

**CELGAR**

NEW MILL OPERATIONS  
 BEFORE TREATMENT      AFTER TREATMENT

30% ClO<sub>2</sub>      100% ClO<sub>2</sub>  
 OLD MILL OPERATIONS      NEW MILL OPERATIONS

**CHLORINATED PHENOLS**

	1° Clarifier	1° Clarifier	2° Clarifier	2° Clarifier	Main	Main	Main
All compounds are in ng/L	July 22, 1993	July 28, 1993	July 22, 1993	July 28, 1993	Oct 92	April 93	July 93
<b>Monochlorinated Compounds</b>							
4-chlorophenol	840	<340	<27	<56	4500	<13	<22
6-chloroguaiacol	<16	<10	<5.8	<10	360	<1.7	<7.2
4-chloroguaiacol	3400	1000	<100	<120	3000	<42	<7.6
5-chloroguaiacol	190	180	<6.7	<12	1000	<2.0	<8.3
3-chlorocatechol	<22	<10	<17	<21	380	<9.7	<16
4-chlorocatechol	<33	<16	<26	<32	1300	<6.1	<24
3-chlorosyringol	<8.1	<3.0	<5.3	<6.6	<58	<1.8	<4.6
5-chlorovanillin	<130	1400	<24	<32	1400	<6.2	<23
6-chlorovanillin	3500	*>26000	950	1800	31000	1000	510
2-chlorosyringaldehyde	<35	38	<9.2	<12		<2.6	<8.4
<b>Total</b>	<b>7930</b>	<b>28618</b>	<b>950</b>	<b>1800</b>	<b>42940</b>	<b>1000</b>	<b>510</b>
<b>Dichlorinated Compounds</b>							
2,6-dichlorophenol	<62	<87	<35	<48	<180	<5.1	<13
2,4/2,5-dichlorophenol	<110	140	<18	<75	6600	<14	<27
3,5-dichlorophenol	<13	<6.2	<32	<180	<73	<2.5	<12
2,3-dichlorophenol	<22	<5.7	<13	<17	<230	<7.5	<11
3,4-dichlorophenol	<8.2	<3.9	<8.8	<11	<68	<15	<7.5
3,4/4,6-dichloroguaiacol	<120	<80	<11	<13	8000	<11	<10
4,5-dichloroguaiacol	1200	280	38	<62	44000	5.8	28
3,4-dichlorocatechol	<48	<17	<14	<14	150	<7.0	<12
3,6-dichlorocatechol	<30	<12	<17	<17	5200	<4.6	<14
3,5-dichlorocatechol	<24	<9.8	<14	<14	6200	<33	<12
4,5-dichlorocatechol	<32	<100	<19	29	11000	<63	<20
3,5-dichlorosyringol	<31	<14	<16	<24	<46	<7.5	<17
2,6-dichlorovanillin	<30	120	<13	<20	7200	<4.1	<11
2,6-dichlorosyringaldehyde	<54	<19	<25	<28		<4.4	<19
4,5-dichloroveratrole	290	290	<0.5	<2.3	480	9.4	<0.8
<b>Total</b>	<b>1490</b>	<b>730</b>	<b>38</b>	<b>29</b>	<b>88830</b>	<b>15.2</b>	<b>28</b>
<b>Trichlorinated Compounds</b>							
2,4,6-trichlorophenol	<24	<5.5	<11	<13	11000	<20	<9.4
2,3,6-trichlorophenol	<8.3	<4.1	<8.3	<9.4	<12	<3.1	<7.0
2,3,5-trichlorophenol	<8.5	<75	<8.5	<9.6	<8.3	<1.5	<6.9
2,4,5-trichlorophenol	<7.6	<3.6	<6.0	<7.4	<16	<1.6	<5.5
2,3,4-trichlorophenol	<82	64	<7.6	<120	<19	<1.6	<7.6
3,4,5-trichlorophenol	<8.2	<3.9	<6.5	<8.0	<7.5	<1.8	<5.8
3,4,6-trichloroguaiacol	<12	<7.2	<7.4	<17		<5.5	<8.7
3,4,5-trichloroguaiacol	<12	<7.2	<7.3	<16	17000	<6.8	<8.6
4,5,6-trichloroguaiacol	<8.7	10	<5.2	<12	4800	<3.8	<6.2
3,4,6-trichlorocatechol	<20	<14	<12	<16		<4.1	<11
3,4,5-trichlorocatechol	<24	<24	<13	<14	26000	<12	<16
3,4,5-trichlorosyringol	<19	<8.6	<8.6	<15	16	<6.2	<11
3,4,6-trichloroveratrole	<0.2	<0.2	<0.3	<0.5	86	<0.4	<0.5
3,4,5-trichloroveratrole	<1.9	<1.9	<0.3	<0.5	400	18	<0.4
<b>Total</b>	<b>ND</b>	<b>74</b>	<b>ND</b>	<b>ND</b>	<b>59302</b>	<b>18</b>	<b>ND</b>
<b>Tetrachlorinated Compounds</b>							
2,3,5,6-tetrachlorophenol	<17	<7.4	<9.8	<14	<5.2	<4.9	<9.4
2,3,4,6-tetrachlorophenol	<18	<8.1	<11	<15	940	<5.4	<10
2,3,4,5-tetrachlorophenol	<11	<4.8	<6.4	<8.9	<4.5	<3.2	<6.2
3,4,5,6-tetrachloroguaiacol	<16	<7.2	<8.4	<14	6600	<4.3	<9.7
3,4,5,6-tetrachlorocatechol	<34	<12	<16	<17	15000	<8.0	<12
2,4,5,6-tetrachloroveratrole	<0.2	<0.2	<0.1	<0.2	71	6.9	<0.2
<b>Total</b>	<b>ND</b>	<b>ND</b>	<b>ND</b>	<b>ND</b>	<b>22611</b>	<b>6.9</b>	<b>ND</b>
Pentachlorophenol	<23	<11	<16	<20	70	<3.6	<16

