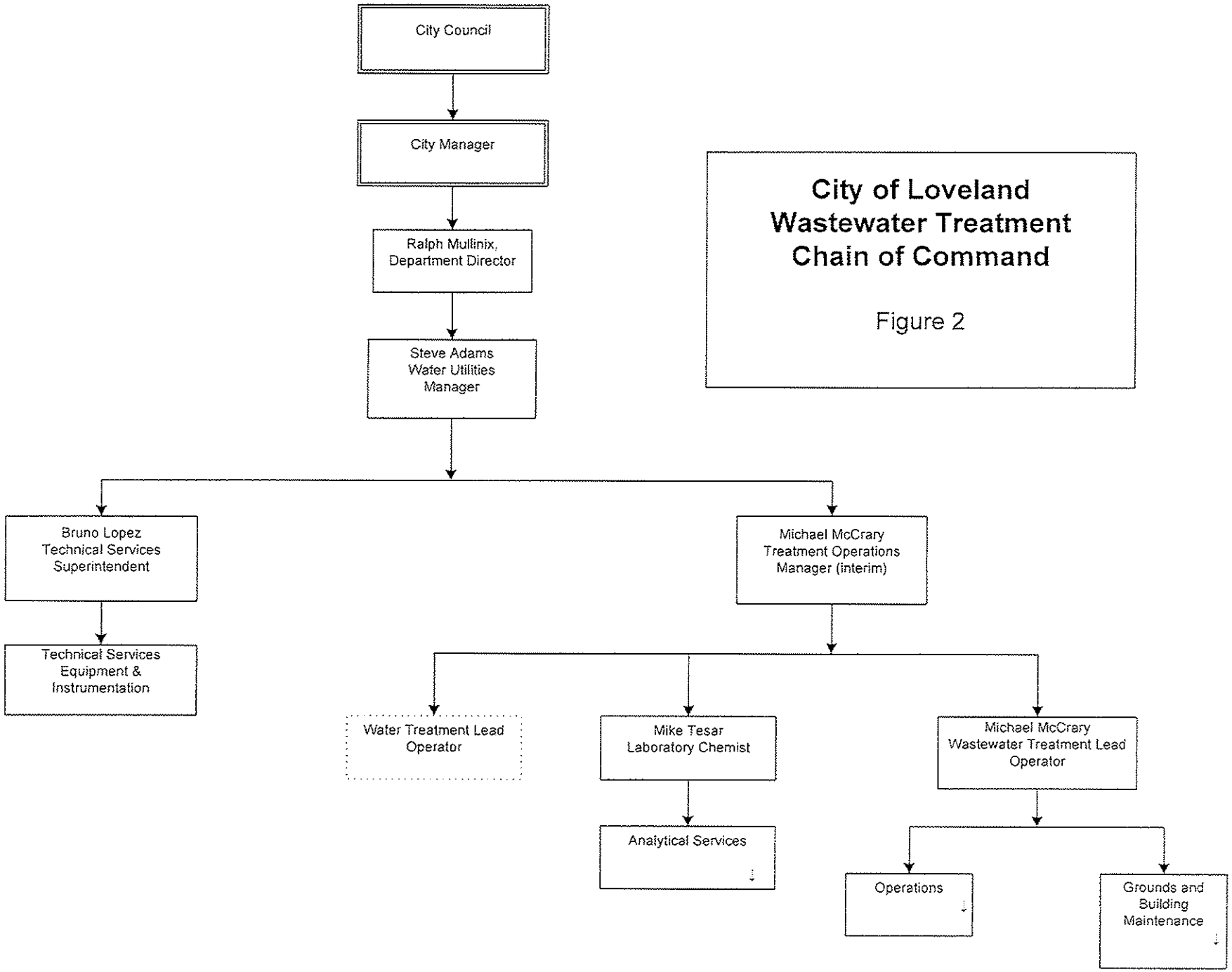
4. *Provide any other information for emergency response.*

No additional information.



City of Loveland
Water and Power Department Organization

Figure 1



City of Loveland Wastewater Treatment Chain of Command

Figure 2

Attachment J

SECTION VI - OPERATION AND MANAGEMENT

24. *Provide the following information for the facility. A current plan of operation which includes this information may be substituted.*

C. ***Attach a list of any chemicals which are used in the operation of the treatment facility. This includes chemicals added directly to the treatment process (chlorine, copper sulfate, other algicides, alum, etc.) as well as chemicals which are used adjacent to unit processes (ponds, basins, etc.) which may be carried into the treatment system by storm events, snowmelt, etc. MSDS sheets shall be included for any name-brand (Aquashade, Round-up, etc.) products.***

The following chemicals are used at the wastewater treatment plant. This list includes chemicals used directly in treatment and those that are used adjacent to the treatment process units. The Material Safety Data Sheets are also attached.

Chemicals Used at the Loveland Wastewater Treatment Plant

Name	Use
Chemicals Used for Treatment	
Sodium Hypochlorite	Chemical used for RAS chlorination and NPW chlorination.
Chemicals Used Onsite	
AMINE 4 2,4-D Weed Killer	Herbicide used on vegetation around treatment units.
Autoguard RV Winterizer	Antifreeze used in equipment.
Bar Bait All Weather Rat and Mouse Killer	Rat and Mouse Control around treatment units.
Cygon 2E Dimethoate Systemic Insecticed	Insect Repellant applied around treatment units.
Eliminator Hornet and Wasp Killer	Insecticide used on vegetation around the treatment units.
HRR	Equipment cleaning.
Kleenup Grass & Weed Killer	Herbicide used on vegetation around treatment units.
Nufarm Weedone LV6 EC Broadleaf Herbicide	Herbicide used on vegetation around treatment units.
Ranger® PRO Herbicide	Herbicide used on vegetation around treatment units.
Repel Insect Repellent Unscented Sportsmen Formula, Classic Repel Inspect Repellent Unscented Sportsmen Formula	Insect Repellant applied around treatment units.
ZEP Sewer Aid	Used in the primary clarifiers when plugging occurs because of grease buildup.

Material Safety Data Sheet

Provided by:
DPC Industries, Inc. DX Systems Company
DPC Enterprises, LP DX Terminals
DXI Industries, Inc.

PO Box 24600
Houston, Tx 77229-4600
281-457-4888
888-647-7717
www.dxgroup.com

SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name DIXICHLOR

Synonyms BLEACH

Chemical Name SODIUM HYPOCHLORITE 10%

Date of Issue: 1/8/2001

Emergency phone: 281-457-4888
Chemtrec: 800-424-9300

Reviewed / Revision Date: 08/28/2006

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENTS	PERCENT	CAS NO.
SODIUM HYPOCHLORITE	10	7681-52-9
SODIUM CHLORIDE	7 - 8	7647-14-5
SODIUM HYDROXIDE	0.5 - 2	1310-73-2
WATER	REMAINDER	7732-18-5

SECTION 3 - HAZARDS IDENTIFICATION

Potential Health Effects

ACGIH - TLV: NOT ESTABLISHED; 1 ppm AS CHLORINE

Eye Contact MAY CAUSE SEVERE PAIN, BLURRED VISION, TEARING AND SWELLING. CONCENTRATED SOLUTIONS MAY CAUSE BURNING.

Skin Contact MAY CAUSE MODERATE SKIN IRRITATION. CONTACT WITH CONCENTRATED SOLUTIONS MAY BLEACH THE SKIN AND CAUSE REDNESS, PAIN, BLISTERING, ITCHY ECZEMA AND POSSIBLE CHEMICAL BURNS.

Ingestion MAY CAUSE PAIN AND INFLAMMATION OF THE MOUTH, THROAT, ESOPHAGUS, AND STOMACH. CAN CAUSE EROSION OF MUCOUS MEMBRANES, ESPECIALLY IN THE STOMACH.

Inhalation VAPORS MAY CAUSE SLIGHT TO SEVERE IRRITATION OF THE RESPIRATORY TRACT. HIGH CONCENTRATIONS MAY CAUSE SORE THROAT, BLISTERING, DELAYED PULMONARY EDEMA (SWELLING OF LUNG TISSUE) AND SHORTNESS OF BREATH.

Carcinogenicity: *NTP* NO *IARC* NO *OSHA* NO

SECTION 4 - FIRST AID PROCEDCURES

Eye Contact: IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

Skin Contact: IMMEDIATELY REMOVE CONTAMINATED CLOTHING OR SHOES. WIPE EXCESS FROM SKIN AND FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. USE SOAP IF AVAILABLE OR FOLLOW BY WASHING WITH SOAP AND WATER. DO NOT REUSE CLOTHING UNTIL THOROUGHLY CLEANED. GET MEDICAL ATTENTION.

Inhalation: REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GIVE ARTIFICIAL RESPIRATION IF NOT BREATHING. GET MEDICAL ATTENTION.

Ingestion: DO NOT INDUCE VOMITING. RINSE MOUTH WITH WATER. IF CONSCIOUS, GIVE LARGE QUANTITIES OF WATER OR MILK AND GET IMMEDIATE MEDICAL ATTENTION. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON!

SECTION 5 - FIRE FIGHTING MEASURES

Flash Point (°F)	NONFLAMMABLE.
Extinguishing Media	USE MEDIA APPROPRIATE FOR SURROUNDING AREA.
Special Firefighting Procedures/Precautions	WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR. STAY UPWIND AND KEEP OUT OF LOW AREAS.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

For Spill: CLEAN-UP PERSONNEL SHOULD USE PROTECTIVE EQUIPMENT TO PREVENT CONTACT. CONTAIN MATERIAL. PLACE COLLECTED MATERIAL IN A DISPOSAL CONTAINER. PREVENT LIQUID FROM ENTERING SEWERS OR WATERWAYS. DO NOT USE COMBUSTIBLE ABSORBENTS.

SECTION 7 - HANDLING AND STORAGE

Keep container tightly closed when not in use. Store in a cool, dry, well-ventilated area, away from heat and incompatible materials. Protect containers from physical damage.

AVOID CONTACT WITH EYES AND SKIN AND INHALATION OF VAPORS, MISTS, AND FUMES.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory Protection	NOT NECESSARY UNDER NORMAL USE AND CONDITIONS. FOR AREAS WITH HIGH VAPOR CONCENTRATIONS, USE NIOSH APPROVED RESPIRATOR PROTECTION. FOR CANISTER TYPE RESPIRATORS, USE CHLORINE FILTERS. IN CASE OF FIRE, WEAR SELF-CONTAINED BREATHING APPARATUS.
Ventilation	LOCAL AND MECHANICAL RECOMMENDED.
Protective Gloves	CHEMICAL IMPERVIOUS GLOVES.
Eye/Face Protection	CHEMICAL SAFETY GOGGLES AND/OR FULL-FACE SHIELD.
Other Protection	CHEMICAL RESISTANT CLOTHING SUCH AS COVERALLS/APRON, BOOTS, ETC.
Work Practices	USE GOOD PERSONAL HYGIENE PRACTICES. WASH HANDS BEFORE EATING, DRINKING, SMOKING, OR USING TOILET FACILITIES. PROMPTLY REMOVE SOILED CLOTHING AND WASH THOROUGHLY BEFORE REUSE. SHOWER AFTER WORK USING PLENTY OF SOAP AND WATER.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point (°F):	DECOMPOSES	*Vapor Pressure (mmHg):*	17.5 (@ 20 C)
Freezing Point (°F):	7 - 10	*Vapor Density (Air=1):*	NOT ESTABLISHED.
Solubility (H2O):	COMPLETE	*Specific Gravity (H2O=1):*	1.20 - 1.40
pH	12 - 13	*Evaporation Rate:*	NOT ESTABLISHED.

Appearance/Odor: CLEAR, PALE YELLOW OR GREENISH LIQUID WITH A CHLORINE ODOR.

SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability:	YES
Incompatible Material:	ANY ACIDIC MATERIAL, AMMONIA, UREA, OXIDIZABLE MATERIALS AND METALS, SUCH AS NICKEL, COPPER, TIN, ALUMINUM AND IRON.
Hazardous Polymerization:	WILL NOT OCCUR.
Decomposition Products:	CHLORINE GAS RATE OF DECOMPOSITION INCREASES WITH THE CONCENTRATION WITH TEMPERATURES ABOVE 85 DEGREES F.

SECTION 11 - TOXICITY INFORMATION

Oral = > 8000 mg/kg (Rat) Dermal LD50 = N.E. Inhalation LC50= > 10.5 mg/l (Rat)

SECTION 12 - ECOLOGICAL INFORMATION

DAPHNIA MAGNA 24 HR. LC50 = > 500 MG/L ZEBRA FISH STATIC 24 HR. LC50 = > 500 MG/L

SECTION 13 - DISPOSAL CONSIDERATIONS

DO NOT DISCHARGE INTO WATERWAYS OR SEWER SYSTEMS WITHOUT PRIOR APPROVAL. EMPTY DRUMS, AS DEFINED BY RCRA, MAY BE SENT TO LICENSED DRUM RECONDITIONED FOR REUSE.

DISPOSE OF WASTE MATERIALS ACCORDING TO ALL FEDERAL, STATE AND LOCAL REGULATIONS.

SECTION 14 - TRANSPORT INFORMATION

USA DOT Shipping Name: HYPOCHLORITE SOLUTION

Hazard Class: 8

UN/NA Number: UN1791

Packing Group: III

Subsidiary Hazard:

Marine Pollutant: NO

SECTION 15 - REGULATORY INFORMATION

CERCLA RQ (lbs): 100

SARA Title III Section 312:

☑ *Acute* ☐ *Chronic* ☐ *Flammable* ☐ *Sudden Release of Pressure* ☐ *Reactive*

SARA Title III Section 313: No

SARA Extremely Hazardous Substance: No

HMIS HAZARD RATING

Health: 2 *Fire:* 0 *Reactivity:* 1

0 - Least 1 - Slight 2 - Moderate 3 - High 4 - Extreme

SECTION 16 - OTHER INFORMATION

EPA Pesticide Registration Number: 813-16

NSF Maximum Use Level for Potable Water (Standard 60): CHECK PRODUCT LABEL. RANGES 46 mg/l TO 105 mg/l

TSCA (Toxic Substance Control Act), 40 CFR 710:

Sources of the raw materials used in this mixture assure that all chemical ingredients present are in compliance with Section 8(b) Chemical Substance Inventory, or are otherwise in compliance with TSCA.

DISCLAIMER

THE DATA PRESENTED IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF; HOWEVER, NEITHER SELLER NOR PREPARER MAKES ANY WARRANTIES, EXPRESSED OR IMPLIED, CONCERNING THE INFORMATION PRESENTED. THE USER IS CAUTIONED TO PERFOM HIS OWN HAZARD EVALUATION AND TO RELY UPON HIS OWN DETERMINATIONS.

AMINE 4 2,4-D WEED KILLER

FOR CHEMICAL EMERGENCY, SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT, CALL CHEMTREC - DAY OR NIGHT 1-800-424-9300

SECTION I - IDENTIFICATION OF PRODUCT

MANUFACTURER'S NAME:
Platte Chemical Co.
150 South Main Street
Fremont, NE 68025-5697
EMERGENCY TELEPHONE NO.:
CHEMTREC (800) 424-9300 (24 Hours)
TRADE NAME AND SYNONYMS: CLEAN CROP AMINE 4 2,4-D WEED KILLER
CHEMICAL NAME AND SYNONYMS: 2,4-D Amine; 2,4-Dichlorophenoxyacetic acid, dimethylamine salt
CHEMICAL FAMILY: Phenoxy Herbicide
EPA REGISTRATION NUMBER: 34704-120

SECTION II - PRODUCT COMPONENTS

COMPONENT:	%
2,4-D acid (CAS: 94-75-7)	
Dimethylamine (CAS: 124-40-3)	
2,4-D acid, dimethylamine salt (CAS:2008-39-1)	46.5
Inert Ingredients	53.5

THRESHOLD LIMIT VALUE (Units):
For 2,4-D acid:
ACGIH TLV-TWA: 10 mg/m^3
MSHA STD-air-TWA: 10 mg/m^3
OSHA PEL FINAL: 8H TWA: 10 mg/m^3
For Dimethylamine:
ACGIH TLV-TWA: 18 mg/m^3
MSHA STD-air-TWA: 18 mg/m^3
OSHA PEL FINAL: 8H TWA: 18 mg/m^3

SECTION III - PHYSICAL INFORMATION

APPEARANCE AND ODOR: Amber to nearly black liquid with "fishy" amine-like odor
BOILING POINT (°F): Approx. 100°C (212°F)
BULK DENSITY: 9.65-9.73 lbs./gal.
EVAPORATION RATE (BUTYL ACETATE = 1): Lower than Butyl Acetate
PERCENT VOLATILE (BY VOLUME): Approx. 50%
pH: 7.5-9.0
SOLUBILITY IN WATER: Miscible
SPECIFIC GRAVITY (WATER = 1): 1.158-1.168
VAPOR DENSITY (AIR = 1): 6.021 (HCR TM007)
VAPOR PRESSURE (MM OF MERCURY): 20.7 (Reid, ASTM D 323)
VISCOSITY: 11.5-13.0 Centipoise

SECTION IV - FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (SPECIFY METHOD - °C): Not applicable; does not flash
FLAMMABLE LIMITS (PERCENT BY VOLUME): Not applicable
FIRE EXTINGUISHING MEDIA: Considered non-combustible; use medium appropriate to surrounding fire. Dry Chemical, CO_2, Foam, Water Spray or Fog.
SPECIAL FIRE FIGHTING PROCEDURES: Smoke and fumes from fire may contain hazardous components. Wear self-contained breathing apparatus and full protective clothing. Fight fire from upwind side. Avoid run-off. Keep non-essential personnel away from immediate fire area, and out of any fall-out or run-off areas.
UNUSUAL FIRE AND EXPLOSION HAZARDS: If water is used to fight fire or cool containers, contain run-off by diking to prevent contamination of water supplies.
NFPA HAZARD RATING:

0 Least	2 Hazard
1 Slight	3 Extraordinary
2 Moderate	4 Reactivity
3 High	
4 Severe	

SECTION V - REACTIVITY INFORMATION

STABILITY: Stable
CONDITIONS TO AVOID: Excessive heat
INCOMPATIBILITY (Avoid contact with): Strong oxidizers, acids.
HAZARDOUS DECOMPOSITION PRODUCTS: Ammonia, oxides of nitrogen, chlorine-containing compounds and other unknown hazardous materials may be formed in a fire situation. Incomplete combustion may lead to formation of carbon monoxide and/or other asphyxiants.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: None known.

SECTION VI - HEALTH INFORMATION

TOXICOLOGICAL TEST DATA:
Acute Oral LD_{50} (rat): 1670 mg/kg
Acute Dermal LD_{50} (rabbit): >2000 mg/kg
Acute Inhalation LC_{50} (rat): >5.25 mg/l
Eye Irritation: Corrosive
Skin Irritation: Non-irritating; not a sensitizer
EFFECTS OF OVEREXPOSURE:
Routes of Entry: Ingestion, inhalation, eyes and skin contact.
Most likely Route of Entry: Dermal. May be fatal if swallowed or absorbed through skin. Overexposure may cause loss of appetite, nausea, vomiting, general lameness and muscular weakness, and prolonged or repeated exposure may lead to liver or kidney damage or central nervous system symptoms.
EMERGENCY AND FIRST AID PROCEDURES: Call a physician immediately in all cases of suspected poisoning.
Ingestion: Drink 1 or 2 glasses of water. Do not induce vomiting or give anything by mouth to an unconscious person. Keep head lower than chest to avoid aspiration into lungs. Call physician immediately.
Eyes: Flush with running water for at least 15 minutes while holding eyelids open to help flush out material. Get medical attention.
Skin: Remove all contaminated clothing. Wash skin and hair thoroughly with soap and water. Wash clothing before reuse. If irritation persists, get medical attention.
Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen; if breathing stops administer artificial respiration. Get medical attention immediately.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known. Preexisting skin or respiratory disorders may be aggravated by excessive exposure to this material.
POTENTIAL CARCINOGEN STATUS (Source of Information - Registry of Toxic Effects of Chemical Substances):
CARCINOGENICITY, TERATOGENICITY, MUTAGENICITY: The International Agency for Research on Cancer (IARC) lists exposure to chlorophenoxy herbicides as a class 2 B carcinogen, limited evidence for carcinogenicity in humans. The Science Advisory Panel of EPA has given a Class D classification (not classifiable as to human carcinogenicity) and has required additional animal studies on 2,4-D. Various animal cancer tests have shown no reliable positive association between 2,4-D exposure and cancer. Birth defects are unlikely. In laboratory animals however, exposures having no adverse effects on the mother had other harmful effects on the fetus. High dietary levels of 2,4-D caused toxic effects (weight and viability reduction) in rats on a reproduction test. Results of mutagenicity tests in animals have been inconclusive.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Contain spill; absorb liquids by covering with clay or other absorbent material, vacuum, scoop or sweep up wastes and place in container for disposal. Wash spill area with water containing strong detergent, absorb and sweep up (as above) and place in a container for disposal. Repeat procedure as needed until area is clean.
WASTE DISPOSAL METHOD:
Pesticide Disposal: Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate, is a violation of Federal Law and may contaminate groundwater. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.
Container Disposal: Metal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by other procedures approved by state and local authorities. **Plastic:** Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ingestion: Store the material in a well-ventilated, secure area out of the reach of children and domestic animals. Do not store food, beverages, or tobacco products in the storage area. Prevent eating, drinking, tobacco usage. Always wash thoroughly after handling.
Eye Contact: To avoid eye contact, wear chemical safety glasses or goggles.
Skin Contact: To avoid skin contact, wear rubber gloves, rubber boots, long-sleeved shirt, long pants, and hat.
Inhalation: To avoid breathing spray or mist, wear an NIOSH-approved pesticide respirator.
EPA HANDLER REQUIREMENTS
Worker Protection Standard
40 CFR 170
Note: the following PPE requirements address handler/applicator requirements under FIFRA and may differ from what is felt necessary to address a clean up, needs during formulation/manufacturing or other areas of involvement with the product.
Personal Protective Equipment:
Applicators and other handlers must wear: Long-sleeved shirt and long pants, chemical resistant gloves, shoes plus socks and protective eyewear. Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

SECTION IX - SPECIAL PRECAUTIONS

HANDLING AND STORAGE: Do not store below temperature of 25°F. If frozen, warm to 70°F, and reactivate before using by rolling or shaking the container. Store in a safe manner. Store in original container only. Store in cool, dry place. Keep container tightly closed when not in use. Reduce stacking height where local conditions can affect package strength. Personnel should use clothing and equipment consistent with good pesticide handling.
OTHER PRECAUTIONS: Do not contaminate water supplies by handling or storage of product, cleaning of equipment or disposal of wastes. Keep work and storage areas clean. Toxic to aquatic invertebrates. Drift or runoff may adversely affect aquatic invertebrates and non-target plants.

SECTION X - REGULATORY INFORMATION

SARA TITLE III HAZARD CATEGORY:
IMMEDIATE Y
DELAYED N
FIRE N
REACTIVE N
SUDDEN RELEASE OF PRESSURE N
SUBSTANCES REGULATED UNDER SARA, TITLE III, SECT. 313:
2,4-D (CAS: 94-75-7) 28.6%
DATE OF ISSUE: 01/2/96
SUPERSEDES: 05/10/97
All information contained in this Material Safety Data Sheet is furnished free of charge and is intended for your evaluation. In our opinion the information is, as of the date of this Material Safety Data Sheet, reliable, however, it is your responsibility to determine the suitability of the information for your use. You are advised not to construe the information as absolutely complete since additional information may be necessary or desirable when particular, exceptional or variable conditions or circumstances exist or because of applicable laws or government regulations. Therefore, you should use

this information only as a supplement to other information gathered by you, and you must make independent determinations of the suitability and completeness of the information from all sources to assure both proper
- of the material described herein and the safety
health of employees. Accordingly, no guarantee
essed or implied is made by Platte Chemical Co
as to the results to be obtained based upon your use of the information, nor does Platte Chemical Co. assume any liability arising out of your use of the information.

Material Safety Data Sheet

Material Name: Autoguard RV Winterizer

ID: AG-005

* * * Section 1 - Chemical Product and Company Identification * * *

Part Number: 30100 (6/1 Gal)
Chemical Name: Mixture
Product Use: Antifreeze in heating and cooling systems
Manufacturer Information

Specialty Oil Company
Division of Quaker State Corporation
2740 Valley View Drive
Shreveport, LA 71108

Phone #: 800-256-9268

Emergency # 800-424-9300 CHEMTREC

General Comments

CHEMTREC Emergency telephone number is to be used in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals. All non-emergency questions should be directed to customer service.

* * * Section 2 - Composition / Information on Ingredients * * *

CAS #	Component	Percent
7732-18-5	Water	60-65
57-55-6	1,2-propylene Glycol	35-40
Not Available	FD&C Red #40	< 1

Component Information/Information on Non-Hazardous Components

This product is considered not hazardous under 29 CFR 1910.1200 (Hazard Communication).

* * * Section 3 - Hazards Identification * * *

Emergency Overview

Product is a non-flammable pink mixture. Liquid and vapor may be irritating to the eyes, skin and respiratory system. This product may be harmful if it is swallowed. Use dry chemical or carbon dioxide for small fires, water spray or foam for large fires. Irritating and toxic vapors may be released upon combustion of product.

Hazard Statements

This product may be irritating to the eyes, skin and respiratory system.

Potential Health Effects: Eyes

This product may cause irritation to the eyes.

Potential Health Effects: Skin

Prolonged contact may cause irritation and dermatitis.

Potential Health Effects: Ingestion

This product may be harmful if large quantities are swallowed. Ingestion can cause gastrointestinal irritation, nausea, vomiting and diarrhea. Ingestion of product may result in central nervous system effects including headache, sleepiness, dizziness, slurred speech and blurred vision.

Potential Health Effects: Inhalation

This product may cause irritation to the respiratory system.

HMIS Ratings: Health: 1 Fire: 1 Reactivity: 0 Pers. Prot.: gloves, goggles
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

* * * Section 4 - First Aid Measures * * *

First Aid: Eyes

Flush eyes with large amounts of water for 15 minutes. Get medical attention if eye irritation develops or persists.

First Aid: Skin

In case of contact, wash thoroughly with soap and large amounts of water. If irritation develops, get medical attention.

First Aid: Ingestion

Do not induce vomiting. Call your local poison control center or get medical attention.

