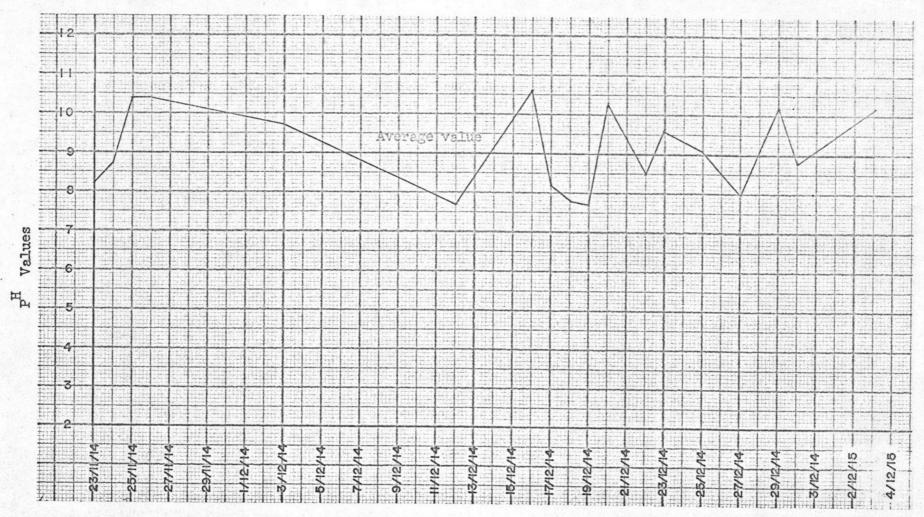
CHAPTER 7
WASTEWATER ANALYSIS AND RESULTS

TABLE 3 RAW CHARACTERISTICS OF WASTEWATER

Date	p ^H	COD mg/l.	Alkalinity mg/1. as CaCO3	Color units	Turbidity units JTU	Suspended solids mg/1.
23/11/14	8.2	114	370	930	110	176
24/11/14	8.7	350	680	1050	126	161
25/11/14	10.4	202	1100	1030	132	122
26/11/14	10.4	218	560	680	98	144
3/11/14	9.7	408	690	940	114	187
12/12/14	7.7	280	380	780	132	192
16/12/14	10.6	406	2700	400	66	132
17/12/14	8.2	112	300	680	94	187
18/12/14	7.8	112	290	960	110	145
19/12/14	7.7	285	230	560	80	150
20/12/14	10.3	268	860	560	98	125
22/12/14	8.5	330	580	1620	296	196
23/12/14	9.6	406	2500	2100	470	180
25/12/14	9.1	227	750	1230	154	188
27/12/14	8.0	150	360	1040	126	150
29/12/14	10.2	226	945	910	102	154
30/12/14	8.8	281	1090	2500	550	157
3/1/15	10.2	207	920	1530	206	182

1



DATE OF COLLECTING SAMPLES

FIGURE 6 RELATION BETWEEN PH VERSUS DAYS

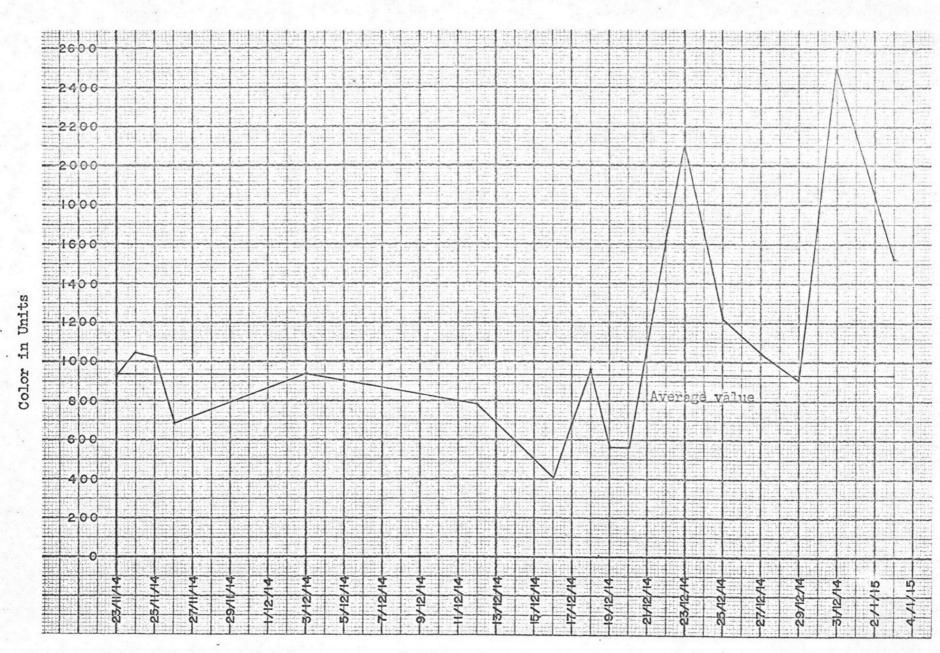
FIGURE 7 RELATION BETWEEN ALKALINITY VERSUS DAYS

