Appendix G

GEO-TECHNICAL SERVICES
Consulting Engineers & Geologists

JOB CATAWISSA CREEK

SHEET NO. _____ OF _____

CALCULATED BY sjm DATE 11/81

CHECKED BY _____ DATE _____

SCALE WLT#2

JOB CATAWISSA CREEK WLT-2

SHEET NO. _____ OF _____

CALCULATED BY SJW DATE 9/87

CHECKED BY _____ DATE _____

SCALE WLT #2

GEO-TECHNICAL SERVICES
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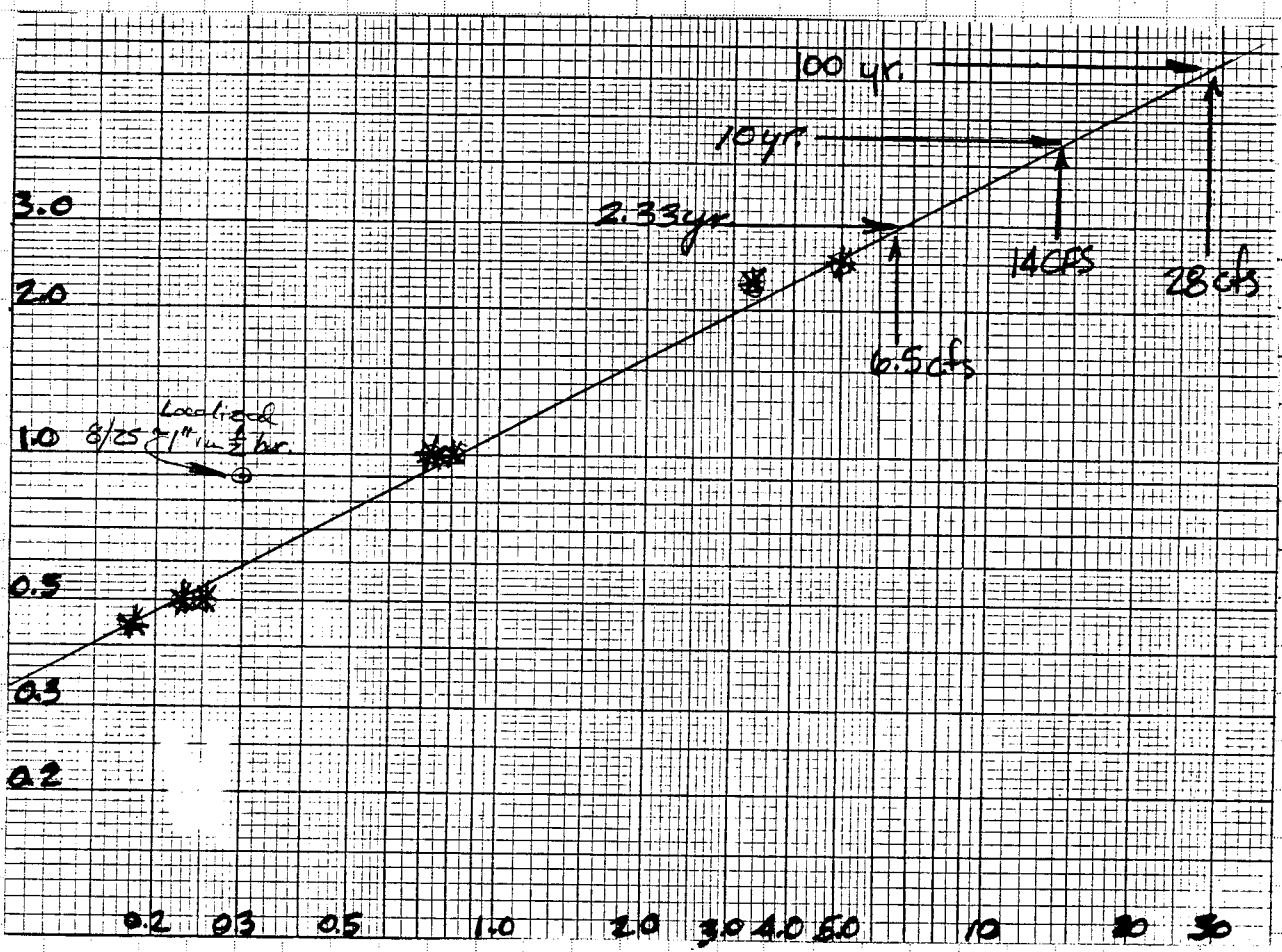
PLOT PEAK DISCHARGE - BASE FLOW vs 24 hr. Precipitation
(OBSERVED RAPID FLOW CAUSED BY PRECIP - IGNORE SNOWMELT)



