

LUMBAHL WAVE GUIDE installed

10/29/93 @ 11<sup>30</sup> A.M.

~~Wave Observations for Monday in Train~~  
port station @ Longs

Q of Billingsley Cr @ Hutching

22.44 cfs = Crest week

of January.

27.5 cfs =  $\bar{y}$  for December

26.09  $\bar{y}$  - Crest week of Dec.

1st wk - 25.57

2nd wk - 24.40

3rd wk - 23.93

3AM  $\bar{y}$  = 24.09 cfs

GEORGE H. LEMMON  
1050 E. 2727 SOUTH  
HAGERMAN, ID 83332

RECEIVED  
SEP 21 1993  
Department of Water Resources

IDWR

T, M LUKE

Diversions from Billingsley  
Creek to Currah Ditch. 1993  
measured over 10' rectangular w

5-28-93	Head 0.52	=	12.49 CFS
6-7-93	0.56	=	13.80
7-1-93	0.56	=	13.8
7-5-93	0.54	=	13.1
7-8-93	0.54	=	13.1
7-9-93	0.56	=	13.5
7-10-93	0.56	=	13.5
7-12-93	0.58	=	14.5
7-13-93	0.54	=	13.1
7-14-93	0.58	=	14.5
7-16-93	0.58	=	14.5
7-17-93	0.58	=	14.5
7-19-93	0.56	=	13.8
7-20-93	0.58	=	14.5
7-21-93	0.56	=	13.8
7-22-93	0.56	=	13.8
7-24-93	0.58	=	14.5
7-26-93	0.66	=	17.6
7-27-93	0.68	=	18.4
7-28-93	0.70	=	19.2
7-29-93	0.70	=	19.2
7-30-93	0.70	=	19.2
7-31-93	0.70	=	19.2

Date	Depth	C. F. S.
8-2-93	0.62	16.1
8-3-93	0.64	16.8
8-4-93	0.64	16.8
8-5-93	0.64	18.8
8-6-93	0.56	13.8
8-9-93	0.64	16.2
8-10-93	0.66	17.6
8-11-93	0.66	17.6
8-12-93	0.68	18.4
8-13-93	0.68	18.4
8-14-93	0.70	19.2
8-16-93	0.72	20.1
8-17-93	0.74	20.9
8-19-93	0.76	21.7
8-20-93	0.76	21.7
8-21-93	0.76	21.7
8-22-93	0.76	21.7
8-23-93	0.68	18.4
8-24-93	0.76	21.7
8-25-93	0.78	22.6
8-26-93	0.78	22.6
8-27-93	0.78	22.6
8-28-93	0.68	18.4
8-30-93	0.76	19.2
8-31-93	0.72	20.1

Date	Depth	C.F.S.
9-1-93	0.72	20.1
9-2-93	0.72	20.1
9-3-93	0.74	20.7
9-4-93	0.74	20.7
9-6-93	0.68	18.4
9-7-93	0.74	20.7
9-8-93	0.74	20.7
9-9-93	0.74	20.7
9-10-93	0.74	20.7
9-11-93	0.76	21.7
9-13-93	0.76	21.7
9-14-93	0.78	22.6
9-15-93	0.79	23.0
9-22-93	0.78	22.6

↳ MEASURED BY TIM LIKE @ Orange Airway - JDUK  
 MEASURED HAND OVER 10' WALK, CONTINUED AND WERE CURED  
 Length = 10' JZ 9-23-93

**MEMORANDUM**

**TO:** Water District 36-A File

**FROM:** TIM LUKE

**DATE:** August 30, 1993

**RE:** Discussion with Watermaster Concerning Delivery of Water Rights from Curren Tunnel

=====

On August 26, 1993, Loren Holmes and I went to Hagerman and visited with the Water District 36-A watermaster, George Lemmon, in regard to a call for water on Weatherby and Three Springs made by Bill Jones of the Jones Fish Hatchery (see August 24, 1993 letter from attorney Pat Brown demanding delivery of water to Hatchery).

Prior to conducting a field inspection and taking measurements of the above springs, I talked with Mr. Lemmon about his response to my letter of August 10, 1993 concerning delivery of water rights from the Curren Tunnel. My letter of August 10 requested Mr. Lemmon to contact the water users and/or holders of water rights from the Curren Tunnel and advise them of measurements which I had made on August 6. The summary of measurements showed that water from Curren Tunnel was not being diverted in accordance with the decreed water rights and their priority dates. For example, there was an excess of more than 2.0 cfs diverted under the 1884 rights which otherwise could have been used to fill an 1892 right. My letter of August re-affirmed the Department's previous direction to the watermaster to distribute water rights from Curren Tunnel according to decreed priority unless the parties otherwise agreed to rotate water among themselves. My letter asked Mr. Lemmon to advise the Department in writing by August 12, 1993 regarding the water users intentions for the distribution of the available supply of Curren Tunnel water. A copy of my August 10 letter was carbon copied to Pat Brown, the attorney representing certain Curren Tunnel water users who had demanded that the Department deliver water according to priority rights.

On August 12, 1993, Mr. Lemmon contacted the Department via telephone and talked with David Shaw of this office. Mr. Shaw's memo to the file dated August 13 summarizes his conversation with Mr. Lemmon. Mr. Shaw's memo notes that Mr. Lemmon said that 'it was the choice of the water users to rotate the water supply from the tunnel'. Mr. Lemmon also stated that Butch Morris, who is the 1892 water right user, was getting the water that he needed at the time.

When I visited with Mr. Lemmon on August 26, I specifically asked him if he had in fact contacted the Curren Tunnel water users to ask whether they wanted the available water supply from the tunnel

delivered either strictly by decreed priority dates and amounts or through some rotation arrangement among themselves. Mr. Lemmon answered that he had physically contacted the users, including Mr. Morris, and that he was told that the users would continue with a rotation. Mr. Lemmon said that he did he did not contact Pat Brown and advise him of the water user's intentions.

I further asked Mr. Lemmon if he was aware that several Curren Tunnel water users had submitted affidavits to the Attorney General's Office stating that at no time since August 1, 1993, had any one from the Department, including the Water District 36-A watermaster, contacted the users asking them how they wanted the available water supply delivered. I also informed Mr. Lemmon that Mr. Morris and Mr. Musser's attorneys, Pat Brown and John Lezamiz, had stated in court a day earlier that the Department had made no efforts since August 1 to contact any of their clients who use water from Curren Tunnel and ask how they wanted their water rights delivered. I further advised Lemmon that these same attorney's had informed me, Norman Young and the State's attorney, Peter Anderson, a day earlier during a private meeting that Lemmon had not contacted any of the Curren Tunnel users and asked how they wanted the water rights and available supply delivered. In response to this information, Mr. Lemmon told me that the water user's affidavits and statements from the attorney's was not in agreement with the information he had previously given the Department, that he did contact the users between August 10 and 12, and had received a response from the user's regarding how the water was to be delivered.

Finally, I reminded Mr. Lemmon that he still had not provided the Department with a written response to our letter of August 10. I recommended to Mr. Lemmon that he submit the written response as soon as possible and that he fully document the nature and timing of his conversations with the water users regarding the subject of delivering the available supply of Curren Tunnel either by priority or rotation.

On August 27, 1993, I phoned Mr. Lemmon and advised him of the measurements which Loren Holmes and I had made at the Jones Hatchery on August 26. During our conversation, Mr. Lemmon advised me that he had contacted some of the Curren Tunnel users and Pat Brown concerning the discrepancy over whether or not Lemmon had contacted the water users in response to my August 10 letter. Mr. Lemmon told me that there was some mis-communication over this matter between the different parties and that the Department should soon expect a written response to the Department's August 10 correspondence.

MEMORANDUM

To: File

From: David Shaw <sup>ABS</sup>

August 13, 1993

Subject: Telephone Conversation with George Lemmon, Water District 36A  
Watermaster

George Lemmon tried to call Tim Luke on Thursday, August 12 in response to the August 10, 1993 letter from Tim to George. Both Tim and Norm Young were out of the office so I returned the call to George about 2:00 p.m. since the August 10 letter had required a response by August 12, 1993.

George asked for the measurements of the Musser & Candy diversions Tim had made on August 5. I told George I would get that information for him but did not have it before me at that time.

George then explained he thought the list of priorities in Tim's letter was not accurate, the oldest right should have been 36-00004 for 15 cfs from 9/10/1884. George did say this right was from Billingsley Creek and it was being filled at this time but had been short earlier in the year. He said the diversion had been recently measured a little in excess of the right. [This right is recommended for 4.51 cfs.] His next right is 36-00134 which matches Tim's list which also shows the right divided into the three present ownerships. George's next right is the Musser right for 4.8 cfs [recommended at 4.1 cfs] but he referred to it as 36-00132. Tim's list shows the right number as 36-00102 which matches both the adjudication record and the water right record. Our records show 36-00132 as a Riley Creek right.

George then went on to list the next right, number 36-00135 from 4/1/1908 for 4.8 cfs [recommended at 2.29 cfs] which is used on the same land and is owned by the same water users as 36-00134. Finally he listed 36-00018 for 20 cfs from 4/1/1917 [recommended for 20 cfs] diverted from Billingsley Creek.

George then said it was the choice of the water users to rotate the water supply from the tunnel.

I then asked George if, with the idle land, the Musser right was getting the water needed now. George said our information was wrong, it was part of the Crandlemire land that was idle but that Morris was getting the water he needed now for the acreage he had planted this year by rotating the water among the rights.

I then asked George again if Morris was getting the water he needs now. George replied he was, he was no longer irrigating his wheat in anticipation of harvest

George Lemmon Telcon  
August 13, 1993  
Page 2

and all he needed to continue to irrigate was potatoes, hay and corn. He might need to irrigate the wheat ground later if he plans to put in some fall seeding.

George said he had asked Rangen to measure the water they were taking from the tunnel and their measurement was close to 1.5 cfs instead of the 1.08 cfs Tim had measured on August 6. George said he thought the measurement by Rangen was in error because the person making the measurement had cleaned the moss off the boards before the measurement and the pond above the boards was probably draining slightly as the measurement was taken. He said he would get another measurement from them and he had been told the Rangen diversion through the pipe was fairly constant. The measurement is made where the water spills over (check?) boards and from George's explanation the boards are used as a weir crest.

George said he would like someone to come down and compare his measurement of the Big Springs pipe diversion with a polysonic measurement when the system was being used at full demand. He did not suggest a date for the measurement but said he was sure our earlier measurement had not been taken when the pipeline was being used to capacity.

George said the real problem with water supply had been a couple of months ago in May and June. **That the springs had come up but continue to vary from day to day depending upon the pumping demand on the plain above.** He said the springs were up on August 6 when Tim took his measurements because the weather a few days earlier had reduced the pumping demand on the plain.

I told George I would get the measurement data he had asked for and our telephone conversation ended at this point.

I then got Tim Luke's August 5, 1993 measurement data from Phil Rassier. The measurements are 3.15 cfs for the Musser pipeline and 1.02 cfs for the Candy pipeline. Phil told me the Crandlemire pipeline was measured at 0 cfs and the Rangen pipeline was not measured.

As I returned to my office to call George with the measurement data I met Tim Luke returning to the office. I double checked the measurement data with him and noted the Crandlemire pipeline was not measured on August 5 but Tim was told it was not in use.

I then called George's number and he was not in. I left the measurement data with Jerry, the person answering the phone. I then asked Jerry to remind George we did want a written response from George as requested by the letter and if George had questions or needed more information to call.

TRANSMITTAL COVER SHEET

OMNIFAX G66

TO: Tim Luke

Water Allocations

TOTAL PAGES SENT: 2

DOCUMENT DESCRIPTION: Crown Tunnel Current Meter  
Notes For 7/7/93

FROM: IDAHO DEPARTMENT OF WATER RESOURCES  
222 SHOSHONE AVE E  
TWIN FALLS ID 83301

PHONE: 736-3033

FAX: 736-3037

SENDER: [Signature]

CHARGES:

One (1) free copy per request, cover sheet not counted. Two (2) or more copies per request will cost \$0.25 per page. (\$0.50 minimum)

Please consider this document as a billing statement.

The charge for your fax copies is: \_\_\_\_\_

Please remit to the above address.

COMMENTS:

\_\_\_\_\_  
\_\_\_\_\_

FOR Hyd's Cove.  
-try adding .05' or .6" to Avg 6 & earlier depths.

0 .10 .20 .30 .40 .50 .60 .70 .75 .80 .85  
Form 570-01  
7/88

STATE OF IDAHO  
DEPARTMENT OF WATER RESOURCES  
Open Channel Discharge Measurement Notes

Water Right No.  
(if applicable)

A. GENERAL INFORMATION

1. Name of stream or ditch: Cupran Tunnel
2. Location: \_\_\_\_\_
3. Person conducting measurement: Allen Merritt-Meter, Loren Adams, Nute
4. Date and time of measurement: 7/7/93 12:00
5. Accompanied by: \_\_\_\_\_
6. Measuring device size and ID no.: \_\_\_\_\_
7. Spin test before measurement OK? \_\_\_\_\_ after measurement OK? \_\_\_\_\_
8. Purpose of measurement: \_\_\_\_\_

B. MEASUREMENT DATA

Angle to velocity	Dist. from point to point	Width	Depth	Obstruction Depth	Revolutions	Time in seconds	VELOCITY		Adjusted for bar, rough or	Area	Discharge
							At point	Mean in vertical			
	.50	.15	.10					1.53		.02	.01
	.80	.30	.24	.10	20	19		1.05		.07	.08
	1.10	.30	.42	.17	30	23.3		1.29		.13	.16
	1.40	.30	.58	.23	30	20.1		1.49		.17	.26
	1.70	.30	.78	.31	30	16.8		1.79		.23	.42
	2.00	.30	.90	.36	30	15.5		1.94		.27	.52
	2.30	.30	.98	.39	30	15.9		1.89		.29	.55
	2.60	.30	1.00	.40	30	17.1		1.75		.30	.53
	2.90	.25	1.02	.41	30	19.1		1.57		.26	.40
EP	3.10	.25	1.04	.42	30	22.0		1.36		.26	.35
EP	3.40	.30	.46	.18	30	18.1		1.66		.14	.23
EP	3.70	.25	.94	.38	30	21.1		1.42		.24	.33
	3.90	.25	.90	.36	30	21.5		1.40		.23	.31
	4.20	.30	.79	.32	30	22.3		1.35		.24	.32
	4.50	.30	.60	.24	30	23.7		1.27		.18	.23
	4.80	.30	.46	.18	30	32.0		.94		.14	.13
12.5 RB	5.10	.275	1.20	.08	20	36.0		.56		.06	.03
	5.35	.125	0.0					.28		.01	-
	4.85	4.85									4.87

$1.04 + 1.36 = .57$

$1.94 + 1.42 = .53$

$d = 5.04$

Standard 468.72  
 Pauger 891.49  
 Lowy 269.13  
 P. gauge 291.41  
 1940-25  $\Rightarrow$  4.32

Range - 292 gauge  $\Rightarrow$  .65  
 1.11 diff 5.52

TRANSMITTAL COVER SHEET

OMNIFAX G66

TO: Tim Luke

Water Allocations Bur

TOTAL PAGES SENT: 2

DOCUMENT DESCRIPTION: Cannon Tunnel current  
meter for late June

FROM: IDAHO DEPARTMENT OF WATER RESOURCES  
222 SHOSHONE AVE E  
TWIN FALLS ID 83301

PHONE: 736-3033

FAX: 736-3037

SENDER: [Signature]

CHARGES:

One (1) free copy per request, cover sheet not counted. Two (2) or more copies per request will cost \$0.25 per page. (\$0.50 minimum)

Please consider this document as a billing statement.

The charge for your fax copies is: \$1,000<sup>00</sup>

Please remit to the above address.

COMMENTS: Couldn't get our hands on original  
notes right away - we'll keep looking

NAME OF STREAM OR DITCH CURRAN TUNNEL  
 LOCATION -----  
 PURPOSE OF MEASUREMENT -- DISCHARGE FROM CURRAN SPRINGS COMPLEX  
 BASIS OF VELOCITY CALCULATIONS  
 IF YOU ARE USING A PTMETER ENTER ----- 1  
 IF YOU ARE USING A AA METER ENTER ----- 2  
 ENTRY ----- " 1  
 FOLLOWING THE LAST ENTRY IN:  
 "DISTANCE FROM INIT PT" ENTRY MUST = "END"

WATER RIGHT NUMBER IF APPLICABLE -----  
 AGENCY CONDUCTING MEASUREMENT -----  
 ACCOMPANIED BY -----  
 PREMEASUREMENT RPM TEST (MIN/SEC) ---  
 POST MEASUREMENT RPM TEST (MIN/SEC) -

ANGLE OF COEFFICIENT	DISTANCE FROM INIT PT	DEPTH IN FEET	CALC DEPTH END PTS	VELOCITY DATA				CALC WIDTH	AREA IN SQ FT	CALCULATED VELOCITY			DISCHARGE IN CFS
				1ST MEASUREMENT REVS	2ND MEASUREMENT REVS	1ST POINT VELOCITY	2ND POINT VELOCITY			MEAN VELOCITY			
INITIAL POINT	0.6		0.16					0.70	0.032			0.46	0.01
	1.0	0.32		40	43.7			0.45	0.164	0.92		0.92	0.13
	1.5	0.66		40	30.0			0.50	0.330	1.34		1.34	0.44
	2.0	0.90		40	27.3			0.45	0.405	1.66		1.66	0.59
	2.4	1.06		40	29.1			0.35	0.371	1.38		1.38	0.51
	2.7	0.52		40	28.3			0.30	0.156	1.41		1.41	0.22
	3.0	1.08		40	33.1			0.60	0.432	1.21		1.21	0.52
	3.5	1.06		60	22.6			0.50	0.520	1.79		1.79	0.93
	4.0	0.96		40	23.0			0.50	0.480	1.74		1.74	0.84
	4.5	0.64		40	26.6			0.50	0.320	1.51		1.51	0.68
	5.0	0.32		40	38.4			0.60	0.128	1.04		1.04	0.13
	5.3		0.16					0.20	0.032			0.52	0.02
END												1.83	

2.0  
 2.4 .5  
 3.0 .55  
 2.5

RECEIVED

JUL 06 1993

Department of Water Resources

MEMORANDUM

DATE: 02-Jul-1993

FROM: Loren Holmes *LH*

TO: Curran Tunnel file

SUBJECT: Measurement activities to date

On 6/30/93, Doug Jones and I made the following measurements at the Curran Tunnel:

MEASUREMENT	TIME	METHOD	Q (cfs)
Open discharge inside tunnel	1100	current meter	4.81
Rangen lab pipeline from tunnel	1700	Polysonic	.71
Total tunnel discharge			5.52
Rangen diversion from lower collector (water not from Curran tunnel)	1600	special vessel method	1.78

Due to inexperience with the use of the Polysonic instrument, we were unsuccessful in measuring all the pipelines diverting from the tunnel. The sum of the current meter measurement and the Rangen lab pipeline accounts for all the discharge of the tunnel.

Doug Jones returned on 7/1/93 and measured all the pipeline diversions, which also accounts for all the discharge of the tunnel.

7/1/93 measurements:

MEASUREMENT	TIME	METHOD	Q (cfs)
Candy pipeline	1137	Polysonic	.63
Musser pipeline	1157	"	1.27
Crandelmire pipeline	1221	"	<del>2.83</del> 1.99
Rangen lab pipeline	1300	"	.73
Total Curran tunnel discharge			<del>2.83</del> 4.62

Due to the large discrepancy between the 6/30 and 7/1 measurements, I plan to make an additional measurement run on 7/7.

Prior to going to the Curran tunnel on 6/30, I was advised by Norm Young that Walter Candy, a tunnel wateruser had requested through his counsel that he be notified when a measurement was planned so that he could be present. This office left a message on his answering machine to the effect that we would be measuring on 6/30. Mr. Candy appeared briefly while we were working at the tunnel mouth.