DATE OF COLLECTING SAMPLES

300 1200 -1100 1000 900 Alkalinity in mg/1. as $CaCO_3$ 800 700 600 500 400 300 200 100 3/12/14 9/12/14 1/12/14 5/12/14 7/12/14 17/12/14 15/12/14 29/11/14 11/12/14 13/12/14 19/12/14 21/18/14 31/12/14 23/11/1 2/1/12 4/1/15 -23/12/4 27/2/14 29/12/14

-520 -480 -440--400 Chemical oxygen demand in mg/l. -360 valu Avera -320 -280 -200 120 80 40 -29/11/14 5/12/14 27/11/14 1/12/14 3/12/14 7/12/14 9/12/14 13/12/14 15/12/14 17/12/14 11/12/14 19/12/14 21/12/14 **25/11/14** 29/12/14 DATE OF COLLECTING SAMPLES

FIGURE 8 RELATION BETWEEN CHEMICAL OXYGEN DEMAND VERSUS DAYS



DATE OF COLLECTING SAMPLES

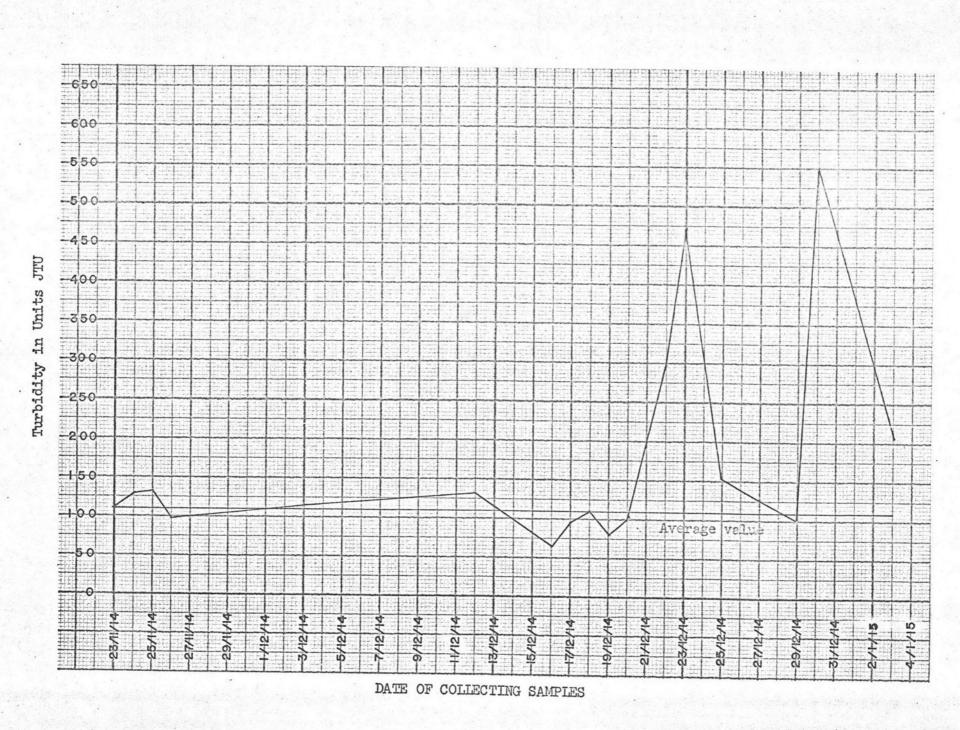
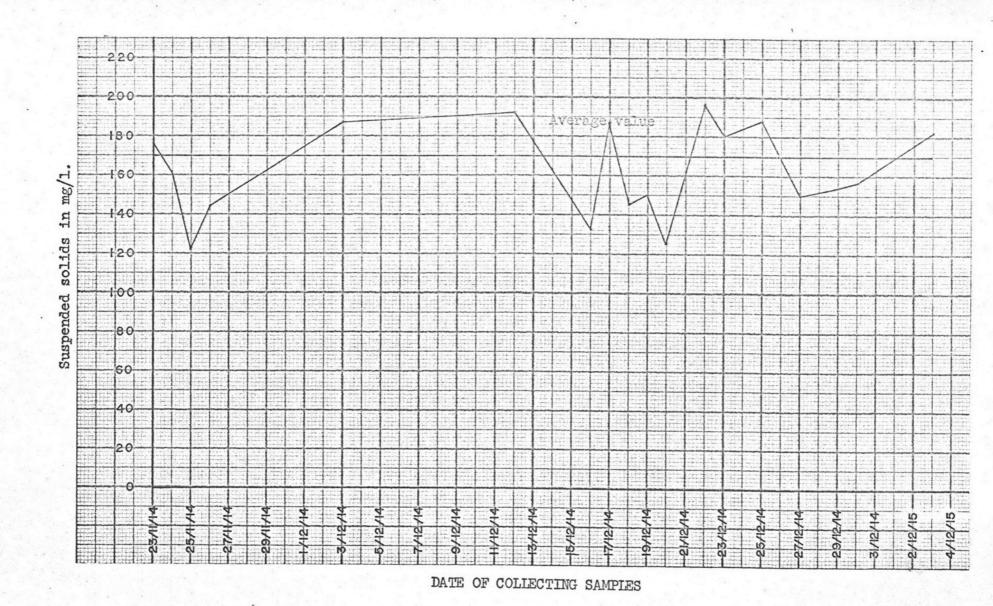


FIGURE 10 RELATION BETWEEN TURBIDITY VERSUS DAYS



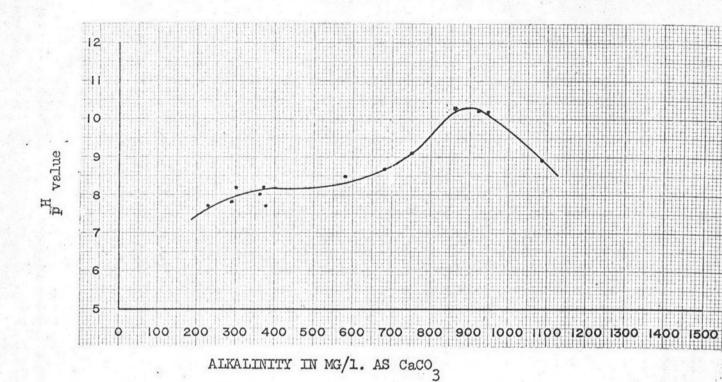


FIGURE 12 REIATION BETWEEN PH VALUE VERSUS ALKALINITY

TABLE 4 AVERAGE RAW CHARACTERISTICS OF TEXTILE WASTES FROM GRAPHS

P^{H}	=	9.0
COD	=	300 mg/l.
alkalinity	=	600 mg/l. as CaCO ₃
color	=	930 units
turbidity	=	110 units JTU
Suspended solids	=	170 mg/l.

