

CHAPTER 7

WASTEWATER ANALYSIS AND RESULTS

TABLE 3 RAW CHARACTERISTICS OF WASTEWATER

Date	p ^H	COD mg/l.	Alkalinity mg/l. as CaCO ₃	Color units	Turbidity units JTU	Suspended solids mg/l.
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

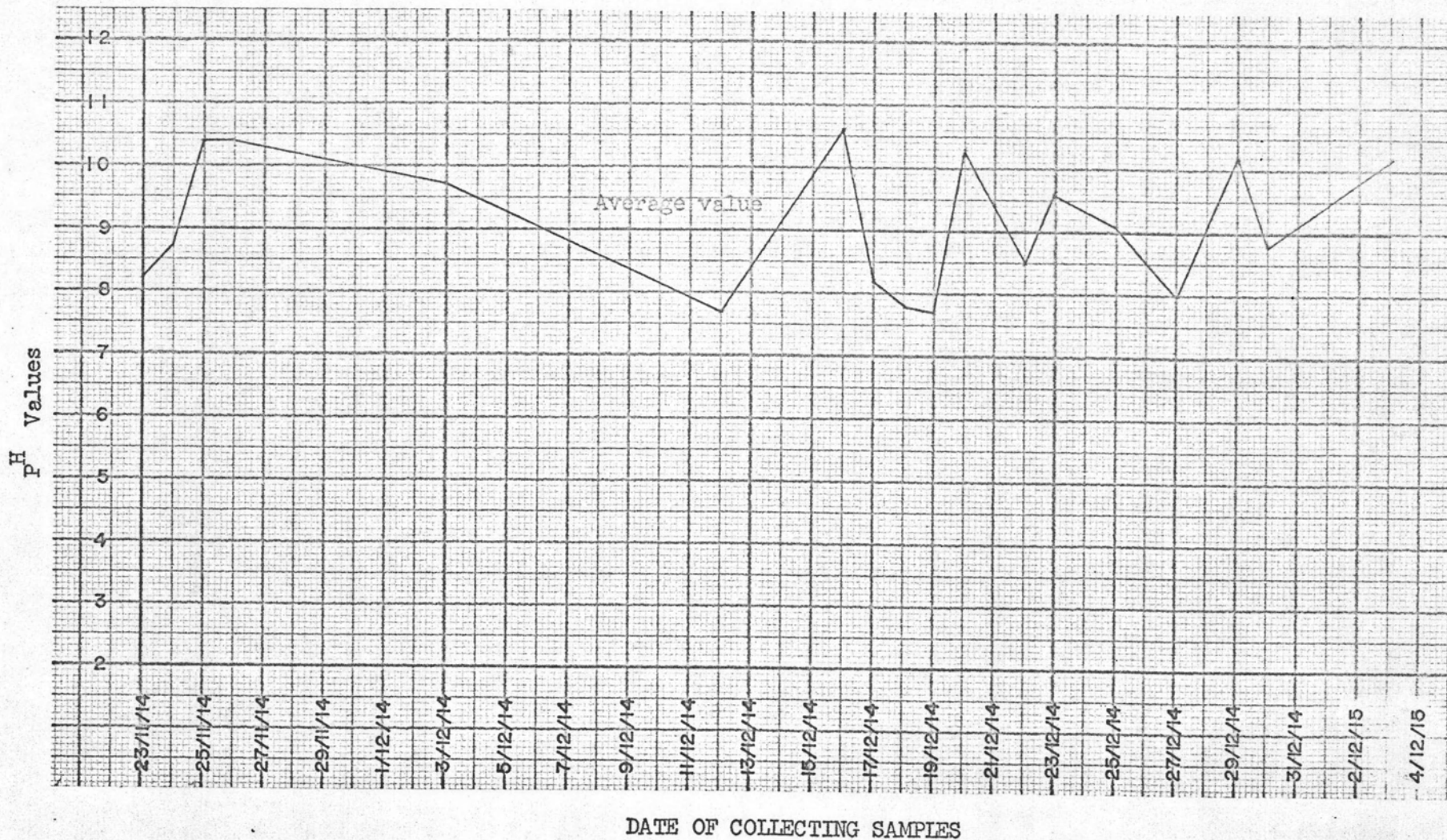


FIGURE 6 RELATION BETWEEN P^H VERSUS DAYS

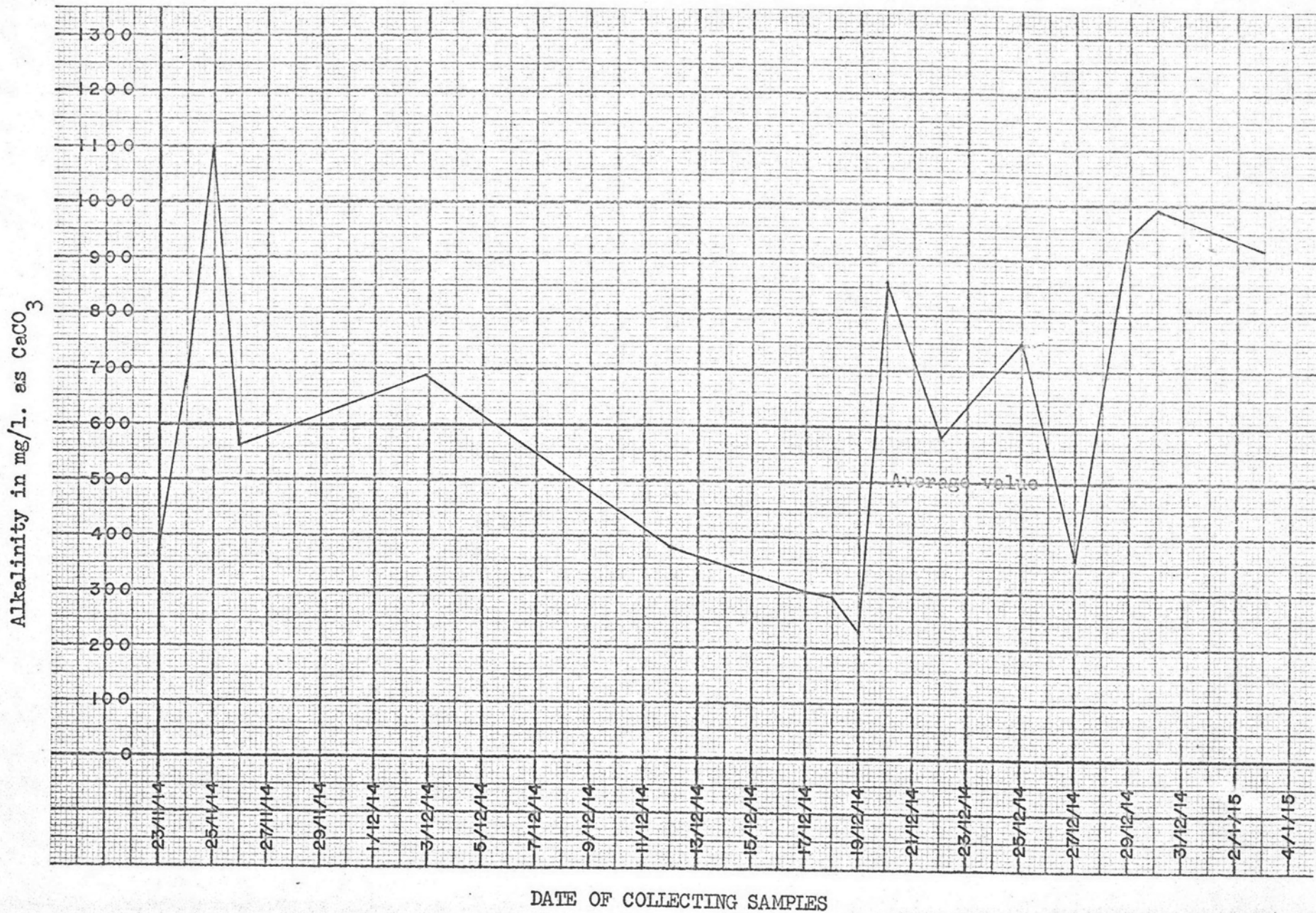


FIGURE 7 RELATION BETWEEN ALKALINITY VERSUS DAYS

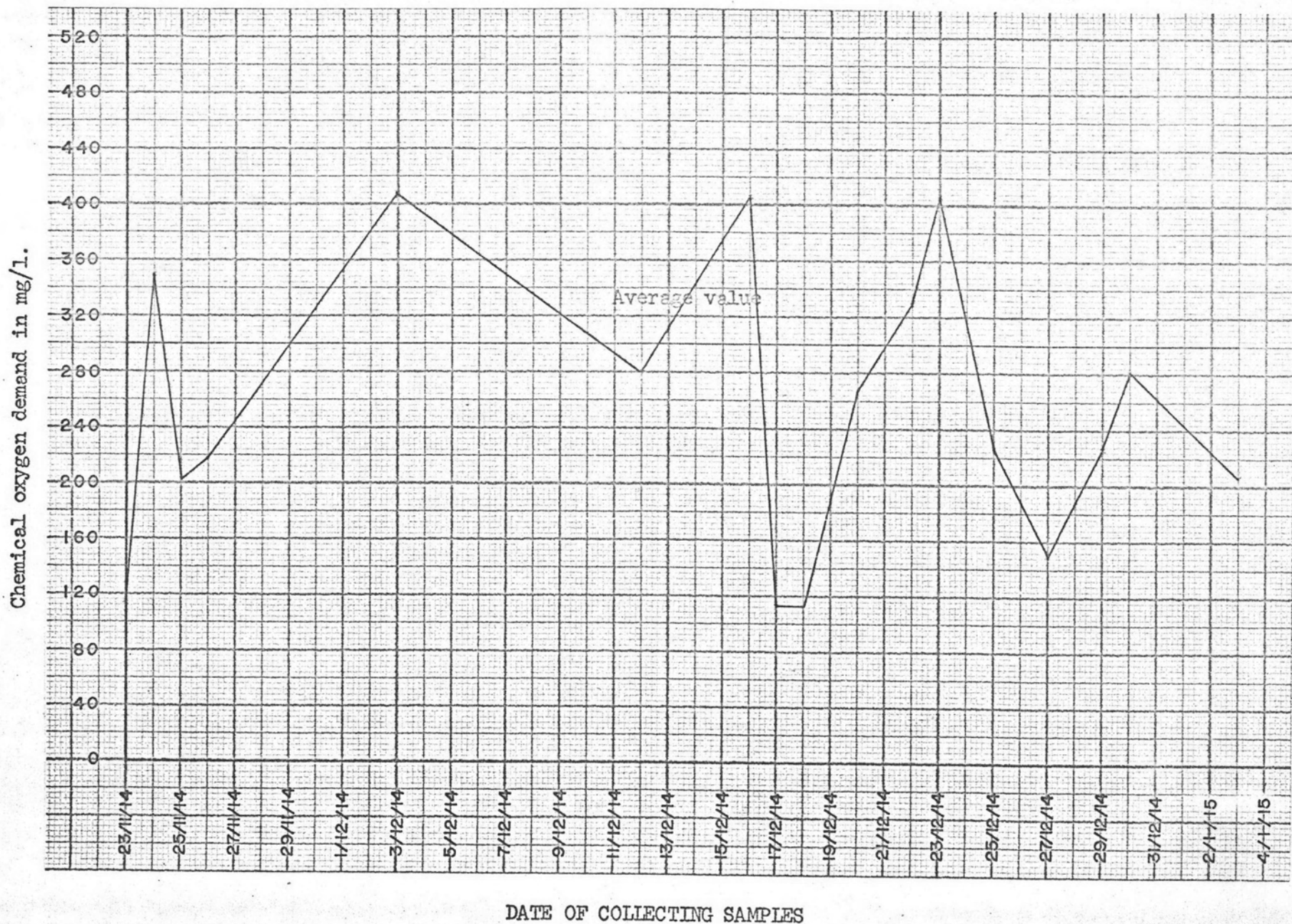


