

US EPA ARCHIVE DOCUMENT

Figure 1.
Layout of Mill Sewer System Showing Sample Locations

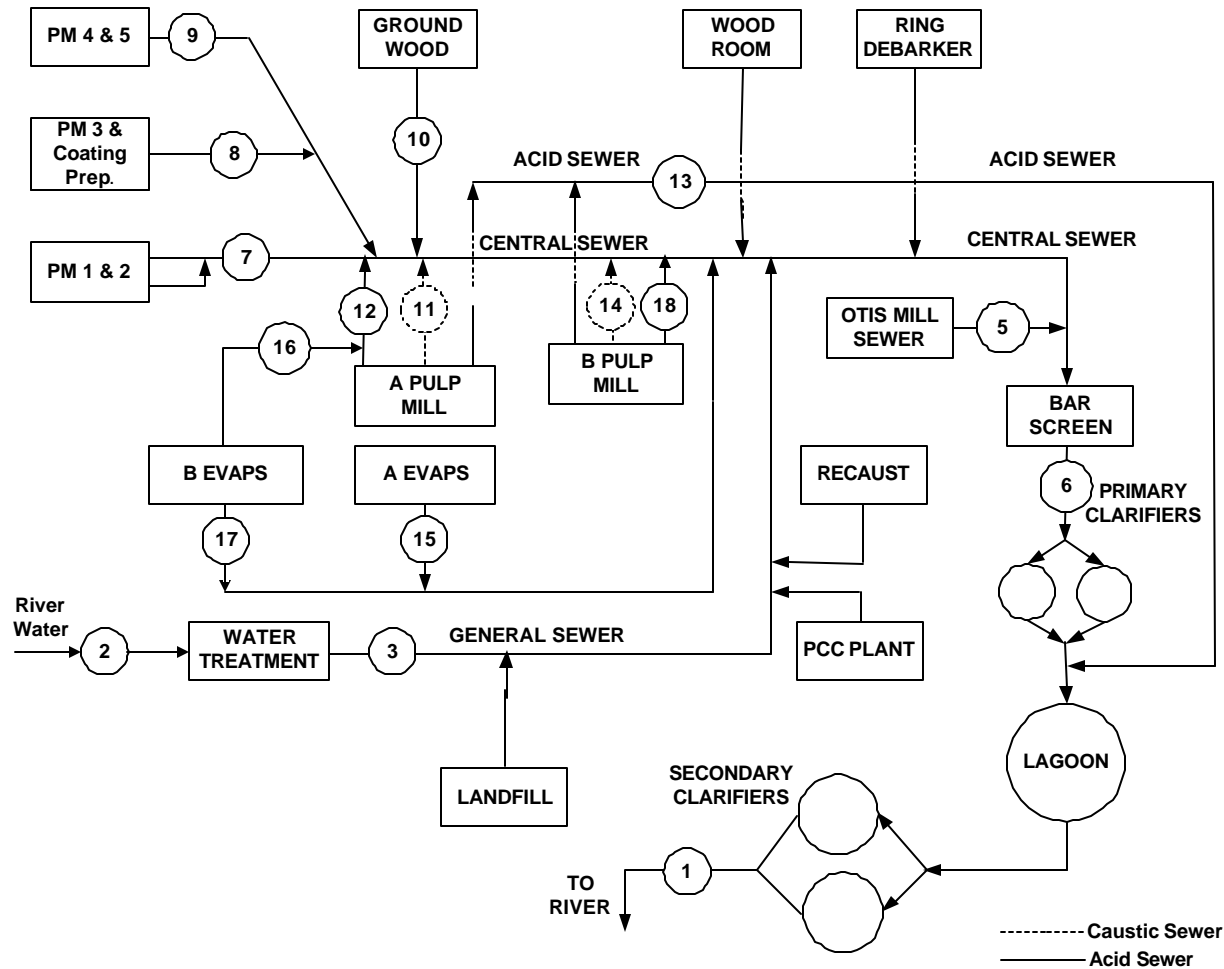


Table 1.
Sample Location and Flow Measurement Identification

SAMPLE		FLOW	
Number	Description	Measured	Estimated
1	Final mill effluent – Composite Sample	X	
2	Raw water intake – Grab Sample		X
3	Raw water waste – Grab Sample		X
5*	Otis waste water – Composite Sample	X	
6	Mill sewer after bar screen – Composite Sample	X	
7	Effluent of paper machines 1 plus 2 – Composite Sample	X	
8	Effluent of paper machine 3 plus coating prep. – Composite Sample	X	
9	Effluent of paper machines 4 plus 5 – Composite	X	
10	Groundwood mill effluent - Composite Sample	X	
11	Caustic sewer of A pulp mill - Composite Sample	X	
12	General sewer of A pulp mill – Composite Sample	X	
13	Acid sewer – Grab Sample		X
14	Caustic sewer of B pulp mill – Grab Sample		X
15	Evaporators effluent of A pulp mill – Grab Sample		X
16	Evaporators effluent of B pulp mill – Grab Sample		X
17	6 th effect evaporator plus surface condenser effluent of B pulp mill – Grab Sample		X
18	General sewer of B pulp mill – Composite Sample	X	

*Sample four (4) is non-existent

**Table 2.
XL-2 Sewer Survey (2001)**

INTERNATIONAL PAPER COMPANY, ANDROSCOGGIN MILL

<i>Sample Point</i>	<i>ISCO Sampler Present</i>	<i>Flow Measurement Device Available</i>	<i>Color, pH¹</i>	<i>Toxicity²</i>	<i>TSS, VSS, Ash, Conductivity, BOD (filtered/unfiltered), COD (filtered/unfiltered)²</i>	<i>Comments³</i>
PM 1 & 2 (near main lab)	✓ xx	✓ xx	✓ xx		✓ xx	
PM 1 & 2 General Sewer (inside parshall flume house)		✓ xx	✓ xx		✓ xx	Flow meter requires calibration. Sampler not presently at site.
PM 1 & 2 Caustic Sewer (inside parshall flume house)		✓ xx	✓ xx		✓ xx	Flow meter requires calibration. Sampler not presently at site.
PM 3 & Coating Prep	✓ xx	✓ xx	✓ xx	✓ xx	✓ xx	
PM 4 & 5	✓ xx	✓ xx	✓ xx		✓ xx	
A Pulp Mill General Sewer (inside parshall flume house)	✓ xx	✓ xx	✓ xx		✓ xx	Flow meter requires calibration.
A Pulp Mill Caustic Sewer (inside parshall flume house)		✓ xx	✓ xx	✓ xx	✓ xx	Flow meter requires calibration. Sampler not presently at site.
B Pulp Mill General Sewer	✓ xx	✓ xx	✓ xx		✓ xx	
B Pulp Mill Caustic Sewer			✓ xx		✓ xx	grab sample
Groundwood	✓ xx	✓ xx	✓ xx		✓ xx	
Evaporators			✓ xx		✓ xx	grab sample
Acid Sewer			✓ xx	✓ xx	✓ xx	Acid sewer sample point now available at waste treatment.
Otis	✓ xx	✓ xx	✓ xx		✓ xx	
Water Treatment		✓ xx	✓ xx		✓ xx	grab sample
Total Mill (Bar Screen)	✓ xx	✓ xx	✓ xx	✓ xx	✓ xx	
Mill Effluent	✓ xx	✓ xx	✓ xx		✓ xx	

NOTES:

- 1) pH and color to be completed by International Paper
- 2) Toxicity, TSS, VSS, ash, conductivity, BOD, COD to be completed by external laboratory
- 3) In all cases listed, John will follow-up and get flow meters calibrated. Travis will follow-up and have ISCO samplers, or other means of sampling, available for the survey.
- 4) Digital photos to be taken of all sewer samples
- 5) 3, 24 hour composite samples to be taken at each location with an ISCO composite sampler
- 6) 3 grab samples, taken each day of the survey at approximately 7:00am, will be taken at locations with no ISCO sampler
- 7) Mill production rates to be recorded by Travis Flagg during the survey