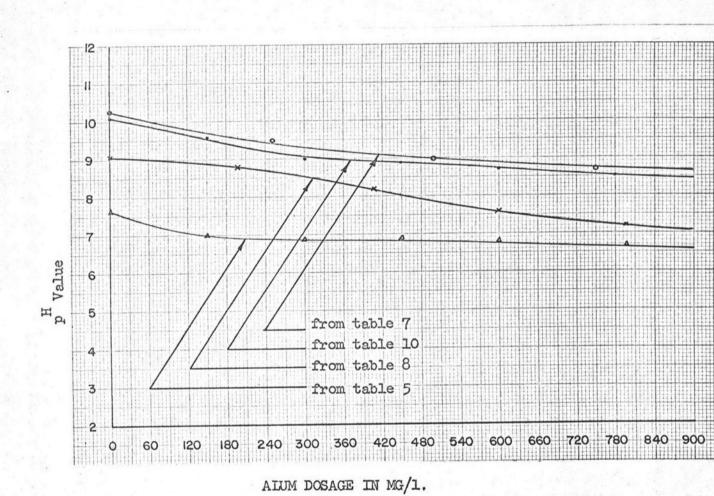


FIGURE 13 RELATION BETWEEN PH VALUE VERSUS ALUM

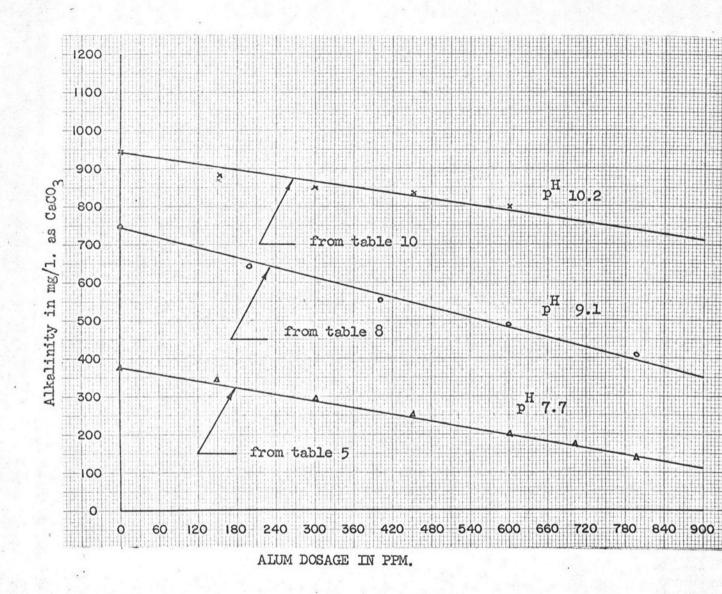


FIGURE 14 RELATION BETWEEN ALKALINITY VERSUS ALUM DOSAGE

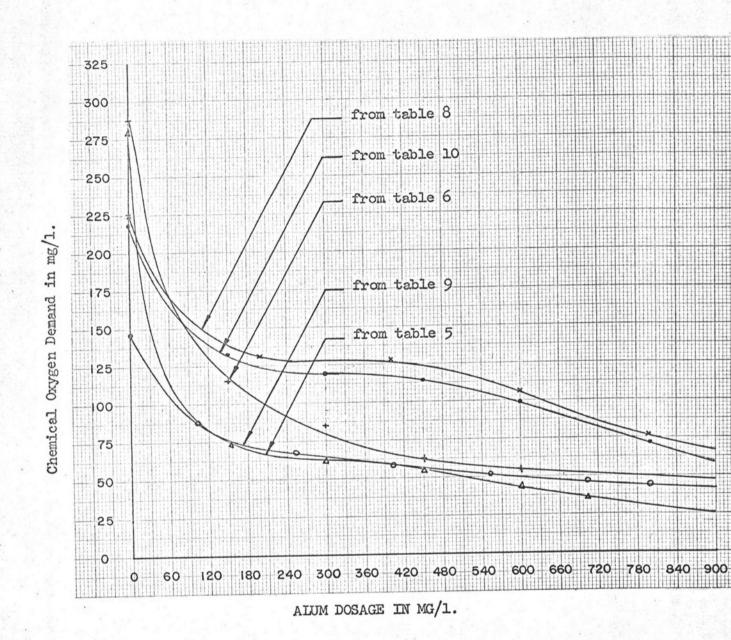


FIGURE 15 RELATION BETWEEN ALUM DOSAGE VERSUS C.O.D.