Material Safety Data Sheet

Material Name: Autogrizd RV Winterizer ID: AG-005

First Aid: Inhalation

If affected, remove individual to fresh air. If the affected person is not breathing, apply artificial respiration. Get medical attention if symptoms develop or persist.

First Aid: Notes to Physician

Provide general supportive measures and treat symptomatically.

*** Section 5 - Fire Fighting Measures ***

Flash Point: Not Available
Method Used: Not Available
Upper Flammable Limit (UFL): Not Available
Lower Flammable Limit (LFL): Not Available
Auto Ignition: Not Available
Flammability Classification: Not Available
Rate of Burning: Not Available

General Fire Hazards

No fire or explosion hazards are expected under normal storage and handling conditions. Product may form flammable vapors with air if heated sufficiently.

Hazardous Combustion Products

Upon decomposition, this product emits carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons.

Extinguishing Media

Dry chemical, foam, carbon dioxide, water fog. Use water to cool fire-exposed containers and to protect personnel. Direct water spray or foam may cause frothing and spattering. If a leak or spill has not ignited, use water spray to disperse vapors and to flush spills away from exposure.

Fire Fighting Equipment/Instructions

Firefighters should wear full-face, self contained breathing apparatus and impervious protective clothing. Firefighters should avoid inhaling any combustion products.

NFPA Ratings: Health: 1 Fire: 1 Reactivity: 0 Other:
Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Stop the flow of material, if this is without risk.

Clean-Up Procedures

Absorb with inert absorbent such as dry clay, sand or diatomaceous earth, commercial sorbents, or recover using pumps. Scoop up used absorbent into drums or other appropriate container.

Evacuation Procedures

Isolate area. Keep unnecessary personnel away.

Special Procedures

Wear appropriate personal protection equipment. Avoid skin contact with the spilled material. Surfaces may become slippery after spillage. Do not allow product to enter sewer or waterway.

*** Section 7 - Handling and Storage ***

Handling Procedures

Avoid getting this material into contact with your skin and eyes. Avoid prolonged or repeated breathing of this material. Use this product with adequate ventilation. Wash thoroughly after handling.

Storage Procedures

Keep this material away from food, drink and animal feed. Keep the container tightly closed and dry. "Empty" containers retain product residue (liquid and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition, they may explode.

*** Section 8 - Exposure Controls / Personal Protection ***

Exposure Guidelines

A: General Product Information

As a precaution, exposure to liquids, vapors, fumes or mists should be minimized.

B: Component Exposure Limits

Material Safety Data Sheet

Material Name: Autoguard RV Winterizer ID: AG-005

No information is available.

Engineering Controls

Use general ventilation and use local exhaust, where possible, in confined or enclosed spaces

PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment: Eyes/Face

Wear safety glasses with side shields. Wear chemical goggles, face shield (if splashing is possible).

Personal Protective Equipment: Skin

Use impervious gloves for prolonged contact. Use of protective coveralls and long sleeves is recommended.

Personal Protective Equipment: Respiratory

Use an organic vapor respirator for concentrations exceeding the occupational exposure limits. Use supplied-air respiratory equipment as required.

Personal Protective Equipment: General

Eyewash fountains and emergency showers are recommended.

* * * Section 9 - Physical & Chemical Properties * * *

Appearance:	Pink	Odor:	Not Available
Physical State:	Liquid	pH:	(100%) 9.0-9.7
Vapor Pressure:	Not Applicable	Vapor Density:	Not Applicable
Boiling Point:	Not Applicable	Melting Point:	Not Applicable
Solubility (H2O):	Not Applicable	Specific Gravity:	1.03-1.04
Freezing Point:	0-3 F; -16to-18 C		

Physical Properties: Additional Information

No information available for the product.

* * * Section 10 - Chemical Stability & Reactivity Information * * *

Chemical Stability

Stable

Chemical Stability: Conditions to Avoid

Avoid excessive heat and all sources of ignition.

Incompatibility

This product may react with strong oxidizing agents.

Hazardous Decomposition

At thermal decomposition temperatures, carbon monoxide and carbon dioxide.

Hazardous Polymerization

Will not occur.

* * * Section 11 - Toxicological Information * * *

Acute Toxicity

A. General Product Information

Propylene glycol is a mild skin and eye irritant. Renal and hepatic toxicity have been noted following ingestion in animals. Ingestion of large volumes may result in central nervous system depression characterized by stupor, drowsiness, confusion and unconsciousness.

Material Safety Data Sheet

Material Name: Autoguard RV Winterizer ID: AG-06S

None of this product's components are listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Epidemiology

No information available for the product.

Neurotoxicity

No information available for the product.

Mutagenicity

No information available for the product. Propylene glycol has been reported to cause mutations in fruit fly larvae and chromosomal mutations in sperm cells when injected into mice. Subcutaneous injection into mice resulted in inhibited DNA repair. Propylene glycol has been tested and was determined to be non-mutagenic in both the Salmonella/microsome mutagenesis assay (Ames assay) and in the micronucleus mutagenicity test. A study conducted in mice treated with propylene glycol intraperitoneally at a level of 10 mg/kg suggest that it is non-mutagenic at this level

Teratogenicity

No information available for the product. Propylene glycol administered intraperitoneally to mice affected embryo survival No adverse effects on reproduction were found when concentrations of propylene glycol in the diet of mice were below 7.5%

Other Toxicological Information

None.

* * * Section 12 - Ecological Information * * *

Ecotoxicity

No information available for the product.

Environmental Fate

No information available for the product. Keep product out of sewers and waterways. Propylene glycol rapidly degrades to CO2 in soil without any lag time. If released to water, propylene glycol is expected to degrade via biodegradation. If released to the air, it is photochemically degraded rapidly (half-life 32 hr). Physical removal from the air by rainfall is possible.

* * * Section 13 - Disposal Considerations * * *

US EPA Waste Number & Descriptions

A: General Product Information

Product as shipped does not meet the definition or characteristics of a hazardous waste

B: Component Waste Numbers

No information is available

Disposal Instructions

Do not allow this material to drain into sewers/water supplies. All wastes must be handled in accordance with local, state and federal regulations

* * * Section 14 - Transportation Information * * *

US DOT Information

Shipping Name: Not regulated

Hazard Class: Not regulated

UN/NA #: Not regulated

Packing Group: Not regulated

Required Label(s): No labels required

Additional Info.: None

International Transportation Regulations

Not regulated as dangerous goods

* * * Section 15 - Regulatory Information * * *

US Federal Regulations

A: General Product Information

No additional information.

B: Component Analysis

Material Safety Data Sheet

Material Name: Autoguard RV Winterizer ID: AG-005

None of this products components are listed under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65), or CERCLA (40 CFR 302.4).

State Regulations

A: General Product Information

Other state regulations may apply. Check individual state requirements.

B: Component Information

Component	CAS #	CA	FL	MA	MN	NJ	PA
1,2-propylene Glycol	57-55-6	No	No	No	Yes	No	Yes

Other Regulations

A: General Product Information

No additional information

B: Component Inventory Status

Component	CAS #	TSCA	DSL	EINECS
Water	7732-18-5	Yes	Yes	Yes
1,2-propylene Glycol	57-55-6	Yes	Yes	Yes

C: Component Information (Canada)

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	%	Minimum Concentration
1,2-propylene Glycol	57-55-6	35-40	1% Item 1362 (145-4)

* * * Section 16 - Other Information * * *

Other Information

This information is, to the best of Quaker State Corporation's knowledge and belief, accurate and reliable. However, no representation, warranty, or guarantee is made to its accuracy, reliability, or completeness. It is the user's responsibility to satisfy himself as to the suitableness and completeness of such information for his own particular use.. Preparation Information: New MSDS 05/06/1997.

Key/Legend

N = No, Y = Yes; ppm - parts per million, mg/m3 = milligrams per cubic meter of air; ACGIH = American Conference of Governmental Industrial Hygienists, OSHA = Occupational Safety and Health Administration; TLV = Threshold Limit Value; NIOSH = National Institute of Occupational Safety and Health; NTP = National Toxicology Program, IARC = International Agency for Research on Cancer; EPA = Environmental Protection Agency.

Contact Person: Vince Bernard, Corporate Safety Director

Contact Phone: (830) 562-5928

This is the end of MSDS #AG-005

MATERIAL SAFETY DATA SHEET

FORT DODGE

Bar Bait® All Weather Rat and Mouse Killer

Fort Dodge Animal Health
800 5th Street NW
PO Box 518
Fort Dodge, IA 50501

Emergency Telephone No.: (515) 955-6033
General Information No.: (515) 955-4600
Preparation Date: 12 August, 1994
Revision Date: 15 January, 1999

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 PRODUCT NAME: Bar Bait® All Weather Rat and Mouse Killer

1.2 USE: Used as a rodenticide.

1.3 SIZE: 1 lb. bars

1.4 SYNONYMS/TRADE NAMES: Warfarin

2. COMPOSITION / INFORMATION ON INGREDIENTS (Indicates active ingredient)

INGREDIENT NAME	SYNONYMS	CAS NO.	CONC.	OSHA PEL/STEL	ACGIH PEL/STEL	OTHER PEL/STEL
Warfarin	NA	81-81-2	0.025%	0.1 mg/m³	0.1 mg/m³	Not Established
Sulfaquinoxaline	NA	59-40-5	0.025%	Not Established	Not Established	Not Established
Inert Carrier	NA	NA	Balance	Not Established	Not Established	Not Established

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW

3.1 POTENTIAL HEALTH EFFECTS: Ingestion of Bar Bait product may result in anticoagulation overdose effects associated with ingestion of warfarin. If swallowed, immediately drink 1 or 2 glasses of water and induce vomiting. Seek medical attention immediately.

3.1.1 ACUTE EFFECTS:

INHALATION: Inhalation of this product is considered unlikely. If inhaled, seek medical attention immediately

INGESTION: Ingestion may cause anticoagulation of the blood. If ingested, drink 1 or 2 glasses of water and induce vomiting. Seek medical attention immediately. NOTE TO PHYSICIAN: Ingestion of this product should be treated as warfarin poisoning.

SKIN: Skin absorption is not considered to be a likely route of exposure. However, it is good practice to avoid skin contact and to wash the hands thoroughly after handling this product.

EYE: May be irritating to the eyes. If material contacts eyes, rinse eyes thoroughly for 15 minutes with clean water.

3.1.2 TARGET ORGAN EFFECTS (SUB/CHRONIC/CHRONIC): Hepatic System.

3.1.3 CARCINOGENIC EFFECTS: This product is not considered to be carcinogenic.

3.1.4 REPRODUCTIVE/TERATOGENIC EFFECTS: There are no reproductive or teratogenic effects associated with exposure to this product.

Continued on Page 2

3.2	CARCINOGENICITY STATUS:	This product is not listed as a carcinogen or suspected carcinogen by OSHA, IARC, or other organizations.
3.3	MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:	None known

4. FIRST AID MEASURES

INHALATION: Remove victim to fresh air. Seek medical attention immediately.

INGESTION: DRINK 2 GLASSES OF WATER AND INDUCE VOMITING. Seek medical attention immediately.

SKIN: Wash affected area thoroughly with soap and water. If irritation persists seek medical attention.

EYE: Rinse eyes thoroughly with water for 15 minutes, holding eyelids open with fingers. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

5.1	FLASH POINT:	NA - Not flammable	METHOD:	NA
5.2	AUTOIGNITION TEMPERATURE:	Not established.		
5.3	FLAMMABILITY LIMITS:	LOWER LIMIT: Not established. UPPER LIMIT: Not established.		
5.4	UNUSUAL FIRE AND EXPLOSION HAZARDS:	Fires involving this product may burn vigorously, and may release toxic vapors and smoke.		
5.5	COMMON EXTINGUISHING METHODS:	Water, foam, dry chemical, or carbon dioxide extinguishers.		
5.6	FIRE FIGHTING PROCEDURES:	Wear full protective gear, including SCBA. Use as little water as possible, and dike area to prevent runoff. If water enters a drainage system, advise authorities downstream. Use spray or fog - solid stream may cause spreading. Conduct fire fighting and rescue operations from upwind of the fire area. Evacuate people downwind who may come in contact with smoke, fumes, or contaminated surfaces. Do not decontaminate personnel or equipment or handle broken packages or containers without protective equipment described in Section 8, Exposure Controls. Decontaminate emergency personnel with soap and water before leaving the fire area.		

6. ACCIDENTAL RELEASE MEASURES

Wear appropriate protective gear as described in Section 8, Exposure Controls. For small spills, such as those that would be associated with normal use of this product, do not wash spilled material to a drain. Carefully sweep up material and place into a container for future disposal. Wash affected areas with soap and water. For large spills, contain the spill immediately using dikes, spill booms, or other appropriate containment devices. Using dry collection methods, collect material and place into containers for future disposal. Do not allow the spill to enter rivers, lakes, streams, or sewer systems.

7. HANDLING AND STORAGE

Store product in a secure, dry, cool, well-ventilated area. Do not contaminate water, food, or feed by storage or disposal. Keep out of the reach of children, pets, and wildlife. Not for use or storage in or around the home. Use in accordance with label direction.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1	VENTILATION:	For normal handling of this product as described on the label, special ventilation provisions are not considered necessary provided that the product is used outdoors or in large, well-ventilated buildings. In situations where bulk quantities of the product are being handled, local exhaust ventilation is recommended.
8.2	RESPIRATORY PROTECTION:	If sufficient ventilation cannot be provided to maintain exposures within acceptable limits, use a NIOSH/MSHA approved full face or half mask respirator fitted with HEPA filter cartridges.
8.3	PROTECTIVE GLOVES:	Latex or nitrile surgical gloves are recommended.
8.4	EYE PROTECTION:	Safety glasses are recommended.
8.5	OTHER:	Protective clothing, such as Tyvek coveralls, is recommended if the product could spill or splash onto the skin.

Continued on Page 3

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 APPEARANCE AND ODOR: Tan meal - pressed into bar shape

9.2 MELTING POINT: Unknown

9.3 BOILING POINT: Unknown

9.4 SPECIFIC GRAVITY / DENSITY: Unknown

9.5 VAPOR DENSITY: Not Available

9.6 VAPOR PRESSURE: Not Available

9.7 SOLUBILITY
- WATER: Insoluble
- OTHER SOLVENTS: Insoluble

9.8 DECOMPOSITION TEMPERATURE: Not Available

9.9 VISCOSITY: Not Available.

9.10 pH: Not Available

10. STABILITY AND REACTIVITY

10.1 STABILITY: This product is considered to be stable under normal conditions.

10.2 HAZARDOUS DECOMPOSITION PRODUCTS: This product may release toxic vapors when subjected to fire conditions.

10.3 CONDITIONS TO AVOID: Avoid high heat, flame, and other sources of ignition.

10.4 MATERIALS AND SUBSTANCES TO AVOID (INCOMPATIBILITY): Strong acids or bases.

11. TOXICOLOGICAL INFORMATION

11.1 ACUTE DATA: This product is considered to be highly toxic through ingestion, producing anticoagulation of the blood.

INHALATION: No specific inhalation toxicity information available.

INGESTION: Oral LD_{50} (Rat) - 3 mg/kg (warfarin). Considered to be highly toxic through ingestion. Ingestion of this product may result in anticoagulation of the blood - in the event of ingestion, seek medical attention immediately.

EYES: May be irritating to the eyes

SKIN: No specific dermal toxicity information is available.

11.2 TARGET ORGAN EFFECTS DATA (SUBCHRONIC/CHRONIC): Hepatic system.

11.3 CARCINOGENIC EFFECTS DATA: This product is not considered to be carcinogenic.

Continued on Page 4

11.4	MUTAGENIC EFFECTS DATA:	There are no mutagenic effects associated with exposure to this product.
11.5	REPRODUCTIVE / TERATOGENIC EFFECTS DATA:	There are no adverse reproductive or teratogenic effects associated with exposure to this product.

12. ECOLOGICAL INFORMATION

12.1	ECOTOXICOLOGICAL INFORMATION:	This product is considered to be toxic to fish and other aquatic life.
12.2	CHEMICAL FATE INFORMATION:	Not available.

13. DISPOSAL CONSIDERATIONS

Persons seeking to dispose of this product should contact a commercial hazardous waste disposal firm for specific waste disposal procedures. Incineration in a licensed and approved hazardous waste incinerator is recommended.

14. TRANSPORT INFORMATION

14.1	U.S. DEPARTMENT OF TRANSPORTATION (DOT):	Classified as a hazardous substance per US DOT regulations - "Pesticide, Solid, Toxic, n.o.s. (warfarin), 6.1, UN2588, II"
14.2	INTERNATIONAL TRANSPORTATION REGULATIONS:	Classified as a hazardous substance per International Transport regulations.

15. REGULATORY INFORMATION

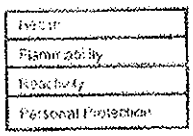
15.1	FEDERAL REGULATIONS:	Regulated under the FIFRA act as a rodenticide.
15.2	STATE REGULATIONS:	Regulated under state regulations as a pesticide.

16. OTHER INFORMATION

16.1 HAZARD RATINGS

NFPA*:
Health - 3
Flammability - 1
Reactivity - 0
Special Hazards - 0

HMIS:



Health - 3
Flammability - 0
Reactivity - 0
Personal Protection - See Section 8

* A hazard rating has not been developed by NFPA for this product. NFPA-derived rating is based on NFPA hazard evaluation criteria.

16.2 PREPARATION AND REVISION INFORMATION

Fort Dodge Animal Health, Department of Safety

The information and recommendations presented in this MSDS are based on sources believed to be accurate. However, Fort Dodge Laboratories, Inc. Division and/or Subsidiaries assumes no liability for the accuracy, completeness, or sufficiency of this information. It is the product user's responsibility to determine the suitability of the information for their particular purposes.

This product should only be used by, or under the supervision of, a person trained and qualified to administer the product. Please refer to the package insert for indications or control recommendations for use, and for dosage information.

CYGON® 2E DIMETHOATE SYSTEMIC INSECTICIDE
MATERIAL SAFETY DATA SHEET

Manufacturer's Name & Address
Southern Agricultural Insecticides, Inc. Phone: 941-722-3285
P O Box 218, Palmetto, Fla. 34220 Chemtrec: 800-424-9300

I. PRODUCT NAME CYGON 2E DIMETHOATE SYSTEMIC INSECTICIDE EPA Reg No.829-251
Chemical Name: O,O-dimethyl- S-(N-methylcarbamoyl-methyl) phosphorodithioate
Synonyms: Cygon, Dimethoate.
Chemical Family: Organophosphate insecticide

II. HAZARDOUS INGREDIENTS	nominal %	CAS #	(ACGIH)TWA	OSHA PEL (sub part Z)
(1) Dimethoate	24.4%	60-51-5	N/A	N/A
(2) Cyclohexanone	36.1%	108-94-1	25 ppm (skin)	50 ppm
(3) Trimethylbenzene	17.2%	25551-13-7	25 ppm	Removed
(4) Ethyltoluenes	7.0%	25550-14-5	25ppm	N/A
(5)1,3 Dimethylbenzene	2.9%	108-38-3	100ppm	100ppm
(6) Xylenes	1.1%	1330-20-7	100ppm	100ppm

Hazardous ingredients listed in excess of 1%, Carcinogens in excess of 0.1% as per CFR 29 1910-1200
Ingredients listed as Carcinogen IARC, NTP, OSHA NONE

III HEALTH HAZARD DATA (Acute and Chronic)
Data given for technical Dimethoate
Oral LD50 (Rat) 387 mg/kg Dermal LD50 (rat) >2000 mg/kg
Inhalation LC50 (rat) 1.6 mg/l/4-h (estimated value)
Product Signal word: WARNING
Primary Routs of entry: Ingestion, skin absorption, eye contact.
Irritancy Of Dimethoate: Very slight transient dermal irritation. Slight eye irritant.
Skin Sensitization: Dimethoate is not considered to be a skin sensitizer.
Medical conditions aggravated by exposure: Preexisting eye, skin, respiratory disorders and prior experience with lowered cholinesterase level..
Signs and symptoms: Headaches, nausea, vomiting, cramps, weakness, blurred vision, pin point pupils, tightness in chest, labored breathing, nervousness, sweating, watering of eyes, drooling or frothing of mouth and nose, muscle spasms and coma.
Reproductive Effects: A reduction of successful matings are observed in rats at doses where cholinesterase effects were observed.
Teratology: No embryotoxic or teratogenic effects are observed in rats and rabbits, even at maternal toxic doses.
Mutagenicity: No mutagenic effects observed in invivo tests.

IV FIRST AID:
In all cases of suspected poisoning: Call a physician or poison control center immediately: Follow first aid instructions. Remove patient from exposure area. Keep patient quiet
IF SWALLOWED: Call a physician or poison control center immediately: Gastric lavage is usually indicated. Do not induce vomiting. Vomiting may cause aspiration pneumonia. Do not induce vomiting or give anything by mouth to an unconscious person. Keep exposed person quiet
IF INHALED: Remove victim to fresh air. Assist respiration if indicated. If breathing has stopped, start artificial respiration immediately, and continue until physician takes charge
IF ON SKIN; Promptly wash contaminated skin with soap and water. If material gets on or inside protective clothing remove protective clothing and wash exposed skin with soap and water. Do not wear contaminated clothing.
IF IN EYES: Immediately flush eyes with plenty of water. Hold lids open while flushing for at least 15 minutes. Get medical attention;
NOTE TO PHYSICIAN: Dimethoate is a cholinesterase inhibitor affecting the central and peripheral nervous systems and producing cardiac and respiratory depression. Antidote: Administer atropine sulfate in large doses. TWO to FOUR mg intravenously or intramuscularly as soon as cyanosis is overcome Repeat at 5-10 minute intervals until signs of atropinization appear. 2-PAM chloride is a pharmacological antidote and may be administered as an adjunct but not a substitute for atropine. DO NOT GIVE MORPHINE OR TRANQUILIZERS. At first sign of pulmonary edema, the patient should be given supplemental oxygen and treated symptomatically. Continued absorption of DIMETHOATE may occur and relapse may occur after initial improvement. VERY CLOSE SUPERVISION OF PATIENT IS INDICATED FOR AT LEAST 48 hours.

V PHYSICAL PROPERTIES
Boiling Point: > 200° F Specific Gravity: 1.01
Percent Volatile: (by volume)>50% Vapor Density: (air=1) >3
Evaporation Rate: not determined Solubility In Water: emulsifies in water.
Appearance/Odor: Clear colorless to light-yellow liquid; slight mercaptan odor

VI FIRE AND EXPLOSION DATA
Flash Point: 100 °F(Min) Flammable Limits: not available
Extinguishing Media: CO_2, dry chemical, foam. Water spray may be used to cool containers. A water stream may spread flames.

Special Fire Fighting Procedures: Flammable liquid. Fight fire upwind. Evacuate people downwind. Vapors readily form explosive mixtures with air. Heavier than air vapors can travel to distant ignition sources and flashback. Fire fighters should wear full face self contained breathing equipment and impervious clothing gloves, hoods, suits, and rubber boots. Decontaminate clothing and equipment before reuse. Control water runoff.
Unusual Fire & Explosion Hazards: Keep away from heat, sources of ignition, and oxidizers. Hot containers may explode, use water to keep containers cool.

VII Reactivity:
Stability: X Stable under normal storage conditions. Conditions to avoid: Heat, flame, sparks, build up of static electricity and storage temperatures above 80°F. Materials to Avoid: Oxidizers, strong alkalis, amines,
Hazardous Decomposition Products: Dimethyl sulfide, methyl mercaptan, carbon monoxide, and unidentified carbon compounds.
Hazardous Polymerization: Not expected, However technical dimethoate undergoes exothermic and autocatalytic reactions which involve rearrangements and polymerization.

VIII SPILL OR LEAK PROTECTION
Steps To Be Taken If Spilled: Personnel involved with clean up should be equipped with proper protective equipment. See Section IX. Dike and soak up spilled material with absorbent material such as lime, sawdust, or vermiculite. Sweep up recovered material and place in appropriate chemical waste container. Wash spill area with liquid chlorine bleach or caustic soda solution. Flush spill area with water to remove residue.

IX SPECIAL PROTECTION
For Agricultural Use Requirements refer to label and Worker Protection Standard (WPS) 40 CFR part 170
Respiratory: For exposure in enclosed area use a respirator with either an organic vapor removing cartridge with an organic vapor removing cartridge with a prefilter approved for pesticides (MSHA/NIOSH TC-23C) or a canister approved for pesticides (MSHA/NIOSH TC-14G. For outdoor use a dust/mist filtering respirator (MSHA/NIOSH TC21
Ventilation: Local Exhaust is recommended for indoor use Gloves: Barrier laminate, or viton.
Eye Protection: Yes safety glasses with side shields or goggles.
Other Protective Equipment: Coveralls over short sleeved shirt and pants. Chemical resistant footwear plus socks Chemical resistant headgear for overhead exposure. Chemical resistant apron for cleaning equipment, mixing and loading. Remove clothing immediately if pesticide gets inside and/or after using, wash thoroughly and change to clean clothing. Launder contaminated clothing separately from household wash.

X SPECIAL PRECAUTIONS
Handling Precautions: Keep out of reach of children. Do not allow spray drift to unprotected persons. Do not allow contact with sprayed surfaces until sprayed surfaces have dried.
Storing Precautions: Handle cases so as to avoid breakage. Do not store open, leaking, or broken containers. Store as a combustible pesticide in cool, dry, well ventilated area away from ignition sources. Store below 800F Do not store with feed or foodstuffs. If product has frozen, allow product to return to room temperature and shake if necessary. Do not apply direct heat to containers.