Table 3.
Average Daily Emissions (lbs/Day) for Measured Quantities

Location	Flow Rate (gpm)	Total		Dissolved		Susp.	Solids Diss.	Est. Total	Color
		BOD	COD	BOD	COD				
(#/Day)									
(2) Raw Water - Grab	29028	6170	21305	5821	13155	4773	30152	34925	2328
(8) PM #3 & Coating Prep - Composite	3492	4565	74780	2591	6134	47346	21384	68730	6750
(9) PM #4 & #5 - Composite	2065	5747	44715	629	4157	24941	5548	30489	18383
(7) PM #1& #2 - Composite	5036	7574	54691	2100	5453	34313	24316	58629	929
Paper Mill Total	10592	17885	174185	5320	15743	106600	51248	157848	26062
(12) A Pulp Mill (general) - Composite	1836	3881	17911	3174	13831	759	23516	24274	16018
(11) A Pulp Mill (caustic) - Composite	630	5789	23296	5748	22184	222	41918	42140	14162
(18) B Pulp Mill (General)- Composite	223	2479	14885	481	2578	10347	2931	13278	5475
(14) B Pulp Mill (caustic) - Grab	656	8998	18496	7014	16391	800	17943	18743	4025
(13) Acid Sewer - Grab	2620	6431	24252	5769	21793	462	65568	66031	10245
(15) A Evaporators - Grab	800	9051	16459	8422	12577	64	603	667	337
(16) B Evaporators - Grab	494	937	2088	644	1320	38	164	202	258
(17) B Evaporators 6th & SC - Grab	310	4998	7410	4066	6652	5	469	474	298
BL Cycle Total	7075	41627	122709	34674	96006	12659	152948	165607	50561
(10) Groundwood - Composite	274	551	2140	517	1153	4269	578	4847	798
(5) Otis - Composite	2371	10842	30823	4698	9701	6486	10899	17385	618
(3) River Waste - Grab	347	33	1421	15	85	3010	1546	4556	153
Others Total	2993	11427	34384	5231	10939	13765	13023	26788	1569
(6) Mill Sewer (Bar Screen) - Composite	25717	87774	313139	46001	143367	212988	311282	524270	133053
Sum Paper Mill, BL Cycle, Others minus Acid Sewer and B Evaporators	18040	64508	307026	39456	100895	132562	151650	284213	67946
(1) Mass Closure at Bar Screen (%)	29.9	26.5	2.0	14.2	29.6	37.8	51.3	45.8	48.9
Mill Effluent - Composite	29537	3672	73328	1895	55559	11491	367115	378606	89439

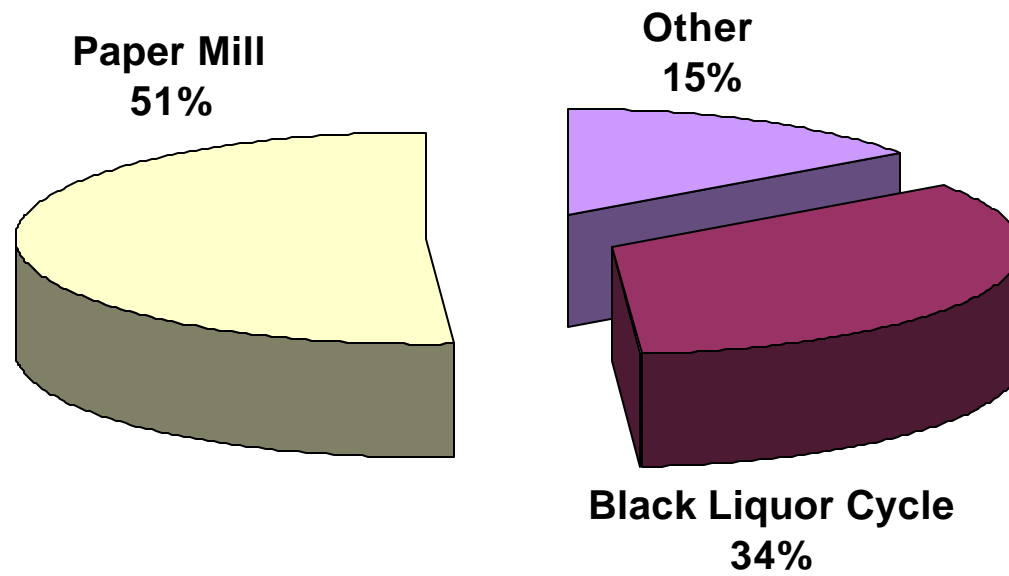
(mg/L)(X)[flow(gpm)]=(#/day)
where x= 0.012032

Table 4.
Mass Balances For Combined Effluent at Bar Screen

VARIABLE	MEASURED (1000 lbs/day)	CALCULATED (1000 lbs/day)	DIFFERENCE (%)
Total BOD	88	65	27
Dissolved BOD^(a)	46	39	14
Total COD	313	307	2
Dissolved COD^(a)	143	101	30
Color	133	68	49
Total Suspended Solids (TSS)	213	133	38
Dissolved Solids	311	152	51
Estimated Total Solids	524	284	46
Flow (million gallons/day)	37	26	30

(a) Samples were filtered through a 0.8 micron filter.

