Document Number
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CUMENT CONTROL

Corp of Engineers 1978 Watana
Field Books, Annotated

DC NO 51

ACRES

Design Calculation Cover Sheet

PROJECT No. P5700

Task ~~FILE No.~~ P5700.05

SERIAL No. P5700.16.994

DUPLICATE SET

PROJECT TITLE SUSITNA HYDROELECTRIC PROJECT

ALASKA POWER AUTHORITY

DEPARTMENT GEOTECHNICAL

CALCULATIONS FOR: COE 1978 WATANA FIELD BOOKS ANNOTATED W/ PLOTTING NOTES

ORIGINAL BY Various - COE DATE / / 1978

CHECKED BY Various - ACRES DATE / / 1981

REV No.	BY	DATE	CHECKED	DATE
		/ /		/ /
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		/ /		/ /

THIS IS A DUPLICATE SET

FOR HARZA-EBASCO

INDEXES BOOKS 1-42
MISC PROJ NOTES
RIVER SURVEY
" GEOLOGY
L. ABUT "
R. " "
RESERVOIR / REGIONAL GEOLOGY

APPROVED BY

PROFESSIONAL ENGINEERS SEAL

ORIGINAL COPIES PLACED IN MAIN FILE ON CLOSURE OF PROJECT

BY Lance Duncan

DATE 2 / 25 / 83

TOTAL No. OF SHEETS ≈250 not counted
incl. cover, dividers

60.04.01 Form 146 A

DAMSITE LEFT

INDEX

① Field No. DDH-a

Permanent No. DH-1

Location: River on seismic Line

Reason: Depth to rock ; ℄ condition

Date started:

Date completed:

Elevation: (TOH)

Depth:

Angle from vertical:

Azimuth

Overburden depth:

Notes on OB:

Rock cored:

Recovery:

Notes on rock:

Survey Location:

COE DRILLING
SUMMARY
1978
WATANA

Rec'd Doc. Control
3/25/83

DAMSITE LEFT

INDEX

F. ③ Field No. DDH-6

P. Permanent No. DH-3

L Location: RIVER ON SEISMIC LINE

R Reason:

S. Date Started: 3 APR 1978

E Date Completed: 18 APR 1978

E Elevation: (TOH)

L Depth: 174.5'

Angle from vertical: 0°

A Azimuth —

O. Overburden depth: 77.6'

Notes:

C Rock Cored: 81.3'

Recovery: 83.3%

Notes: ROCK DRILLED 96.9'

S. Survey Location:

DAMSITE LEFT

TAILEY

F. (5). DDH-C

R DH-2

L RIVER ON SEISMIC LINE

K

S. 23 MARCH 1978

E 12 APR 1978

L

L 29.0'

0°

A

O. 29

C 0.0

0.0

Sc

DAMSITE LEFT

TAIDEX

F (7) DDH-e

A DH-4

L. RIVER ON CENTER LINE

X"

S." 17 APR 1978

E 23 APR 1978

L

L 122.9'

0°

A —

C. 77.7

C: 40.9'
90.5%
ROCK DRILLED 45.2

S

DAMSITE

TANDEX

(9) DUH-f

DH-5

RIVER ON CENTER LINE

19 APR 1975

3 MAY 1975

176.9'

0°

59.6

114.0'
@ 7%

INDEX

(11) DDH-T6

DH-7

RIGHT ABUTMENT [illegible]

6 MAY 1978

17 MAY 1978

122.3'

31°

210°

8.5°

108.3'

96% -

ROCK DRILLED 113.1'

DAMSITE LEFT

INDEX

(13) DDH-U

DH-8

RIGHT ABUTMENT ON CENTER LINE

31 MAY 1978

29 MAY 1978

150.0'

0°

16.2

122.1'

98.7%

5

(15) DDH-V

DH-10

RIGHT ABUTMENT ON CENTER LINE

8 MAY 1975

19 MAY 1978

203.5'

[illegible]

[illegible]

153.7'

83.6%

ROCK DRILLED 183.9'

DAMSITE LEFT

INDEX

MISC REPT NOTES

(17) DDH-Va

DH-11

RIGHT ABUTMENT ON CENTER LINE

22 MAY 1978

5 JUNE 1978

300.0'

45°
32°
22.7'

276.1'
99.6%

DAMSITE LEFT

INDEX

(19) DR-ee

DR-13

RELICT CHANNEL [illegible] SEISMIC LINE

17 APR [illegible]

[illegible] APR [illegible]

84'

0°

GREATER THAN 84'

DAMSITE LEFT

INDEX

(21) IR-666

DR-15

REJECT CHANNEL

27 APR 1978

16 MAY 1978

316.5'

0°

~286'

21.3'

100%

ROCK DRILLED 30.3

DITMSITE LEFT

INDEX

(23) DR-CC

DR-16

[illegible]

31 MAY 1978

4 JUNE [illegible]

91,5'

0°

—

67'

9.2'

100%

[illegible] 4.5

DAMSITE LEFT

INDEX

(25) DR-99

DR-17

STEEL WAY

6 JUNE [illegible]

[illegible] JUNE [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

21.2'

100%

[illegible] 26.7'

(27) DR-PP

DR-18

SPI/[illegible]

[illegible] JUNE [illegible]

21 JUNE [illegible]

248.3'

0°

231'

5.5

61%

ROCK DRILLED [illegible].3'

DAMSITE LEFT

INDEX

(29) DR-Z

DR-20

SPILLWAY ON SEISMIC LINE

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

12.5'

83%

ROCK SPILLED 12.6'

DAMSITE LEFT

INDEX

(31)

(33) DH-K

DH-12

LEFT ABUTMENT ON CENTER LINE

11 JUNE 1978

3 JUL 1978

301.1'

0

—

9.5'

BOULDERS IN SILT, SAND MATRIX.

285.1

97%

ROCK DRILLED: 291.6

INDEX

MISC PROJ NOTES

RIVER CROSSING

(35) DDH-[illegible]

[illegible]

LEFT ABUTMENT [illegible] CENTER LINE

7 JUL 1978

17 JUL 1978

119.2'

45°

205°

7.0°

SMALL BOULDERS IN SILT AND SAND

111.4'

99.4 %

ROCK DRILLED 119.2'

VERTICAL DISTANCE - 84.3'

HORIZONTAL DISTANCE: 84.3

DAMSITE LEFT

TAIDFY

(37) DDR-70

DR-[illegible]

LEFT BOTTOM [illegible] CENTER LINE

DAMSITE LEFT

INDEX

MISC PROJ NOTES

RIVER SECTION

RIVER SIGNATURE

(39) DDA E

[illegible]

[illegible] ALONG CENTER LINE

[illegible]

[illegible]

149.5

[illegible]

[illegible]

[illegible] FRAGMENTS

146.0'

100%

DAMSITE LEFT

INDEX

(41) [illegible]

[illegible]

[illegible] ALIGNMENT ALONG CENTER LINE

30 MAY 1978

29 JUN 78

283.8'

45°

043°

5.6'

DIORITE AND QUARTZ DIORITE BOULDERS IN SAND MATRIX

276.7

99.5 %

ROCK DRILLED: 278.2

DAMSITE LEVEL

TAILFX

43

CHANNEL

DIAMSITE LEGT

INDEX

(40)

[illegible]

[illegible]

[illegible]

(47) [illegible]

[illegible]

[illegible]

Book 11 Pat General Geology Notes
5MAY-17 Right bank tape & Brunton
41 pgs Points 1 -177 odds
geology traverse points
CLOSED Samples 34,35-45 odds

BOOK 13 TAPE & BRUNTON
Alan [illegible] LEFT ABUTMENT
PTS 251, 403-799 odds, ØØØ
1JUN-4JUN Samples 1-A
no geology points
47 pgs
CLOSED

BOOK 12 Pat Left Abutment
Glen Geology Traverses
45 pgs
20May-3JUNE Pt 215, 216-262 evens,
400-558 evens
CLOSED 600-714 evens
note on Watana Creek basalt

BOOK 14 Pat Geology Traverses -
Both Banks
20MAY78
19 pgs Pts 201-251 odds
CLOSED 281-345 all EXCEPT 288
347-377 odds

Fog Creek notes

NO	TITLE	TABLE OF CONTENTS	NO.
	(NEW DETAILED) INDEX PAGE	A SUMMARY OF ALL 'START & END' POINTS ALONG DIFFERENT GEOLOGIC TRAVERSES.	
	(DETAILED) † BOOK #1	RIVER GEOLOGY AND CONTROL SURVEY NOTES. (INST. SURVEYS)	
	† BOOK #2	RIVER GEOLOGY MAPPING AND CONTROL SURVEY NOTES. (INST. SURVEYS)	
	† BOOK #3	RIVER GEOLOGY MAPPING AND CONTROL SURVEY NOTES (INST SURVEYS)	
	† BOOK #4	RIVER GEOLOGY MAPPING AND SURVEY LOCATIONS. (INST. SURVEYS)	
	† BOOK #5	RIVER GEOLOGY AND CONTROL SURVEY NOTES. ALSO INCLUDED ARE RELICT CHANNEL AND SPILLWAY SURVEY LOCATIONS. (INST SURVEYS)	
	† BOOK #6	RIVER GEOLOGY, INCLUDES EXPLORATION BASELINE, SOUTH ABUTMENTS, DAMAXIS AND BOREHOLE SURVEYS. (INST SURVEYS)	
	† BOOK #7	FIELD GEOLOGY MAPPING AND CONTROL SURVEY NOTES (INST SURVEYS)	
	† BOOK #8	RIVER GEOLOGY AND CONTROL SURVEY NOTES — NABT DAMAXIS AND BOREHOLE SURVEYS. (INST. SURVEYS)	
	BOOK #9.	GEOLOGY TRAVERSE — NORTH ABUTMENT (TAPE AND BRUNTON)	
	BOOK #10	RIVER GEOLOGY NOTES (TAPE AND BRUNTON)	
	BOOK #11	GEOLOGY TRAVERSE AND GENERAL GEOLOGY NOTES — RIGHT BANK. (TAPE AND BRUNTON)	
	BOOK #12	GEOLOGY TRAVERSE — LEFT ABUTMENT (TAPE AND BRUNTON)	
	BOOK #13	GEOLOGY TRAVERSE — LEFT ABUTMENT. (TAPE AND BRUNTON)	
	BOOK #14	GEOLOGY TRAVERSE — BOTH BANKS.	

NO	TITLE	TABLE OF CONTENTS	NOTES
16.	BOOK #15	WATANA GENERAL GEOLOGY (TAPE AND BRUNTON).	
17.	BOOK #16	GEOLOGY TRAVERSE AND GEOLOGY TRAVERSE NOTES. SOUTH ABUTMENT U/S OF ℄. (TAPE AND BRUNTON)	
18.	BOOK #17.	GEOLOGY TRAVERSE AND GEOLOGY TRAVERSE NOTES SOUTH ABUTMENT U/S AND SOUTH OF ℄.	
19	BOOK #18	GEOLOGY TRAVERSE AND GEOLOGY TRAVERSE NOTES – TSUSENA TO DEADMAN, RIGHT BANK.	
20	BOOK #19.	GEOLOGY TRAVERSE – SOUTH ABUTMENT D/S OF ℄ AND GEOLOGY TRAVERSE NOTES	
21.	BOOK #21	GEOLOGY TRAVERSE AND GEOLOGY TRAVERSE NOTES – SOUTH ABUTMENT U/S OF ℄.	
22.	BOOK #23	GEOLOGY TRAVERSE AND GEOLOGY TRAVERSE NOTES – SOUTH ABUTMENT AND TSUSENA CREEK. (TAPE AND BRUNTON)	
23.	BOOK #25	GEOLOGY TRAVERSE – TSUSENA AND DEADMAN CREEKS (TAPE AND BRUNTON MAPPING)	
24.	BOOK #26	WATANA RESERVOIR MAPPING.	
25.	BOOK #27	MISC. PICTURE TIMEL AND DRILL HOLE LOCATION SURVEYS.	
26.	BOOK #28	MISC: ABUTMENT, DEADMAN AND WATANA CREEK MAPPING	
[illegible]	[illegible]	TRAVERSE [illegible]	

START AND END

TYPE OF GEOLOGY TRAVERSE POINTS — WATANA SITE

SEQUENCE

1-8 INSTRUMENT SURVEYS

9 a. 31 to 32 to 280 (EVEN)

10. NOTHING G50-G81 (Geology Notes)

11. a. "V" to 1 to 31 (ALL)

b. 31 to 139 (ODD)

c. N-F to 141 to 177 (ODD)

12. a. 215 to 216 to 262 (EVEN)

b. 262 = 400 to 558 = "d"

c. 452 = 600 to 714 (EVEN)

13. a. "R" = 251 to 403 to 471 (ODD)

b. "000" to 473 to 799 (ODD)

a. "M" to 201 to 251 (ODD)

b. "V" to 281 to 345 (ALL)

c. "K" to 347 to 377 (ODD)

15. NOTHING

16. a. "K" to 346 to 366 (EVEN)

b. "J" to 368 to 452 (EVEN)

17. a. "R" = 251 to 2000 to 2030 (ALL)

b. 404 to 2032 to 2081 (ALL)

18. a. 799 to 861 (ODD)

b. BMWA-5 to 863 to 1023 (ODD)

c. "HP" to 1025 to 1085 (ODD)

d. NAIL to 1087 to 1257 (ODD)

a. 577 to 1258 to 1332 (ALL)

20. NOTHING

21. a. 2047 to 2082 to 2129 (ALL)

22. NOTHING

Master Index Watana Book 1-42 (1)

	WATANA INDEX	
BK #1	Spot fuel + misc dumps	8-27 MAR 78 ✓
39 pgs.	w/ Air Force, Tie in ℄	
closed	holes a, b, c, d & e; u/s cofferdam,	
Galbraith	clay core & D/S cofferdam hole	
	to seismic line. River geology	
	notes from ≈ 5600' u/s to 400'	
	D/S. of D/S cofferdam	
	~~mag decl set to 29°E~~	
	~~Samples 1-5, G1-G28~~	✓
BK #2	River Geology Mapping	25-27 MAR 78 ✓
DORCAN	Survey Location Notes	
34 pgs		
& insert	Survey up river from seismic line,	
from bk 1	on ice.	
& pgs 36-41	- TP 1, Pts. 1-6	✓
change of elev.	G1-28 used	✓
for grid level	G-11 B.M.	✓
elevations	TP-1 on Seismic line is BM	✓
(office calc)	~~Samples 7-10~~	
closed	Established N. Monument on seismic	
	line as +100000.00 N, +100000.00	

BK3
23 pgs
Pat
closed

River Geology ~~Locations~~ & Geology 5 Apr 78 - 7 Apr 78
resurvey on some holes U/S of Seismic line, geology D/S of seismic line
mag decl set to 26° E.

G-29 unused, G10-24 rebeds, G-30-48
Samples G-10

BK4
DUNCAN
29 pgs
closed

River Geology Mapping Survey Locations 5 Apr-7 Apr 78
Survey on book 3
reset Pt 1 as Pt 1'.

used G-30 thru G-48.
no BM's
TP-1' on seismic line is B.M.
through Pt 13

BK5
PAT.

RELICT CHANNEL & SPILLWAY SURVEY LOCATIONS
11 Apr 1978 -
pg 1-5 11 Apr misc notes
6-7 location of holes e', f', g'
8-9 misc notes
10-19 4-5 May Relict channel locations
20-46 blank
47 hole "U", "l" location instructions
abutment Points NF, NH, NI
Points P-aa thru P-al
closed

BK6
(Pat)
19 pgs
closed

River Geology Survey Notes
18 Apr 1978 - 22 Apr 1978
Includes Exploration base line South abutment
used Survey Points 14-22
G 50-G73
abutment points S-a thru S-d

BK 7 (Rigo) Field Geology Mapping

CANCELLED

BK8 DAM REFERENCE AXIS
17 April 78 - 21 Apr 1978
Don Fredericksen
48 pgs. North abutment base line
includes shot to south
closed. abutment for line continuation

used Abutment points N-A
thru N-G

BM-1

BK9 N. Abutment.
~~Don~~ Pat Glen used points 31-280
35 pgs all even #'s
17-19 MAY 78
CLOSED

BK 10 Pat
(Pat) 18 Apr 1978 - 22 Apr 1978
29 pgs River geology notes
G-50 thru G-81
closed.
18-22 Apr 78 SAMPLES 12-33

BOOK 15 Watana General Geology
Pat 1 Mass Field notes on
13JUN-6AUG 78 drill hole

BOOK 16 DUNCAN S. Abutment upstream
23pgs of centerline.
26-27MAY Geology Traverse Notes
CLOSED

Pts 346-452 evens
Samples 46, 48, 50, 52, 54,

BOOK 17 DUNCAN S. ABUTMENT U.S.A.
28pgs SOUTH OF C/L
28 MAY - 15 JUN 1978 GEOLOGY TRAVERSE NOTES
CLOSED Pts 251, 2000-2081
SAMPLE: 2040, 2057A-E

BOOK 18 MACLEOD TSUSENA TO DEADMAN
40 pgs RIGHT BANK
7-12 JUNE GEOLOGY TRAVERSE NOTES
CLOSED

Pts 799, 801-1187 ODD, 1191-1257 ODD
918
SAMPLE 949

BOOK 19 Glen
Alan
10 pgs
17 JUNE 78
CLOSED

S. ABUTMENT D.S OF C/L
GEOLOGY TRAVERSE NOTES
Pts 577, 1258-1332

BOOK 21
11 pgs DUNCAN
16 JUNE 1976
CLOSED

S. ABUTMENT U.S.
OF C/L
GEOLOGY TRAVERSE NOTES
Pts. 2047, 2082-2129

BOOK 20 Glen Auger Hole Logs
Wayne, Dave Jensen AH1-AH15

BOOK 22 RESISTIVITY TRIAL
DUNCAN
11/13 JULY 78
12 pgs
Closed

BOOK 23
MACLEOD
20-21 JUNE 78.
12 pgs
CLOSED

S. ABUTMENT AND
TSUSENA CREEK
GEOLOGY TRAVERSE NOTES
PES 1300-1317, 1400-1452
(REPEAT)

BOOK 25 Tape & Brunton Mapping
MacLeod Tsusena & Deadman Creeks
38 pgs
3, 6, & 19 JULY 78 PES 1452 - 1485
Closed 1500-1552
1600-1709, 404, 1710-1761

BOOK 24
WAYNE FRYE

WATER TABLE RECORDS

BOOK 26 WATANA RESEVOIR MAPPING
MACLEOD - SAMPLES R-1 THRU R-26
7 JULY - 19 JULY W-1 THRU W-7
23 pg

BOOK 27 MISC PICTURE PANEL & DRILL HOLE LOCATION SURVEYS
DUNCAN
13 JULY-
6 pgs
Closed

BOOK 28 Misc Abutment, Roadman, & WATANA CREEK MAPPING
Smith
15 JULY 78
8 pgs
Closed
Pts 4000-4016, 4018-4049

BOOK 29 RESISTIVITY ON SEISMIC LINE FROM HOLE "CC" TO Z PIC POINT
SMITH & CAMPBELL
21 JULY 78
2 pgs
Closed

BOOK 30 WATANA CREEK STRATIGRAPHY, MISC SOUTH ABUTMENT MAPPING
SMITH
14 pgs
Samples W-8 thru W-14
Closed
Pts 1712, 1720, 1724, 2130-2151

BOOK 31 Misc. Watana Aerial
DUNCAN Geology & Survey Photos
16 Aug - 19 Aug
CLOSED

BOOK 32 Rig #1 Driller's log book
8 Apr - DDH - b
- f
closed

BOOK 33 Drill log book
28 Mar - 12 Apr. holes ?
closed DDH - B, A

BOOK 34 Drill log book
28 Mar - 10 May DDH - a, b, f, V
closed

BOOK 35 Core drilling log book
23 May - 29 Aug
closed

DDH - Va
- K
- Ka
- 24
- 25
- 28 (ll)

BOOK 36 Drill log book
5 July - 18 August

DR-22 (cc)
- 26 (dd)
- 27 (ee')

closed

BOOK 37 Pat - general field notes
Tat - & hole status notes
6 AUG - 23 Aug
setting picture points

9 Aug + Reservoir mapping R 27-R44

closed

BOOK 38 Watana Test Pits
Sherman AH 16 - AH-24
13 July - 30 July TP 1-6

closed

BOOK 39 Watana DR-27
17-25 Aug (eei) log Book

closed

BOOK 40 Watana Holes - logs
18 Apr-3 July
ee DR-13
ll DR-14
bbb -15
z -20
rr -16
qq -17
pp -18
mm -19

closed

BOOK 41 Shannon & Wilson
9-30 Sept 78 seismic contract notes

Pat

closed

BOOK 42 Test Pits
DAVE TP 8 - TP 26
JENSEN AUG 76

closed

"Rites in the Rain"
WEATHERPROOF

LEVEL

NOTEBOOK NO. 311 COE 15

DARLING CORPORATION
WASHINGTON 98421 U.S.A.

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1.

In the figure below, opposite 7 under "Cut or Fill" and under 18 read 11.5, the distance out from the side stake at left. Also, opposite 11, under "Cut or Fill" and under 1, read 16.7, the distance out from the side stake at right.

Cut or Fill	0	1	2	3	4	5	6	7	8	9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

1' log of cc, LL & U.
bb.
RR, QQ, Z (Wayne)

record sticks & stick cap
backsum on
Shift report —
some measurement off.

summary sheet of meas —
check alternate

13 Jun 1978
Photos 12-~~6~~ 9 → 12-~~19~~ 18
Pan Deadman Ck → Tsusenia Ck.
from Lonely Tree.

Allan & Wayne C. to augering
1200 hrs ±
Start East from Seismic / Spillway
intersection & see what happens.

---

where are the core boxes -
were supposed to be
sent up.

---

send up W cans -
std split spoon
work table - (pipe table)
18" pipe wrenches.
Keel -
Clear acrylic for tags -
wash bucket - use pot hole w/ bucket.
Large SPL bags
Small spl bags.
large tags - Wayne F.

for auger Holes

fence posts for AHs. [use wood stakes]
short rope for drive rod. -
shovel - fredwell pick up.
~~racks for drive rod.~~
Standard soils log sheet.

pp. 158' - Clayey silt
20-110'

15 Jun 1978
Weather day

16 Jun 1978
Cloudy - leave ≈ 0800
John R + Wayne C on late flight.

N05W30W cross from Tsusena

Az 250 striations (big)
Top of 1st knob across from Tsusena
creek - in meta sed.

Roll 13
Photos 1-8 look u/s from
bucket → Dam. - tourist
13-9 wild flowers - ≈ 1/2" across
13-10 Conglomerate ≈ 1/2 mi
O/S of Watana Creek
weath surf
13-11 fresh
13-12 → 13-16 Pan O/S Bikeft
bank from Jon at Trailer

[illegible] nud
2 (ea) 2 way on w/ no off
toggle switches

	time					est.	
	11	12	13	14	15	16	17
	Sun	M	T	W	Th	F	S
Allan M	12	8-4	8-4	8	8-4	8-4	12
Wayne F	12	8-4 ~~12~~	8-4	8	8-4		
Cathy	12	8-4 ~~12~~	8-4	8	8-4		
Wayne C FM-04	12	~~12~~ 8-4	8-4	8-~~1~~4	8-~~4~~5	8-4	
Barbara FM-04		~~9~~ 8-1	8-4	8	8-5		
Pat. FM-04		8	8-~~2~~	8	8-3	8	12
John R. FM-06	12	~~12~~ 8-4	8-4	8-2	8-4	8-2	

Wayne C +20 +19 +17 +15 +13 +12
John R +10 +9 +7 +5 +7

Creek up of Deadman -
Checks - small creek.

Three pt w/ altimeter on
andesite beds at Tsusena
Creek - across river.

17
~~16~~ June 1978

hole T_b to town.
run DDH-v (DH-10) on site
John R. lo. tall 0800

DH-10
Diorite, ~~hard~~ moderately
hard, moderately weathered, highly
weathered in shear zones, med to highly fractured light
gray, healed breccia and
x enoliths inclusions common,
iron staining on joints common.

Photo 13-17 R14 + R15
DH-10 (v) gorge

Completed DH-10 (v)
+ 11 Boxes of 22 of DH-11 (va)

Allan + Wayne out 0600 in 1900

19
~~18~~ Jun 1978
Bring air packers back.

GS-1350-5/7/9

Portland Dist.
close 23 June 1978
Vac No. 78-212

GS-810-11 S+1 omaha.
Al Starkel 402-221-4094

DDH-C - beautiful qtz
diorite all the way

23 June 1978

Time

S	M	T	W	Th	F	S		
18	19	20	21	22	23	24	~~Allan~~	
8	8	8-4	~~8-4~~	8-4	8-4	~~8-4~~ 12	Allan	FM04 thru Thurs RB Fri & Sat
8	[illegible]		"	8	8-4	~~8-4~~ 12	Cathy	Left bank exp
8	8		"	8	8-4	~~8-4~~ 12	Wayne F	~~Ch~~ Spillway exp. ✓
8-2	8-2		8-5	8-2	8-~~8~~6	4	Wayne C	FM0.4
8-1	8-1		8-5	8-1	3	~~8~~ 0	John R	R.B exp
8	8	↓	8-4	8-4	8-4	12	Pat.	FM04.

Wayne C ~~+12~~ ~~+8~~ ~~+7~~ ~~+5~~ ~~+4~~

John R ~~+2~~ ~~+4~~ ~~+3~~ ~~+2~~ ~~+1~~

Thurs (22 June)
weather - Allan & d
worked on summary logs.

23 Jan 1978
final logs etc here —

Book 24 to Wayne F -
water table records

List of titles vs Nos.
start & comp. data.

overburden - avg
HW - avg
MW - avg w/ types
LW - avg

General of glory hole deposits

1-11 rehash

Box 1 of 22 breccia 22.7 - 28.0
20.6 - 35.9 breccia 30.0' - 31.5
" 31.9 - 35.9
~~Start~~

Box 11 of 22 breccia 172.5 - 174.2
166.7 - 181.5 176.8 - 181.5

Box 10 of 22 Inclusion 152.0 - 152.2
152.0 - 166.7 161.8 slicks & gray gouge
whole box is healed
breccia - indistinct
in spots - emplacement
breccia

Box 9 of 22
137° to 152.0 inclusion 149.4 - 152.0
whole box is healed
breccia - sometimes
distinct - sometimes
not

over

Box 8 of 22 whole box is healed recrystallized breccia

Box 22 of 22 297.0-299.7 retreated breccia

Box 21 of 22 285.7-297.0 295.1-297.0 healed breccia
rest is qtz diir w/ some healed fracs
minor qtz stringer

Box 20 of 22 274.1-285.7 no breccia
occas. healed fracs

Box 19 of 22 262.6-274.1' healed fracs common -
272.1-273.1 ? brecciated frac healed w/ dark diorite
photo 15-13.

Box 18 of 22
~~203~~ 250.6-262.6 mafic inclusion 255.6-255.9
healed fracs common

Box 17 of 22 239.8-250.6 healed fracs
mafic inclusion 248.9-250.0

Box 16 of 22 227.4 to 239.0 healed fracs common.

Box 15 of 22 216.0-227.4 healed fracs common

Box 14 of 22 204.5 to 216.0 healed fracs common
≈ ½ w/ qtz

Box 20 of 22 181.5-193.5 breccia 181.5-192.9
Shear 191.5-192.9
lost 0.5 core
recovered 0.5'
clay gouge
yellow-brown

Box 13 of 22
193.5-204.5 healed fracs.
part of shear zone
high frac → shattered
194.0 - 197.0
200.3 - 201.5
iron stain.
slicks @ 204
most 45° to core.

DH-8
Box 9 of 10 no breccia
130.3 - 142.0

Box 10 of 10 no breccia
146.0 - 150.0

Box 4 of 10 no breccia
52.5 - 68.0

Box 5 of 10 no breccia
68.0 - 84.2

DH-8 cont.

19.9
3.4
19.3

Box 7 of 10
99.6 - 115.2 no breccia

Box 6 of 10
84.2 - 99.6 no breccia

Box 8 of 10 no breccia
115.2 - 130.3

Box 1 of 10 breccia
0.0' - 22.5' 19.3 - 22.5
19.3 - 20.1 is?

Box 2 of 10
22.5 - 38.0 breccia 22.5 - 30.4
questionable below 27'

Box 3 of 10
38.0 - 52.5 no breccia

Get last # Allan & Wayne
used on Tsusena Ck. 1452

Carrie Annes
3719 Arctic Blvd
274-1604

Time

	June 25	M 26	T 27	W 28	Th 29	F 30	Sat. Jul 1
Allan	8	8	8	8-4 RB exp	8-4	8	12 04
Cathy	8	8	8	8-4 LB exp	8-4	8	12 LB
Wayne	8	8	8	8-4 Spilling	8-4	8	12 Spill
John R	—	8	8	8-4 RB exp	8-4	8	12 04
Pat	8	8	8	8-4 FM 04	8	8	12 OK
	weath	weath	W			weath	

Time

	July 2	3	4	5	6	7	8
Allan	04 8-4	04 8-4	8	04 8-4	04 8-4	Reserv 8-4	12 Res
Cathy	LB 8-4	LB 8-4	8	LB 8-4	LB 8-4	LB 8-4	12 LB
Wayne F	Spilling 8-4	Channel 8-4	8	Channel 8-4	Chan 8-4	Chan 8-4	12 Chan
John R	04 8-4	04 8-4	8	04 8-4	04 8-4	River 8-4	~~SX~~
Pat	04 8-4	~~Rivers~~ Flat 8-4	8	River 8-4	River 8-4	(8) SX	12 River
			weath	04 3 River 5-4			

phoned to Anch 7

Call

1 Jul 79
Book 25 to Allan for mapping.
Lift off on time - heavy ground fog - late leaving Hilton
Cathy on Rig 1
Rig 2 breaking down for engine change.
Kieth & Wayne on Rig 3
Wayne took H_2O spl for Clare & plunking holes.
Rig 2 will not get to "d" hole today.
Completed pressure tests on OH-9(U4) and started going over core.
Subtle breccia in spots - took samples.