XI ECOLOGICAL INFORMATION
Dimethoate is biodegradable, undergoing rapid degradation in the environment. It is toxic to wildlife and aquatic invertebrates. Acute toxicities for Dimethoate: Fish; 96-h LC50 Rainbow trout Salmo gairdneri 30.2 ppm
Invertebrates, 48 h LC50 Daphids Daphnia magna 4.7 ppm
Birds, LD50 ,acute oral, Mallard Duck (M) 41.7 mg/kg
Bees, 24-h LD50 topical, 0.12 ug/bee
24-h LD50 oral 0.15 ug/bee

XII WASTE DISPOSAL Dispose of in an approved waste facility or in accord with local, State, and Federal regulations.
Container Disposal: 8 oz., 16 oz., 32 oz. containers from household use. Rinse thoroughly and discard in trash
Pesticide disposal: 8 oz., 16 oz., 32 oz. containers from household use. Securely wrap original container in several layers of newspaper and discard in trash.
Container disposal, except household, Triple rinse, or equivalent, then offer for recycling or puncture and dispose of in sanitary landfill, or incinerate, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

XIII REGULATORY INFORMATION (Not meant to be all-inclusive--Selected regulations referenced)
TRANSPORTATION: Proper shipping name: Organophosphorus Pesticide, Liquid, Toxic, Flammable, n.o.s. (Dimethoate/Petroleum naphtha) 6.1 (3) UN3017 PG III Marine Pollutant ERG guide #28 Cases of 2x2 1/2 gal and larger sizes require "RQ"
Note :8 oz., pint, and quarts are classified as Consumer Commodity ORM-D .
REGULATORY: OSHA: This product is a "Hazardous Chemical" as defined by the OSHA COMMUNICATION STANDARD< 29 CFR-1910.1200.
Dimethoate is listed as an EHS 40 CFR part 355 RQ 10 pounds, TPQ 500/10000 pounds
SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of section 313.
Xylenes (mixed isomers) CAS # 1330-20-7, m, xylene CAS # 108-38-3,
HAZARD CATEGORIES SARA TITLE III sections 311 & 312: An Immediate Health Hazard, A Delayed Health Hazard, A Fire Hazard

This information relates solely to the designated product and is not inclusive for combinations with other materials. This information is given without warranty or representation. Information is based on data we believe to be correct as of the date hereof. This information is furnished solely for your consideration, investigation, and verification. Before using any product READ THE LABEL.

Last revised: 5//93 This revision 3//96 as of 5/95

Gro Tec, Inc.

P.O. Box 290 - Madison, Ga 30650

Material Safety Data Sheet

ELIMINATOR HORNET & WASP KILLER

This product is used by Homeowners and Professionals

MSDS NO. ELI-20 MAR. 1998

SECTION 1 - PRODUCT IDENTIFICATION

Chemtrec Transport Emergency — Non-Transportation Emergency — Poison Control Center

Telephone: 1-800-424-9300 — Pennington/Gro Tec 706-342-1254 — Atlanta: 1-800-282-5846

EPA Reg. Number: 59144-29

Trade Names: Eliminator Hornet & Wasp Killer

SECTION 2 - COMPOSITION

Component	Percentage	ACGIH Exposure Limit	OSHA Exposure Limit
Cyfluthrin [CAS# 7096-12-3]	0.100%	TLV - N/E	PEL - N/E
Permethrin [CAS# 52645-53-1]	0.250%	TLV - N/E	PEL - N/E
Piperonyl butoxide [CAS# 51-03-6]	0.500%	TLV - N/E	PEL - N/E
Petroleum distillate [CAS# 64742-47-8]	> 90%	TLV - N/E	PEL - N/E
Carbon dioxide [CAS# 124-38-9]	> 2%	TLV (TWA) - 5,000 ppm TLV (STEL)-30,000 ppm	PEL (TWA) - 5,000 ppm

SECTION 3 - HEALTH HAZARD DATA

EMERGENCY OVERVIEW

A light yellow aerosol odorless to a faint kerosene odor

- Causes moderate eye irritation
- Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals
- Toxic to fish and aquatic invertebrates
- Combustible. Contents under pressure.

ROUTE(S) OF ENTRY: Skin contact.

EYES: Causes moderate eye irritation.

SKIN: Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.

SECTION 4 - FIRST AID

IF IN EYES: Flush eyes with plenty of water. Call a physician if irritation persists.

IF ON SKIN: Wash thoroughly with soap and water.

SECTION 5 - FIRE & EXPLOSION HAZARDS

FLASH POINT: 152°F

EXTINGUISHING MEDIA: Carbon dioxide, Dry chemical, Foam or Water.

SPECIAL FIRE FIGHTING PROCEDURES: As in any fire, wear self-contained breathing apparatus pressure demand, MSHA/NIOSH approved (or equivalent) and full protective gear.

UNUSUAL FIRE OR EXPLOSION HAZARDS: Combustible. Contents under pressure. Keep away from heat, sparks and open flame. Do not puncture or incinerate container. Exposure to temperatures above 130°F may cause bursting.

SECTION 6 - SPILL AND LEAK PROCEDURES

Soak up with an absorbent material and discard in trash.

SECTION 7 - STORAGE & HANDLING

Storage: Do not store near heat or open flame. Store in a cool, dry area away from children.

Storage Temperature: Ambient (Average Warehouse) Temperatures Shelf Life: 3-5 years

Handling: Avoid contact with eyes or clothing. Wash thoroughly with soap and water after handling. Do not use in commercial food handling establishments, restaurants or other sites where food is commercially prepared or processed. Not for use in Federally inspected meat and poultry plants.

SECTION 8 - SPECIAL PROTECTION INFORMATION

Respirator Type: None required during application.

Eye Protection: Safety glasses or chemical goggles.

Gloves: Chemical-resistant gloves.

Other Protective Equipment: Use in a well-ventilated area.

SECTION 9 - PHYSICAL DATA

Physical Form: Liquid	Color: Light yellow	
Vapor Pressure: N/E	Bulk Density: 6.55 lbs/gal	Odor: odorless to faint solvent
Specific Density: 0.79	Flash Point: 192°F	pH: N/A
Solubility (water): N/A	Viscosity: 20.3 cp @ 22°C	

SECTION 10 - REACTIVITY DATA

Stability: Stable. Polymerization: Will not occur

SECTION 11 - TOXICOLOGICAL INFORMATION

LD 50 (ORAL rat) > 5,000 mg/kg

LD 50 (DERMAL rabbit) > 5,000 mg/kg

4-Hour LC 50 INHALATION (rat) > 4.73 mg/L (1-Hour LC_{50} equivalent > 18.92 mg/L)

EYE IRRITATION (rabbit) Moderately irritating

SKIN IRRITATION (rabbit) Slightly irritating

SKIN SENSITIZATION (guinea pig) Positive

CHRONIC/CANCER INFORMATION: A statistically significant increase in the incidence of lung and liver tumors was observed in female mice receiving diets containing 375 and 750 mg/kg/day of permethrin technical over 81 weeks.

A statistically significant increase in the number of benign liver tumors appeared in mice fed piperonyl butoxide technical at doses which far exceed any anticipated daily human intake. Independent and industry toxicological experts who have reviewed the data agree that the findings in the study do not lead even a remote risk to human beings.

SECTION 12 - ECOLOGICAL INFORMATION

This product is toxic to fish and aquatic invertebrates. Do not apply directly to water.

SECTION 13 - DISPOSAL

Replace cap, wrap container in several layers of newspaper and discard in trash. Do not incinerate or puncture. Can may be disposed of with other recyclables where local law permits.

SECTION 14 - TRANSPORTATION

Proper Shipping Name: Consumer Commodity

Technical Name (If applicable)

UN Initial & Number: Class: Packing Group: RQ: Not required

Hazard Labels: ORM-D

SECTION 15 - REGULATORY INFORMATION

SARA TITLE III - Section 313:
Tetramethrin (CAS# 7696-12-0), 0.1%
Permethrin (CAS# 52645-53-1), 0.25%
Piperonyl butoxide (CAS# 51-03-6) 0.5%

IARC, NTP, OSHA Carcinogens: None listed

STATE REGULATIONS:

CALIFORNIA PROPOSITION 65: None listed
ILLINOIS TOXIC SUBSTANCE LIST: Carbon dioxide
MASSACHUSETTS TOXIC SUBSTANCE LIST: Permethrin, carbon dioxide
NEW JERSEY TOXIC SUBSTANCE LIST: Permethrin, carbon dioxide
PENNSYLVANIA TOXIC SUBSTANCE LIST: Carbon dioxide

SECTION 16 - OTHER INFORMATION

NOTICE FROM GRO TEC, INC.

The information contained herein is offered only as a guide to the handling of this specific material. Since such information does not relate to use of the material with any other material or in any process, any person using this information must determine for himself its availability for any particular application. The buyer and user assumes all risk and liability of use, storage and/or handling of this product not in accordance with the terms of the product label.

ABBREVIATIONS KEY:
N/A = Not available or applicable
N/E = Not established
TLV=Threshold Limit Value
PEL= Permissible Exposure Limit
STEL=Short Term Exposure Limit

Material Safety Data Sheet

EMERGENCY

FOR CHEMICAL EMERGENCY: SPILL, LEAK, FIRE, EXPOSURE OR ACCIDENT CALL
CHEMTREC - DAY or NIGHT - (800) 424-9300

Product Name: **HRR**

SECTION I - GENERAL INFORMATION

Manufactured For:	STRANCO, INC. 595 Industrial Drive Bradley, Illinois 60915
Trade Name & Synonyms:	HRR
Chemical Name & Synonyms:	ACID CLEANER
Generic Description:	SURFACE CLEANER
Formula:	PROPRIETARY MIXTURE
D.O.T. Proper Shipping Name:	CORROSIVE LIQUIDS, N.O.S. (Hydrochloric and Sulfuric Acid)
D.O.T. Hazard Class:	8, PG II
U.N. or N.A. Identification #:	UN 1760
D.O.T. Emergency Response Guide No.:	60

Hazardous Matls ID System Values (HMIS):	Health -3	Flammability -0	Reactivity -1	Personal Protection -C
Nat'l Fire Protection Assn. (NFPA 704M):	Health -2	Flammability -1	Reactivity -2	Specific Hazard:

SECTION II - HAZARDOUS INGREDIENTS

Hazardous Component(s)	CAS#	PEL	TLV
Hydrochloric Acid	7647-01-0	7 ppm	7 ppm
Sulfuric Acid	7664-93-9	1 mg/m^3	1 mg/m^3
Phosphoric Acid	7664-38-2	1 mg/m^3	1 mg/m^3
(Carboxymethyl) bis(2-OH-et) Taloammon OH	70750-46-8	NOT ESTABLISHED	NOT ESTABLISHED

Ingredients listed in this section have been determined to be hazardous as defined in 29 CFR 1910.1200. Materials determined to be health hazards are listed if they comprise 1% or more of the composition. Materials identified as carcinogens are listed if they comprise 0.1% or more of the composition. Information on proprietary materials is available as provided in 29 CFR 1910.1200 (i) (1).

SECTION III - PHYSICAL DATA

Boiling Point (F):	> 212°F	Specific Gravity (water = 1):	1.1 - 1.2
Vapor Pressure (mm Hg):	NOT DETERMINED	% Volatile (by Volume):	NOT DETERMINED
Vapor Density (air = 1):	> 1	Evaporation Rate:(Water = 1)	< 1
Melting Point (F):	NOT APPLICABLE	pH:	0 - 2
Solubility in Water:	COMPLETE		
Appearance & Odor:	PALE AMBER LIQUID - MILD ODOR		

SECTION IV - FIRE & EXPLOSION DATA

Flash Point (F):	NON-FLAMMABLE Method: NOT APPLICABLE
Extinguishing Media:	WATER, CARBON DIOXIDE, FOAM, DRY CHEMICAL
Special Fire Fighting Procedures:	COOL CONTAINER WITH WATER IF EXPOSED TO FIRE. WEAR SELF-CONTAINED BREATHING APPARATUS.
Unusual Fire & Explosion Hazards:	NONE KNOWN

SECTION V - REACTIVITY DATA

Stability -	_____Unstable	__X__Stable
Conditions to Avoid:	MOST METALS. STRONG OXIDIZERS, SULFIDES.	
Incompatibility (Materials to Avoid):	AVOID CONTAMINATION WITH ALKALIES OR AMINES.	
	HEAT CAN CAUSE EVOLUTION OF HYDROGEN CHLORIDE	
Hazardous Decomposition Products:		
Hazardous Polymerization:	_____Will Occur	__X__Will Not Occur
Conditions to Avoid:	NONE KNOWN	

HRR

SECTION VI - HEALTH HAZARD DATA

Acute Health Hazards: CORROSIVE TO SKIN, EYES, RESPIRATORY TRACT.
Chronic Health Hazards: MAY CAUSE CONTACT DERMATITIS, BRONCHITIS.
Signs & Symptoms of Exposure: CAUSES BURNS TO SKIN, EYES AND MUCOUS MEMBRANES.
Medical Conditions Generally Aggravated by Exposure: UNKNOWN
Chemical Listed as Carcinogen or Potential Carcinogen by:

National Toxicology Program:	Yes:	No:	√
I.A.R.C. Monographs:	Yes:	No:	√
O.S.H.A.	Yes:	No:	√

Emergency & First Aid Procedures: FOR PRINCIPAL ROUTE OF ENTRY, SEE APPROPRIATE EMERGENCY PROCEDURES BELOW.
NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

Route of Entry:
- Inhalation: REMOVE TO FRESH AIR - CALL A PHYSICIAN.
- Eyes: FLUSH WITH WATER FOR 15 MINUTES - CALL A PHYSICIAN.
- Skin: FLUSH WITH WATER FOR 15 MINUTES - CALL A PHYSICIAN.
- Ingestion: DO NOT INDUCE VOMITING. DRINK PLENTY OF WATER. CALL A PHYSICIAN.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled:
CAN BE NEUTRALIZED WITH SODA ASH. FLUSH WITH LARGE AMOUNTS OF WATER

Waste Disposal Methods: NEUTRALIZE WITH SODA ASH. DISPOSE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION VIII - SPECIAL PROTECTION AND CONTROL MEASURES

Respiratory Protection (Specify Type): NONE GENERALLY NEEDED.

Ventilation -
- Local Exhaust: GENERALLY NOT NEEDED
- Mechanical Exhaust: SATISFACTORY
- Special Exhaust: NONE
- Other Exhaust: NOT REQUIRED

Protective Equipment -
- Gloves: RUBBER
- Eye Protection: SAFETY GOGGLES

Other Protective Equipment: COVERALLS, PLASTIC OR RUBBER APRON. MAINTAIN ADEQUATE VENTILATION.

Work or Hygienic Practices: USE SAFE CHEMICAL HANDLING PROCEDURES SUITABLE FOR THE HAZARDS PRESENTED BY THIS MATERIAL.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storage:
DO NOT GET IN EYES, ON SKIN OR CLOTHING.
IN CASE OF CONTACT, IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES. CALL A PHYSICIAN.

Other Precautions: RINSE AREAS OF USE VERY WELL. KEEP OUT OF REACH OF CHILDREN.

Date of Last Revision: 10/14/96

MATERIAL SAFETY DATA SHEET

SOLARIS

DATE PREPARED: 06/09/1994

MSDS No: 3899

KLEENUP® Grass & Weed Killer

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: KLEENUP® Grass & Weed Killer

PRODUCT DESCRIPTION: Herbicide

MANUFACTURER

The SOLARIS Group

of Monsanto Company

P.O. Box 5008

San Ramon, CA 94583-0808

EPA REG. NO.: 239-2509 PN: 5512

24 HR. EMERGENCY TELEPHONE NUMBERS

Emergency Phone 800-454-2333

2. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	Wt.%	CAS Registry #
Glyphosate, Isopropylamine salt of N-(phosphonomethyl)glycine	0.5	38641-94-0
Acifluorfen, Sodium Salt, Sodium 5-[2-Chloro-4-(trifluoromethyl)phenoxy]-2-nitrobenzoate	0.2	62476-59-9
INERT INGREDIENTS	99.29	

"Inert Ingredients" is a term defined by the U.S. Environmental Protection Agency under the Federal Insecticide, Fungicide, and Rodenticide Act (40 CFR 158.153). It refers to any substance, other than an active ingredient, which is intentionally added to a pesticide product. Some inert ingredients may be hazardous chemicals, as defined by the Federal OSHA Hazard Communication Standard (29 CFR 1910.1200). The hazards associated with these inert ingredients have been included in this document.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL APPEARANCE: Clear liquid

IMMEDIATE CONCERNS: AVOID CONTACT WITH EYES
- KEEP OUT OF REACH OF CHILDREN

POTENTIAL HEALTH EFFECTS

EYES: This substance is slightly irritating to the eyes. Eye contact may include discomfort, tearing, redness, swelling, and blurred vision. See Toxicological Information, section 11.

SKIN: This substance is not expected to cause prolonged or significant skin irritation. If absorbed through the skin, this substance is considered practically non-toxic to internal organs.

INGESTION: If swallowed, this product may cause gastrointestinal tract irritation.

INHALATION: If inhaled, this substance is considered practically non-toxic to internal organs.

4. FIRST AID MEASURES

EYES: Flush eyes immediately with fresh water for at least 15 minutes while holding the eyelids open. Remove contact lenses if worn. No additional first aid should be necessary. However, if irritation persists, see a doctor.

SKIN: No first aid procedures are required. As a precaution, wash skin thoroughly with soap and water. Remove and wash contaminated clothing.

INGESTION: If swallowed, immediately telephone a poison control center, emergency treatment center or a physician for advice. DO NOT make person vomit unless directed to do so by medical personnel. If medical advice cannot be obtained, then immediately take person or product container, with label, to an emergency treatment center.

INHALATION: If respiratory discomfort or irritation occurs, move the person to fresh air. See a doctor if discomfort or irritation continues.

ADDITIONAL INFORMATION: In case of medical emergencies involving this product, call day or night, (800) 454-2333.

5. FIRE FIGHTING MEASURES

FLASHPOINT AND METHOD: >200 to 0°F TAG CC

EXTINGUISHING MEDIA: Water Spray, dry chemical, CO2.

HAZARDOUS COMBUSTION PRODUCTS: Heating this material (Acifluorfen component) may generate hydrogen chloride, hydrofluoride and nitrogen oxide.

FIRE FIGHTING PROCEDURES: This material will not burn. Smoke from fires

involving this material may present unusual hazards. Avoid breathing smoke and mists. Avoid contact with fallout and runoff. Minimize the amount of water used for fire fighting. Do not enter any enclosed area without full protective equipment, including self-contained breathing equipment. Contain and isolate runoff and debris for proper disposal. Read entire document.

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILL: Soak up spilled material with paper towels and discard in trash.

LARGE SPILL: Liquid spills on floor or other impervious surfaces should be contained or diked, and should be absorbed with attapulgite, bentonite or other absorbent clays. Collect contaminated absorbent, place in plastic-lined metal drum and dispose of in accordance with instructions provided under Section 13, "DISPOSAL". Thoroughly scrub floor or other impervious surface with a strong industrial type detergent solution and rinse with water.

For liquid spills that soak into the ground, contact the applicable Federal, State and or County Health Dept. for disposal recommendations. If disposal is required then refer to Section 13 "DISPOSAL" for instructions.

Leaking containers should be separated from non-leakers and either the container or its contents transferred to a drum or other non-leaking container and disposed of in accordance with instructions provided under Section 13 "Disposal". Any recovered spilled liquid should be similarly collected and disposed of.

Do not contaminate water, foodstuffs or feed by storage or disposal.

GENERAL PROCEDURES: Observe all protection and safety precautions when cleaning up spills -- see Section 8, "EXPOSURE CONTROLS-PERSONAL PROTECTION". For help with any spill, leak, fire or exposure involving this material, call day or night (800) 454-2333.

7. HANDLING AND STORAGE

GENERAL PROCEDURES: Keep pesticide in original container. Store in a secure, preferably locked, storage area. Protect container from freezing.

STORAGE TEMPERATURE: Do not store below 32oF.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: No special ventilation is usually necessary. However, if operating conditions create high airborne concentrations of material, special ventilation may be needed.

PERSONAL PROTECTION

EYES AND FACE: For application of product in accordance with label instructions, no special eye protection is needed

Handling of the product is not likely to present an eye exposure concern during normal handling. In the event of an accidental discharge of material during manufacture or handling which could cause eye contact, workers should wear goggles or a faceldhie

SKIN: No special skin protection is usually necessary. Avoid prolonged or frequently repeated skin contact with this material. Skin contact can bunimized by wearing protective clothing. Wash throughly with soap and water after handling.

RESPIRATORY Handling of the product is not likely to present an airborne exposure concern during normal handling. In the event ofaccidential discharge of the material during manufacture or handling which produces a heavy mist, workers should put on respiratory protection equipment. Consult respirator manufacturer to determine appropriate type of equipment. Observe respirator use limitations specified by NIOSH/MSHA or the manufacturer.

For application of product in accordance with label instructions, no special respiratory protection is required.

OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200):

	EXPOSURE LIMITS		
ChemicalName	OSHA PEL	ACGIH TLV	ACGIH STEL
Sodium 5-[2-Chloro-4-(trifluoromethyl)phenoxy]-2-nitrobenzoate	None	None	None
3-iodo-2-propynylbutylcarbamate	None	None	None

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: Liquid

APPEARANCE: Clear yellow liquid

pH: 5 to 6

PERCENT VOLATILE: Not Determined

VAPOR PRESSURE: Not Determined

BOILING POINT: No Data Available

FREEZING POINT: No Data Available

MELTING POINT: No Data Available

SOLUBILITY IN WATER: Miscible with water.

EVAPORATION RATE: Not Determined

VISCOSITY: 3 to 4cps (Brookfield)

COMMENTS:

DENSITY: 8.3 lb/gal

10. STABILITY AND REACTIVITY

STABLE: YES

HAZARDOUS POLYMERIZATION: NO

POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: For Acifluorfen: HCL, HF, NOx during combustion.

INCOMPATIBLE MATERIALS: May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

11. TOXICOLOGICAL INFORMATION

ACUTE

EYES: Corneal involvement or irritation clearing in 7 days or less. The Draize Eye Irritation Score (range, 0-110) in rabbits is 2.0.

DERMAL LD50: Mild to slight irritation at 72 hours. (No irritation or slight erythema.) The Draize Skin Primary Irritation Score (range, 0-8) for 4-hour exposure (rabbits) is 0. The dermal LD50 in rabbits is greater than 5 g/kg.

ORAL LD50: The oral LD50 in rats is greater than 5 g/kg.

INHALATION LC50: The 4-hour Inhalation LC50 in rats is > 6.3 mg/l.

CARCINOGENICITY:

IARC: Sodium acifluorfen, one of the active ingredients in this product, has been designated as a probable human carcinogen by the U.S. EPA.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: This material may be toxic to aquatic organisms and should be kept out of sewage and drainage systems and all bodies of water.

Environmental toxicity data for Sodium Acifluorfen:

Mallard Duck LD50 - 4187 mg/kg Rainbow Trout 96hr LC50 - 54mg ai/l
Bobwhite Quail LC50 >10,000 mg/kg Channel Catfish 96 hr LC50 - 188mg/l
Mallard Duck LC50 >10,000 mg/kg Daphnia 48 hr LC50 - 28 mg ai/l

Fiddler Crab 96 hr LC50 >1000 mg/l Grass Shrimp 96 hr LC50 - 446 mg/l
Freshwater Clam 96 hr LC50 - 150 mg/l
Eastern Oyster 48 hr EC50 - 74 mg/l
Bobwhite Quail - No reproductive impairment up to 20 ppm
Mallard Duck - No reproductive impairment up to 100 ppm
Bluegill 96 hr LC50 - 31 mg ai/l (static)
Bluegill 96 hr LC50 >32 mg ai/l (dynamic)

Studies performed with a concentrated solution of the isopropylamine salt of glyphosate indicate the following:

MON 0139 Technical (62%)
48-hr LC50 Daphnia: 930 mg/L, Practically Nontoxic
96-hr LC50 Bluegill: >1,000 mg/L, Practically Nontoxic
96-hr LC50 Trout: >1,000 mg/L, Practically Nontoxic
96-hr LC50 Carp: >10,000 ppm, Practically Nontoxic

13. DISPOSAL CONSIDERATIONS

FOR LARGE SPILLS:Material collected that cannot be reprocessed should be disposed of in a landfill approved for pesticide disposal or accordance with applicable Federal, State or local procedures.

PRODUCT DISPOSAL:The Solaris Group is committed to responsible environmental practices and recommends that all of the product used up, carefully following all label directions and precautions.

If necessary to dispose of partially filled product container, then securely wrap it in several layers of newspaper and discard in trash.

EMPTY CONTAINER:Do not reuse container. Rinse throughly before discarding in trash.

14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION)

PROPER SHIPPING NAME:Not Regulated

PRIMARY HAZARD CLASS/DIVISION:None

UN/NA NUMBER:NONE

PACKING GROUP:NO

U.S. SURFACE FREIGHT CLASS:Tree or weed killing compounds, NOI, Density of 20 lbs. or greater per cu. ft.

AIR (ICAO/IATA)

PROPER SHIPPING NAME:Not Regulated

SPECIAL SHIPPING NOTES:The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

PRODUCT CLASSIFICATION UNDER SECTION 311 OF SARA
ACUTE:YES CHRONIC:NO FIRE:NO REACTIVITY:NO PRESSURE GENERATING:NO

TITLE III NOTES:Immediate (acute) health hazard: Product is slightly irritating to the eyes.

16. OTHER INFORMATION

HMIS CODES

FIRE:0 HEALTH:1 REACTIVITY:0 PROTECTION:-

NFPA CODES

FIRE:0 HEALTH:1 REACTIVITY:0 SPECIAL:-

APPROVAL DATE:11/01/1994

REVISION SUMMARY:New MSDS

COMMENTS:For additional information concerning this product, call the SOLARIS Groups Consumer Helpline at 800-225-2883.

MANUFACTURER DISCLAIMER:This Material Safety Data Sheet (MSDS) contains health, safety and environmental information for you and your employees. It does not replace the precautionary language, use directions, or the storage and disposal information found on the product label. Information contained in this MSDS will help you to prepare for emergency response and to meet community right-to-know emergency response and reporting requirements under SARA Title III and many other laws. Emergency response agencies and health care providers will also find this additional information useful.

Use of this product is regulated by the U.S. Environmental Protection Agency (EPA) through the approved label copy. It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, Monsanto Company and The Solaris Group make no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determinations as to its suitability for their purposes prior to use. In no event will Monsanto Company or The Solaris Group be responsible for damages of any nature whatsoever resulting from the use of or reliance upon Information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

Nufarm

WEEDONE® LV6 EC BROADLEAF HERBICIDE

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY DESCRIPTION

Product Name:	Nufarm Weedone LV6 EC Broadleaf Herbicide
Synonyms:	2,4-D 2EHE; 2,4-D IOE; 2,4-Dichlorophenoxyacetic acid, isooctyl (2-ethylhexyl) ester.
EPA Reg. No.:	71368-11
Company Name:	Nufarm Americas, Inc. Burr Ridge, IL 60521
Phone Numbers:	**For Chemical Emergency, Spill, Leak, Fire, Exposure, Or Accident, Call CHEMTREC Day or Night: 1-800-424-9300.** **For Medical Emergencies Only, Call 877-325-1840.**
Date:	March 12, 2002
Revisions:	New or updated information in all sections.
Reasons for Revisions:	General revision utilizing more specific data.
Supersedes:	March 31, 2000

2. COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT	CAS REG. NO.	% BY WEIGHT
Acetic acid, (2,4-dichlorophenoxy)-, isooctyl (2-ethyhexyl) ester*	1928-43-4	86.6
Inert ingredients including emulsifier, petroleum distillates and other ingredients (trade secret)	Not applicable	13.4

*OSHA hazard

3. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance and Odor: Amber liquid, phenolic odor.
Warning Statements: CAUTION. Keep out of reach of children. Harmful if swallowed or absorbed through the skin. Causes moderate eye irritation. Avoid breathing vapors or spray mist. Do not get in eyes, on skin or on clothing.