Figure 2
Percentage Flow by Area



Calculated Total Flow in Million Gallons/Day=29.75

Figure 3
Total COD and BOD Mass Balances - Comparison of 2000 with 2001 Trial

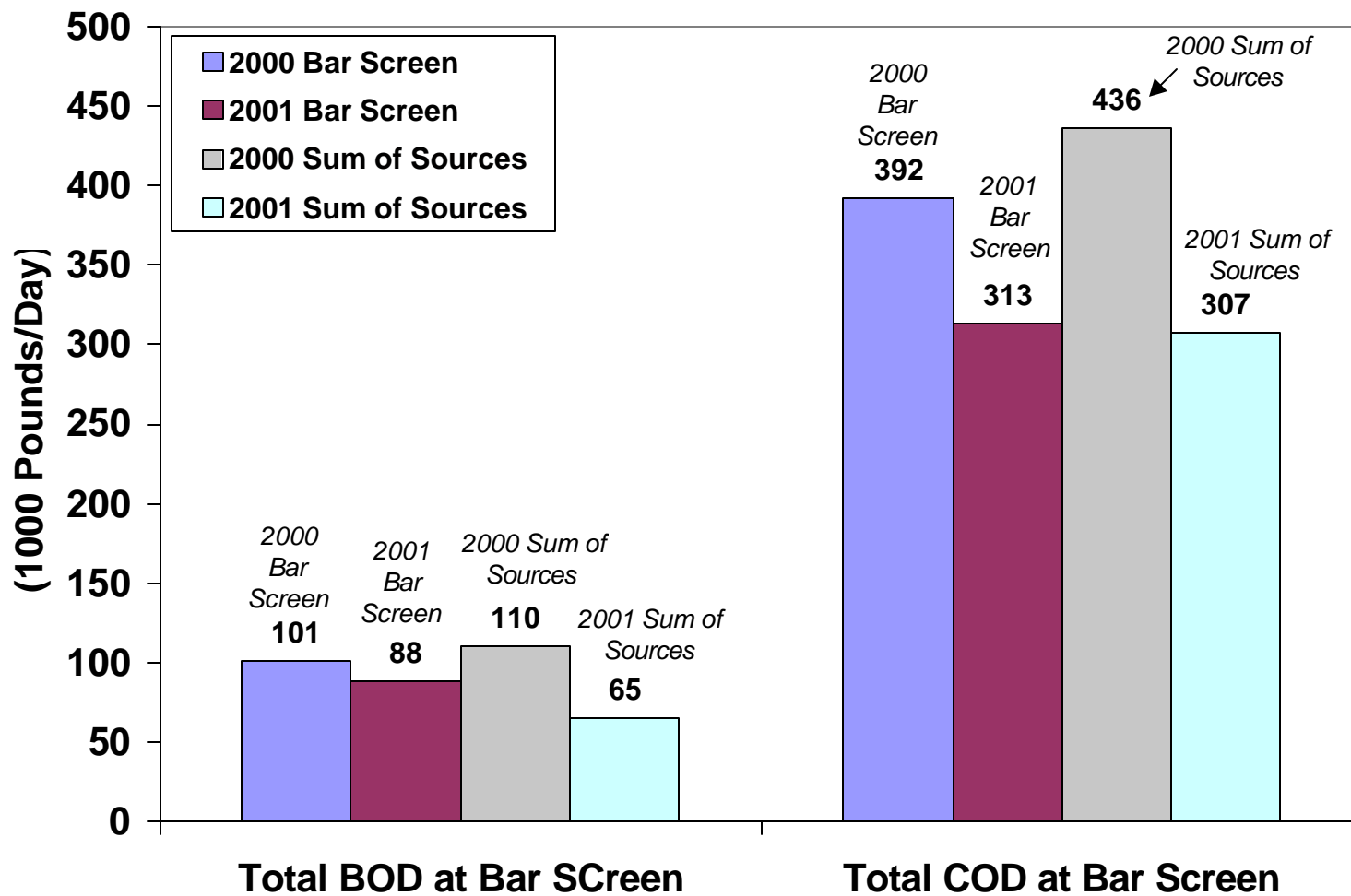


Figure 4
2001 Efficiency of Waste Treatment Plant

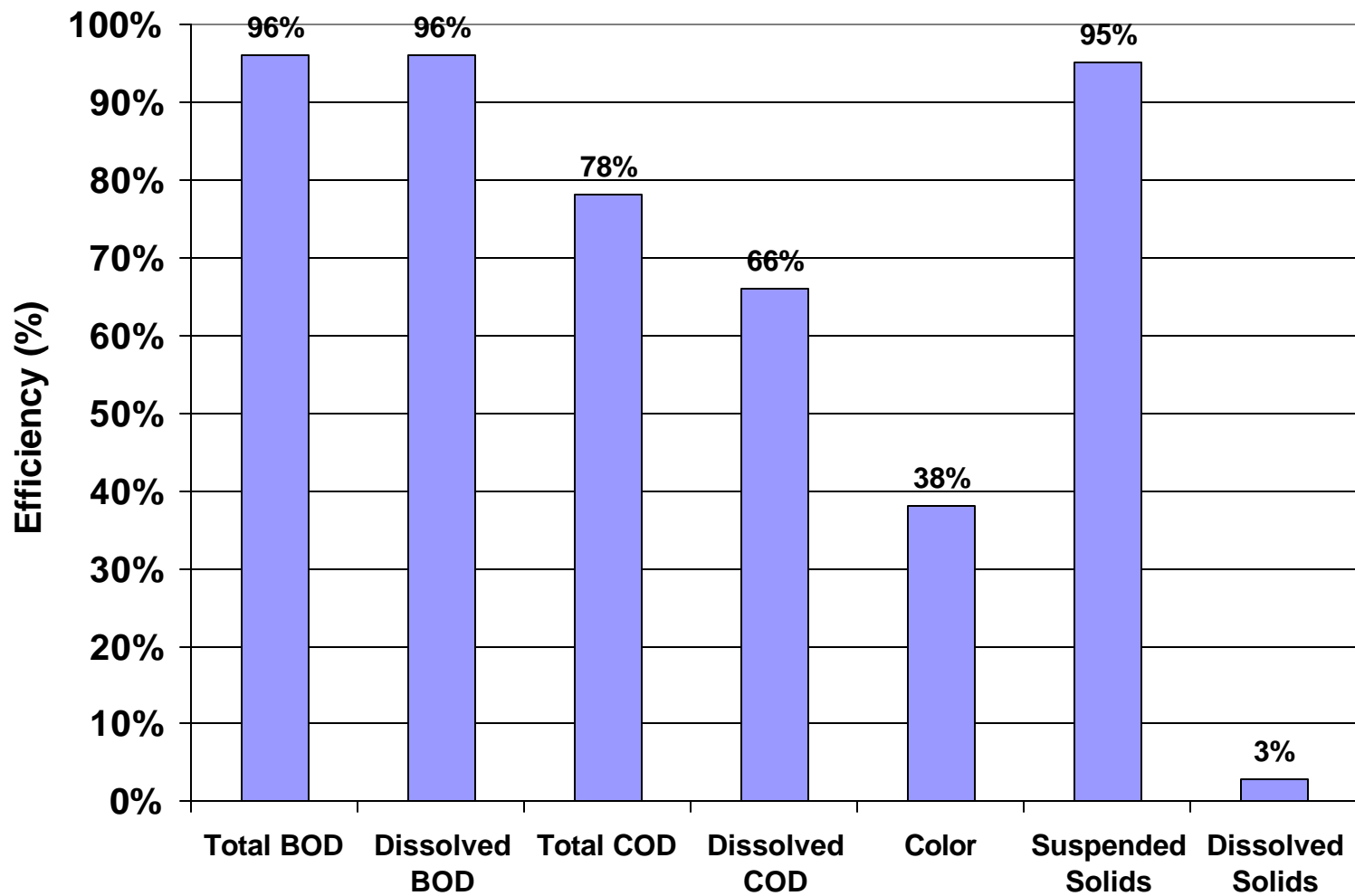


Table 5.
Removal Efficiencies in Waste Water Treatment Plant

VARIABLE	INFLUENT (1000 lbs/day)	EFFLUENT (1000 lbs/day)	REMOVAL EFFICIENCY (%)
Total BOD	94	3.7	96
Dissolved BOD^(a)	51.8	1.9	96
Total COD	337	73	78
Dissolved COD^(a)	165	56	66
Color	143	89	38
Total Suspended Solids (TSS)	214	11.5	95
Dissolved Solids	377	367	2.6
Estimated Total Solids	590	379	36
Flow (million gallons/day)	40.8	42.5	

(a) Samples were filtered through a 0.8 micron filter.

Figure 5
 Comparison of 2001 Average Total and Dissolved BOD

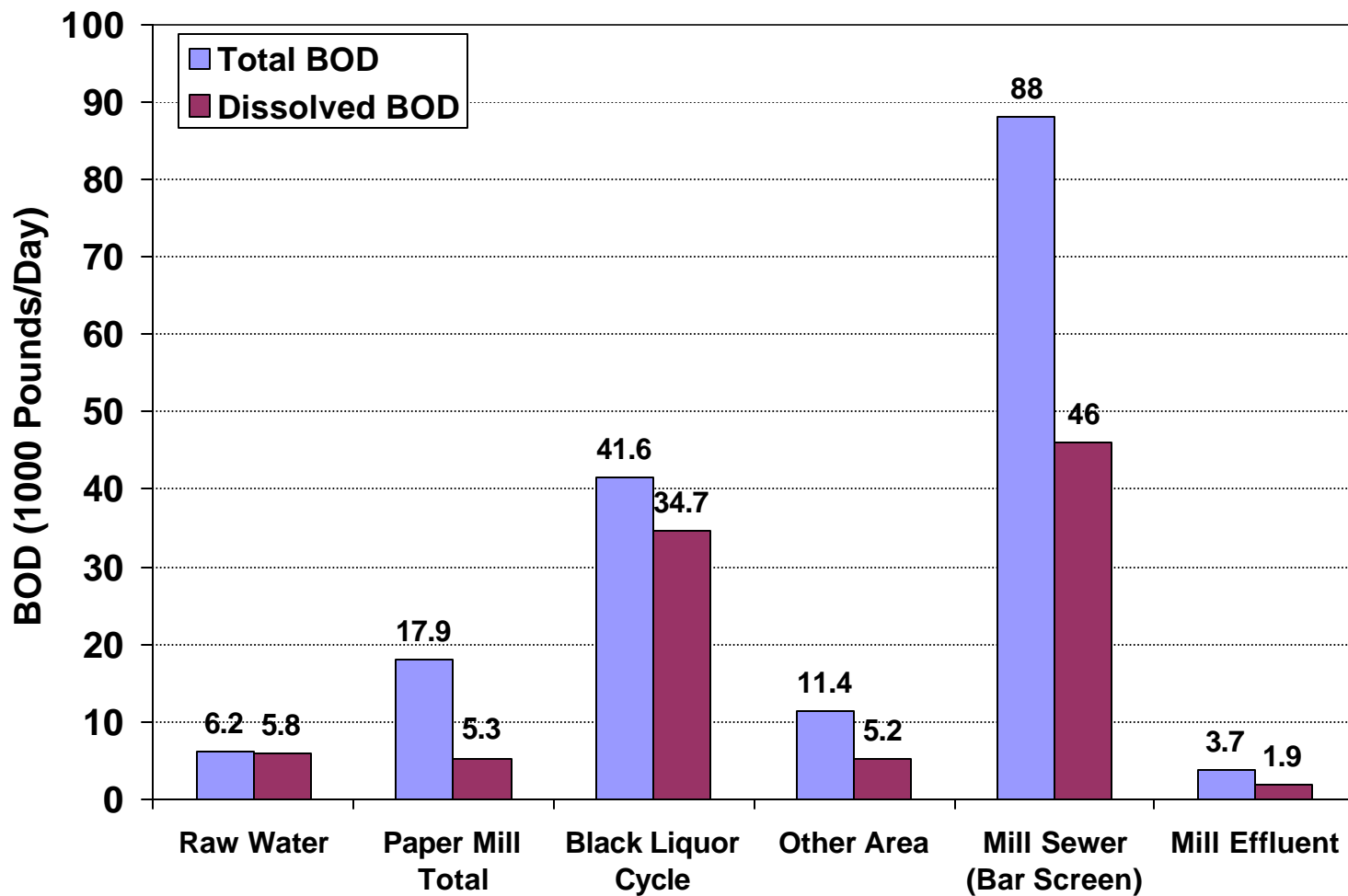


Table 6.
COD Removal Efficiencies Due to Sample Filtration

AREA DESCRIPTION	TOTAL COD	DISSOLVED COD	COD REMOVAL EFFICIENCY BY FILTRATION (%)
	(1000 lbs/day)		
Total Paper Mill	174	15.7	91
Total Black Liquor Cycle	123	96	22
Total Others	34.4	10.9	68