2 Jul
Completed review of OH-9(U4) if this is the worst - no sweat.

Need log sheets, ditto paper, shift reports.
OH-21 (OOH-d)
type, write in rain book.
ball point pen.

7.5
drill
3+1+1+1+1
+1
push casing
1
1

2
cement
weather
1111

15½ shifts drilling
2 " push casing
2 " cementing
4 " weather

23½

- 30 days -

30M - 29 Jun.
1½ plus pressurized.

25

3 Jul 19[illegible]

Bill held safety meeting. Flew over "CC" to check location — went to river. Glen had set N30W bearing for drill — I'm not too sure about the direction but OK. — He's the boss.

Hi temp 81
66 @ 1600

K(DH-12) bottomed @ 301. Set 3/4 for temp. records. Frost at DH-21 @ bottom of tundra. Chuck thicks he's in frost @ 9' too. Rig 3 moved to DR-22 (CC). Rig 1 to set for 4 hole tomorrow — Cut short. Wind shifting to S & SW.

Chucks Home

3305 E 17th
Check w/ 3307 — They are watching house.

5 Jul 1978
Hole Nos. assigned to date:

letter	No	letter	No.
a	DH-1	e^2	DR-13
b	DH-3	l^2	DR-14
c	DH-2	m^2	DR-19
d	DH-21	p^2	DR-18
e	DH-4	q^2	D-R-17
f	DH-5	r^2	DR-16
Kvert	DH-12	b^3	DR-15
tvert	DH-6		
tA	DH-7		
uvert	DH-8		
uA	DH-9		
Vvert	DH-10		
VA	DH-11		
Z	DR-20		

5 Jul '78 con't.

three samples from OR-19 (mm) in w/ Bill Burgess for tranship to Earl Chandler.
Rig 1 setting K4 (OH-23)
no NX boxes here. Left note yesterday
Rig 2 pushing 4" casing - problems w/ diesel.
look for old write up & outline.

6 Jul 1978
Low temp PM 3 Jul - AM 6 Jul 42°
Hi temp. PM " " 80°
80° must have been 3 Jul PM.

Del in - asked him to find out who is bitching about John's Comp time.

Chuck need a 36" pipe wrench

Hi 6 Jul 78°F
@ 1630 hr 58°F

7 Jul 78
Book 26 to Glen
Reservoir use R-1 etc.

people coming
USGS 1. Henry Moore } 24 Jul for 2 wks.
Rube K }
2. Bob Schuster 24 + 25 Jul

(Med Rescr) 31 Jul 1 + 2 Aug.
2 or 3 days for 8 people
from COE OCF + NPD

32.45
4.85
27.60

8 Jul '78
Hi today 83 in the sun
low last nite 38°
temp @ 1500 42°

NX to 33.4 - (7.1 - 5.9) = 32.2
4" CSG to 32.45 - (7.1 - 2.25)
32.45 - 4.85 = 27.6
drill 4" 4.1

		M	T	W					
		10	11	12					
Allan	10 Nov (4-4) 16	04 8-4	04 8-4	8					
Cathy	LB 12	LB 8-4	LB 8-4	8					
Wayne F	Spill 12	Chan 8-4	Chan 8-4	8					
John R	—	04 8-4	River 8-4	8					
Pat	04 16+	4-2 04 4-2 river	04 8-2	8					
			weak	weak		weak			

53.0
= 12.7
40.3

DH-21

R1 D

10 Jul 1978
DH- hole d

Run	From	To	D	C	L
1	42.8	43.2	0.4	0.4	0.0
2	43.2	45.2	2.0'	1.2'	0.8'
			Gravel (frozen)		

NX Casing to 39.8-(7.1-5.5) = 38.2
4" CSG to 34.5-(7.1-6.0) = 33.4
NCQ to 53.0-(7.1+5.6) = 40.3
@ 0940hrs

Teams for tomorrow:
Wayne F & Clare - Temp measurem.
Lance & Barbara - Fill Holes.
John R - Rig 2
Cathy - Rig 1
Allan & Wayne C - Finish Deadman.
Rig 3 not running
Rig 3½ " "

58.3
13.1
45.2

13 Jul 1978
last flt 0800
Jemo & Allan located DH-21
& do reservoir.
Barbara & Wayne C — resistivity
Fred A & Terry — rig 3½, located
TPs.
Wayne F — finish temp measurements &
Rig 3
Cathy Rig 1
John R Rig 2
M & write, & finish Rig 3 review.
Dwayne C & Wylie in to look
at cat train route & TP
locations.

	M	T	W	Th	F	S
	10	11	12	13	14	15
Barbara	8	8-4	8	8-4	8	8-4 04
Wayne C	8	8-4	8	8-4	8	8-4 04
Lenore	8	8-4	8	8-4	8	12 04
		04	Cath			

Weekend Schedule.

1st shift
Rig 2
Maint
Rig 3½

Geol.

2nd shift
Rig 1
Rig 3

15W going into town
for jet fuel — don't go
back empty.

need water run —

A Jul.
22, 28 & 29 Lance
start Roll #17
Call time.

for Vern.
Dick G 18 Jul - 3 Aug.
Rub K
John Moore } USGS 24 Jul - 6/7 Aug.

Glen G 24-28 Jul
31 Jul - 3 Aug.

Hod Moore
Jack Richards
Ed Prickett
Lloyd Underwood
Ernie Dodson
Ellis Krinitsky } 31 Jul - 3 Aug.

15 Jul 1978
Scuddy weather.
Rigs 1 & 2 going
Rig 3 push casing
Barbara & BH on Leftbank mapping
Lance & Allan Reservoir mapping
Rig 3½ Fred & Terry looking for materials.

d @ 73' still in gravel - pull 4" tomorrow & change bits.

KA 101.7' - badly frac & altered - Last run a bit better but none to great.

16 Jul 1978
Weather
did absolutely nothing - enjoyed every minute.

17 Jul.

Arr site 1100 - fog -
1st trip out 0700.

Time 16 - 22 Jul.

	16	17	18	19	20	21	22
Allan	8	8-4 04	8-4 04	8	8/~~4~~	8-4	~~12~~ 8
Cathy	8	8-4 LB	8-4 LB	8	8~~4~~	8-4	~~12~~ 8
John R	8	8-4 LB	8-4 LB	8	CT	CT	—
Wayne F.	12	8-4 channel	8-4 Stow	8 OK	8~~4~~	8-4	~~12~~ 8
Pat	12	8-2 04	8-3 04	8	8~~4~~	8-4	~~12~~ 8
Lance	8	8-4 04	8-4 04	8	8~~4~~	8-4	~~12~~ 8
Barbara	8	8-4 04	8-4 04	8	SL	8-4	~~12~~ 8
Wayne C.	8	8-4 04	8-4 04	8	8~~4~~	8-4	~~12~~ 8
	weath.			water	weath.		weath.

note
Wayne F.
Pat could
4 OT for 4
Jul.

Called K & at 119.2
left 0.4 in hole. TD 119.6
light frac. below 107.6

18 Jul 1978
Signed John R's Comp leave
thru next monday. ✓

Dana, Allan, Barbara & Wayne C
filling holes for map.

John R on Rig 2 - no rock yet
much casing. NCB to 73'

Wayne F on Rig 3

Cathy doing summary log.

Phil Brna taking in III A write up
EE final log for veritype - leave
slip, etc.

Earl C & Dick G in tonite.
Lance will escort tomorrow
Wayne F off tomorrow.

Wayne C & Barbara to try resistivity
from Z to CC for top & thickness
of clay.
Survey holes starting 20-21 Jul Stone

18 Jul
Called Hod in AM to see if bore hole camera can take 45° hole - he doesn't know.

Tobacco
1 14oz Sir W. Raleigh
1 7oz Capt. Black (white can)

19th Weather delivered spls to town

20th Weather - worked over comments on Whittier job & phoned to Glen.

21th Short day - full pay. finished review of DH-23 + redid Summary log. Cathy painted core boxes. Wayne F on Rig 3. Allan on Rig 1. Lance escorted Dick & Earl. Fred, Terry etc sampling. Wayne & Bobs run resis from Z → CC.

Time 23-29 Jul 78

	Sun 23	M 24	T 25	W 26	Th 27	F 28	Sat 29 ~~30~~
Allan	LB 12	LB 8-4	LB 8-4	8-4	8-4	8-4	12
Cathy	LB 12	8 W	LB 8-4	8-4	8-4	8-4	12
Wayne F	Chan 12	8 W	Chan 8-4	8-4	8-4	8-4	12
Pat	04 12	04 8-4	04 8-4	4/4CT	4/4CT	8	—
John R.	—	CT	CT	CT	8-4	8-4	12

23 Jul -
went popping w/ Fred & Dick G
Rig 1 pushing thru ice to open lc vert
Rig 2 @ 83' no rock.
Rig 3 @ 240' in till.

lay out 2 deep abutment holes & hole f (deep river)

24 Jul 74
got out but Rig 3 + Cathy didn't - weather. Bad fog, etc in A.M. went popping in P.M. see Map + samples. Fred on South side ridge - possible quarry near abutment. Mt. Watana "greenstone". slugged DH-23 full depth - may have melted some ice & got take of 0.01 (est) gal/5 min.

turbine oil

6.43
15.00
2.95
24.38 → 24.~~4~~038

25 Jul '78
26 Sep

~~Check w/ Cathy OT request.~~

~~Copy of flight linearmt map~~ ✓

~~Pay out holes~~ -

~~Check holes~~ -

~~push in watches~~

~~check on PO~~

~~checks to bank~~

~~Call Betty McAntyre USGS Anch - Schuster where are you.~~

~~Robin's phone in Travel Lodge note of 17th?~~
Rm 112?

wed 26 Jul lv Talk 0830
Gr Anch 1100 4 hr comptaken
Th 27 Jul 4h 04 4 CT
Fr 28 Jul 8 04
Sat lv Anch 1600
Gr Talk 1830

0600 206 rig 2 3
205 USGS 2
Maint

	30	31	1	2	3	4	5
Allan	LB 12	04 8-4	off	off	04 8-4	(8-4)	(12)
Wayne F	channel 12	chan 8-4	chan 8-4	chan 8-4	chan 8-4	(8-4)	(12)
Cathy	LB 12	LB 8-4	LB 8-4	LB 8-4	04 off	(8)	(12)
John R.	04 12	LB 8-4	LB 8-4	LB 8-4	LB 8-4	CT	—
Pat.	04 12	04 8-4	04 8-4	04 8-4	04 8-3	(8)	(12)

Start roll #18 - 36 prints

N @ 1330 105' 1.3 ⇒ <0.1

d @ 1330 204' Good all the way.

John slept in - sent him to Anch & pick up stuff & left (stupid) -
Allan on rig 2
Cathy on rig 1
Rig 2 made 50' today - best to date

31. Rig 1 - deeper
Rig 2 - going good w/ vg rock.

Spl #2 phyllitic bedded
NW 60 SW

1 August.
N pressure test.

30-60-100 - zero -

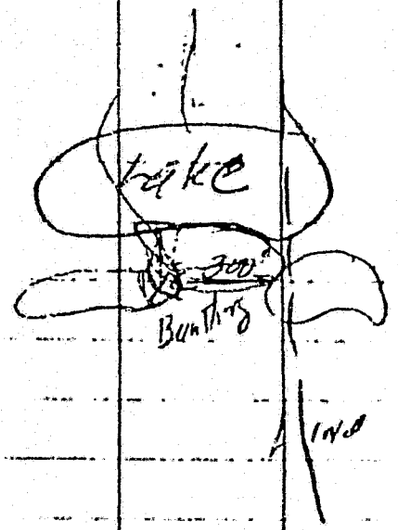
"CC" @ 1300 476' (459 mb)
DH-21 284.2 OK

Wayne - how much mud loss & where on CC,

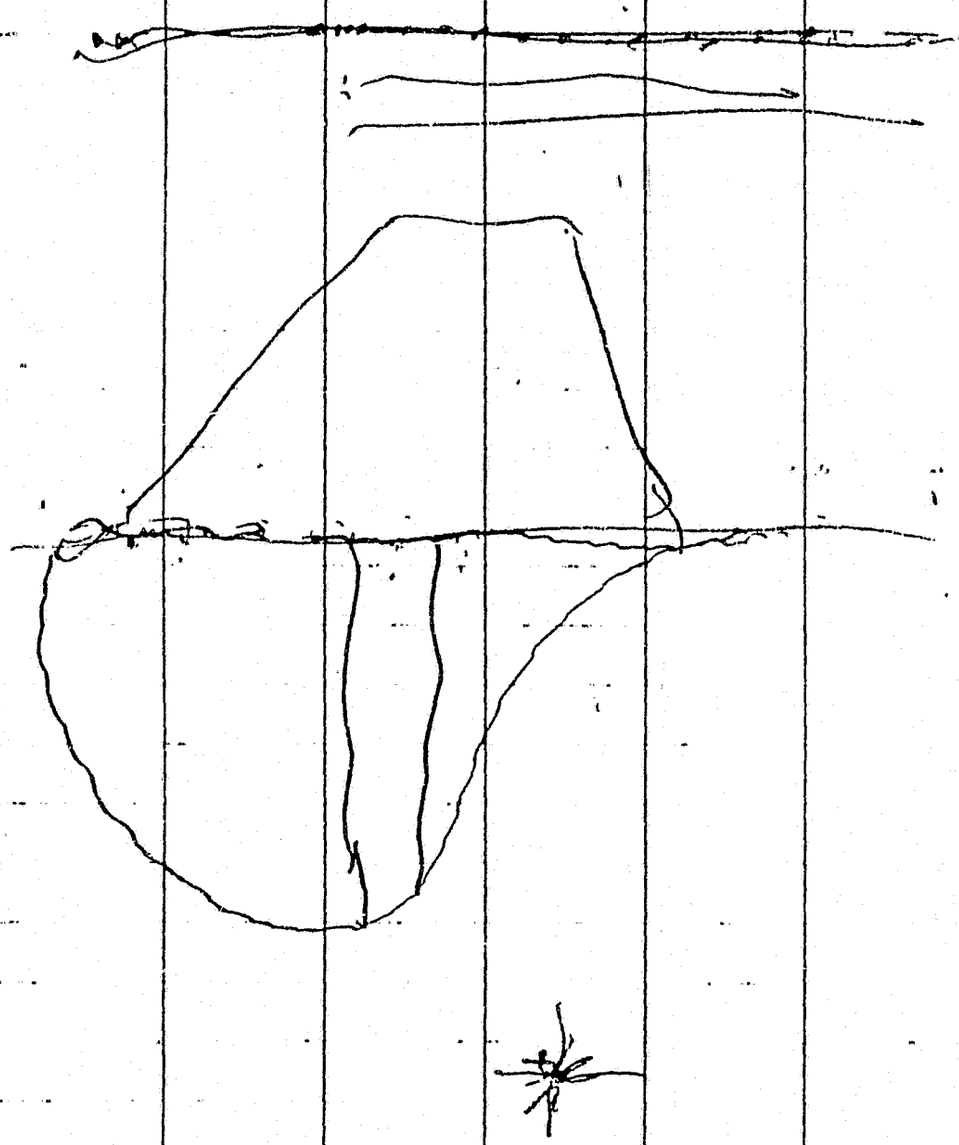
2 Aug: Wimp photoed DH-24 to shear. We can still drill S & L but Glen & Hod cancelled w/o even talking to me. So much for this job.

(11)

3 Aug



hole.
J. bearing N47E.
dip. 46°
8.0' to ground



Allan
nite differential on OT —
what are hours for
nite diff.

owe Allan 5 hr — 2/3 May
not recorded.

owe Allan 6 hr 15 Apr.

My pay sheets ~~13~~ 14 May — ~~22 May~~ 4 June

---

4 Aug — Photos of old
seismic line for BLM.

— Call NPD —

Blm
80 12 → 12
(8)

4 Aug

Wimp:
Clmn
Fri Sat & Sun

Vance ~~Sa~~ Airport In
Sea — Tac.
Mon nite.

Bill has flts.

Rig	2	3
Rig	3	4
Bill B		1
~~Dan M~~		~~1~~
Dan S		1
Pat		1
Rub		1
Henry		1
		13
~~Dave M~~		~~1~~
		14
Wimp		1
		15
Dicky		1
		15

2 (4)

Pat's Comp Record

27 M	99.7
13 → 16	16
17 + 18	20
19	—
20 → 23	16
24	12
	153.7
25 J 1 Jul	24
2 Jul – 9 Jul	28
	205.7
9 Jul	16 +
	221.7
13 Jul	10
	231.7
22 Jul	41
	~~256.7~~
	272.7
25 Jul	20
	292.7
	8
29 Jul	284.7
31 Jul	16
	300.7

TRIGONOMETRIC FORMULÆ

Right Triangle — Oblique Triangles

Solution of Right Triangles

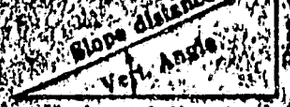
For Angle A, $\sin = \frac{a}{c}$, $\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

Given	Required	
a, b, c	A, B, c	$\tan A = \frac{a}{b} = \cot B$, $c = \sqrt{a^2+b^2} = b\sqrt{1+\frac{b^2}{a^2}}$
a, c	A, B, b	$\sin A = \frac{a}{c} = \cos B$, $b = \sqrt{(c+a)(c-a)} = c\sqrt{1-\frac{a^2}{c^2}}$
A, a	B, b, c	$B = 90° - A$, $b = a \cot A$, $c = \frac{a}{\sin A}$
A, b	B, a, c	$B = 90° - A$, $a = b \tan A$, $c = \frac{b}{\cos A}$
A, c	B, a, b	$B = 90° - A$, $a = c \sin A$, $b = c \cos A$

Solution of Oblique Triangles

Given	Required	
A, B, a	b, c, C	$b = \frac{a \sin B}{\sin A}$, $C = 180° - (A+B)$, $c = \frac{a \sin C}{\sin A}$
A, a, b	B, c, C	$\sin B = \frac{b \sin A}{a}$, $C = 180° - (A+B)$, $c = \frac{a \sin C}{\sin A}$
a, b, C	A, B, c	$A+B = 180° - C$, $\tan \frac{1}{2}(A-B) = \frac{(a-b)\tan\frac{1}{2}(A+B)}{a+b}$; $c = \frac{a \sin C}{\sin A}$
a, b, c	A, B, C	$s = \frac{a+b+c}{2}$, $\sin \frac{1}{2}A = \sqrt{\frac{(s-b)(s-c)}{bc}}$; $\sin \frac{1}{2}B = \sqrt{\frac{(s-a)(s-c)}{ac}}$, $C = 180° - (A+B)$
a, b, c	Area	$s = \frac{a+b+c}{2}$, area $= \sqrt{s(s-a)(s-b)(s-c)}$
A, b, c	Area	area $= \frac{bc \sin A}{2}$
A, B, C, a	Area	area $= \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL



Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10′. From Table, Page IX, cos 5° 10′ = .9959. Horizontal distance = 319.4 × .9959 = 318.09 ft.

Horizontal distance also = Slope distance minus slope distance times (1 − cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10′ = .9959, 1 − .9959 = .0041. 319.4 × .0041 = 1.31, 319.4 − 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately = the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance = $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

MADE IN U. S. A.

"Rite in the Rain"
WEATHERPROOF

LEVEL

NOTEBOOK NO. 311

WATANA BOOK 31

MISC GEO GEOLOGY

[illegible] 71 - 19 AUG 78

[illegible]

[illegible]

[illegible]

a product of

J. L. DARLING CORPORATION

TACOMA, WASHINGTON 98421 U.S.A.

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1

In the figure below, opposite 7, under "Cut or Fill" and under 0 respectively, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under 4, I read 14.7 the distance out from the side stake at right.

Cut or Fill	0	1	2	3	4	5	6	7	8	9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

BORING LOCATIONS

128.9 air to air

16 Aug 78

Points visible from HP.

n
k
j

visible from

V – k
n

WAYANA Roll #28

photo - some sliding trailer,

360° pan from HP cw starting @ K hole,

fig 3 on ee'

Tsuana Falls

"ice contact" @ T. Falls

T Falls

2 shots lower Tsuana - 1 up spillway
1 down creek

From WA-14
1st 3 shots - lower Tsusena Creek & up spillway

probably see PP
RR
QQ

can see - HP
SS

roll is labeled
8/16 DUNC1
KC 135-36

Roll 8/16 DUNC2 roll ~~22~~ 22
1st 1 or 2 shots - orange no smoking sign in chopper

4 shots - 1st cliff US of Tsusena Creek, Rt bank

Ash (tuff) & andesite flow

4 shots of mouth of Tsusena Creek seismic area

3 or 4 shots up Tsusena Creek from mouth

4 shots on dacite looking E & N

4 quarry shots W to S, S. bank

3 tourist shots N from ~~[illegible]~~ trailer site

3 shots downriver from over slide block

1 shot down deadman from Arsene falls 1/4 mile

3 shots w up Fox/Watana creeks from top of coal beds

8/16

2 shots showing lineaments @ the bucket: 5 miles DS of the looking South

Mon - geology w/ Glen by chopper

0830-1630 8 hrs

8/17 Tape & Bunta

Start new seismic line to start 1975 line

		FS	BS	DIST
0	1	N74°W	S79°E	100'
1	2	N75°W	S79°E	100'
2	3	N75°W	S78°E	100'
3	4	—	—	100'
4	5	—	—	100'
5	6	—	—	100'
6	"A"	—	—	19'

BS on ∅ point - S76°E
S75°E

3/17 Roll Ouvc3 Roll 54
2 photos down old seismic line -

drill rig in distance, fuel drums in mid-distance are ≈ 10' to west of line

Flying about

3 sample top of LS mtn across from Watana Creek basalts. Red overlies LS

DG-2

0600 - 1800 = 12 hrs

8/18

~730 start uphill from river PK nail -

PK nail flagged yellow
EP - rock cairn about 1" rebar -
rebar not on elevation

t - ≈ 6-8' East of C/L

DH6 = picture point t

DH7 angle = 1.5' S33°W from
panel point - 0.2' lower

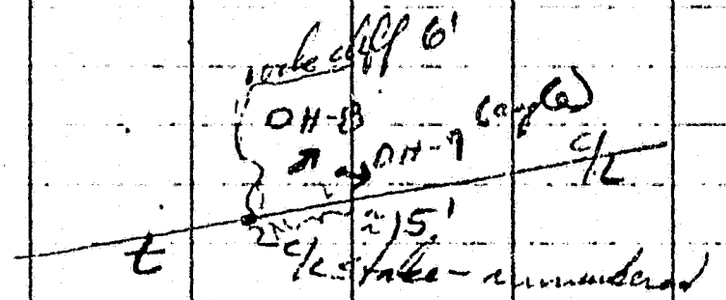
N-"C" is ≈ 1' N30°E of
panel point -

photo taken - looking at K.
visible from here - k, n, o holes

R-1 is over horizon.

N-D in place w/ yellow & red guard tree ≈ 6' uphill

DH-8 / DH-9 ≈ 15' W of C/L



DH-8 N21°W @ 61°
DH-9 N40°E @ 42°

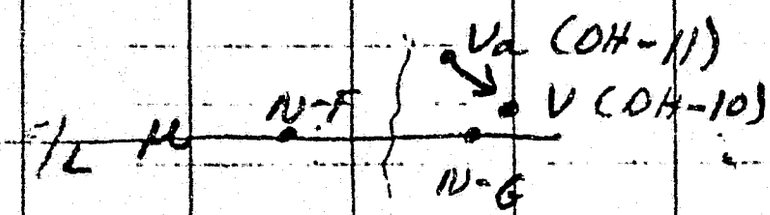
visible from u -
probably R-1
k
n
o

photo looking [illegible] river

N-F in place with angled guard stake by tree stump.

2 shots to hole in
1 shot to V panel
(2 to holes)

N-G possibly destroyed (@ V)



≈ 100' to panel V – line of sight. Can see rod or plumb bob @ N-F from V panel

Photo uphill towards panel rebar. = N-H top of rebar

no panels other than V visible from holes.

From V panel – can see
O
k thru trees
n
R-1
j thru tree

c/L nail in place in stump E 15' above V panel flagged yellow

Visible from HP

j
WA-14
possibly dd, ee

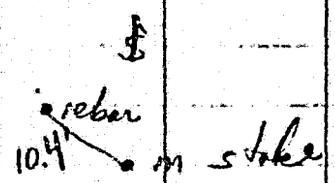
w/ offset to south – (to see ground outside edge –
O
k
n
m

copied from Pats' General notes Gang –

seismic photo – 1st 2 just S of E

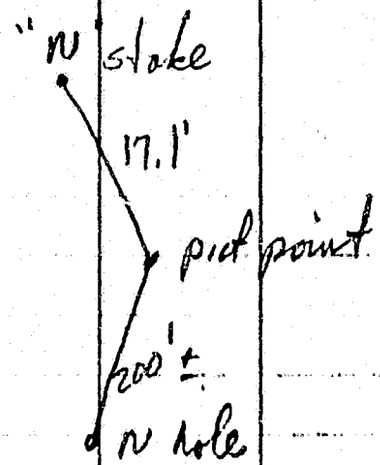
3d ⊙ shothole w/ 5' tape.

"m" pic point is flush w/ ground
rebar has 0.75' stickup



have panel & C/L

n hole



have panel & C/L

come off here

K hole – lost panel – have to come off "n"

stake only – come off n

visible from HP, μ, V

l - rebar set

ee - hole = point - post
can see rock from 1st
hole, not 2nd.

see BS rear TP
other points available

ff - point on hole - post
WA-11 visible from ll

bbb - hole = post = panel
staked - OK
probably nothing visible

gg - rebar on rock - mark on
corrugation 15 center

✓
Deadman point

qq	just below trailer visible from trailer, SS, WA-14	z	OK panel OK
rr	T-3 ? long shot possible WA-14? tree problem z-trees ≈ 5 setups from qq	mm	R-1 visible, possibly j 3 shots from SS
op	staked OK visible from WA-14 (possible tree problem at WA-14 probably HP (w/10 rod definite) definitely from SS just across gut		

R-1	small white cloth	d	done from ER with transit.
TP	1 page back	j	visible from HP V panel no nebar — yellow ribbon & white can.

D-1 abandon

D-2 corrugation or rebar on top of bare knoll - can't see anything

D-3 lost - no mark

D-4 in place - next to freeze probe w/yellow

LP in place w/rebar

dd can see SS, HP
Qt - post in

cc big mud pile -
≈ 10' S of clearcut line -
can see HP, not SS
no other points visible
OK - post in

Fog Creek Geology notes.
1st sample directly across from
Fog Creek in river (looks
smooth)

point on E side ≈ 1/2 mile US
of Fog Creek - 2 Flows
dip ≈ 15° - 20° N - looks
continuous in marked.
labelled Fog = A (top)
B (2nd)

C - @ bend S of river

Seems like some in Tsusena
Creek volcanics - dip slightly
S here - possible all
dips east

AH-12 second to last hole
in Deadman Creek -

across from big gravel fill
side above falls on deadman
on edge of steep tree slope
on slight bench

AH-13 ≈ 200 yds N20°E ±

AH-14 ≈ 75 yds N20°E of 13

AH-15 ≈ 100 yds N15°E of 14

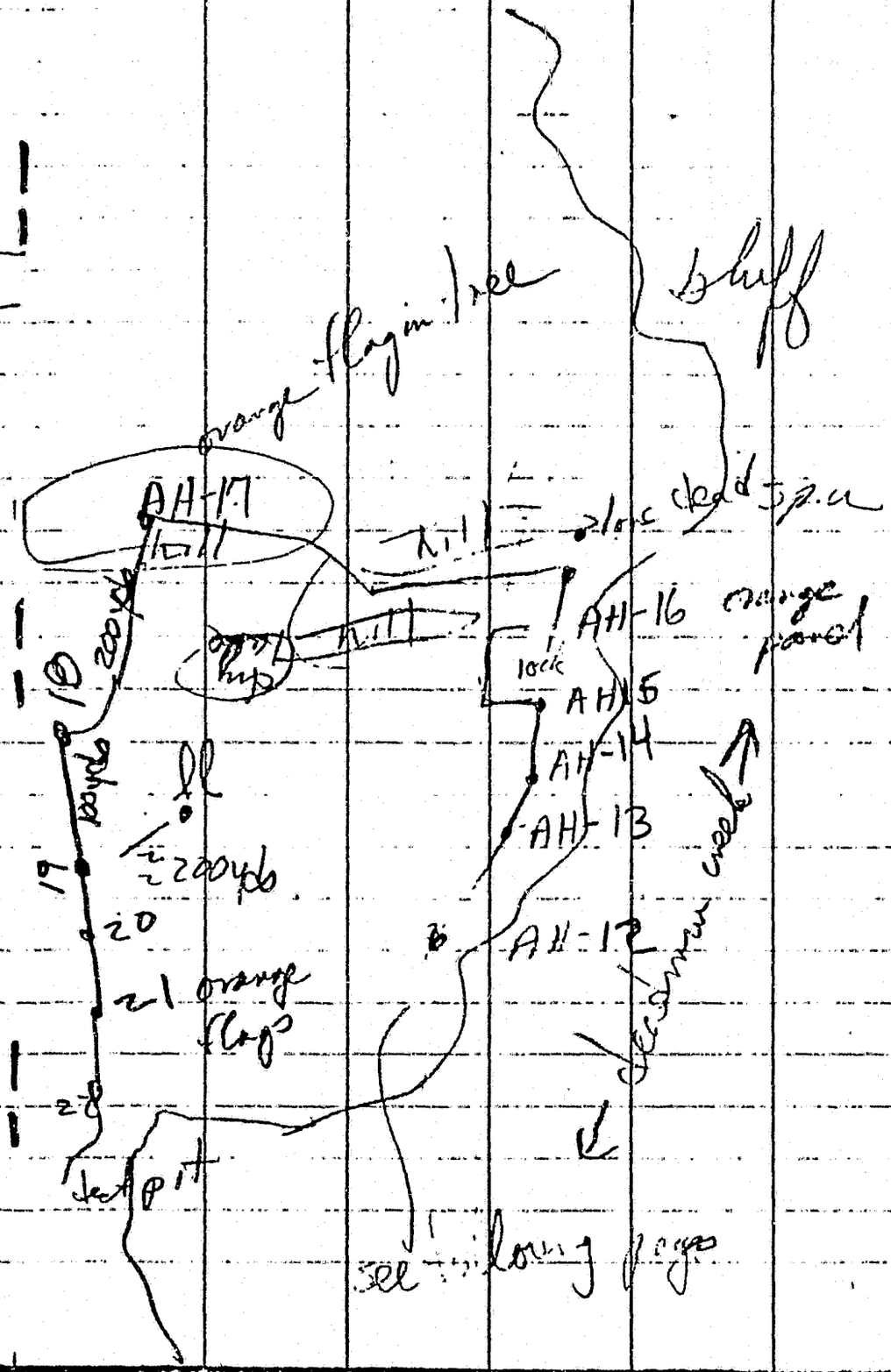
AH-16 ≈ 200 yds N25°E of 15

AH-17 ≈ 1200 yds N55°W of 16
on hill w/ orange panel in tree

AH-18 ≈ 200 yds SSW of tree

AH-19 ≈ 200 yds S - low country

AH-20, 21, 22 ≈ 100 yd intervals
- 200 yd



photos ≈ 1200 of ice leaves 30.6'
in hole ee

8/19

AH-1 ≈ 10' SE of Z panel ~~freeze probe~~ SP?