OBSERVED BASE FLOW RANGE 0.6 TO 2 cfs

ASSUME DESIGN PEAKFLOWS

TR	PEAK DISCHARGE
2.33	7 cfs
10	15 cfs
100	30 cfs

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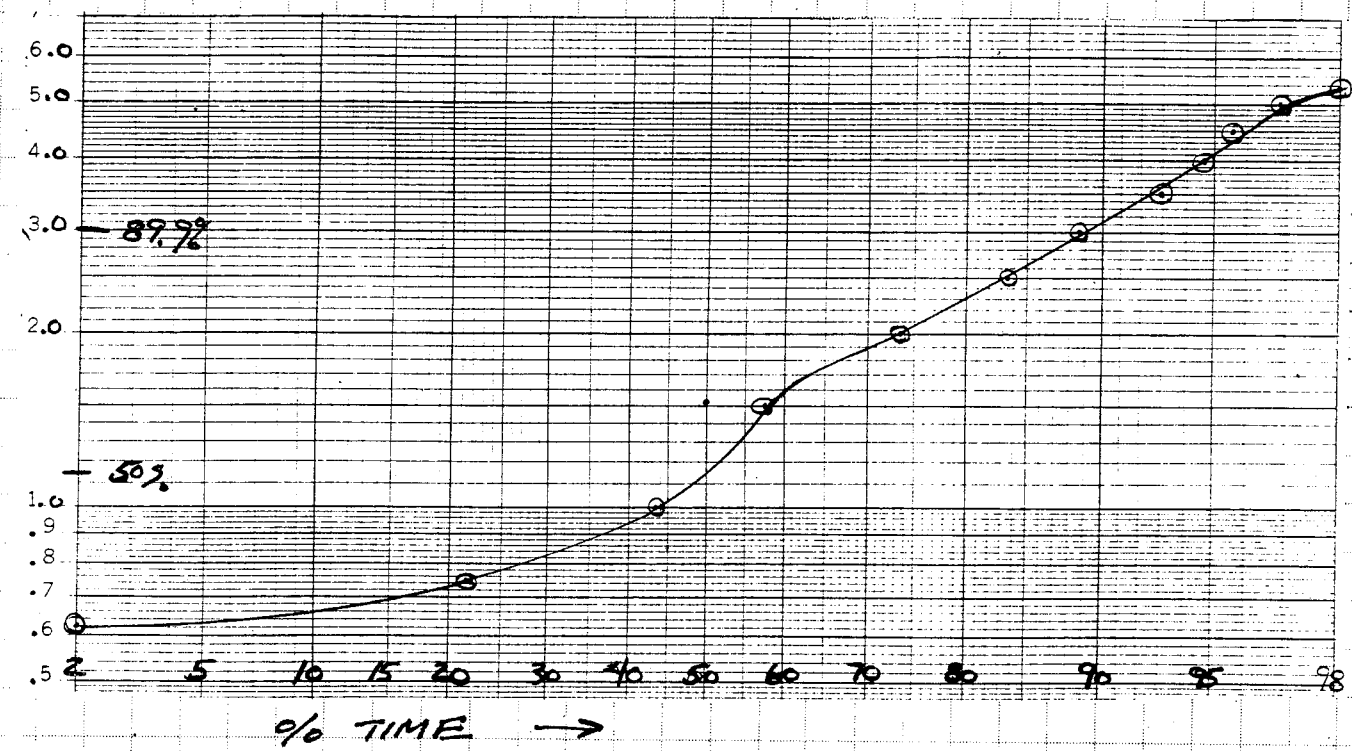
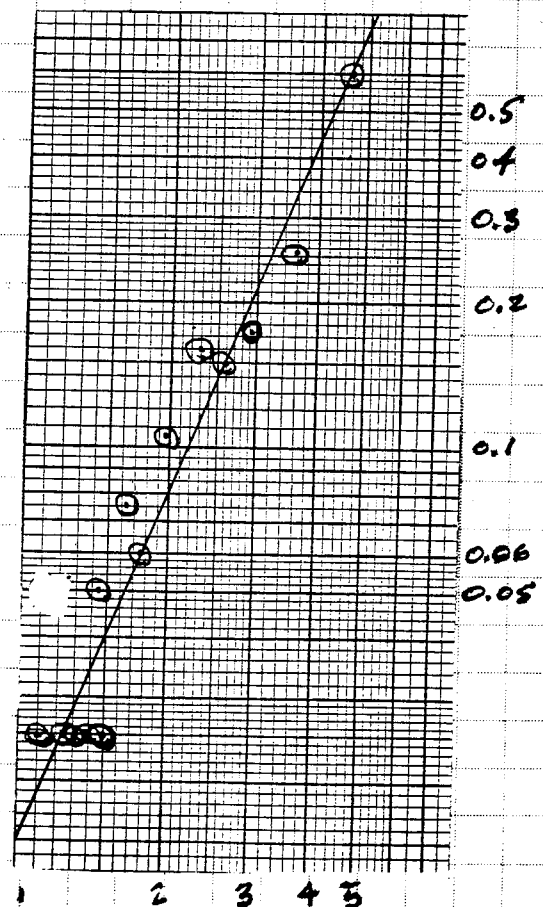
JOB CATAWISSA CREEK
SHEET NO. _____ OF _____
CALCULATED BY Sfm DATE 9/81
CHECKED BY _____ DATE _____
SCALE WLTH2