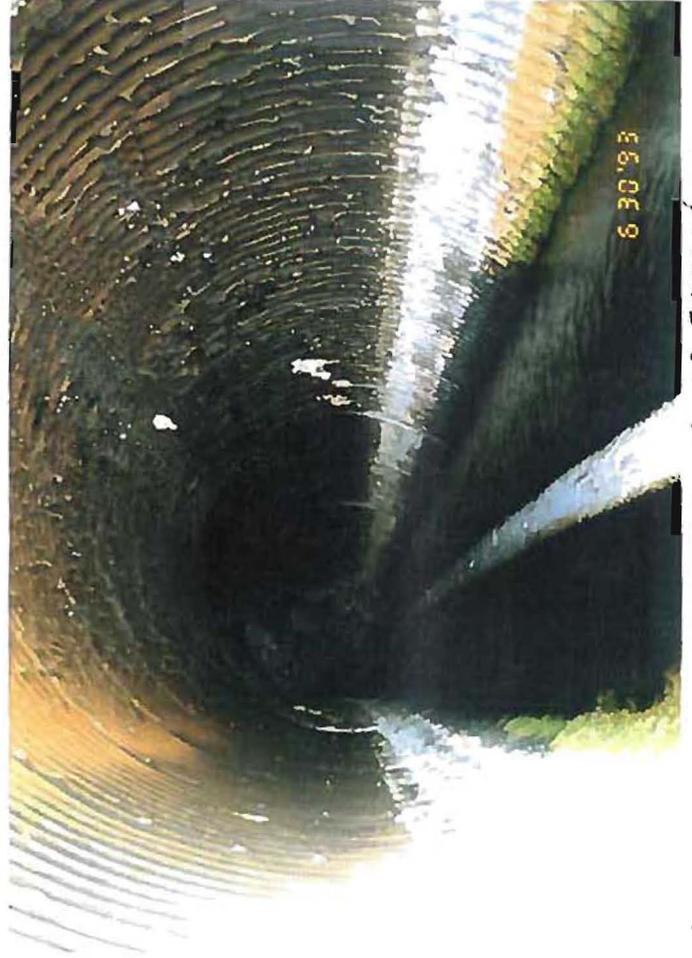
The best measuring site for the Candy, Musser, and Crandelemire pipelines is located on Candy's property. The measuring site is accessible via the Candy's driveway without opening any gates or causing any disturbance. This is where we unsuccessfully attempted measurements on 6/30, after stopping at the Candy house to notify them we were there. no one came out to the measuring site on that day.

While Doug Jones was repeating the measurements on 7/1, I received a call from Phil Rassier saying that he had been contacted by Candy's lawyer with a message that the department was trespassing without permission. When Doug returned, he said he had gone to the measuring site and gone to work without first stopping at the house, on the assumption that they would know what he was doing when they saw the vehicle and would come out if interested. He said Mr. Candy came out and "read him the riot act".

After Phil's call and prior to Doug's return, I called the Candy residence and talked to Mrs. Candy. She told me their only concern was that they want to know when anyone enters the property. Prior notice must be given by phone and anyone entering the place must stop at the house. This instruction has been given to Southern Region staff by me.



View upstream 50' inside Tunnel

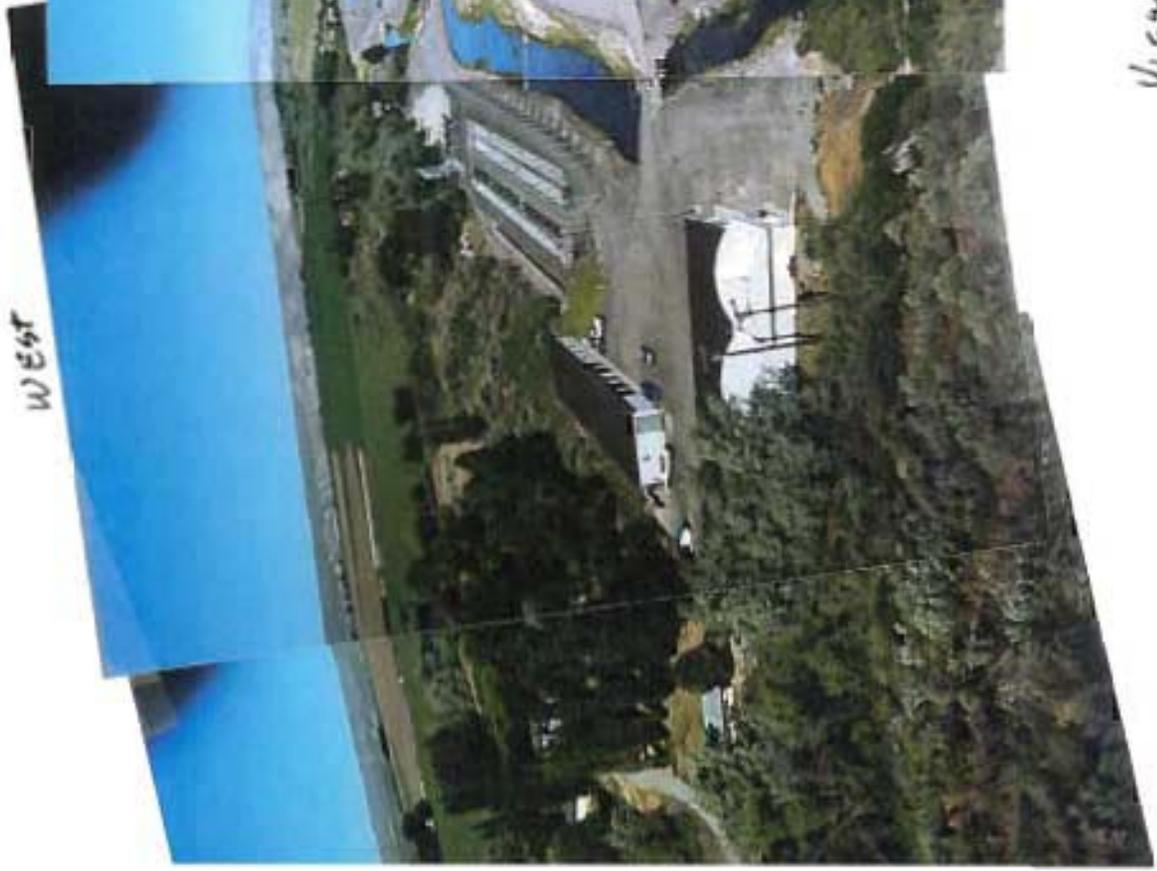


View upstream from mouth of tunnel

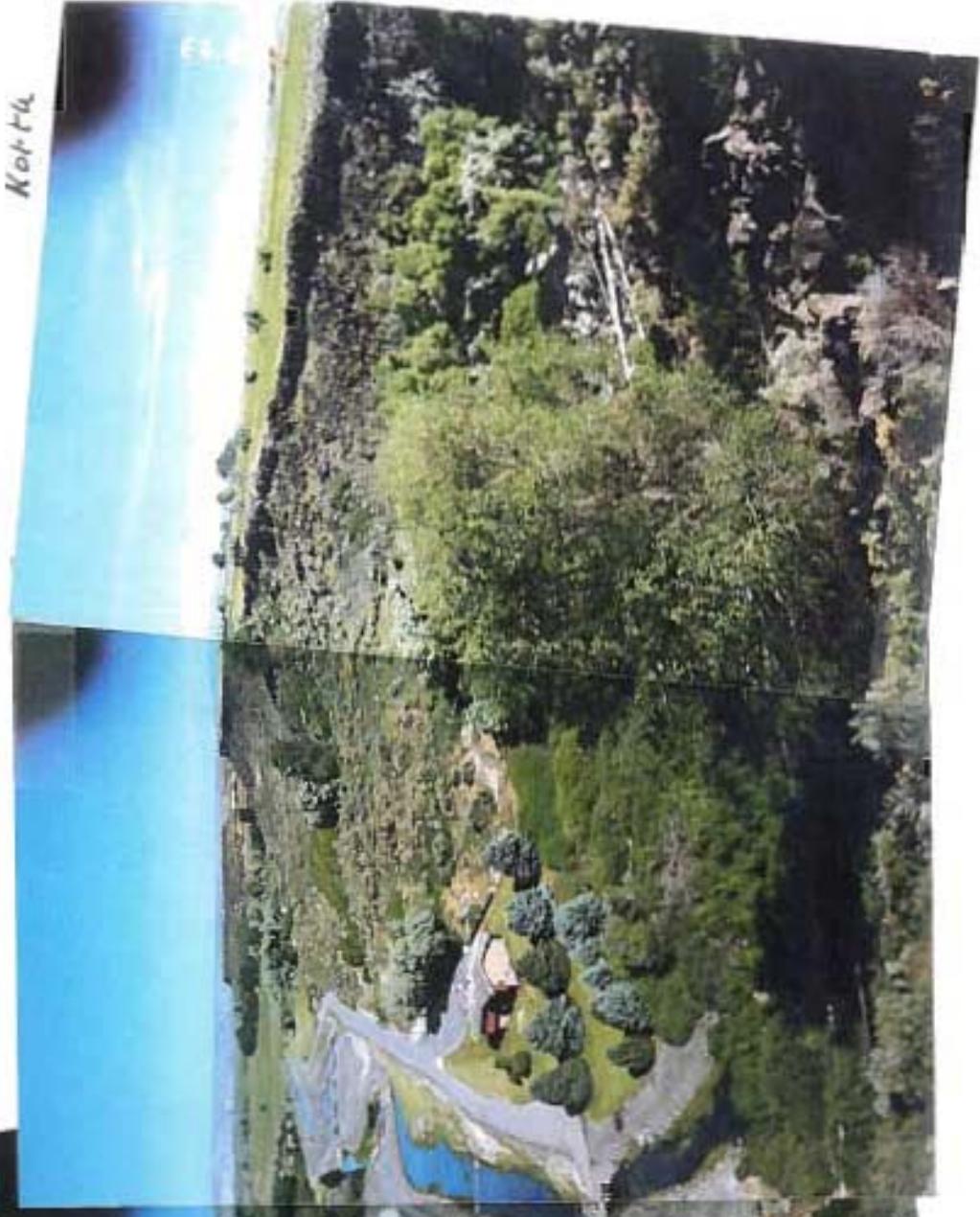


Mouth of Cotton Tunnel  
CMP extends 50' upstream  
White PVC pipe diverts to  
Rungen Lab.

West



North



↑  
Tunnel  
Outlet

View from Rim Looking North & West

South

southeast



↑ toward outlet

View from River Looking South

Candy →  
Musset →  
Candlemeter →



From Cotton  
Tunnel TO  
Ranger Lab.

From lower Collector  
TO Ranger faceways

Pipelines from Cotton Tunnel  
& lower Collector



← crane/meter

From Tunnel  
Catch Basin  
TO Rungen  
lower collector

From  
Tunnel TO  
Rungen  
Lub

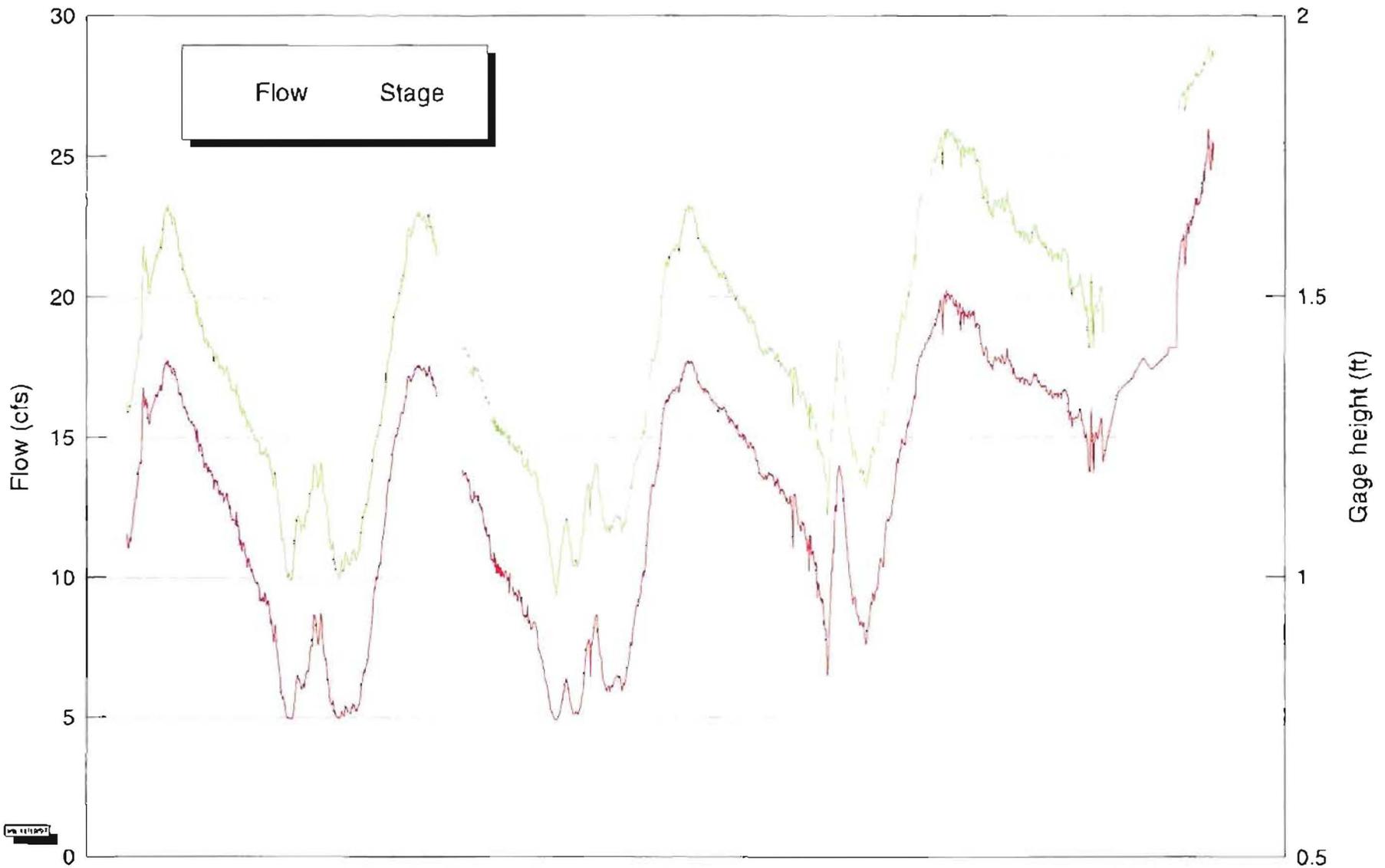
Lower collector  
captures springs →  
below tunnel  
outlet



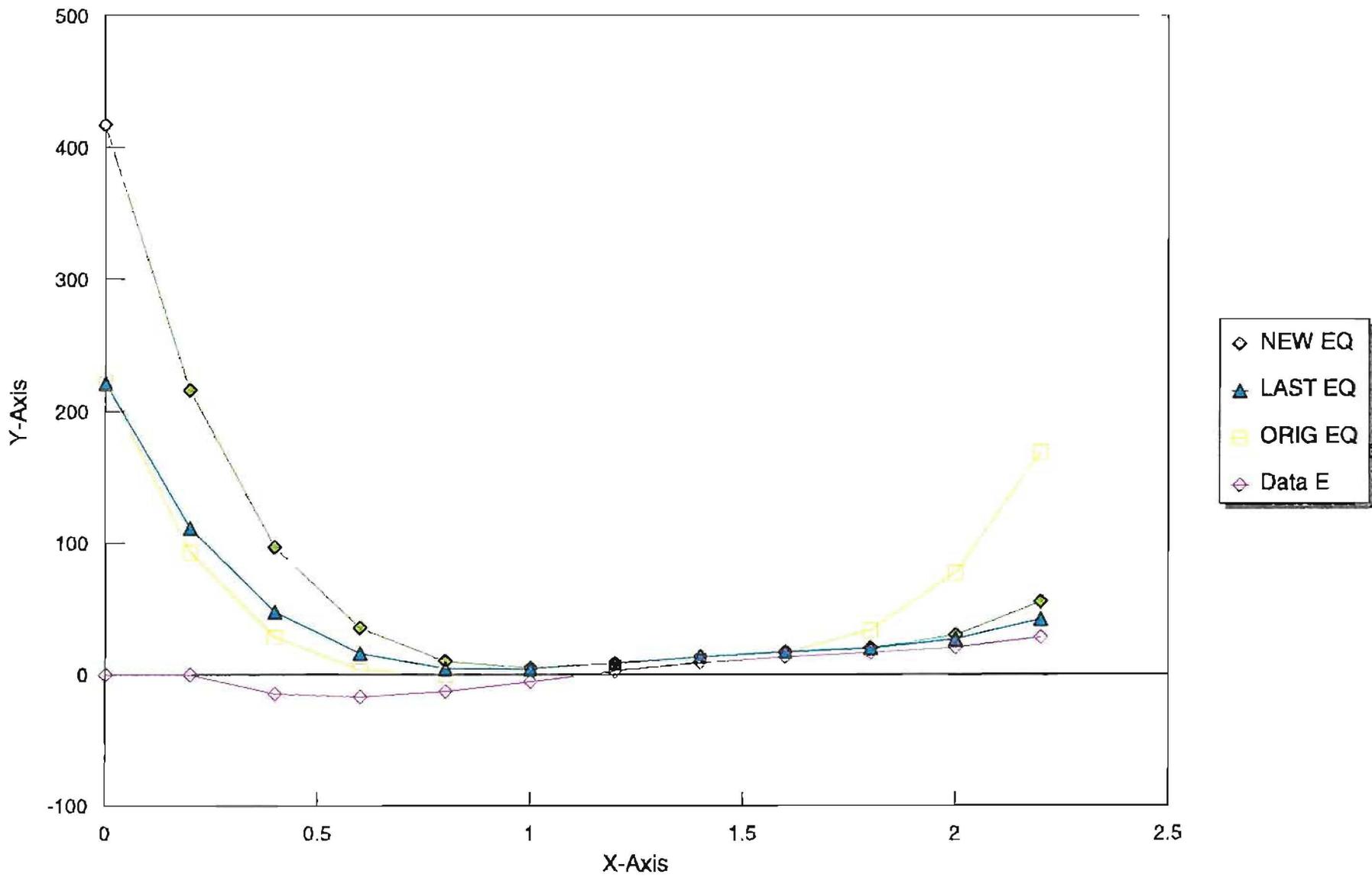
← Lower collector

# Curren Tunnel, Average Daily Flow

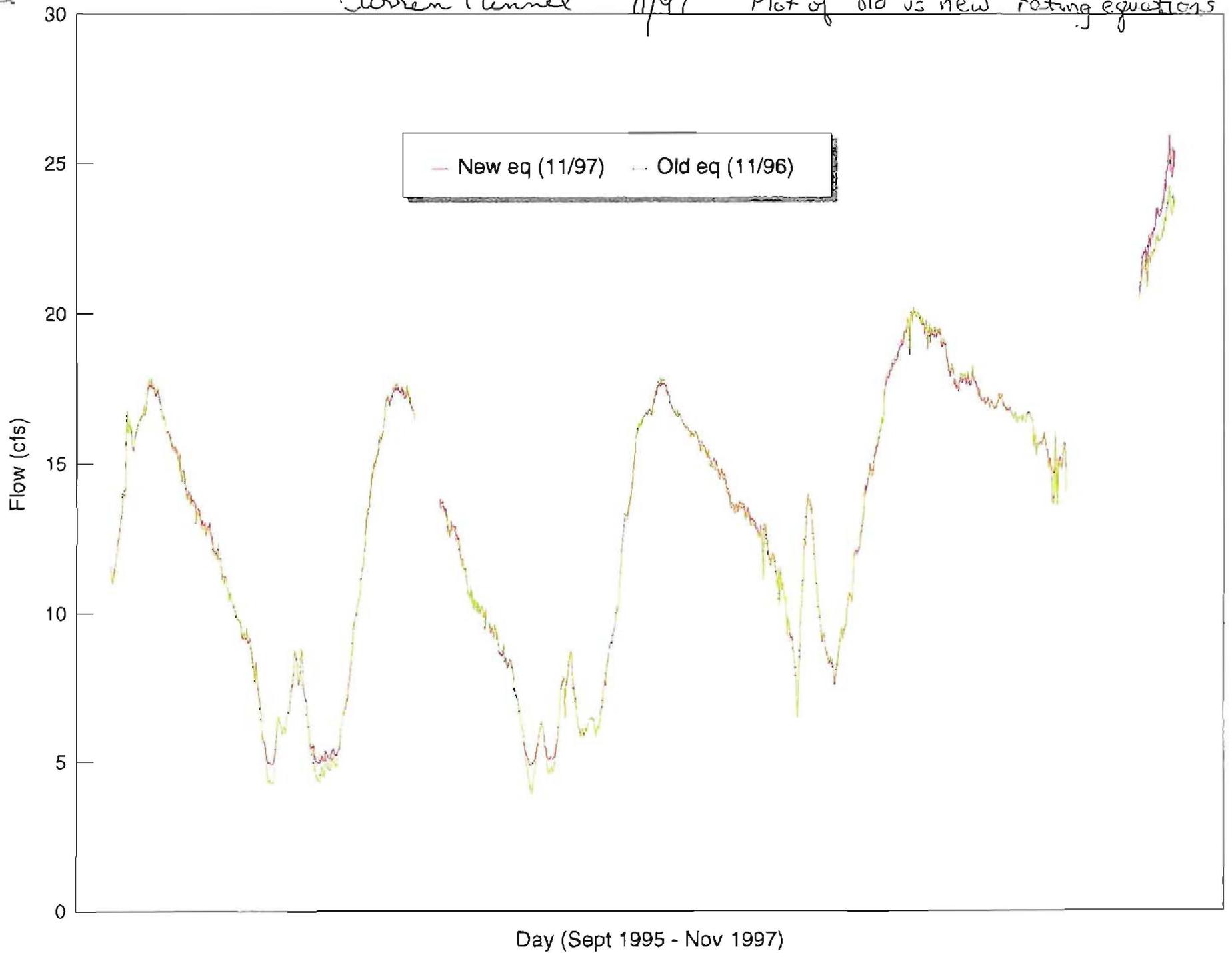
September 1, 1993 - November 7, 1997



# Current Tunnel stage-flow equation

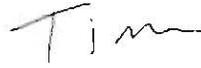


Curren Tunnel 11/97 Plot of old vs new rating equations



## MEMORANDUM

To: Curren Tunnel Graph Users  
From: Scott King   
Date: November 27, 1996



Subject: Rating Table Update

Good news! Curren Tunnel has experienced the highest flows since we began monitoring in September 1993. Tim Luke and I visited the tunnel near the very peak flow and measured a flow rate of 20.1 cfs. These recent measurements have been used to create a new rating table, which has caused a significant shift in the *Average Daily Flow Rate* chart that is updated and plotted about every 45 days.