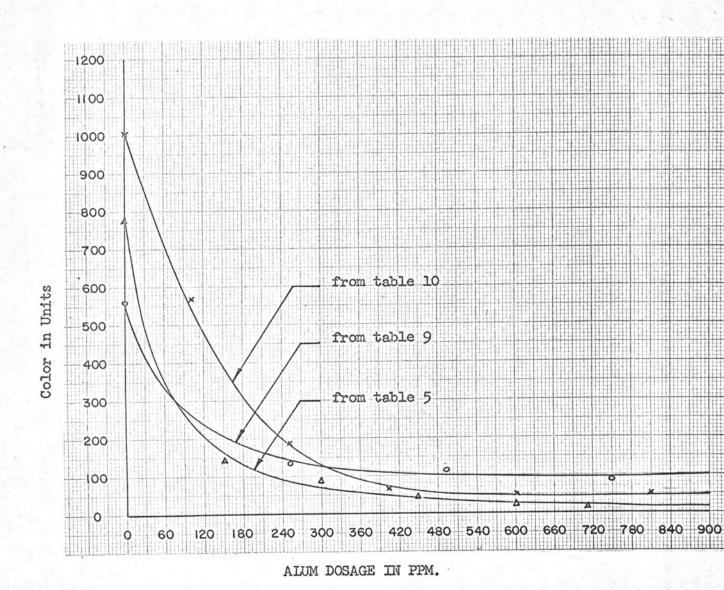


FIGURE 16 RELATION BETWEEN COLOR VERSUS ALUM DOSAGE

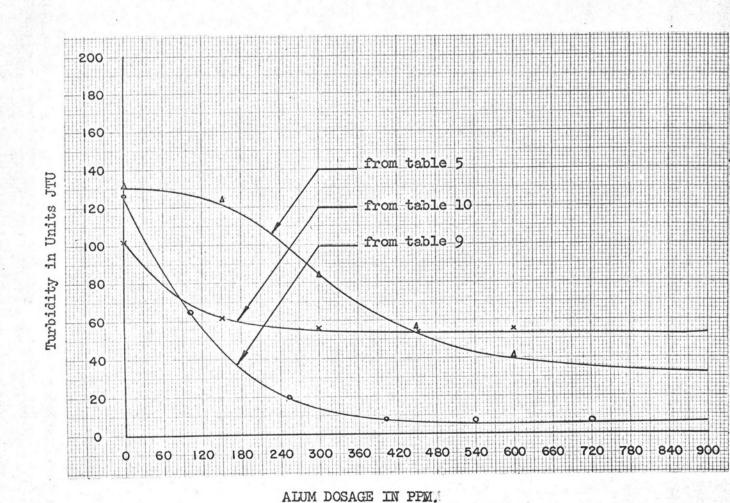
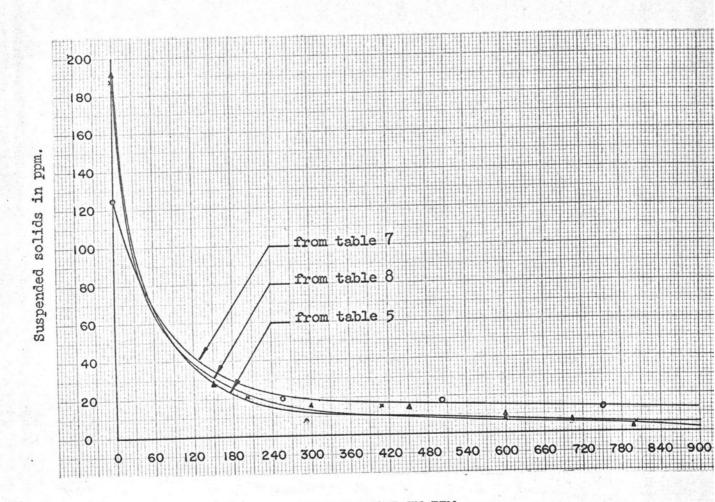