FLOW / TIME DURATION CURVE

RECESSION RATE OF PEAKS (to shows time duration of high flows caused by single event storm)



GEO-TECHNICAL SERVICES
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JOB CATAWISSA CREEK
SHEET NO. _____ OF _____
CALCULATED BY TAG DATE 9/81
CHECKED BY _____ DATE _____
~~SCALE~~ WLT-2 TREATMENT DESIGN

CHEMICAL PARAMETERS FOR TREATMENT DESIGN

FLOW -cfs-	pH	ACIDITY mg/l	ALK* mg/l	C_T*
.6	3.42	105	-40	65
.8	3.55	95	-30	65
1.0	3.65	88	-24	64
2.0	3.78	65	-16	49
3	3.80	55	-14	41
4	3.82	50	-12	38
5	3.85	47	-11	36

ESTIMATE REQ'D HEADS FOR DRUM TREATMENT

$$H = \frac{\Delta alk}{0.13\,A} = \frac{\Delta alk}{3.9}$$

EST. 40 ppm req'd for treatment to 6.5

FLOW	Δ alk	H	
0.6	80	20.5	} 3 DRUMS REQ'D FOR LOW FLOW TREATMENT
1.0	64	16.4	
2.0	56	14.4	
4.0	52	13.3	
5.0	51	13.1	
10.0	40	10.3	

NOTE:
1. WLT-2 HAS SITE LIMITATIONS - 3 - 6'ϕ drums PROBABY COULD NOT BE ECONOMICALLY INSTALLED
2. Ave TOT. Fe ≈ 0.8 mgl.
3. SOME DILUTION / RESIDUAL ALK. AVAIL. FROM AVDEN. CHECK STATIC BED POTENTIAL