FIGURE 8 RELATION BETWEEN CHEMICAL OXYGEN DEMAND VERSUS DAYS

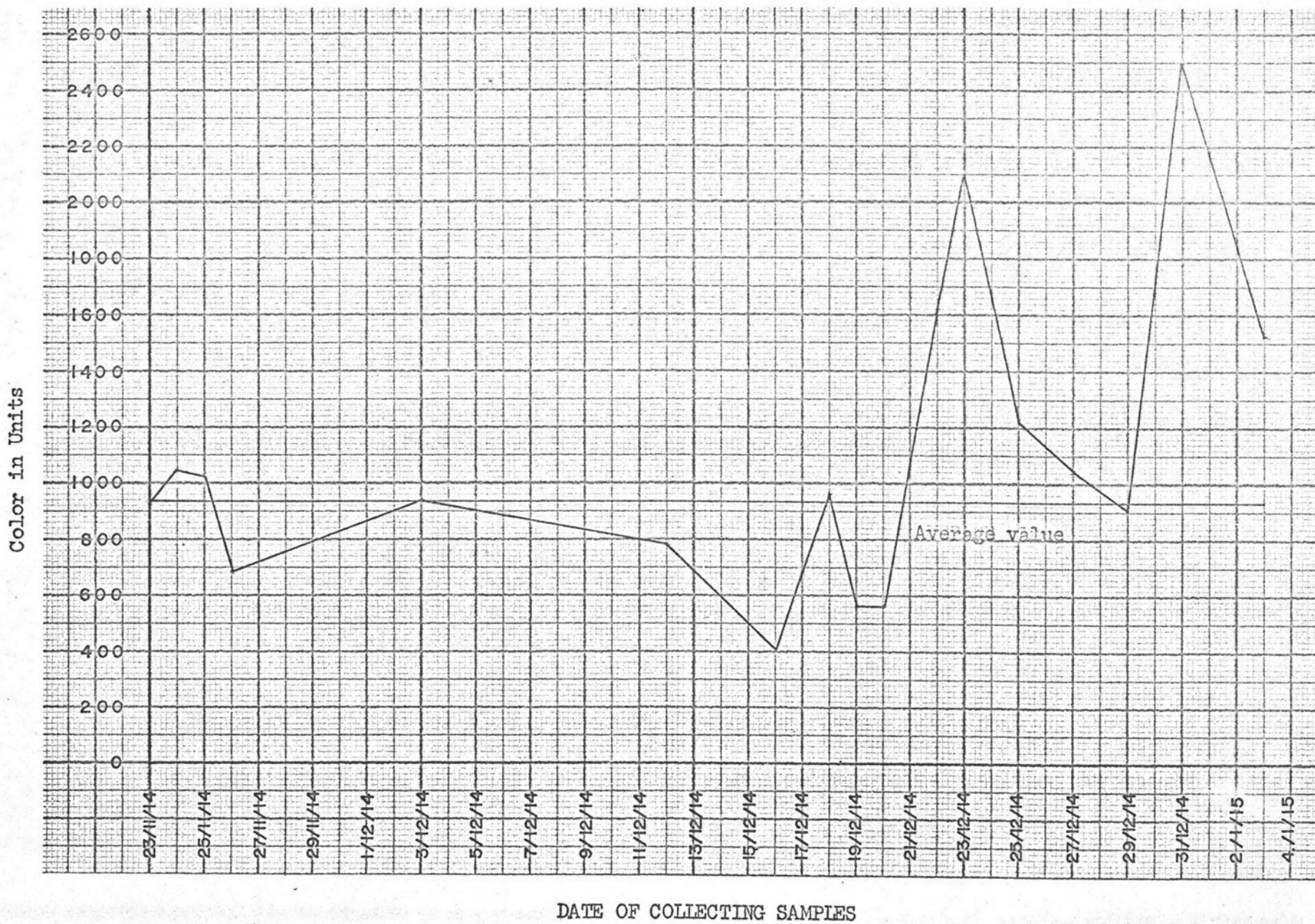


FIGURE 9 RELATION BETWEEN COLOR VERSUS DAYS

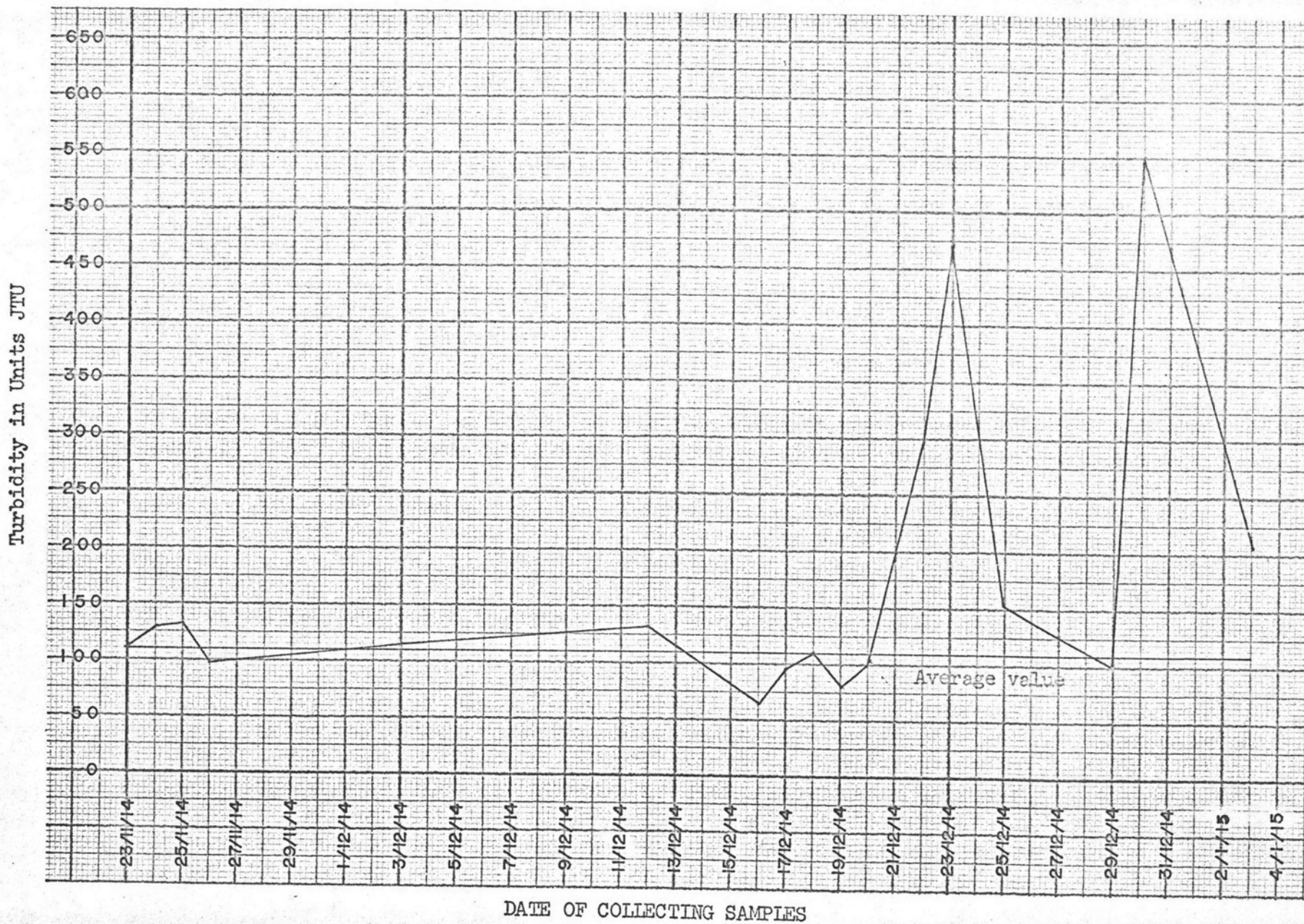


FIGURE 10 RELATION BETWEEN TURBIDITY VERSUS DAYS