The new, updated charts, and also one old chart, are attached to this memo (#1, #2, and #3, respectively). Notice that the October/November '93, '94, and '95 peak flows are now near 18 cfs. The old rating table charted these peaks near 20 cfs. Although the peak flows now appear lower on the new chart, flows below 17 cfs are now plotted somewhat higher than they previously were. Chart #4 plots both the old and the new rating curves for easier comparison.

The high end of the old rating was based on several high flow measurements from three years ago. Shortly after the first high flow measurements, we refined the method of measurement in the tunnel. High flow measurements over the past two years indicate that the past flow measurements in the first year may have been skewed slightly high.

There has been no change or adjustment to the raw water level measurements. It is useful to review the water level hydrograph (charts #5 & #6) along with the flow hydrographs.

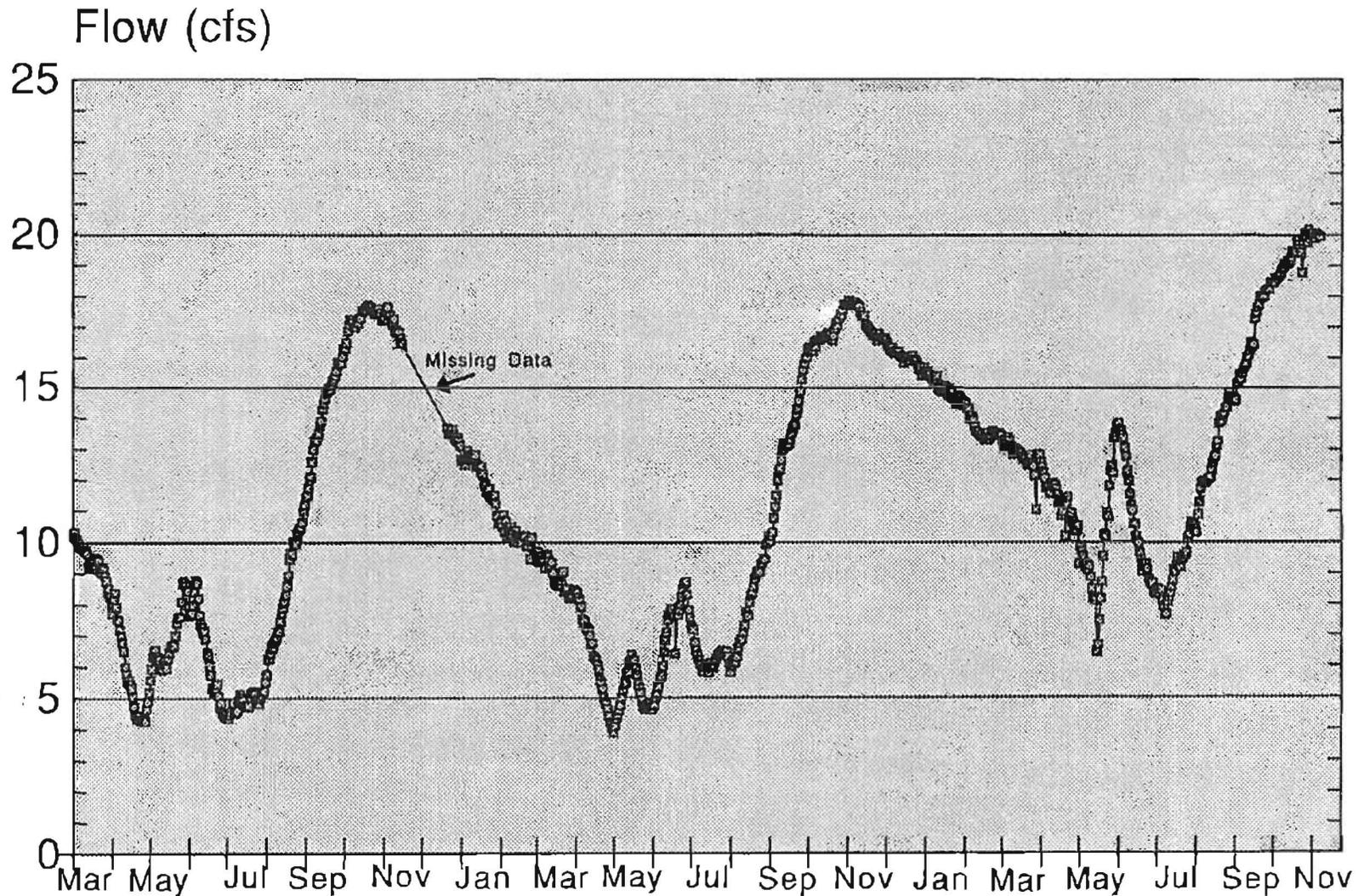
Tim's measurements have greatly helped in refining the rating table, and these new charts should better represent the actual flow history of Curren Tunnel.

# Curren Tunnel

Average Daily Flow Rate  
March 1, 1994 to November 7, 1996

Chart #1

New Rating



Based on average daily water levels and rating table.

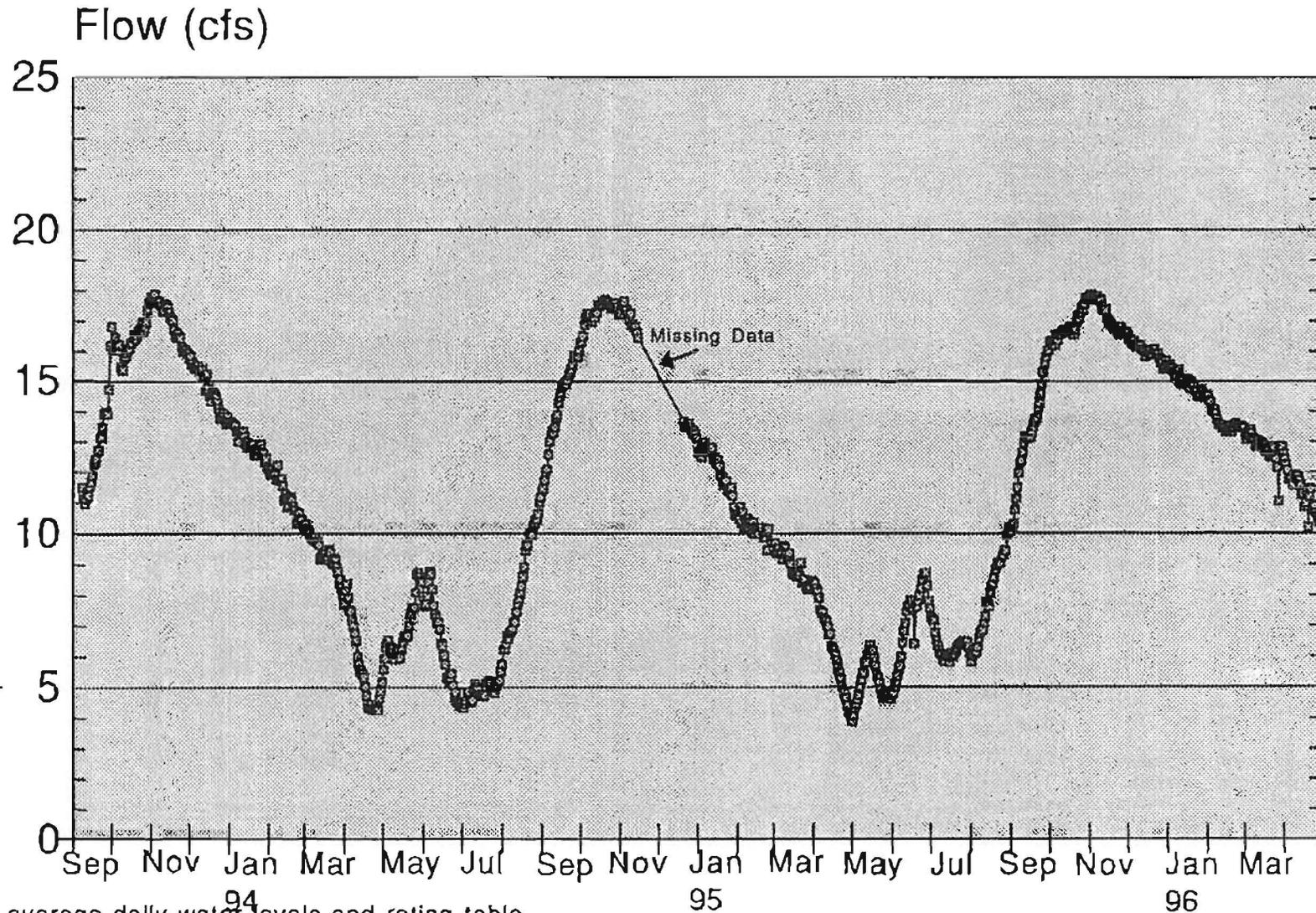
Note: Rating table re-calibrated November 1996.

95  
96

# Curren Tunnel

Average Daily Flow Rate  
September 8, 1994 to April 30, 1996

Chart #2  
New Rating  
(continued)

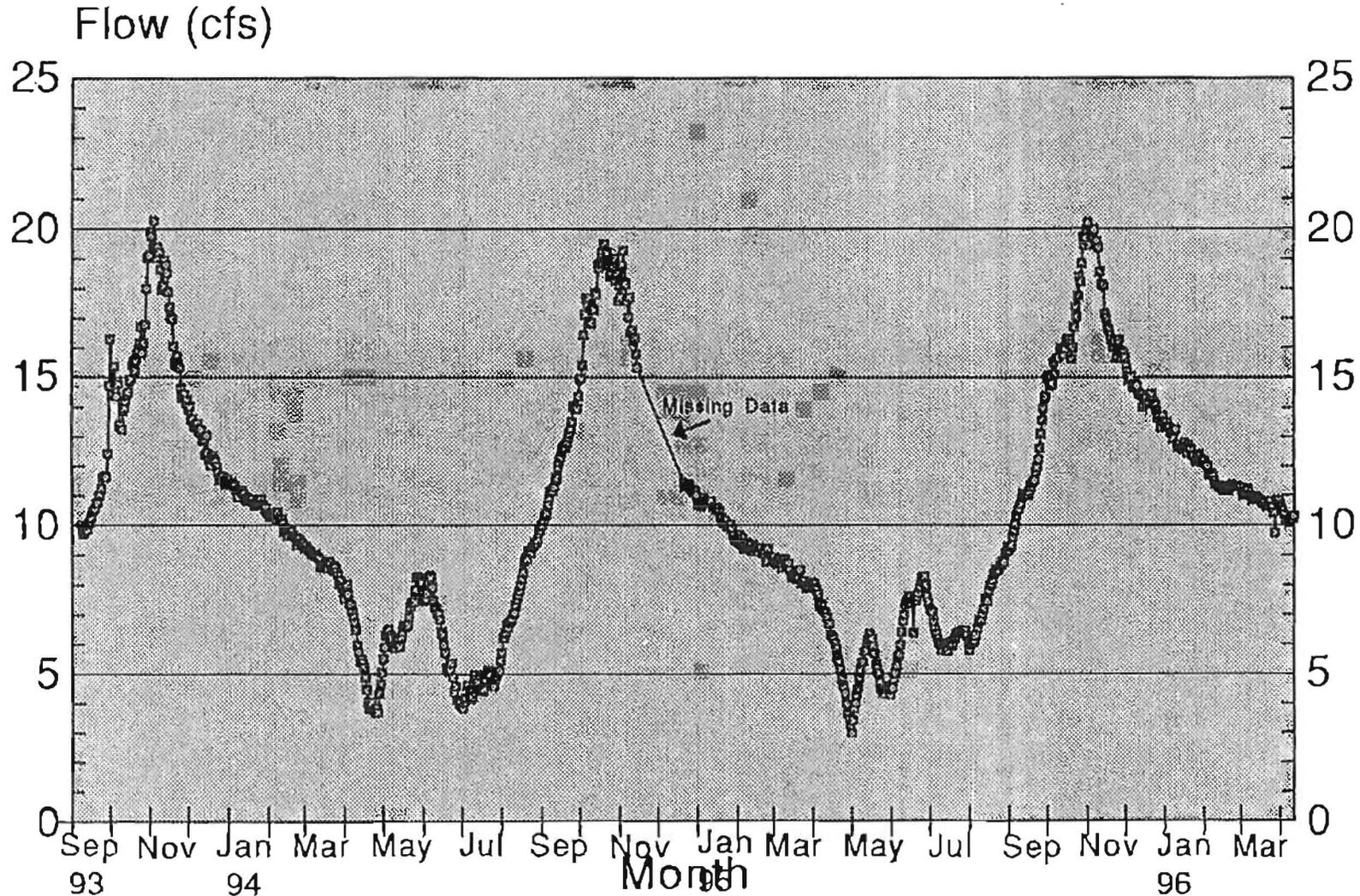


Based on average daily water levels and rating table.  
Note: Rating table re-calibrated November 1996.

# Curren Tunnel

Average Daily Flow Rate  
September 8, 1993 to April 12, 1996

Chart #3  
Old Rating

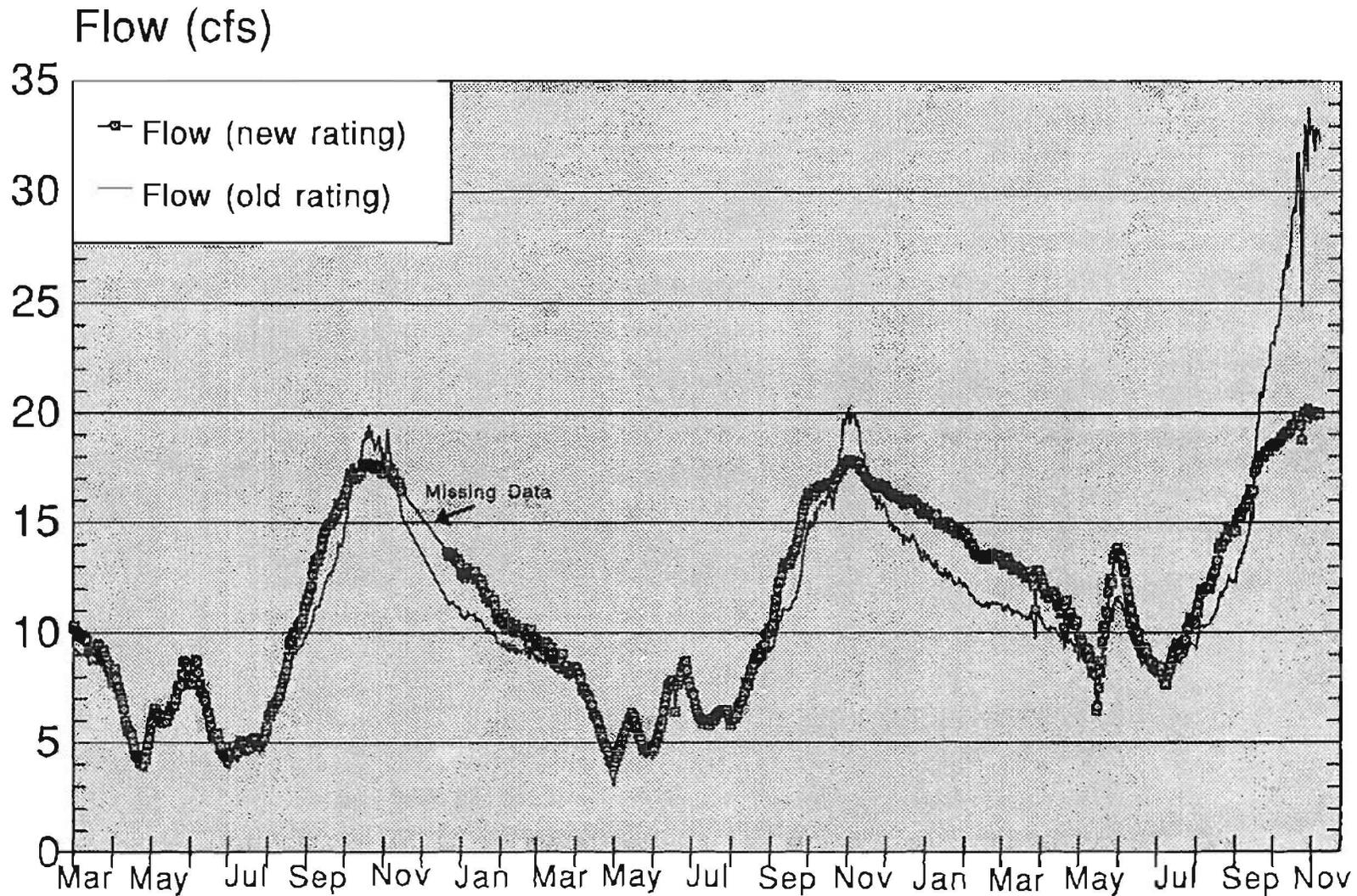


Based on average dally water levels and rating table.

# Curren Tunnel

Average Daily Flow Rate  
March 1, 1994 to November 7, 1996

Chart #4  
old & new  
ratings



Based on average daily water levels and rating table.

Note: Rating table re-calibrated November 1996.