* ESTIMATED FROM EQUILIBRIUM CONDITIONS

GEO-TECHNICAL SERVICES
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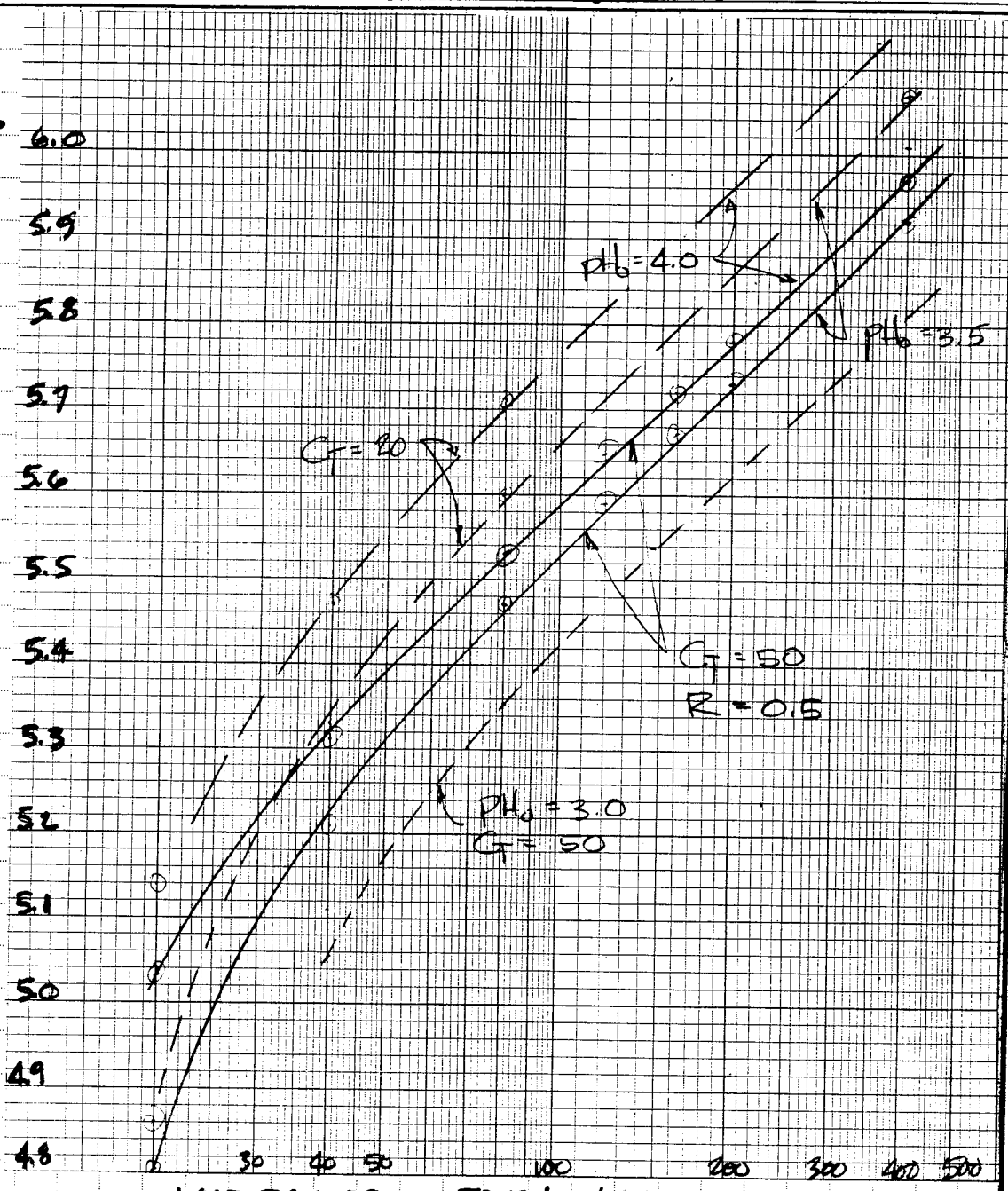
JOB CATAWISSA CREEK
SHEET NO. _____ OF _____
CALCULATED BY SJM DATE 8/1/81
CHECKED BY _____ DATE _____
SCALE WLT#2