AH-2 ≈ 150' E of Z freeze probe panel

AH-3 ?

flew to AH-12 (can land nearby)
will backtrack

AH11 ≈ 75 yds line of sight to AH12
≈ S40°W from AH-12

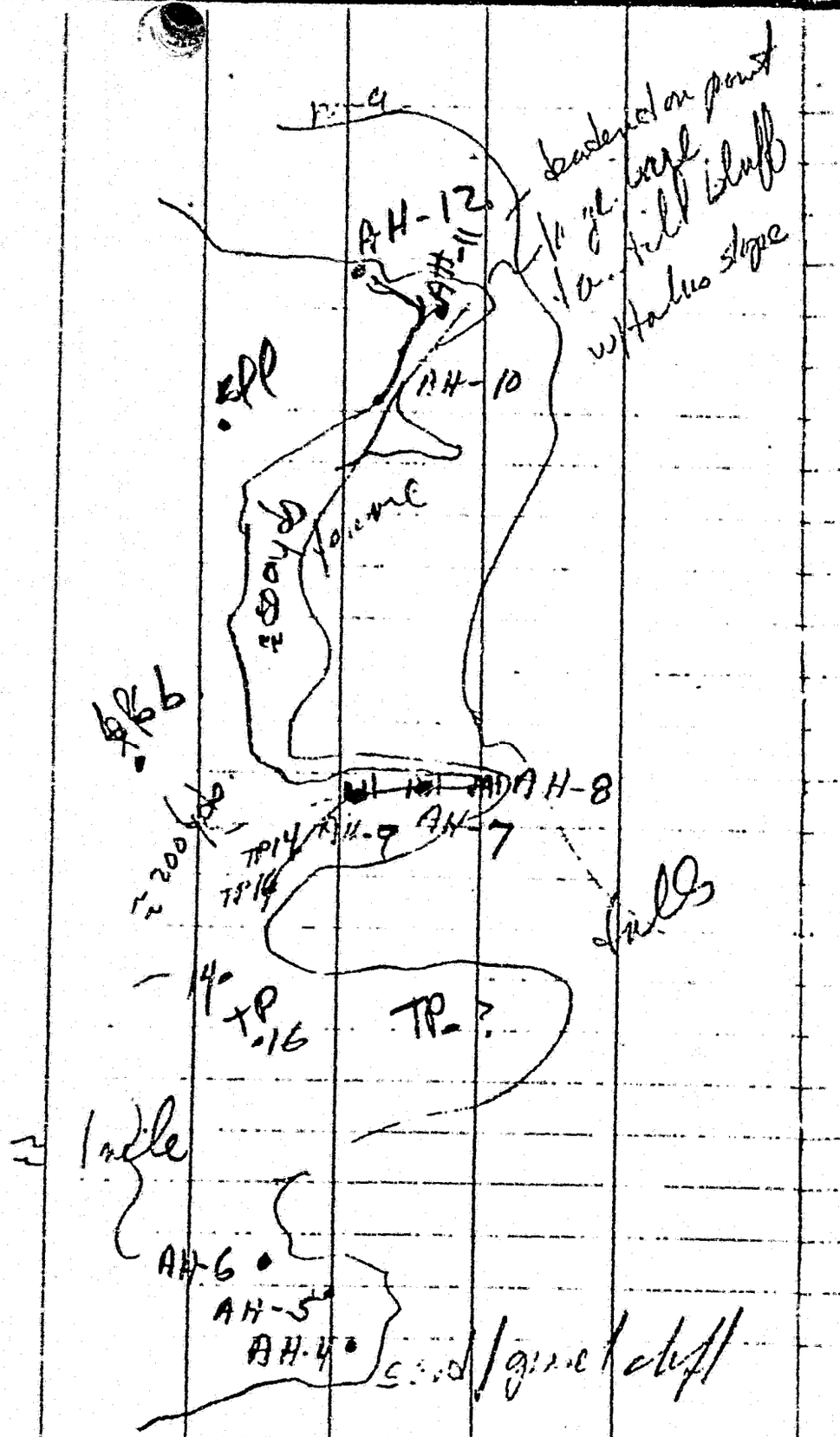
AH10 ≈ 100 yds line LU of AH-11 -
no intervisibility
short leg T [illegible] rubber

AH-9 ≈ in open, w/ probe, - no pic pts visible

AH-8 = near tip ≈ S55°E of 7 ≈ 30 yds
might see AH-11 clearly, maybe not

AH-7 = rock of land

AH-9 w/ 10'
offset could get HP by
cutting 1 tree nearby
= D4 vicinity - D-4 lost



TP14 ≈ 100yds W of AH-9

1st shot Bill sitting in trailer

Photos of auger holes & TP's

		dir looking	# shots
AH's	1	NW	1
	2	N	1
	3	N	1
	4	N	1
	5	N	1
	6	NW	1
	7	NW	1
	8	NW	1
	9	N	1
	10	W	1
	11	W	1
	12	W	1
	13	W	1
	14	W	1
	15	W	1
	16	W	1
	17	N	1
	18	E	1
	19	E	1
	20	E	1
	21	E	1
	22	S	1

General area shots

3-6	
7-9	
10-12	
12-16	(25 shots)
16-17	1 - E to W 1 - W to E
17-666	35 shots down line

[redacted] WATANA ROLL 23

new roll - test pit shots -

Tsusena Creek - 5 shots, from Watana north to east

one rover area shots

test pits - all looking north

8 N/shot each in center of photo
9 N
10 E w/ backhoe
~~11~~ 19 E w/ bbb in R background
12 S trees
13 S @ edge tail w/ tree
14 N
15 W
16 ~~W~~ E → 7 Sept 78
17 N
18 SW
19 @ top
11 @ bottom, bbb @ right

general test pit photos

13, 12, 10, 19 2 shots looking east

11, 18, 15, 8 N E → 7 Sept

8, 15, 17, 16, 14 N

8, 19, 11, 9 N

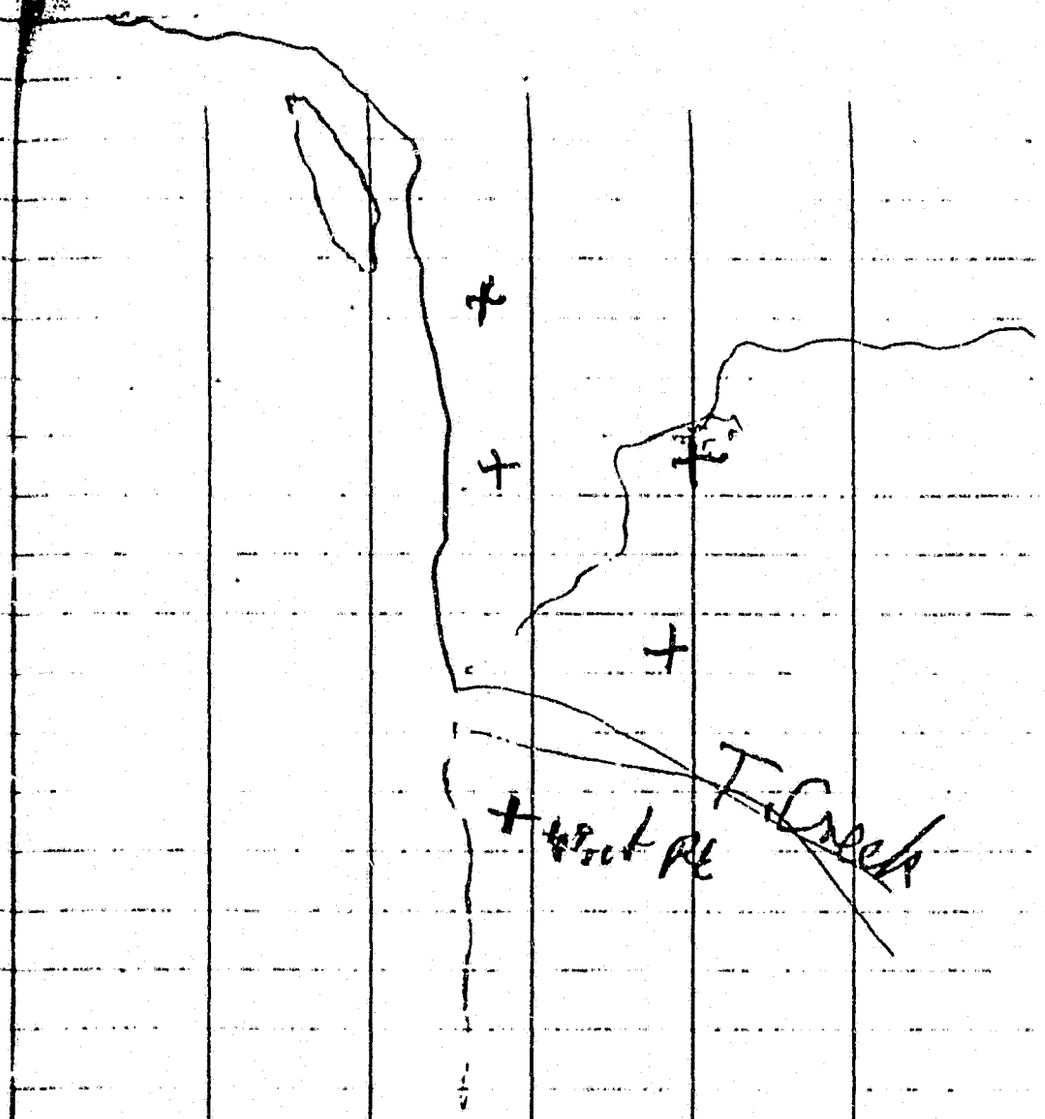
test pits are brown, drill holes have gray mud.

2 pits @ Tsusena Butte area -
1 below T Butte
1 at airstrip

[illegible] from red zone on [illegible] T. Butte

Question - is there a "rift" or [illegible] Increment from T. Butte across @ north of Watana & back (south) of Mt Watana?

(photos from N. of T. Butte may show it)



STANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width; Side Slopes 1½ to 1.

In the figure below opposite 7 under "Cut or Fill" and under 8 read 11.0, the distance out from the side stake at left. Also opposite 11 under "Cut or Fill" and under 7 read 16.7, the distance out from the side stake at right.

Cut or Fill	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
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33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

Watana Book 37 (1)

6 Aug 1979 CoE Book 37

Weather

tried thru 1030 hr.
broke in R.4 & got Wimps small
camera out & packed up boxes
for slinging. Went back by
way of Devil Canyon & Clear
Creek. Plenty Salmon (Pinks?)
in Clear Creek & some bears too.

7 Aug 1979

Got out on time for a change.
Rube & Gritheary to finish trapping
from Devil to Tallgeetna.
Wimp's boxes to town.
Bit box to R5; fuel (gas) in
from town. 461 gas to R5.
Block etc to R3. Pretty quiet
mostly. Bobcat moved. Water pipe
& fire hose to R5. USGS finished.
Wayne took water levels. Got
OR-76V-17 fence posts. Took fence
post to OR-226CC). Pilot out R5.
R5 3 pulling casing - busted smash blocks.
New blocks in from Anch. - 6 to 8. All by
1930.

Time 6-12 Aug

	6	7	8	9	10	11	12
[illegible]	8	8-4 05	8-4 04	8-4 04	8-4 04	(8-4)	12
[illegible]	8	8-4 04	8-4 04	2 04 6-4 chawn	chawn 8-4	(8-4)	
[illegible]	8	8-4 05	8-4 05	8-4 05	8-4 05	(8-4)	
[illegible]		CT	8-4 05	8-4 05	8-4 05	(8-4)	
[illegible]	8	8-4 04	8-4 04	8-4 04	8-4 04	(8-4)	12
	W						W

Dig 1 — 3
2 — 3
3 — 4
Pat
Dan S
Dudy
Dan M
Bill B.

15

Person notes out

(1 — Kelly
1 — sand line)

failing

(1900)

③

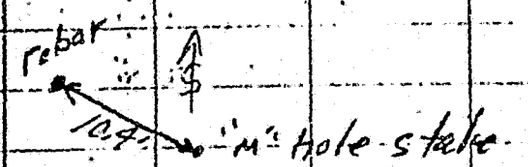
8 Aug Seismic line photos.
1st 2 ground photos just
SOUTH of EE.

3rd ground photo shot hole
w/ 5' of tape at SS pic pt.

N	OH-24
KV	OH-12
KA	OH-23

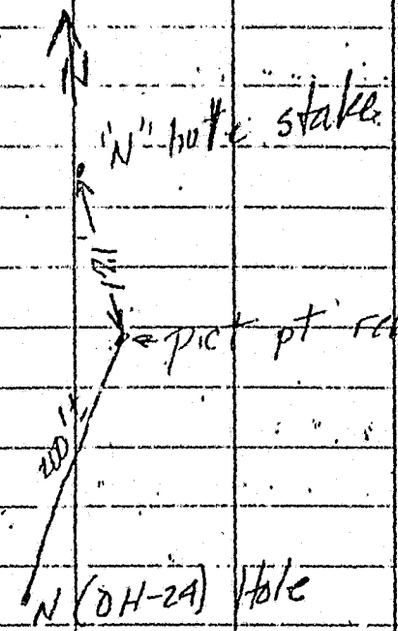
M, N & K, l.

"M" Pic. Pt. flush w/ ground.
re-bar set S/U 0.75' AGL



both w/ orange paint.

N Hole pict Pt.
2 1.5' AGL



K hole Kvert (OH-12) ▽ -8.1'
from top of casing
KA (OH-23) ▽ - 10.0'
from top of casing

K pic pt. gone & no
way to guess, to where.
Survey will have to come
off "N"

8 Aug 1978

Pic Pt. "l" flush w/ ground
no hole - set rebar.

Picture Points to date
M
N
K - gone
J
I
V
T
river
Z

cc fence post = hole = pic pt.
ll " " = " = " "
= casing too

between ll + b3 ? # - near
freeze pipe (survey this in)
& on deadman agg source

(7)

Holes w/ fence posts to date
N
k v
k ∡
t v
t ∡
u v
u ∡
v v
v ∡
gg ✓
rr ✓
z
mm
cc
14
PP
15

no fence posts
✓ at a, b, c, ~~d~~, e & f

not yet set
d (DH-21) + j (DH-25)
ll, bbb, ee
~~q~~ 10

b3 fence post = hole = pic pt.
gg - re-bar laying on rock.
dented corrugation
is ⊙
TP - use TP monument

RIVER GEOLOGY
RIVER SURVEY

8 Aug 1978

Upper Deadman LB –
"Bear" – on ground –
over ground?

Deadman falls – on Rock –
pounded down corrugation
on rebar

Deadman mouth – No re-bar –
no chance of survival

---

9 Aug 1978

1 Const mtn / Basalt

2 what is it

3 D/S of V (creek)

4 Goose Cb LB → V

5 Creek up to Clearance

6

7. Contact w/ what?

Glen + Janice next monday.

Long + short photos of TPs.

RIVER GEOLOGY
RIVER SURVEY

13 Aug 1978
hole ee'
1.0' ~~0.5'~~ tundra
boulders
~~4.8~~ lost water - not frozen
more cobbles & gravel - less
boulders @ 7'
~~7~~ Sand at 4.8' - Clean
medium grained -
frozen @ 4.8'
5.0 more boulders/cobbles w/100%
DWR.
5.1 Gray-brown DWR - sandy gravel ?
5.6 Smooth gravelly-sand?
w/occ. cobbles
6.0' Cobbles. ~~to~~
8.3' Smoother - sandy gravel?
8.8' cobbles.
10.2 - 10.7 Sand lens - 10.7 - 13.7 cobbles
~~13.7~~ 11.7? 11.9 13.7 - 13.9 Sand lense
13.9 - 11.9?

get wax
& seal 4x5½ bbl.

20' rod 2.8' bit.

Time

	13	14	15	16	17	18	19	20
Allan	05 8-12	8	05 8-4	Chann 8-4	05 8-4	05 8-4	~~8-12~~ 12 05	8
Wayne F	05 8-12	8	05 8-4	05 8-4	Chann 8-4	Chan 8-4	—	
Kathy	04 8	5 travel 8	—	—	—	—	—	
Pat	Chann 8-12	8	Chann 8-4	04 8-4	~~8-4~~ 05 5/05 3/4/04	05 8-4	~~8-4~~ 05 12	
		W						
Petcham						04 8-2	~~12~~ 05	

Casing shoe & mullen
17
↓
seat of 15W

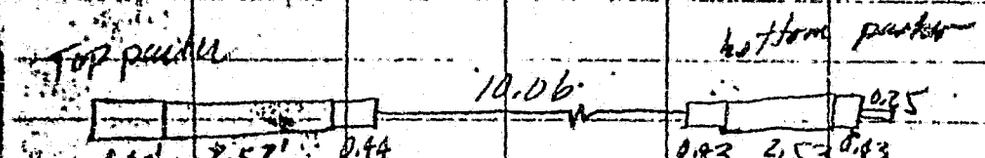
hole d: 603.7 - bottom
topo says short of other
side but doesn't look it.
Anyway - must at limit.

1. Bitat 578.9 +15.0' Al rod

+

@ 1445

21 Aug 1978
DH-21
packer sketch



(3)

Time 20-26 Aug.

	S	M	T	W	Th	F	S
	20	21	22	23	24	25	26
Allen	8	Travel 8-4	—	—	—	—	—
Wayne E.	—	Travel 8	—	—	—	—	—
Peterson	8	8-4 05	8-4 05	8-4 05	8-9 05	8-4+T 05	—
Pat.	8	8-4 05	8-4 05	5-3 (05) 3 (05)	8-4 04	8-4 04	12 05
W							

Time 27 Aug - 2 Sept

	S	M	T	W	Th	F	S
	27	28	29	30	31	1	2
Pat. 12	04	8-4 05	8-4 05				

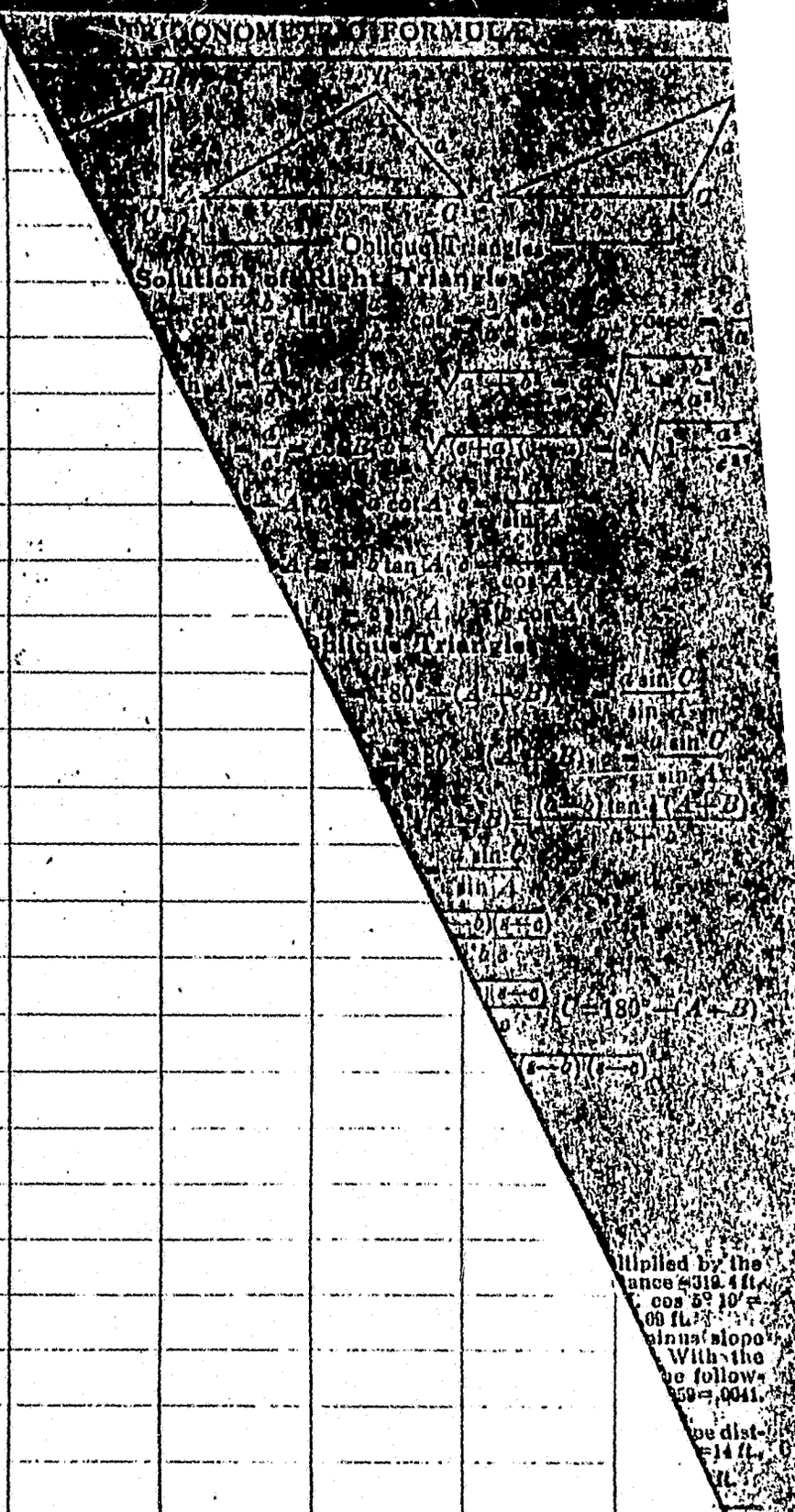
Things for next time:
fishing
~~IIII~~ ~~IIII~~ I

$$\begin{array}{r} 8.1 - 4.6 \\ 4.6 \\ \hline 25 \end{array}$$

23 Aug
Repair 0700–0930

Test in casing.

closed
6 Nov 78
geology notes to reservoir
geology map

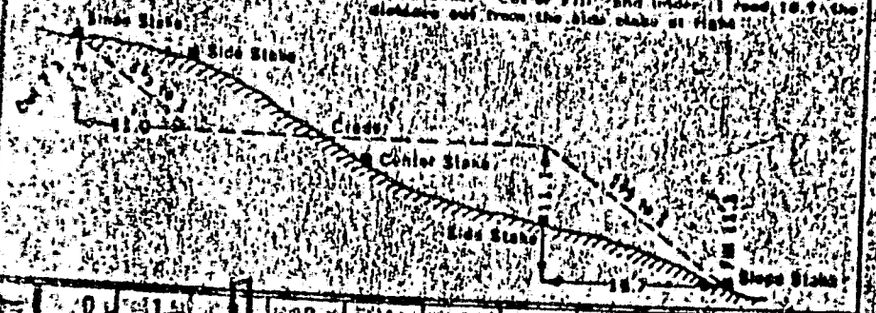


Survey Notes

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width, Side Slopes 1½ to 1

In the figure below, opposite 9 under "Cut or Fill" and under 19 road (1.6) the distance out from the base stake at left. Also, opposite 15 under "Cut or Fill" and under 1 road (8.9) the distance out from the base stake at right.



Cut or Fill	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

P14

49'

H.Ba, PA
PT 1
Cathedral Ledge

Collinsville
Book 6

①

Occupy P13
Set 0°00' Shoot P12 (?) P11 (?)

HI 4.05'

Rod	Vert ∠	Stadia
2.6	0°00'	½ (6:1)

From	To	∠ Rt	Rod	Stadia	Vert ∠
P-13	G-50	218°00'	7.73	3.48	0°00'
	Start of sedimentary outcrop.				
	G-51	174°04'	6.3	3.5	-01°00
P-13	P-14	170°00	8.0	~~9.5~~ 15.5	0°00
	HI	4.9			
P14	G-51	269°00'	5.82	1.67	0°00'
P14	G-52	225°30'	5.20	1.68	0°00'
P14	G-53	205°35'	4.83	1.89	0°00'
P14	G-54	192°30'	4.19	2.34	0°00'
P14	G-55	183°50'	3.80	2.54	0°00'
P14	G-56	164°00'	6.22	4.45	+1°00'
P14	P15	139°00	7.11	5.60	+1°00'

1°-0'	H	99.97
	V	1.74

* Assumed that "rod" & "stadia" readings are reversed. Plotted as though they are.

RCP

Plotted 19 & 20 June 81

RIVER GEOLOGY
IMPORTANT

DYNAMITE LEFT

F	T	∡ RT	ROD	STADIA	VERT ∠
P15	MARKED BY STICK. P15 IS 1¼ NORTH, ON ROCK				
	HI 4 ⊥ also shores				
P15	G 56	311°58'	3.60	2.36	0°00'
P15	G57	286°11'	3.50	1.75	0°00'
P15	XS	108 10	2.7	.80	0°00'
		19 Apr 1978			
	~~Ste~~ set on P15		HI 4.6'		
Occupy	Backsite	Horiz ∡	Vert ∡	rod	stadia
P15	P14	0°00'	0°00'	—	—
Room	To	Horiz ∡ RT	Vert ∡	rod	Full stadia
P15	P16	100°02'	0°00'	~~3.81~~ 3.75	3.33
P15	G-58 (Backsite P14)	204°46'	0°00'	4.8	2.93
P15	G-59	195°19'	0°00'	~~3.15~~ 3.55	3.84
P16	Backsite P-15 HI=4.92				
P16	P-17	281°21'	0°00'	5.6	7.51
P16	P-15	359°57'	0°00'	6.0	3.35

P16 ice at small diorite rock on D/S edge of sand bar. Bar is ≈ 200' left of 1st island

contact between slate (bot) + ? (top)

Plotted 19 & 22 June 81

RCP

Backsite P15

From	To	Horiz ∠	Vert ∠	rod	stadia
P16	D/S Island tip	353°42'	0°00'	5.53	2.63
P16	Island Left Bank	067°53'	0°00'	5.79	2.11
P16	G-65	132°53'	0°00'	2.35	5.95
P16	64	125°30'	0°00'	2.75	7.40
P16	63	119°23'	0°00'	1.1	9.40
P16	62	117°15'	0°00'	0.5	10.15
P16	61	116°10'	+0°21'	5.00	10.60
P16	G-60	111°07'	+0°14'	5.00	14.60

at G-65 instrument melted into ice & had to be relveled.
New HI at G-65 4.75'
a melt in of 0.17'

Note G-60 & G-61 bracket major ice from Groundwater
Recheck to P-15 360°01'

Relevel instrument HI 4.75'

P-16	G-66	220°10'	0°00'	4.32	2.76
P-16	G-67	252°55'	0°00'	4.51	2.89
P-16	G-68	259°35'	0°00'	4.59	3.61
P-16	P-17	281°28'	0°00'	5.90	7.51

Backsite P-16 HI 4.75 (3)

From	To	Horiz ∠	Vert ∠	rod	stadia
P-17	P-18	171°18'	0°00'	5.15	11.8

Plotted 19 & 22 June 81
RCP

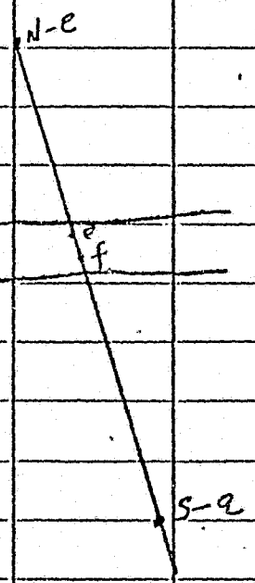
Hole locations South (Left) Bank

20 Apr 1978

~~Sa~~ scaled distance N-e → BM5
1760'
half stadia 8.80 (horiz dist)
1718.75' horiz scaled.