Potential Adverse Health Effects:

Likely Routes of Exposure: Inhalation, eye and skin contact.
Eye Contact: Minimally irritating.
Skin Contact: Minimally irritating. Overexposure by skin absorption may cause nausea, vomiting, abdominal pain, decreased blood pressure, muscle weakness, muscle spasms. May cause allergic reaction in sensitive individuals.
Inhalation: Harmful if inhaled. May cause symptoms similar to those from ingestion.
Ingestion: Harmful if swallowed. May cause nausea, vomiting, abdominal pain, decreased blood pressure, muscle weakness, muscle spasms.
Medical Conditions Possibly Aggravated By Exposure: Inhalation of product may aggravate existing chronic respiratory problems such as asthma, emphysema or bronchitis. Skin contact may aggravate existing skin disease.
Subchronic (Target Organ) Effects: (An adverse effect with symptoms that develop slowly over a long period of time): Repeated overexposure may cause effects to liver, kidneys, blood chemistry, and gross motor function. Rare cases of peripheral nerve damage have been reported, but extensive animal studies have failed to substantiate these observations, even at high doses of 2,4-D for prolonged periods.
Chronic Effects/Carcinogenicity: Prolonged overexposure can cause liver, kidney and muscle damage. The International Agency for Research on Cancer (IARC) lists exposure to chlorophenoxy herbicides as a class 2B carcinogen, the category for limited evidence for carcinogenicity in humans. However, more current 2,4-D lifetime feeding studies in rats and mice did not show carcinogenic potential. The USEPA has given a class D classification (not classifiable as to human carcinogenicity).
Reproductive Toxicity: No impairment of reproductive function attributable to 2,4-D has been noted in laboratory animal studies.
Developmental Toxicity: Studies in laboratory animals with 2,4-D have shown decreased fetal body weights and delayed development in the offspring at doses toxic to mother animals.
Genotoxicity: There have been some positive and some negative studies, but the weight of evidence is that 2,4-D is not mutagenic.

4. FIRST AID MEASURES

If swallowed: Do not induce vomiting. If patient is conscious and alert, give 2 to 3 glasses of water to drink. Do not give anything by mouth to an unconscious person. Get medical attention.
If on skin: Immediately wash skin with plenty of soap and water, if available.
If in eyes: Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes. Get medical attention, preferably an ophthalmologist.
If inhaled: Remove to fresh air. If not breathing, give artificial respiration. Administer oxygen if necessary. Get medical attention.
Note to Physician: This product contains petroleum distillates. If large amounts (greater than 1 ml/kg body weight) of this product have been ingested, the stomach should be evacuated by gastric intubation with the aid of a cuffed endotracheal tube to prevent aspiration of petroleum distillates and possible chemical pneumonia. After removal of stomach contents, wash stomach by instilling 30 to 50 grams of activated charcoal in 3 to 4 ounces of water through the stomach tube and again remove stomach contents. Avoid oily laxatives.
This product contains a phenoxy herbicidal chemical. There is no specific antidote. All treatments should be based on observed signs and symptoms of distress in the patient. Overexposure to materials other than this product may have occurred.
Myotonic effects may include muscle fibrillations, myotonia, and muscular weakness. Ingestion of massive doses may result in persistent fall of blood pressure. Myoglobin and hemoglobin may be found in urine. Elevations in lactate dehydrogenase (LDH), SGOT, SGPT and aldolase indicate the extent of muscle damage. It has been suggested that overexposure in humans may affect both the central and peripheral nervous systems. The acute effects on the central nervous system resemble those produced by alcohol or sedative drugs. In isolated cases, peripheral neuropathy and reduced nerve conduction velocities have been reported although these observations may be related to other factors. Gas-liquid chromatography for detecting and measuring chlorophenoxy compounds in blood and urine may be useful in confirming and assessing the magnitude of chlorophenoxy absorption.

5. FIRE FIGHTING MEASURES

Flash Point: 218° F (103° C) by Seta-Flash closed cup and ASTM D3278.
Autoignition Temperature: Not determined.
Flammability Limits: Not determined.
Extinguishing Media: Recommended (large fire): foam, water spray. Recommended (small fires): dry chemical, carbon dioxide.
Special Fire Fighting Procedures: Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing. Dike area to prevent runoff and contamination of water sources. Dispose of fire control water later.
Unusual Fire and Explosion hazards: When heated above the flash point, this material emits flammable vapors which, when mixed with air, can burn or be explosive. Fine mist or spray may be flammable at temperatures below the flash point. Under fire conditions, toxic, corrosive fumes are emitted. Containers will burst from internal pressure under extreme fire conditions.
Hazardous Decomposition Materials (Under Fire Conditions): Hydrogen chloride, other chlorine compounds, oxides of nitrogen and oxides of carbon.

6. ACCIDENTAL RELEASE MEASURES

Evacuation Procedures and Safety: Wear appropriate protective gear for the situation. See Personal Protection information in Section 8.
Containment of Spill: Dike spill using absorbent or impervious materials such as earth, sand or clay. Collect and contain contaminated absorbent and dike material for disposal.
Cleanup and Disposal of Spill: Pump any free liquid into an appropriate closed container. Collect washings for disposal. Decontaminate tools and equipment following cleanup. (See Section 13.)
Environmental and Regulatory Reporting: Prevent material from entering public sewer system or any waterways. Do not flush to drain. Large spills to soil or similar surfaces may necessitate removal of top soil. The affected area should be removed and placed in an appropriate container for disposal. Spills may be reportable to the National Response Center (800-424-8802) and to state and/or local agencies.

7. HANDLING AND STORAGE

Handling:
Handle containers carefully to avoid damage and spills.
Storage:
Store in original container in a dry secured storage area. Do not contaminate water, food or feed by storage or disposal. Avoid storage in close proximity to insecticides, fungicides, fertilizers and seeds. Keep container tightly closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

General:

These recommendations provide general guidance for handling this product. Because specific work environments and material handling practices vary, safety procedures should be developed for each intended usage, including maintenance and repair of equipment. Contact personal protective equipment manufacturers for assistance with selection, use and maintenance of such equipment.

Personal Protective Equipment:

Respiratory Protection: When respirators are required, select NIOSH/MSHA approved equipment based on actual or potential airborne concentrations and in accordance with the appropriate regulatory standards and/or industrial recommendations. Under normal conditions, in the absence of other airborne contaminants, the following devices should provide protection from this material up to the conditions specified by the appropriate OSHA or ANSI

standard(s): Air-purifying (half-mask/full-face) respirator with cartridges/canister approved for use against pesticides. Under conditions immediately dangerous to life or health, or emergency conditions with unknown concentrations, use a full-face positive pressure air-supplied respirator equipped with an emergency escape air supply unit or use a self-contained breathing apparatus unit.

Eye/Face Protection: Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material. Eye contact should be prevented through use of protective eyewear such as chemical safety glasses with side shields or splash proof goggles. An emergency eye wash should be readily accessible to the work area.

Skin Protection: Skin contact should be avoided through the use of permeation resistant clothing, gloves and footwear, selected with regard for use conditions and exposure potential. An emergency shower should be readily accessible to the work area. Consider both durability and permeation resistance of clothing.

Work Practice Controls: Personal hygiene is an important work practice exposure control measure and the following general measures should be taken when working with or handling this material: (1) Do not store, use, and/or consume foods, beverages, tobacco products, or cosmetics in areas where this material is stored. (2) Wash hands and face carefully before eating, drinking, using tobacco, applying cosmetics, or using the toilet.

Exposure Guidelines:

Exposure Limits:	OSHA PEL*	ACGIH TLV@*	STEL	Units
Acetic acid, (2,4-Dichlorophenoxy)-, isooctyl (2-ethylhexyl) ester	10**	10**	ND	mg/m³

*8-hour TWA unless otherwise noted.
**Based on adopted limit for 2,4-D.

Ventilation:

Where engineering controls are indicated by specific use conditions or a potential for excessive exposure, use local exhaust ventilation at the point of generation.

9. PHYSICAL AND CHEMICAL PROPERTIES

NOTE: Physical data are typical values, but may vary from sample to sample. A typical value should not be construed as a guaranteed analysis or as a specification.

Physical Appearance: Amber liquid.
Odor: Characteristic phenolic.
pH: Not Available.
Specific Gravity: Approximately 1.13
Water Solubility: Product is emulsifiable in water.
Melting Point Range: Not Available.
Boiling Point Range: Not Available. Based on components, expected to be >200°C.
Vapor Pressure: 3.6×10^{-6} mm Hg @ 25°C (data on 2,4-D 2EHE)
Molecular Weight: 333.27 (data on 2,4-D 2EHE)

10. STABILITY AND REACTIVITY

Chemical Stability: This material is stable under normal handling and storage conditions described in Section 7.
Conditions To Be Avoided: Excessive heat.
Incompatibility With Other Materials: Strong oxidizing agents: bases, acids.
Hazardous Decomposition Products:

Decomposition Type: Thermal
Decomposition Products: Hydrogen chloride, other chlorine compounds, oxides of carbon and nitrogen.

Hazardous Polymerization: Does not occur.

11. TOXICOLOGICAL INFORMATION

Toxicological Data:
Data on this product:

Eye Irritation: Minimally irritating (Rabbit).
Skin Irritation: Slightly irritating (Rabbit).
Dermal: Slightly toxic. (Rabbit LD_{50} >2020 mg/kg).
Inhalation: Slightly toxic. (Rat 4-hr LC_{50}: >5.12 mg/L)
Oral: Slightly toxic. (Rat LD_{50} 1380 mg/kg).

This product contains substances that are considered to be probable or suspected human carcinogens as follows:

	Regulatory Agency Listing As Carcinogen			
Ingredients Name	**OSHA**	**IARC**	**NTP**	**ACGIH**
Chlorophenoxy herbicides	No	2B	No	No

(Also see Section 3.)

12. ECOLOGICAL INFORMATION

Aquatic Toxicity:
Data on 2,4-D 2EHE or EC formulation:

96-hr LC_{50} Bluegill: >5 mg/l
96-hr LC_{50} Rainbow Trout: 7.2 mg/l
48-hr EC_{50} Daphnia: >5 mg/l

Avian Toxicity:
Data on 2,4-D 2EHE:

Bobwhite Quail Dietary LC_{50}: >5620 ppm
Mallard Duck 8-day Dietary LC_{50}: >5620 ppm

Environmental Fate:
In representative laboratory and field studies, 2,4-D 2EHE rapidly hydrolyzed to parent acid. The typical half-life of the resultant 2,4-D acid ranged from a few days to a few weeks.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method:
Pesticide wastes are toxic. Improper disposal of excess pesticide is a violation of Federal Law and may contaminate ground water. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Handling and Disposal:
Do not reuse empty container. Triple rinse (or equivalent) adding rinsate to application equipment. Then offer empty container for recycling or reconditioning, or puncture and dispose of in a sanitary landfill or by incineration, or, if allowed by State and local authorities, by burning. If burned, stay out of smoke.

14. TRANSPORTATION INFORMATION

NOTE: Information is for surface transportation of package sizes generally offered and does not address regulatory variations due to changes in package size, mode of shipment or other conditions.

Packages containing less than 18.5 gallons of this product are generally not regulated. For packages containing 18.5 gallons or higher:

DOT Proper Shipping Name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (2,4-D ESTER), RQ (2,4-D ESTER)
DOT Hazard Class / I.D. No.:	9 / UN3082
DOT Label:	Class 9
U.S. Surface Freight Classification:	Weed killing compound, N.O.I.B.N

15. REGULATORY INFORMATION

Federal Regulations:

TSCA Inventory: This product is excepted from TSCA because it is solely for FIFRA regulated use.

SARA Hazard Notification:
Hazard Categories Under Criteria of SARA Title III Rules (40 CFR Part 370):

Fire:	Reactive:	Release of Pressure:	Acute Health:	Chronic Health:
No	No	No	Yes	Yes

Section 313 Toxic Chemical(s):
ACETIC ACID, (2,4-DICHLOROPHENOXY)-, 2-ETHYLHEXYL ESTER, CAS NO. 1928-43-4 (86.6% by weight in product)

Reportable Quantity (RQ) under U.S. CERCLA:

Ingredient	RQ
ACETIC ACID, (2,4-DICHLOROPHENOXY) -, 2-ETHYLHEXYL ESTER	100 lbs

Selected State Regulations:

This product contains the following components that are regulated under California Proposition 65:

Ingredient Name	Cancer List	Reproductive List	Risk Level (ug/day)	
			CaliforniaN	ufarm
Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

16. OTHER INFORMATION

National Fire Protection Association (NFPA®) Hazard Ratings:

Ratings for This Product		Key to Ratings	
2	Health Hazard	0	Minimal
1	Flammability	1	Slight
0	Instability	2	Moderate
		3	Serious
		4	Severe

Abbreviations and Acronyms Not Defined Elsewhere:

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DOT	Department of Transportation
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
IARC	International Agency for Research on Cancer
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
SARA	Superfund Amendments and Reauthorization Act of 1986
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average
USEPA	U.S. Environmental Protection Agency

This Material Safety Data Sheet (MSDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-ACCEPTED PRODUCT LABELING (attached to and accompanying the product container). This MSDS provides important health, safety and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course.

Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of federal law to use a pesticide product in any manner not prescribed on the EPA-accepted label.

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, Nufarm, Inc. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Nufarm, Inc. be responsible for damages of any nature whatsoever resulting from the use or of reliance upon Information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

WEEDONE® is a registered trademark of Nufarm, Inc.

MONSANTO COMPANY
Material Safety Data Sheet
Commercial Product

1. PRODUCT AND COMPANY IDENTIFICATION

Product name
Ranger® PRO Herbicide

EPA Reg. No.
524-517
Product use
Herbicide
Chemical name
Not applicable.
Synonyms
None.
Company
MONSANTO COMPANY, 800 N. Lindbergh Blvd., St. Louis, MO, 63167
Telephone: 800-332-3111, **Fax:** 314-694-5557
Emergency numbers
FOR CHEMICAL EMERGENCY, SPILL LEAK, FIRE, EXPOSURE, OR ACCIDENT Call CHEMTREC - Day or Night: 1-800-424-9300 toll free in the continental U.S., Puerto Rico, Canada, or Virgin Islands. For calls originating elsewhere: 703-527-3887 (collect calls accepted).
FOR MEDICAL EMERGENCY - Day or Night: 314-694-4000 (collect calls accepted).

2. COMPOSITION/INFORMATION ON INGREDIENTS

Active ingredient
Isopropylamine salt of N-(phosphonomethyl)glycine; {Isopropylamine salt of glyphosate}

Composition

COMPONENT	CAS No.	% by weight (approximate)
Isopropylamine salt of glyphosate	38641-94-0	41
Other ingredients		59

The specific chemical identity is being withheld because it is trade secret information of Monsanto Company.

OSHA Status
This product is hazardous according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

Emergency overview
Appearance and odour (colour/form/odour): Amber / Liquid / Sweet

CAUTION!
CAUSES EYE IRRITATION

Potential health effects
Likely routes of exposure
Skin contact, eye contact
Eye contact, short term
May cause temporary eye irritation.

Skin contact, short term
Not expected to produce significant adverse effects when recommended use instructions are followed.
Inhalation, short term
Not expected to produce significant adverse effects when recommended use instructions are followed.

Refer to section 11 for toxicological and section 12 for environmental information.

4. FIRST AID MEASURES

Eye contact
If in eyes, hold eye open and rinse slowly and gently for 15-20 minutes. Remove contact lenses, if present, after first 5 minutes, then continue rinsing.

Skin contact
Take off contaminated clothing, wristwatch, jewellery.
Wash affected skin with plenty of water.
Wash clothes and clean shoes before re-use.

Inhalation
Remove to fresh air.

Ingestion
Immediately offer water to drink.
Do NOT induce vomiting unless directed by medical personnel.
If symptoms occur, get medical attention.

Advice to doctors
This product is not an inhibitor of cholinesterase.

Antidote
Treatment with atropine and oximes is not indicated.

5. FIRE-FIGHTING MEASURES

Flash point
None.

Extinguishing media
Recommended: Water, foam, dry chemical, carbon dioxide (CO2)

Unusual fire and explosion hazards
Minimise use of water to prevent environmental contamination.
Environmental precautions: see section 6.

Hazardous products of combustion
Carbon monoxide (CO), phosphorus oxides (PxOy), nitrogen oxides (NOx)

Fire fighting equipment
Self-contained breathing apparatus.
Equipment should be thoroughly decontaminated after use.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Use personal protection recommended in section 8.

Environmental precautions
SMALL QUANTITIES:
Low environmental hazard.
LARGE QUANTITIES:
Minimise spread.
Keep out of drains, sewers, ditches and water ways.
Notify authorities.

Methods for cleaning up
SMALL QUANTITIES:
Flush spill area with water.
LARGE QUANTITIES:
Absorb in earth, sand or absorbent material.
Dig up heavily contaminated soil.
Collect in containers for disposal.
Refer to section 7 for types of containers.
Flush residues with small quantities of water.
Minimise use of water to prevent environmental contamination.

Refer to section 13 for disposal of spilled material.

7. HANDLING AND STORAGE

Good industrial practice in housekeeping and personal hygiene should be followed.

Handling
When using do not eat, drink or smoke.
Wash hands thoroughly after handling or contact.
Thoroughly clean equipment after use.
Do not contaminate drains, sewers and water ways when disposing of equipment rinse water.
Emptied containers retain vapour and product residue.
Refer to section 13 for disposal of rinse water.
Observe all labelled safeguards until container is cleaned, reconditioned or destroyed.

Storage
Minimum storage temperature: -15 °C
Maximum storage temperature: 50 °C
Compatible materials for storage: stainless steel, aluminium, fibreglass, plastic, glass lining
Incompatible materials for storage: galvanised steel, unlined mild steel, see section 10.
Keep out of reach of children.
Keep away from food, drink and animal feed.
Keep only in the original container.
Partial crystallization may occur on prolonged storage below the minimum storage temperature.
If frozen, place in warm room and shake frequently to put back into solution.
Minimum shelf life: 5 years.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Airborne exposure limits

Components	Exposure Guidelines
Isopropylamine salt of glyphosate	No specific occupational exposure limit has been established.
Other ingredients	No specific occupational exposure limit has been established.

Engineering controls

No special requirement when used as recommended.

Eye protection
If there is significant potential for contact:
Wear chemical goggles.

Skin protection
No special requirement when used as recommended.
If repeated or prolonged contact:
Wear chemical resistant gloves.

Respiratory protection
No special requirement when used as recommended.

When recommended, consult manufacturer of personal protective equipment for the appropriate type of equipment for a given application.

9. PHYSICAL AND CHEMICAL PROPERTIES

These physical data are typical values based on material tested but may vary from sample to sample. Typical values should not be construed as a guaranteed analysis of any specific lot or as specifications for the product.

Colour/colour range:	Amber
Form:	Liquid
Odour:	Sweet
Flash point:	None.
Specific gravity:	1.169 @ 20 °C / 15.6 °C
Solubility:	Water: Completely miscible.
pH:	4.4 - 5.0
Partition coefficient (log Pow):	< 0.00 (active ingredient)

10. STABILITY AND REACTIVITY

Stability
Stable under normal conditions of handling and storage.

Hazardous decomposition
Thermal decomposition: Hazardous products of combustion: see section 5.

Materials to avoid/Reactivity
Reacts with galvanised steel or unlined mild steel to produce hydrogen, a highly flammable gas that could explode.

11. TOXICOLOGICAL INFORMATION

This section is intended for use by toxicologists and other health professionals.

Data obtained on similar products and on components are summarized below.

Similar formulation

Acute oral toxicity
Rat, LD50: 5,108 mg/kg body weight
Practically non-toxic.
FIFRA category IV.

Acute dermal toxicity
Rat, LD50 (limit test): > 5,000 mg/kg body weight
Practically non-toxic.
FIFRA category IV.
No mortality.

Skin irritation
Rabbit, 6 animals, OECD 404 test:
Days to heal: 3
Primary Irritation Index (PII): 0.5/8.0
Essentially non irritating.
FIFRA category IV.

Eye irritation
Rabbit, 6 animals, OECD 405 test:
Days to heal: 3
Slight irritation.
FIFRA category III.

Acute inhalation toxicity
Rat, LC50, 4 hours, aerosol: 2.9 mg/L
Other effects: weight loss, breathing difficulty
Practically non-toxic.
FIFRA category IV.

Skin sensitization
Guinea pig, Buehler test:
Positive incidence: 0 %

N-(phosphonomethyl)glycine; [glyphosate]

Mutagenicity
In vitro and in vivo mutagenicity test(s):
Not mutagenic.

Repeated dose toxicity
Rabbit, dermal, 21 days:
NOAEL toxicity: > 5,000 mg/kg body weight/day
Target organs/systems: none
Other effects: none
Rat, oral, 3 months:
NOAEL toxicity: > 20,000 mg/kg diet
Target organs/systems: none
Other effects: none

Carcinogenicity
Mouse, oral, 24 months:
NOEL tumour: > 30,000 mg/kg diet
NOAEL toxicity: ~ 5,000 mg/kg diet
Tumours: none
Target organs/systems: liver
Other effects: decrease of body weight gain, histopathologic effects
Rat, oral, 24 months:
NOEL tumour: > 20,000 mg/kg diet
NOAEL toxicity: ~ 8,000 mg/kg diet
Tumours: none
Target organs/systems: eyes
Other effects: decrease of body weight gain, histopathologic effects

Toxicity to reproduction/fertility:
Rat, oral, 3 generations:
NOAEL toxicity: > 30 mg/kg body weight
NOAEL reproduction: > 30 mg/kg body weight
Target organs/systems in parents: none

Other effects in parents: none
Target organs/systems in pups: none
Other effects in pups: none

Developmental toxicity/teratogenicity

Rat, oral, 6 - 19 days of gestation:
NOAEL toxicity: 1,000 mg/kg body weight
NOAEL development: 1,000 mg/kg body weight
Other effects in mother animal: decrease of body weight gain, decrease of survival
Developmental effects: weight loss, post-implantation loss, delayed ossification
Effects on offspring only observed with maternal toxicity.

Rabbit, oral, 6 - 27 days of gestation:
NOAEL toxicity: 175 mg/kg body weight
NOAEL development: 175 mg/kg body weight
Target organs/systems in mother animal: none
Other effects in mother animal: decrease of survival
Developmental effects: none

12. ECOLOGICAL INFORMATION

This section is intended for use by ecotoxicologists and other environmental specialists.

Data obtained on product and components are summarized below.

Aquatic toxicity, fish

Rainbow trout (Oncorhynchus mykiss):
Acute toxicity, 96 hours, static, LC50: 5.4 mg/L
Moderately toxic.

Bluegill sunfish (Lepomis macrochirus):
Acute toxicity, 96 hours, static, LC50: 7.3 mg/L
Moderately toxic.

Aquatic toxicity, invertebrates

Water flea (Daphnia magna):
Acute toxicity, 48 hours, static, EC50: 11 mg/L
Slightly toxic.

Avian toxicity

Mallard duck (Anas platyrhynchos):
Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet
Practically non-toxic.

Bobwhite quail (Colinus virginianus):
Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet
Practically non-toxic.

Arthropod toxicity

Honey bee (Apis mellifera):
Oral/contact, 48 hours, LD50: > 100 µg/bee
Practically non-toxic.

Soil organism toxicity, invertebrates

Earthworm (Eisenia foetida):
Acute toxicity, 14 days, LC50: > 1,250 mg/kg soil
Practically non-toxic.

N-(phosphonomethyl)glycine; (glyphosate)

Bioaccumulation

Bluegill sunfish (Lepomis macrochirus):
Whole fish: BCF: < 1
No significant bioaccumulation is expected.

Dissipation

Soil, field:
Half life: 2 - 174 days
Koc: 884 - 60,000 L/kg
Adsorbs strongly to soil.
Water, aerobic:
Half life: < 7 days

13. DISPOSAL CONSIDERATIONS

Product
Excess product may be disposed of by agricultural use according to label instructions.
Keep out of drains, sewers, ditches and water ways.
Recycle if appropriate facilities/equipment available.
Burn in proper incinerator.
Follow all local/regional/national/international regulations.

Container
See the individual container label for disposal information.
Emptied containers retain vapour and product residue.
Observe all labelled safeguards until container is cleaned, reconditioned or destroyed.
Empty packaging completely.
Triple or pressure rinse empty containers.
Do NOT contaminate water when disposing of rinse waters.
Ensure packaging cannot be reused.
Do NOT re-use containers.
Store for collection by approved waste disposal service.
Recycle if appropriate facilities/equipment available.
Follow all local/regional/national/international regulations.

14. TRANSPORT INFORMATION

The data provided in this section is for information only. Please apply the appropriate regulations to properly classify your shipment for transportation.

Not hazardous under the applicable DOT, ICAO/IATA, IMO, TDG and Mexican regulations.

15. REGULATORY INFORMATION

TSCA Inventory
All components are on the US EPA's TSCA Inventory

OSHA Hazardous Components
Surfactant

SARA Title III Rules
Section 311/312 Hazard Categories
Immediate
Section 302 Extremely Hazardous Substances
Not applicable.
Section 313 Toxic Chemical(s)
Not applicable.

CERCLA Reportable quantity
Not applicable.

16. OTHER INFORMATION

The information given here is not necessarily exhaustive but is representative of relevant, reliable data.
Follow all local/regional/national/international regulations.
Please consult supplier if further information is needed.
In this document the British spelling was applied.