DOWNFLOW →
DESIGN CURVES



Q	pH_0	C_{T_0}	$pH_f = 5.0$	$pH_f = 5.25$	$pH_f = 5.5$	$pH_f = 5.75$	$pH_f = 6.0$
0.6	3.42	65	30	50	110	250	620
1.0	3.65	64	25	44	90	220	540
2.0	3.78	49	20	36	78	200	480
4.0	3.82	38	18	32	70	175	430
5.0	3.85	36	18	31	67	167	410
10.0	3.90	34	18	29	60	150	380

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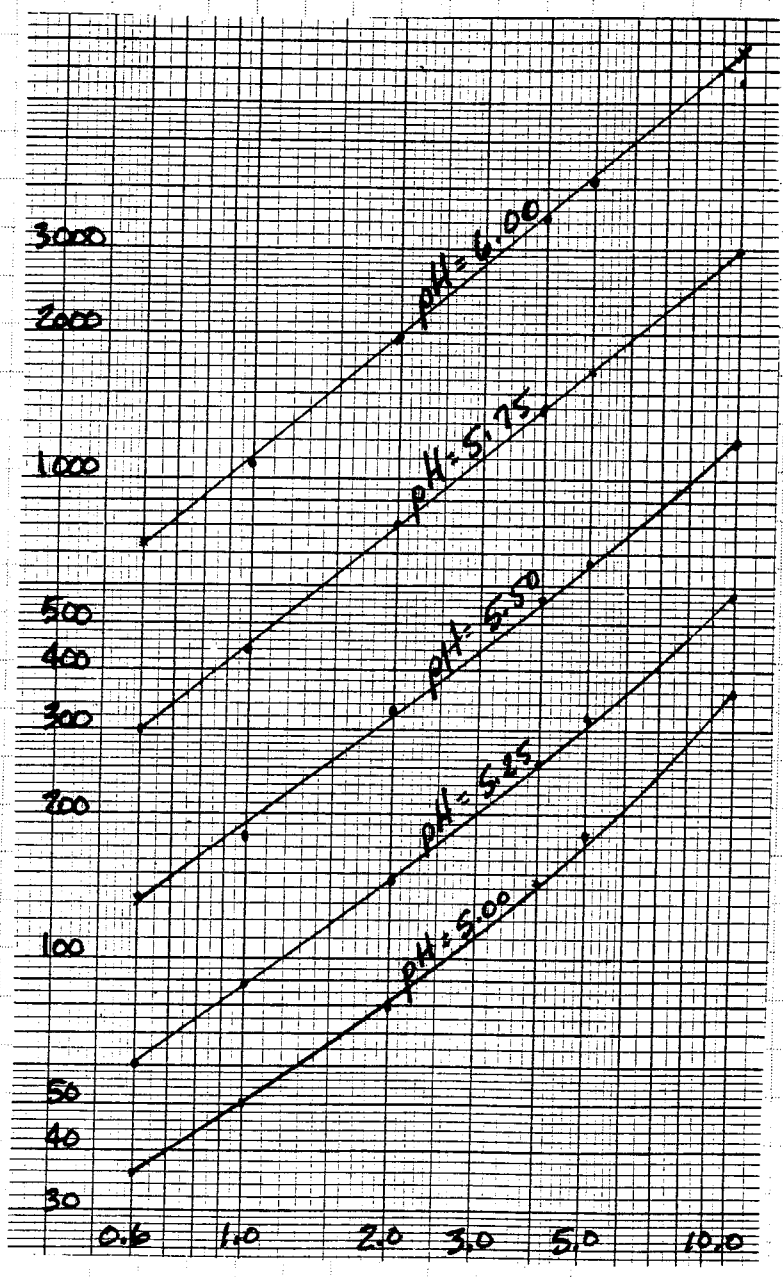
Assume same 5' beds as dewatered then.
Surface area = 2 × Q × LF



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JOB LAHAWISSA CREEK
SHEET NO. _____ OF _____
CALCULATED BY JPM DATE 11/81
CHECKED BY _____ DATE _____
SCALE WLT #2