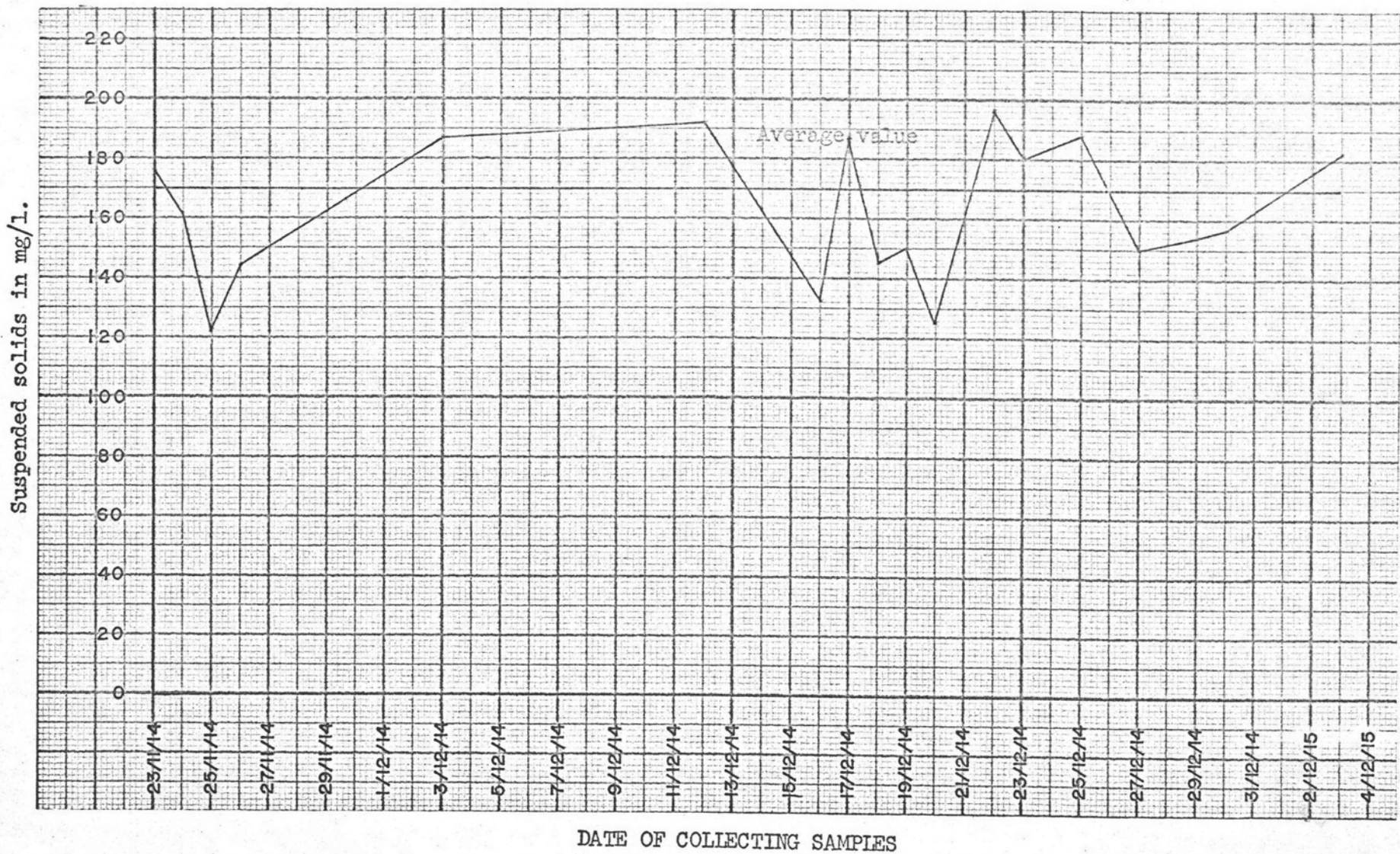


FIGURE 11 RELATION BETWEEN SUSPENDED SOLIDS VERSUS DAYS

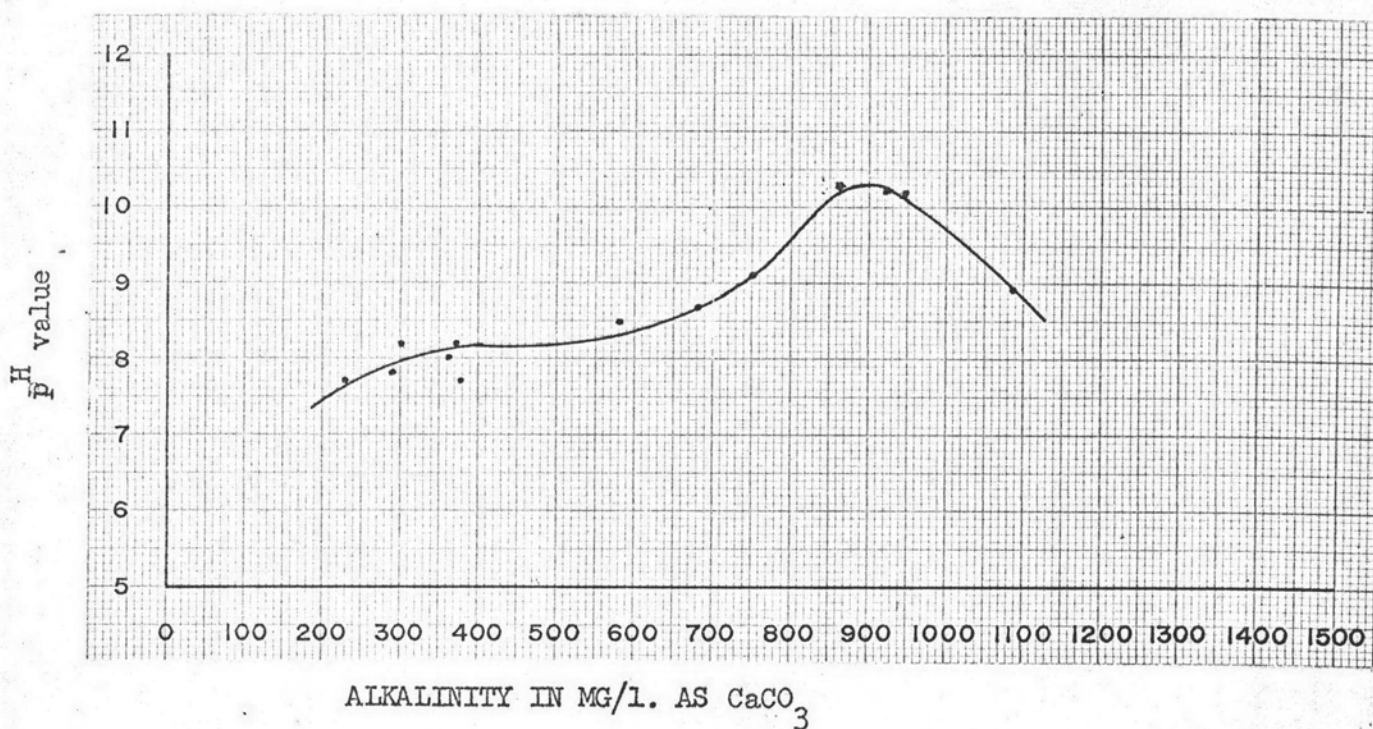


FIGURE 12 RELATION BETWEEN P^H VALUE VERSUS ALKALINITY

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.