Figure 6
 Comparison of 2001 Average Total and Dissolved COD

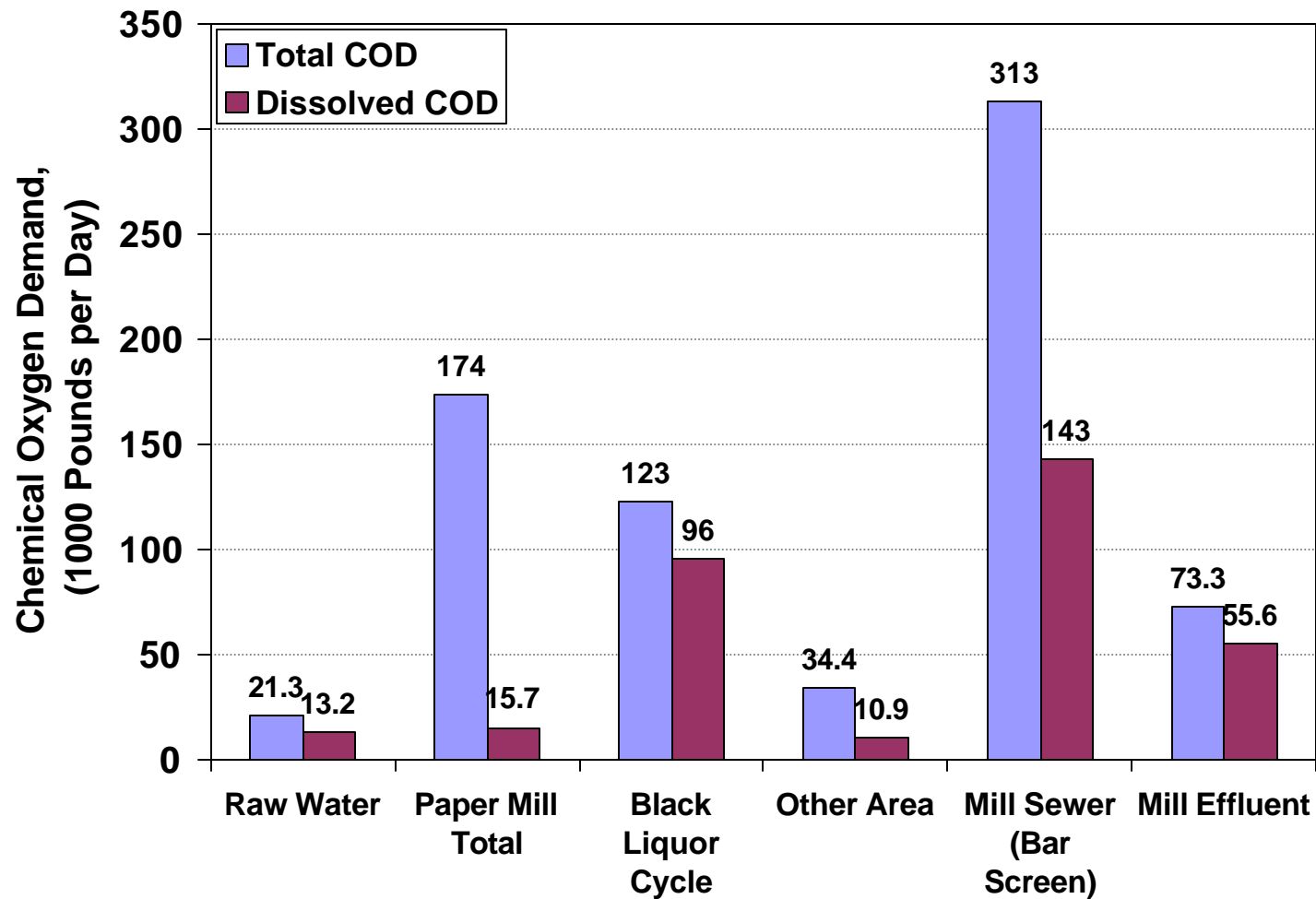
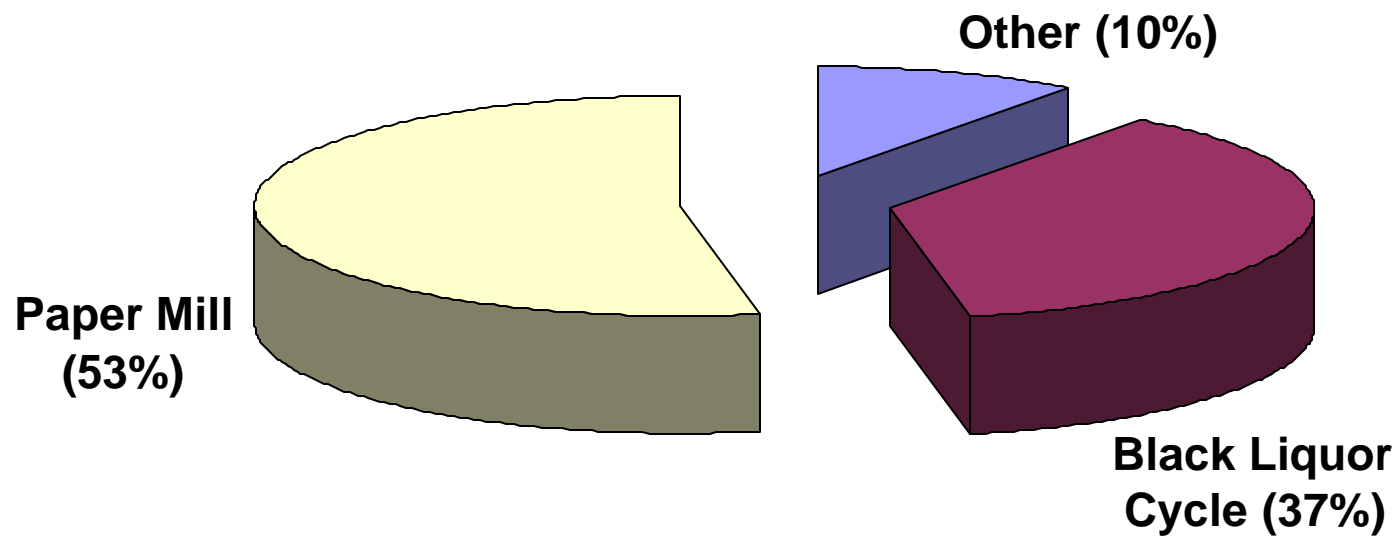
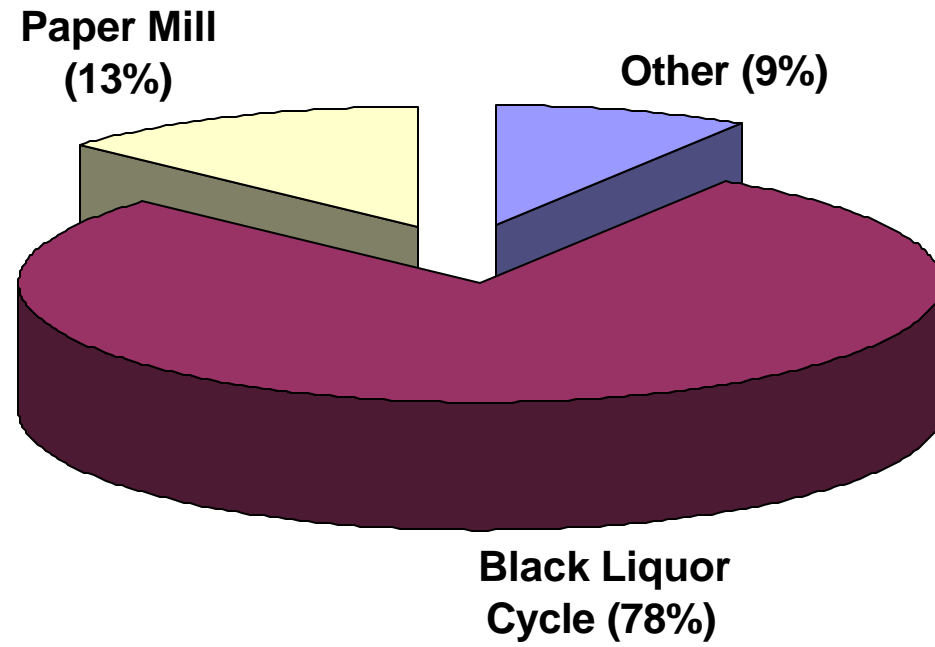