TRY 400 SF OF DOWNFLOW REDS

Q (cfs)	pHf	Acy mgl	Alk. mgl	Req'd Alk* for pH 6.5	Req'd H ft.	Req'd Prod. (#/hr.)
0.6	5.8	4	8	32	8.2	6
1	5.7	4	8	32	8.2	11
2	5.6	5	7	33	8.5	22
3	5.4	6	7	33	8.5	33
5	5.3	8	6	34	8.7	56
10	5.1	10	5	35	8.9	116

DUE TO LIMITED SPACE TRY TO TREAT WITH ONE DRUM & WHEEL CONFIGURATION

TRY 10' WATER WHEEL & 4' ϕ DRUM

ASSUME WHEEL KD = 2.0
THEN TURNING MOM = $30.5 \times D^3 L$ = 3812 #'/LF
IF 12" WIDE WHEEL IS USED THEN
DRUM LENGTH OF $\frac{3812}{500}$ = 7.6' allowed.
HOWEVER 4' LONG PROBABLY SUFFICIENT

USE PROD. RATE = $\frac{E_p\ 23.5\ P_I}{550}$

& $P_I = E_w Q K D \delta_w$

$E_w = 0.67$
$KD = 10$
$\delta_w = 62.4$

$RPM = \frac{60}{2\pi} \frac{P_I}{M_R}$ $M_R = 4 \times 500 = 2000$ '#

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JOB LATAWISSA CREEK
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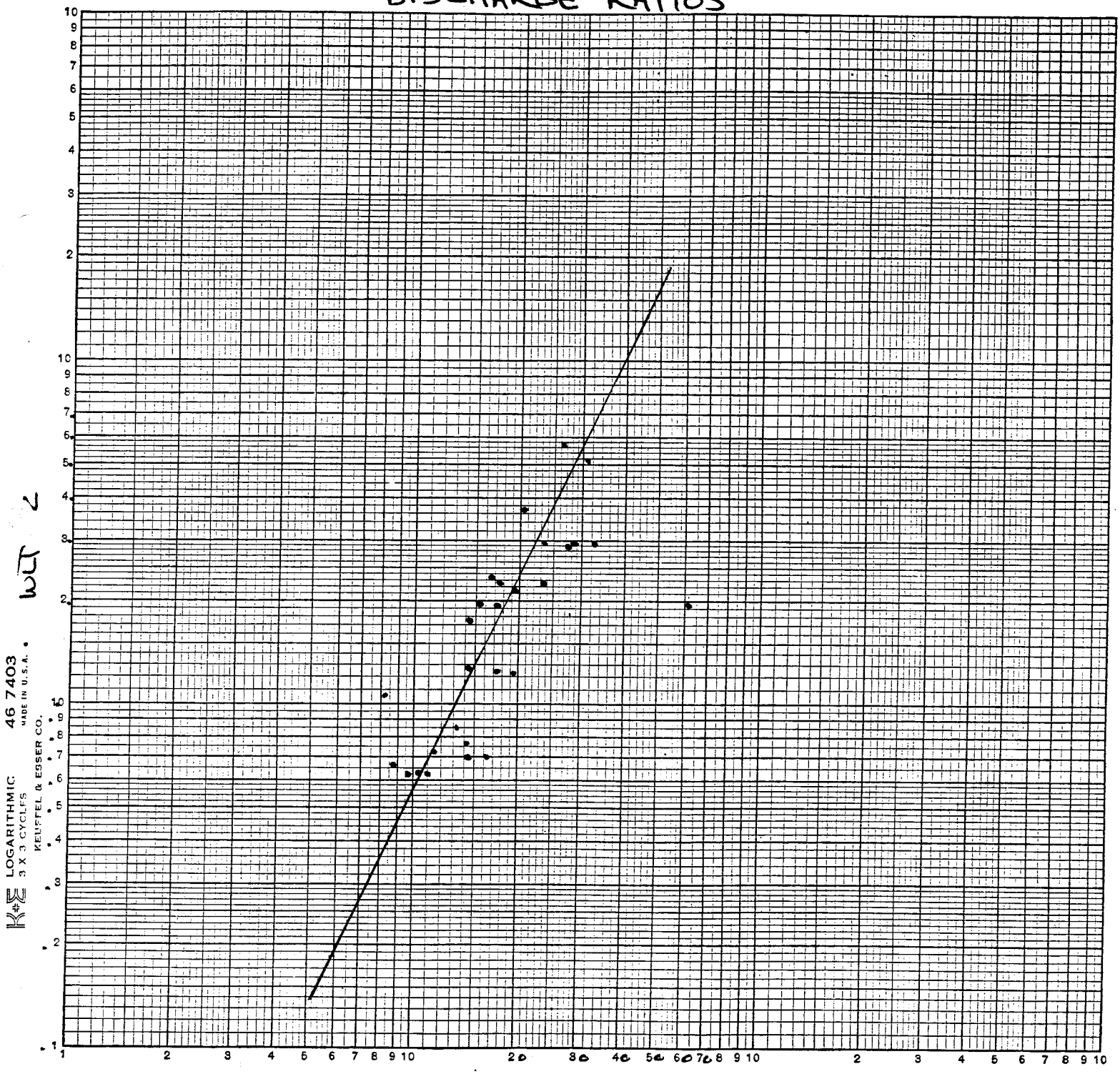
COMPUTE POWER & PRODUCTION RATES