95

96

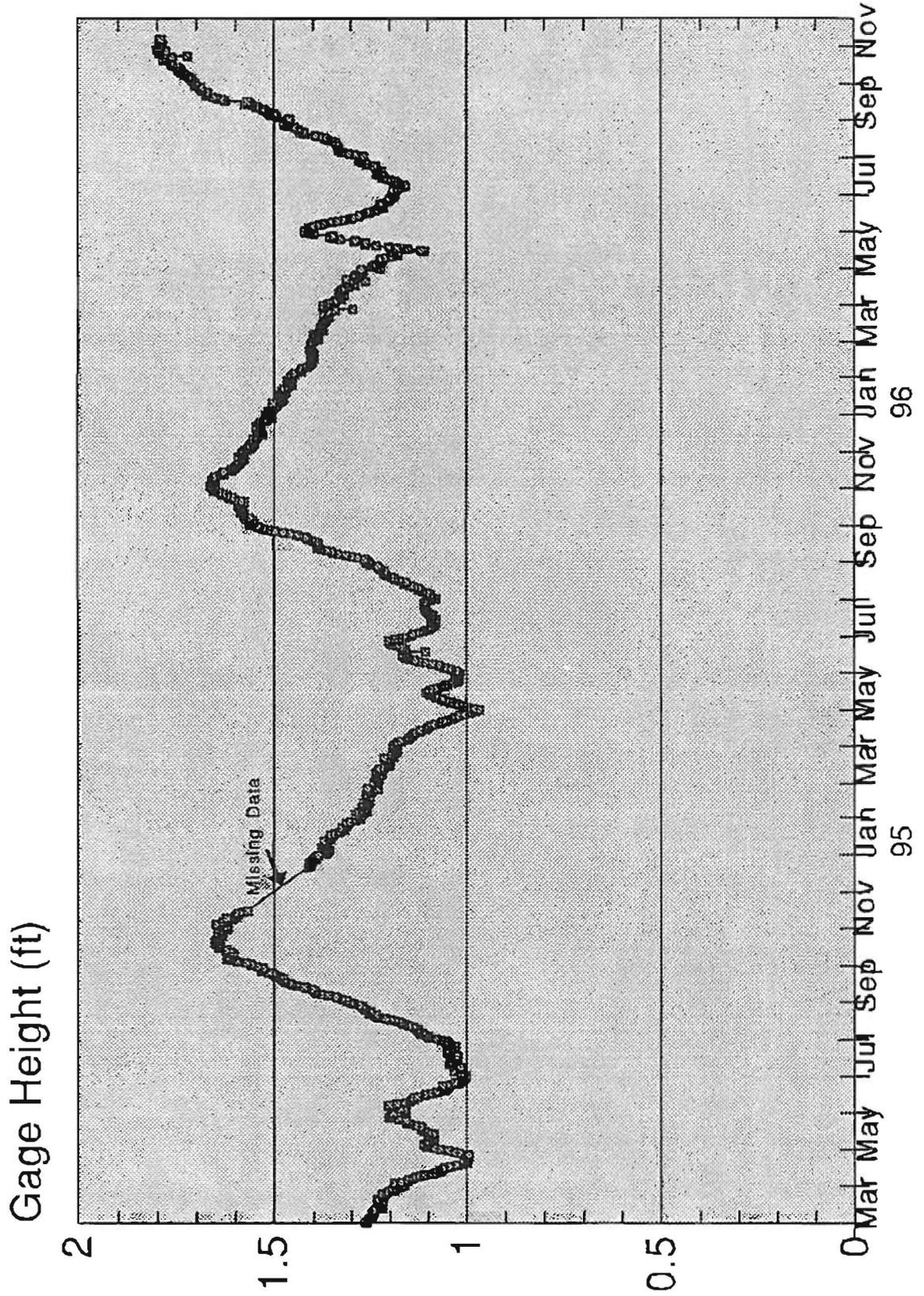
# Curren Tunnel

Average Daily Gage Height

March 1, 1994 to November 7, 1996

Chart # 5

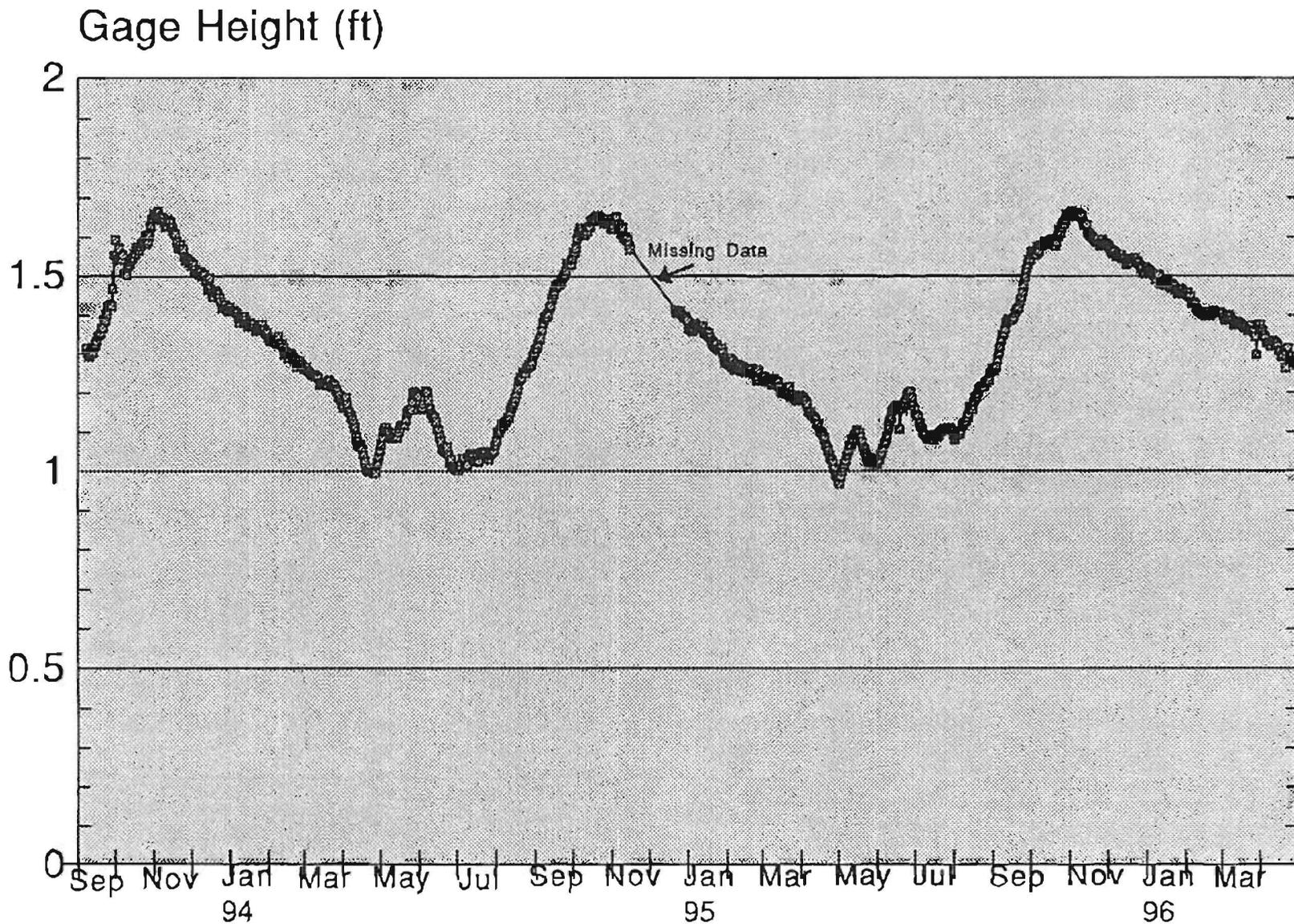
Water level



# Curren Tunnel

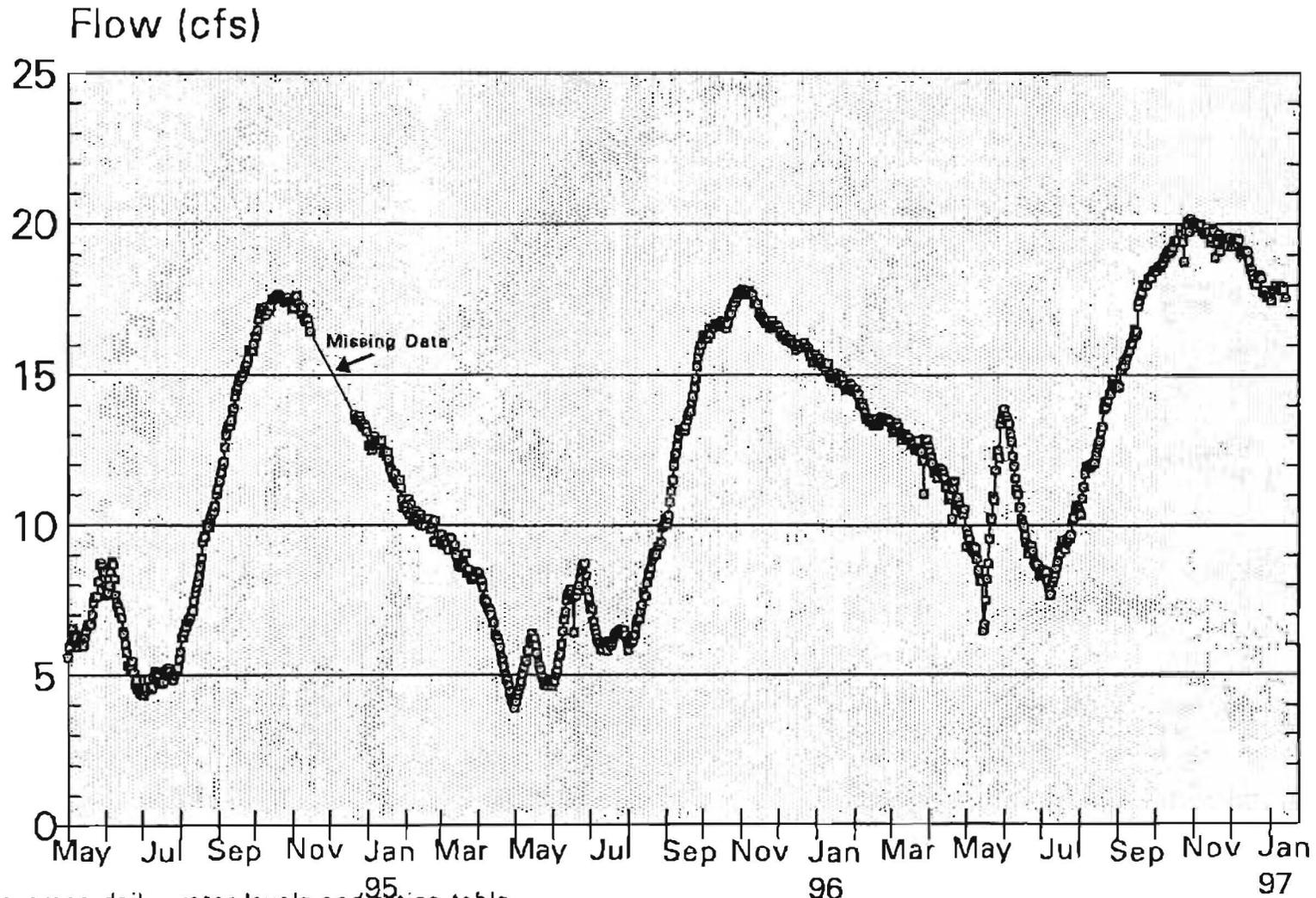
Average Daily Gage Height  
September 8, 1993 to April 30, 1996

Chart #6



# Curren Tunnel

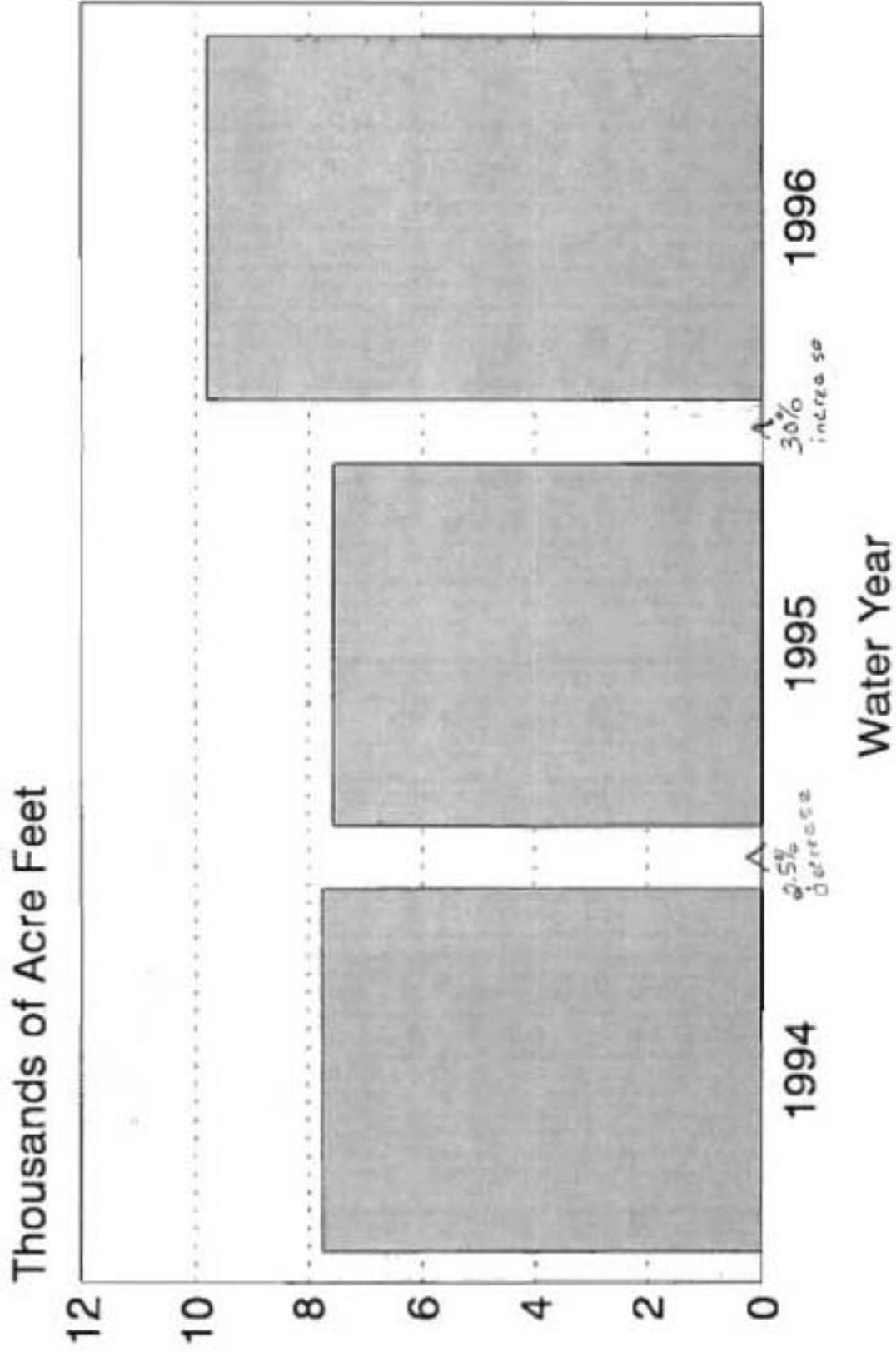
Average Daily Flow Rate  
May 1, 1994 to January 13, 1997



Based on average daily water levels and rating table.  
Note: Rating table re-calibrated November 1996.

# Current Tunnel

Annual Discharge (Oct 1 - Sept 30)



T1	A	B	C	D	E	F
1						
2		CURREN TUNNEL SPREADSHEET DATA				11/16/95
3	Y	X				
4	GH (FT)	Q (CFS)		OBS GH	AVG GH	DATE
5						
6	1.08	5.77		1.08	1.08	5/11/95
7	1.12	6.81		1.11	1.12	5/17/94
8	1.14	7.14		1.14	1.17	4/4/94
9	1.22	9.14		1.22	1.24	3/11/94
10	1.31	11.33		1.31	1.3	2/18/94
11	1.44	14.31		1.44	1.42	12/29/93
12	1.6	16.8		1.62	1.6	10/18/95
13	1.63	17.23		1.66	1.63	10/27/95
14	1.67	18.14		1.67	1.66	11/3/95
15	1.8	20.13		1.8		11/13/96
16						
17						
18						
19						
20	Compiled by T. Luke & S. King, IDWR					

DATE	OBSERVED G.H.	WATS.		DAILY		Daily Avg (A) / cfs
		Flow (A)	cfs	Avg G.H.	cfs	
5/11/95	1.08 ✓	5.77 (5.77)	1.08			5.77
5/17/94	1.11 ✓	6.81 (6.22)	1.12			6.60
4/4/94	1.14 ✓	7.14 (7.05)	1.17			7.70
3/11/94	1.22 ✓	9.14 (8.59)	1.24			8.91
2/14/94	1.31 ✓	11.33 (9.10)	1.30			9.81
12/24/93	1.44 ✓	14.31 (11.38)	1.42			11.54
12/1/93	1.57 ✓	16.70	1.53			13.90
12/4/95	1.62 ✓	15.62	1.60			16.56
10/18/95	1.62 ✓	16.80 (17.54)	1.63			16.21
10/27/95	1.66 ✓	17.23 (19.88)	1.66			19.88
11/03/95	1.67 ✓	18.14 (20.22)	1.66			19.88
1/21/93	1.27	12.27	1.37			10.76