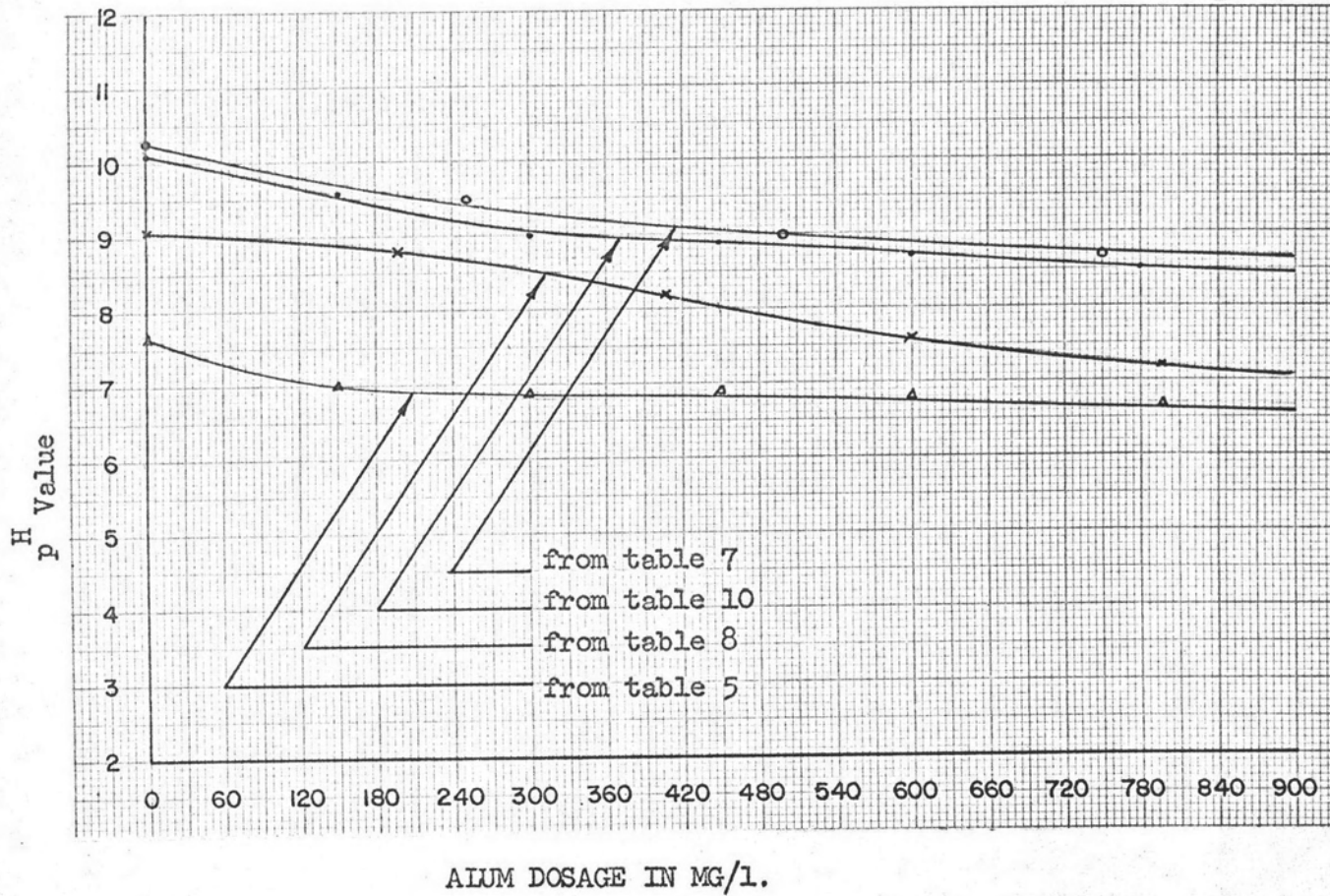


FIGURE 13 RELATION BETWEEN P^H VALUE VERSUS ALUM

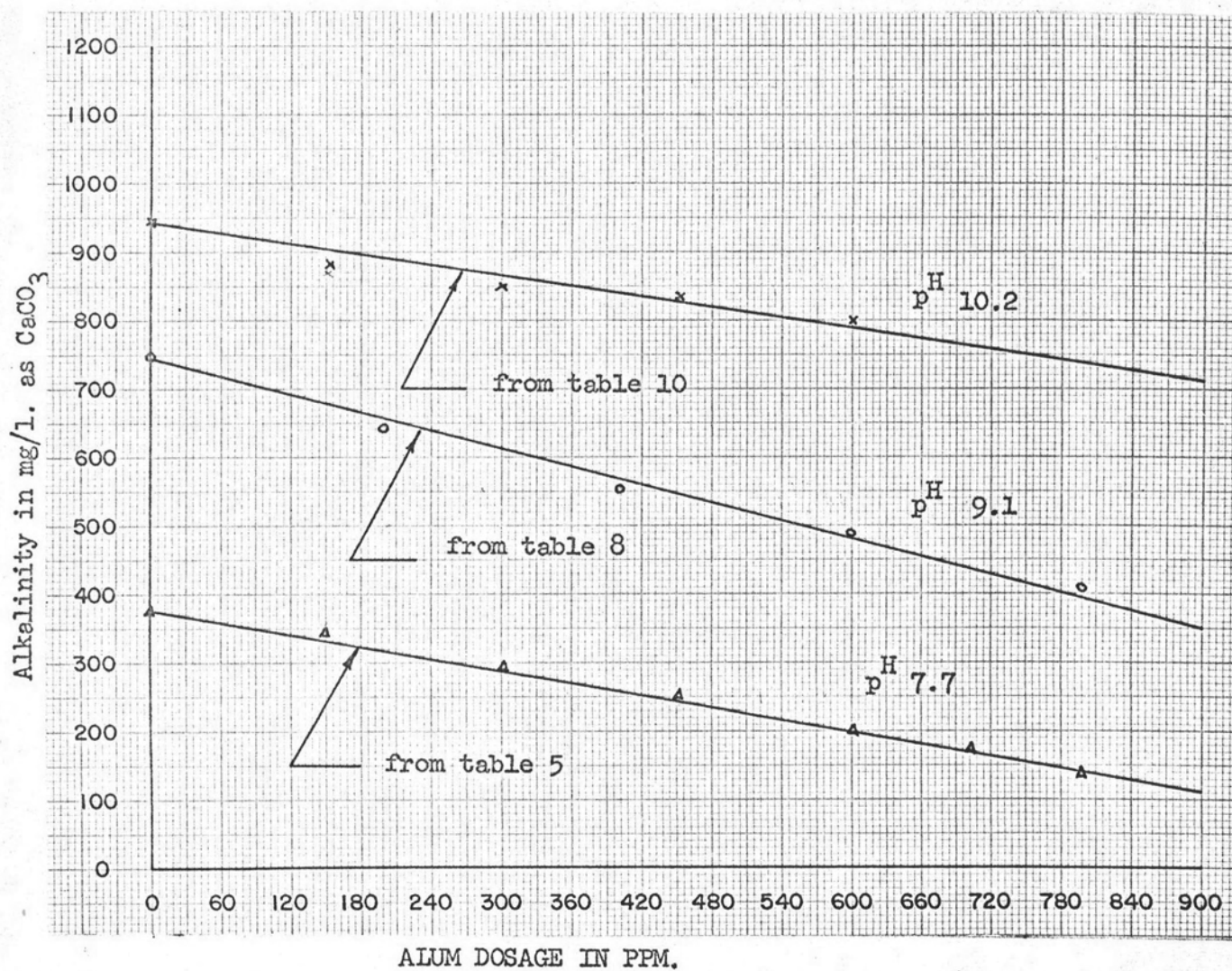