OLD MILL - 30% ClO<sub>2</sub>

NEW MILL = 100% ClO<sub>2</sub>



**Table 4.1.1 Quarterly chemical analyses of final effluent for Celgar Pulp Company, EEM Cycle One.**

Parameter (Units)	Oct. 27, 1994	March 27, 1995	June 26, 1995	Sept. 11, 1995
Colour (CU)	398	295	445	180
Tannins/lignins (mg/L)	10.6	6.29	1.12	11.7
AOX (mg/L)	2.7	2.2	2.1	2.6
Total suspended solids (mg/L)	1.84	4.51	5.42	4.39
Total phenols (mg/L)	0.003	0.004	0.005	0.001
Total organic carbon (mg/L)	107	72.0	71.3	53.0
Dissolved oxygen (mg/L)	11.5	12.5	11	11
pH	7.0	6.9	7.4	7
Conductivity (mhos)	1,852	1,476	1,754	1,226
Turbidity (NTU)	4.9	5.0	10	20
Dissolved sodium (mg/L)	409	610	442	302
Nitrate and nitrite (mg/L)	<0.03	0.01	<0.03	<0.03
Ammonia (mg/L)	0.10	0.06	0.164	0.040
Orthophosphate (mg/L)	0.269	0.404	0.333	0.389
<b>RESIN ACIDS (mg/L)</b>				
Pimaric	<0.005	<0.005	<0.005	0.084
Sandaracopimaric	<0.005	<0.005	<0.005	0.091
Isopimaric	<0.005	<0.005	0.008	0.203
Levopimaric	<0.005	<0.005	<0.005	0.093
Dehydroabiatic	<0.005	<0.005	0.005	0.093
Abietic	<0.005	<0.005	0.005	0.211
Neoabietic	<0.005	<0.005	<0.005	0.06
Chlorodehydroabiatic	<0.005	<0.005	<0.005	0.03
Dichlorodehydroabiatic	<0.005	<0.005	<0.005	<0.005
<b>TOTAL RESIN ACIDS</b>	<b>&lt;0.005</b>	<b>&lt;0.005</b>	<b>0.018</b>	<b>0.865</b>
<b>FATTY ACIDS (mg/L)</b>				
Lauric	<0.005	<0.005	<0.005	<0.005
Myristic	<0.005	<0.005	<0.005	0.007
Palmitic	0.010	0.019	0.009	0.037
Stearic	<0.005	0.006	0.007	0.064
Oleic	<0.005	<0.005	<0.005	0.024
Linoleic	0.005	0.015	0.022	na
Linolenic	<0.005	<0.005	<0.005	0.044
Arachidic	<0.005	0.009	0.007	0.102
Behenic	<0.005	0.024	0.029	0.247
Lignoceric	<0.005	0.014	0.034	0.178
<b>TOTAL FATTY ACIDS</b>	<b>0.015</b>	<b>0.087</b>	<b>0.108</b>	<b>0.703</b>