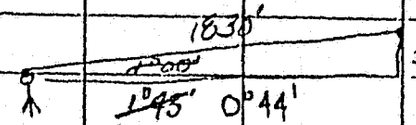
– 16 pd nails –
stakes.

Set stake S-a; sighted in from N-e HI 4.55 (PAT)



set transite "A" at 360°00'

½ Stadia 9.15
Full 18.30



0°43'
0°45'
0°44'

HI (DON) 3.94

1629.85'
1760 – 1720 Horiz correction
.9998 → 1829.63'
.0128 → 23.42' vertical correction

Stake S-a
theoretical 1760'
69.7' SOUTH. of BM5

Vert ~~0°44'~~ 18.3 × 1.28 = +23.42'

N-e + 3.94 + 23.4' ~~4.55~~ 3.94 = ~~23.79~~ 123.4

el. S-a = (N-e) + 23.4

1422.3 + ~~3.94~~ + 23.42 ~~3.0~~ = 1445.7

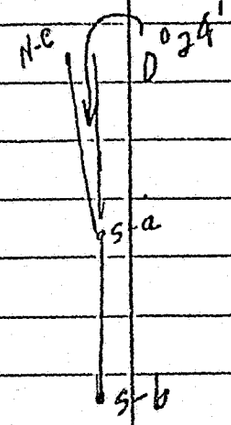
Set S-a to N-e @ 360°00'
plunge to N-e @ 360°01'

S-a → S-b HI 4.55
180°00' rod ~~9.0~~ 8.0 Stad 1.06
180°02' vert ∡ + 17°24'
use + 17°59' 95.9 Horiz 31.1 Vert.

S-b → S-a HI = 4.21'
180°00' * ~~15°16'24'~~ 13°34' stadia 1.04
rod 9.0
179°54' − 13°31' rechecked 1.02
13°32' + 0k 97.4 23.4

S-b in front of large boulder
AVERAGE 96.7

recheck from S-b → N-e



ELS-"A" + HI + VCORRECTION − ROD = EL S-"b"
1445.7 + 4.6 + 31.1 − 8.0 = 1473.4

ELS-"B" + HI − VCORRECTION − ROD = EL S-"a"
1473.9 + 4.2 − 23.4 − 9.0 = 1445.7

use 1473.7 for EL S-"b"

S-b → S-C
Reset 0°00' to Von's target.
~~Rod 4.55~~
~~vert ∡ + 17°21'~~
~~Stadia 4.05~~
redo
HI = 4.21' rod 4.21' Horiz ∡ 0°00'
vert ∡ + 17°14'
stadia 4.10
Horiz ∡ 179°57'
vert ∡ + ~~17°49'~~ 17°11'
Stadia 4.13.

occupy S-C HI 4.16

site S-b "A" 0°00'
Rod 4.16
vert ∡ − 17°16'
Stadia 4.15
Plunge
Rod 4.16
Horiz ∡ 180°00'
vert ∡ − 17°18'
stadia 4.19
17°15' 4.14 377.6 H 117.2 V

Need 21 Apr
hole N 160' back from S-C
hole m 330' ahead of S-C

hole n Typical reduction Nos.

20°00'	88.30 / 32.14
21°00'	87.16 / 33.46
22°00'	85.97 / 34.73
23°00'	84.73 / 35.97
19°00'	89.40 / 30.78
18°00'	90.45 / 29.39
17°00'	91.45 / 27.96
16°00'	92.40 / 26.50
15°00'	93.30 / 25.00
14°00'	94.15 / 23.47
13°00'	94.94 / 21.92
12°00'	95.68 / 20.34
11 -	96.36 / 18.73
10 -	96.98 / 17.10
9	97.55 / 13.78
8	98.06 / 13.78

<7° = < 2% hor dist error

Things to do.

1. Don to take in clay samples
   a. MAs, hydrometer
   b. Atterbergs
   c. Permeability?
   etc.

S-C → Hole N HI = 4.16
Rod 4.16 Horiz ∡ 180°00'
vert ∡ -21°20'
Stadia 1.84
Plunge 359°51'
rod 4.16
-21°22' vert ∡
Stadia 1.85

~~22°21'~~

.77

Stadia 1.845
21°21' vert 21 00 87.16
22 00 85.97
39/60 x 1.19
86.74

EL S-"C"
1590.9'

160.04'

		H	V
21°21'	1.84'	159.6	62.4

S-c → S-d
HI = 4.16
Horiz ∡ 180°00' "A"
Vert ∡ + 17° 14'
Rod 7.00 ✓
Stadia 1.65
Plunge HI = 4.16
Horiz ∡ 359°57'
Vert ∡ +17° 16'
Rod 7.0
Stadia 1.65'

17°15'	1.65	150.5 H	46.7 V	43.9

EL S-"d" = EL S-"c" + Vert Correction − Rod + HI
(1634.8) = 1590.9 + 46.7 − 7.0 + 4.16

S-d → S-c HI 5.14
Horiz ∡ 0°00'
Vert ∡ − 15° 57'
rod 6.0
Stadia 1.65
Plunge
Horiz ∡ 179° 59'
vert ∡ − 15° 56
rod 6.0
Stadia 1.65

Average 1635.1

m = 44.2

15°56'	1.65	152.6 H	43.6 V	44.5

EL S-"c" = EL S-"d" − Vert correction − Rod + HI
1590.9 (= 1635.4) − 43.6 − 6.0 + 5.1

~~S-d →~~
distance S-c → S-d ~~150.5~~ OK
slope 1.65
vert ∡ 17°15' → ~~91.20~~ 17°00' 91.45
18°00' 90.45

~~91.450~~
~~− .125~~

S-d → Hole M. HI = 5.09

~~225 +1~~
Horiz ∡ 0°00'
vert ∡ +11° 51'
rod 5.09
Stadia 1.88
Plunge
Horiz ∡ 180°00'
Vert ∡ ~~+12°~~ + 11° 52'
rod 5.09
Stadia 1.87

EL DH-"m" = EL S-"d" + Vert Corr − Rod + HI
(1672.9) = 1635.1 + 37.8 − 5.09 + 5.09

11°52'	1.88	180.1 H	37.8 V

Hole M → S-d
HI = 4.70
Horiz ∡ 0°00'
Vert ∡ − 12°01'
rod 4.70
stadia 1.90

1673.4

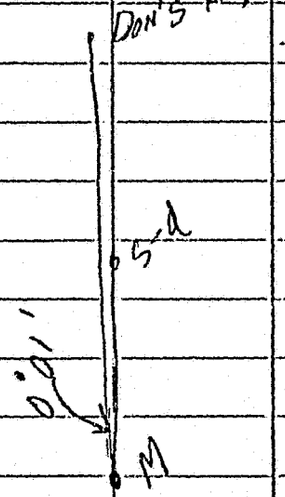
Plunge
Horiz ∡ 179°59'
Vert ∡ − 12°03'
rod 4.70
stadia 1.91

12°02'	1.90	181.7	38.7

EL S-"d" = EL DH "m" − Vert Correction − Rod + HI
1635.1 = 1673.8 − 38.7 − 4.7 + 4.7

180.9	38.3

end



S-d → Hole M
~~Hor~~ Vert ∡ 11°51'
11°52'
12°01'
12°03'
46°107'
47°47'
+

~~46°109'~~ 120
44°227'
$\boxed{11° \cancel{59} 56' 45''}$

11°00' 96.36
~~S-d → S-d~~ 12°00' 95.68
0.68

$\frac{56.75}{60} \times \frac{3.25}{60} \times 0.68 = 0.0368$

95.7168

Stadia 1.91
1.90
1.87
1.88
1.89

180.9'
150.5'
331.4'

Geology survey notes
occupy P-18, Backsite P-17
HI = 5.03

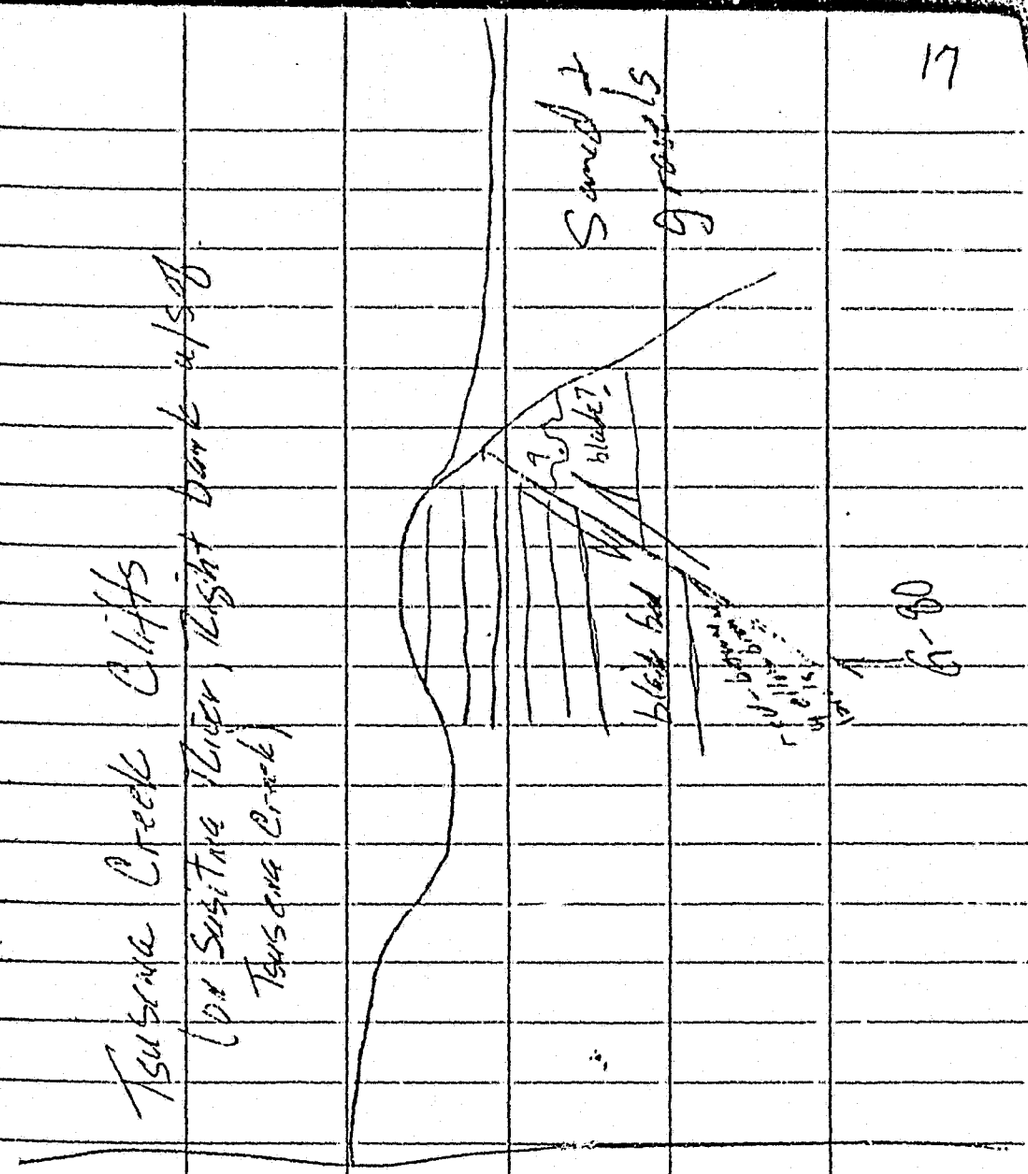
From	To	Horiz ∡	Vert ∡	rod	stadia
P-18	P-17	0°00'	—	—	—
P-18	G-69	323°41'	0°00'	5.39	6.58
P-18	G-70	327°52'	0°00'	4.85	6.80
P-18	G-71	337°29'	0°00'	5.12	7.70
P-18	G-72	345°04'	0°00'	3.90	9.71
P-18	P-17	359°59'	0°00'	~~11~~ 4.00	11.60 ~~4.00~~

Note: P-18 on u/s tip of 2nd island on gravel. trees start ≈ 150' o/s of P-18 ≈ 3.6' o/s of large boulder

P-18	3rd island u/s end of island	279°08'	0°00'	6.4	4.82
P-18	P-19	235°25'	0°00'	8.25	½(5.93)

occupy P-19 HI = 5.02

P-19	P-18	0°00'	0°00'	3.50	½(5.95)
P-19	G-81	165°56'	0°00'	11.19	7.08
P-19	G-80	158°44'	0°00'	11.0	7.56
P-19	G-79	153°53'	0°00'	10.35	8.58
P-19	G-78	152°41'	0°00'	10.05	8.95
P-19	G-77	151°34'	0°00'	9.9	9.53



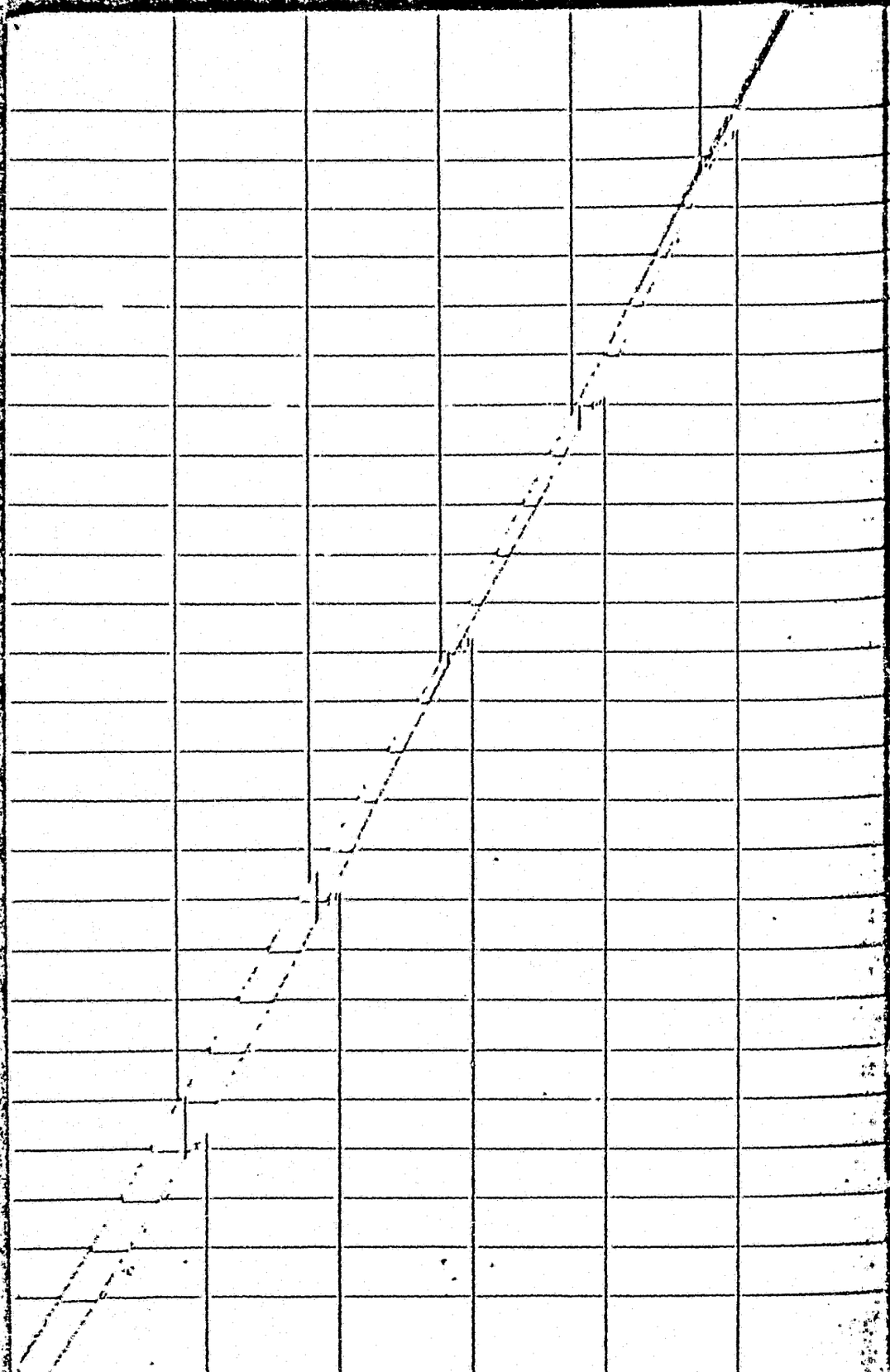
From	To	Horiz ∡	Vert ∡	rod	Stadia
P-19	G-76	150°09'	0°00'	10.7	10.1
P-19	G-75	149°08'	0°00'	10.0	10.9
P-19	G-74	147°27'	0°00'	10.1	½(~~6.1~~) 6.05
P-19	G-73 = P-20	144°30'	0°00'	9.55	½(7.6)

Plotted 19 & 22 June 81 RCP

From	To	Horiz	Vert	Rod	Stadia
~~P-19~~ P-20	~~P-18~~ P-19	0°00'	—	—	—
P-20	P-21	178°17'	0°00'	5.15	1/2 (8.3)
		HI = 5.31			
P-21	P-20	0°00'	—	—	—
P-21 @	P-22	116° ~~HO~~ 17'	+07°02	4.00	0.54
HI 5.43	Nail in Log w/ red ribbon (Log)				30' x 18" dia
~~P-22 @~~	~~P-21~~	~~0°00'~~	~~0°00'~~	~~11.56~~	
HI 3.32					
P-22	P-21	0°00'	-01°30'	10.0	0.54
P-22	P-23	69°50'	0°00'	4.13	0.70
	Nail in Log on Tsusewa Ck. Bank w/ red Ribbon			≈ 20' Long x 15"	

end of book

Plotted 19 & 22 June 81 RCP



S-b → S-a

~~S-a → S-b~~

~~17°24~~ 13°32'30'

17° 59' 1.03

32 94.52 → 94.515

34 94.50

97.35' horiz

22.75 → 22.7625

22.80

23.79' vert

S-b → S-c

Stadia	vert ∡
4.10	17°14'
4.13	17°11'
4.15	17°16'
4.19	17°18'
4.14	68°59'

17°14.75'

Horiz	Horiz	Vert
17°14'	91.22	28.30
17°16'	91.19	28.34
	91.2086	28.3152
	377.60	117.22

Rite in the Rain
WEATHERPROOF

LEVEL

NOTEBOOK NO. 311

COE WATANA BK 8

DAM REFERENCE AXIS

[illegible] NOTES

DON FREDERICKSON

17 AUG 78 - 21 AUG 78

[illegible]

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TACOMA, WASHINGTON 98421 U.S.A.

RIVER / WINTER SURVEY
COE BOOK 8

Sta.	S. Dist	Hor. Dist	V. ∡	Rod	Elev						
⊼ - Dist 2 # 50178			TD Fredrickson & D Eckert		8 Apr 78 Clear Breeze						
115 - hill	bla										
1x2 Stk. south side			+ 25.09		984.6 ~~1,022.1~~	1x2 Stake/w nail, south side of river Ground,					
		Inv	9 - ~~30~~ 29	5.2	983.3 ~~1,020.8~~						
	155	D	9 - 28 ~~9 - 24 - 30~~ 26	+ 21.2 3.90							
	154	m.	9° 28' 30"	3.90							
rill Site ℄	4.1. = ~~1000.40~~ 963.35		Top Stk		959.45 ~~997.00~~						
Stk m.u. = 3.9°	520	0° - 00	—	-3.19 3.11							
m. 4.9°											
	522	173' - 35	—	-3.98 3.9°							
Rd PT A rill site m.u. 4.28	560	0° - 00'	—	1.0	960.15 ~~997.70~~		+		—		
Pt. A	560'	103° - 13'	—	6.0	~~997.69~~						
						BM-1	2.35				
		~~103° - 13'~~		1 100° 11' 30" 2 200° 24'					Rock 0.655	65 E of BM-1	
k nail 2 stk m.u. = 3.69				m. 100° 12' 0"	962.45 ~~966.10~~						
	135	0° - 00'	+ 36.86 -16° - 30	+ 33.86 3°							
	124.6 136	0° - 00'	16° 21' +16 - 28	3°							
PIKE					1,000	Rod Spike in Birch Stump, Assumed Elev.					
			37.55								

18 Apr '18
Clear.

Sta.	Dist.	H. Dist.	V. ∡	Rod		
V - B-Pt Right - Hole En Hill		499.3	201.4	~~+201.4~~	1,160.9	
H. 3.28 Top Stk 4.3 Gr Back	142		m 26 22 2 26 23 m 26 22 30' - 56.5	4.3 ~~3.28~~ ~~4.3~~		
Forward	140 138 142	111.5	1 26 - ~~46~~ 50 2 26 - ~~56~~ 50 m 26° 48' 30" + ~~56.4~~	4.3 4.3		
H.I. = 1108.79 N - A - Pt H. Gr. 4.3 Back	445 445		1 - 20° 30' 2 - 20 - 32' m. 20 - 31' - 145.06	4.3 4.3	1,104.~~49~~ 50	
V - A	442	387.8	1 20° 34' 30 + 2 20 26 30 + m. 20° 30' 30" + 145.02	+141.24 3.8 3.8	+ ~~145.02~~ ~~141.24~~ - ~~140.49~~	Rod @ Stk. Gr., Stk 0.75 high " " " "
Forward " 3.8 Top Stk ~~N - A Pt~~ 4.8 H.I = 963.25	{440 443 437} 440					
m - 1 Right Stk	250 248 240.3		1 10 - ~~44~~ 45' 2 10 - 47' m 10 - 45 + ~~44.69~~ 45.69	4.9 3.9 3.9 +41.79	1005.2 ~~1042.69~~	
5. DDH - E H.I. = ~~1000.70~~ 963.35 DDH - 5 H. Stk 3.9 Gr. 4.9						

19 Apr 78
Clear.

Sta.	S Dist	1	V ∡	Red.	
1-"D"	1"x2 Stk	l/w	nail.		1,305.
H.I. 1,309.29		798.6	+ 345.48		
Back	1 116 HS		1 27° 37'		
	2 116 HS		2 27° 37'	4.31	
4.31 Stk	116 HS		m 27° 37'		
4.73 Gr.					
			27° 39'		
	232 Stk	182.0	+95.36		
	116 HS			+91.03	
	1 115 H.S.		1 27 41		
Forward	2 117 H.S.		2 27-41	4.33	
			m 27-41		
H.I. = 1213.95				Elev. 1,209.6	
V-C	1x2 Stk. Guarding Timber Spike				1
4.33 Spike					
4.67 Gr.		616.6	+250.12		
Back	H.S. 69			4.33	
	68.5			1. 22° 30'	
	S 137.5			2 22° 31'	
				m 22° 30' 30"	
		117.3	+48.68	~~24 32~~ 15	
				3.26	
				1 22°-32	
Forward	H.S. 68			2 22-36	
	69.5			m 22-34	
	S 137.5			+45.42	
V-"B" H.I. = 1164.2					1160.9
3.26 Stk					N-1
4.28 Gr.					
Drill @ E					
River					
		499.3	201.4		

[illegible]ne Crew 19420 Apr 78

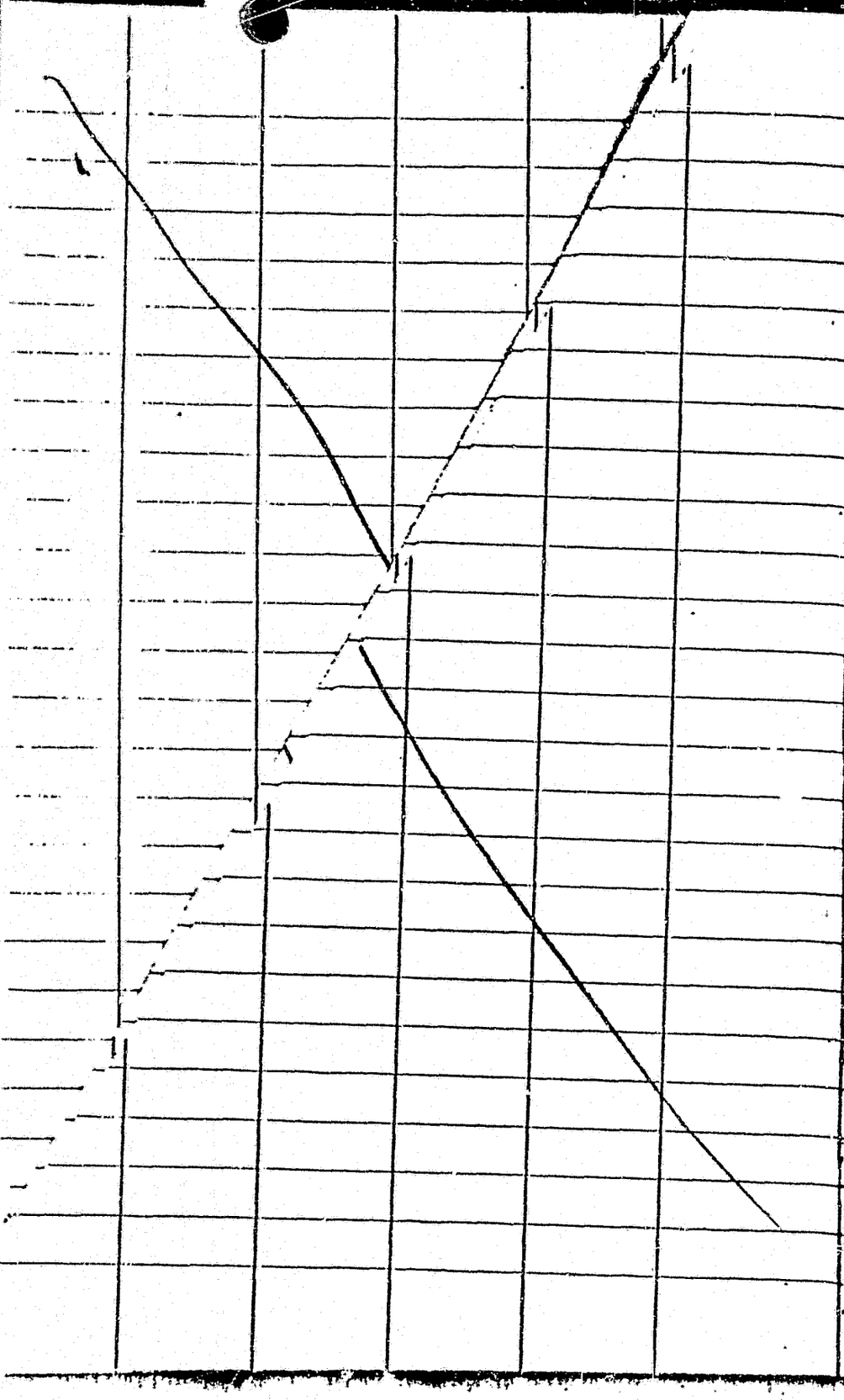
Sta.	Dist.	H. ∡	V. ∡	Rod	Elev	Sta.	S Dist.	H Dist.	V. ∡	Rod	Elev.
N-"E" H.I. = 1,501.93 4.75 3 ft "H. 4.98 Root west side		1221.3'	537.6'		1497.18						
Back	115 H.S. 115 H.S 230	201.8'	1-20° 30 2-20° 31' m. 20° 30' 30" + 75.46	4.75							
			m. 75.57								
Forward	H.S. 21 Apr 115 ~~23E~~ ~~126~~ ~~125~~ ~~124~~ 250 230	201.6' ~~219.2~~	1 20 34 2 20 35 m 20 34 30 + ~~82.25~~ + 75.67	+ 71.63 3.94							
N-"E" H.I. = 1425.55 H.K. 3.94 3 ft 4.41 Gr.		1019.6	462.08		1,421.6	N-"E"					
						Back to BM-3 = Hole "U"					
Back	140 HS 141 HS		1 27-47 2 27-48 m 27-47-30	3.94							
	222.5	221.0	27° 49' + 116.6	+ 112.1							
Forward	143 H.S. 141 H.S		1 27-50 2 27-51 m 27° 51' 30"	4.51							
N-"D" H.I. 1309.51 H.K. 4.51 3 ft "H. 4.93 Gr					1305.0						
N-"C"		798.6	345.48								

Sta.	S. Dist.	Horz. Dist " ∡	Vert. ∡	Rod	Elev.
		1385.7	572.9		
1-G = Hole "V"					1532.47
3.97 Stk					
4.60 Gr					
Back	86 H.S.	164.4'	1-12°-05 00	3.97	
	172		2-12° 05 00		
			m 12° 05 00		
			12°07'		
			35.3'		
				+30.5	
Forward	86 H.S		1 12° 10 00"	4.75	
	172		2 12° 09 40		
			m 12° 09' 30"		
N-"F" H.I. = 1501.93					1497.18
M.H. = 4.75 Stk					
= 4.98 Rod					
N-"E"					
		1221.3	537.6		