→ 12/03 02 = 1.57, rating H = 14.93 to 15.69 cfs

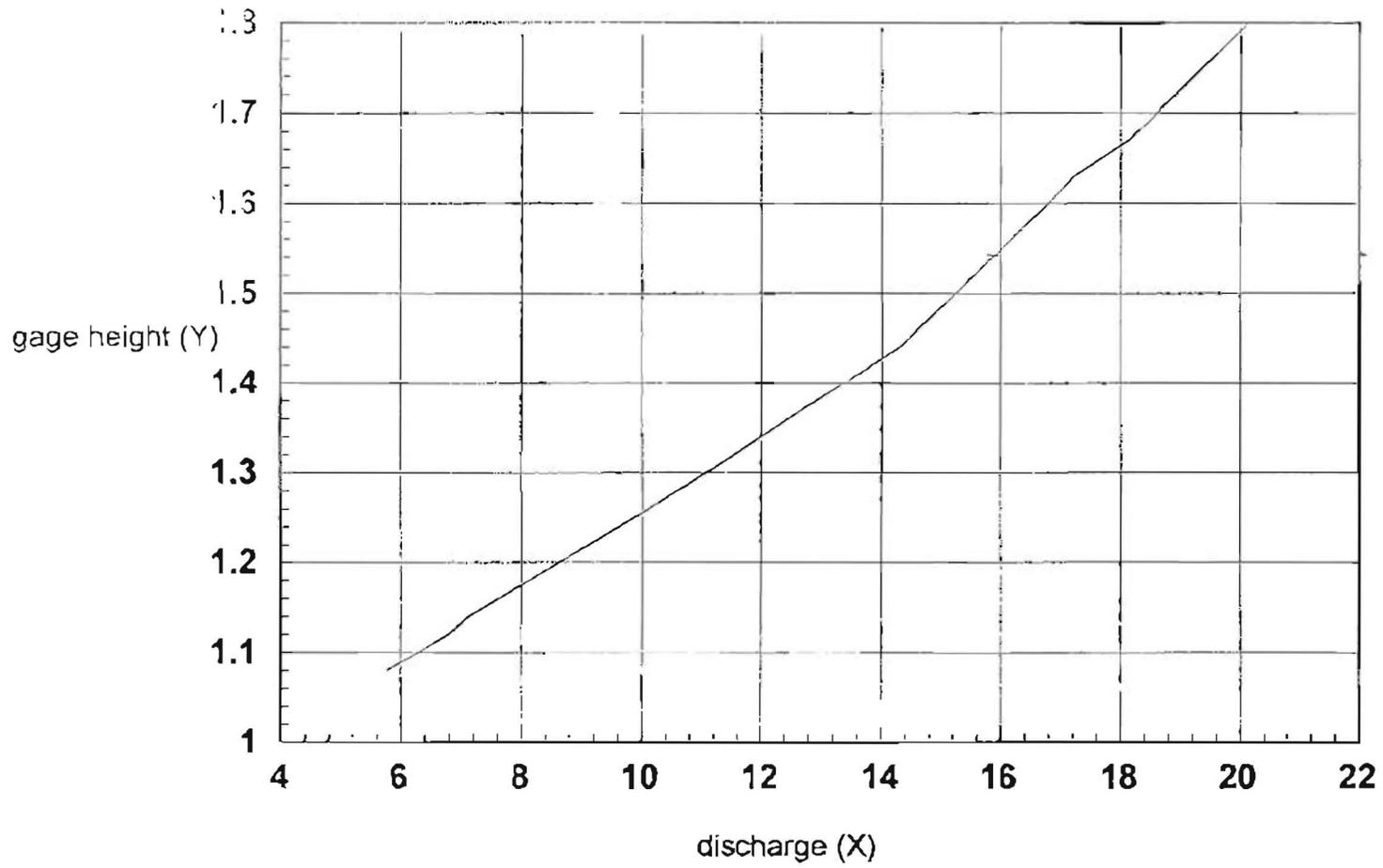


28.59

60.53

$$/ 25 = 3.56$$

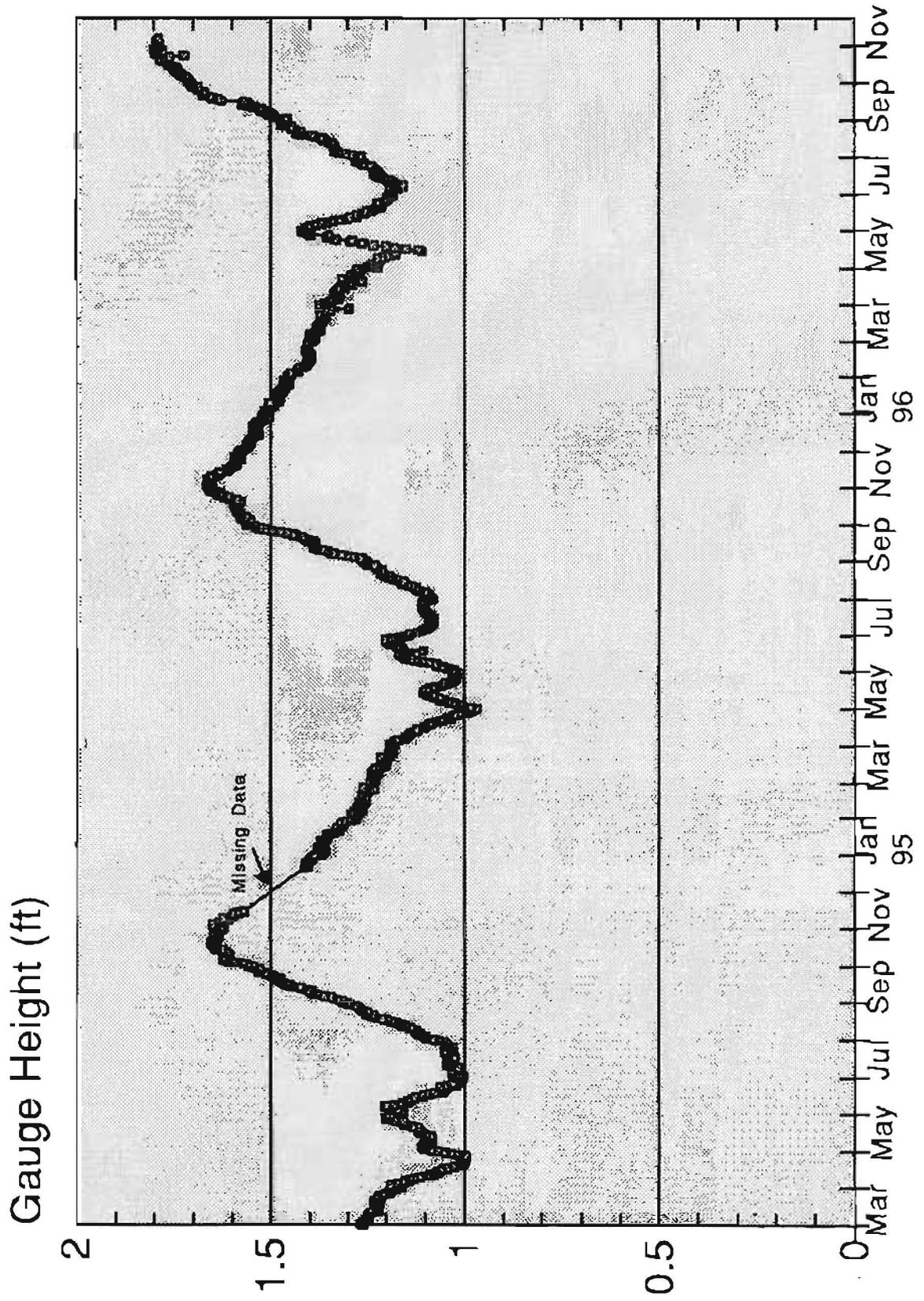
Green Tunnel X-Y Plot  
Discharge (X) vs. GH (Y)



# Curren Tunnel

Average Daily Gauge Height

March 1, 1994 to November 7, 1996



# Copper Tunnel Rating

10/27 @ 500 pm

- Current measured 17.23 cfs

- GH = 1.66 @ 167 (1.66 GH ≈ 19.9 cfs)

- Average GH for 10/27 (100 Am - 500 pm) = 1.64

- GH w/ 1.64' - RATED flow/table = 18.64 cfs

$$18.64 - 17.23 = 1.41 \text{ cfs}$$

$$17.23 - 18.64 / 18.64 \times 100 = -7.56\%$$

OR

$$18.64 - 17.23 / 17.23 \times 100 = 8.2\%$$

10/18

- news 16.77 cfs Rate GH = 1.62' (17.54 cfs)

avg GH = 1.60, Avg Q = 16.34 cfs  
10/18

$$16.77 - 16.34 / 16.34 \times 100 = 2.63\%$$

$$16.34 - 16.77 / 16.77 \times 100 = -2.56\%$$

Dates/notes. for New Rating

5/11/95

expanded with  
5.77 cfs

GH Avg  
1.08

GH manual  
1.08

5/17/94

6.81

1.12

1.11

10/18/95

16.8 cfs

1.60

1.62

10/27/95 ?

17.23

3.59 1.63

1.67 - 1.66

11/03/95

18.14

1.66 part

1.67

install  
wool  
partition  
⇒ 12/1/93  
8.4242

10/03 Avg 100 Am - 300 pm = 3.56

5.22

measured 18.14 cfs @ 130 230

5

3.56

400 pm reading = 3.55

1.66

300 " = 3.57

100 " 3.53 5.22 5.22 !

5.22

3.53

1.69

3.55

1.67

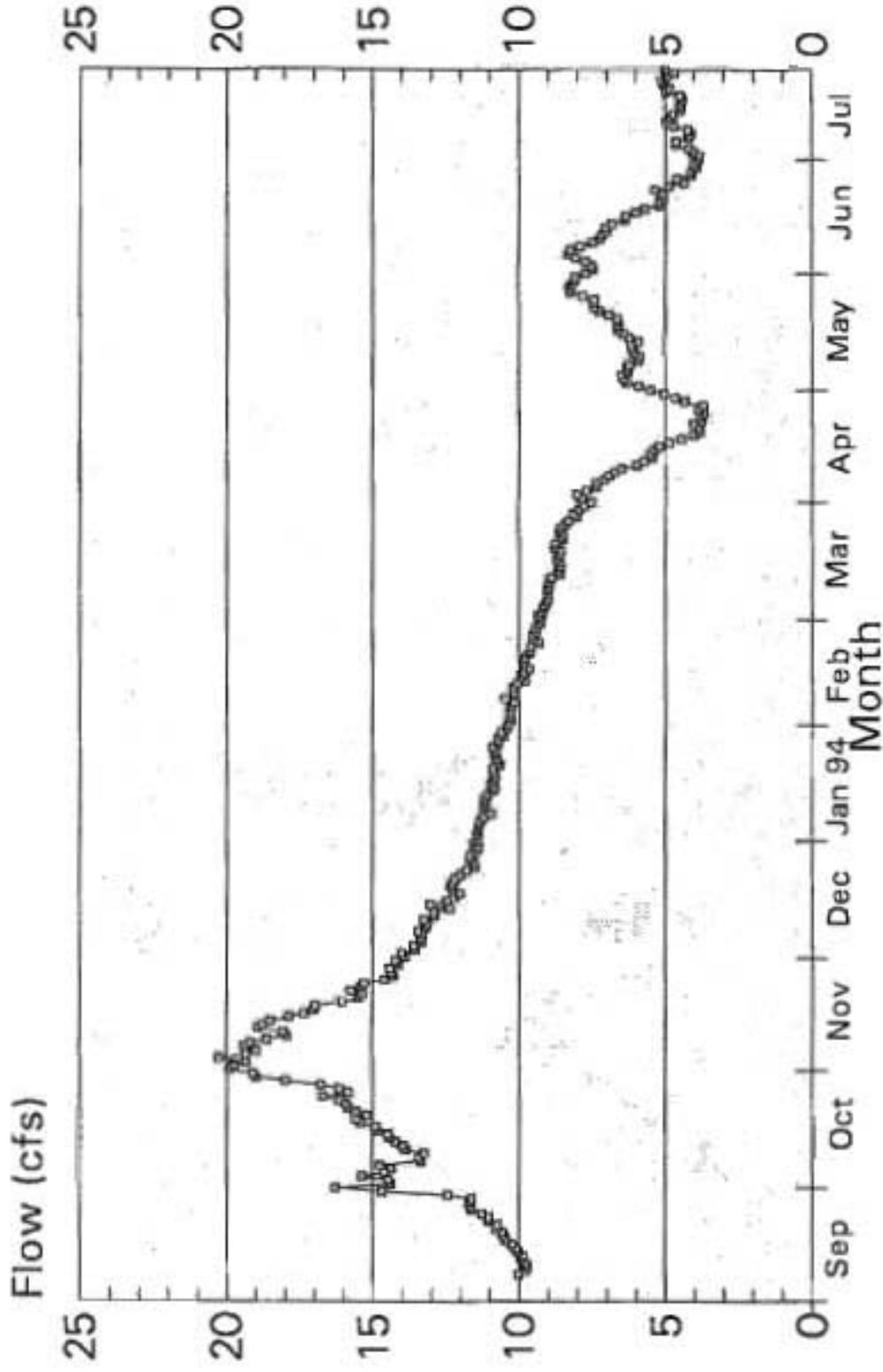
5.22

3.57

1.65

# Curren Tunnel

## Average Daily Flow Rate

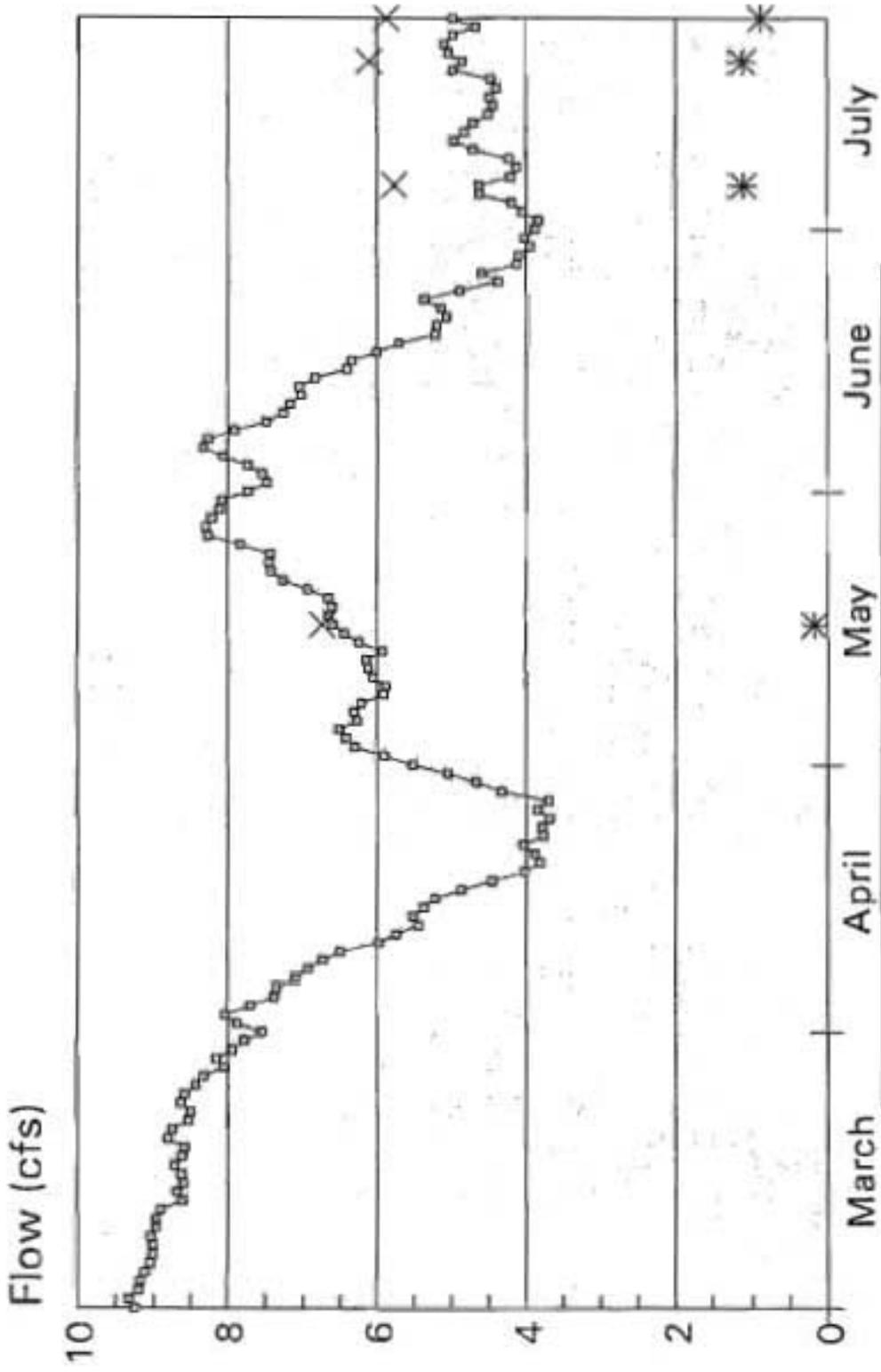


Based on average daily water levels and rating table.

# Curren Tunnel

Average Daily Flow Rate

Enlarged Version

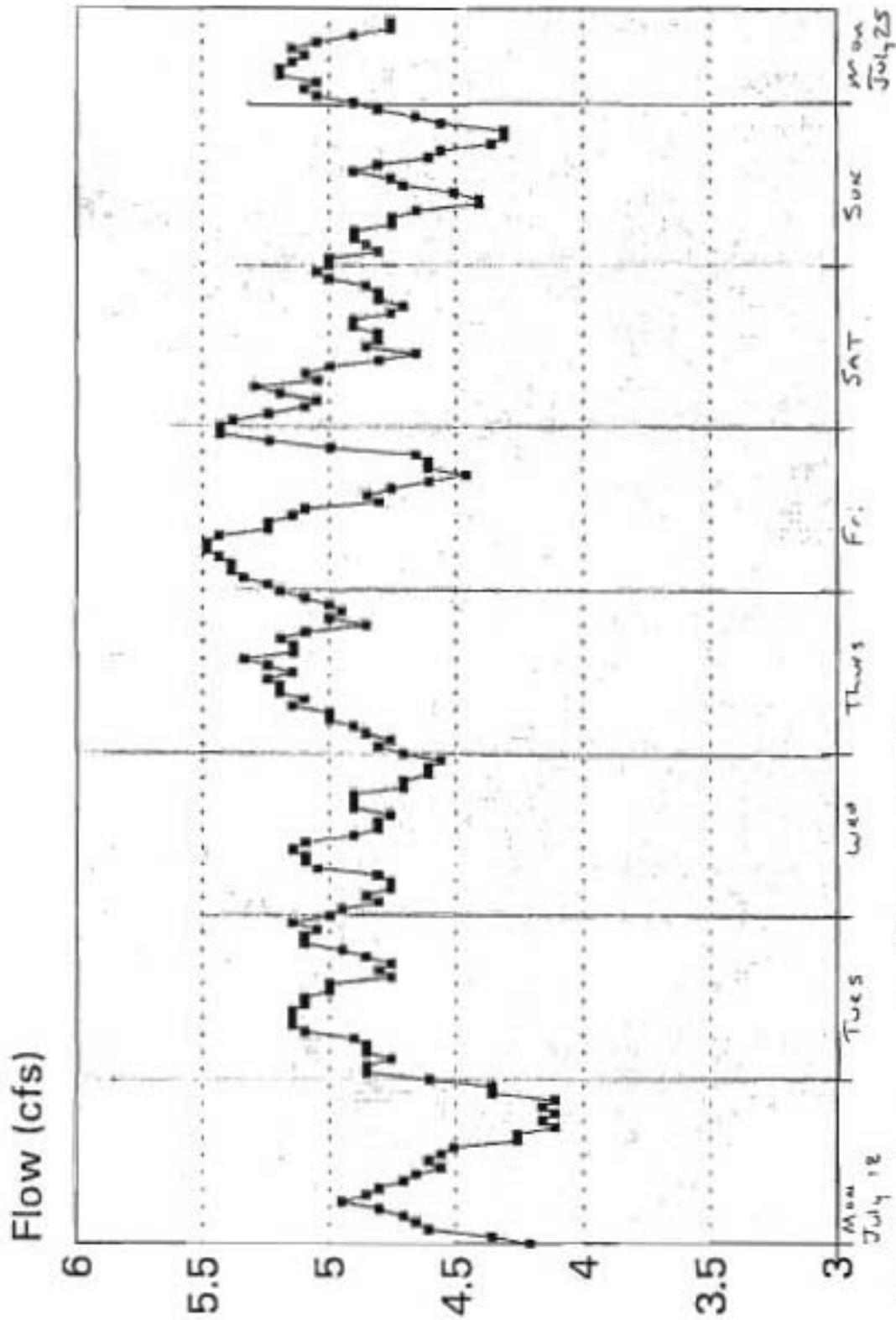


Based on average daily water levels and rating table.