	Health	Flammability	Instability	Additional Markings
NFPA	2	1	1	

0 = Minimal hazard, 1 = Slight hazard, 2 = Moderate hazard, 3 = Severe hazard, 4 = Extreme hazard

Full denomination of most frequently used acronyms. BCF (Bioconcentration Factor), BOD (Biochemical Oxygen Demand), COD (Chemical Oxygen Demand), EC50 (50% effect concentration), ED50 (50% effect dose), I.M. (intramuscular), I.P. (intraperitoneal), I.V. (intravenous), Koc (Soil adsorption coefficient), LC50 (50% lethality concentration), LD50 (50% lethality dose), LDLo (Lower limit of lethal dosage), LEL (Lower Explosion Limit), LOAEC (Lowest Observed Adverse Effect Concentration), LOAEL (Lowest Observed Adverse Effect Level), LOEC (Lowest Observed Effect Concentration), LOEL (Lowest Observed Effect Level), MEL (Maximum Exposure limit), MTD (Maximum Tolerated Dose), NOAEC (No Observed Adverse Effect Concentration), NOAEL (No Observed Adverse Effect Level), NOEC (No Observed Effect Concentration), NOEL (No Observed Effect Level), OEL (Occupational Exposure Limit), PEL (Permissible Exposure Limit), PII (Primary Irritation Index), Pow (Partition coefficient n-octanol/water), S.C. (subcutaneous), STEL (Short-Term Exposure Limit), TLV-C (Threshold Limit Value-Ceiling), TLV-TWA (Threshold Limit Value - Time Weighted Average), UEL (Upper Explosion Limit)

This Material Safety Data Sheet (MSDS) serves different purposes than and DOES NOT REPLACE OR MODIFY THE EPA-APPROVED PRODUCT LABELING (attached to and accompanying the product container). This MSDS provides important health, safety, and environmental information for employers, employees, emergency responders and others handling large quantities of the product in activities generally other than product use, while the labeling provides that information specifically for product use in the ordinary course. Use, storage and disposal of pesticide products are regulated by the EPA under the authority of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) through the product labeling, and all necessary and appropriate precautionary, use, storage, and disposal information is set forth on that labeling. It is a violation of federal law to use a pesticide product in any manner not prescribed on the EPA-approved label.

Although the information and recommendations set forth herein (hereinafter "Information") are presented in good faith and believed to be correct as of the date hereof, MONSANTO Company makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for the purposes prior to use. In no event will MONSANTO Company be responsible for damages of any nature whatsoever resulting from the use of or reliance upon information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR TO THE PRODUCT TO WHICH INFORMATION REFERS.

MATERIAL SAFETY DATA SHEET

WISCONSIN PHARMACAL COMPANY
1 Repel Road
P.O. Box 198
Jackson, WI 53037

EMERGENCY NUMBER: 1-800-255-3924 INFORMATION NUMBER: 1-800-558-6614

PRODUCT NAME: Repel Insect Repellent Unscented Sportsmen Formula EPA REG. NO.: 308-32
Classic Repel Insect Repellent Unscented Sportsmen Formula

PRODUCT CODE: 312, 320, 329, 338 DATE PREPARED: 6-6-96 PREPARED BY: J. Killoren

• HAZARDOUS INGREDIENTS/IDENTITY INFORMATION •

Material	CAS#	%	OSHA PEL	ACGIH TLV	TWA	STEL
Hydrocarbon aerosol propellent (propane & butane blend)	75-28-5 & 106-97-8	15%	N/E	N/E	N/E	N/E
Alcohol	67-63-0	45%	N/E	N/E	400 ppm	500 ppm
N,N-diethyl-m-toluamide	134-62-3	40%	N/E	N/E	N/E	N/E

* N/E = NOT ESTABLISHED

• HEALTH HAZARDS •

Acute Inhalation: Vapors and mist may irritate the nose and throat. Inhalation of higher concentrations may cause headaches, nausea, and coma.

Eye Contact: Vapors may irritate the eyes. Liquid and mist can severely irritate or damage the eyes and cause corneal burns.

Skin Contact: May cause skin irritation in rare cases. Do not apply to severely sunburned or damaged skin. Prolonged contact may irritate the skin, causing dermatitis.

Ingestion: Swallowing large amounts causes headaches, nausea, vomiting, stomach cramps, diarrhea, and perhaps unconsciousness.

Primary Routes of Entry: Inhalation, skin contact and ingestion.

Systemic & Other Effects: May cause central nervous system disturbances. There have been a handful of isolated cases of adverse systemic effects associated with excessive exposure to DEET. Most of these cases have involved long-term high dosage use of DEET on children.

Medical Conditions Aggravated by Exposure: Persons with pre-existing skin disorder, eye problem or impaired respiratory function may be more susceptible to the effects of this substance.

Chemicals Listed as Carcinogens or Potential Carcinogens: None known.

COMMENTS: Unnecessary exposure to this product or any chemical should be avoided.

EMERGENCY FIRST AID PROCEDURES:

Inhalation: Remove to fresh air. Administer oxygen if difficulty in breathing. Seek medical attention.

Skin: Wash with soap and water if irritation occurs. If irritation persists, seek medical attention.

Eyes: Flush well with water. Avoid contact with eyes and lips.

Oral: If conscious and alert, give several glasses of water and induce vomiting. Seek medical attention.

• PHYSICAL/CHEMICAL CHARACTERISTICS •

BOILING POINT: 180°F for alcohol.

SPECIFIC GRAVITY: 0.861 at 24°C (H_2O = 1)

VAPOR PRESSURE: approximate 40 psig (mm Hg)

PERCENT VOLATILE BY VOLUME: Not determined

EVAPORATION RATE: 2.88 for alcohol (n-Bu Acetate = 1)

SOLUBILITY IN WATER: Partial

APPEARANCE AND ODOR: Clear fluid, leaves clear residue repellent. Slight odor.

• REACTIVITY DATA •

STABILITY: Stable.

INCOMPATIBILITY (Material to Avoid): Strong oxidizing agents, halogens and aldehydes. Strong acids and bases may cause hydrolysis. Do not use on Rayon, Acetate or Dynel clothing. It will have a softening affect on most plastics and some paint/varnishes. May damage leather.

HAZARDOUS POLYMERIZATION: Will not occur.

HAZARDOUS DECOMPOSITION: Incomplete combustion may produce oxides of nitrogen and carbon.

CONDITIONS TO AVOID: DO NOT store above 120°F. Extreme temperatures, fire, flames or sparks.

• FIRE AND EXPLOSION HAZARDS •

FLAME EXTENTION: 18 inches

FLASH POINTS: alcohol 69°F (TOC)

AUTOIGNITION: Not determined.

FLAMMABILITY LIMITS IN AIR, % BY VOL.: LEL: 1.3 UEL: 12.0 (Estimated)

EXTINGUISHING MEDIA: Foam, CO_2, dry chemical.

UNUSUAL FIRE OR EXPLOSION HAZARDS: Avoic bursting of aerosol can. DO NOT expose to temperatures greator than 120°F.

SPECIAL FIRE FIGHTING PROCEDURES: Flammable product. Keep away from any source of ignition.

• SAFE HANDLING AND USE •

SPILL RESPONSE: Absorb on suitable material, keep away from sources of ignition, ventilate area

WASTE DISPOSAL AND PRECAUTIONS: Do not puncture or incinerate. If waste cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

HANDLING AND STORING PRECAUTIONS: Do not spray in eyes. Avoid excess inhalation. Do not take internally. Store in a dry location at room temperature away from fire, flame or sparks.

OTHER PRECAUTIONS: Keep away from fire, flame or sparks. Do not store where temperatures may exceed 120°F. Read and follow directions on product label. Good practice requires that gross amounts of any chemical be removed from skin as practical, especially before eating or smoking.

• PROTECTION MEASURES •

RESPIRATORY PROTECTION: Sufficient to keep vapors less than 400 ppm.

VENTILATION: Use only in a well ventilated area.

PROTECTIVE EQUIPMENT: None required with normal use. Keep out of eyes

SKIN: Do not expose treated skin to fire, sparks or flame until liquid has evaporated.

EMERGENCY NUMBER: 1-800-255-3924

COMMENTS: Wash with soap and water after use.

• SPECIAL PRECAUTIONS •

HANDLING AND STORAGE: Store in dry location at room temperature away from fire, flame or sparks.

OTHER PRECAUTIONS: Read and follow directions on product label.

REGULATORY REQUIREMENTS: This product has been reviewed according to EPA "Hazard Categories" promulgated under Section 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

a fire hazard
sudden release of pressure

SARA 313 INFORMATION: This product contains the following substances subject to the reporting requirements of Section 313 Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

CHEMICAL NAME	CAS NUMBER	CONCENTRATION

None.

NOTE: This data represents typical values, not product specifications. No guarantee of accuracy or completeness is made. No responsibility is assumed for any kind of loss or damages arising from use of this data. The aforementioned effects are based on the evaluation of individual components and the relevancy to the product as a whole is unknown.

CLEAN ACROSS AMERICA AND THROUGHOUT THE WORLD™

MATERIAL SAFETY DATA SHEET
AND SAFE HANDLING AND DISPOSAL INFORMATION

1-877-I-BUY-ZEP (1-877-428-9937)

ZEP MANUFACTURING COMPANY
P.O. BOX 2015
ATLANTA, GEORGIA 30301

ISSUE DATE: 09/11/00
SUPERSEDES: 04/16/93
Date printed: 11/17/00

ZEP SEWER AID FA
Prod No: 1670 Sewer and Drain Cleaner - Alkaline, Granu

SOLD TO:

01667

(342)
LOVELAND CITY OF WASTE WATER PLANT
920 S BOISE AVE
LOVELAND CO 80537-8873

A24993

SECTION I -EMERGENCY CONTACTS

TELEPHONE:
(404) 352-1680 *BETWEEN 8:00 AM - 5:00 PM (EST)*
MEDICAL EMERGENCY:
(770) 439-4200 *NON OFFICE HOURS, WEEKENDS*
(770) 432-2873 *AND HOLIDAYS, PLEASE CALL*
(770) 424-4789 LOCAL POISON CONTROL
(770) 424-2048
(770) 455-8160
(770) 552-8836
TRANSPORTATION EMERGENCY:
(770) 922-0923
CHEMTREC:
(800) 424-9300 TOLL FREE-CALLS RECORDED
DISTRICT OF COLUMBIA:
(202) 483-7616 ALL CALLS RECORDED

SECTION II - HAZARDOUS INGREDIENTS

DESIGNATIONS	(PPM)	EFFECTS (SEE NOTICE)	% IN PROD.
** SODIUM HYDROXIDE ** caustic soda; soda lye, CAS# 1310-73-2, RTECS# WB4900000; OSHA/ACGIH CEILING LIMIT-2 MG/M3	N/D	TOX, COR	40-50
** ALUMINUM, METALLIC GRANULES ** CAS# 7429-90-5, RTECS# BD0530000 ACGIH DUST LIMIT - 5 mg/M3; OSHA PEL N/D	N/D	IRR	5-10
** SODIUM NITRATE ** chile saltpeter; soda niter, CAS# 7631-99-4, RTECS# WC5600000; OSHA PEL-N/D	N/D	TOX	20-30
** SODIUM CHLORIDE ** halite, salt, CAS# 7647-14-5, RTECS# VZ4725000; OSHA PEL-N/D	N/D	IRR	5-10
** SODIUM CARBONATE ** soda ash; carbonic acid, disodium salt, CAS# 497-19-8; RTECS# VZ4050000, DUST LIMIT = 15 MG/M3	N/D	IRR	5-10
** ALUMINUM, METALLIC POWDER ** CAS# 7429-90-5, RTECS# BD0330000 ACGIH DUST LIMIT-10mg/m3;OSHA PEL-5mg/m3	N/D	IRR	< 5
** PROPRIETARY TERMINATED ALKYL ARYL ETHER NONIONIC SURFACTANT ** CAS# PROPRIETARY, RTECS# NONE, OSHA PEL-N/D	N/D	IRR	< 5

SECTION III - HEALTH HAZARD DATA

GENERAL NOTE: MSDS data pertains to the product as dispensed from the container. Adverse health effects not be expected under recommended conditions of use (diluted) so long as prescribed safety precautions achieved.

ACUTE EFFECTS OF OVEREXPOSURE:
Corrosive to skin and eyes. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastrointestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe overexposure can produce lung damage, choking, unconsciousness or death.
CHRONIC EFFECTS OF OVEREXPOSURE:
Repeated exposure of the eyes to a low level of dust can produce tissue damage. Repeated skin exposure can produce local skin destruction or dermatitis. Repeated inhalation of dust can produce varying degrees of respiratory irritation or lung damage.
None of the hazardous ingredients are listed as carcinogens by IARC, NTP, & OSHA.
ESTD PEL/TLV: Not established PRIMARY ROUTES OF ENTRY: Inh, Skin

HMIS CODES: HEALTH: 3, FLAM: 0, REACT: 2, PERS. PROTECT: X , CHRONIC HAZ: YES

FIRST AID PROCEDURES:
SKIN: Immediately flush contaminated skin with plenty of water for at least 15 minutes. Get medical attention immediately.
EYES: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting upper and lower lids. Get medical attention at once.
INHALE: Move victim to fresh air. Flush mouth and nasal passages with water repeatedly. Get medical attention if irritation persists.
INGEST: If this product is swallowed, do not induce vomiting. If individual is alert, give plenty of water to drink. Get medical attention at once.

SECTION IV - SPECIAL PROTECTION INFORMATION

PROTECTIVE CLOTHING: Wear rubber, neoprene, or nitrile gloves, alkali resistant footwear, face shield, apron, and arm coverings.
EYE PROTECTION: Wear splash-proof safety goggles especially if contact lenses are worn.
RESPIRATORY PROTECTION: Use NIOSH-approved dust mask if dust is present.
VENTILATION: If dust is detected, ventilate work area by opening windows and using exhaust fans.

SECTION V - PHYSICAL DATA

BOILING POINT (F):	N/A	SPECIFIC GRAVITY:	
VAPOR PRESSURE (mm Hg):	N/A	EVAPORATION RATE (N/A=1):	N/A
VAPOR DENSITY (AIR=1):	N/A	pH (CONCENTRATE):	N/A
SOLUBILITY IN WATER:	12G/100ML	pH (USE DILUTION OF 1%):	12.5-13.0
VOC CONTENT (CONCENTRATE):	N/A		

APPEARANCE AND ODOR: A BLUE, CRYSTALLINE PRODUCT HAVING LITTLE OR NO ODOR.

SECTION VI - FIRE AND EXPLOSION DATA

FLASH POINT (F) (METHOD USED): N/A (N/A)
FLAMMABLE LIMITS - LEL: N/A UEL: N/A
EXTINGUISHING MEDIA: Dry Chemical
SPECIAL FIRE FIGHTING: None
UNUSUAL FIRE HAZARDS: See Section IX for more information.

SECTION VII - REACTIVITY DATA

STABILITY: Stable
INCOMPATIBILITY (AVOID): Strong oxidizers, acids, and active metals
POLYMERIZATION: Will not occur
HAZARDOUS DECOMPOSITION: Carbon dioxide, carbon monoxide, & oxides of nitrogen

SECTION VIII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Observe safety precautions in sections 4 & 9 during clean-up. Sweep powder or absorb spilled task-solution on inert absorbent material (e.g. Zep-O-Zorb) and place in a clean D.O.T. specification container for disposal. Wash area thoroughly with a detergent solution and rinse well with water.
WASTE DISPOSAL METHOD:
Empty cans cannot be sent to landfills unless solidified. Never dispose of this product with general waste. Unusable product and spent task-solution may require disposal as a hazardous waste at a permitted treatment/storage/disposal facility. In most states hazardous wastes in total amounts of 220 lbs. or less per month may be disposed of at a chemical or industrial waste landfill. If company effluent is treated by a publicly owned

Product No: 1670 SECTION VIII - SPILL AND DISPOSAL PROCEDURES (continued)

[illegible] for proper disposal method in your area
[illegible] WASTE NOS: D00[illegible]

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN WHEN HANDLING AND STORING
Store tightly closed container in a dry area at temps. between 40-120 degrees F
KEEP PRODUCT DRY. Contact with moisture (rain, high humidity, etc.) can generate excessive heat and may ignite combustibles
Store away from strong acids and oxidizing compounds
Keep product away from skin and eyes
Do not breathe dust
Clothing or shoes which become contaminated with substance should be removed promptly and not reworn until thoroughly cleaned
Add chemical to solution slowly
Keep out of the reach of children

SECTION X - REGULATORY INFORMATION

DOT PROPER SHIPPING NAME: CORROSIVE SOLIDS, BASIC, INORGANIC, N.O.S. (SODIUM HYDROXIDE)
NOTE: DOT information applies to larger package sizes of affected products. For some products, DOT may require alternate names and labeling in accordance with packaging group requirements.
DOT HAZARD CLASS: 8 9 2. DOT PACKING GROUP: II
DOT I.D. NUMBER: UN3262 DOT LABEL/PLACARD: CORROSIVE
EPA TSCA CHEMICAL INVENTORY - ALL INGREDIENTS ARE LISTED
EPA CWA 40CFR PART 117 SUBSTANCE/RQ IN A SINGLE CONTAINER: SODIUM HYDROXIDE
1000#

Date Last Reviewed by Compliance Services: [illegible]

NOTICE

[illegible] for your interest in and use of Zep products. Zep Manufacturing Co. is pleased to be of service to you by supplying this Material Safety Data Sheet for your files. Zep Manufacturing is concerned for your health and safety. Zep products can be used safely with proper protective equipment and proper handling practices consistent with label instructions and the MSDS. Before using any Zep product, be sure to read the complete label and the Material Safety Data Sheet.

As a further word of caution, Zep wishes to advise that serious accidents have resulted from the misuse of "emptied" containers. "Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, or other sources of ignition; they may explode or develop harmful vapors and possibly cause injury or death. Clean empty containers by triple rinsing with water or an appropriate solvent. Empty containers must be sent to a drum reconditioner before reuse.

TERMS AND ABBREVIATIONS LISTED ALPHABETICALLY BY SECTION

SECTION II: HAZARDOUS INGREDIENTS

CAR: Carcinogen - A chemical listed by the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC) or OSHA as a definite or possible human cancer causing agent.
CAS #: Chemical Abstract Services Registry Number - A universally accepted numbering system for chemical substances.
CBL: Combustible - At temperatures between 100F and 200F chemical gives off enough vapor to ignite if a source of ignition is present as tested with a closed cup tester.
CNS: Central Nervous System depressant which reduces the activity of the brain and spinal cord.
COR: Corrosive - Causes irreversible injury to living tissue (e.g. burns).
DESIGNATIONS: Chemical and common names of hazardous ingredients.
EYE: Eye Irritant Only - Causes reversible reddening and/or inflammation of eye tissues.
EXPOSURE LIMITS: The time weighted average (TWA) airborne concentration at which most workers can be exposed without any expected adverse effects. Primary sources include ACGIH TLVs and OSHA PELs (TWA, STEL and ceiling limits).
ACGIH: American Conference of Governmental Industrial Hygienists
[illegible]: The concentration that should not be exceeded in workplace during any part of the working exposure.
[illegible] Occupational Safety and Health Administration Permissible Exposure Limit - A set of time weighted [illegible] exposure values established by OSHA for a [illegible] hour day and a 40-hour work week.
PPM: Parts per million - unit of measure for exposure limits.
[illegible] SKIN: Skin contact with substance can contribute to overall exposure.
STEL: Short Term Exposure Limit - Maximum concentration for a [illegible] for the exposure period.
TLV: Threshold Limit Value - A set of time weighted average exposure [illegible] established by the ACGIH [illegible]

enough vapor to ignite if a source of ignition is present as tested with a closed cup tester.
HAZARDOUS INGREDIENTS: Chemical substances determined to be potential health or physical hazards based on the criteria established in the OSHA Hazard Communication Standard - 29 CFR 1910.1200.
HTX: Highly toxic - the probable lethal dose for a 70kg (150 lb.) man and may be approximated as less than 6 teaspoons (2 tablespoons).
IRR: Irritant - Causes reversible effects in living tissues (e.g. inflammation) - primarily skin and eyes.
N.A.: Not Applicable - Category is not appropriate for this product.
N.D.: Not Determined - Insufficient information to make a determination for this item.
RTECS#: Registry of Toxic Effects of Chemical Substances - an unreviewed listing of published toxicology data on chemical substances.
SARA: Superfund Amendment and Reauthorization Act - Section 313 designates chemicals for possible reporting for the Toxic Release Inventory.
SEN: Sensitizer - Causes allergic reaction after repeated exposure.
TOX: Toxic - The probable lethal dose for a 70 kg (150 lb.) man is one ounce (2 tablespoons) or more.

(rev. 1/98)

SECTION III: HEALTH HAZARD DATA

ACUTE EFFECT: An adverse effect on the human body from a single exposure with symptoms developing almost immediately after exposure or within a relatively short time.
CHRONIC EFFECT: Adverse effects that are most likely to occur from repeated exposure over a long period of time.
EST D PEL/TLV: The estimated, time-weighted average exposure limit, developed by using a formula provided by the ACGIH, pertains to airborne concentrations from the product as a whole. This value should serve as guide for providing safe workplace conditions to nearly all workers.
HMIS CODES: Hazardous Material Identification System - a rating system developed by the National Paint and Coating Association for estimating the hazard potential of a chemical under normal workplace conditions. These risk estimates are indicated by a numerical rating given in each of three hazard areas (Health/Flammability/Reactivity) ranging from a low of zero to a high of 4. The presence of a chronic hazard is indicated with a yes. Consult HMIS training guides for Personal Protection letter codes which indicate necessary protective equipment.
PRIMARY ROUTE OF ENTRY: The way one or more hazardous ingredients may enter the body and cause a generalized systemic or specific organ toxic effect.
ING: Ingestion - A primary route of exposure through swallowing of material.
INH: Inhalation - A primary route of exposure through breathing of vapors.
SKIN: A primary route of exposure through contact with the skin.

SECTION IV: SPECIAL PROTECTION INFORMATION

Where respiratory protection is recommended, use only MSHA and NIOSH approved respirators and dust masks.
[illegible]

SECTION V: PHYSICAL DATA

EVAPORATION RATE: Refers to the rate of change from the liquid state to the vapor state at ambient temperature and pressure in comparison to a given substance (e.g. water).
pH: A value representing the acidity or alkalinity of an aqueous solution (Acidic pH < 7, Neutral pH = 7, Alkaline pH > 7).
VOC CONTENT: The percentage or amount in pounds per gallon of the product that is regulated as a Volatile Organic Compound under the Clean Air Act of 1990 and various state jurisdictions.
SOLUBILITY IN WATER: A description of the ability of the product to dissolve in water.

SECTION VII: REACTIVITY DATA

HAZARDOUS DECOMPOSITION: [illegible] produced upon product decomposition by extreme heat or fire.
INCOMPATIBILITY: Material contact by extreme heat and the conditions to avoid to prevent hazardous reactions.
POLYMERIZATION: Indicates the tendency of the product's molecules to combine with themselves in a chemical reaction releasing excess pressure and heat.
STABILITY: Indicates the susceptibility of the product to spontaneously and dangerously decompose.

SECTION VIII: SPILL AND DISPOSAL PROCEDURES

RCRA WASTE NOS: RCRA (Resource Conservation and Recovery Act) waste codes (40 CFR 261) applicable to the disposal of spilled or unusable product from the original container.

SECTION X: TRANSPORTATION DATA

CWA: Clean Water Act. Federal Law which regulates chemical releases to bodies of water.
RQ: Reportable Quantity - The amount of the specific ingredient that, when spilled to the ground and can enter a storm sewer or natural watershed, must be reported to the National Response Center, and other regulatory agencies.
TSCA: Toxic Substances Control Act - a federal law requiring all commercial chemical substances to appear on an inventory maintained by the EPA.

DISCLAIMER

All statements, technical information and recommendations contained herein are based on available scientific tests or data which we believe to be reliable. The accuracy and completeness of such data are not warranted or guaranteed. We cannot anticipate all conditions under which this information and our products, or the products of other manufacturers in combination with our products, may be used. Zep assumes no liability or responsibility for loss or damage resulting from the improper use or handling of our products, from incompatible product combinations, or from the failure to follow instructions, warnings, and advisories in the product's label and Material Safety Data Sheet.

(rev. 1/98)

Attachment K

25.C. *Attach a description of approved analytical procedures which are used, or will be used, for analyzing each influent and effluent parameter in order to meet the reporting requirements of the permit. Also, describe the location where each analysis is or will be completed and the requirement used for each method not done in the lab. (i.e., BOD_5-Method 5210B from Standard Methods, etc.) Is a commercial or other WWTP laboratory used? If so, identify the laboratory and submit their analytical methods for each parameter.*

The following table outlines for each parameters the analytical method, and where the samples are obtained. For those analysis done outside, the name of the Lab is included. The methods they use are listed in the chart. Copies of the analysis method are those listed in the documents. It is assumed that the Division has copies of these references.