...ta.	S. Dist.	Horz. ∡ Hor. Dist.	V. ∡	Red	Elev.
...n-7 Line					
7-1					
4.54 stk			1 16-56 00		
4.90 Gr	60'		2 16 56 00	4.54	
Back	80'	73.2'	m 16 56 00		
			16°59'		
			22.4'		
Forward		1 272 00 00			
		2 184 00' 30"			
...Hole "U"	40' M.S.	m 272° 00' 15"	1 17 01 30	4.23	
...SIGHT			2 17 03 00		
...1-"C"			m 17° 02' 15"		
...ht N-"D"					
...U-E"					
...ht "C"					
... 3.94 stk			1 23°-35	-29.42	
...t Hole "U"	59	49.56'	2 23°-33	8.0	
	59		m 23°-34'		
			-21.62		
	30 M.S.		use -25.7	4.23	
...e "U"			1 27°-26		
sight "E"			2 27-21		
4.23 stk			m 27°-23' 30"		
4.67 Gr					
...-"C"		47.3	+24,5		
		48.5	25.1		

ta.	S Dist.	Hor ∡ Dist.	V. ∡	Rod,	Elev
		1			
8-1 -8 Line 2.75 Stk 3.62 Gr N-"C"	23 HS	42.2	1 16 47 2 16 50 m 16° 48' 30" + 12.7	4.0 ~~2.75~~ use 12.3	
erward	22 22 4.5	41.0	1 15° -00 2 15° 02' m 15° -01 00 - 11.0	4.23	
		1 92° - 12 2 184 - 21 m 92° 13' 30"			
p Hole "4" 4.23 Stk					
	0.45				
			6.65 5		
				4.57 B	
ht N-"D"					

16d Spike in 20" Stump Root, in SW Side, low 11 S SSW of Hole "U" Stk
on Top Rock 4' So of Stump



343.75
70.84
414.59

79.39
20.61

@ 27° add 20.61

Back W 27° 26'
27 21

C → D - 182
D - E - 221
403
394
09

343
50
393

221
182
403

343.7
49.6
393.3
394

		95.68 / 4.32		92 / 88 / 92	
100° 11' 30"					
			85.87	272°	272 / 544 / 360 / 184
0° 33' 0"	100° 24'			360 / 88	
	100° 12' 0"				
			V. X	Rod	
	51 5	3.20 / 44.26 / 5.74	122°-05'	-17.41 / 7.5 / 25.41	
Pole "4"	59'	49.56	23° 35' / 33 / m 23° 34'	8 0	
	0.22 ft				
Pt. 18.30 H.S. Dist		1.5° 43 / 2 0 45' / m 0° 44'	+2.34 / +23.42	3.0	2436
		0.00			
		20.42 / 3.94		80.00 4 54	1 14° 56 / 14 56
	23.42 / 3.94				
2° 15	19.48				
			0° - 43 / 0 - 45 / m - 00 44	3.0	
	1840				
49.56 / -19.2	49.56 / 201.7				
68.76 / 14. / 16.	251.26 / 214.1 / 162.8	Horz Dist Need from "4"			
	7.0				
	169.8 / .70	85.		END OF BOOK	

TRIGONOMETRIC FORMULÆ

Right Triangles — Oblique Triangles

Solution of Right Triangles

Given | Required | Formulas

Angle A, a — B, c, b: $B = 90° - A$; $c = \frac{a}{\sin A}$; $b = \frac{a}{\tan A}$

Angle A, b — B, c, a: $B = 90° - A$; $c = \frac{b}{\cos A}$; $a = b \tan A$

Angle A, c — B, a, b: $B = 90° - A$; $a = c \sin A$; $b = c \cos A$

Angle A, a, b — B, c: $B = 90° - A$; $c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$

Angle A, a, c — B, b: $B = 90° - A$; $b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$

Angle A, b, c — B, a: $B = 90° - A$; $a = \frac{b}{\cos A}$; $a = \frac{c}{\sin A}$

Angle A, a, b, c — B: $B = 90° - A$; $\sin A = \frac{a}{c}$; $\cos A = \frac{b}{c}$

Solution of Oblique Triangles

Given | Required | Formulas

Side a, A, B — b, c, C: $b = \frac{a \sin B}{\sin A}$; $C = 180° - (A + B)$; $c = \frac{a \sin C}{\sin A}$

Side a, b, A — B, c, C: $\sin B = \frac{b \sin A}{a}$; $C = 180° - (A + B)$; $c = \frac{a \sin C}{\sin A}$

Side a, b, A — B, c, C: $A + B = 180° - C$; $\tan \frac{1}{2}(A - B) = \frac{(a-b)\tan\frac{1}{2}(A+B)}{a+b}$; $c = \frac{a \sin C}{\sin A}$

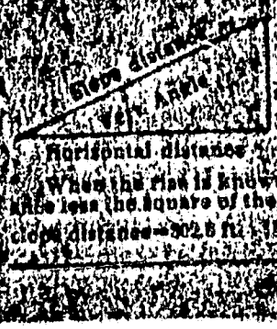
Side a, b, c — A, B, C: $\sin \frac{1}{2}A = \sqrt{\frac{(b-c)(s-c)}{bc}}$; $\sin \frac{1}{2}B = \sqrt{\frac{(a-c)(s-a)}{ac}}$; $C = 180° - (A + B)$

Side a, b, c — Area: $\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$

Side a, b, A — Area: $\text{Area} = \frac{ab \sin A}{2}$

Side a, A, B — Area: $\text{Area} = \frac{a^2 \sin B \sin C}{2 \sin A}$

REDUCTION TO HORIZONTAL



Horizontal distance = slope distance multiplied by the cosine of the vertical angle. Thus, slope distance = 319.4 ft., Vert. angle = 5° 10'. From Table, Page 1X, 400, 5° 10' = .9950. Horizontal distance = 319.4 × .9950 = 318.00 ft.

Horizontal distance also = Slope distance minus slope distance times (1 — cosine of vertical angle). With the same figures as in the preceding example, the following result is obtained. Cos 5° 10' = .9950, 1 — .9950 = .0041, 319.4 × .0041 = 1.31, 319.4 — 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately the slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft., slope distance = 302.6 ft. Horizontal distance = $302.6 - \frac{14 \times 14}{2 \times 302.6} = 302.6 - 0.32 = 302.28$ ft.

Made in U.S.A.

"Rite in the Rain"
WEATHERPROOF

LEVEL

NOTEBOOK NO. 311

COE
WATANA BOOK 27

MISC. CONTROL SURVEY

13 JULY 78

L. DUNCAN

NOTHEN-PM-G

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TACOMA, WASHINGTON 98421 U.S.A.

RIVER GEOLOGY
MOORING

DAMSITE LEFT

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width, Side Slopes 1½ to 1

In the first table opposite 7 under "Cut or Fill" and under 8 and 11 in the Roadway from the side stake it left. Also, opposite 11 under "Cut or Fill" and under 7 and 14 in the roadway and place the side stake there.

Cut or Fill	0	1	2	3	4	5	6	7	8	9	Cut or Fill
	Distances out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

L. Duncan — cloudy, 60° ?

A MacLeod

		H.I.	DIST (STADIA)	F.S. READING	AZIMUTH
PK NAIL	~~PANEL~~ ~~RE~~	2.5	?	–	0°00'
	S PK NAIL				– 2°34'
PK NAIL	PANEL R.E.	2.30	130' taped	6.0'	~~0°00'~~
					∡R 359°38'
					– 16°21'
R.E.	"d"	4.65	1080'	+1.0'	∡R from
			Rstadia	6.9'	PK nail N.
				5.9'	106°02'
					+ 0°36'

reduced 31 Oct 78

plotted 1 Nov 78

Survey point at old chopper pad OS S. side

Arbitrary BS on HP				VA	∡R Bearing
				+1°44'	0° ✓
Pad	OS hole "SOW"	panel		-4°26'	11°08' ✓
Pad	V	panel		-3°00'	22°10'
"	T	"		-11°51½'	32°26'

plotted 14 Nov 78

	Dist	Ocean Macleod FS	BS	FS VA	BS VA
T-1 Panel	192'	S69°W	64°	-2	0°
to		S69°W	65°	-2	+1°
Tsusena					
Creek	190'	S71°W	67°	-2°	+2°
↓					
nail	164' nail	S75°W	73°	+1°	0°

REDUCTION

T-1 [illegible]		S[illegible]			17[illegible]
		S[illegible]		-2°	19[illegible]
[illegible]		S74[illegible]		+½	11[illegible]

REDU[illegible]

Plotted [illegible]

		DIST	FS	BS	FS VA	BS VA
Fins Point (Start)		100'	N49°W	127	+11½°	-13
		100'	N57°W	121	+9°	-8°
		~~200'~~ 247'	N37°W	139°	+10°	-12°
		243'	N30°W	147°	+1°	-3°
		180'	N03°E	183°	+5°	-6°
	"mm"	147'	N23°E	202°	+½°	-2°
(southern-most of seismic line holes)				mm	+½	-1½°

R-1 panel to survey point

	108'		S02°W	N03E	+1½°	-3°

Plotted

WATANA BOOK 1

15 Mar 1978

set over 7" birch w/ PK Nail

shoot spruce @ 180°00' (South) ✓

i/RB
g/LB

HI = 3.2' ✓

vert ∠ ~~0.00~~ 0°00' NO go. ✓

el. Nail 1400 OMLLW ✓

arbitrary

Rod	vert ∠	standing Int.	Horiz ∠	
✓ 3.2	-2°54'	5.75	180°00'	PK nail → spruce ✓
✓ 3.2	-16°55'	1.37	180°00'	PK nail → Pt 1. ✓

Set PT1 el. ? notes Frye
HI 5.1) ↑ Galbraith
Rod Michael ✓

Rod	vert ∠	Interval	Hor ∠	~~PT1 →~~
✓ 5.1	-3°00'	0.55	South	PT1 → D+E ✓
✓ 8.0	+0°04'	1.45	L0°15'	PT1 → C (mast) ✓
	all horiz. ∠'s	left or right	from	South
10.0 ✓	-0°06'	1.30 (1.60)	L0°15'	PT1 → A ✓
10.0 ✓	-0°09'	2.56	0°00'	PT1 → B ✓
5.1 ✓	-0°24'	4.40	L63°20'	PT1 → f vs cofferdam ✓
5.1 ✓	-0°16'	16.80	R77°03'	PT1 → h ds cofferdam ✓

Geology + Pat | ⊼ LANCE DUNCAN ⊼ ①✓

COE Watana

15 March 1978 Book 2

Rod (looking N.)	vert ∠	interval	hor ∠	
			0°00'	∂ → PK nail N. ✓ mast on C
	H.I. = 5.4'			
5.4	+0°06'	18.60	R71°30' from N0°00' (Pat 17 Mar)	∂ → Hole i (Pat 17 Mar) ✓

could not see hole ~~i~~ g from hole a ✓
seismic line is 600-~~600~~ 650 feet u/s
from theoretical ℄ on maps. We
go with seismic line. (Pat 17 Mar

no hole

revised arbitrary elev
20 MAR 78 ↳

now

*↳ error - not north line - pt A
is offset to east
29 MAR 78

after move to station.

WATANA
BOOK 2
USACE

Geology - Pat Galbraith

LANCE DUNCAN

WAYNE FRYE (W.F.)

25 MAR 78

≈25°F

Survey East of Seismic Line UP RIVER

clear, 20 mph winds

working off ice on river.

for geology notes see notebook 1 by Pat Galbraith, same dates. This book contains surveyed locations only.

Note 1: All angles are measured right from next downstream station (∡R from backsight)

Note 2: All elevations are arbitrary from TP1. Taken as +1000.00' - need to be adjusted to N. end origin - see pg 36. (30 Mar 78)

Note 3: All stadias are 1/2 stadia distances: i.e. 1' on rod = 200'

Note 4: Equipment is K&E transit & stadia board (Paragon 191694)

Note 5: F.S. Sta Elev = Previous H.I. - F.S. rod on this station F.S.
H.I. = Sta Elev + H.I. measurement after move to station.

RIVER GEOLOGY

② Copied over

③

25 MAR 78

Occupied Station	Rod Sight	∡ Right	W.F. Dist (Stadia)	F.S.D. - H.I.	F.S. STATION Local Elev
TP 1	S. on	0°00'	—	+1000.00	1000.00
(Point 1)	seismic line		H.I.	4.38	
Top stake			Ht	1004.38	
				(@ Sta 1)	
	D.S.	77°03'	—	—	—
	Cofferdam		sight falls ≈ 2' right of stake		
Begin upstream		B/L SURVEY			1004.38
1	2	∡ Left	8.0	10.[illegible]	-8.00
	+8.0'	~~84°10'~~ 76.45	-4.1	996.38	996.38
	+8.0	hasta	8.0	3.98	HI @ 2
	∡ brair on rod	be wrong in bushes	-4.1	1000.36	el unst at pt 2
			+3.9	(sta 2)	Inst. setup height
		see pg 32 27 Mar 78	780'		
2	3	143°00'	5.80	998.66	1000.36
		283	-1.70	+4.75	-1.70
	+1.7'		4.10	1003.41	998.66
			820'	(STA 3)	

½ stadia reading

determined at 3

el at 2

from sta

el at 3

Sketch - not to scale

N. End seismic line

approximate

Tree w/ nail

TP1 = Point 1

77°03'

84°10'

76.45

to Pt 2

TO D.S. Cofferdam stake

X DDH-D-FM07 (planned)

X Drill hole C being drilled

X DDH-B-FM07 (planned)

X Hole DDH-A-FM07 (planned)

S. End Seismic Line

Tree stump w/ flagging & nail

for sketch of points 1-8 east of seismic line, see pg. 6

143

N

143

N

RIVER GEOLOGY MAPPING

DAMSITE LEFT ABUT. GEOLOGY

④ copied over

INSTRUMENT STATION	ROD SIGHT	∡ RIGHT (WF)	STADIA DIST	F.S. H.I.	F.S. STATION LOCAL ELEV (25 MAR 78)
3	4	177°49'	5.00		1003.41
			1.95		− 1.95
	+ 1.95		3.05	1001.46	1001.46
				+ 4.46	
			610'	1005.92	
4	5	184°46'	7.2		1005.92
			2.5		− 2.50
	2.50		4.7	1003.42	1003.42
				+ 4.84	
			940'	1008.26	
5	6	151°41'	7.3		1008.26
			− 3.8		− 3.80
	3.80		3.5	1004.46	1004.46
				+ 4.21	
			700'	1008.67	
6	7	162°43'	5.2	1012.6	1008.67
			1.0	+ 5.1	− 1.00
			4.2	1017.7	1007.67
					+ 4.89
					1012.6

1.00 w/ vertical ∡ = 0°20'

actual elev = .58/100 stadia mark

× 2 × 4.2 = 8.4 × .58 = 4.89

840'

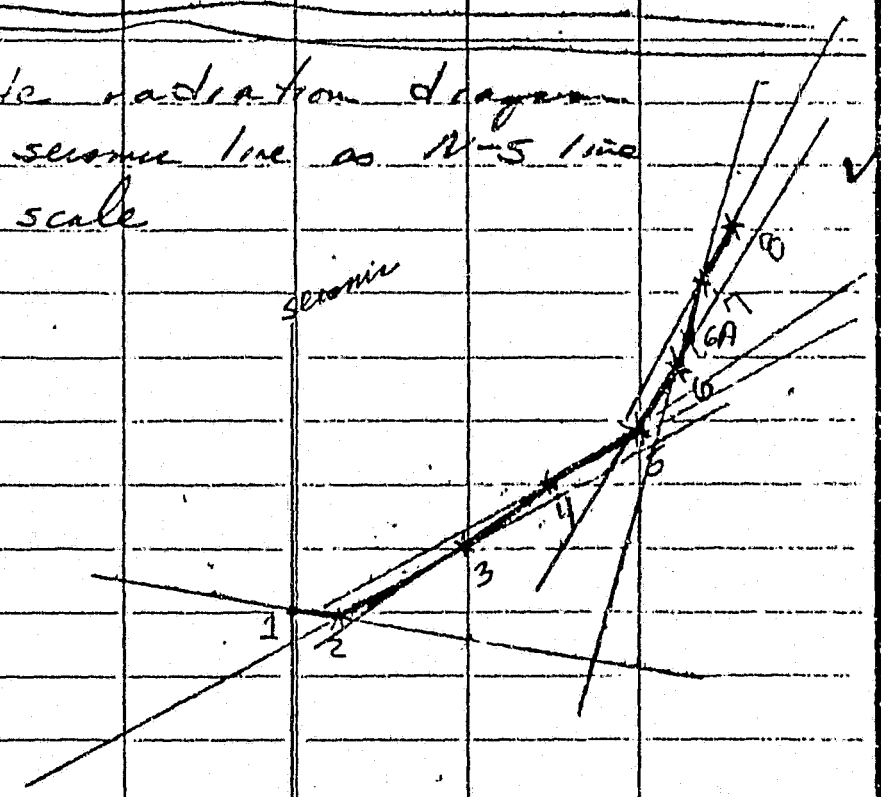
copied over

INSTRUMENT STATION	ROD SIGHT	∡ RIGHT (WF)	STADIA DIST	F.S. H.I.	F.S. STN LOCAL ELEV
7	8	192°04'	8.4		1017.7
			3.9		− 3.9
	3.9		4.5	1013.8	1013.8
				+ 5.1	
			900'	1018.9	

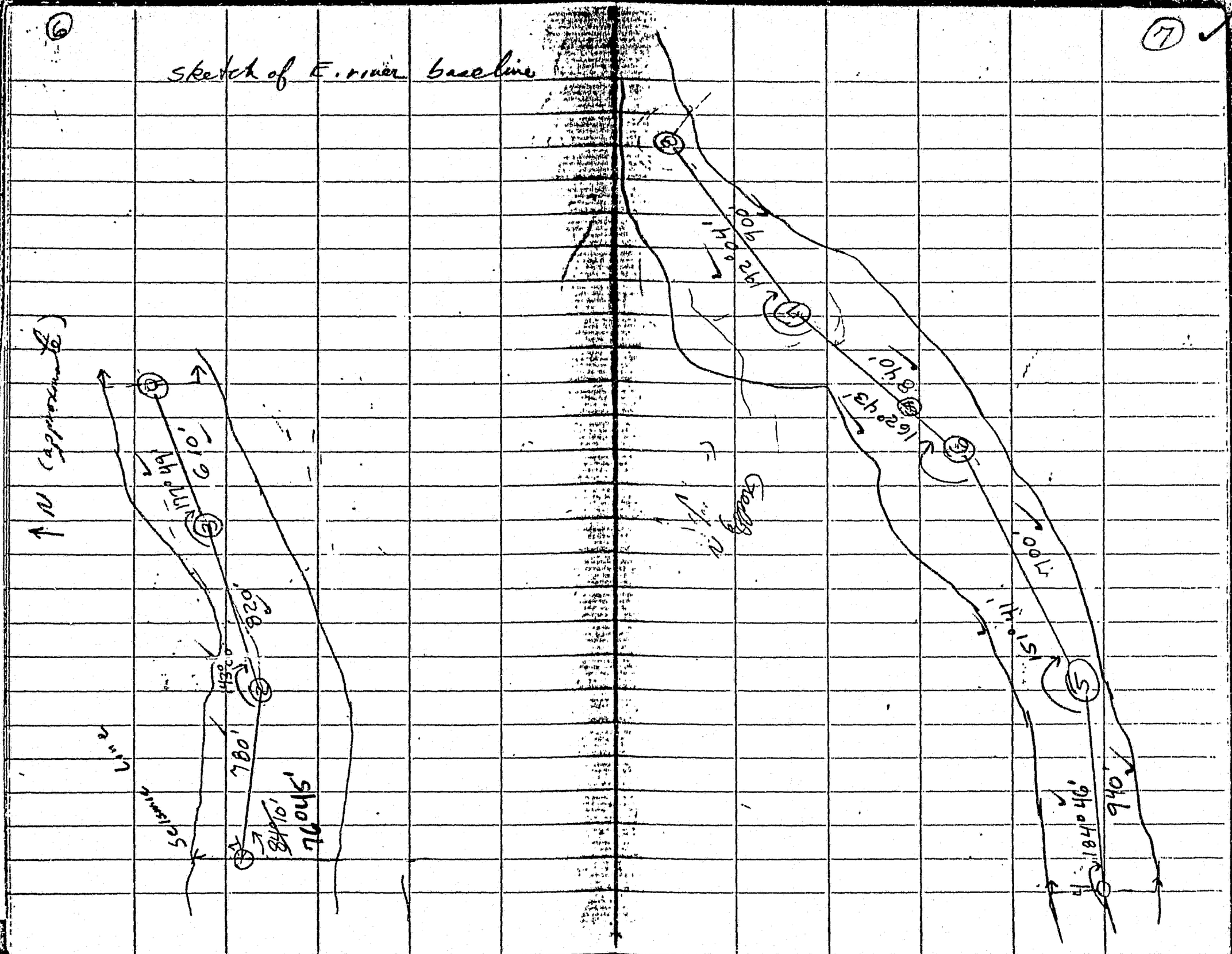
HI 8

⑤

stationic radiation diagram using seismic line as N-S line - not to scale



sketch of E. river baseline


(approximately)
1 in
2 in
Scale
1 in
1 in
1 in

(8) copied over

Geology notes working west from Pt. 8.

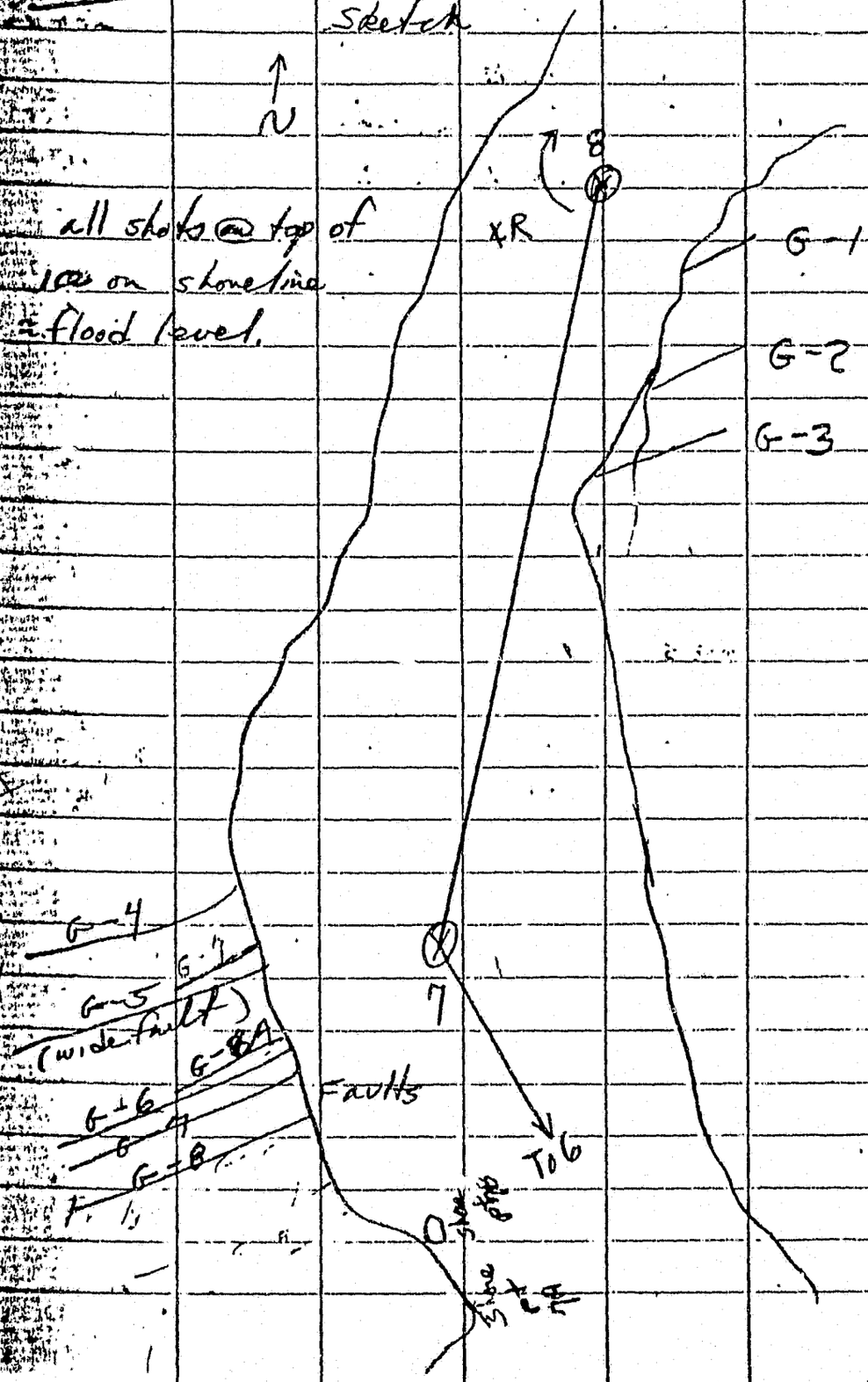
Instrument Station	Rod Sight	∢ Right	STADIA DISTANCE	F.S. H.I.	F.S. STATION LOCAL ELEV
8	G-1	275°25'	3.60		1018.9
(B.S.=7)	2.1		2.10		- 2.1
			1.5		1016.8
					+ 11.0
gouge at 11' on rod					1027.8
			300'		
toe of cliff-fault intersection					
	[illegible]	277°46	3.59		1018.9
	2.1		2.10		- 2.1
			1.49		1016.8
gouge @ bottom rod					
			298'		
	G-2	291°26'	7.50		1018.9
			6.32		- 6.3
	6.32		1.18		1012.6
gouge @ 4' on rod, add 10' back					+ 4.0
			240'		1016.6
			+ 10'		
			250'		
(rod on ice in river)					

copied over

all shots @ top of ice on shoreline

= flood level.