FIGURE 17 RELATION BETWEEN TURBIDITY VERSUS ALUM DOSAGE



ALUM DOSAGE IN PPM

FIGURE 18 RELATION BETWEEN SUSPENDED SOLIDS VERSUS ALUM DOSAGE

TABLE 5 JAR TEST FOR TRIAL OPTIMUM VALUE OF ALUM DOSAGE
RAPID MIXING 3 MINUTES SPEED 75 rpm.
SLOW MIXING 27 " " 25 "

CONTACT TIME 30 "

THE RESULTS ARE SHOWN IN TABLE BELOW

Jar No.	Raw	1	2	3	4	5	6
Alum dosage mg/l.	-	150	300	450	600	700	800
PH	7.7	7.0	6.9	6.9	6.8	6.8	6.7
COD mg/1.	280	72	65	55	45	36	18
Alkalinity mg/l. as CaCO3	380	354	294	250	200	178	148
Color units	780	130	90	50	20	- 0	-0
Turbidity units JTU	132	126	82	56	42	6	•
S.S. mg/1.	192	28	17	15	10	5	2

DATE 12/12/14

TABLE 6 JAR TEST FOR TRIAL OPTIMUM OF ALUM DOSAGE

RAPID MIXING 3 MINUTES SPEED 75 rpm.

SLOW MIXING 27 " " 25 "

CONTACT TIME 30 "

THE RESULTS ARE SHOWN IN TABLE BELOW

DATE 19/12/14

Jar No.	Raw	1	2	3	14
Alum dasage mg.l.	AS	150	300	450	600
$\mathbf{p}^{\mathbf{H}}$	7.7	7.2	6.6	6.1	6.0
COD mg/l.	285	115	90	55	30
Alkalinity mg/1. as CaCO3	230	210	180	64	58
Color units	560	590	530	430	430
Turbidity units JTU	80	82	64	60	60
S.S. mg/1.	150	20	12	10	2

TABLE 7 JAR TEST FOR TRIAL OPTIMUM VALUE OF ALUM DOSAGE

RAPID MIXING 3 MINUTES SPEED 75 rpm.

SLOW MIXING 27 " " 25 "

CONTACT TIME 30 "

THE RESULTS ARE SHOWN IN TABLE BELOW

DATE 20/12/14

Raw	1	2	3	14	5
-	250	500	750	1000	1200
10.3	9.5	9.0	8.7	8.5	8.4
268	230	204	192	150	77
860	740	610	570	450	390
560	130	130	90	90	50
98	98	90	76	66	54
125	20	18	13	1	1
	- 10.3 268 860 560 98	- 250 10.3 9.5 268 230 860 740 560 130 98 98	- 250 500 10.3 9.5 9.0 268 230 204 860 740 610 560 130 130 98 98 90	- 250 500 750 10.3 9.5 9.0 8.7 268 230 204 192 860 740 610 570 560 130 130 90 98 98 90 76	- 250 500 750 1000 10.3 9.5 9.0 8.7 8.5 268 230 204 192 150 860 740 610 570 450 560 130 130 90 90 98 98 90 76 66

TABLE 8 JAR TEST FOR TRIAL OPTIMUM VALUE OF ALUM DOSAGE

RAPID MIXING 3 MINUTES SPEED 75 rpm.

SLOW MIXING 27 " " 25 "

CONTACT TIME 30 "

THE RESULTS ARE SHOWN IN TABLE BELOW

DATE 25/12/14

Jar No.	Raw	1	2	3	14
Alum dosage mg/l.	-	200	400	600	800
p^{H}	9.1	8.8	8.2	7.6	7.2
COD mg/1.	227	132	132	113	76
Alkalinity mg/1. as CaCO3	750	640	550	490	410
Color units	1220	1030	940	780	500
Turbidity units JTU	154	136	110	100	58
S.S. Mg/1.	188	19	16	9	14

TABLE 9 JAR TEST FOR TRIAL OPTIMUM VALUE OF ALUM DOSAGE

RAPID MIXING 3 MINUTES SPEED 75 rpm.
SLOW MIXING 27 " " 25 "
CONTACT TIME 30 "

27/12/14

THE RESULTS ARE SHOWN IN TABLE BELOW

DATE

Jar No. Raw Alum dosage mg/l. p^{H} 8.0 7.1 6.9 6.8 6.5 6.5 6.0 COD mg/1. Alkalinity mg/l. as CaCO3 Color units Turbidity units JTU S.S. mg/1.