Q cfs	P_I ft·lb	RPM	ϵ_p *	PROD. #/HR	REQ'D **
0.6	251	1.2	.6	6.4	(6)
1.0	418	2.0	.8	14.3	(11)
2.0	836	3.0	.9	32.2	(22)
3.0	1254	6.0	1.0	53.6	(33)
5.0	2090	10.0	.9	80.3	(56)
10.0	4181	20.0	.8	143	(116)

* ASSUMED BASED OBSERVED MAX. EFFICIENCY AT RPM = 6.5
** REQ'D FINES PRODUCTION & ACTUAL PRODUCTION CAN BE MATCHED DURING OPERATION BY RETARDING DRIVING WHEEL OR BYPASSING FLOW.

CATAWISSA CR'K
WLT #2

DISCHARGE RATIOS



Audenried Flows

JOB CATAWISSA CREEK

SHEET NO. _____ OF _____

CALCULATED BY TAG DATE 11/19/81

CHECKED BY _____ DATE _____

BORE WLT - 2

GEO-TECHNICAL SERVICES
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ANNUAL LIMESTONE USE:

DURATION %	DAYS /yr	FLOW cfs	-DRUMS- FINES lbs/hr.	TOT. FINES lbs	-DOWNFLOW- ACID mg/l	LBS NEUT. lbs	TOTAL TONS
0-2	7.2	.6	6.4	1106	105	1345	1.2
2-5	11	.6	6.4	1690	105	2054	1.9
5-10	18.3	.65	7.4	3250	102	3597	3.4
10-20	36.5	.7	8.3	7271	100	7574	7.4
20-30	36.5	.8	10.3	9023	95	8224	8.6
30-40	36.5	.9	12.3	10775	91	8862	9.8
40-50	36.5	1.0	14.3	12527	88	9522	11.0
50-60	36.5	1.35	18.8	16469	80	10821	13.7
60-70	36.5	1.75	27.7	24865	71	13445	18.9
>-80	36.5	2.0	32.2	28207	65	14067	21.1
80-90	36.5	3.0	53.6	46954	55	17854	32.4
90-95	18.3	3.5	60.3	26484	53	10064	18.3
95-98	11	5.0	80.3	21199	47	7663	14.4
98-100	7.2	10.0	143.0	24710	47	10032	17.4

ANNUAL LIMESTONE CONSUMPTION (TONS) : 179.5

USE RATE FORMULAS *

DRUMS TOT. FINES:

TOTAL FINES = FINES (lbs/hr) x 24 hr/day x days

DOWNFLOW LBS. NEUT:

$$\text{LBS. ACID NEUTRALIZED} = 1.1\left[\frac{\text{ACIDITY}^{**}(\text{mg/l}) \times \text{FLOW (cfs)} \times 5.3901 \times \text{days}}{2}\right]$$

* Developed from experimental results at Quakake.
** Assumes complete acid removal (conservative limestone use estimate)