Analytical Procedures

Parameter	Method	Purpose of Sample	Lab Name
Arsenic (wastewater)	EPA method 200.7	Not required	Stewart Environmental 214 North Howes St. Fort Collins, CO 80522
Arsenic (solid wastes)	EPA method 200.9, EPA digestion method 3050B	503 Sludge Requirements	Digestion performed at Loveland Water Quality Lab Stewart Environmental 214 North Howes St. Fort Collins, CO 80522
Aluminum	Standard Method 3111 D. Flame	Not required	Performed at Loveland Water Quality Lab
Cadmium	Standard Method 3113 B. Furnace, EPA digestion method 3050B	Sludge	Performed at Loveland Water Quality Lab
Chromium, total	Standard Method 3113 B. Furnace, EPA digestion method 3050B	Sludge	Performed at Loveland Water Quality Lab
Chromium, hex	Standard Method 3500 – Cr D. Colormetric	Influent, effluent	Performed at Loveland Water Quality Lab
Copper (wastewater)	Standard Method 3113 B. Furnace	Audits, influent, effluent	Performed at Loveland Water Quality Lab
Copper (sludge)	Standard Method 3111 B. Flame, EPA digestion method 3050B	503 Sludge Requirements	Performed at Loveland Water Quality Lab
Iron	EPA method 236.1 Flame	Not required	Performed at Loveland Water Quality Lab
Nickel (wastewater)	Standard Method 3113 B. Furnace	Not required	Performed at Loveland Water Quality Lab
Nickel, sludge	Standard Method 3111 B. Flame, EPA digestion method 3050B	503 Sludge Requirements	Performed at Loveland Water Quality Lab
Manganese	Standard Method 3113 B. Furnace	Not required	Performed at Loveland Water Quality Lab
Molybdenum	Standard Method 3113 B. Furnace, EPA digestion method 3050B	Sludge	Performed at Loveland Water Quality Lab

Analytical Procedures

Parameter	Method	Purpose of Sample	Lab Name
Lead	Standard Method 3113 B. Furnace	Sludge	Performed at Loveland Water Quality Lab
Mercury (wastewater)	EPA method 1631	Effluent, audit	Brooks Rand 3958 Sixth Ave NW Seattle, WA 98107
Mercury (sludge)	Standard Method 3112 B. Cold Vapor AA Spectrophotometer	Sludge	Performed at Loveland Water Quality Lab
Zinc	Standard Method 3111 B. Flame, EPA digestion method 3050B	Sludge	Performed at Loveland Water Quality Lab
Selenium (wastewater)	Standard Method 3113B	Audits, effluent	Stewart Environmental 214 North Howes St. Fort Collins, CO 80522
Selenium (sludge)	EPA method 200.9, EPA digestion method 3050B	503 Sludge Requirements	Digestion performed by Loveland Water Quality Lab Stewart Environmental 214 North Howes St. Fort Collins, CO 80522
Silver	Standard Method 3113 B. Furnace	Not required	Performed at Loveland Water Quality Lab
Total Suspended Solids	Standard Method 2540 D.	Audits, influent, effluent	Performed at Loveland Water Quality Lab
pH	Standard Method 4500-H^+ B (Fischer Accumet 750 and Ross pH Electrode)	Audits, influent, effluent, sludge, pretreatment	Performed at Loveland Water Quality Lab
Ammonia Nitrogen	Standard Method 4500-NH_3 B	Audits, influent, effluent, sludge	Performed at Loveland Water Quality Lab
TKN	Standard Method 4500-N	503 Sludge Requirements	Performed at Loveland Water Quality Lab
Fecal Coliform (wastewater)	Standard Method 9222 A	Audits, influent, effluent	Performed at Loveland Water Quality Lab
Fecal Coliform (sludge)	Standard Method 9221E MPN	503 Sludge Requirements	Performed at Loveland Water Quality Lab
BOD_5	Standard Method 5210 B	Audits, influent, effluent	Performed at Loveland Water Quality Lab
Cyanide (Colormetric)	Standard Method 4500-CN-E	Audits, influent, effluent	Performed at Loveland Water Quality Lab
Cyanide, weak acid dissociable	ASTM Manual, page 127, Method C	Audits, influent, effluent	Performed at Loveland Water Quality Lab
Whole Effluent Toxicity Testing	Short Term Methods for Estimating Chronic Toxicity of Effluents and Receiving Waters of Freshwater Organisms, EPA/600/4-89/001 and Guidelines for Conduction Whole Effluent Toxicity Tests, WQCD	Effluent	SeaCrest 1341 Cannon Street Louisville, CO 80021

Attachment L

SECTION VII - BIOSOLIDS HANDLING - BENEFICIAL USE OR DISPOSAL

28. *For a mechanical facility, please attach a short narrative description of the type of treatment (i.e. Class A or Class B), beneficial use (i.e. land application, composting) as described in EPA 503 Regulations/Colorado Biosolids Regulations #64, or disposal method(s) (i.e. landfill, transported to another facility) which are to be utilized.*

The City of Loveland wastewater treatment plant operates two anaerobic sludge digesters, one as a primary, and the other as a secondary. The detention time in these two digesters is consistently between 45 and 90 days and no problems have been encountered meeting the Federal §503 or Colorado Biosolids regulations. These digesters have also been approved for operation as two primary digesters.

The City of Loveland believes in beneficial reuse of biosolids and prefers land application as a disposal alternative. The City of Loveland performs all monitoring and certification of the biosolids as it leaves our facility. The contract hauler, Liquid Waste Management, performs all on-site permitting, monitoring, and certification. It is considered a Class B sludge.

29. *Are biosolids being stored at the facility? For how long?*

No biosolids are stored at the facility outside of the material in treatment units. Liquid digested sludge is pumped directly into trucks and hauled to the land application sites by the contract hauler.

30. *Will a contract hauler be utilized?* Yes
If yes, please give name and frequency used.

Biosolids disposal is contracted to:

Liquid Waste Management
204 S. Bowen
Longmont, Colorado 80501

Material is hauled as needed.

31. *Please attach a short narrative description on contingency plan for biosolids beneficial use and or disposal practice(s).*

There are no contingency plans for beneficial use of the biosolids; however, there are sludge drying beds on site that could be used to store biosolids. If Liquid Waste Management were to go out of business, the City would pursue contracting with another company to dispose of its biosolids. Under a worst case scenario, the sludge could be dewatered on site and hauled to a landfill until other disposal methods are approved.

32. *Describe the handling and final disposal method of screenings, grit and any other similar types of material at the facility (i.e. landfill, surface disposal, certificate of designation, storage).*

Screenings are removed from the process stream with a self-cleaning in line auger/grinder unit. The unit collects the ground screenings, which are rinsed, compacted, and discharged to a disposal bin. The screenings are disposed of on a weekly basis at the Larimer County Landfill. The process stream then enters a grit basin where grit is removed. Grit is stored in a hopper for one to two weeks at which time it is put in the back of a dump truck. The grit is subjected to the paint filter drip test and if it passes, it is taken to Larimer County Landfill for disposal. If the grit fails the drip test, it is taken to the drying beds where it is left in the truck and allowed to dry until it does pass the drip test. It is then taken to the Larimer County Landfill for disposal.

Attachment M

SECTION VIII - INDUSTRIAL CONTRIBUTORS AND PRETREATMENT

33.

A. ***On a separate sheet, list any of the pollutants found in Appendix A and B which you know or have reason to believe are present in or may be present in the influent to the facility. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data (influent or effluent) in your possession (use separate sheets). If this information has been previously submitted to the Division, please indicate the date of the submittal and who in the Division it was sent to.***

Table 1 lists the parameters from Appendix A and B that are believed to be present based on analytical data collected as part of the pretreatment program. Toxic Organic pollutant analyses were performed from March 2000 through September 2006 on the influent to the facility.

TABLE 1
Pollutants Present in the Influent

Pollutant	Reason pollutant is believed to be present	Number of times Sampled	Number of times Detected
Aldrin	Undetermined*	28	1
4,4'-DDT	Undetermined*	28	1
Endosulfan I	Undetermined*	28	2
Endosulfan Sulfate	Undetermined*	28	1
Chloroform	Chlorine reaction with water supply	28	20
Ethyl-benzene	Undetermined*	28	1
Methylene Chloride	Addressed with industry, possible lab contamination	28	1
Toluene	Addressed with commercial laundry	28	2
bis (2-ethylhexyl) phthalate	Sample container with preservative, plastic	28	8
Butyl benzylphthalate	Sample container with preservative, plastic	28	2
Diethylphthalate	Sample container with preservative, plastic	28	4
Isophorone	Undetermined*	28	1
Phenol	Undetermined*	28	23
4-Chloro-3-methylphenol	Undetermined*	28	1

*Presence of pollutant is believed to be due to use in consumer products.

In addition, it is believed that Formaldehyde could be present due to use by funeral homes/mortuaries and possibly from recreational vehicle discharges.

D. *If not previously submitted to the Division, provide the following on separate sheets:*

1. *A discussion of pretreatment provided by each significant industrial user and/or specific treatment, if any provided at the domestic treatment plan for any industrial waste received.*

   There are three significant industrial users that contribute waste to the City of Loveland WWTF. These include Super Vacuum Manufacturing Company, Circle Circuits Inc., and Woodward Governor Company. Information has previously been provided regarding Super Vacuum Manufacturing Company and Circle Circuits Inc. Super Vacuum Manufacturing Company uses chemical precipitation to pretreat a waste stream of approximately 500 gpd and Circle Circuits Inc. uses ion exchange to pretreat a waste stream of approximately 250 gpd.

   Woodward Governor received a new permit effective January 1, 2007. The permit was necessary due to a new process in use at the facility. Currently, Woodward Governor only uses pH adjustment to treat the waste stream. Woodward Governor is aware that additional treatment may be necessary.

2. *The estimated degree of reduction in the domestic facility of any relevant pollutant listed in Appendices A and B.*

   The attached table lists the anticipated reduction rates for the pollutants measured in the influent and/or effluent.

3. *A summary or outline of the procedures for monitoring and testing of industrial pollutants generated in the service area.*

   The City of Loveland samples all significant industrial user (IU) discharges once per year, in accordance with the terms of the current discharge permit. In addition to the required permit limits of annual sampling, quarterly sampling is performed for 40 CFR 122, Appendix D Table II parameters. The City of Loveland also samples a sewer trunk line once per quarter for a total of four trunk lines per year. If the City of Loveland identifies a potential issue with a parameter concentration, an evaluation of the situation is performed to determine if additional analysis and or investigation are necessary.

4. *A copy of any pretreatment ordinances and user charge schedules applicable to industrial contributors.*

   A copy of the City of Loveland's 2007 High Strength Sewer Surcharge Rates and the Municipal Ordinance for Wastewater Systems, Chapter 13.10 are attached.

5. *A discussion of any problems encountered with contributed industrial wastes and how these problems have been handled.*

   No problems have been encountered with contributed industrial wastes.

Amendment to the City of Loveland Approved Pretreatment Program

August 3, 2000

Re: *Identifying Industrial Users - (40 CFR 403.8(f)(2)(i)*

The purpose of this amendment is to update that City's Pretreatment Programs current method(s) to "identify and locate all possible Industrial Users which might be subject to the POTW Pretreatment Program"

The following reflects the present measures for identifying industrial users proposing to or connected to the City sewer system:

- A development review meeting takes place weekly to review proposed developments, annexations, and building additions or modifications. The applicant/user will be informed of any pretreatment devices, requirements, or information required in order to protect the sewer system and treatment plant. Any information or requirements previously required are followed up at the weekly meeting to see if the conditions were met.

JAN '04 - Began reviewing Building Permit applications BT 1/17/07

  Where necessary, the applicant/user will be required to complete a non residential discharge questionnaire in order to obtain specific information about the business or the proposed use.

- Obtain a monthly update from Utility Billing of new commercial customers that are receiving City services. The Coordinator will investigate to determine if the user will fall under the high strength sewer surcharge program and/or the pretreatment program. The user will be informed by letter which program(s) they fall under if applicable.(*)

- Review local newspaper.(*)

- Review the local phone book as necessary.(*)

- Drive through specific business/industrial areas in the City service area as needed, but not less than once per year.(*)

- Use the internet to conduct specific business category search and compare to list of industrial users as necessary.(*)

The Pretreatment program will maintain a file for each user that we request information from, receive information from, or contact in some other form (such as a complaint).

(*) = If necessary, the Industrial User will be required to complete a questionnaire/survey or supply information as directed to obtain information about their operation, processes, and/or discharge.

City of Loveland

Department of Water and Power

Service Center • 200 North Wilson Avenue • Loveland, CO 80537
(970) 962-3000 • Fax (970) 962-3400 • TDD (970) 962-2620
www.cityofloveland.org

July 14, 2006

Mr. Brian Kane, Manager
Plant Services
McKee Medical Center
2000 N. Boise Avenue
Loveland, Colorado 80538

Re: Wastewater discharge analysis

Brian:

The purpose of this letter is to provide you with a summary of the analysis from wastewater samples the City collected during the week of June 19, 2006. The sampling was performed in response to an Environmental Protection Agency action item from an audit conducted in March 2006. The samples were collected from the city manhole located in a landscaped area on the west side of the hospital (see attached schematic).

The City has determined that McKee Medical Center was in compliance with the local discharge limits at Section 13.10.205 of the Loveland Municipal Code. We find that no wastewater discharge permit is necessary at this time. We would like to bring to your attention two metals that could be of concern in the near future; aluminum and molybdenum (see attached summary of the analysis).

Considering the above the City request that McKee Medical Center evaluate the sources of these metals and report the findings to the City by August 15, 2006. In addition, please identify if the facility discharges wastewater to the sewer main on the north and east boundary of the facility and where that connection(s) is.

If you have any questions, or need to discuss this further, please call me at 962-3719.

Sincerely,

Bill Thomas
Pretreatment Coordinator

xc: Jen Quade, City of Loveland
Rebecca Hamblin, McKee Medical Center
File

enc.

McKee Medical Center (Hospital)

2000 N. Boise Avenue

Summary of Pollutant Analysis

Sample event conducted:

Monday June 20, 2006 - Thursday June 23, 2006

	Aluminum	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Moly	Nickel	Selenium	Silver	Zinc
6/19-20/2006	<0.01	<0.05	<0.01	<0.01	0.096	<0.073	<0.0001	0.0063	<0.03	<0.10	<0.03	0.22
6/20-21/2006	<0.01	<0.05	<0.01	<0.01	0.19	<0.073	<0.0001	0.089	<0.03	<0.10	<0.03	0.094 B
6/21-22/2006	<0.01	<0.05	<0.01	<0.01	0.11	<0.073	<0.0001	0.0076	<0.03	<0.10	<0.03	0.07
6/22-23/2006	0.23	<0.05	<0.01	<0.01	0.079	<0.073	<0.0001	0.070	<0.03	<0.10	<0.03	0.084 B

B = Analyte detected in the associated Method Blank, value not subtracted from result.

Loading (average pounds/day)

Meter #	Avg GPD	Moly (lbs)	
3912	49,000	0.0026	
19636	567	0.0004	
23158	1,167	0.0001	
38020	39,700	0.0232	
39870	0	0.0000	
	90,434	0.0262	Total

City of Loveland - Industrial Pretreatment Program
Summary of Influent Sampling Data

Influent mg/L

Date	608 Aldrin	608 4,4'-DDT	608 Endosulfan I	608 Endosulfan Sulfate	624 Bromo-methane	624 Chloroform	624 Ethyl-benzene	624 Methylene Chloride	624 Toluene	625 1,4-Dichloro-benzene	625 bis(2-ethylhexyl) phthalate	625 Butyl benzyl phthalate	625 Diethyl phthalate	625 Di-n-butyl-phthalate	625 Hexachloro-butadiene	625 Hexachloro-ethane	625 Isophorone	625 Phenol	625 4-Chloro-3-methylphenol
Mar-2000						0.007												0.026	
Jun-2000						0.007													
Aug-2000						0.005												0.015	
Nov-2000						0.005													
Dec-2000											0.018		0.016					0.064	
Mar-2001			0.0001			0.007							0.010					0.069	
May-2001			0.00012			0.006					0.080						0.015	0.036	
Aug-2001						0.0086			0.0053									0.015	
Nov-2001											0.025		0.011					0.026	
Feb-2002						0.0076		0.012					0.012					0.023	
May-2002	ND											0.002J		0.002J				0.024	
Jul-2002						0.0067						0.002J						0.022	
Nov-2002											0.011	0.002J						0.029	
Mar-2003											0.050J							0.030J	
Jun-2003						0.0068						0.003J						0.019	
Aug-2003											0.0028J							0.013	
Nov-2003										0.002J	0.0051	0.0017J						0.035	
Mar-2004					ND	0.0058					0.0026J							0.003J	
Jun-2004	0.00012	0.00014								0.0018J	0.0051							0.028	0.040
Sep-2004				0.000063														0.012	
Dec-2004						0.0029					0.0031J	0.0013J							
Mar-2005						0.0043			0.002	<0.005	0.0038J	0.009			<0.005	<0.005		0.025	
May-2005						0.0059					0.0030J							0.049	
Sep-2005						0.0045													
Dec-2005						0.0022												0.036	
Mar-2006						0.0041						0.0056						0.068	
Jun-2006						0.0041					0.0086							0.043	
Sep-2006						0.0040	0.0028											0.130	
Nov-2006						0.0032					0.0015		0.0034J					0.043	

J = estimated value below the LQL

City of Loveland - Industrial Pretreatment Program
Summary of Effluent Sampling Data

Effluent mg/L

Date	608 Aldrin	608 4,4'-DDT	608 Endosulfan I	608 Endosulfan Sulfate	624 Bromo-methane	624 Chloroform	624 Ethyl-benzene	624 Methylene Chloride	624 Toluene	625 1,4-Dichloro-benzene	625 bis(2-ethylhexyl) phthalate	625 Butyl benzyl phthalate	625 Diethyl phthalate	625 Di-n-butyl-phthalate	625 Hexachloro-butadiene	625 Hexachloro-ethane	625 Isophorone	625 Phenol	625 4-Chloro-3-methylphenol
Mar-2000						ND												ND	
Jun-2000						ND													
Aug-2000						ND												ND	
Nov-2000						ND													
Dec-2000											ND		ND					ND	
Mar-2001			ND			ND							ND					ND	
May-2001			0.0001								ND	ND					ND	ND	
Aug-2001						ND			ND									ND	
Nov-2001											ND		ND					ND	
Feb-2002						ND		ND					ND					ND	
May-2002	0.000065										ND	ND		ND				ND	
Jul-2002						ND					0.003J	ND						ND	
Nov-2002											ND	ND						ND	
Mar-2003											0.003J							ND	
Jun-2003						ND						ND						ND	
Aug-2003											ND							ND	
Nov-2003										ND	ND	ND						ND	
Mar-2004					0.011	0.0073					ND							ND	
Jun-2004	ND	ND								ND	ND							ND	ND
Sep-2004				ND														ND	
Dec-2004																			
Mar-2005						<0.002			<0.002	0.0018J	<0.005	<0.005			0.0035J	0.0023J		<0.005	
May-2005						<0.002					<0.005							<0.005	
Sep-2005						<0.002													
Dec-2005						<0.002												<0.0026	
Mar-2006																			
May-2006																			
Aug-2006																			
Nov-2006																			

J = estimated value below the LQL

% Removal

City of Loveland - Industrial Pretreatment Program
Influent / Effluent Removal Efficiency

Date	608 Aldrin	608 4,4'-DDT	608 Endosulfan I	608 Endosulfan Sulfate	624 Bromo-methane	624 Chloroform	624 Ethyl benzene	624 Methylene Chloride	624 Toluene	625 1,4-Dichloro-benzene	625 bis(2-ethylhexyl) phthalate	625 Butyl benzyl phthalate	625 Diethyl phthalate	625 Di-n-butyl-phthalate	625 Hexachloro-butadiene	625 Hexachloro-ethane	625 Isophorone	625 Phenol	625 4-Chloro-3-methylphenol
Mar-2000						100												100	
Jun-2000						100													
Aug-2000						100												100	
Nov-2000						100													
Dec-2000											100		100					100	
Mar-2001			100			100							100					100	
May-2001			17			100					100						100	100	
Aug-2001						100			100									100	
Nov-2001											100		100					100	
Feb-2002						100		100					100					100	
May-2002																		100	
Jul-2002						100												100	
Nov-2002											100							100	
Mar-2003																		100	
Jun-2003						100												100	
Aug-2003																		100	
Nov-2003											100							100	
Mar-2004						-26												100	
Jun-2004	100	100									100							100	100
Sep-2004				100														100	
Dec-2004						100													
Mar-2005						100			100			100						100	
May-2005						100												100	
Sep-2005						100													
Dec-2005						100												100	
Mar-2006						100						100						100	
Jun-2006						100					100							100	
Sep-2006						100	100											100	
Nov-2006						100					100							100	

City of Loveland
Pretreatment Program

Parameter	Inf/Eff Test Method	Biosolids Test Method
Antimony	200.7	SW6010
Arsenic	200.7	SW6010
Beryllium	200.7	SW6010
Cadmium	200.7	SW6010
Chromium	200.7	SW6010
Copper	200.7	SW6010
Lead	200.7	SW6010
Mercury	245.1	SW7470
Molybdenum	200.7	SW6010
Nickel	200.7	SW6010
Selenium	200.7	SW6010
Silver	200.7	SW6010
Thallium	200.7	SW6010
Zinc	200.7	SW6010
Cyanide	4500 CN-E	SW6010
Phenols	420.1	SW9071
TTOs	608, 624, 625	SW 8260B, 8270C, 8081/8082
O & G (total)	1664	SW9010
O & G (silica gel)	1664	SW9071
Total Solids	---	SW9065

Analysis conducted by: Evergreen Analytical Laboratory
4036 Youngfield Street
Wheat Ridge, CO 80033
(303) 425-6021

Chapter 13.10

WASTEWATER SYSTEM

This Chapter has been approved by City Council and is awaiting approval from Federal Emergency Management Association (FEMA).

13.10.101 Purpose and policy.

A. This Chapter 13.10 sets forth uniform requirements for all users of the Publicly Owned Treatment Works for the City of Loveland and enables the city to comply with all applicable state and federal laws, including the Clean Water Act (33 U.S.C. § 1251 et seq.) and the General Pretreatment Regulations (40 C.F.R. Part 403). The objectives of this chapter are:

1. To prevent the introduction of pollutants into the POTW that will interfere with its operation;
2. To prevent the introduction of pollutants into the POTW that will pass through it, inadequately treated, into receiving waters, or otherwise be incompatible with the POTW;
3. To enable the city to comply with its National Pollutant Discharge Elimination System (NPDES) permit conditions, sludge use, and disposal requirements, and all other state and federal laws to which the POTW is subject.
4. To promote reuse and recycling of industrial wastewater and sludge from the POTW; and

5. To protect the POTW personnel who may be affected by wastewater and sludge in the course of their employment. (Ord. 5143 § 1, 2006; Ord. 4156 § 1 (part), 1996)

B. This Chapter 13.10 authorizes the issuance of a wastewater discharge permit and other control mechanisms; provides for monitoring, compliance, and enforcement activities; establishes administrative review procedures; requires user monitoring and reporting; and provides for the setting of fees for the equitable distribution of costs resulting from the program established herein. (Ord. 5143 § 1, 2006; Ord. 4156 § 1 (part), 1996)

13.10.102 Administration.

Except as otherwise provided herein, the director shall administer, implement, and enforce the provisions of this Chapter 13.10. Any powers granted to or duties imposed upon the director may be delegated by the director to other water and power personnel. (Ord. 5143 § 1, 2006; Ord. 4156 § 1 (part), 1996)

13.10.103 Abbreviations.

The following abbreviations, when used in this Chapter 13.10, shall have the designated meanings:

CWA	Clean Water Act, 33 U.S.C. § 1251 *et seq.*
gpd	Gallons per day
mg/l	Milligrams per liter
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and maintenance
RCRA	Resource Conservation and Recovery Act

(Ord. 5143 § 1, 2006; Ord. 4156 § 1 (part), 1996)

13.10.104 Definitions.

Unless a provision explicitly states otherwise, the following terms and phrases, as used in this Chapter 13.10, shall have the meanings hereinafter designated.

A. Approval authority -- The appropriate EPA regional administrator, or upon approval of Colorado's pretreatment program, the chief administrator of such pretreatment program.

B. Authorized representative of the user --

1. If the user is a corporation:
   a. The president, secretary, treasurer, or a vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or
   b. The manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiate and direct other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; can ensure that the necessary systems are established or actions taken to gather complete and accurate information for control mechanism requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
2. If the user is a partnership or sole proprietorship: a general partner or proprietor, respectively.
3. The individuals described in subparagraphs B.1. and B.2., above, may designate another authorized representative if the authorization: is in writing by one of the individuals described in subparagraphs B.1. or B.2.; specifies the individual or position responsible for the overall operation of the facility from which the discharge originates, such as the position

of plant manager, operator of a well, or well field superintendent, or a position of equivalent responsibility, or having overall responsibility for environmental matters for the company; and is submitted to the city.

C. Best management practices or BMPs -- The activities, practices, operating, or maintenance procedures and treatment requirements necessary to meet the objectives of this Chapter 13.10 and to prevent or reduce prohibited discharges into the POTW.

D. Biochemical oxygen demand or BOD. The quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedures for five (5) days at 20 (centigrade, usually expressed as a concentration (e.g., mg/l).

E. Categorical Pretreatment Standard or Categorical Standard -- Any regulation containing pollutant discharge limits promulgated by EPA in accordance with Sections 307(b) and (c) of the Act (33 U.S.C § 1317) which apply to a specific category of users and which appear in 40 C.F.R Parts 405-471.

F. City -- The City of Loveland, Colorado.

G. Composite sample -- A sample formed either by continuous sampling or by mixing discrete samples. The sample may be a time proportional composite sample or a flow proportional composite sample. In cases in which a composite sample is not obtainable, a composite sample shall consist of a minimum of four (4) grab samples collected at equally spaced intervals.

H. Daily maximum discharge limit -- The maximum allowable discharge of a pollutant during a calendar day determined by the arithmetic average of all measurements of the pollutant taken that day.

I. Director -- The director of the department of water and power or his duly authorized representative.

J. Domestic wastewater --(i) Wastewater from normal residential activities including, but not limited to, wastewater from kitchen, bath, and laundry facilities; (ii) wastewater from the personal sanitary conveniences (toilets, showers, bathtubs, fountains, noncommercial sinks, and similar structures) of commercial, industrial, or institutional buildings, provided that the wastewater exhibits characteristics that are similar to those of wastewater from normal residential activities.

K. Enforcement Response Plan -- The plan that sets forth the specific actions the city will take to respond to violations of this Chapter 13.10.

L. Environmental Protection Agency or EPA -- The U.S. Environmental Protection Agency or, where appropriate, the Regional Water Management Division Director, or other duly authorized official of said agency.

M. Fats, oil, and grease or FOG -- A semi-solid, viscous liquid organic polar compound derived from animal or plant sources that contains multiple carbon chain triglyceride molecules. These substances are detectable and measurable using analytical test procedures established in 40 C.F.R. Part 136.

N. Food service establishment or FSE -- A facility engaged in preparing or serving food. This term does not include single-family residences.

O. Grab sample -- A sample which is taken from a wastestream without regard to the flow in the wastestream and over a period of time not to exceed fifteen (15) minutes.

P. Grease interceptor -- An outside, underground, multi-compartment tank designed to reduce the amount of fats, oil, and grease in the wastewater discharged to the POTW.

Q. Grease trap -- An indoor device designed to reduce the amount of fats, oil, and grease in wastewater discharged into the POTW. Grease traps usually serve no more than four (4) fixtures.

R. Grease removal device -- A grease trap, grease interceptor, or other device that is designed, constructed, and intended to remove, hold, or otherwise prevent the passage of fats, oil, and grease to the sanitary sewer.

S. Hauled waste -- Any domestic or nondomestic waste from holding tanks, including, without limitation, chemical toilets, vacuum pump tank trucks, and septic tanks. Hauled waste does not include domestic waste from an individual's recreational vehicle (e.g., camper or trailer).