Figure 7
2001 Total COD by Area



Calculated Total COD = 331,000 lbs/day

Figure 8
2001 Dissolved COD by Area



Dissolved COD = 123,000 Pounds per Day

Figure 9
2001 Average Black Liquor Cycle Total and Dissolved COD

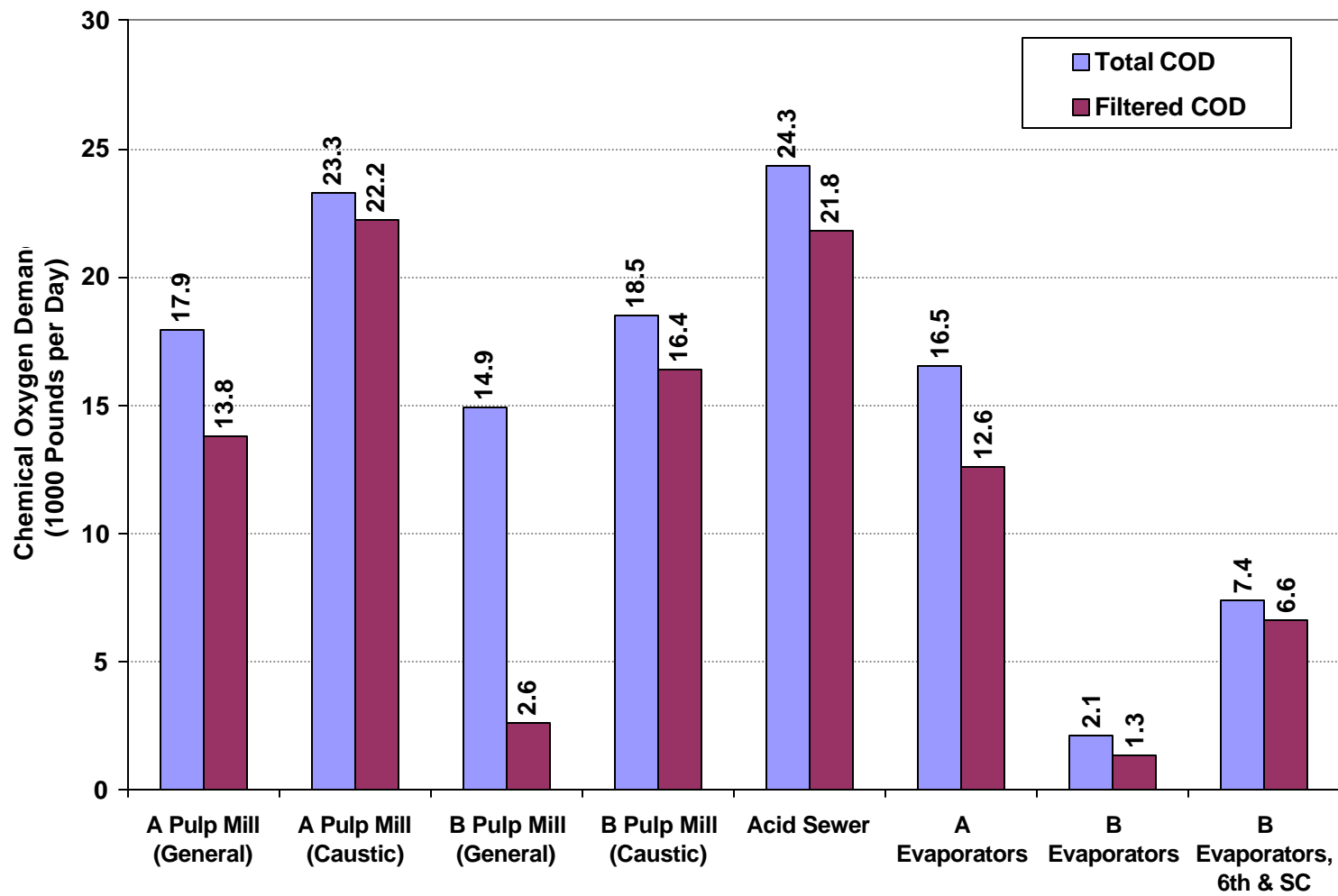


Figure 10
2001 Dissolved COD of Black Liquor Cycle

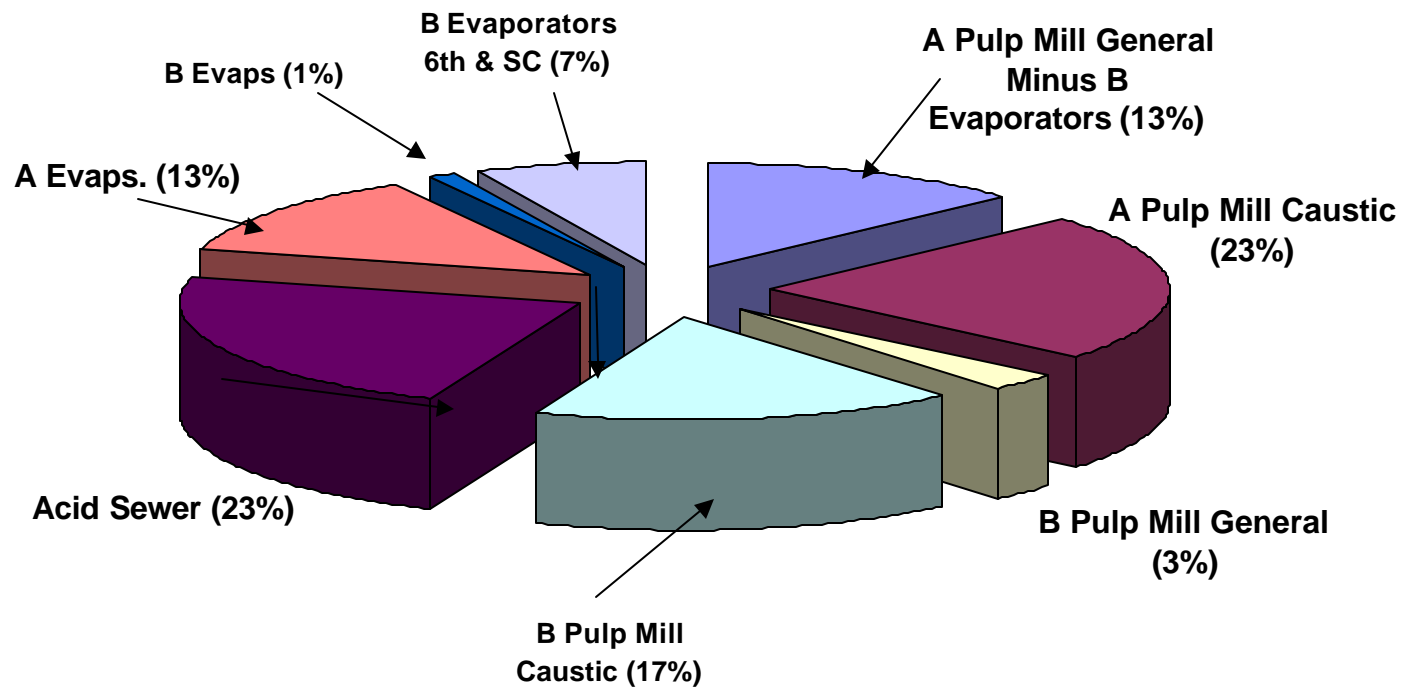


Figure 11
2001 (Dissolved COD - Dissolved BOD)