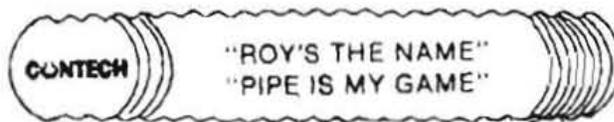
# Current Tunnel

Hourly Flow Rate

July 18 12:00 am - July 25, 2:00 pm



Data points based on average of 5 nearest points



Tian O'Keefe  
- 543-6421  
Gen. Manager, Procter Inc.  
out on AL WK July 11,

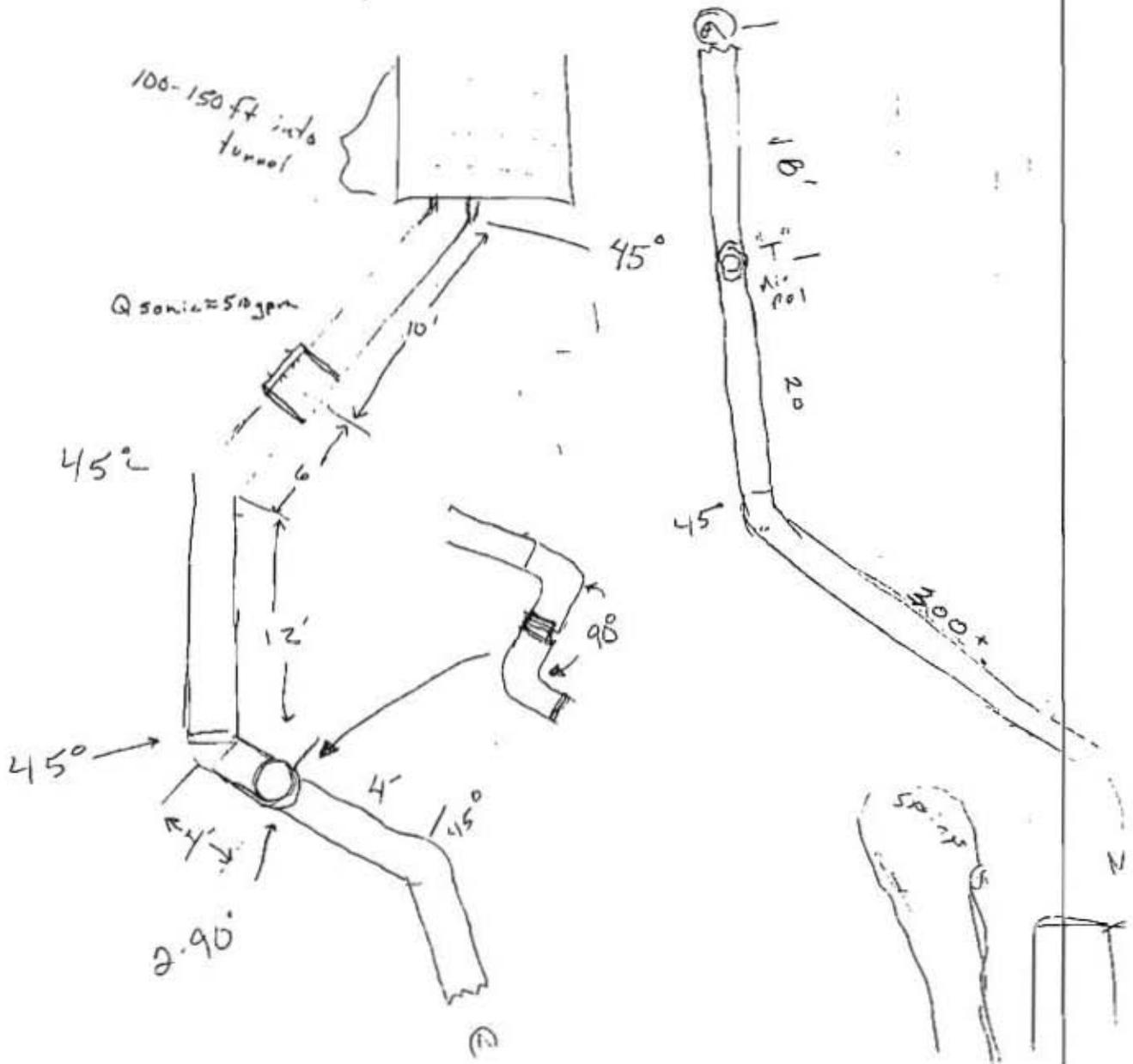
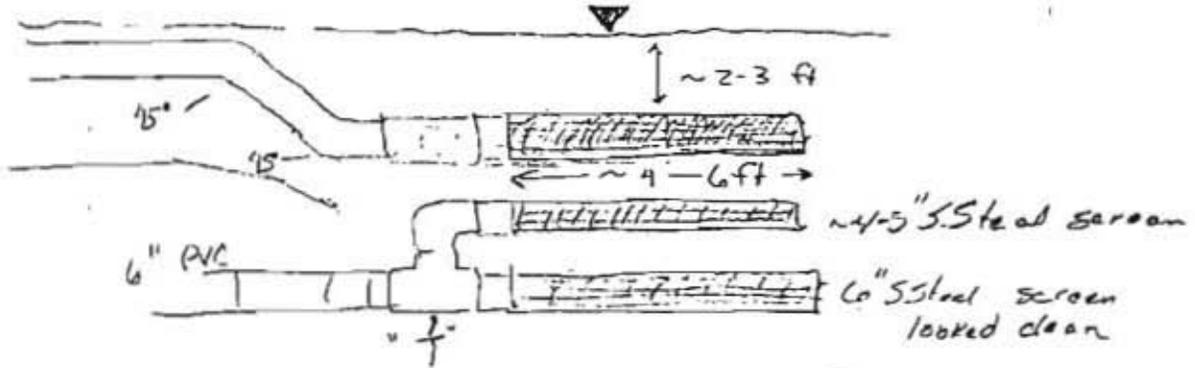
Phil Jones.

**Roy H. Beams**  
CONTECH Construction Products Inc.  
1790 Kimberly Road  
Twin Falls, Idaho 83301  
Phones: Office 733-4188 - Home 423-4892  
TOLL FREE 1-800-865-7192

7-6 Current

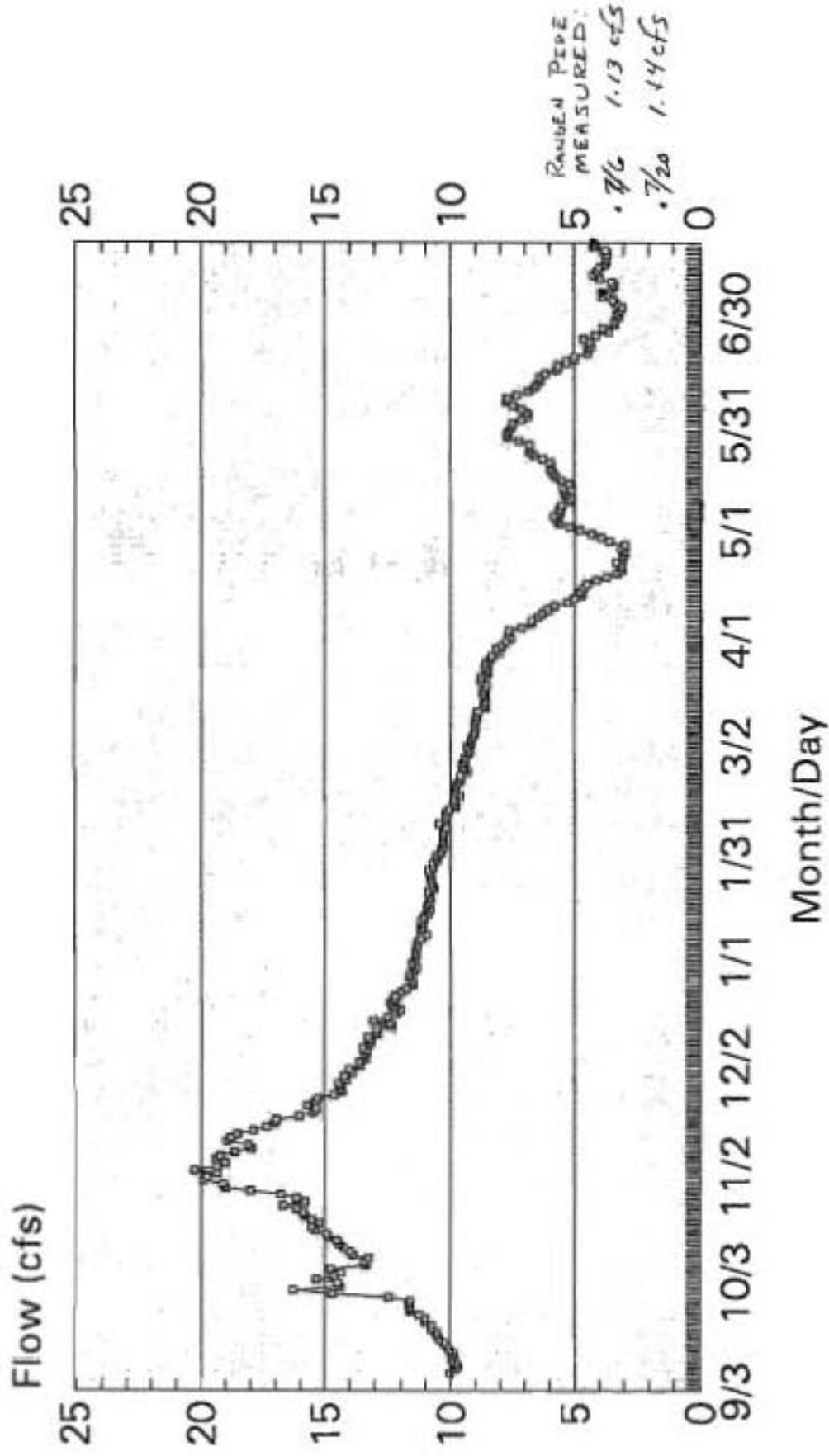
S. King

Download. Ok except for some 8.18 others 5.  
 Set pressure → 7. Loaded several 5min ok.  
 Set volume to log 1hr. Relocated volume ~ 10:15 am  
 Measurement ranges pipe w/ poly sonic ~ 510 gpm  
 In speed at intake. Will always run full.



# Curren Tunnel

## Average Daily Flow Rate



Based on average daily water levels and rating table.

TURNED ON 3 Big Units when Johnson  
came in, last one  $\approx 1.2$  H, then fixed  
up add'l VATS.

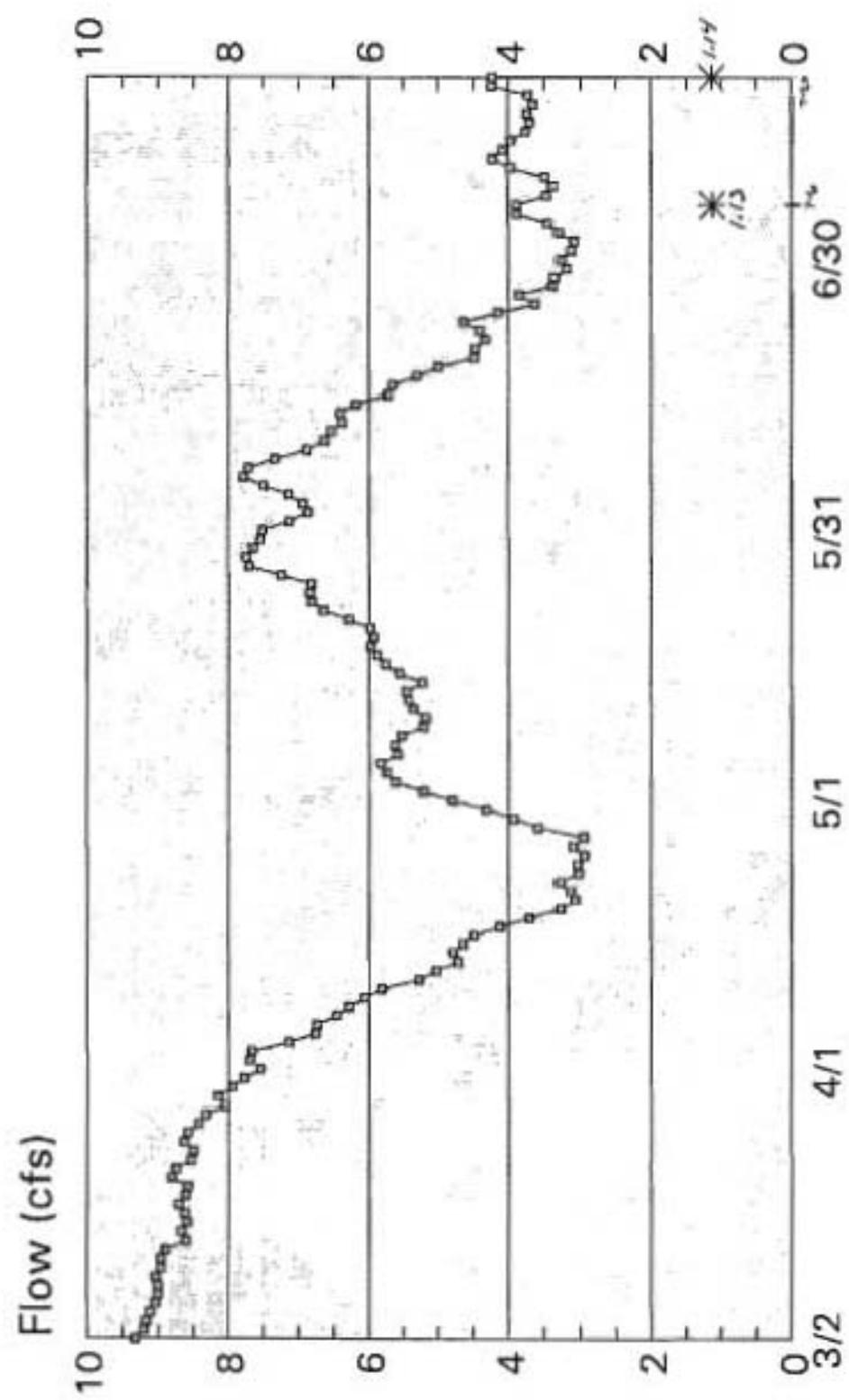
MAY 16 - Ranger turned on 3 Big units  
total  $\approx 33$  gpm

MAY 24 - Stocked smaller VATS for exp.  
 $\approx 170$  gpm +  $33$  gpm  $\approx 200$  gpm  
@ most @ this time

PRIOR to MAY 16 - would have maybe  
1 or 2 less VATS.  $\approx 20-30$  gpm

# Current Tunnel

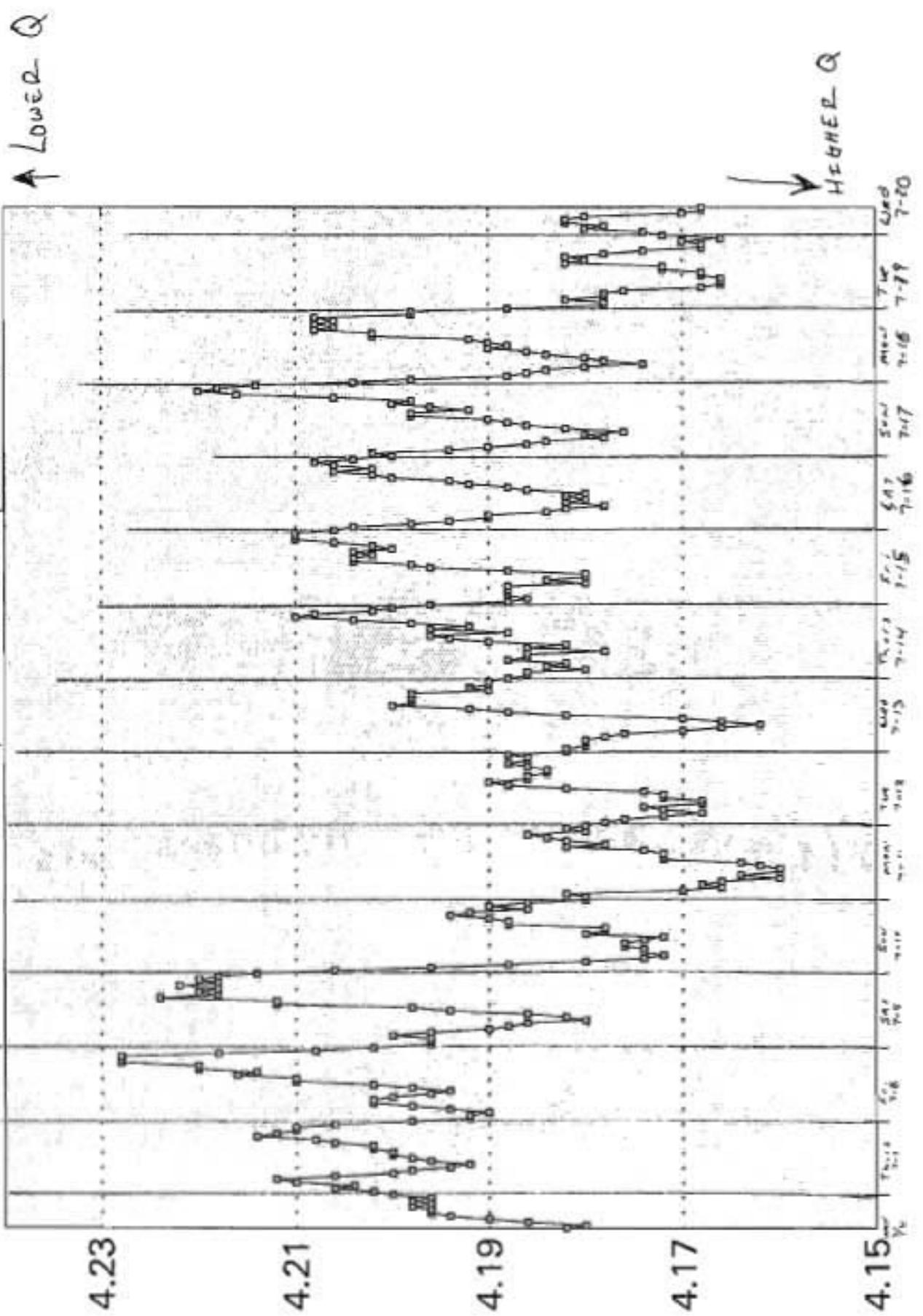
Average Daily Flow Rate  
Enlarged Version



→ FLOW (CFS) \* Rangan Pipe (CFS)  
*Alignment Measurement*

Based on average daily water levels and rating table.

Curren Tunnel  
 MODIFIED RAW WATER LEVEL DATA  
 July 6 - July 20 1994



From 7-6 - 7-20. wk 1

28-Jun-94

CURREN TUNNEL

LINEAR RELATIONSHIP BETWEEN DATA POINTS

COMPILED BY IDWR, JUNE 1994

Q = (GHT - 0.841)/0.041 FOR GHT 0.85 THRU 1.12  
Q = (GHT - 0.6817)/0.06437 FOR GHT 1.13 THRU 1.27  
Q = (GHT - 0.744)/0.05751 FOR GHT 1.28 THRU 1.45  
Q = (GHT - 0.9514)/0.0406 FOR GHT 1.46 THRU 1.63  
Q = (GHT - 1.478)/0.0091 FOR GHT 1.64 THRU 1.66

\*\*\*\*\*  
GHT 0.000 0.010 0.020 0.030 0.040 0.050 0.060 0.070 0.080 0.090  
\*\*\*\*\*  
0.800 0.220 0.463 0.707 0.951 1.195  
0.900 1.439 1.683 1.927 2.171 2.415 2.659 2.902 3.146 3.390 3.634  
1.000 3.878 4.122 4.366 4.610 4.854 5.098 5.341 5.585 5.829 6.073  
1.100 6.317 6.561 6.805 6.964 7.120 7.275 7.430 7.586 7.741 7.897  
1.200 8.052 8.207 8.363 8.518 8.673 8.829 8.984 9.139 9.320 9.494  
1.300 9.668 9.842 10.016 10.190 10.363 10.537 10.711 10.885 11.059 11.233  
1.400 11.407 11.581 11.754 11.928 12.102 12.276 12.527 12.773 13.020 13.266  
1.500 13.512 13.759 14.005 14.251 14.498 14.744 14.990 15.236 15.483 15.729  
1.600 15.975 16.222 16.468 16.714 17.802 18.901 20.000 21.099 22.198 23.297

# GRAVEN TUNNEL

Linear Rels Between Pts.

y	X cfs
1.04	4.86
1.12	6.81
1.27	9.14
1.45	12.27
1.63	16.7
1.66	20.0

Sec 1

$$y(1.04) \rightarrow 1.04 = m(4.86) + b$$

$$y(1.12) \rightarrow 1.12 = m(6.81) + b$$

$$-0.08 = m(-1.95)$$

$$m = 0.041$$

$$1.12 = 0.04102524(6.81) + b$$

$$b = 1.12 - 0.279$$

$$b = 0.841$$

$$y_1 = 0.041x + 0.841$$

$$x = y_1 - 0.841 / 0.041$$

Sec 2

$$1.12 = m(6.81) + b$$

$$1.27 = m(9.14) + b$$

$$-0.15 = m(-2.33)$$

$$m = 0.06437$$

$$1.27 = 0.06437(9.14) + b$$

$$b = 1.27 - 0.5883$$

$$b = 0.6817$$

$$y_2 = 0.06437y + 0.6817$$

$$x = y_2 - 0.6817 / 0.06437$$

Sec 3

$$1.27 = m(9.14) + b$$

$$1.45 = m(12.27) + b$$

$$-0.18 = m(-3.13)$$

$$m = 0.05751$$

$$1.45 = 0.05751(12.27) + b$$

$$b = 1.45 - 0.7056$$

$$b = 0.744$$

$$y_3 = 0.05751(x) + 0.744$$

$$x = y_3 - 0.744 / 0.05751$$

Sec 4

$$1.45 = m(12.27) + b$$

$$1.63 = m(16.7) + b$$

$$-0.18 = m(-4.43)$$

$$m = 0.0406$$

$$1.63 = 0.0406(16.7) + b$$

$$b = 1.63 - 0.6786 = 0.9514$$

$$x = y_4 - 0.9514 / 0.0406$$



Sec 5

$$\begin{aligned}1.63 &= m(167) + b \\1.66 &= m(200) + b \\-0.03 &= m(-330) \\m &= 0.0091\end{aligned}$$

$$\begin{aligned}1.66 &= 0.0091(200) + b \\b &= 1.66 - 0.182 \\b &= 1.478\end{aligned}$$