T. Indirect discharge or discharge -- The introduction of pollutants into the POTW from any nondomestic source regulated under Section 307(b), (c), or (d) of the Clean Water Act.

U. Industrial user or user -- a source of indirect discharge.

V. Instantaneous measurement -- For monitoring requirements, a single reading, observation, or measurement independent of the industrial flow rate and the duration of the sampling event.

W. Interference -- A discharge that, alone or in conjunction with a discharge or discharges from other sources, both:

1. Inhibits or disrupts the POTW, its treatment processes or operations or its sludge processes, use or disposal; and
2. therefore is a cause of a violation of the city's NPDES permit or of the prevention of sewage sludge use or disposal in compliance with any of the following statutory or regulatory provisions or permits issued thereunder, or any more stringent state or local regulations: Section 405 of the Clean Water Act; the Solid Waste Disposal Act, including Title II, commonly referred to as the Resource Conservation and Recovery Act ; any state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the Solid Waste Disposal Act; the Clean Air Act; the Toxic Substances Control Act; and the Marine Protection, Research, and Sanctuaries Act.

X. Local limit -- Limit developed for a specific pollutant based on the quantity that the POTW can accept.

Y. Monthly average -- The maximum allowable discharge of a pollutant during a calendar month determined by the arithmetic mean of all samples collected during the calendar month.

Z. New source

1. Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced after the publication of proposed pretreatment standards under Section 307(c) of the Clean Water Act, which will be applicable to such source if such standards are thereafter promulgated in accordance with that section, provided that:
   a. The building, structure, facility, or installation is constructed at a site at which no other source is located; or
   b. The building, structure, facility, or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
   c. The production or wastewater generating processes of the building, structure, facility, or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant and the extent to which the new facility is engaged in the same general type of activity as the existing source should be considered.
2. Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility, or installation meeting the criteria of subsection Z.1.b. or c. above but otherwise alters, replaces, or adds to existing process or production equipment.
3. Construction of a new source as defined under this paragraph has commenced if the owner or operator has:
   a. begun, or caused to begin, as part of a continuous onsite construction program:
      i. any placement, assembly, or installation of facilities or equipment; or
      ii. significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities which is necessary for the placement, assembly, or installation of new source facilities or equipment; or

b. entered into a binding contractual obligation for the purchase of facilities or equipment which is intended to be used in its operation within a reasonable time. Options to purchase or contracts which can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation under this paragraph.

AA. Nondomestic wastewater -- Water carrying wastes from any process or activity of business, trade, manufacturing, industry, or service.

AB. Oil and sand removal device -- Trap, interceptor, or other city-approved device designed to remove petroleum products, sand, sediment, or similar substances.

AC. Pass through -- A discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the city's NPDES permit, including an increase in the magnitude or duration of a violation.

AD. Person -- Any individual, partnership, copartnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity, or any other legal entity; or their legal representatives, agents, or assigns. This definition includes all federal, state, and local governmental entities.

AE. Pollutant -- Includes, but is not limited to, dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, medical wastes, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, municipal, agricultural and industrial wastes, and certain characteristics of wastewater (*e.g.*, pH, temperature, TSS, turbidity, color, BOD, COD, toxicity, or odor).

AF. Pretreatment -- The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into the POTW. The reduction or alternation may be obtained by physical, chemical, or biological processes, process changes, or by other means except as prohibited by Section 13.10.207. Appropriate pretreatment technology includes control equipment, such as equalization tanks or facilities for protection against surges or slug loadings that might interfere with or otherwise be incompatible with the POTW. However, where wastewater from a regulated process is mixed in an equalization facility with unregulated wastewater or with wastewater from another regulated process, the effluent from the equalization facility must meet an adjusted pretreatment limit calculated in accordance with 40 C.F.R. 403.6(*e*).

AG. Pretreatment requirements -- Any substantive or procedural requirement related to pretreatment other than a pretreatment standard imposed on a user.

AH. Pretreatment standard or standard --Any regulation containing pollutant discharge limits promulgated by the EPA in accordance with Section 307(b) and (c) of the Clean Water Act, which applies to industrial users. This term includes prohibitive discharge limits established pursuant to 40 C.F.R. 403.5.

AI. Prohibited discharge standards or prohibited discharges -- Absolute prohibitions against the discharge of certain substances as set forth in Section 13.10.202.

AJ. Publicly owned treatment works or POTW -- A treatment works, as defined in Section 212 of the Clean Water Act (33 U.S.C §1292) which is owned by the city. This definition includes any devices or systems used in the storage, treatment, recycling, and reclamation of municipal sewage or industrial waste of a liquid nature and any sewers, pipes, and other conveyances which convey wastewater to the treatment plant.

AK. Significant Industrial User or SIU --

1. All industrial users subject to categorical pretreatment standards under 40 C.F.R. 403.6 and 40 C.F.R. Chapter I, Subchapter N; or
2. Any other industrial user that:

a. discharges an average of twenty-five thousand (25,000) gpd or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blowdown wastewater);
b. contributes a process wastestream which makes up five percent (5%) or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or
c. is designated as such by the city on the basis that it has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement.

3. Upon a finding that a user meeting the criteria in subsection AK.2. above has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the city may at any time, on its own initiative or in response to a petition received from a user, and in accordance with procedures in 40 C.F.R 403.8(f)(6), determine that such user should not be considered a significant industrial user.

AL. Slug discharge -- Any discharge at a flow rate or concentration which could cause a violation of the prohibited discharge standards in Section 13.10.202 or any discharge of a nonroutine, episodic nature including, but not limited to, an accidental spill or noncustomary batch discharge that has a reasonable potential to cause interference or pass through, or in any other way violate the POTW's regulations, local limits, or permit conditions.

AM. Wastewater -- Liquid and water-carried domestic and nondomestic wastes from residential dwellings, commercial buildings, industrial and manufacturing facilities, and institutions, whether treated or untreated, which are contributed to the POTW.

AN. Wastewater treatment plant or treatment plant -- That portion of the POTW which is designed to provide treatment (including recycling and reclamation) of municipal sewage and industrial waste. (Ord. 5143 § 1, 2006; Ord. 4933 § 1 (part) 2004)

13.10.201 Legal authority.

A. The city operates pursuant to legal authority enforceable in federal, state, or local courts, which authorizes or enables the city to apply and enforce the requirements of this Chapter 13.10 and 40 C.F.R Part 403. This authority allows the director to:

1. deny or condition new or increased contributions of pollutants, or changes in the nature of pollutants to the POTW by users where:
   a. such contributions do not meet applicable federal, state, or local pretreatment standards and requirements; or
   b. could cause the treatment plant to violate its NPDES permit; or
   c. could cause problems in the POTW.
2. control through permit, order, or similar means the wastewater contributions to the POTW by each user to ensure compliance with applicable pretreatment standards and requirements.
3. require compliance with applicable pretreatment standards and requirements by industrial users.
4. identify and locate all possible industrial users which might be subject to the pretreatment program. (Ord. 5143 § 1, 2006; Ord. 4156 § 2 (part), 1996)

13.10.202 Prohibited discharge standards.

A. General prohibitions. No user may introduce or cause to be introduced into the POTW any pollutant(s) which causes pass through or interference. These general prohibitions apply to all users of the POTW whether or not they are subject to categorical pretreatment standards or any other federal, state, or local pretreatment standards or requirements.

B. Specific prohibitions. No user shall introduce or cause to be introduced into the POTW the following pollutants, substances, or wastewater:

1. Pollutants which create a fire or explosive hazard in the POTW including, but not limited to, wastestreams with a closed-cup flashpoint of less than 140° F (60° C) using the test methods specified in 40 C.F.R 261.21;
2. Pollutants which will cause corrosive structural damage to the POTW, but in no case discharges with a pH less than 5.0;
3. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the POTW resulting in interference;
4. Any pollutant, including oxygen-demanding pollutants (BOD, etc.), released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the POTW;
5. Wastewater having a temperature which will inhibit biological activity in the treatment plant resulting in interference, but in no case wastewater which causes the temperature at the introduction into the treatment plant to exceed 104° F (40° C);
6. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin, in amounts that will cause interference or pass through;
7. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems;
8. Any trucked or hauled pollutants, except at discharge points designated by the director in accordance with Section 13.10.304;
9. Noxious or malodorous liquids, gases, solids, or other wastewater which, either singly or by interaction with other wastes, are sufficient to create a public nuisance or a hazard to life, or to prevent entry into the sewer for maintenance or repair;
10. Wastewater which imparts color which cannot be removed by the treatment plant process which consequently imparts color to the treatment plant effluent;
11. Wastewater containing any radioactive wastes or isotopes except in compliance with applicable state or federal regulations;
12. Sludges, screenings, or other residues from the pretreatment of industrial wastes;
13. Wastewater causing, alone or in conjunction with other sources, the treatment plant effluent to fail a toxicity test;
14. Wastewater causing two (2) readings on an explosion hazard meter at the point of discharge into the POTW, or at any point in the POTW, of more than five percent (5%) or any single reading over ten percent (10%) of the lower explosive limit of the meter;
15. Detergents, surface-active agents, or other substances which may cause excessive foaming in the POTW.

C. Users processing, storing, or handling pollutants, substances, or wastewater prohibited by this Section 13.10.202 in such a manner that they could be discharged to the POTW may be required to develop a slug control plan in accordance with Section 13.10.303. (Ord. 5143 § 1, 2006; Ord. 4156 § 2 (part), 1996)

13.10.203 National categorical pretreatment standards.

The categorical pretreatment standards found at 40 C.F.R Chapter I, Subchapter N, Parts 405-471 are hereby incorporated.

A. Where a categorical pretreatment standard is expressed only in terms of either the mass or the concentration of a pollutant in wastewater, the director may impose equivalent concentration or mass limits in accordance with 40 C.F.R 403.6(c).

B. When wastewater subject to a categorical pretreatment standard is mixed with wastewater not regulated by the same standard, the director may impose an alternate limit using the combined wastestream formula at 40 C.F.R 403.6(e).

C. A user may obtain a net gross adjustment to a categorical standard in accordance with 40 C.F.R 403.15. (Ord. 5143 § 1, 2006; Ord. 4156 § 2 (part), 1996)

13.10.204 State pretreatment standards.

State pretreatment standards and requirements adopted pursuant to the Colorado Water Quality Control Act shall apply in any case where they are more stringent than federal standards. (Ord. 5143 § 1, 2006; Ord. 4156 § 2 (part), 1996)

13.10.205 Local limits.

The following pollutant limits are established to protect against pass through and interference. No significant industrial user shall discharge wastewater containing in excess of the following daily maximum allowable discharge limits:

Arsenic	0.15 mg/l	Mercury	0.0002 mg/l
Cadmium	0.08 mg/l	Molybdenum	0.49 mg/l
Chromium	1.10 mg/l	Nickel	1.95 mg/l
Chromium (VI)	0.59 mg/l	Selenium	0.37 mg/l
Copper	1.94 mg/l	Silver	0.19 mg/l
Cyanide	0.65 mg/l	Zinc	6.28 mg/l
Lead	0.92 mg/l		

All concentrations for the pollutants listed are for total unless indicated otherwise. The director may impose mass limitations in addition to, or in place of, the concentration-based limitations above. The director may develop limits for other users, as appropriate, to protect against pass through and interference. (Ord. 5143 § 1, 2006; Ord. 4156 § 2 (part), 1996)

13.10.206 City's right of revision.

The city reserves the right to establish, by ordinance, resolution, in a wastewater discharge permit, or other appropriate means, more stringent or additional standards or requirements to protect the POTW. (Ord. 5143 § 1, 2006)

13.10.207 Dilution.

Except where expressly authorized to do so by an applicable pretreatment standard or requirement, no user shall ever increase the use of process water, or in any way attempt to dilute a discharge, as a partial or complete substitute for adequate treatment to achieve compliance with a discharge limitation unless expressly authorized by an applicable pretreatment standard or requirement. The director may impose mass limitations on an industrial user who is using dilution to meet applicable pretreatment standards or requirements, or in other cases when the imposition of mass limitations is appropriate. (Ord. 5143 § 1, 2006)

13.10.301 Pretreatment facilities.

A. Users shall provide wastewater treatment as necessary to comply with this Chapter 13.10 and shall achieve compliance with all categorical pretreatment standards, local limits, and the prohibitions set out in Sections 13.10.202 through 13.10.205 within the time limitations specified by EPA, the state, or the director, whichever is more stringent. Any facilities necessary for compliance shall be provided, operated, and maintained at the user's expense. The director may require that detailed plans describing such facilities and operating procedures be submitted for review, and shall be acceptable to the city before such facilities are constructed. The review of such plans and operating procedures shall in no way relieve the user from the responsibility of modifying such facilities as necessary to produce a discharge acceptable to the city under the provisions of this Chapter 13.10.

B. The director may require a user to install sampling, monitoring, or other appropriate pretreatment equipment as necessary to assure compliance with the pretreatment standards and requirements.

The equipment shall be maintained at all times in a safe and proper operating condition by the user at its own expense. (Ord. 5143 § 1, 2006)

13.10.302 Additional pretreatment measures.

A. Whenever deemed necessary, the director may require that a user's wastewater be discharged only into specific sewers, separate domestic wastestreams from industrial wastestreams, and such other conditions as may be necessary to protect the POTW and determine the user's compliance with the requirements of this Chapter 13.10.

B. Backflow prevention devices shall be installed and maintained by the user wherever there is a possibility of the user's process or activity contaminating the city water supply. Such devices shall be tested, inspected, and repaired as needed by the user at its expense.

C. Oil and sand removal devices and grease removal devices.

1. Oil and sand removal devices shall be provided when, in the opinion of the director, they are necessary for the proper handling of wastewater containing excessive amounts of oil, sand, or similar material; except that such devices shall not be required for residential users. All such devices shall be of type and capacity approved by the city and shall be so located to be easily accessible for cleaning and inspection. Such devices shall be inspected, cleaned, and maintained, as needed, by the user at its expense.
2. Grease removal devices shall be provided in accordance with Section 13.10.305.

D. Users with the potential to discharge flammable substances may be required to install proper treatment equipment or an approved combustible gas detection meter.

E. Individual water meters, sub-meters, or flow meters shall be installed where the director has determined it is necessary to ascertain flow data. Such devices shall be tested, inspected, and repaired as needed by the user at its expense. (Ord. 5143 § 1, 2006)

13.10.303 Accidental discharge; slug control plans.

A. Each user shall provide protection from accidental discharge of substances that have a reasonable potential to violate the POTW's regulations, local limits, or permit conditions.

B. The director shall evaluate whether a significant industrial user needs a plan or other action to control slug discharge within one (1) year of being designated a significant industrial user.

C. The director may require any user to develop, submit for approval, and implement a slug control plan or best management practices plan. If the director decides that a slug control plan is needed, the plan shall address, at a minimum, the following elements:

1. Description of discharge practices, including nonroutine batch discharges;
2. Description of stored chemicals;
3. Procedures for immediately notifying the POTW of slug discharge, including any discharge that would violate a prohibition under Section 13.10.202.B, with procedures for follow-up written notification within five (5) days as required by Section 13.10.606; and
4. If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment for emergency response.

D. A notice shall be posted in a prominent place advising which employees who to call in the event of a discharge described in subsection 13.10.303.A, above. Employers shall ensure that all employees who may cause such a discharge to occur are advised of the emergency notification procedure.

E. Significant industrial users are required to notify the POTW immediately of any changes at their facilities affecting potential for a slug discharge. (Ord. 5143 § 1, 2006)

13.10.304 Hauled waste.

A. Any hauled waste meeting the definition of a RCRA hazardous waste as defined in 40 C.F.R 261 will not be accepted.

B. The director may accept hauled wastes on a case-by-case basis and may require such haulers to obtain a wastewater discharge permit. Hauled waste is subject to all the requirements of this Chapter 13.10. Hauled waste may only be discharged at locations designated by the director. No load may be discharged without prior consent of the director. The director may collect samples of each hauled load to ensure compliance with applicable standards. The director may require the waste hauler to provide a waste analysis of any load or a waste-tracking form for every load prior to discharge. (Ord. 5143 § 1, 2006)

13.10.305 Fats, oil, and grease management.

A. Applicability. This Section 13.10.305 shall apply to all food service establishments connected to the POTW when, in the opinion of the director, it is necessary to prevent fats, oil, and grease in quantities sufficient to cause sanitary sewer line restriction or necessitate increased POTW maintenance.

1. New food service establishments. All new food service establishments shall be required to install a grease removal device as set forth in Section 13.10.305.B. prior to commencing discharge to the POTW.
2. Existing food service establishments.
   a. Unless otherwise exempted under subsection A.2.b., below, all food service establishments in existence prior to November 1, 2004 shall install a grease removal device within the timeline specified by the director after notification that such a device is required. A grease removal device shall be required if:
      i. the food service establishment does not have a grease removal device and is discharging to the POTW wastewater containing fats, oil, and grease in quantities sufficient to cause sanitary sewer line restriction or necessitate increased POTW maintenance;
      ii. the existing grease removal device, in combination with best management practices, does not cause a reduction in the quantity of fats, oil, and grease sufficient to prevent sanitary sewer line restriction or POTW maintenance; or
      iii. the food service establishment changes in nature or is renovated in such a manner as to increase the likelihood of discharging to the POTW wastewater contributing fats, oil, and grease in quantities sufficient to cause sanitary sewer line restriction or necessitate increased POTW maintenance.
   b. Existing food service establishments that are unable to comply with this Section 13.10.305 due to site or plumbing constraints which make compliance impossible or financially impracticable shall apply in writing to the director for an exemption, which may be granted by the director in his sole discretion. The written request shall include the reason(s) why the food service establishment cannot comply with this Section 13.10.305 and steps the food service establishment will take to prevent sanitary sewer line restriction and increased POTW maintenance.

A. Grease removal device requirements.

1. Grease interceptors. Unless exempted under subsection B.2, below, food service establishments shall install grease interceptors. Grease interceptors shall be 750 gallon minimum capacity and provide a minimum of thirty (30) minutes retention time at total peak flow and must be maintained and installed in accordance with manufacturer's instructions and all applicable laws. The maximum size shall be 2,500 gallons; a series of interceptors may be necessary for grease interceptor capacities greater than 2,500 gallons based on cleaning and maintenance frequency. Grease interceptors shall be located to provide easy access for cleaning and inspection.

2. Grease traps. A food service establishment may install a grease trap in satisfaction of the requirements set forth in subsection A., above, if the director determines that the food service establishment is discharging to the POTW wastewater containing fats, oil, and grease in such small amounts that a grease interceptor is not warranted or that installation of a grease interceptor is not feasible. At minimum, grease traps shall be fifty (50) gpm flow rated or provide 100 pound grease retention and must be maintained and installed in accordance with manufacturer's instructions and all applicable laws. Grease traps shall be located to provide easy access for cleaning and inspection. A flow restriction device shall be placed upstream of the grease trap and must be accessible for cleaning and inspection.
3. Other grease removal devices may be allowed if it is shown that an alternative pretreatment technology is equally effective in controlling the discharge of fats, oil, and grease. The director will evaluate the proposed use of other grease removal devices on a case-by-case basis and set appropriate maintenance and recording keeping requirements as needed.
4. Unless directed otherwise, a professional engineer registered in the State of Colorado shall size and provide documentation to the city to support the proposed grease removal device size.
5. Certification. If required by the city, an engineer licensed by the State of Colorado shall file a written, signed certification with the director stating that the required grease removal device has been installed and all sources of fats, oil, and grease are discharging to the device before discharging wastewater to the POTW.

B. Best management practices. Food service establishments shall use best management practices designed to reduce the amount of wastewater containing fats, oil, and grease discharged into the POTW. These include:
1. implementing a comprehensive employee training program on the problems associated with fats, oil, and grease and their proper disposal;
2. disconnecting or minimizing the use of garbage disposals;
3. installing a 1/8" or 3/16" mesh screen over all kitchen sinks, mop sinks, and floor sinks;
4. using "dry" clean-up methods, including scraping or soaking up fats, oil, and grease from plates and cookware before washing;
5. using pre-wash sinks to clean plates and cookware;
6. recycling fats, oil, and grease and beneficial food waste when possible;
7. pouring remaining liquid fats, oil, and grease from pots, pans, and other cookware into containers to be disposed of in the trash once congealed; and
8. posting BMPs in the food preparation and dishwashing areas at all times.

C. Maintenance.
1. Grease removal devices shall be inspected, cleaned, and maintained in proper working order at all times by the user at its expense.
2. Grease interceptor maintenance.
   a. Grease interceptors in active use shall be cleaned at least once every three (3) months or when the total accumulation of surface fats, oil, and grease (including floating solids) and settled solids reaches twenty-five percent (25%) of the grease interceptor's overall liquid depth, whichever occurs first.
   b. In the event that a grease interceptor is larger than the capacity of a vacuum truck, the interceptor shall be completely evacuated within a twenty-four (24) hour period. The user's documentation shall accurately reflect each pumping event.
3. Grease trap maintenance. Grease traps shall be serviced at least one (1) time per month or when the amount of waste captured reaches twenty-five percent (25%) of the trap's capacity, whichever occurs first. Removable baffles shall be removed and cleaned during the maintenance process.

4. Other grease removal devices. Facilities with grease removal devices other than grease interceptors or grease traps shall follow the director's maintenance and recordkeeping requirements as directed in Section 13.10.305.B.3.
5. The director may require that a grease removal device be cleaned more frequently than set forth in this Section 13.10.305.D. if the cleaning frequency set forth herein is found to be inadequate. The director may change the required maintenance frequency to reflect changes in actual operating conditions.
6. After each cleaning, the food service establishment shall inspect the device to verify that:
   a. the contents of the device have been fully evacuated and that no liquids, semi-solids, or solids were discharged back into the device after cleaning; and
   b. the interior components of the device are in proper working order.
7. Food service establishments shall require the liquid waste hauler, transporter, or any other person cleaning or servicing a grease removal device to completely evacuate all contents, including floating materials, wastewater, bottom solids, and accumulated waste on the walls of the grease removal device. Waste must be disposed of in accordance with federal, state, and local laws.
8. Cleaning frequency variance. Any food service establishment desiring a cleaning schedule less frequent than that required in this Section 13.10.305.D. shall submit a request to the director along with the maintenance records for the last four (4) grease interceptor cleanings, or last eight (8) grease trap cleanings, including measurements of the thickness of the floating fats, oil, and grease and bottom solids layer, and total volume removed. A reduction in cleaning frequency may be granted by the director when it has been determined that the grease interceptor has adequate detention time for fats, oil, and grease removal. The cleaning frequency will depend on variables such as the capacity of the device, the amount of grease in the wastewater, the amount of solids in the wastewater, and the degree of adherence to BMPs.

D. Prohibitions. The following are strictly prohibited:
1. Connecting garbage grinders, garbage disposals, and dishwashers to grease traps.
2. Discharging wastewater to a grease trap in excess of 140° Fahrenheit.
3. Altering or tampering with a grease removal device.
4. Discharging or permitting another to discharge any liquid, semi-solid, or solid back into a grease removal device at any time during maintenance or cleaning operations.
5. Discharging or permitting another to discharge any grease removal device wastes into any drain, public or private sewer, or other grease removal device.
6. Using hot water or chemicals, bacteria, enzymes, or other products to emulsify fats, oil, and grease prior to discharging wastewater into the POTW; provided, however, that products may be added to floor drains and other kitchen fixtures to keep the plumbing between the kitchen and the grease removal device clear if such products are used according to their labels and do not interfere with the operation or performance of the grease removal device. Labels and other product descriptions must be kept on file with the food service establishment for at least three (3) years. (Ord. 5143 § 1, 2006)

13.10.401 Permit requirement.

A. No significant industrial user shall discharge wastewater into the POTW without first obtaining a wastewater discharge permit from the director, except that an SIU that has filed a timely application pursuant to Section 13.10.403 may continue to discharge for the time period specified therein.

B. The director may require other users to obtain a wastewater discharge permit as necessary to carry out the purposes of this Chapter 13.10.

C. Any violation of the terms and conditions of a wastewater discharge permit shall be deemed a violation of this ordinance and subjects the wastewater discharge permittee to the sanctions set out in Sections 13.10.111, 13.10.121, and 13.10.122.

D. Obtaining a wastewater discharge permit does not relieve a permittee of its obligation to comply with all federal and state pretreatment standards or requirements or with any other requirements of federal, state, and local law. (Ord. 5143 § 1, 2006)

13.10.402 Discharge permitting.

A. Existing connections -- Any user required to obtain a wastewater discharge permit who was discharging wastewater into the POTW prior to January 1, 2007 and who wishes to continue such discharges in the future, shall, within thirty (30) days after said date, apply to the director for a wastewater discharge permit in accordance with Section 13.10.403, and shall not cause or allow discharges to the POTW to continue after ninety (90) days of January 1, 2007, except in accordance with a wastewater discharge permit issued by the director.

B. New connections -- Any user required to obtain a wastewater discharge permit who proposes to begin or recommence discharging into the POTW must obtain such permit prior to the beginning or recommencing of such discharge. An application for this wastewater discharge permit, in accordance with Section 13.10.403, must be filed at least ninety (90) days prior to the date upon which any discharge will begin or recommence. (Ord. 5143 § 1, 2006)

13.10.403 Permit application contents.

All users required to obtain a wastewater discharge permit must submit a permit application. The director may require all users to submit as part of an application the following information:

A. Information required under 40 C.F.R 403.12(b) of the general pretreatment regulations (e.g., owner information, pollutant and flow measurements);

B. A description of plant processes and list of all raw materials and chemicals used or stored at the facility;

C. Number of employees, hours of operation, and proposed or actual hours of operation;

D. Product(s) produced and service(s) provided;

E. Site plans, floor plans, plumbing plans, and details to show all sewers, floor drains, and all points of discharge;

F. Time and duration of discharges; and

G. Any other information as may be deemed necessary by the director to evaluate the wastewater discharge permit application. Incomplete or inaccurate applications will be returned to the user for revision. (Ord. 5143 § 1, 2006)

13.10.404 Wastewater analysis.

When requested by the director, a user must submit information on the nature and characteristics of its wastewater within the time specified by the director. The director is authorized to prepare a form for this purpose and may periodically require users to update this information. (Ord. 5143 § 1, 2006)

13.10.405 Signatures and certification.

When required, user applications, surveys, questionnaires, and reports must be signed by an authorized representative of the user as defined in Section 13.10.104.B. and contain the following certification statement:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for

submitting false information, including the possibility of fine and imprisonment for knowing violations. (Ord. 5143 § 1, 2006)

13.10.406 Permit decisions.

The director will evaluate the data furnished by the user and may require additional information. Within thirty (30) days of receipt of a complete wastewater discharge permit application, the director will determine whether or not to issue a wastewater discharge permit. The director may deny any application for a wastewater discharge permit. (Ord. 5143 § 1, 2006)

13.10.501 Permit duration.

A wastewater discharge permit will be issued for a period no greater than five (5) years from the date of issuance. Each wastewater discharge permit will indicate a specific date upon which it will expire. (Ord. 5143 § 1, 2006)

13.10.502 Permit contents.

A. A wastewater discharge permit shall include such conditions as are deemed reasonably necessary by the director to prevent pass through or interference, protect the quality of the water body receiving the treatment plant's effluent, protect worker health and safety, facilitate sludge management and disposal, and protect against damage to the POTW.