Sketch



(9) ✓

copied over

25 Mar 78

Instrument Station	Rod Sight	∢ Right	STADIA DISTANCE	F.S. HI	F.S. STA LOCAL ELEV	Instrument Station	Rod Sight	∢ Right	STADIA DISTANCE	F.S. HI	F.S. STA LOCAL ELEV
							shore @	199°25'	6.1	1017.7	1017.7
8	6-3	336°15'	5.15	1018.9	1018.9		flood		4.0		4.0
			3.80		- 3.8				2.1		1013.7
	3.8		1.35		1015.1		4.0				
			270'						420'		
crops @ base rod @ 0.00'											
							shore @ flood	210°21'	5.9		1017.7
									4.9		4.9
	7	0°00'	10.9		1018.9				1.0		1012.8
			-6.3		- 6.3		4.9				
	6.3		4.6	1012.6	1012.6				200'		
				5.1							
			=920'	1017.7			6-4	130°39'	11.8		1017.7
				HI					9.2		9.2
7	8	192°04'			1017.7		9.2		2.6		1008.5
(B.S.=6)					- 3.7						
	shore @ flood, t/ice	195°29'	6.4		1014.0		edge river ice, flood line		520'		
			3.7								
	3.7		2.7								
			540'								

(see sketch page 10)

(12) copied over

(13)

25 Mar 78

copied over

INSTR STATION	ROD SIGHT	∢ Right	STADIA DISTANCE	F.S. HI	F.S. STA LOCAL ELEV	INSTR STATION	ROD SIGHT	∢ RIGHT	STADIA DISTANCE	F.S. HI	25 Mar 78 F.S. STA LOCAL ELEV
7	F-5	112°18'	10.9		1017.7		G-6	99°25'			1017.7
	10.9		8.7		- 10.9		gouge	96°54'	snow filled fault, drop		
			2.2		1006.8						
				T. river ice							1017.7
	add 20' to rock		440' 20'	W/L ≈	1005'		G-7	79°00'	dirt & snow slide in fault		
			460'								
	on rod - 10'		to fault	+	10.0		G-8	59°09'	dirt slide in fault		
					1016.8						1017.7

Fault edges @ H.I

112°45'

110°14'

fault width:

scope @ 440' ≈ 9.6' wide

width fault = 2.1 scope widths

= 9.6
× 2.1
9.6
19.2
20.16'

$\frac{460}{440} = 1.02$ ∴ ≈ 20-21' wide

(14) (15)

WF

≈ 15°F Cloudy, slight bag down mine 26 MAR 78

Wind increasing downriver ≈ 15 mph

INSTR. STATION	ROD SIGHT	∡ RIGHT	STADIA DIST	F S HI	F.S. STA. LOCAL ELEV	INSTR. STATION	ROD SIGHT	∡ RIGHT	STADIA DIST	F S HI	F.S. STA LOCAL ELEV
7	6-7-8	192°24'	—	H.I @ 7	ground 8		G-6		VA		
				= 4.93			base	97°31'	1°40'		
				+ 1012.6							
				1017.5	previous measurement 1014.0 1013.7		top	90°09'	+24°04'		
							center ice flow				
	G-4		VA								
	base	128°51'	+1°56'				G-7	79°12'	0°00'		
		128°24'	+1°56'				base				
	top	119°36'	+18°09'	east edge							
							top	75°35'	+26°40'		
	G-5						left leg				
	base	112°45'	0°09'								
		110°16'	0°09'				G-8	59°08'	0°00'		
	top	105°18'	+26°56'				~~top~~ base				
		104°15'	26°56'								
							½ way up to top @ eye	61°11'	+12°50'		
	G-9 6A										
	(center) base near	101°12'	+3°46'			shore pt	7A	12°24'	~~26°25'~~		
	top	100°47'	+27°30'				7B	26°25'			1017.5
	~ or E edge of fault										~~1017.5~~
						S. shoreline		320°10'	9.4		- 8.3
							8.3		-8.0		~~1009.4~~
									1.4 = 280'		1009.2

(16) (17)

INSTR STATION	ROD SIGHT	∡R IGHT	STADIA DIST	F.S. H.I.	F.S. STA LOCAL ELEV	INSTR STATION	ROD SIGHT	∡R IGHT	STADIA DIST	F.S. H.I.	F.S. STA LOCAL ELEV
7	6A	0°00'	8.15		1017.5 ~~1017.5~~ ok		G-6	↑			
in line with 6			7.00		7.5		base	121°42'	+01°45'		
→ 27 min 78	~~6.30~~		1.15	1010.0 ~~1010.00~~	~~1010.00~~						
	7.55		230'	4.92	~~1010.0~~ 1010.0		top	~~110°02'~~	~~+24°07'~~		
				~~1014.9~~				100°45'	24°12'		
				~~1015.1~~ 1014.9 (6A)			G-7				
6A	6	0°00'	—	~~(4.92)~~	~~1015.1~~ ~~1014.9~~		base	110°42'	+0°13'		
					~~1014~~		top	~~100°~~			
	7	180°00'	—	~~1004.5~~	~~1004.5~~			92°35'	+27°10'		
				~~+4.3~~			G-8				
	G4			~~1008.8~~ ~~@6A~~			base	+92°50'	+02'15'		
	base	142°45'	~~+5°0'~~				top	86°45'	+14°24'		
	top	135°10'	+14°02'								
						Shore	7A	20°30'			
	G-5						7B	64°05'			
	base	132°06'	+01°25'								
		130°35'	+01°06'								
	top	118°22'	+25°22'			→ sta 6					
		117°09'	+26°35'								
	G-6A						10.4	0°00'	11.0		1015.1
	base	124°00'	+02°04'						- 8.0		- 10.4
	top	112°30'	+25°40'						3.0		1004.7
									= 600'		
											1014.9
											- 10.4
											1004.5

(18) Wind 30 mph gusty moderate snow

(19)

INSTR STA	ROD SIGHT	∡R	STADIA DIST	F.S. HT	F.S. STA LOCAL ELEV	INSTR STA	ROD SIGHT	∡R	STADIA DIST	F.S. HT	F.S. STA LOCAL ELEV
6	Pt. 5	0°00'		(4.3)	~~1008.8~~ ✓	5	4-5-6 G-11	151°41' 39°00'		(5.30)	1008.7
	Pt 6a	162°42'		1004.5	✓				7.4		- 6.2
	Pt 7	162°43'		1008.8 @6			6.2		-6.0		1002.5
									1.4		
	G-9	253°00'	(sketch pg 21)		~~1004.7~~ ✓				280'		
	edge ice				- ~~2.7~~						
	2.7		4.15		~~1002.0~~		Pt 6A	143°41'	side shot		
			3.00		1008.8						
			1.15		2.7						
			= 230'		1006.1		Pt ~~7~~ or 8?	142°15'	side shot		
							prob 7				
	G-10	287°05'	5.15								
	edge ice		-4.00		~~1004.7~~ ✓		Pt 2?	357°54'	side shot		
	4.1	center fault			~~4.1~~		Pt 3?	358°08'	side shot		
			1.15 = 230'		~~1000.6~~		upper cofferdam stake				
	edges of fault -				1008.8			355°50'	side shot		
		295° ✓ bad			4.1		30 MAR	by plotting - read wrong circle - is left angle.			
		281° ✓ angles.			1004.7		Send seismic line -				
						Pks	flagged pole				
	Pt 5	0°00'	8.5	(5.30)	1008.8 ✓			358°56'	side shot		
			5.0		- 5.4						
			3.5	1003.4	1003.4		G-12	251°13'	5.9		1008.7
			= 700'	5.3			5.0		5.0		5.0
	5.4			1008.7 instr ht.					.9		1003.7
									180'		

(20) clearing, breezy, stopped snowing

(21) ✓

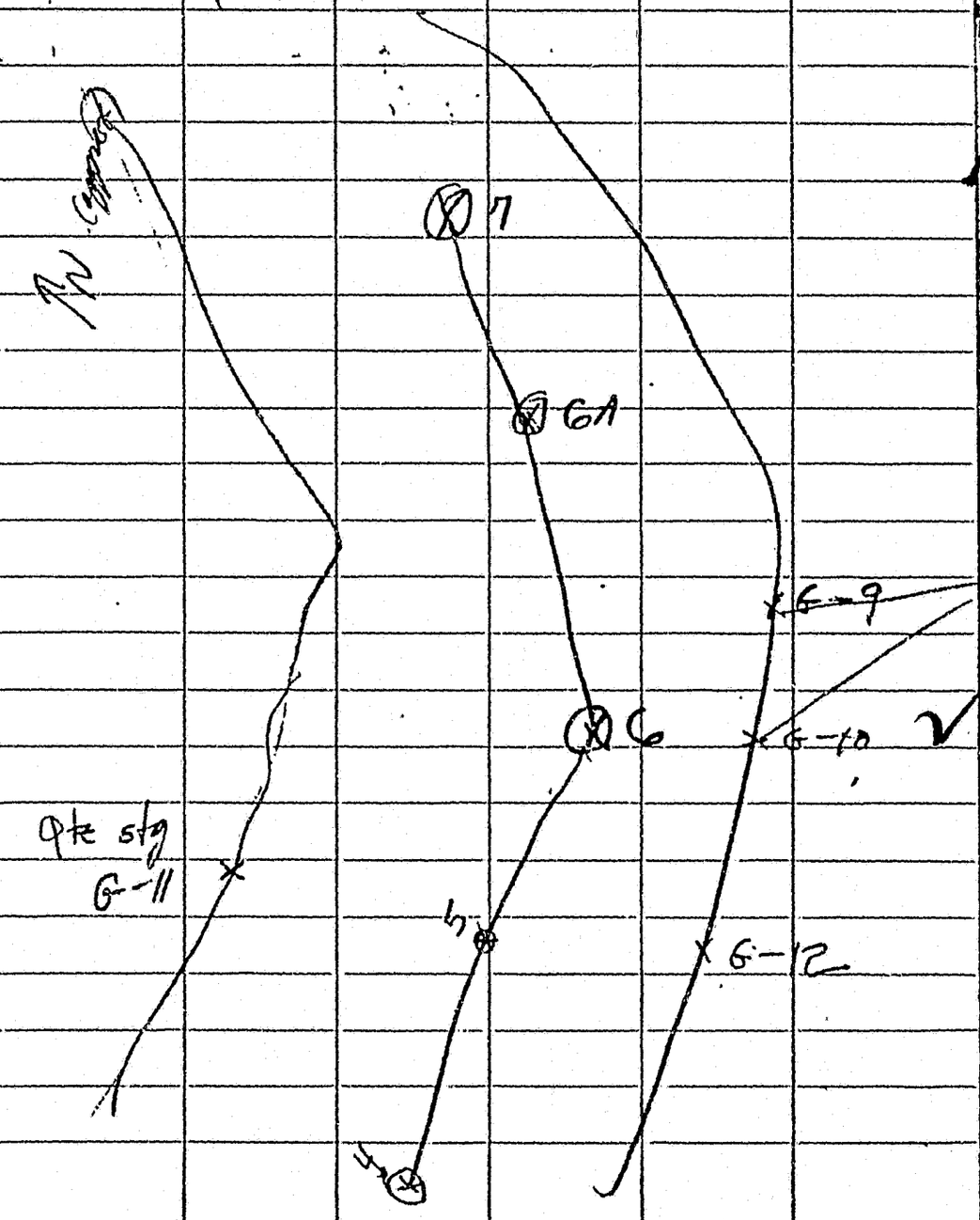
sketch

INSTR STA	ROD SIGHT	∡R	STADIA DIST	F.S. HI.	F.S. STA LOCAL ELEV
5	G-11 B.M.				

establish SE top corner of squarish block ✓
as B.M. – has white stringer in it.
B.M. @ X of qte stg & top face of block
visible from S side of canyon

39°00'

VA = 02°45'



(22)

INSTR STA	ROD SIGHT	⊼ ↳ ⊡ ↳ B Pat ∠R	STADIA DIST	clear, calm ≈20°F F.S. HI	27 Mar 78 F.S. STA LOCAL ELEV
reoccupy 5	~~6~~ 4	0°00'		1003.42	1008.6
				5.22	7.1
				1008.64	1001.5
	7.1		HI @ 5		@ 4
			11.7		
			− 7.0		
			4.7		
			= 940'		

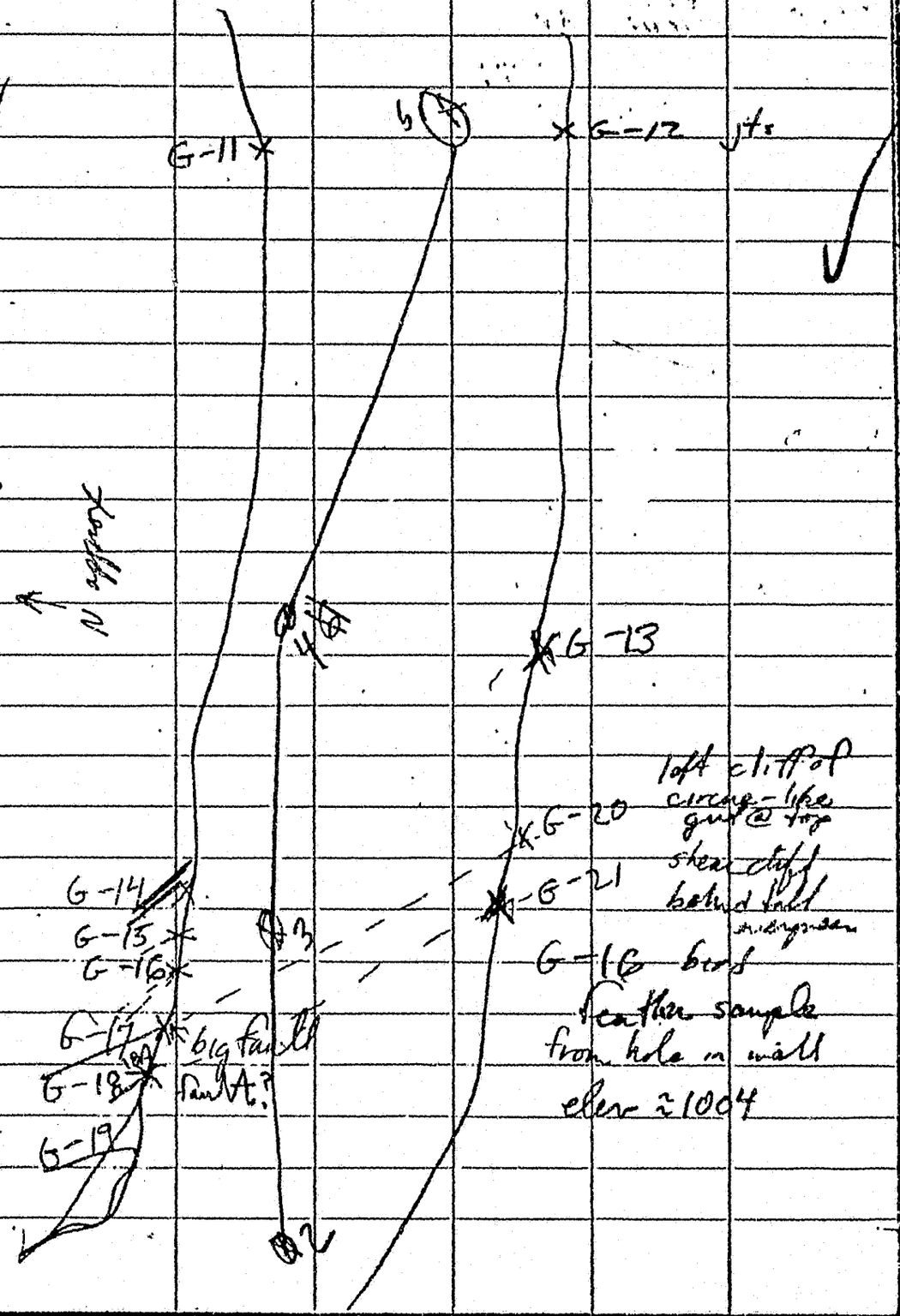
mag azimuth = S 54° W
Pt 5 to Pt 4

N 85 E incl 29° dead on compass
4-5 w/ Brunton

85
29
N 56° E mag 4-5

(23)

sketch



(24)

INSTR STA	ROD SIGHT	∡R	STADIA DIST	F.S. HT	F.S. STA LOCAL ELEV
4	3-4-5	184°47'	—	(4.61)	
	magnetic	N56°E		1001.5	✓
				1006.1	
				inst ht.	
	G-13	255°32'			1006.1
	4.1				− 4.1 ✓
					1002.0
	upper cofferdam stake				
	7.4	350°07'		8.9	1006.1
				7.0	− 7.4 ✓
				1.9	998.7
	Pt 2	01°18'		380'	
	S. end seismic line				✓
		03°16'			
	G-13-b E edge out crop, edge possible fault + river ✓				
		239°30'			
	break - major st face				✓
		244°20'			
	major fault @ ≈85' W. on face				✓
		252°10'			
	2 intersecting faults				
		262°10'			✓

(25)

INSTR STA	ROD SIGHT	∡R	STADIA DIST	F.S. HT	F.S. STA ELEV
4	G-14				
	fault?	intersects	cofferdam stake.		✓
	Pt. 3		10.05		1006.1
	7.1		7.00		− 7.1
			3.05		999.0
			61'	ice heaved	
				999.0	
				HI = 4.07	
3	2-3-4	177°49°			
				1003.8	
	cofferdam stake upstream				~~1003.8~~
		192°47'			
	G-16	left (D.S) fault of pier			✓
	∡R	32°30'			1003.8
	3.1		4.0		3.1
			3.0		1000.7
			1.0		
			200'		
	Send seismic line				
		02°14'			
	c/l rig mast sand line				
	DDH A-FM07				
		05°15'			

INSTR STA	ROD SIGHT	∠R	STADIA DIST	F.S. H.I.	F.S. STA LOCAL ELEV
	G-15	44°15'			✓
	vert fault offsetting				
	horiz one				
	HW mark ≈ 1004				
	G-14 base of fault ≈ 20' above river				
		73°	~~4.4~~		
	~~3.3~~		~~-3.0~~		
			~~1.4~~		
	G-17	22°37'	4.4		1003.8
	3.3		-3.0		- 3.3
			1.4		1000.5
			280'		
	G-18		5.7		1003.8
	3.7	17°44'	-4.0		- 3.7
			1.7		1000.1
			340'		

~~sketch~~

G-18A	small rock on ice near point		
	19° 10'		
G-19		5.6	1003.8
3.4		- 3.0	- 3.4
		2.6	1000.4
		570'	
G-20	gut VA 18°42'		
	211°20'		
G-21	cliff VA 17°00'		
	223°46'	6.0	1003.8
Pt 2		- 1.8	- 6.2
6.2		4.2 840'	997.6
shoreline	S side - change of direction		
3.4		5.7	1003.8
		- 3.0	3.4
		2.7	1000.4
		540'	

~~pt 2 apparently rose 1' in last 3 days only 0.04' off for 3 days~~

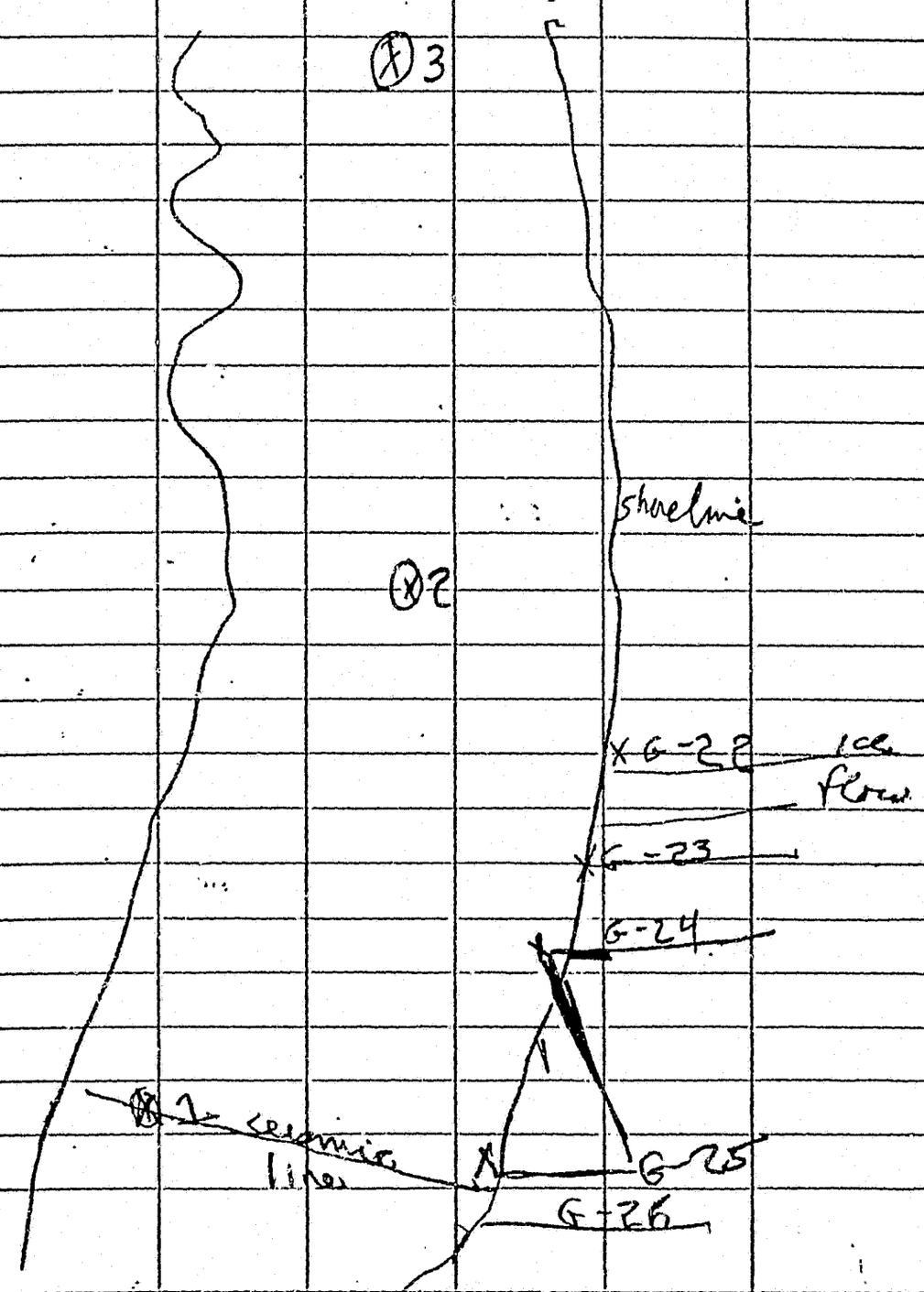
INSTR STA	ROD SIGHT	∡R	STADIA DIST	F.S. H.I.	F.S. STA LOCAL ELEV	INSTR STA	ROD SIGHT	∡R	STADIA DIST	F.S. H.I.	F.S. STA LOCAL ELEV
2	-2-3	142°59'	—	997.6	1002.2		G-22		4.4		1002.2
				+ 4.6	—		2.5	283°43'	-3.0		2.5
				1002.2					1.4		999.7
									280'		
	DDH-A-FM07										
	sandline	333°45'	on rig		✓						
							G-23	306°50'	5.4		1002.2
	DDH-B-FM07				✓		2.7		-3.0		-2.7
	stake	341°00'							2.4		999.5
									480'		
	DDH-C-FM07				✓						
	sandline on rig						G-24		6.9		1002.2
		349°11'					4.3		-4.0		-4.3
									2.9		997.9
	G-18A	131°30'			✓				580'		
	G-20	161°32'			✓		DDH-A-FM07				1002.2
		VA 11°40'					ice elev ≈ 6.0' std (est)				-6
	G-21	163°05'	other end diff		✓						≈996'
		VA 10°00'					DDH-C-FM07				
							ice elev ≈ 5' std				1002
	N. shoreline	51°52'	2.575		1002.2 ✓						-5
	2.5		-2.0		-2.5						997'
			0.575		999.7						
			= 105'								

(30)

IN STR STA	ROD SIGHT	∡R	STADIA DIST	F. S. H.I	F. S. STA LOCATION
2	G-25	330°00'	8.0		1002.2
	5.3		-4.0		- 5.3
			4.0		996.9
			800'		
	G-26		8.5		1002.2
	4.4		-4.0		- 4.4
			4.5		997.8
			900'		
	Pt 1	0°00'			1002.2
	1.7		4.9		- 1.1
			-1.0		~~1000.5~~ 1001.1
			3.9		no 1000.00 B.M.
			=780'		

sketch

(3)



INSTR STATION	ROD SIGHT	∡R	STADIA DISTANCE	F.S. HI	F.S. - STA LOCAL ELEV
1	1	/	0.00	4.17	1000.00
				1000.00	
				1004.17	

looking S.

S. end Seismic line mag az = S11.5° E (N11.5° W) of mag north.

0°00' VA = +01°20'

2 left 76°44' ε = 359°58' ✓

R ∡ 283°14' rel. 76°45°

DS cofferdam

R 76°57'

✓ DDH-A-FM07 sandline on rig

~~DDH~~ 359°30'

✓ DDH-C-FM07 sandline on rig

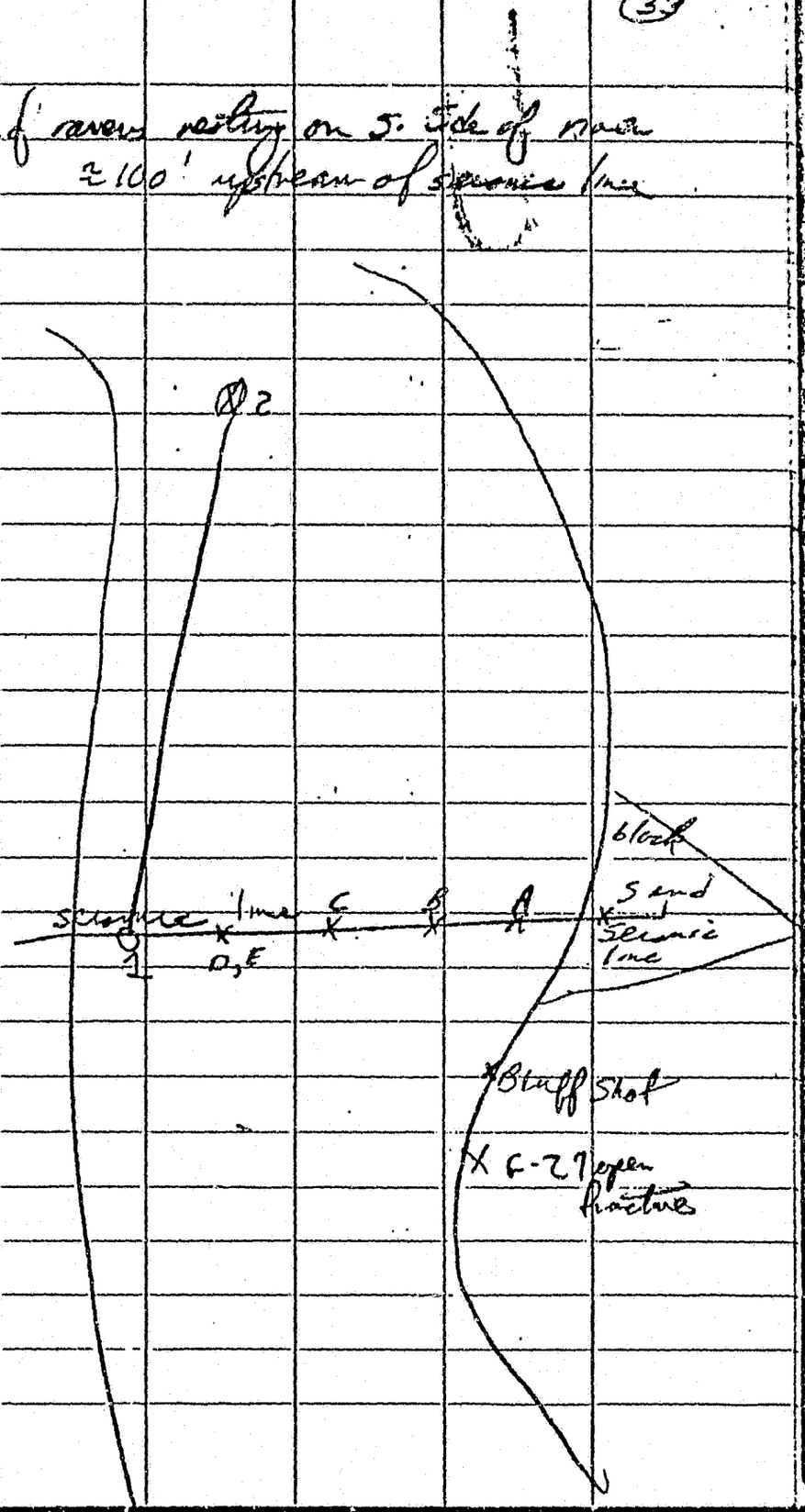
359°20'

≈ top of block on S. side - ≈ vertical cliff

VA = +18°40'

G-26 18°14'

pair of ravens resting on S. side of river ≈ 100' upstream of seismic line



INSTR STA	ROD SIGHT	∡RIGHT	STADIA DIST	F.S. H.I	F.S. INSTR ELEV (CHAN)
1	Bluff				
(top stake = 1000.00)	9.0	32°15'	9.0		1004.17
			6.9		- 9.0
			2.1		995.2
	VA = 22° to top bluff		420'		
	G-27	44°01'	10.2		1004.[illegible]
	8.6		- 8.0		- 8.6
			2.2		995.6
			440'		
	G-28	48°06'	10.4		1004.2
	8.7		- 8.0		- 8.7
			2.4		995.5
			480'		

END OF BOOK

FOR FIELD NOTES

VERTICAL SYSTEM NOTES FOLLOW

(36)

30 MAR 78

Office correction of elevations

B.M N end seismic line +1000.00

Pt 1 961.90

to calculate correct elevations of base line station relative to grid origin point.

1000.00 assumed

961.90 actual

+38.1 difference

For grid local elev: take baseline elevation and subtract 38.1

(37)

Corrected station elevations

Baseline 1-8	Local Elev	Corr	Elev
Pt 1	1000.00	+38.1	+961.9
Pt 2	996.38		958.28
Pt 3	998.66		960.56
Pt 4	1001.46		963.36
Pt 5	1003.42		965.32
Pt 6	1004.46		966.36
Pt 7	1012.6		974.5
Pt 8	1013.8		975.7

(38)

Corrected Station Elevations

Baseline	8-1 ≈ dir	# side shots measured elev	corr.	Elev.
Pt8		1013.8	-38.1	975.7
G-1		1027.8		988.9
gouge		1037.8		999.7
toe fault/cliff		1016.8		978.7
G-2		1016.6		978.5
G-3		1015.1		977.0
Pt7		1012.6		974.5
shore shot	≈195°	1014.0		975.9
shore shot	≈199	1013.7		975.6
shore	≈210°	1012.8		974.7
G-4		1008.5		970.4
G-5	≈112°	1016.8		978.7
w/L		1005		966
G-6		1017.7		979.6

(39)

Sta	elev	corr	grid Elev
G-7	1017.7	-38.1	979.6
G-8	1017.7		979.6
Shoreline ≈320°	1009.2		971.1
Pt6A	1010.0		971.9
Pt6	1004.5		966.4
G-9	1006.1		968.0
G-10	1004.7		966.6
Pt5	1003.4		965.3
G-11	1002.5		964.4
G-12	1003.7		956.6
Pt4	1001.5		963.4
G-13	1002.0		963.9

(40)

Sta	Local elev	corr	Grid elev
upper cofferdam	998.7	-38.1	960.6
G-14	999.0		960.9
G-16	1000.7		962.6
G-17	1000.5		962.4
G-18	1000.1		962.0
G-19	1000.4		962.3
Pt 2	997.6		959.5
shore	1000.4		962.3
shoreline ≈ 52°	999.7		961.6
G-22	999.7		961.6
G-23	995.5		957.4
G-24	997.9		959.8
G-25	996.9		958.8

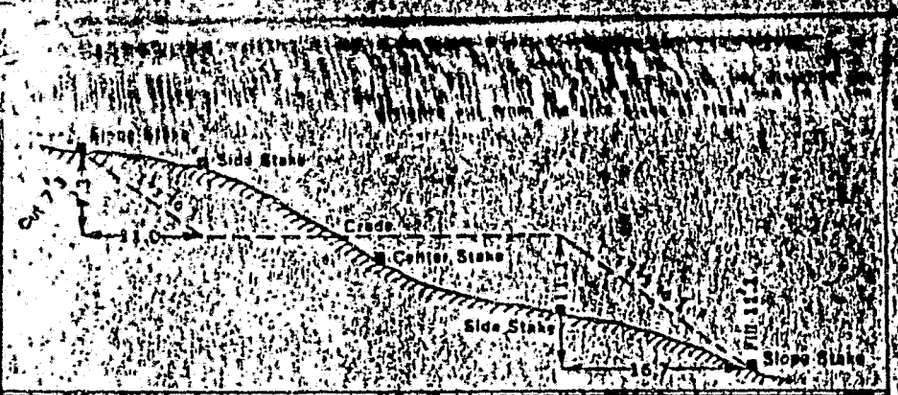
(41)

Sta	Local Elev	corr	Grid elev
G-26	997.8	-38.1	959.7
Pt 1	1001.1		962.0

(poor closure

1 part per 5600 accuracy

END OF Book



Center Line	0	1	2	3	4	5	6	7	8	9	Center Line
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE Wadana Book 4

Misc Notes #1

Survey West of Seismic Line
(Down RIVER)

Selected misc river points

working off ia on river

for geology notes see Book 3
by Pat Galbraith - same dates
This book contains surveyed
locations only.