TABLE 10 JAR TEST FOR TRIAL OPTIMUM VALUE OF ALUM DOSAGE
RAPID MIXING 3 MINUTES SPEED 75 rpm.

SLOW MIXING 27 " " 25 rpm.

CONTACT TIME 30 "

THE RESULTS ARE SHOWN IN TABLE BELOW

DATE 29/12/14

Jar No	Raw	1	2	3	14
Alum dosage	-	150	300	450	600
p ^H	10.2	9.6	9.0	8.9	8.7
COD mg/l	226	138	120	115	100
Alkalinity mg/l. as CaCO ₃	945	870	850	830	800
Color units	910	530	500	470	400
Turbidity units JTU	102	62	56	56	56
S S mg/1.	154	26	16	9	5

TABLE 11 JAR TEST FOR TRIAL OPTIMUM VALUE OF ALUM DOSAGE

RAPID MIXING 3 MINUTES SPEED 75 rpm.

SLOW MIXING 27 " " 25 "

CONTACT TIME 30

RESULTS ARE SHOWN IN TABLE BELOW

DATE 30/12/14

Raw	1	2	3
NO.	150	300	450
8.8	8.4	8.2	8.0
281	110	94	82
1090	1050	1010	900
2500	2100	2050	2000
550	348	334	320
157	36	30	17
	- 8.8 281 1090 2500 550	- 150 8.8 8.4 281 110 1090 1050 2500 2100 550 348	- 150 300 8.8 8.4 8.2 281 110 94 1090 1050 1010 2500 2100 2050 550 348 334

TABLE 12 COMPARISON PERCENTAGE OF REMOVAL BETWEEN COAGULATION PROCESS AND ACTIVATED CARBON COLUMN.

DATE 25/12/14

200 8.8 132	removal	300 8.5 132	removal - 42.0	400 8.2 132	removal	8.5	emoval
8.8		8.5	- 42.0	8.2			-
1		İ	42.0				-
132	42.0	132	42.0	132	112 0	-0	
	1	1			42.0	38	83.2
640	14.7	610	18.7	550	26.6	400	46.6
1030	15.6	960	21.2	940	23.0	120	90.0
136	11.8	120	22.1	110	28.6	12	92.0
19	89.9	16	91.1	16	91.5	4	97.9
	1030	1030 15.6	1030 15.6 960 136 11.8 120	1030 15.6 960 21.2 136 11.8 120 22.1	1030 15.6 960 21.2 940 136 11.8 120 22.1 110	1030 15.6 960 21.2 940 23.0 136 11.8 120 22.1 110 28.6	1030 15.6 960 21.2 940 23.0 120 136 11.8 120 22.1 110 28.6 12

TABLE 13 COMPARISON PERCENTAGE OF REMOVAL BETWEEN COAGULATION PROCESS AND ACTIVATED CARBON.

DATE 27/12/14

			Coa		Activated carbon				
	Raw waste		% removal		% removal		% removal	colum	THE RESERVE AND ADDRESS OF THE PERSON NAMED IN COLUMN 2 IS NOT THE
Alum dosage mg/l.		100	-	250	-	400	_		-
pH	8.0	7.1	-	6.9	-	6.8	-	3.8	-
COD mg/1.	150	75	50.0	70	53.4	68	55.6	10	93.3
Alkalinity mg/l. as CaCO	360	310	13.8	260	27.8	195	45.8	-	-
Color units	1040	570	45.2	190	78.8	60	94.2	20	98.0
Turbidity units JTU	126	63	50.0	20	84.0	8	93.5	6	95.0
S.S. mg/l.	150 .	20	86.5	15	90.0	9	94.0	3	98.0

TABLE 14 COMPARISON PERCENTAGE OF REMOVAL BETWEEN COAGULATION PROCESS AND ACTIVATED CARBON COLUMN.