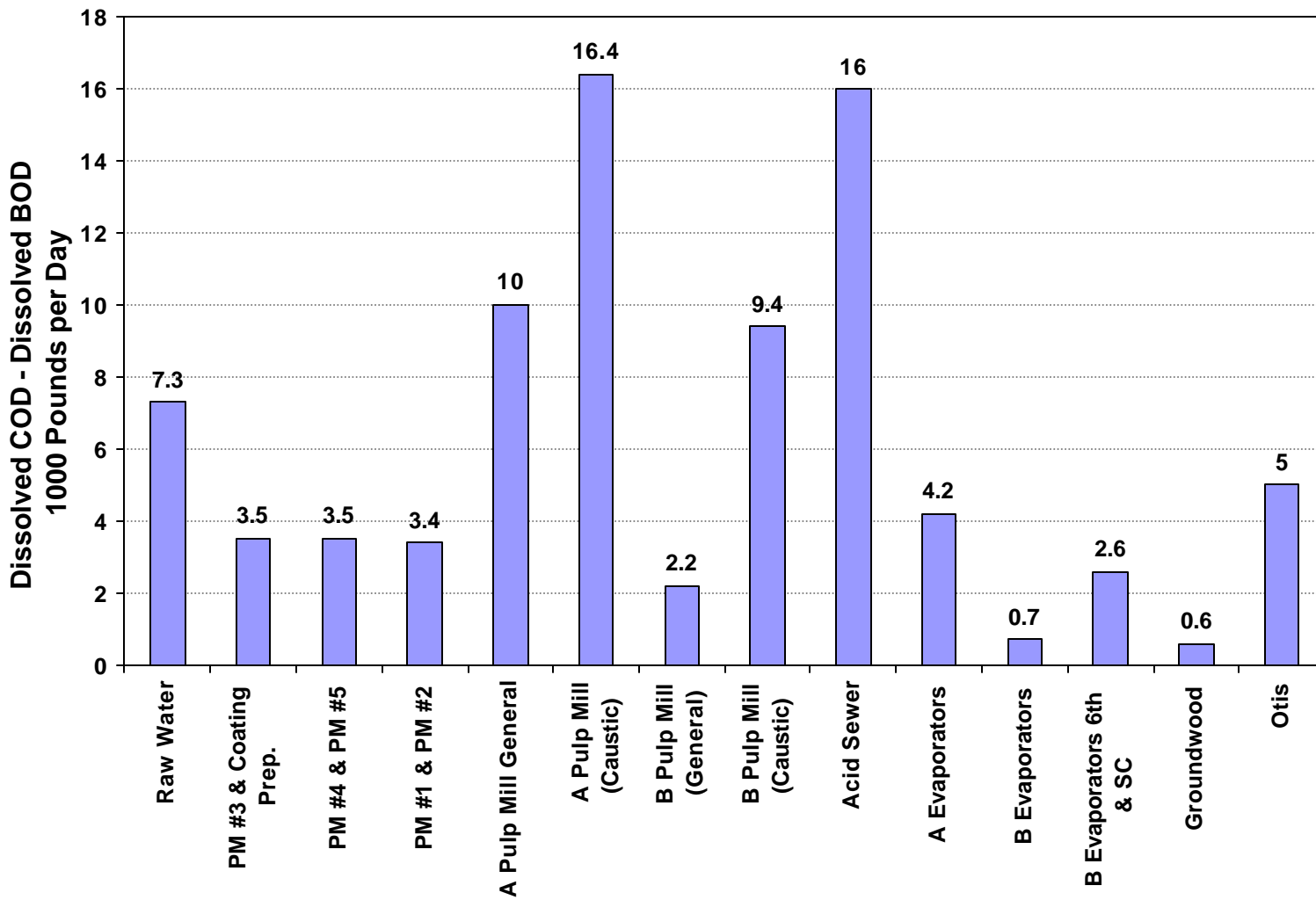
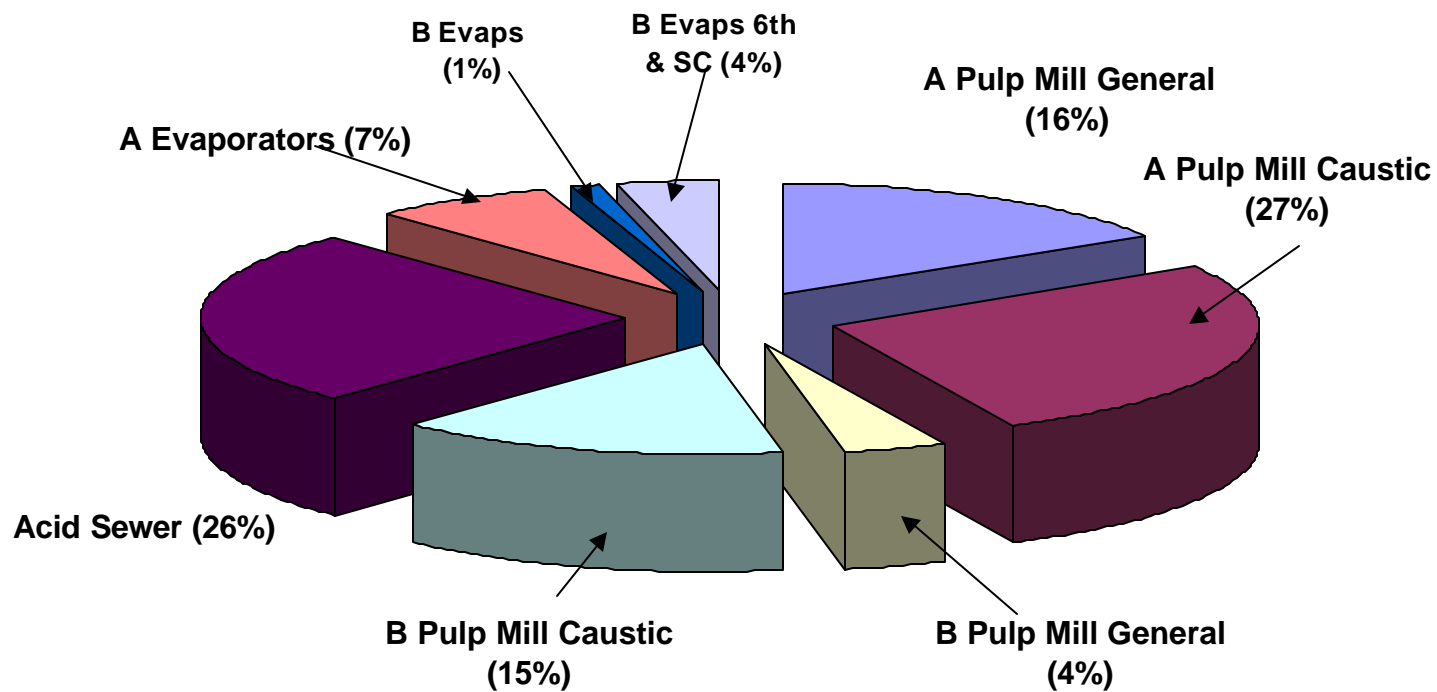


Figure 12
2001 (Dissolved COD - Dissolved BOD) of Black Liquor Cycle as Percentage (%)

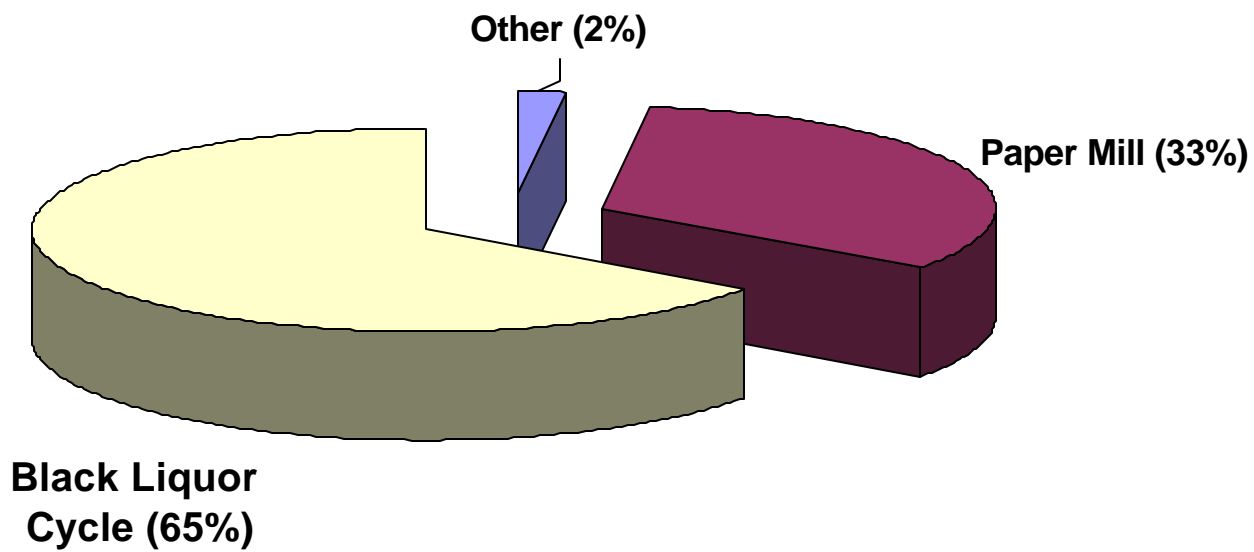


(Dissolved COD - Dissolved BOD) of Black Liquor Cycle = 61.4 (1000 Pounds per Day)

Table 7.
Contribution of the Different Areas of the Pulp Mill to (Dissolved COD-Dissolved BOD) Of The Total Black Liquor Cycle

AREA DESCRIPTION	DISSOLVED COD – DISSOLVED BOD (1000 lbs/day)	PERCENTAGE OF TOTAL BL CYCLE (%)
A Pulp Mill General Sewer <i>(excludes B Evaporators)</i>	10.0	16
A Pulp Mill Caustic Sewer	16.4	27
B Pulp Mill General Sewer	2.2	4
B Pulp Mill Caustic Sewer	9.4	15
Acid Sewer	16.0	26
A Evaporators	4.2	7
B Evaporators	0.68	1
6th and SC of B Evaporators	2.6	4
Black Liquor Cycle	61.38	100