FIGURE 14 RELATION BETWEEN ALKALINITY VERSUS ALUM DOSAGE

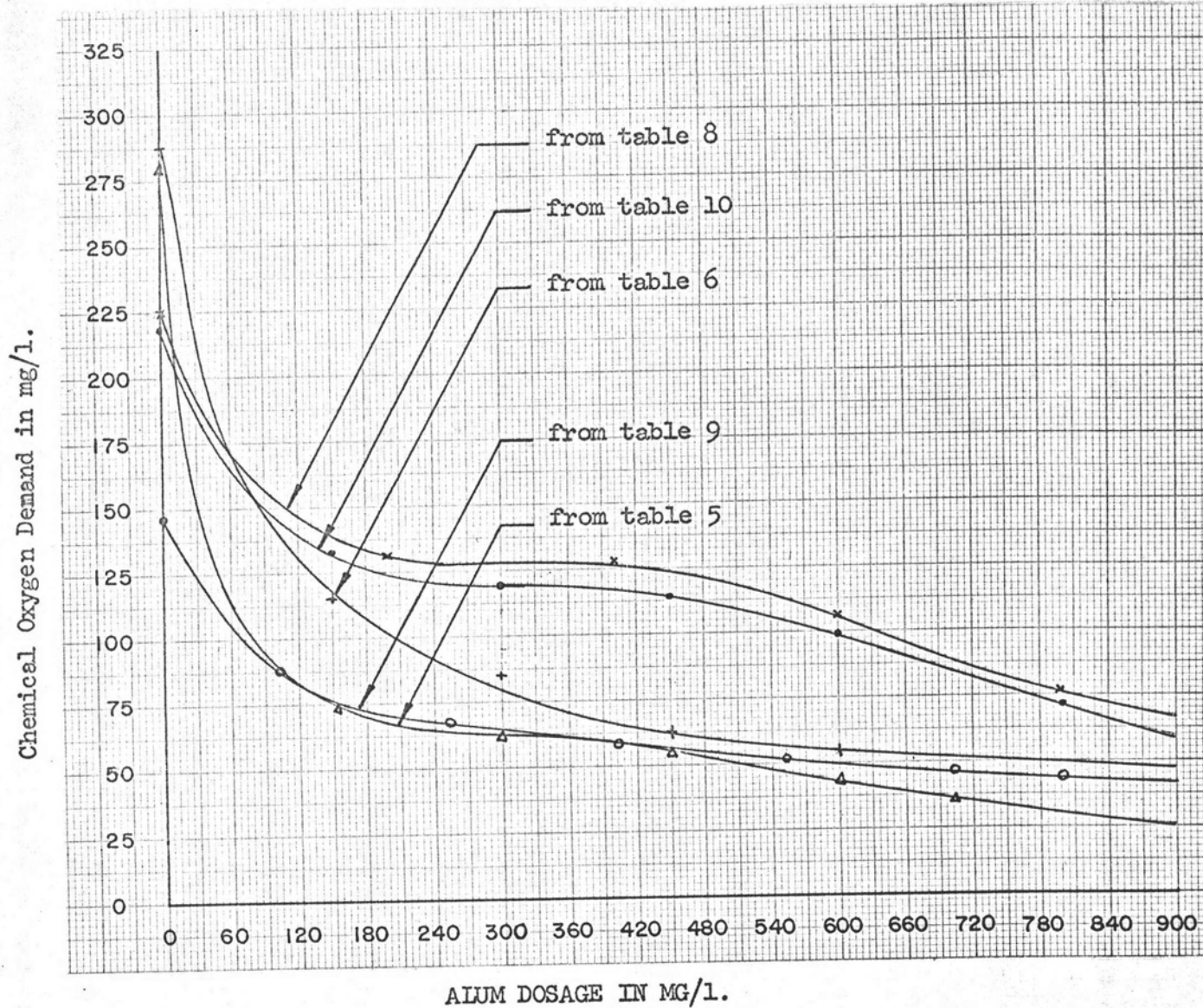


FIGURE 15 RELATION BETWEEN ALUM DOSAGE VERSUS C.O.D.