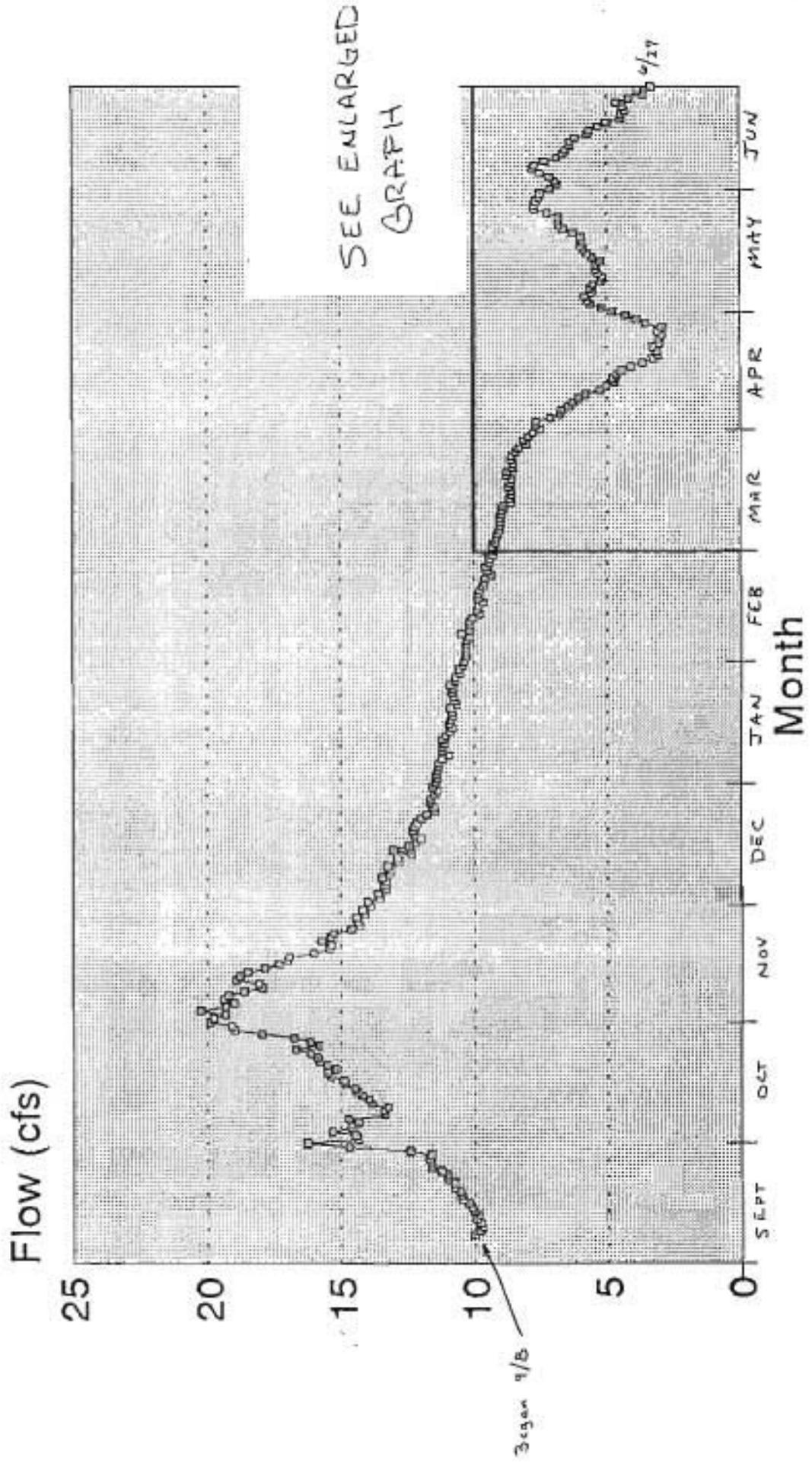
$$\begin{aligned}Y_5 &= 0.0091(x) + 1.478 \\x &= Y_5 - 1.478 / 0.0091\end{aligned}$$

22-141 50 SHEETS  
22-142 100 SHEETS  
22-144 200 SHEETS



# Curren Tunnel

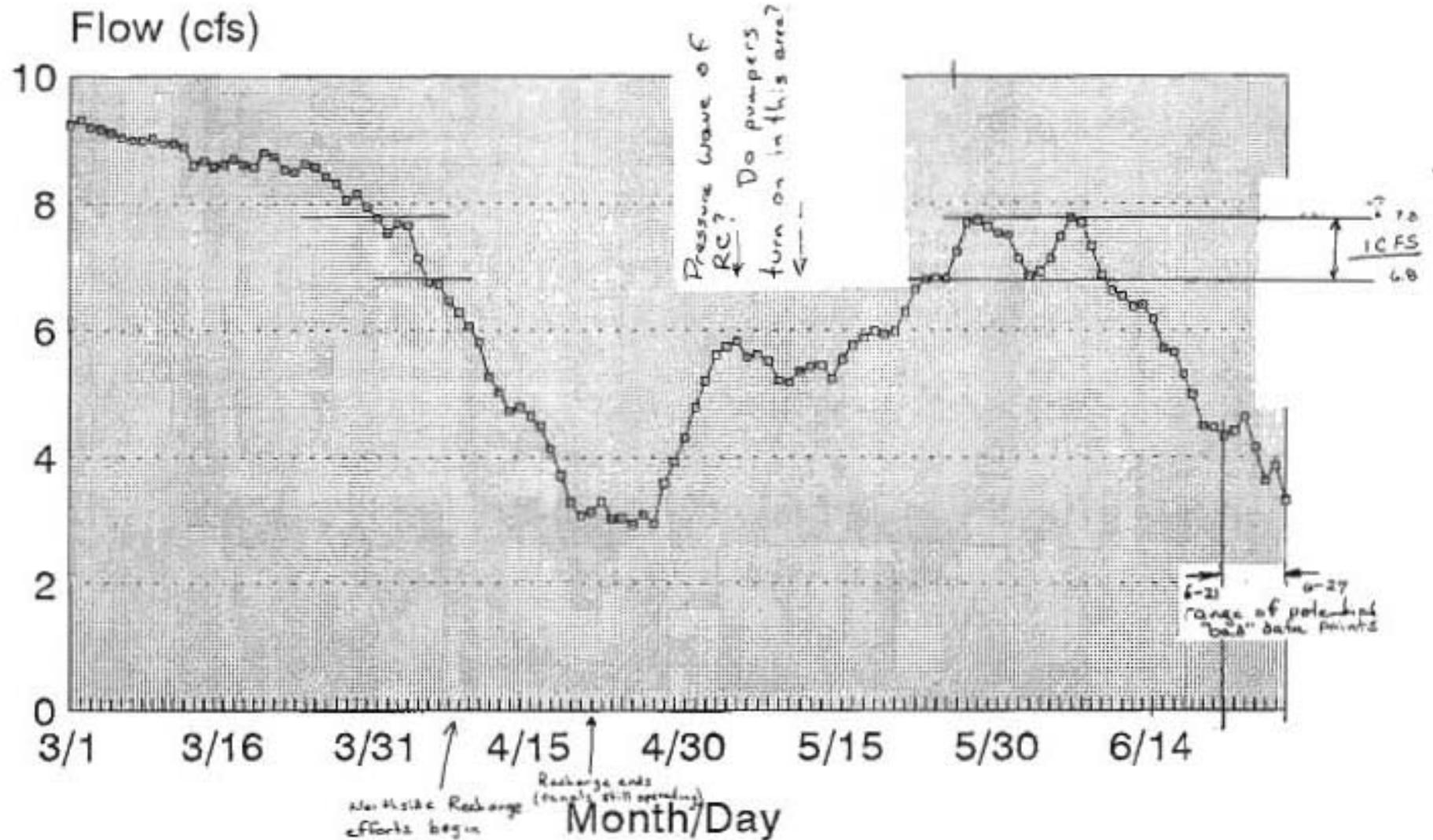
## Average Daily Flow Rate



Based on average daily water levels and rating table.

# Curren Tunnel

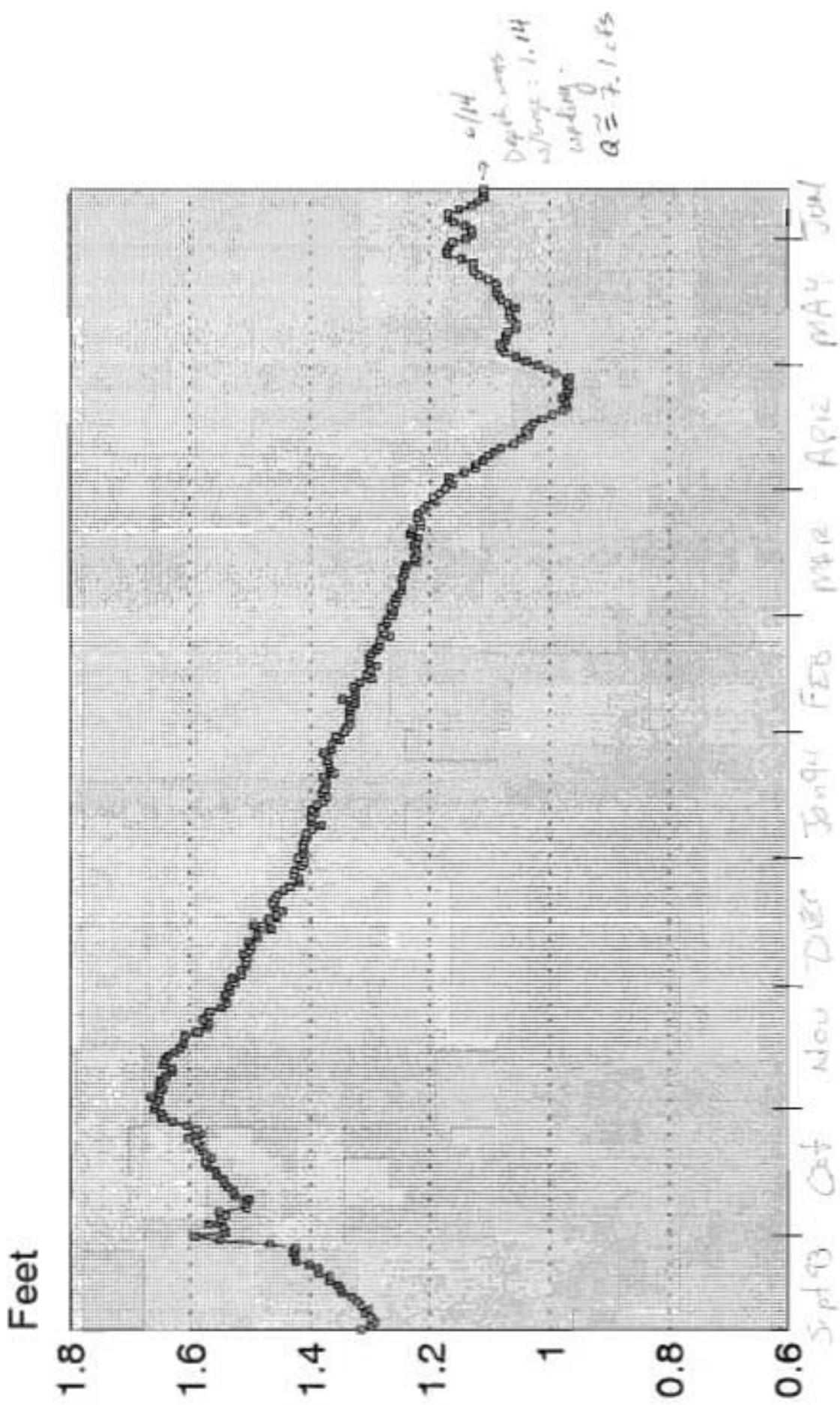
## Average Daily Flow Rate



Based on average daily water levels and rating table.

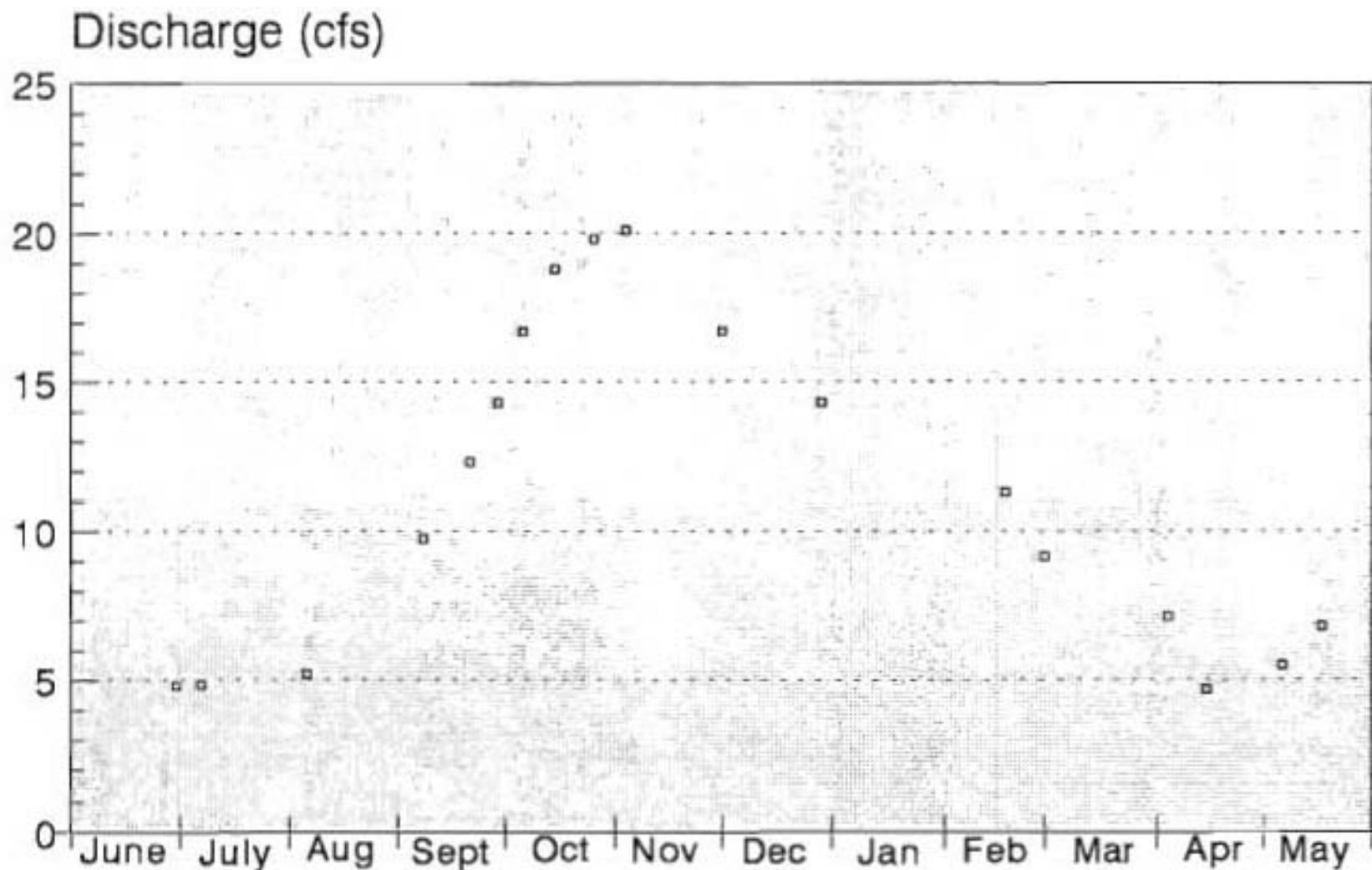
# Curren Tunnel

## Average Daily Water Level



# Curran Tunnel Discharge

Measured Discharge on Miscellaneous Dates  
6/30/93 to 5/17/94



Discharge does not include flow of Rangen pipeline

Tim Luke

4/7/94

Please replot the Martin Curran  
tunnel data using a uniform time scale

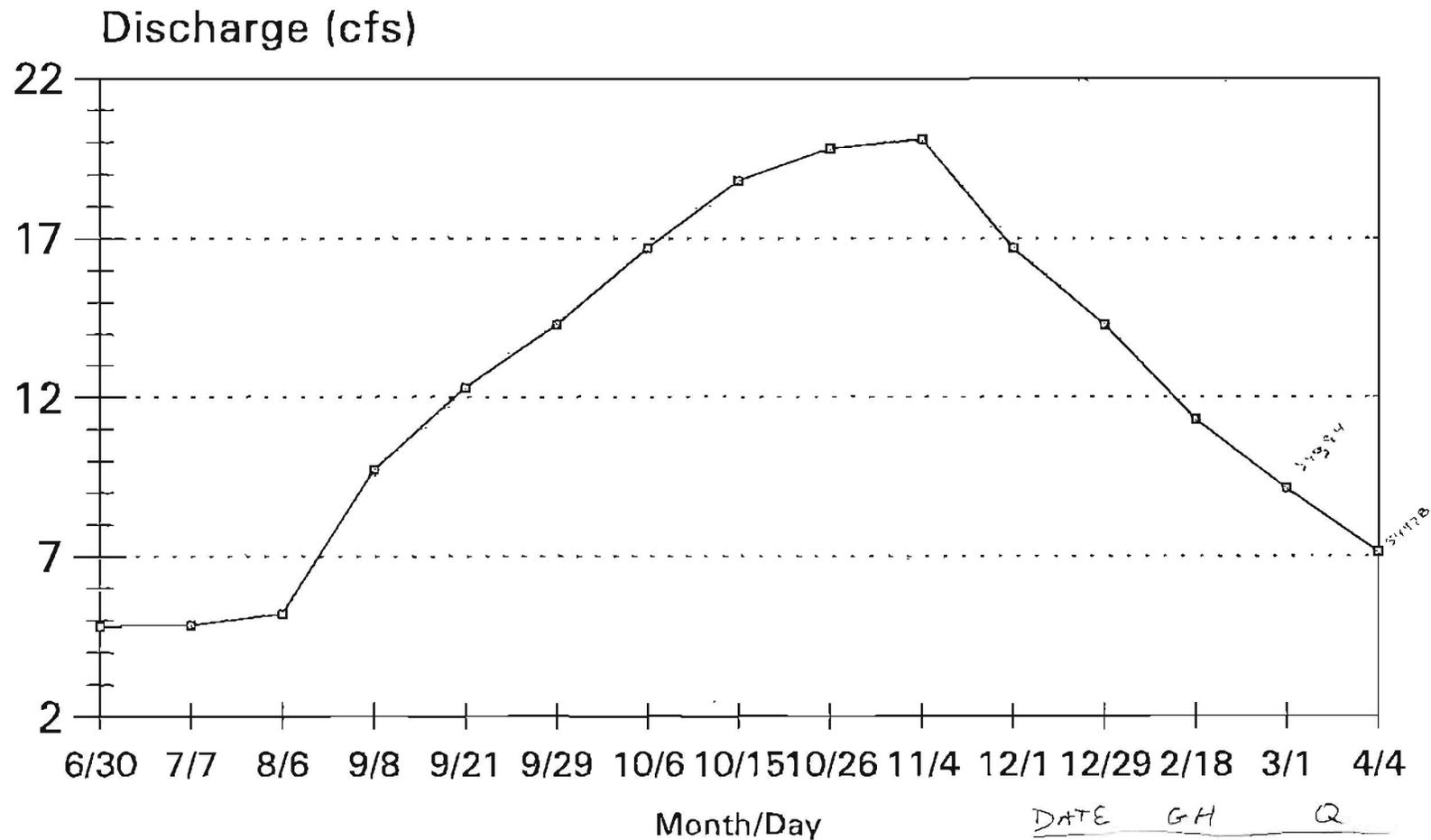
Note the attached memo with one more  
earlier measurement.

Let's monitor the data logger closely to  
be sure it is getting the data as the  
pumps start coming on.