Table 4.1.1 (cont'd)

Parameter (Units)	Oct. 27, 1994	March 27, 1995	June 26, 1995	Sept. 11, 1995
<b>CHLOROPHENOLICS (ng/L)<sup>1,2</sup></b>				
2,3,4-Trichlorophenol	ND (2.0)	ND (0.42)	ND (2.2)	ND (0.43)
2,3,5-Trichlorophenol	ND (2.2)	ND (0.5)	ND (2.4)	ND (0.48)
2,4,5-Trichlorophenol	ND (1.4)	NDR (2.2)	ND (1.9)	ND (0.31)
2,4,6-Trichlorophenol	5.1	ND (0.69)	NDR (2.5)	ND (1.7)
2,3,4,5-Tetrachlorophenol	ND (2.5)	ND (2.2)	ND (4.0)	ND (3.3)
2,3,4,6-Tetrachlorophenol	ND (2.1)	ND (1.0)	ND (2.5)	ND (2.4)
2,3,5,6-Tetrachlorophenol	ND (3.6)	ND (1.8)	ND (4.7)	ND (4.4)
Pentachlorophenol	ND (1.8)	ND (1.2)	10	ND (2.0)
3,4,5-Trichloroguaiacol	NDR (0.99)	ND (1.7)	11	ND (1.1)
Tetrachloroguaiacol	ND (2.0)	ND (1.5)	13	ND (8.2)
3,4,5-Trichlorocatechol	ND (2.2)	ND (4.0)	7.0	ND (3.4)
Tetrachlorocatechol	ND (1.5)	ND (2.1)	3.0	NDR (11)
<b>DIOXIN/FURAN (pg/L)</b>				
Total-T <sub>4</sub> CDD	ND	ND	ND (2)	2.7 (2)
Total-P <sub>5</sub> CDD	ND	ND	ND (4)	ND (4)
Total-H <sub>6</sub> CDD	ND	ND	ND (4)	ND (4)
Total-H <sub>7</sub> CDD	ND	ND	19 (6)	6.8 (6)
Total-O <sub>8</sub> CDD	ND	9.7	64 (8)	28 (8)
Total-T <sub>4</sub> CDF	ND	ND	ND (2)	ND (2)
Total-P <sub>5</sub> CDF	ND	ND	ND (4)	ND (4)
Total-H <sub>6</sub> CDF	ND	ND	ND (4)	ND (4)
Total-H <sub>7</sub> CDF	ND	ND	ND (6)	ND (6)
Total-O <sub>8</sub> CDF	ND	ND	ND (8)	ND (8)

<sup>1</sup> Chlorophenolics were analyzed on November 2, 1994 effluent (a refresh sample) rather than October 27, 1994.

<sup>2</sup> ND = not detected; NDR = peak detected but did not meet quantification criteria; detection limit in parentheses, when available.