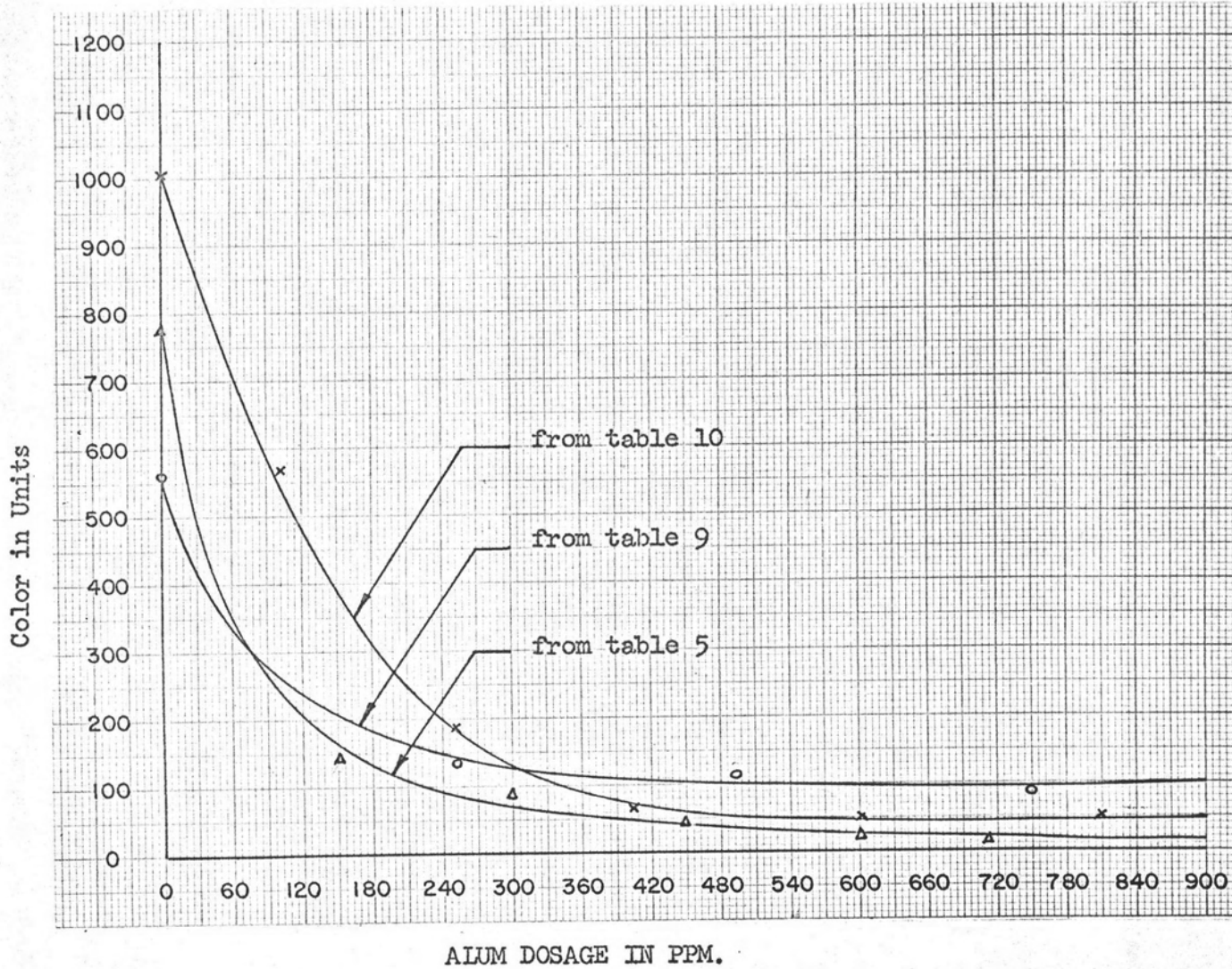


FIGURE 16 RELATION BETWEEN COLOR VERSUS ALUM DOSAGE

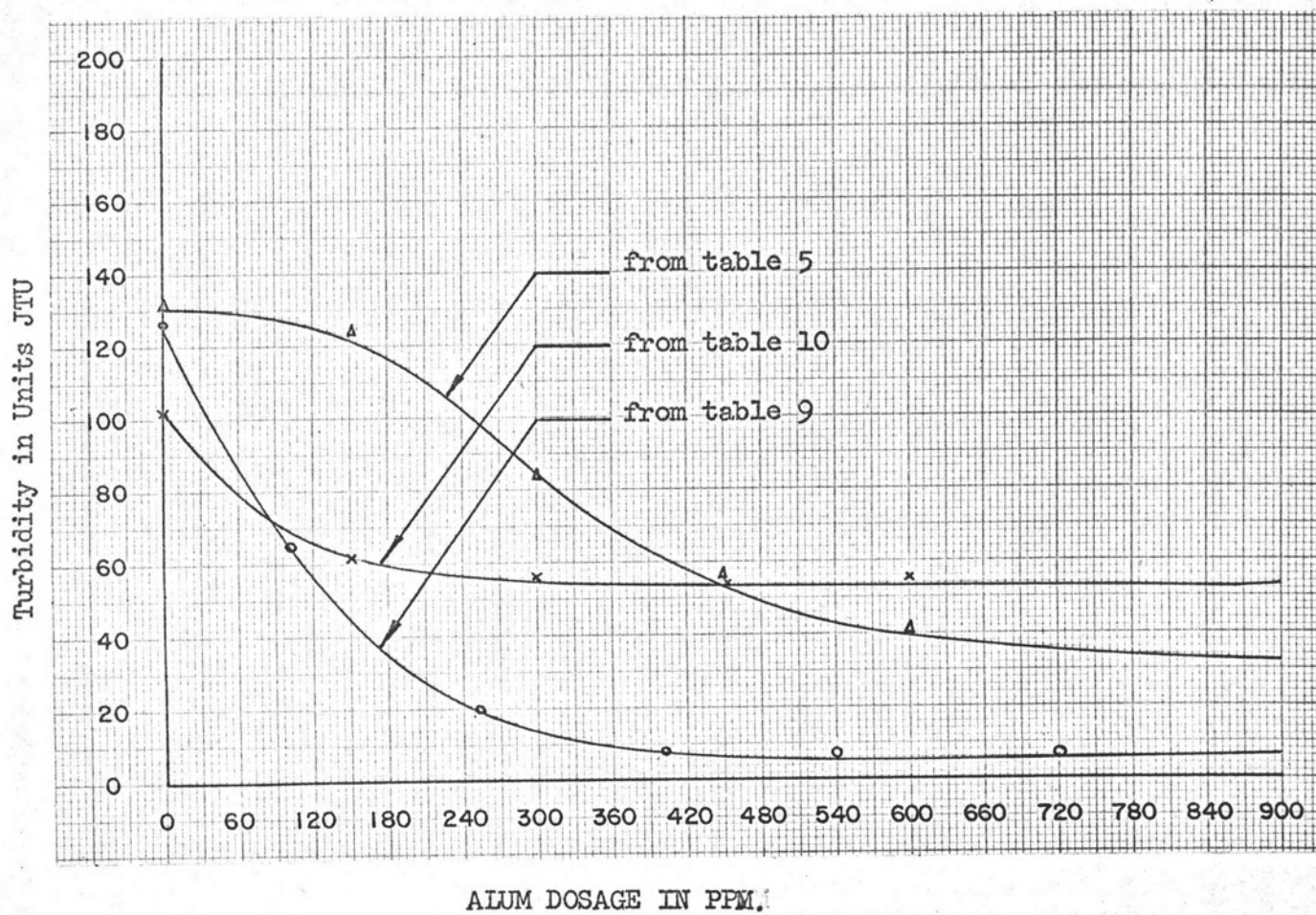


FIGURE 17 RELATION BETWEEN TURBIDITY VERSUS ALUM DOSAGE

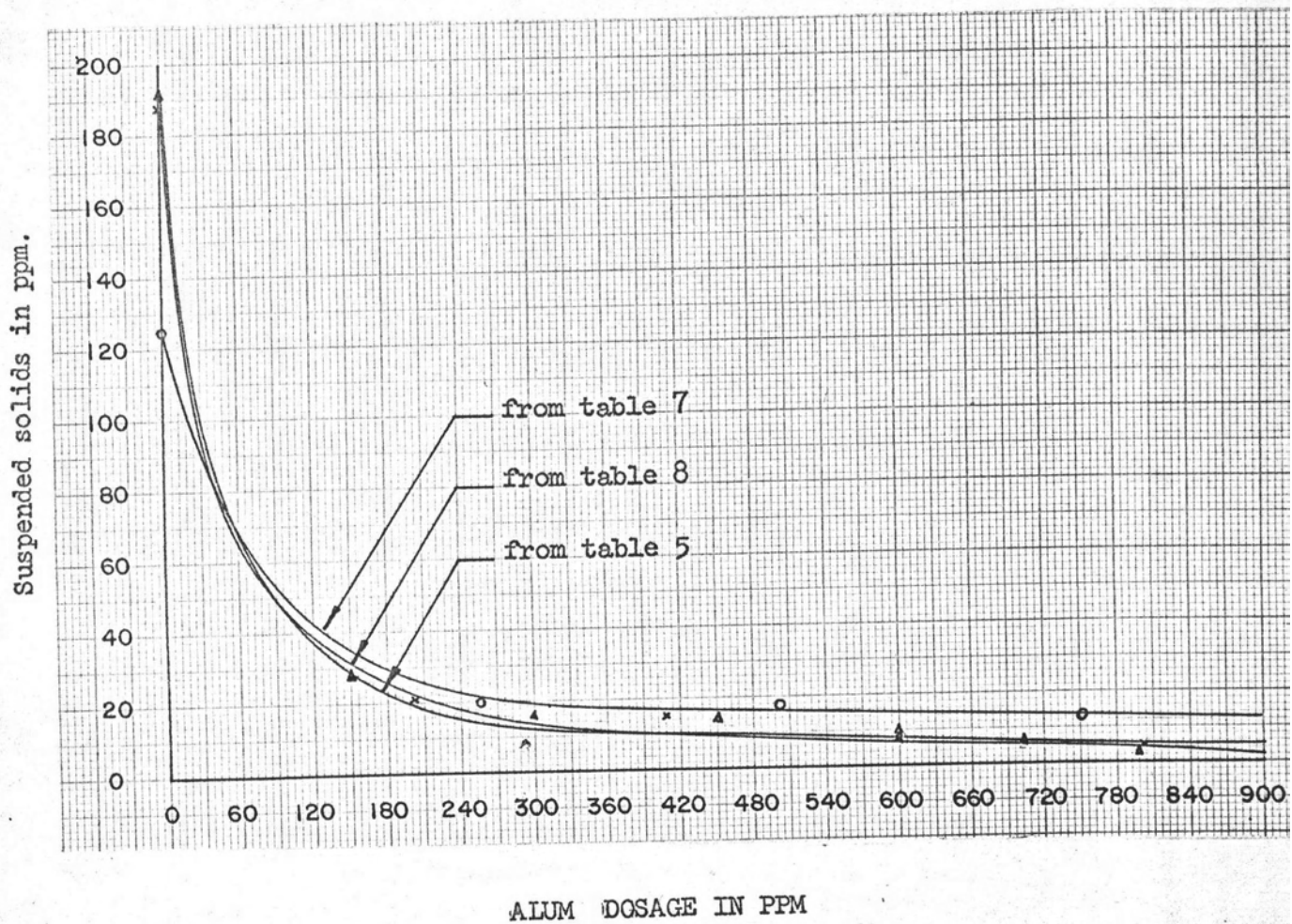


FIGURE 18 RELATION BETWEEN SUSPENDED SOLIDS VERSUS ALUM DOSAGE.

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

DATE 12/12/14

Jar No.	Raw	1	2	3	4	5	6
Alum dosage mg/l.	-	150	300	450	600	700	800
p ^H	7.7	7.0	6.9	6.9	6.8	6.8	6.7
COD mg/l.	280	72	65	55	45	36	18
Alkalinity mg/l. as CaCO ₃	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	0
S.S. mg/l.	192	28	17	15	10	5	2

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	4
Alum dasage mg/l.	-	150	300	450	600
p ^H	7.7	7.2	6.6	6.1	6.0
COD mg/l.	285	115	90	55	30
Alkalinity mg/l. as CaCO ₃	230	210	180	64	58
Color units	560	590	530	430	430
Turbidity units JTU	80	82	64	60	60
S.S. mg/l.	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

Jar No.	Raw	1	2	3	4	5
Alum dosage mg/l.	-	250	500	750	1000	1200
p ^H	10.3	9.5	9.0	8.7	8.5	8.4
COD mg/l.	268	230	204	192	150	77
Alkalinity mg/l. as CaCO ₃	860	740	610	570	450	390
Color units	560	130	130	90	90	50
Turbidity units JTU	98	98	90	76	66	54
S.S. mg/l.	125	20	18	13	1	1

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	4
Alum dosage mg/l.	-	200	400	600	800
p ^H	9.1	8.8	8.2	7.6	7.2
COD mg/l.	227	132	132	113	76
Alkalinity mg/l. as CaCO ₃	750	640	550	490	410
Color units	1220	1030	940	780	500
Turbidity units JTU	154	136	110	100	58
S.S. Mg/l.	188	19	16	9	4

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	"		

THE RESULTS ARE SHOWN IN TABLE BELOW

DATE 27/12/14

Jar No.	Raw	1	2	3	4	5	6
Alum dosage mg/l.	-	100	250	400	550	700	800
p ^H	8.0	7.1	6.9	6.8	6.5	6.5	6.0
COD mg/l.	150	75	70	68	65	59	40
Alkalinity mg/l. as CaCO ₃	360	310	260	195	145	100	45
Color units	1040	570	190	60	60	60	60
Turbidity units JTU	126	63	20	8	8	8	8
S.S. mg/l.	150	20	15	9	6	6	5

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	4
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/l.	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

Jar No.	Raw	1	2	3
Alum dosage mg/l.	-	150	300	450
p ^H	8.8	8.4	8.2	8.0
COD mg/l.	281	110	94	82
Alkalinity mg/l. as CaCO ₃	1090	1050	1010	900