Figure 13
Color by Area



Total Color = 78.2 (1000 Pounds per Day)

Figure 14
Color by Department

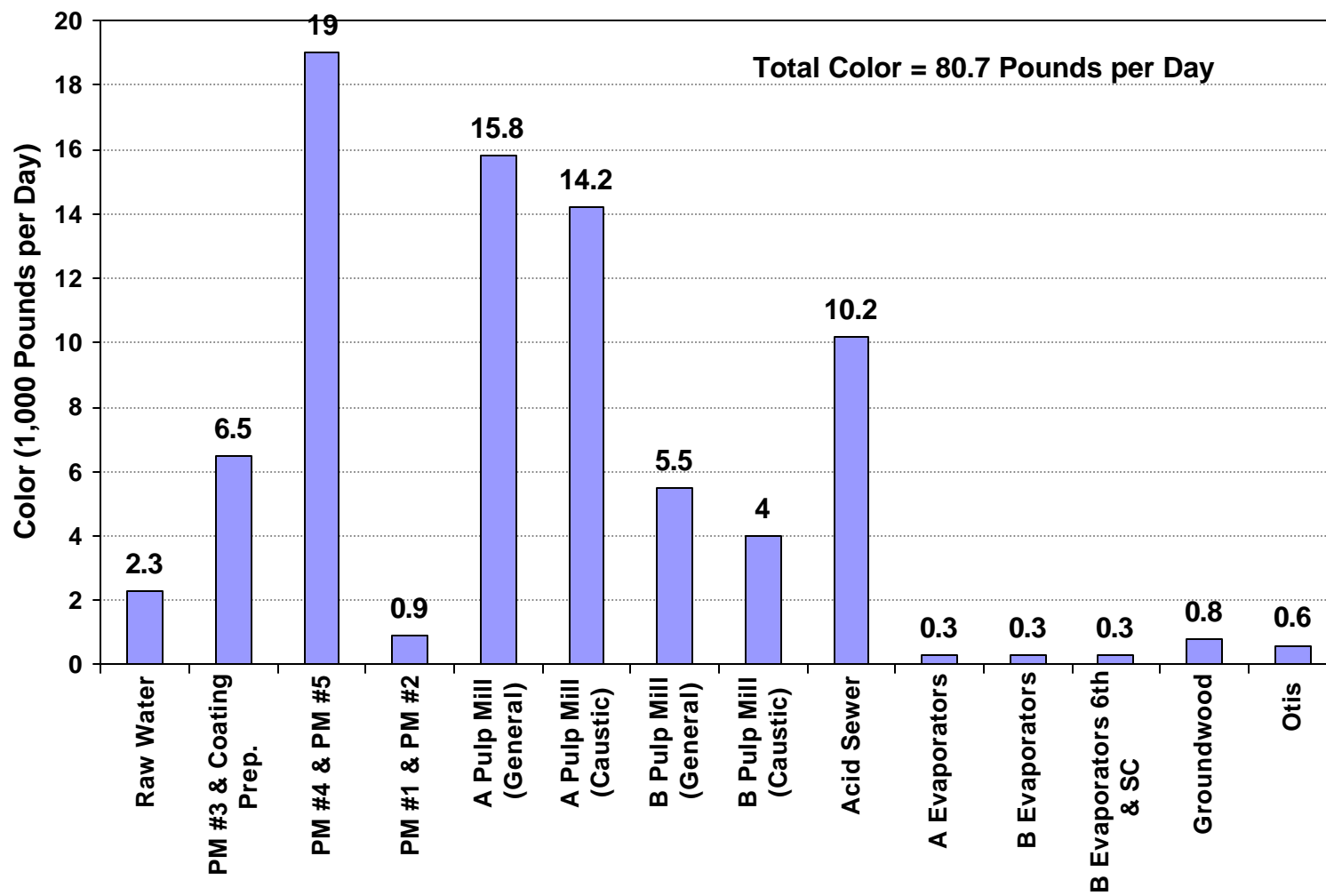


Figure 15
Percentages (%) of 2001 Color in Black Liquor Cycle

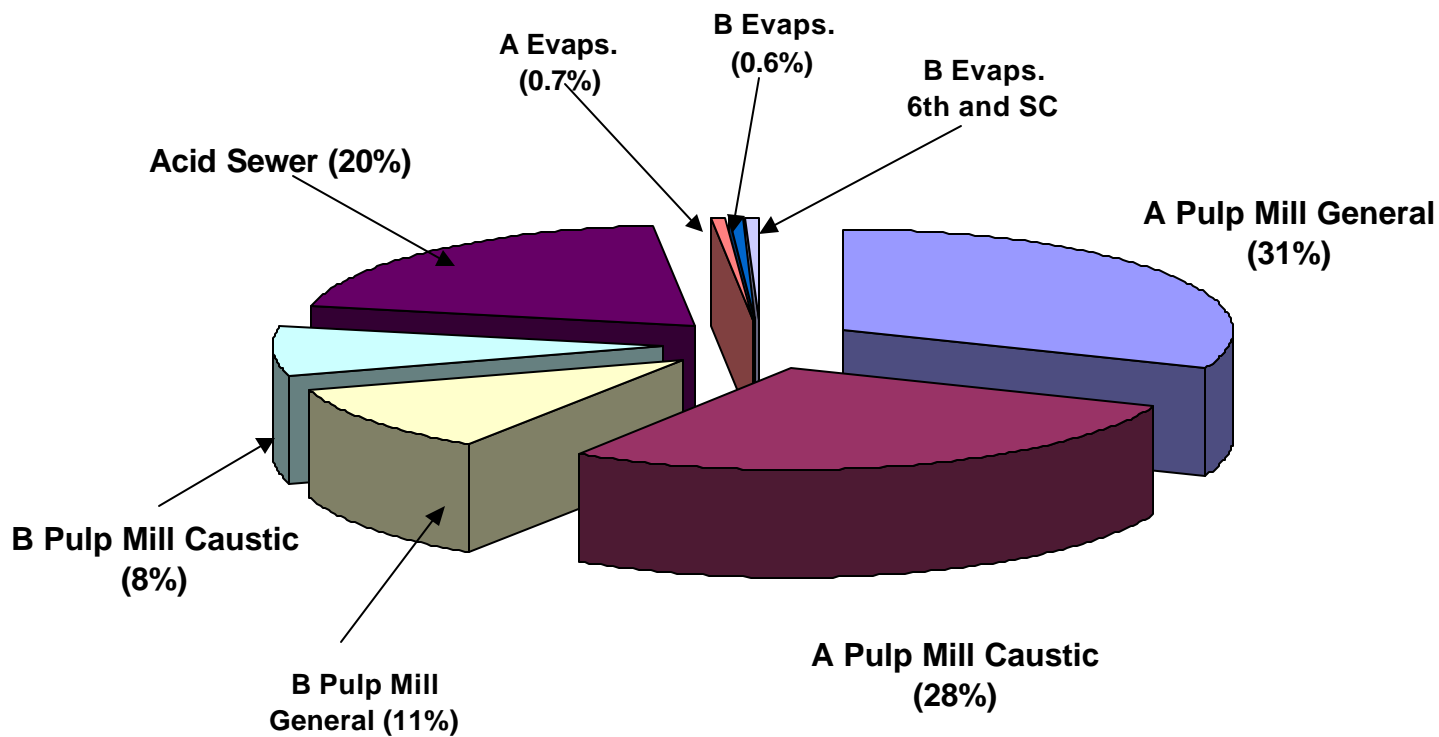


Table 8.
Percentage Contributions to Black Liquor Cycle

AREA DESCRIPTION	Dissolved COD (%)	Dissolved COD - Dissolved BOD (%)	Color (%)	Dissolved Solids (%)
A Pulp Mill General <i>(excludes B evaps)</i>	13	16	31	15
B Pulp Mill General	3	4	11	2
A Pulp Mill Caustic	23	27	28	27
B Pulp Mill Caustic	17	15	8	12
Acid Sewer	23	26	20	43
Bleach plant	63	68	55	82
A Evaporators	13	7	1	0.5
B Evaporators <i>(includes 6th and SC)</i>	8	5	1	0.5
Black Liquor Cycle (1000 lbs/day)	96	61	51	153