B. A wastewater discharge permit shall allow the director to carry out the requirements of this Chapter 13.10 and 40 C.F.R Part 403. (Ord. 5143 § 1, 2006)

13.10.503 Permit appeals.

A. The permittee may petition the director to reconsider the terms of a wastewater discharge permit within thirty (30) calendar days of notice of its issuance.

1. Failure to submit a timely petition for review shall be deemed to be a waiver of the administrative appeal.
2. In its petition, the appealing party must indicate the wastewater discharge permit provisions objected to, the reasons for the objection, and the alternative condition, if any, it seeks to place in the wastewater discharge permit.

B. If the director fails to act within sixty (60) days, a request for reconsideration shall be deemed to be denied. Decisions not to reconsider a wastewater discharge permit, not to issue a wastewater discharge permit, or not to modify a wastewater discharge permit shall be considered final administrative actions for purposes of judicial review. (Ord. 5143 § 1, 2006)

13.10.504 Permit modification.

A. The director may modify a wastewater discharge permit for good cause, including, but not limited to, the following reasons:

1. To incorporate any new or revised federal, state, or local pretreatment standards or requirements;
2. To address significant alterations or additions to the user's operation, processes, or wastewater volume or character since the time of wastewater discharge permit issuance;
3. A change to the POTW's NPDES permit; or
4. To correct typographical or other errors in the wastewater discharge permit. (Ord. 5143 § 1, 2006)

13.10.505 Permit transfer.

A. Wastewater discharge permits may be transferred to a new owner or operator only if the director approves the wastewater discharge permit transfer. The new owner or operator shall submit a written certification to the director which:

1. States that the new owner and/or operator have no intent to change the facility's operations and processes within ninety (90) days after the transfer;
2. Identifies the specific date on which the transfer is to occur; and
3. Acknowledges full responsibility for complying with the existing wastewater discharge permit.

B. Failure to provide advance notice of a transfer renders the wastewater discharge permit void as of the date of facility transfer. (Ord. 5143 § 1, 2006)

13.10.506 Permit revocation.

Any user who violates the provisions of this Chapter 13.10 or the conditions of the permit is subject to having the permit revoked. (Ord. 5143 § 1, 2006)

13.10.507 Permit reissuance.

A. A user with an expiring wastewater discharge permit shall apply for a wastewater discharge permit reissuance by submitting a complete permit application, in accordance with Section 13.10.403, a minimum of sixty (60) days prior to the expiration of the user's existing wastewater discharge permit. A permit may be extended beyond its expiration date, but in no case shall the permit exceed five (5) years from the date it was issued.

B. A wastewater discharge permit issued to a particular user is void upon the issuance of a new wastewater discharge permit to that user. (Ord. 5143 § 1, 2006)

13.10.508 Other jurisdictions.

A. If another jurisdiction, or user located within another jurisdiction, contributes wastewater to the POTW, the city shall enter into an intergovernmental agreement with the contributing jurisdiction.

B. Such intergovernmental agreement shall ensure that discharges received from entities outside of the city's jurisdictional boundaries are regulated to the same extent as are discharges from within the city's jurisdictional boundaries.

C. Such intergovernmental agreement shall also include approval of such contributing jurisdiction as to the territory in which service is to be rendered by the city. (Ord. 5143 § 1, 2006)

13.10.601 Baseline monitoring reports.

A. Within one hundred eighty (180) days after the effective date of a categorical pretreatment standard, or the final administrative decision on a category determination under 40 C.F.R 403.6(a)(4), whichever is later, existing categorical users currently discharging to or scheduled to discharge to the POTW shall submit to the director a report which contains the information listed at 40 C.F.R 403.12(b)(1)-(7). Sampling types shall be as specified at 40 C.F.R. 403.12(g)(3) and (4).

B. At least ninety (90) days prior to commencement of discharge, new sources, and sources that become categorical users subsequent to the promulgation of an applicable categorical standard, shall submit to the director a report which contains the information listed 40 C.F.R 403.12(b)(1)-(5). Sampling types shall be as specified at 40 C.F.R. 403.12(g)(3) and (4). A new source shall report the method of pretreatment it intends to use to meet applicable categorical standards. A new source also shall give estimates of its anticipated flow and quantity of pollutants to be discharged. (Ord. 5143 § 1, 2006)

13.10.602 Compliance schedule.

If additional pretreatment and/or operation and maintenance will be required to meet the pretreatment standards, the user shall submit to the director the shortest schedule by which the user will provide such additional pretreatment and/or operation and maintenance to meet the pretreatment standards and requirements. The completion date in this schedule shall not be later than the compliance

date established for the applicable pretreatment standard. A compliance schedule pursuant to this Section 13.10.602 must meet the requirements contained at 40 C.F.R 403. (Ord. 5143 § 1, 2006)

13.10.603 Reports on compliance.

Within ninety (90) days following the date for final compliance with applicable categorical pretreatment standards, or in the case of a new source following commencement of the introduction of wastewater into the POTW, any user subject to pretreatment standards and requirements shall submit to the director a report containing the information described in 40 C.F.R 403.12(b)(4)-(6) using the sampling types specified at 40 C.F.R. 403.12(g)(3) and (4). All compliance reports must be signed and certified in accordance with Section 13.10.405. (Ord. 5143 § 1, 2006)

13.10.604 Compliance reports.

A. All significant industrial users shall, at a frequency determined by the director but in no case less than once per six (6) months, submit a report indicating the nature and concentration of pollutants in the discharge which are limited by pretreatment standards and the measured or estimated average and/or maximum daily flow for the reporting period. All periodic compliance reports must be signed and certified in accordance with Section 13.10.405.

B. All wastewater samples must be representative of the user's discharge. The failure of a user to keep its monitoring facility in good working order shall not be grounds for the user to claim that sample results are unrepresentative of its discharge.

C. If a user subject to the reporting requirement in this Section 13.10.604 monitors any pollutant more frequently than required by the director, using the procedures prescribed in Section 13.10.610, the results of this monitoring shall be included in the report. (Ord. 5143 § 1, 2006)

13.10.605 Reports of changed conditions.

All industrial users shall promptly notify the director in advance of any planned substantial changes in the volume or character of pollutants of its discharge including the listed or characteristic hazardous wastes for which the industrial user has submitted initial notification under Section 13.10.609. (Ord. 5143 § 1, 2006)

13.10.606 Reports of potential problems.

A. In the case of any discharge, including, but not limited to, a noncustomary batch discharge or a slug discharge, that may cause potential problems for the POTW, the user shall immediately telephone and notify the director of the incident. This notification shall include, at a minimum, the location of the discharge, type of waste, concentration and volume, and corrective actions taken by the user.

B. Within five (5) days following such discharge, the user shall, unless waived by the director, submit a detailed written report describing the cause(s) of the discharge and the measure(s) to be taken by the user to prevent similar future occurrences. Such notification shall not relieve the user of any expense, loss, damage, or other liability which may be incurred as a result of damage to the POTW, natural resources, or any other damage to person or property; nor shall such notification relieve the user of any fines, penalties, or other liability which may be imposed pursuant to this Chapter 13.10. (Ord. 5143 § 1, 2006)

13.10.607 Reports and information.

All users connected to, or proposing to connect to, the POTW shall provide appropriate reports, or information to the director as the director may require in order to achieve the requirements of this Chapter 13.10. (Ord. 5143 § 1, 2006)

13.10.608 Notice of violation; repeat sampling and reporting.

If sampling performed by a user indicates a violation, the user must notify the director within twenty-four (24) hours of becoming aware of the violation. The user shall also repeat the sampling and analysis and submit the results of the repeat analysis to the director within thirty (30) days after becoming aware of the violation. (Ord. 5143 § 1, 2006)

13.10.609 Discharge of hazardous waste.

A. Any user who commences the discharge of hazardous waste shall notify the POTW, the EPA Regional Waste Management Division Director, and state hazardous waste authorities, in writing, of any discharge into the POTW of a substance which, if otherwise disposed of, would be a hazardous waste under 40 C.F.R Part 261. Such notification must include the information specified in 40 C.F.R 403.12(p) and the pretreatment SOP.

B. Dischargers are exempt from the requirements of paragraph A, above, during a calendar month in which they discharge no more than fifteen (15) kilograms of hazardous wastes, unless the wastes are acute hazardous wastes as specified in 40 C.F.R 261.30(d) and 261.33(e). Discharge of more than fifteen (15) kilograms of nonacute hazardous wastes in a calendar month, or of any quantity of acute hazardous wastes as specified in 40 C.F.R 261.30(d) and 261.33(e), requires a one-time notification. Subsequent months during which the user discharges more than such quantities of any hazardous waste do not require additional notification.

C. In the case of any new regulations under Section 3001 of RCRA identifying additional characteristics of hazardous waste or listing any additional substance as a hazardous waste, the user must notify the POTW, the EPA Regional Waste Management Waste Division Director, and State hazardous waste authorities of the discharge of such substance within ninety (90) days of the effective date of such regulations.

D. In the case of any notification made under this section, the user shall certify that it has a program in place to reduce the volume and toxicity of hazardous wastes generated to the degree it has determined to be economically practical.

E. This provision does not create a right to discharge any substance not otherwise permitted to be discharged by this Chapter 13.10, a permit issued thereunder, or any applicable Federal or State law. (Ord. 5143 § 1, 2006)

13.10.610 Analytical requirements.

All pollutant analyses, including sampling techniques, to be submitted as part of a wastewater discharge permit application or report shall be performed in accordance with the techniques prescribed in 40 C.F.R Part 136, unless otherwise specified in an applicable categorical pretreatment standard. If 40 C.F.R Part 136 does not contain sampling or analytical techniques for the pollutant in question, sampling and analyses must be performed in accordance with procedures approved by EPA. (Ord. 5143 § 1, 2006)

13.10.611 Sample collection.

A. Except as indicated in Section B, below, a user must collect wastewater samples using flow proportional composite collection techniques. In the event flow proportional sampling is infeasible, the director may authorize the use of time proportional sampling or a minimum of four (4) grab samples where the user demonstrates that this will provide a representative sample of the effluent being discharged.

B. Grab samples must be used for oil and grease, temperature, pH, cyanide, total phenols, and volatile organic compounds. Temperature and pH must be an instantaneous measurement.

C. Samples shall be collected using protocols (including appropriate preservation) specified in 40 C.F.R. Part 136, approved EPA methodologies, and appropriate EPA guidance. (Ord. 5143 § 1, 2006)

13.10.612 Reports received.

Reports will be deemed to have been submitted on the date postmarked. For reports which are not postmarked the date of receipt of the report shall govern. (Ord. 5143 § 1, 2006)

13.10.613 Record keeping.

A. Users subject to the reporting requirements of this ordinance shall retain, and make available for inspection and copying, all records of information obtained pursuant to any monitoring activities required by this ordinance and any additional records of information obtained pursuant to monitoring activities undertaken by the user independent of such requirements.

B. Records shall include, at a minimum, the date, exact place, method, and time of sampling, and the name of the person(s) taking the sample(s); the dates analyses were performed; who performed the analyses; the analytical techniques or methods used; and the results of such analyses.

C. These records shall remain available for a period of at least three (3) years. This period shall be automatically extended for the duration of any litigation concerning the user or the city, or where the user has been specifically notified of a longer retention period by the director. (Ord. 5143 § 1, 2006)

13.10.701 Right of entry: inspection and sampling.

A. The director shall have the right to enter the premises of any user to determine whether the user is complying with all requirements of this Chapter 13.10 and any wastewater discharge permit or order issued hereunder. Users shall allow the director ready access to all parts of the premises for the purposes of inspection, sampling, records examination and copying, noncompliance investigation, and the performance of any additional duties.

B. Where a user has security measures in force which require proper identification and clearance before entry into its premises, the user shall make necessary arrangements with its security personnel so that, upon presentation of suitable identification, the director will be permitted to enter without delay for the purposes of performing specific responsibilities.

C. Unreasonable delays in allowing the director access to the user's premises shall be considered a violation of this Chapter 13.10. (Ord. 5143 § 1, 2006)

13.10.702 Search warrants.

If the director has been refused access to a building, structure, or property, or any part thereof, and is able to demonstrate probable cause to believe that there may be a violation of this Chapter 13.10, or that there is a need to inspect and/or sample to verify compliance with this Chapter 13.10 or any permit or order issued hereunder, or to protect the overall public health, safety and welfare of the community, the director may seek issuance of a search warrant from the court with appropriate jurisdiction. (Ord. 5143 § 1, 2006)

13.10.801 Confidentially.

A. Information and data on a user obtained from reports, surveys, permit applications, discharge permits and monitoring programs, and from inspection and sampling activities, shall be available to the public without restriction subject to the provisions of the Colorado Open Records Law.

B. Information and data which is effluent data will not be recognized as confidential information and will be available to the public without restriction. (Ord. 5143 § 1, 2006)

13.10.901 Publication.

The director shall publish annually, in a newspaper of general circulation that provides meaningful public notice within the jurisdiction(s) served buy the POTW, a list of the users which, at any time during the previous twelve (12) months, were in significant noncompliance with applicable pretreatment requirements. (Ord. 5143 § 1, 2006)

13.10.902 Criteria.

An industrial user is in significant noncompliance if its violation meets one or more of the following criteria:

A. Chronic violations of wastewater discharge limits, defined here as those in which sixty-six percent (66%) or more of measurements taken for the same parameter during a six (6) month period exceed (by any magnitude) a numeric pretreatment standard or requirement, including instantaneous limits, as defined in Section 13.10.104.AH.;

B. Technical Review Criteria (TRC) violations, defined here as those in which thirty-three percent (33%) or more of measurements taken for the same pollutant parameter during a six (6) month period equals or exceeds the product of the numeric pretreatment standard or requirement, including instantaneous limits, as defined in Section 13.10.104.AI., multiplied by the applicable criteria (TRC = 1.4 for BOD, TSS, fats, oil and grease, and 1.2 for all other pollutants except pH);

C. Any other discharge violation of a pretreatment standard or requirement that the director determines has caused, alone or in combination with other discharges, interference or pass through, including endangering the health of POTW personnel or the general public;

D. Any discharge of pollutants that has caused imminent endangerment to the public or to the environment, or has resulted in the director's authority to halt or prevent such a discharge;

E. Failure to meet, within ninety (90) days of the scheduled date, a compliance schedule milestone contained in a wastewater discharge permit or enforcement order for starting construction, completing construction, or attaining final compliance;

F. Failure to provide within thirty (30) days after the due date, any required reports, including baseline monitoring reports, reports on compliance with categorical pretreatment standard deadlines, periodic self-monitoring reports, and reports on compliance with compliance schedules;

G. Failure to accurately report noncompliance; or

H. Any other violation or group of violations which the director determines will adversely affect the operation or implementation of the local pretreatment program. (Ord. 5143 § 1, 2006)

13.10.111 Penalties for violations.

A. The director has the authority to and, where appropriate, shall seek or assess civil or criminal penalties in the amount of $1,000 per day for each violation by industrial users of the pretreatment standards and requirements set forth in this Chapter 13.10. In addition, the violation of this Chapter 13.10 may be punished by imprisonment for a term not exceeding six months pursuant to Chapter 1.12 of the Loveland Municipal Code.

B. The city has developed an Enforcement Response Plan (ERP). This plan is a separate document approved by the EPA that contains detailed procedures indicating how the director will investigate and respond to industrial user noncompliance. The remedies provided for in the ERP are not exclusive. The director may take any, all, or any combination of those actions in the plan against a noncompliant user. The director may also take other actions against any user as the circumstances warrant. (Ord. 5143 § 1, 2006)

13.10.121 Emergency suspensions.

A. The director may immediately suspend a user's discharge after notice to the user, whenever such suspension is necessary to stop an actual or threatened discharge which reasonably appears to present or cause an imminent or substantial endangerment to the health or welfare of persons, environment, or the POTW.

B. Any user notified of a suspension of its discharge shall immediately stop or eliminate its contribution. In the event of a user's failure to immediately comply voluntarily with the suspension order, the director may take such steps as deemed necessary, including immediate severance of the sewer connection, to prevent or minimize damage to the POTW, its receiving

stream, or endangerment to any individuals. The director may allow the user to recommence its discharge when the user has demonstrated to the satisfaction of the director that the period of endangerment has passed, unless termination proceedings are initiated against the user.

C. A user that is responsible, in whole or in part, for any discharge presenting imminent endangerment shall submit a detailed written statement, describing the cause(s) of the harmful contribution and the measure(s) taken to prevent any future occurrence, to the director.

D. Nothing in this section shall be interpreted as requiring a hearing prior to any emergency suspension under this section. (Ord. 5143 § 1, 2006)

13.10.122 Water supply severance.

Whenever a user continues to violate any provision of this Chapter 13.10, a wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or requirement, water service to the user may be severed. Service will only recommence, at the user's expense, after it has satisfactorily demonstrated its ability to comply. (Ord. 5143 § 1, 2006)

13.10.123 Inspection fees.

An industrial user may be inspected periodically to determine compliance with applicable requirements of this Chapter 13.10. No fee will be charged where the purpose of the first inspection is to determine compliance. However, if a user is not in compliance, a re-inspection fee shall be charged on the user's utility bill for each inspection thereafter until compliance is achieved. Said fee shall be in an amount as established by resolution of the city council adopted after two readings and shall be in addition to any other fees and charges permitted under this Chapter 13.10. (Ord. 5143 § 1, 2006)

13.10.131 Upset.

A. For the purposes of this section, upset means an exceptional incident in which there is unintentional and temporary noncompliance with categorical pretreatment standards because of factors beyond the reasonable control of the user. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

B. An upset shall constitute an affirmative defense to an action brought for noncompliance with categorical pretreatment standards if the requirements at 40 C.F.R 403.16(c) are met.

C. In any enforcement proceeding, the user seeking to establish the occurrence of an upset shall have the burden of proof.

D. Users shall control production of all discharges to the extent necessary to maintain compliance with categorical pretreatment standards upon reduction, loss, or failure of its treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails. (Ord. 5143 § 1, 2006)

13.10.132 Affirmative defense.

A. A user shall have an affirmative defense to an enforcement action brought against it alleging a violation of the general prohibitions in Section 202.A. or the specific prohibitions in Section 202.B.3. through 202.B.7. if it can prove that it did not know, or have reason to know, that its discharge, alone or in conjunction with discharges from other sources, would cause pass through or interference; and

1. A local limit exists for each pollutant discharged and the user was in compliance with each limit directly prior to, and during, the pass through or interference; or
2. No local limit exists, but the discharge did not change substantially in nature or constituents from the user's prior discharge when the city was regularly in compliance with its NPDES permit, and in the case of interference, was in compliance with applicable sludge use or disposal requirements. (Ord. 5143 § 1, 2006)

13.10.133 Bypass.

For the purposes of this section, bypass means the intentional diversion of wastestreams from any portion of a user's treatment facility.

A. An industrial user may allow any bypass to occur which does not cause Pretreatment Standards or Requirements to be violated, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs B and C of this section.

B. If a user knows in advance of the need for a bypass, it shall submit prior notice to the director, at least ten (10) days before the date of the bypass, if possible.

1. A user shall submit oral notice to the director of an unanticipated bypass that exceeds applicable pretreatment standards within twenty-four (24) hours from the time it becomes aware of the bypass. A written submission shall also be provided within five (5) days of the time the user becomes aware of the bypass. The written submission shall contain a description of the bypass and its cause; the duration of the bypass, including exact dates and times, and, if the bypass has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass. The director may waive the written report on a case-by case basis if the oral report has been received within twenty-four (24) hours.

C. Bypass is prohibited, and the director may take an enforcement action against a user for a bypass, unless:

1. bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
2. there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
3. the user submitted notices as required in paragraph B above. (Ord. 5143 § 1, 2006)

13.10.141 Pretreatment charges and fees.

The city may adopt reasonable fees for reimbursement of costs of operating the city's pretreatment program which may include:

A. Fees for wastewater discharge permit applications including the cost of processing such applications;

B. Fees for monitoring, inspection, and surveillance procedures including the cost of collection and analyzing a user's discharge, and reviewing monitoring reports submitted by users;

C. Fees for reviewing and responding to accidental discharge procedures and construction;

D. Fees for filing appeals; and

E. Other fees as the city may deem necessary to carry out the requirements contained herein. These fees may be included on the user's utility bill, relate solely to the matters covered by this Chapter 13.10, and are separate from all other fees, fines, and penalties chargeable by the city. (Ord. 5143 § 1, 2006)

13.10.142 Severability.

If any provision of this Chapter 13.10 is invalidated by any court of competent jurisdiction, the remaining provisions shall not be effected and shall continue in full force and effect. (Ord. 5143 § 1, 2006)

13.10.143 Fraud and false statements.

It is unlawful for any person to knowingly make a false statement, representation or certification in any record, report, or other document submitted or required to be maintained under this Chapter 13.10. (Ord. 5143 § 1, 2006)

13.10.144 Cost recovery.

Any user that violated any of the provisions of this Chapter 13.10 or that discharges or causes a discharge producing a deposit or obstruction or causes damage to or impairs the POTW shall be liable to the city for any expense, loss, or damage caused by such violation or discharge. The city shall charge the user for the cost incurred by the city for any monitoring surveillance, cleaning, repair, or replacement work caused by the violation or discharge and for costs incurred by the city in investigating the violation or discharge and in enforcement this Chapter 13.10, including reasonable attorney fees, court costs, and other expenses of litigation. (Ord. 5143 § 1, 2006)

13.10.145 Leased property.

In situations involving leased or rented property, not resolved with the tenant, the owner or authorized representative of the property shall be notified of continued violations and is responsible for assuring compliance with the standards and requirements of this Chapter 13.10. (Ord. 5143 § 1, 2006)

CITY OF LOVELAND

2007 - High Strength Sewer Surcharge Rates

	Inside Rate	Outside Rate			
BOD =	0.002002	0.003003	for EXCESS over	200	mg/l
TSS =	0.001062	0.001593	for EXCESS over	250	mg/l

		Total		Excess		Inside Rate ($) per 1,000 Gallons			Outside Rate ($) per 1,000 Gallons		
	CATEGORIES	BOD mg/l	TSS mg/l	BOD mg/l	TSS mg/l	BOD	TSS	Total	BOD	TSS	Total
	Meat Packing	848	846	648	596	1.30	0.63	1.93	1.95	0.95	2.90
	Slaughterhouses	1420	1367	1220	1117	2.44	1.19	3.63	3.66	1.78	5.44
	Dairy Products processing	1127	445	927	195	1.86	0.21	2.06	2.78	0.31	3.09
	Fruit & vegetable canning	537	306	337	56	0.67	0.06	0.73	1.01	0.09	1.10
	Grain Mills	978	1406	778	1156	1.56	1.23	2.79	2.34	1.84	4.18
x	Bakeries	688	620	488	370	0.98	0.39	1.37	1.47	0.59	2.05
	Sugar Processing	395	593	195	343	0.39	0.36	0.75	0.59	0.55	1.13
	Fats & Oil processing	403	343	203	93	0.41	0.10	0.51	0.61	0.15	0.76
	Rendering	319	140	119	0	0.24		0.24	0.36		0.36
	Beverage Bottling	536	192	336	0	0.67		0.67	1.01		1.01
	Misc. Food manufacturing	2961	583	2761	333	5.53	0.35	5.88	8.29	0.53	8.82
	Pulp Products	157	477	0	227		0.24	0.24		0.36	0.36
	Inorganic Chemicals	89	3249	0	2999		3.18	3.18		4.78	4.78
	Soap Manufacturing	156	230	0	0						
	Paint Manufacturing	481	1039	281	789	0.56	0.84	1.40	0.84	1.26	2.10
	Ink Manufacturing	412	156	212	0	0.42		0.42	0.64		0.64
	Leather Tanning	2039	1435	1839	1185	3.68	1.26	4.94	5.52	1.89	7.41
	Drum Cleaning	503	974	303	724	0.61	0.77	1.38	0.91	1.15	2.06
x	Restaurants	820	905	620	655	1.24	0.70	1.94	1.86	1.04	2.91
x	Hotels/Motels	310	121	110	0	0.22		0.22	0.33		0.33
x	Fast Food Service	400	450	200	200	0.40	0.21	0.61	0.60	0.32	0.92
x	Commercial laundries	596	367	396	117	0.79	0.12	0.92	1.19	0.19	1.38
x	Laundromats	219	87	19	0	0.04		0.04	0.06		0.06
x	Industrial laundries	1322	1461	1122	1211	2.25	1.29	3.53	3.37	1.93	5.30
x	Hospitals	231	266	31	16	0.06	0.02	0.08	0.09	0.03	0.12
x	Auto repair or similar	385	30	185	0	0.37		0.37	0.56		0.56
	Beauty Salons	100	100	0	0						0.00
x	Grocery Stores +Deli	400	400	200	150	0.40	0.16	0.56	0.60	0.24	0.84
x	Funeral Homes	300	275	100	25	0.20	0.03	0.23	0.30	0.04	0.34
x	Pet shop, grooming/kennel	350	350	150	100	0.30	0.11	0.41	0.45	0.16	0.61
x	Schools (kitchens)	545	96	345	0	0.69		0.69	1.04		1.04
x	Car Wash	150	350	0	100		0.11	0.11		0.16	0.16
	Domestic Waste	200	250	0	0						
x	RV dumping facility	770	500	570	250	1.14	0.27	1.41	1.71	0.40	2.11
	Other Categories	*	*	*	*	*	*		*	*	

* Values to be determined as needed

x = Catergoies present & surcharged