DATE 29/12/14

					Activated carbon				
	Raw waste		removal		% removal		% removal	column	Anna and the State of the State
Alum dosage mg/l.		150		300		450			
p ^H	10.2	9.6	-	9.0	-	8.9	-	7.2	-
COD mg/1.	226	13.8	39.0	120	47.0	115	49.2	72	68.3
Alkalinity mg/l. as CaCO3	945	870	8.0	850	10.1	830	12.2	260	72.5
Color units	910	530	41.8	500	45.0	470	48.3	220	76.0
Turbidity units JTU	102	62	39.2	56	44.2	56	45.0	22	78.5
S.S. mg/1.	154	26	83.0	16	89.9	9	94.3	3	98.9

TABLE 15 COMPARISON PERCENTAGE OF REMOVAL BETWEEN COAGULATION PROCESS AND ACTIVATED CARBON COLUMN.

DATE 30/12/14

				Activated carbon				
Raw waste		% removal		% removal		% removal	colum	n % removal
	150		300		450	(X)		
8.8	8.4	-	8.2	-	8.0	-	8.2	-
281	110	61.0	94	66.5	82	70.9	88	68.8
1090	1050	3.7	1010	7.9	900	17.4	900	17.4
2500	2100	16.0	2050	18.0	2000	25.0	320	87.3
550	348	36.5	334	39.4	320	41.8	38	93.5
157	36	77.0	20	87.3	17	89.2	14	91.1
	8.8 281 1090 2500 550	waste 150 8.8 8.4 281 100 1090 1050 2500 2100 550 348	waste removal 150 8.8 8.4 - 281 110 61.0 1090 1050 3.7 2500 2100 16.0 550 348 36.5	waste removal 150 300 8.8 8.4 - 8.2 281 110 61.0 94 1090 1050 3.7 1010 2500 2100 16.0 2050 550 348 36.5 334	waste removal removal 150 300 8.8 8.4 - 8.2 - 281 110 61.0 94 66.5 1090 1050 3.7 1010 7.9 2500 2100 16.0 2050 18.0 550 348 36.5 334 39.4	waste removal removal 150 300 450 8.8 8.4 - 8.2 - 8.0 281 110 61.0 94 66.5 82 1090 1050 3.7 1010 7.9 900 2500 2100 16.0 2050 18.0 2000 550 348 36.5 334 39.4 320	waste removal removal removal 8.8 8.4 - 8.2 - 8.0 - 281 110 61.0 94 66.5 82 70.9 1090 1050 3.7 1010 7.9 900 17.4 2500 2100 16.0 2050 18.0 2000 25.0 550 348 36.5 334 39.4 320 41.8	waste removal removal removal 150 300 450 8.8 8.4 - 8.2 - 8.0 - 8.2 281 110 61.0 94 66.5 82 70.9 88 1090 1050 3.7 1010 7.9 900 17.4 900 2500 2100 16.0 2050 18.0 2000 25.0 320 550 348 36.5 334 39.4 320 41.8 38

TABLE 16 COMPARISON PERCENTAGE OF REMOVAL BETWEEN COAGULATION PROCESS AND ACTIVATED CARBON COLUMN.

DATE 3/1.15

	Raw waste	Coagulation process				Activated carbon	
		% removal		drop p ^H wa st e to .6.8	% removal	column % removal	
Alum dosage mg/l.		300		300			
H	10.2	9.0	-	6.4	-	6.7	
COD mg/l.	207	94	54.4	113	45.2	56	72.9
Alkalinity mg/l. as CaCO	920	570	38.0	80	91.5	190	79.5
Color units	1500	940	37.4	1370	8.7	0	100
Turbidity units JTU	206	106	48.5	174	15.5	4	99.0
S.S. mg/l.	182	23	87.4	25	86.2	2	98.9