Thanks  
TL

# Curran Tunnel Discharge

## Measured Discharge on Miscellaneous Dates 6/30, 1993 - 4/4, 1994



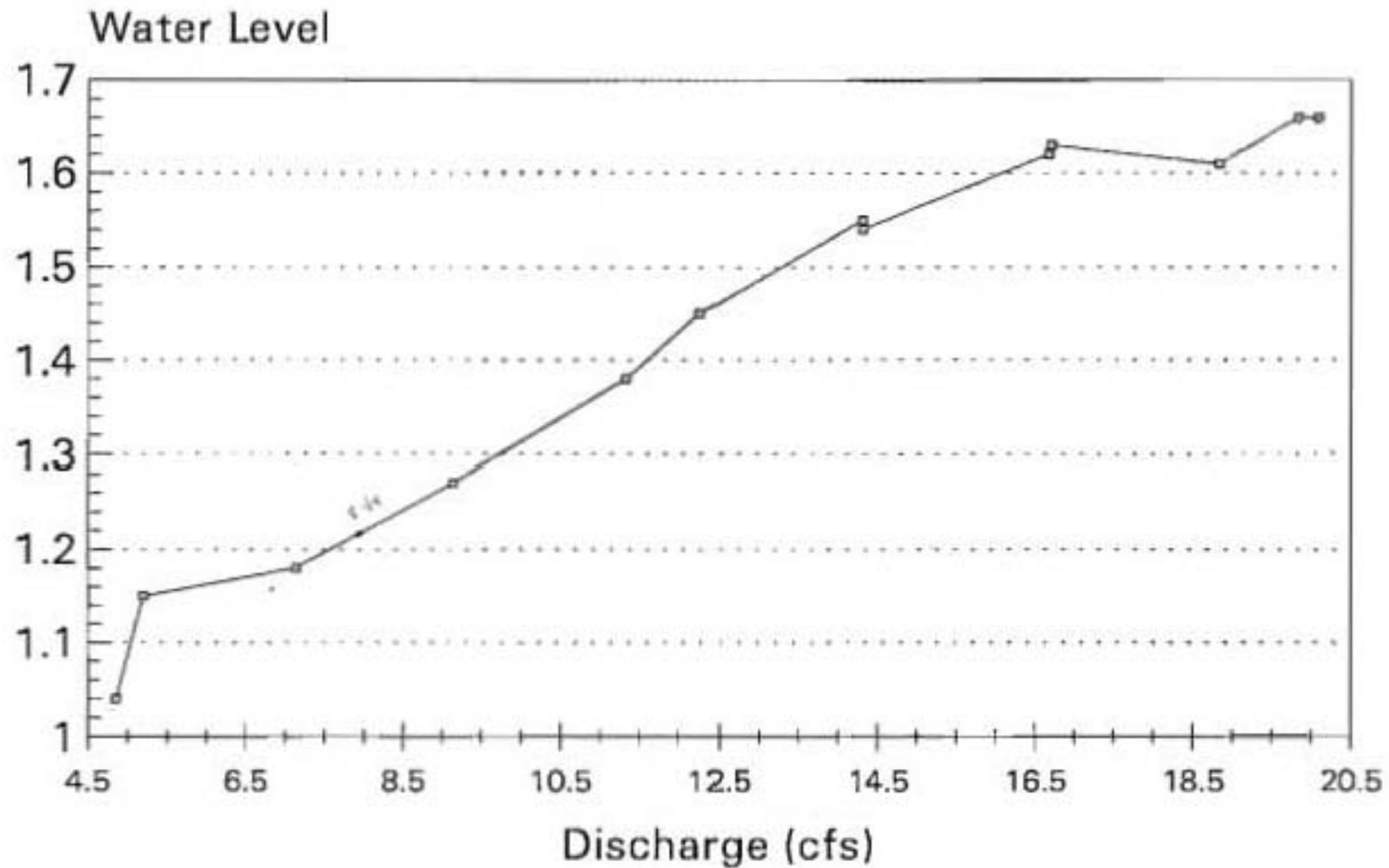
DATE	G.H.	Q
4/15	1.00	4.7 cfs ✓
5/6	1.12 OR 1.12?	5.2 OR 5.5 cfs

Discharge measured 20 ft. upstream from opening  
 Discharge does not include flow of Rangen pipeline

# Curran Tunnel Stage-Discharge Relation

## Miscellaneous Measurements

July 7, 1993 thru April 4, 1994



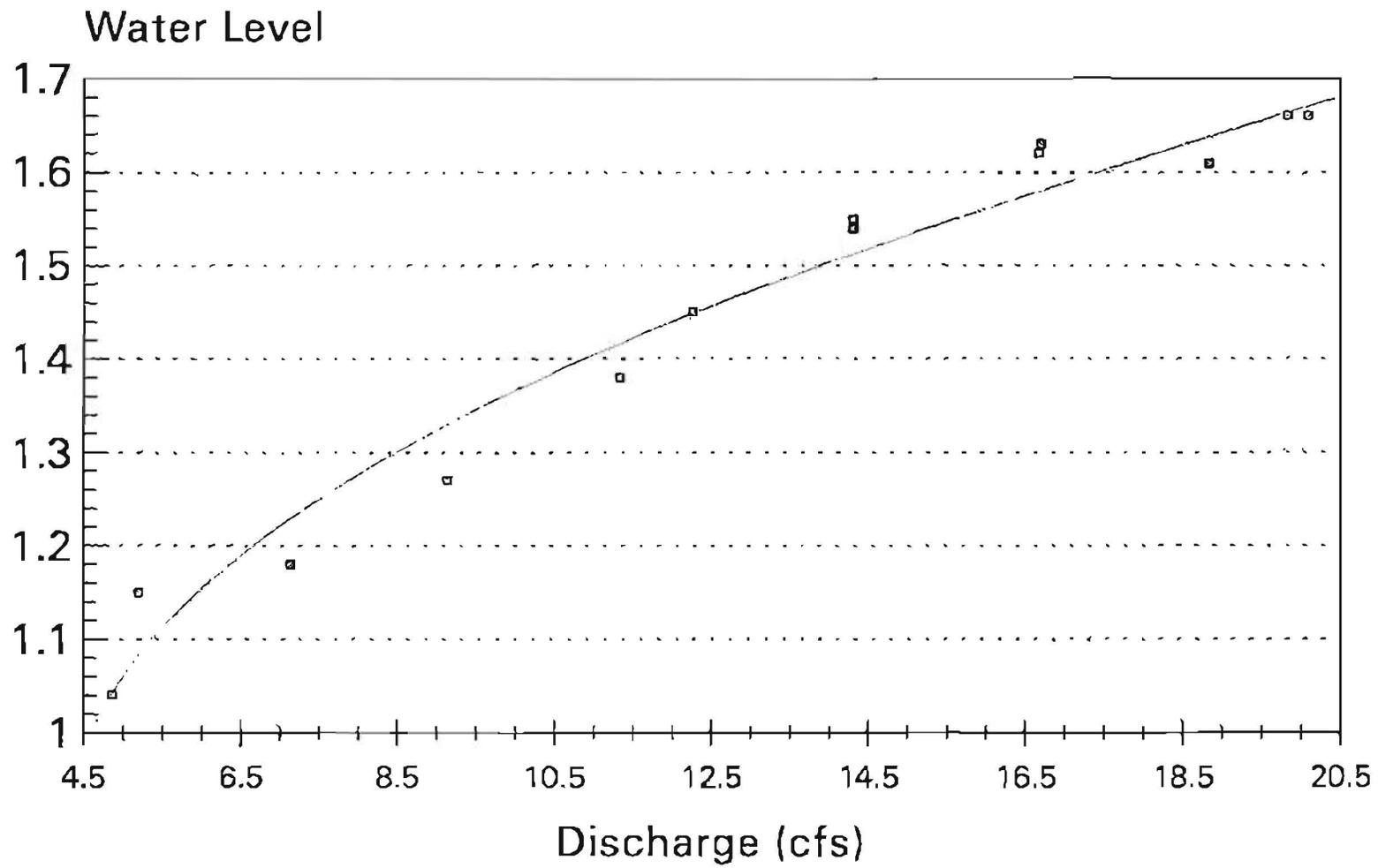
Stage = staff gage observations from current meter measurements

# Curran Tunnel Stage-Discharge Relation

Miscellaneous Measurements

July 7, 1993 thru April 4, 1994

---



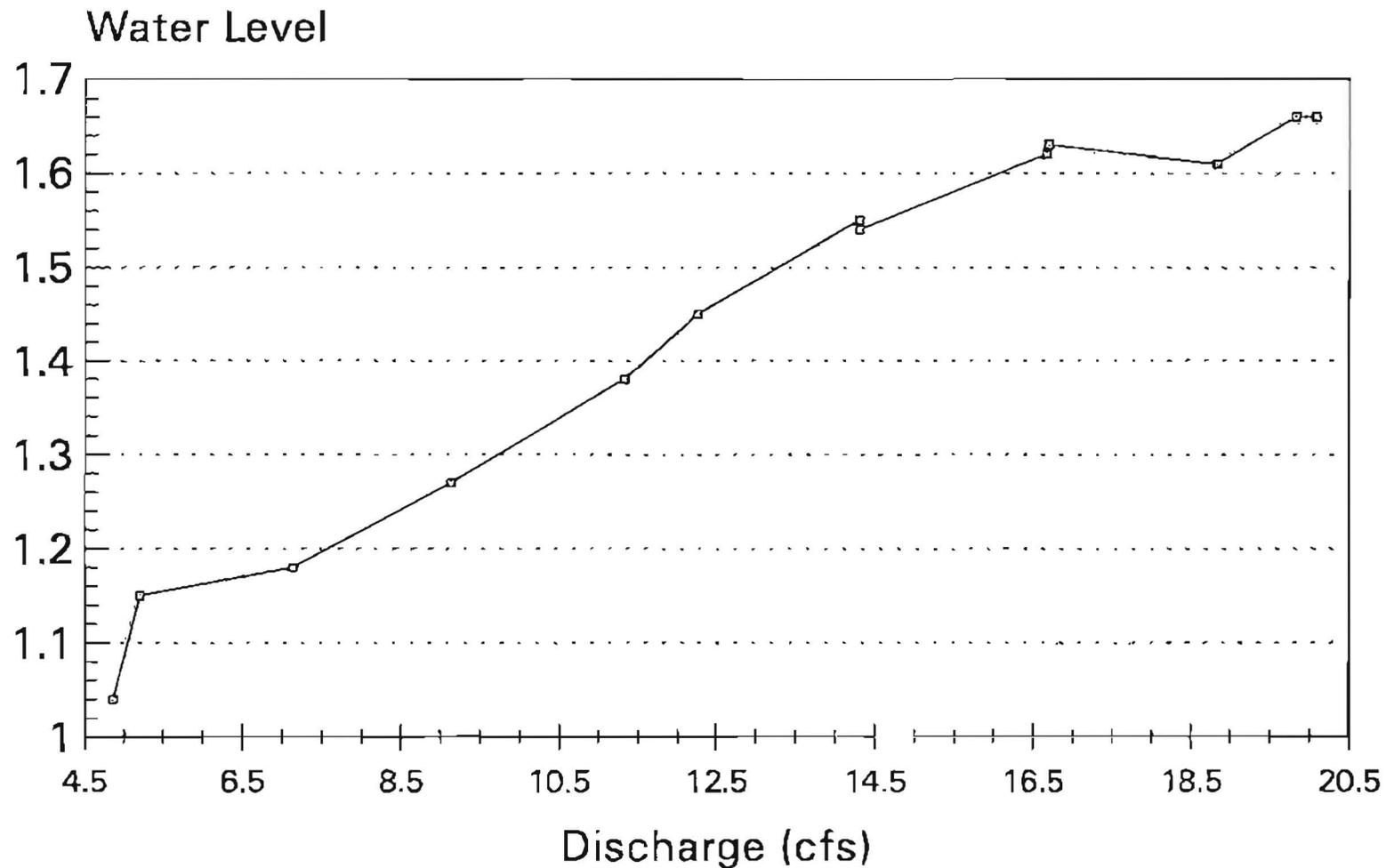
Stage = staff gage observations from current meter measurements

# Curran Tunnel Stage-Discharge Relation

Miscellaneous Measurements

July 7, 1993 thru April 4, 1994

---



Stage = staff gage observations from current meter measurements

```
C *****
C SOURCE FILE: UNIDATA.FOR
C FORTRAN FILE TO READ DATA FILE OUTPUT BY THE UNIDATA
C MACROLOGGER SOFTWARE
C AND WRITE DATE/TIME DATA IN A NUMERICAL FORMAT
C AUTHOR: GEORGE AUSTIGUY IDWR
C 10/93
C *****
```

```
PARAMETER (NDIM =1500)
```

```
CHARACTER YEAR(NDIM)*2
CHARACTER MONTH(NDIM)*2
```

```
CHARACTER DAY(NDIM)*2,T(NDIM)*2,CMIN*2,INTRPF*1
```

```
REAL H2OLVL(NDIM)
```

```
INTEGER IT(NDIM)
```

```
CMIN = '00'
```

```
IREC = 0
```

```
OPEN(1,FILE = ' ',STATUS = 'OLD')
```

```
OPEN(2,FILE = ' ', STATUS = 'UNKNOWN')
```

```
COUNT = 0
```

```
C READ IN DATA
```

```
DO I = 1, NDIM
```

```
    READ(1,10,END = 5) YEAR(I),MONTH(I),DAY(I),T(I),H2OLVL(I)
    COUNT = COUNT +1
```

```
    END DO
```

```
5 CONTINUE
```

```
REWIND 1
```

```
READ(1,11) (IT(I),I=1,COUNT)
```

```
10 FORMAT(A2,1X,A2,1X,A2,1X,A2,4X,F4.2)
```

```
11 FORMAT(9X,I2)
```

```
WRITE(*,*) 'DO YOU WISH TO INTERPOLATE? (Y/N) '
```

```
READ(*,12)INTRPF
```

```
12 FORMAT(A1)
```

```
IF(INTRPF .EQ. 'Y')THEN
```

```
    CALL INTERP(H2OLVL,IT,COUNT,IREC)
```

```
ENDIF
```

```
C WRITE DATA TO OUTPUT FILE
```

```
DO I = 1, COUNT
```

```
WRITE(2,20)YEAR(I),MONTH(I),DAY(I),T(I),CMIN,H2OLVL(I)
```

```
END DO
```

```
20   FORMAT(A2,A2,A2,',',',',A2,A2,',',',',1X,F5.2)
```

```
WRITE(*,25)IREC,'RECORDS REPLACED'
```

```
25   FORMAT(I4,2X,A16)
```

```
END
```

```
C *****
C SOURCE FILE: INTERP.FOR
C SUBROUTINE TO REPLACE BOGUS DATA FROM THE MACROLOGGER BY
C PERFORMING A LINEAR INTERPOLATION FROM ADJACENT POINTS
C 10/93 IDWR GEA
C *****
```

```
SUBROUTINE INTERP(Y,T,CNT,IREC)
```

```
PARAMETER(NDIM=1500)
```

```
REAL Y(NDIM),RL
```

```
INTEGER T(NDIM),NN
```

```
WRITE(*,*)'INPUT LOWER INTERPOLATION LIMIT'
```

```
READ(*,5)RL
```

```
5 FORMAT(F5.2)
```

```
DO 100 I=1,CNT
```

```
IM1 = I-1
```

```
II = I
```

```
IF(Y(I) .GT. RL) THEN
```

```
J=I
```

```
JP1 = J+1
```

```
YA = Y(IM1)
```

```
10 IF(Y(JP1) .GT. RL) THEN
```

```
J= J+1
```

```
JP1 = J+1
```

```
GO TO 10
```

```
ENDIF
```

```
NN = T(JP1)-T(IM1)
```

```
C CHECK FOR START OF NEW DAY
```

```
IF(NN .LT. 0 ) THEN
```

```
NN = NN+24
```

```
ENDIF
```

```
DIFF = Y(JP1)-YA
```

```
IF(NN .LE. 1E-5) THEN
```

```
WRITE(*,*)'POSSIBLE DIVISION BY ZERO'
```

```
GO TO 200
```

```
ENDIF
```

```
XD = DIFF/NN
```

```
DO 20 JJ=1,NN
```

```
Y(II) = YA+FLOAT(JJ)*XD
```

```
II = II+1
```

```
IREC = IREC+1
```

```
20 CONTINUE
```

ENDIF

100 CONTINUE

200 END

```

C *****
C SOURCE FILE: INTERP.FOR
C SUBROUTINE TO REPLACE BOGUS DATA FROM THE MACROLOGGER BY
C PERFORMING A LINEAR INTERPOLATION FROM ADJACENT POINTS
C 10/93 IDWR GEA
C *****

SUBROUTINE INTERP(Y,T,CNT,IREC)

PARAMETER(NDIM=1500)

REAL Y(NDIM),RL

INTEGER T(NDIM),NN

WRITE(*,*)'INPUT LOWER INTERPOLATION LIMIT'
5 READ(*,5)RL
  FORMAT(F5.2)

DO 100 I=1,CNT
  IM1 = I-1
  II = I
  IF(Y(I) .GT. RL)THEN
    J=I
    JP1 = J+1
    YA = Y(IM1)

10    IF(Y(JP1) .GT. RL)THEN
      J= J+1
      JP1 = J+1
      GO TO 10
    ENDIF

    NN = T(JP1)-T(IM1)
C    CHECK FOR START OF NEW DAY
    IF(NN .LT. 0 )THEN
      NN = NN+24
    ENDIF
    DIFF = Y(JP1)-YA

    IF(NN .LE.1E-5)THEN
      WRITE(*,*)'POSSIBLE DIVISION BY ZERO'
      GO TO 200
    ENDIF

    XD = DIFF/NN

    DO 20 JJ=1,NN
      Y(II) = YA+FLOAT(JJ)*XD
      II = II+1
      IREC = IREC+1
20    CONTINUE

    ENDIF

100 CONTINUE

200 END

```

```

C *****
C SOURCE FILE: UNIDATA.FOR
C FORTRAN FILE TO READ DATA FILE OUTPUT BY THE UNIDATA
C MACROLOGGER SOFTWARE
C AND WRITE DATE/TIME DATA IN A NUMERICAL FORMAT
C AUTHOR: GEORGE AUSTIGUY IDWR
C 10/93
C *****

```

```

PARAMETER (NDIM =1500)

```

```

CHARACTER YEAR(NDIM)*2
CHARACTER MONTH(NDIM)*2

```

```

CHARACTER DAY(NDIM)*2,T(NDIM)*2,CMIN*2,INTRPF*1
REAL H2OLVL(NDIM)
INTEGER IT(NDIM)
CMIN = '00'
IREC = 0
OPEN(1,FILE = ' ',STATUS = 'OLD')

```

```

OPEN(2,FILE = ' ', STATUS = 'UNKNOWN')

```

```

COUNT = 0

```

```

C READ IN DATA

```

```

DO I = 1, NDIM

```

```

    READ(1,10,END = 5) YEAR(I),MONTH(I),DAY(I),T(I),H2OLVL(I)
    COUNT = COUNT +1

```

```

5    END DO
    CONTINUE

```

```

REWIND 1
READ(1,11) (IT(I),I=1,COUNT)

```

```

10    FORMAT(A2,1X,A2,1X,A2,1X,A2,4X,F4.2)
11    FORMAT(9X,I2)

```

```

WRITE(*,*)'DO YOU WISH TO INTERPOLATE? (Y/N)'
READ(*,12)INTRPF

```

```

12    FORMAT(A1)

```

```

IF(INTRPF .EQ. 'Y')THEN
    CALL INTERP(H2OLVL,IT,COUNT,IREC)
ENDIF

```

```

C WRITE DATA TO OUTPUT FILE

```

```

DO I = 1, COUNT

```

```

    WRITE(2,20)YEAR(I),MONTH(I),DAY(I),T(I),CMIN,H2OLVL(I)

```

```

END DO

```

```

20    FORMAT(A2,A2,A2,',',A2,A2,',',1X,F5.2)

```

```

WRITE(*,25)IREC,'RECORDS REPLACED'

```

```

25    FORMAT(I4,2X,A16)

```

```

END

```