Figure 16
 Ratio of Specific Conductance to Dissolved Solids Ratio

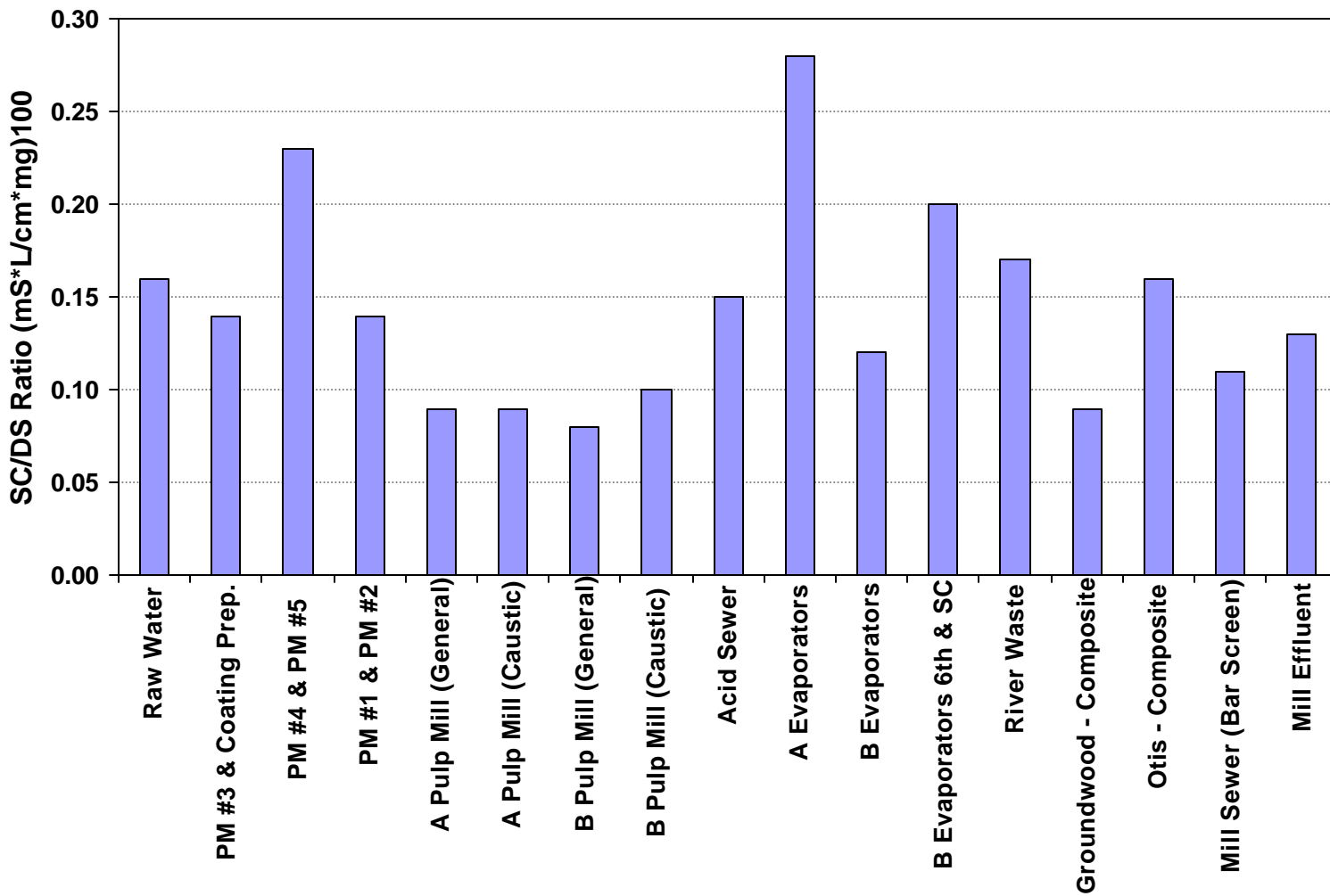


Figure 17
Dissolved Solids Versus Conductivity

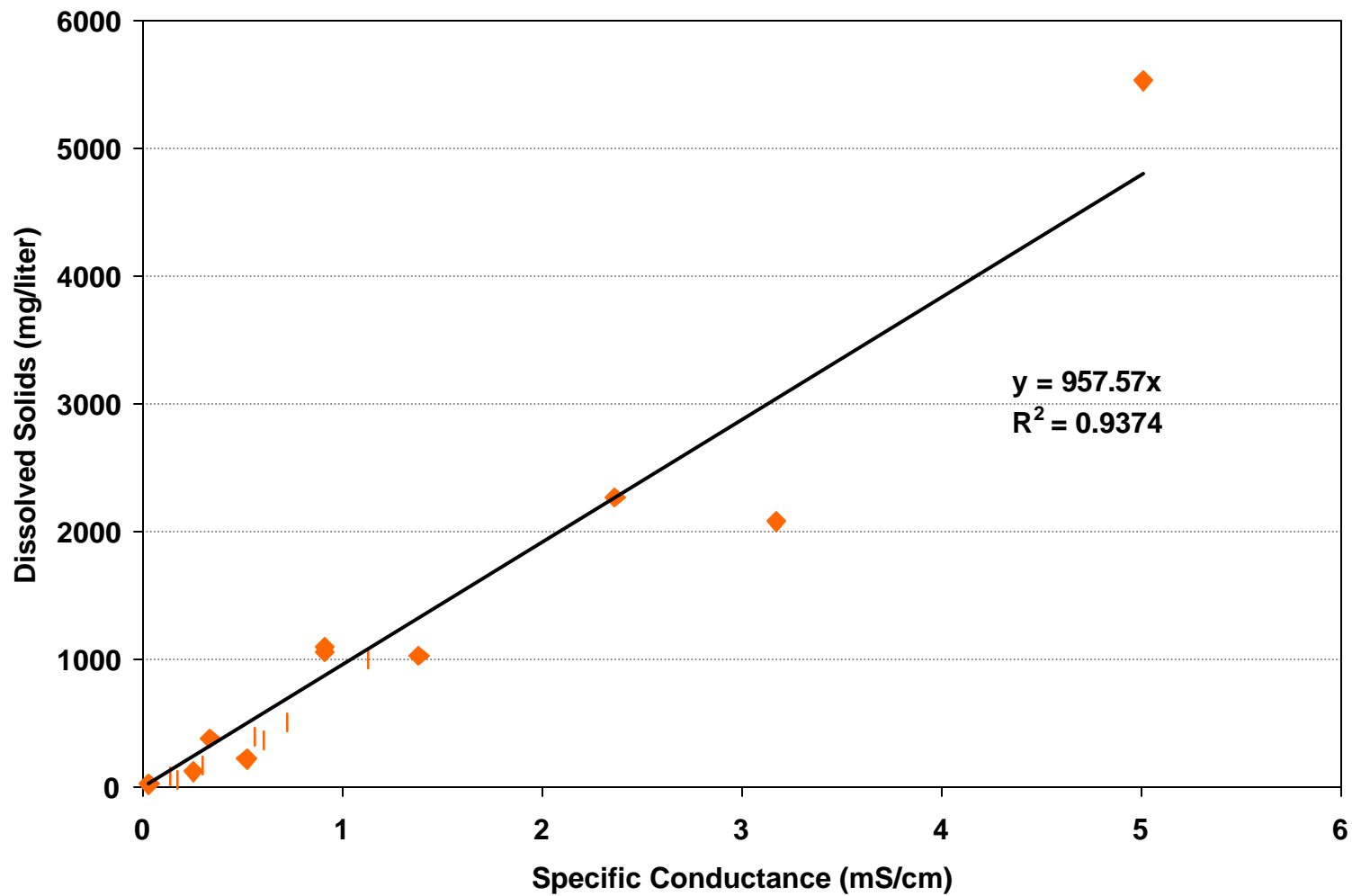


Table 9
(Dissolved COD - Dissolved BOD) and Specific Conductance
for the Black Liquor Cycle Effluent Streams

AREA DESCRIPTION	Dissolved COD - Dissolved BOD (mg/L)	Specific Conductance (mS/cm)	<u>Specific Conductance</u> (Dis. COD-Dis. BOD) (mS*L/cm*mg)
A Pulp Mill (General)	482	0.911	0.19
B Pulp Mill (General)	783	0.914	0.12
A Pulp Mill (Caustic)	2169	5.010	0.23
B Pulp Mill (Caustic)	1188	2.367	0.20
Acid Sewer	508	3.170	0.62
A Evaporators	432	0.175	0.04
B Evaporators	114	0.032	0.03
B Evap, 6th + SC	693	0.252	0.04

Table 10.
Summary of Toxicity Data

SAMPLE DATE	LOCATION	A-NOEC	LC-50
9/4/2001	Bar Screen	35%	47.5%
9/7/2001	No. 3 PM	100%	>100
9/4/2001	A Caustic Sewer	<5%	4.7%
9/10/2001	Acid Sewer	25%	40%