Note 1: All angles shot from
back sight on previous point
unless otherwise noted.

Note 2: All elevations are grid. local
from Nend seismic line - +1000.00
origin.

Note 3: Equipment is K&E transit
Paragon 191694 & stadia board

Misc Notes

Note 4: Most notes contained herein after page 4 have been made by a civil engineer, not a geologist. Hence geological terms and descriptions used should not necessarily be taken literally.

(4)

J COFFIN
J COFFIN/DUNCAN
~~L~~ DONCAN P. GALBRAITH

COOL, SCATTERED BLUE SKY
VERY SLIGHT BREEZE IN A.M.
5 APRIL 78

(5)

INSTR STATION	F.S. STATION	∡ RIGHT	VA	STADIA READINGS	DISTANCE		H.I.	INSTR ELEV	F.S. ROD	F.S. ELEV	
6	G-10	287°05'	—	—	230' ✓		—	—	—	—	
(5-6-)											
	6A	162°47'	—	—	— ✓						
	7	162°45'	—	—	— ✓						
4	3	0° 00' ~~239 30~~			✓		4.5' ✓				
(~~5-4-3~~)											
(3-4-	gut G-13	233°23'		4.34 / 1.00 / 3.34	334' ✓						
	left edge Glock	238°41'		5.19 / 2.00 / 3.19	319' ✓						
	edge cliff joints	244°14'		5.83 / 3.00 / 2.83	283' ✓						
	1st fault (85' w of edge)	252°25'		3.72 / 1.00 / 2.72	272' ✓						
	2nd fault (intersecting gum)	261°59'		3.68 / 1.00 / 2.68	268' ✓						
Δ	G-14 top	fault 20°23'	12°06'		✓						

JC
JC
PG

5 APRIL 1978

INSTR STATION	F.S. STATION	∠R	VA	STADIA READINGS	DISTANCE	H.I.	INSTR. ELEV.	F.S. ROD	F.S. ELEV
4	G-14	~~0°00'~~		5.20					
	intersection	348°26'		3.00	220'				
	≈ on 3-4 line			2.20					
3	2	0°0'				5.0'			
	G-19	11°18'		6.00	500'				
				1.00					
				5.00					
△	G-14	60°42'	29°17'	–	–	–			
2	~~G-24~~	0°0'	–	–	–				
	G-24	319°03'	–	7.05	605'				
				1.00					
				6.05					
△	DDH-B FM07	341°05'	–	–	–				
△	DDH-C FM07	348°54'	–	–					

(8) ⊼ JC
] JC
|| PG, LD

TEMP: 34°F

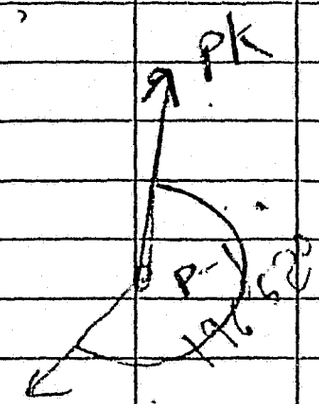
5 APRIL 1978

(9)

INSTR STATION	F.S. STATION	∡R	VA	STADIA READINGS	DISTANCE		H.I.	INSTR ELEV	F.S. ROD	F.S. ELEV
P-1 (B.S. = N END SEISMIC LINE)	N END SEISMIC LINE	0°0'	14°46'	2.36 1.00 1.36	136' ✓	POINT 1 WAS RESET — NEW H.I. = 4.59' 4.21 BASED ON OLD SETTING	4.21' ✓			
			VA FOR STADIA = 15°30' ✓							
	S. END SEISMIC LINE	180°08'	1°20'	2.22 (HALF STADIA)	444' ✓					
△	DDH-B-FM07	179°53'			✓				8.2	
△	DDH-~~C~~"-FM07 C"	179°30'			✓				8.3	

start downstream segment

P-1	N END SEISMIC PK	N14°15'W	MAGNETIC AZIMUTH							
	G-26	196°52'	—	10.98 7.00 3.98	398'				8.74	
	G-30	236°28'	—	11.06 6.00 5.06	506'				9.02	



11 13
11 20
11 11

11 15
11 13

Plotted 19 & 22 June 81 RCP

(10) (10) (11)

5 APRIL 78

INSTR STATION	F.S. STATION	X.R.	V.A.	STADIA READINGS	DISTANCE	H.I.	INSTR ELEV	F.S. ROD	F.S. ELEV

SKETCH

(Not to Scale)

(12) JC JC LD, PG

(13)

5 APRIL 78

INSTR STATION	F.S. STATION	∠R	V.A.	STADIA READINGS	DISTANCE	H.I.	INSTR ELEV	F.S. ROD	F.S. ELEV.
1	G-30A	241°0'	–	9.63	~~263'~~	–		–	
	Center of white rock vein – instr. level.			7.00	526'				
				2.63 (HALF STADIA)					
	9	257°22'	–	10.79 8.00 2.79 (Half Stadia)	558'			11.15	
9	1	0°0'	–	–	–	5.18'			
Pt. 9 is center of chipped spot in ice near angled-upward triangular chunk.									
	G-31	75°44'	–	3.51	151'			3.36	
				2.00					
				1.51					
	G-32	94°08'	–	3.33	133' ~~266~~			3.14	
				2.00					
				1.33					
	G-32A	110°44'	–	3.29	129' ~~258~~			2.72	
				2.00					
				1.29					
	DDH-B-FM07	26°17'	–	–					
	DDH-C"-FM07	15°34'	–	–					

Plotted 19 & 22 June 81 RCP

INSTR. STATION	F.S STATION	∠R.	V∠A	STADIA READINGS	DISTANCE		H.I.	INSTR. ELEV	F.S. ROD	F.S. ELEV
?	S. END SEISMIC LINE	43°20'	1°44'	–	–					
Noticed instrument out of level due to settling (apparently) of one leg in ice – re-levelled instrument.										
	G-33	126°27'	–	3.35 2.00 1.35	135'				2.91	
						Re-checked H.I. – 5.14'				
	G-34	140°16'	–	4.52 3.00 1.52	152'				3.62	
	Shoreline	174°25'	–	6.34 2.00 4.34	434'				3.75	
	Shoreline	175°59'	–	7.89 1.00 6.89	689'				4.44	
	LO	181°06'		8.78 2.00 6.78	678'				4.95	

Plotted 22 June 81 RCP

(16) (17)

JC
JC
LD

Partly sunny, hazy
Strong wind from E.

20-25°F

6 APRIL 78

INSTR STATION	F.S. STATION	∠R	VA	STADIA READINGS	DISTANCE		H.I.	INSTR ELEV	F.S. ROD	F.S. ELEV.
10	9	0°0'	–	–	–		4.92'			
	Shoreline	~~295°49'~~ ~~297°19'~~	1° 00'	5.79 2.00 3.79	379'				~~3.84'~~ ~~3.97~~	
	9	N 64°15' E ~~W~~	Magnetic Azimuth							
	G-35 Pat standing at top of gut on rt. bank (2nd gut toward downstream).	284°31'	22°24'	7.0' Est. by ~~length of~~ Pat's body + hand raised over head.	700'					
	G-35 Bottom of gut (278°30')	278°30'	–	–	–					
	G-36 Upstream corner of rock "cliff."	240°18'	–	6.45 3.00 3.45	345'				5.00	
	G-37	231°04'	–	6.64 3.00 3.64	364'				4.83	
	G-38	223°42'		6.66 3.00 3.66	366'				4.83	
	G-39	214°35'		7.00 3.00 4.00	400'				4.81	

Plotted 19 & 22 June 81

(18) JC JC PG, LD

Very windy in p.m. Cooler, hazy sun.

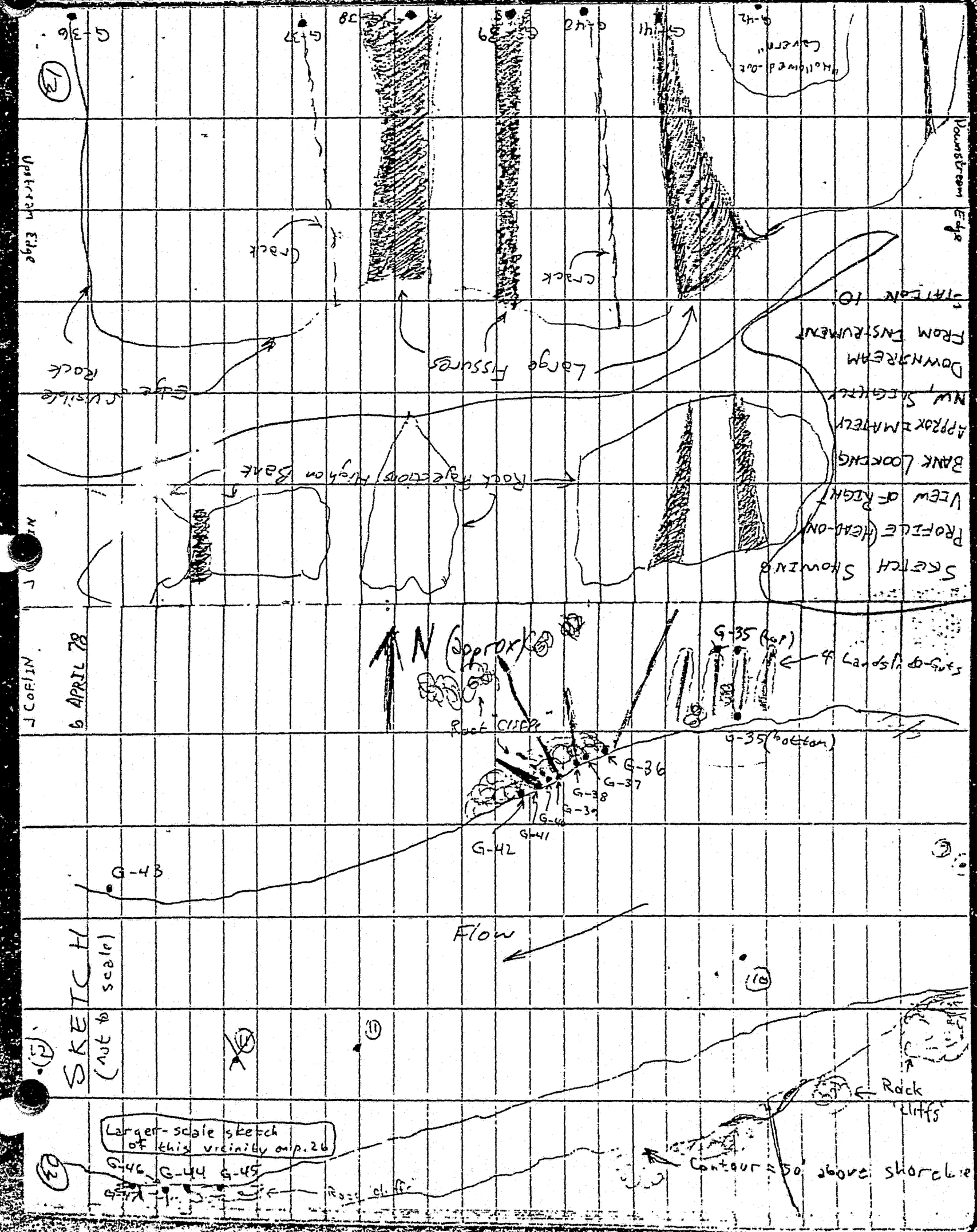
6 APRIL 78

(19)

INSTR STATION	F.S. STATION	∠R	VA	STADIA READINGS	DISTANCE	H.I.	INSTR ELEV.	F.S. ROD	F.S. ELEV.
10	G-40	210°40'	–	7.23 3.00 4.23	423'	4.92'		5.16	
	G-41	206°20'	–	7.41 3.00 4.41	441'			5.17	
	G-42	201°29' ~~201°26'~~	–	7.63 3.00 4.63	463'			5.21	
	Near rt edge of hollowed-out sewer on shore.								
	Shoreline	197°11'	–	7.80 3.00 4.80	480'			5.33	
	Shoreline	192°06'		8.40 3.00 5.40	540'			5.28	
	11	166°12'		11.41 2.00 9.41	941'			6.51	
11	10	0°0'							
	~~Shoreline~~	~~40°20'~~		~~3.92~~ ~~1.00~~ ~~2.92~~	~~292~~			~~2.92~~	

This reading from no. 11 no good - instrument set up too far from point on ice.

Plotted 19 & 22 June 81 RCP



SKETCH (not to scale)
J COFLIN
6 APRIL 78
Upstream Edge
Downstream Edge
Rock Projections Highon Bank
Large Fissures
Crack
Crack
Edge of visible Rock
"Hollowed-out Cavern"
SKETCH SHOWING PROFILE (HEAD-ON) VIEW OF RIGHT BANK LOOKING APPROXIMATELY NW, SLIGHTLY DOWNSTREAM FROM INSTRUMENT STATION 10
N (approx)
Rock "cliffs"
G-35 (top)
4 Landslide-Guts
G-35 (bottom)
G-36
G-37
G-38
G-39
G-40
G-41
G-42
G-43
Flow
Rock "cliffs"
Contour ≈ 50' above shoreline
Larger-scale sketch of this vicinity on p. 26
G-46
G-44
G-45
G-47
Rock cliffs

(22) JC JC LD, PG

6 APRIL 78

(23)

INSTR STATION	F.S. STATION	∡R	VA	STADIA READINGS	DISTANCE		H.I.	INSTR ELEV	F.S ROD	F.S ELEV.
11	10	0°0'	–	–	–		5.06'			
	Shoreline	141°02'	–	4.02 2.00 2.02 (Half Stadia)	404'				2.17	
	G-43	203°26'	–	5.61 1.00 4.61	461'				3.27	
	12	181°~~26~~ 56'	–	10.90 6.00 4.90 (Half Stadia)	980'				4.89	
12	11	0°0'	–	–	–		4.65'		–	
	G-44	55°46'	–	3.31 2.00 1.31 (Half Stadia)	262'				1.86	
	G-45 Bottom of large gut?	44°41'	–	5.25 2.00 3.25	325'				3.76	
	G-46 Bottom of large gut?	62°37'		3.24 1.00 2.24	224'				1.77	
	11	N52°45'W [Should be E?]	Magnetic Azimuth							

Plotted 22, 23 June 81 PCP

(24) JC JC LD, PG

Strong wind, sunny. T = 46°F.

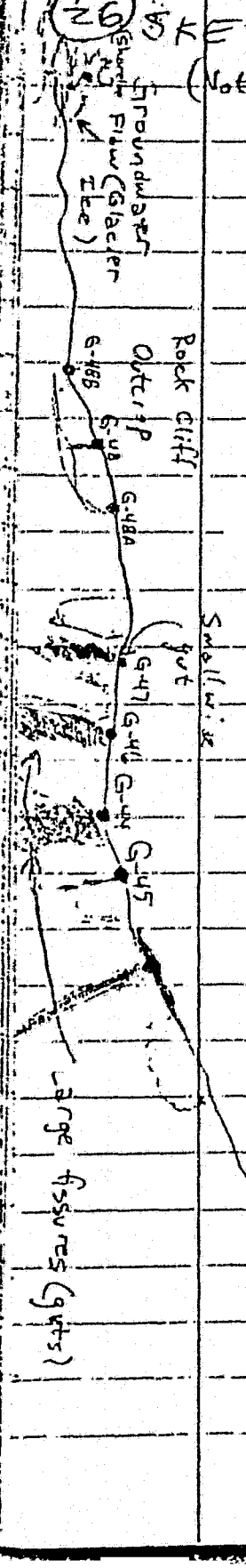
(25)

7 APRIL 78

INSTR. STATION	F.S. STATION	∠R	VA	STADIA READINGS	DISTANCE	H.I.	INSTR. ELEV.	F.S. ROD	F.S. ELEV.
12	11	0°0'	–	–	–	4.32			
	G-47	85°~~35~~ 20'	–	3.68 2.00 1.68	168'			2.98	
	G-48	152°10'						4.57	
	Cleavage at center of outcrop cliffs.			5.38 3.00 2.38	238'				
	G-48A	144°11'			–			–	
	Upstream edge of cliff-outcrop								
	G-48B	157°51'			–			–	
	Downstream edge of cliff-outcrop.								
	Shoreline	223°51'		7.04 2.00 5.04	504'			4.44	
	Shoreline	174°28'		7.56 3.00 4.56 (Half Stadia)	912'			2.58	
	on top of glacier ice ⇒ not true shore elevation.								
	Center of flow of ice is ≈ 30' farther in same direction.								
	11	N50°30' ~~E~~	Magnetic Azimuth						
	13	205°11'		10.10 4.00 6.10 (Half Stadia)	1220'			4.20	

Plotted 23 June 81 KCP

(26) SKETCH
(Not to Scale)



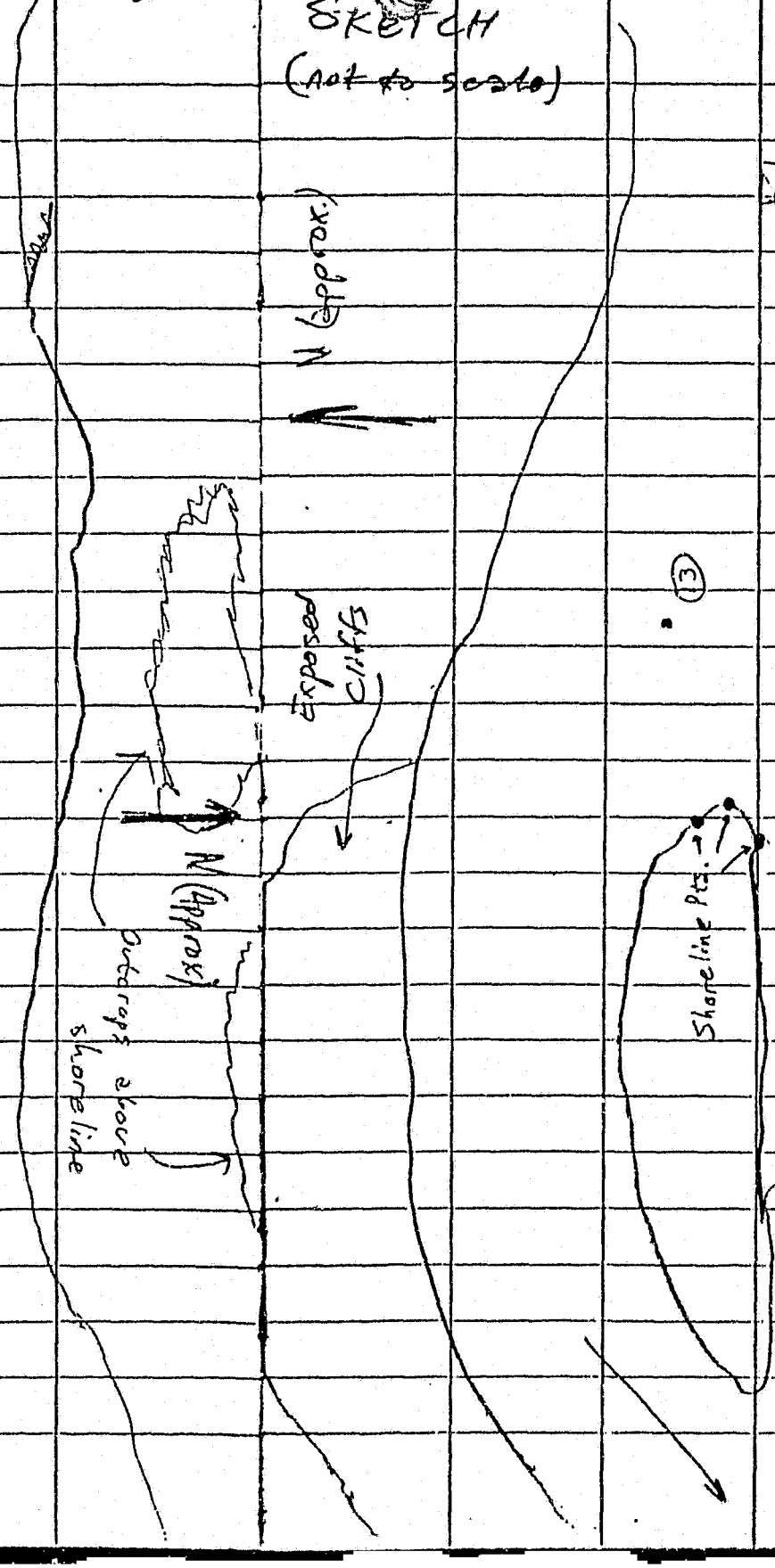
(12)

Flow

(13)

J COFFIN

SKETCH
(not to scale)

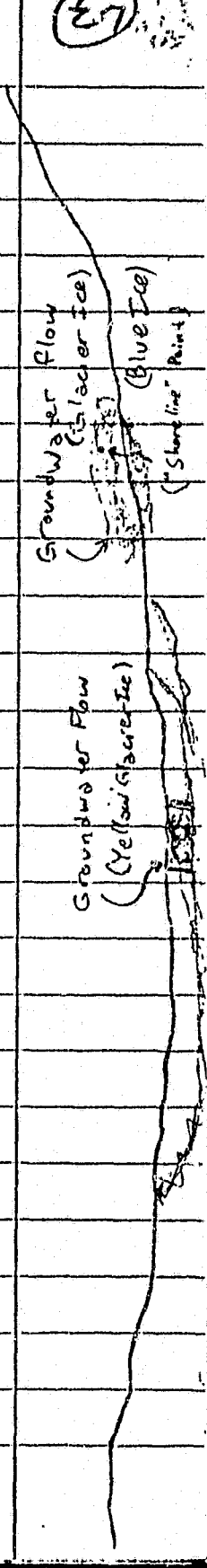


(12)

Flow

(13)

(27)



RIVER GEOLOGY
INTERNATIONAL

(28) (29)

JC
JC
LD, PG

7 APRIL 78

INSTR STATION	F.S STATION	∡R.	VA	STADIA READINGS	DISTANCE	H.I.	INSTR ELEV	F.S. ROD	F.S ELEV
13	12	0°0'	–	–	–	3.90		–	
	Shoreline	142°51'		6.70 4.00 2.70	270'			5.01	
	S. side of island (End of straight edge)								
	Shoreline (E. tip of island)	149°05'	00°30'	5.59 3.50 2.09	209'			4.64	
	[Elevation of island is ≈ 3.5' above the elevation of this point.]								
	Shoreline (Around E tip of island toward NW)	165°23'		5.76 3.00 2.76	276'			4.01	
	12	N76°15'E	Magnetic Azimuth			CLOSED			

Plotted 23 June 81
RCP

product of

J. L. DARLING CORPORATION

TACOMA, WASHINGTON, 98421, U.S.A.

Rite in the Rain®

WEATHERPROOF

LEVEL

NOTEBOOK NO. 311

COE BOOK 5

11 Apr 1978

Hole y 260 taped slope distance along line from 0+00 (rock w/ survey pin)

Hole z ~~251~~ 500' taped from hole y along seismic line

Hole aa 0.1⁻ miles from Hole z

Hole bb 0.1⁺ miles from Hole aa

all holes marked on seismic line

Hole cc 0.22 miles from Hole ~~aa~~ bb.

Hole dd 0.6 miles from Hole cc

Hole ee 0.4 mi from dd.

5280 .4 2112.0

1.10 5280 .22 10560 10560

.22

5280 .4 3168.0

③

note: ½ way between cc and dd float boulders of sandstone (?) continues ss boulder float thru hole dd.

12 Apr 1977

Things to do.

1. ~~Get pickup~~
2. ~~pack up P/U - survey equip & Claus~~
3. ~~Pickup claus~~
4. ~~Spot holes e' & f'~~
5. ~~Wayne to take water samples~~
6. ~~Nail on Air Rotary~~
7. Get old card board from Chevron in talkeetna + make out New rne.
8. Locate "gg" if possible
9. ~~Give T-section to Bill.~~
10. ~~Wayne - when is your wife coming & does she need help etc.~~
11. ~~Stop at trailer for stakes + tape~~
12. ~~Pick up Jeff at Carr's Shopping Center @ 0430~~
13. See Guys about schedule -

13 Apr 1978

Holes gg and ii - do not start until archaeologist completes investigation (could be 15 May).

3Apr 78 | Jeff Coffin (JC) | Galbraith (PG) | Sunny, cloudless sky. Light breeze T = 30°F

(7)

STATION	F.S. STATION	∡R	VA	STADIA READINGS	DISTANCE		H.I.	INSTR. ELEV.	F.S. ROD	F.S. ELEV.
1	S. END Seismic Line	0°00'	1°21'	–	–				–	
	2	283°14'	–	11.54 3.72 7.82	782'		4.40' (0 estimated)		7.62	
2	1	0°00'	–	–	–		3.80 (0 estimated)		–	
	Hole E DDH-E'-FM07	148°43'		5.62 3.00 2.62	262'				4.37	
	DDH-F'-FM07	168°48'		6.03 3.00 3.03	303'				4.52	
	G' Open Fracture	128°49'		2.34 1.00 1.34 (Half Stadia)	268'				1.03	

Description of G':
N30W 77SW

Smooth on u/s face; broken on d/s face.
Open ≈ 1' at most
20' vertical cliff

calculated & plotted
[illegible]

Bill wants

1. Map table
2. Cork board for wall
(bulletin board)

[NW 77 1510 Sat.
Wayne's wife]

blank

(9)

May 1978 7.0 L.E.

(11)

HI 4.97 top of BM PT-A

CC → ee. 5300'
425
655
1280
1000
2280

Shooting in Relict Channel
& Spillway.

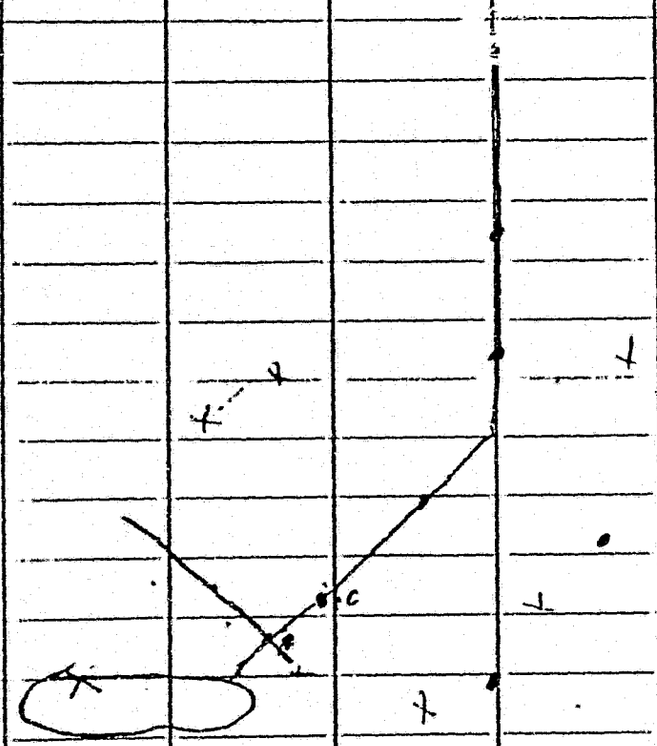
Set 0°00' up seismic Line.

		HI 4.97				
om	To	Rod	Stadia	Horiz ∠	Vert ∠	
T-A	"Z"	4.97	7.48	0°00'	-04°13'	
ksite	PT-A	HI 4.67				
z	Paa	4.67	6.08 ~~180°00'~~	180°00'	+02°20'	
~~aa~~	~~P-ab~~	HI 4.58	Backsite "Z"			
aa	P-ab	13.0	(5.2)½	180°00'	+0°44'	
		HI 4.64				
b	"CC"	4.64	7.12	179°33'	-0°10'	BM "CC" on top of stump. (2.08 ~~Az~~ AGL)
	Set "CC" Shoot target on boulder. Turn left to P-ab. Set 0°00' to target on boulder PT-A					
	0°21'. HI 2.24					
'	P-ac	7.00	4.31	180°00'	-1°41'	
		HI 4.95				
ac	P-ad	4.95	6.59	180°00'	+0°36'	Top of stake - spongy
		HI 4.25				Boggy between P-ac + P-ad
ad	P-ac	4.25	½(5.18)	180°00'	+2°32'	boulder paved "river" up. Line from P-ad.