Color units	2500	2100	2050	2000
Turbidity units JTU	550	348	334	320
S.S. mg/l.	157	36	20	17

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

DATE 25/12/14

	Raw waste	Coagulation process						Activated carbon column	
		% removal		% removal		% removal		% removal	
Alum dosage mg/l.		200		300		400			
p ^H	9.1	8.8	-	8.5	-	8.2	-	8.5	-
COD mg/l.	227	132	42.0	132	42.0	132	42.0	38	83.2
Alkalinity mg/l. as CaCO ₃	750	640	14.7	610	18.7	550	26.6	400	46.6
Color units	1220	1030	15.6	960	21.2	940	23.0	120	90.0
Turbidity units JTU	154	136	11.8	120	22.1	110	28.6	12	92.0
S.S. mg/l.	188	19	89.9	16	91.1	16	91.5	4	97.9

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

DATE 27/12/14

	Raw waste	Coagulation Process						Activated carbon	
			% removal		% removal		% removal	column	% removal
Alum dosage mg/l.		100	-	250	-	400	-		-
p ^H	8.0	7.1	-	6.9	-	6.8	-	3.8	-
COD mg/l.	150	75	50.0	70	53.4	68	55.6	10	93.3
Alkalinity mg/l. as CaCO ₃	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

	Raw waste	Coagulation process						Activated carbon column	
			% removal		% removal		% removal		% removal
Alum dosage mg/l.		150		300		450			
p ^H	10.2	9.6	-	9.0	-	8.9	-	7.2	-
COD mg/l.	226	13.8	39.0	120	47.0	115	49.2	72	68.3
Alkalinity mg/l. as CaCO ₃	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/l.	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

	Raw waste	Coagulation process						Activated carbon column	
		% removal		% removal		% removal		% removal	
Alum dosage mg/l.		150		300		450			
p ^H	8.8	8.4	-	8.2	-	8.0	-	8.2	-
COD mg/l.	281	110	61.0	94	66.5	82	70.9	88	68.8
Alkalinity mg/l. as CaCO ₃	1090	1050	3.7	1010	7.9	900	17.4	900	17.4
Color units	2500	2100	16.0	2050	18.0	2000	25.0	320	87.3
Turbidity units JTU	550	348	36.5	334	39.4	320	41.8	38	93.5
S.S. mg/l.	157	36	77.0	20	87.3	17	89.2	14	91.1

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

DATE 3/1.15

	Raw waste	Coagulation process				Activated carbon column	
		% removal	drop pH waste to 6.8	% removal	% removal		
Alum dosage mg/l.		300		300			
H P	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 ₃	920	570	38.0	80	91.5	190	79.5
Color units	1500	940	57.4	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