HI 4.52

om	to	Rod	Stadia	Horiz	Vert
ae	P-af	4.52	5.55	180°00'	+1° 18'
~~af~~	~~P-a~~	HI 4.74 @ P-af			
-af	P-ag	4.74	10.60	180°00'	-0° 57'
		HI @ P-ag	3.98 (top of Stake)		
-ag	P-ah	3.98	8.70	180°00'	+1° 45'

end 4 May 1978



(P-af left for future work - east of lake.
red ribbon in trees.
CC - EE 5300'

Top of Stake P-ae
HI to ground (bog) 4.88
ON Ground

2280
550
2830
1040
3870
850
4720

From	To	Elev	Dist	ΣDist
~~PT-A~~		~~1000.00~~	~~0.0'~~	~~0.0'~~
~~PTA~~	~~"Z"~~			

~~-4°13'~~	~~Horiz 99.46~~ ~~vert 0.33~~	~~7.48~~	
~~+2°20'~~	~~(6.08)~~	~~99.83~~ ~~4.07~~	
~~+0°44'~~	~~10.4~~	~~99.98~~ ~~1.28~~	
~~-0°10'~~	~~7.12~~	~~100.00~~ ~~0.29~~	
-1°41'	4.31	99.91	
	rod 7.00	2.94	
	HI 2.24		
~~el. "CC" + HI - dist el - Rod~~			
~~981.2 + (2.24 - 12.67 - 7.00) = 963.97~~			
	~~-17.43~~		
~~+0°36'~~	~~6.59~~	~~99.99~~ ~~1.05~~	
~~+2°32'~~	~~10.36~~	~~99.80~~ ~~4.17~~	
~~+1°18'~~	~~5.55~~	~~99.95~~ ~~3.27~~	
~~-0°57'~~	~~10.60~~	~~99.97~~ ~~1.06~~	
+1°45'	8.70	99.91	
		3.05	

Comps

(13)

From	To	Δ El.	Elev.	Dist	Σ Dist
PT-A		0.0	1000.00	0.0	0.0
PT-A	"Z"	-54.83	945.2	743.96	744.0
"Z"	P-aa	+24.75	970.0 ~~606.97~~	606.97	1351.0
P-aa	P-ab	+13.31	983.3	1039.79	2390.8
P-ab	"CC"	-2.06	981.2?	712.00	3102.8
~~"CC"~~	~~P-ac~~	"CC" on top of stump +2.08 AGL			
	Ground at "CC" 979.1				
"CC"	P-ac	-17.43	963.8?	430.61	3533.4
P-ac	P-ad	+6.92	970.7	658.93	4192.3
P-ad	P-ae	+45.79	1016.5	1033.93	5226.2
P-ae	P-af	+12.60	1029.1	554.72	5780.9
P-af	P-ag	-17.60	1011.5	1059.68	6840.6
P-ag	P-ah	+26.54	1038.0	869.22	7709.80

5 May 1978

HI @ P-ah 4.48

From	to	Rod	Stadia	Horiz'd	Vert ∠
P-ah	P-ai	4.46	2.17	180°00'	+ 2° 29'
P-ai	"ec"	—	—	183°17' 23	—
		HI 4.82 @ P-ai			
P-ai	P-aj	4.82	10.15	180°00'	-0° 48'
P-aj	P-ak	4.85	7.75	180°00'	+2° 46'
P-ak	P-al	4.25	1/2(5.55)	180°00'	+0° 39'
P-al	TP	4.63	1.86	179°26'	-0° 22'

From	To	Δ El.	Elev	Dist.	ΣDist
Pah			1038.0		7709.80
Pah	P-ai	+9.40	1047.4	216.59	7926.4
Pai	P-aj	-14.21	1033.2	1014.80	8941.2
P-aj	P-ak	+37.36	1070.6	773.22	9714.4
Pak	P-al	+12.54	1083.1	1109.89	10797.5
Pal	TP	-1.19	1061.9	186.0	10983.5

Set on P-ah backsite P-ag

Near "ec"

22.9' measured (Backsite P-ah) 5.0' below P-ai

Note: Bog between ec (P-ai) + P-aj

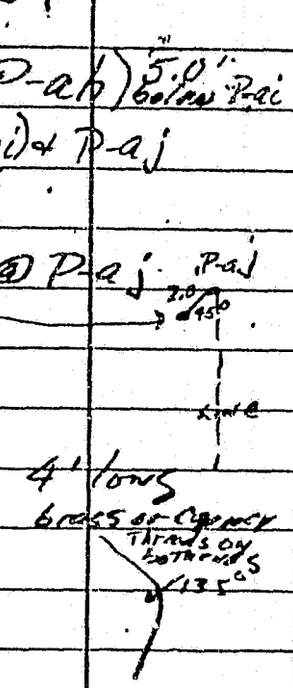
aj — ≈20'± — al

HI @ Paj = 4.85 metal rod @ P-aj

HI @ Pak = 4.25

HI @ Pal = 4.63

Shoot top of hub



Comps

+2°29' 99.61 4.33 2.17

~~-0°48' 10.15~~ 99.98 1.40

~~+2°46' 7.75~~ 99.77 4.82

~~+0°39'~~ 5.55 5.55 (1.10) 99.99 1.13

-0°22' 1.86 100.00 0.64

(17)

5 May 1978

Set Hole V" Stake N-G.

HI to Ground 3.84

From	To	Rod	Stad.	Hor ∡	Vert ∡
1"	N-F	6.0	1.71	0°00'	-11° 16'
		Turn & plunge			
		6.0	1.71	180°02'	-11° 19'
~~1-F~~					
V"	N-H	3.84	0.82	0°00'	+15°46'
		3.84	0.82	180°03'	+15°42'
1"	N-I				

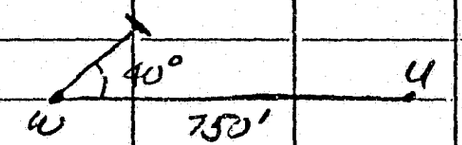
New stake for future work
Shoot to Top of stake

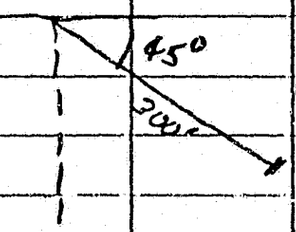
HI @ "V" 3.90 set nail in stump
no info.

END OF FIELD NOTES

To locate hole "w"

1. set up on "u"
   follow Don's line O/S 750'





To locate hole l south side

1. Set on "K"
2. Site North abutment
3. Turn 55° left
4. brush 700' O/S & vert

hole θ

1. 500 more feet from l
   & vert

750
.07
5250

53 | 750

$\times 10^2$

350
750
37500
5250
562500

53
58
159
265
2809

$\sqrt{56,00000}$
7

END OF BOOK

TRIGONOMETRIC FORMULAE

Right Triangle — Oblique Triangles

Solution of Right Triangles

[illegible]

Solution of Oblique Triangles

[illegible]

REDUCTION TO HORIZONTAL

Horizontal distance

Horizontal distance = Slope distance multiplied by the cosine of the vertical angle. Thus: slope distance = 319.4 ft. Vert. angle = 5° 10′. From Table, Page 13, cos 5° 10′ = .9959. Horizontal distance = 319.4 × .9959 = 318.09 ft.

Horizontal distance also = Slope distance minus slope distance times (1 − cosine of vertical ang.). With the same figures as in the preceding example, the following result is obtained. Cosine 5° 10′ = .9959. 1 − .9959 = .0041. 319.4 × .0041 = 1.31. 319.4 − 1.31 = 318.09 ft.

When the rise is known, the horizontal distance is approximately [illegible] slope distance less the square of the rise divided by twice the slope distance. Thus: rise = 14 ft. Slope distance = 302.6 ft. Horizontal distance = 302.6 − $\frac{14 \times 14}{2 \times 302.6}$ = 302.6 − 0.32 = 302.28 ft.

114

Watana Joint Sites.

WATANA: Geology notes - River 5-7 Apr 78

G-10 Gut-wedge shaped N45W, dip high angle but cannot measure.

Joints:

N17W45W
N33W69E
N62E88N
N44W85E - cliffmaker ⊥ to river
N64E79S - cliffmaker ⫫ to river
N65E80S
N40W79N
N42W65N
N50E79NW
N25E 31N ← 31 N
N40E67N
N70E20W
N44W85E - fault (gut)

G-14 Recheck N70W75N
G-24 Recheck - open fractures S05W79E and S80W75N
G-30 Granodiorite (diorite ?) , medium grained, strong dark grey and red/brown stain in joints. Rock weathers dark grey/green and light purple (below hi-water line). Rock is hard and tough.

Open fracture≈0.3' N-S88W

Joints:

N38W87N
N-S06W
N85E50S
N20E81E
N65W24N
N46W87N
(Irregular surface)
N65W71N (qtz on jt)
N10W81E
N64W40N
N20W75E
N42W63N
N42W54N

N62W61S
N35W86S
N65E13N
N75W57N

Sample 6 immediately u/s of Granodiorite dike (G-30a)
Dike N40W - N25W41W
Sample 7 of dike

G-31

Open fracture≈0.3' open N05E80E

Joints from G-31 thru G-32

N50W46NE
N35W vert
N68W68NE
N36W77S
N64W70N
N72W66S
N76W29N
N42E76SE
N78W52S
N62W65S
N60E74SE
N60E80SE
NSEW (0)
N30W75E
N30W88N
N68W66N
N68E25NW
NSEW (0)
N30W81NE
N68W74N
N40E30NW
N65W66N
N75W73S
N68E70SE

G-32 Large gut, left bank, open fracture S05E81E

G32a Large gut D/S of G-32, S22E61E

Joints G-32a - G-33 (dark bluff)

N10E12W
N35W79E
N02W68E
N31W85E (rough surface)
N02W66E (rough surface, green coating)
N55E21NW
N61W65NE
N15E25W
N67W63N
N30W03NE
N70E02N
N25E13W
N70W22N
N85W56N
N72W71N
N28W08NE

G-33

Open fracture (≈0.5') tightens at top S43E70NE. Granodiorite; rock below high water line weathers purple/grey; face grey, joints weeping - white stain.

Joints:
N80E50N
N60E84S
N22W74W
N85E47S
N72E53N
N02E84E
N75W16N

G-34

Thrust fault (?) measureable movement on associated joint ≈1" west. No measurement possible on main plane (E/W 15-20N). Plane irregular. Some red/brown gouge on fault.

G-35

Weathered hill side. Strong signs of hydrothermal alteration. Rock moderately to highly weathered granodiorite (?). Altered rock weathers pink and red/brown. Highly jointed - almost shattered.

S60E82S (main weathered area) Picked up pieces of float very similar to altered area. finger buster

G-36

Major shear ≈10' across, highly weathered in shear, soft clay gouge, iron stained.
N→S description

0.4' white gouge (sericitization) no Fe stain N40W vert ±
2' altered granodiorite
0.3' gouge, white E/W vert ±
3' highly jointed granodiorite
0.3' breccia
0.2' gouge (N80W87S) N edge of main fault
0.3' breccia
2' breccia with gouge
0.3' red/brown to yellow, hard, gouge

Main fault N51W70S (irregular dip)

Joints:

N75W86S
N14E vert
N-S15E
E-W80S
N22E77W
N80W84S
N80W72S
N50W11N

Irregular joints:

N72W47N
N78E10S
N58W48S

Major joints:

N32W87W
N85W87S
N15W85E
N62W88S
N39W86W
N80W08S

Rock has moderate to strong magnetic attraction.

G-37

Shear N50W88N

G-38

Major gut N28W vert

Note: Gneissic structure (vague) starts at G-38

G-39

Major gut N40W74W
Low angle shear between G-38 and G-39 N65W25N.
No sign of slicks, gouge, etc in gut.

Joints:

N60W42S
N52E88S
N27W84E
E-W67N
N25E vert
N-S04E
N25E12S (open joint)

Two shears on D/S edge of gut.

#1 0.6' wide w/0.1' gouge, highly fractured (N43W85E)
#2 gouge N80W77N

Preferred orientation N10W10W
Sample 8

G-40

Shear N46W85N. Gneissic structure continues.

G-41

Open fracture N60W70-80N (varies)

Joints between G-40 and G-41:

N51W85N
N65E73N
N15W72E
N57E89S
N62W70N

Joints D/S of G-41:

N33W12E
N27W26E
E-W89N
N72Wvert
N-S12E
E-W89N
N89E79N (cliff maker)
N-S19E (thrust?)
N21W79E
N38W82E
N60E10S

G-42

Near vertical shear and thrust (?). Rock diced badly. Inclusions change from sedimentary (?) to diorite very abruptly. Open, flat shear (?)
Note: Get core hole above G-42 and down through flat shear.

Bottom fracture open 0.3' ± (N25E13S)
N22W81W shear
N85E34S joint

G-43

Small shear, right bank N05W57E

G-44

Shear, left bank, with slicks, gouge, etc and chatter marks on slicks u/s up, D/S down, reverse movement.

Shear N-S59E (vert limb)
N17W85E

G-45

Gut N-S75E ≈10' wide

Joints between G-44 and G-45:

N30W65E (major, open)
N58W75NE
N25E60SE(rough surface)
N80E63N
N35E32NW
N25E42W (minor, unusual)
N87W56N
N85E89N (cliffmaker)
N15W84W
N80E75W
09

Sample 9 taken

Joints between G-44 and G-46:

N30W59NE (irregular)
N80W09S
N27W80W
N85E80S
N54W85NE
N30E13NW (unusual)
N75W87N
N25W vert
N85W87S

36

1

G-42

Near vertical shear and thrust (?). Rock diced badly.
Inclusions change from sedimentary (?) to diorite very abruptly. Open, flat shear (?)
Note: Get core hole above G-42 and down through flat shear.

Bottom fracture open 0.3' ± (N25E13S)
N22W81W shear
N85E34S joint

G-43

Small shear, right bank N05W57E

G-44

Shear, left bank, with slicks, gouge, etc and chatter marks on slicks u/s up, D/S down, reverse movement.

Shear N-S59E (vert limb)
N17W85E

G-45

Gut N-S75E ≈10' wide

Joints between G-44 and G-45:

N30W65E (major, open)
N58W75NE
N25E60SE(rough surface)
N80E63N
N35E32NW
N25E42W (minor, unusual)
N87W56N
N85E89N (cliffmaker)
N15W84W
N80E75W 08

Sample 9 taken

Joints between G-44 and G-46:

N30W59NE (irregular)
N80W09S
N27W80W 86
N85E80S
N54W85NE
N30E13NW (unusual)
N75W87N
N25W vert
N85W87S

1

G-46

Gut w/ glacier ice. N20E70E

G-47

65

Small shear with slicks N18W85E reverse.
Glacier ice up to 20' above river. Flat joints prominent.
Rock has strong inclusions (granitic)
Prefered orientation N50W09SW (guesstimate)

Joints:

N20W73E
N85E81N
N07E64E
N74W67S (green coating)
N22W10W
N56W67NE
N44W88NE
N61E88N

G-48

Primarily for joint systems. Diorite(?) w/ granitic and mafic (graywacke ?) xenoliths.

Sample 10

Prominent joints:

N66W69S
N32W65E
N54E87W
N69W66S (major)
N39E23W
N54E59W
N21E84W
N81E66S (irregular)
N60W70S (major)

Unusual columnar pattern on D/S edge G-48

N60W09N (top and bottom)
N25W80E
N72E89W
N58W03SW

Note: Large mass of glacier ice ≈500' D/S of G-48.

WATANA GEOLOGY NOTES 18-22 April 78 River Geology

G-50 Graywacke, very highly fractured, blocky to close spacing, exposure over 100' ~~length~~. high.

N65Wvert major joint 1'-2' spacing
N56E53SE major joint 2'-3' spacing
N53E61SE major joint 2'-3' spacing
N44W64NE ~~major joint~~
N38W24SW Bedding (?) rough, undulating surface
N17E82W minor joint spacing <1'
N74E74S major joint <1' spacing
N64W80°N
N57W25SW bedding (?)
N56W62N major joint <1' spacing
N13W69W 6" spacing, odd joint
N40W76SW major joint
N47W83SW major
N50W65NE 0.1' - 0.4' spacing, major
N51W82NE 0.1' - 0.5' spacing, major
N27W77SW
N53W82SW
N50E65SE minor
N70E12N bedding (?)
N30W11SW bedding (best guess) Bedding in graywacke very indistinct- all bedding altitudes are questionable.

20

G-51 Shear in graywacke N55W vert; zone approximately 5' across w/ gouge; weathers to pale yellow. G-51 shot in from P-13 and P-14; photo 8-1. Photo 8-2, bedding approximately 15' D/S of G-51, hammer for scale, head on bedding (note weathering on joints; fissile weathering on bedding) Bedding (?) N60W14SW or N74W03S joints; N68W80N, N10W39W. Small shear approximately 50' D/S of G-51, N09W32W photo 8-3. 10 photos span G-51 to G-52 (8-4 thru 8-13)

6

1 G-52 Shear zone N20W80E

1 G-53 Major shear (gut) N65W75NE approximately 15' across. Note G-52 to G-54, minor lithology change - fault contact?

G-54 Major shear N50W85NE photos 8-14 and 8-15. Joints u/s of shear; major N30E68SE and N70E72N; others N30E46SE, N62E77S, N19W64E; photo 8-16 typical of shattered rock u/s of G-54.

6

34 tot pts for stereo

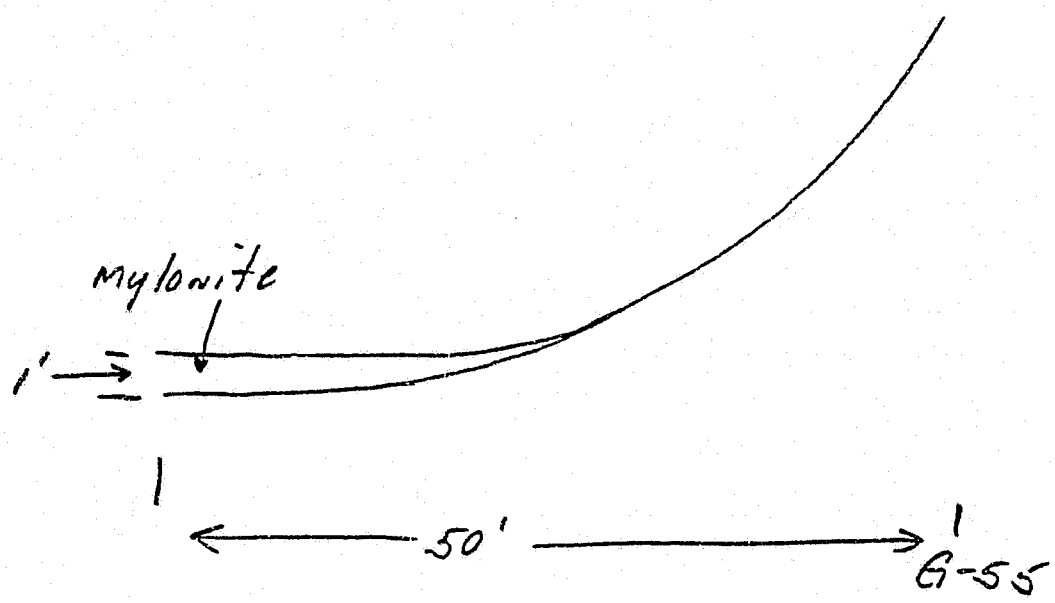
231 tot

(11)

G-55 Contact; bottom graywacke, top sandstone Spl 12 graywacke, Spl 13 sandstone. bedding contact N15W16W. Major joints N35E75SE, N52E56SE, N74W37S, bedding in sandstone N09E14W; joints N25E84S, N52W78SW (6" spacing), N25E86N, N55E79S, N65W81SW, N85E80S. Bedding faults common.

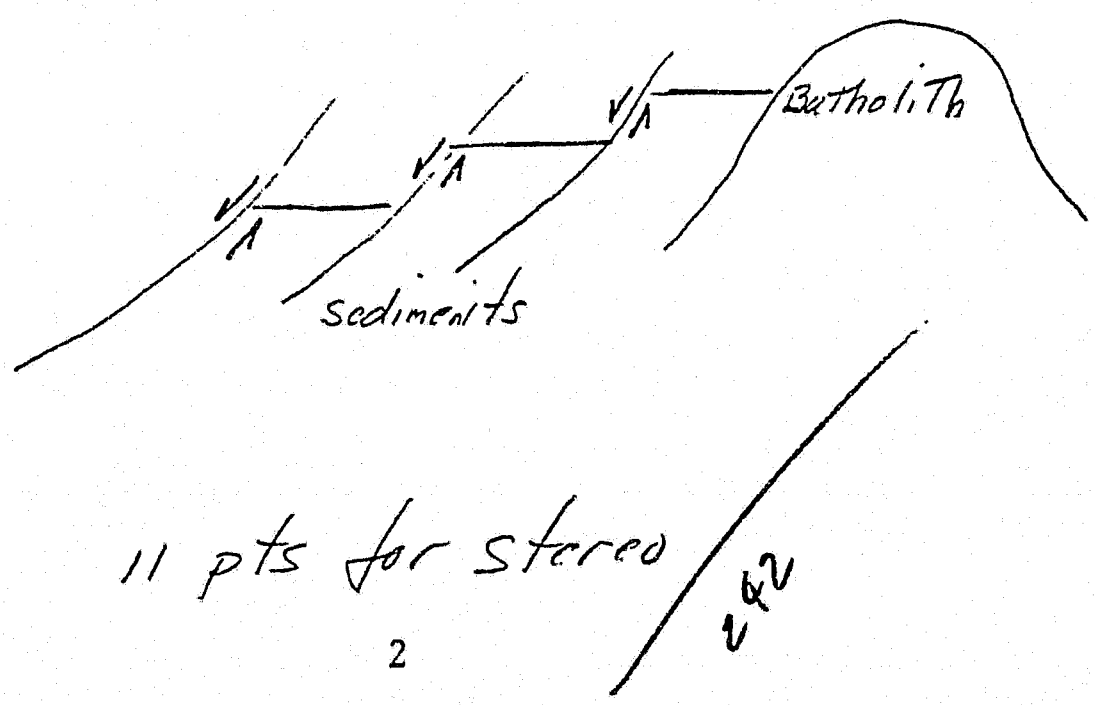
Sketch

Bedding plane fault.



See photo 8-17

Basic Concept sketch



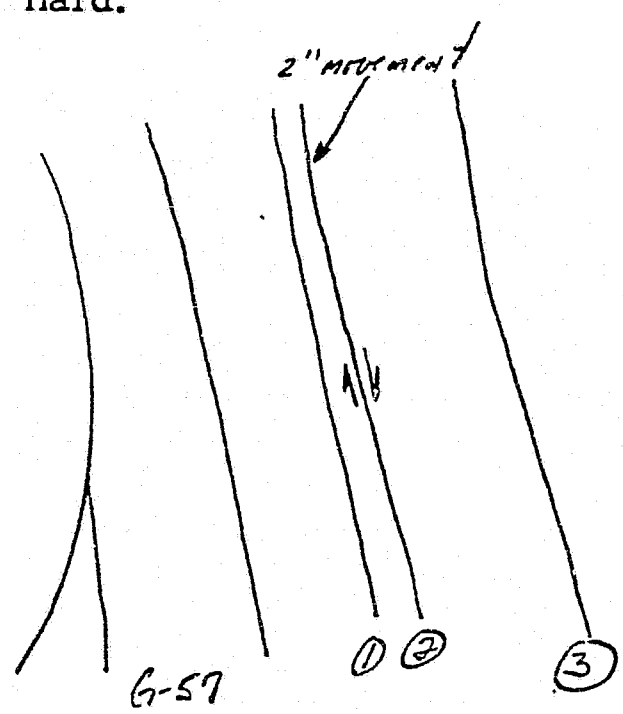
11 pts for stereo

G-56 Shear N35W75NE approximately 20' across. Photos 8-18 and 8-19. Very closely spaced vert to near vert joints u/s of shear. Main shear would day-lite 8' u/s of stadia. Point G-56. Spl 14 taken immediately D/S of G-56. Series thru G-56 is graywacke/ sandstone/shale (very little)/graywacke. Beds gently dipping; graded bedding ~~sun~~ SEEN occasionally. Beds are upright. E/W trending joints form vertical cliffs - overhangs common. Unweathered rock is medium gray with red and white grains (rounded and appear to be sand). Weathers gray/brown to yellow/brown. Thin bedding plane shears common. All sedimentary rock is highly jointed - almost diced. Bedding, where distinct, is from 0.1' to 1.5' thick. Lower graywacke bedding is very indistinct as noted in variations of bed attitudes taken. The lower unit weathers to almost fissle pieces of scree indicating thin beds (may be indistinct relief joints). From G-55 and up section, beds are very distinct. Attitude at G-56 N20W20SW. D/S of G-56, Joint (cliff) N62E82S. Bedding indistinct but breaks fissle. Bedding (?) N69W20S. Up section at G-56, fine grained siltstone, gray, fissle. Bedding N56W16NE. Joints N60E80S and N22W78E (major with <1' spacing); minor N14W73W.

8 pts for stereo

G-57 Gut N40W75NE. Photo 8-20. Numerous sub parallel shears upstream of gut. (N35W67NE, N26W67NE, N31W60NE). Shale/slate with graywacke inclusions. Bedding undulates N12E10E. 100' D/S of G-57 bedding N/S 25W (positive). Major joints G-57 N74E75S, N24W82E, N05W70E, N70E77S, N29W67NE, N50Wvert, minor joints N80E59N, N66E30S, N17W70E. Sample 15, slate ?, 100' D/S of G-57. Medium gray, fine grained, weathers dark gray, w/ some brown iron staining. Hard.

14



1 N35W67NE
2 N26W67NE
3 N31W60NE

See photo 8-20

14 pts for stereo

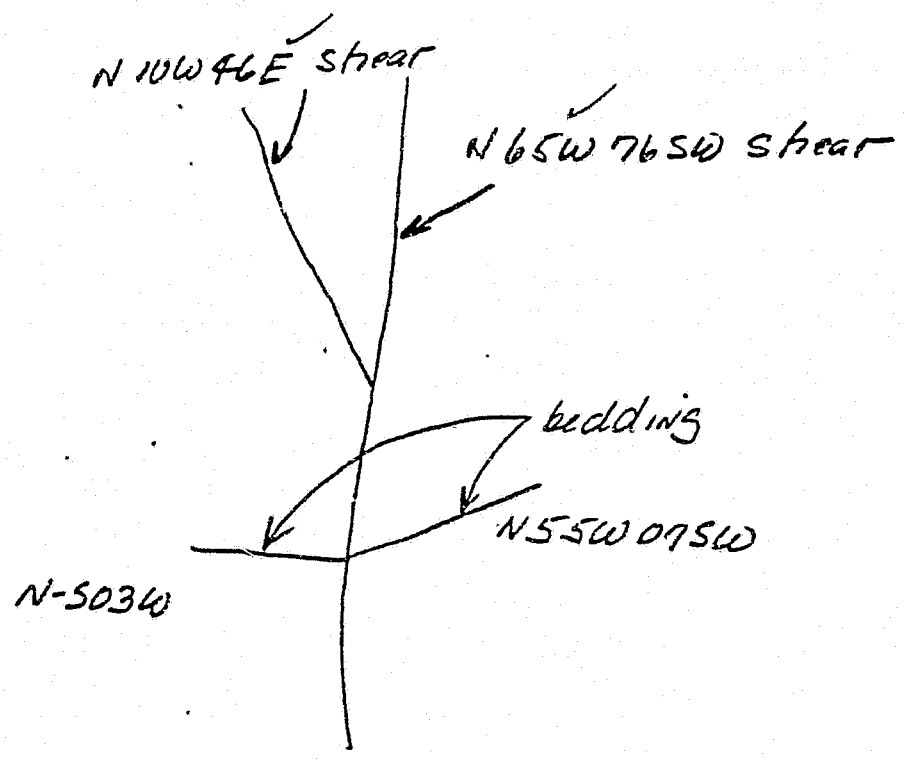
G-58 Right bank - sedimentary rock. Contact between Spl 16 (bottom) and Spl 17 (top). Bedding N80W07S. Joints: N30E82S, major w/ 1' spacing; N56W78SW major w/ 1' and less spacing; N02E74E; N34E84S; N32E84S; N64E82S, cliffmaker; N24W70E; N70W88S; N84W84S w/ 2' spacing; N70W85S; N56E86S, cliffmaker; N02E69E; N50E84SE.

14

G-59 Shale over sandstone; Spl 18 shale; Spl 19 sandstone Photo 9-1 outcrop; photo 9-2 ripple marks. Small shear 20' D/S of G-59 (approximately 0.1' shattered rock). N65W76SW - no significant movement. Bedding N55W07SW u/s of shear; N-S03W D/S of shear. Joints: N74E87S, major; N61E87S, major; N62E vert; N80E89S, cliffmaker; N23W vert; N16W vert; N80E86S; N10W84E; N10W46E; N15W82W; N60E82SE

14

shear



Rotational movement.

28 pts for stereo

G-60 LB
Spl 20; diorite (?) close to contact

G-61 Spl 21; diorite (?) clost to contact; D/S edge of glacier ice. LB

G-62 Spl 22; (?); clost to contact, LB

G-63 Spl 23; graywacke (?) LB

Downstream of large ice fall; graywacke. Joints: N36E88S, major w/ 2' spacing; N85E80N; N35E65SE; N45W74NE; N63E48NW; N59E75NW; N58W75NE; N40E81SE; N60E44NW; N15E80E; N36E66SE; N81E50N, major. Bedding (?) = questionable. Pat

(12)

G-64 Massive sandstone, blocky, bedding (?) N25W07NE Spl 24 Joints: N62E84N, major; N44W82NE, major; N17W60W; N82E85S; N50W61NE; N80E86N

(7)

(4) G-65 Bedding N30E10NW; Spl 25. Joints: N41E73SE, major w/ 2' spacing; N56W74SW, major w/ 1' spacing; N34W78NE.

(5) G-66 Massive blocky shale, Spl 26. Bedding N-S21W. Joints: N64W87S and N14W60E, major; N70W74S and N34W82S minor.

G-67 Contact sandstone on top; shale on bottom; photo 9-3. Joints: N55W85S cliffmaker; N52E80NW. There seems to be a difference in sedimentary rocks on each side of the river; check samples closley. Joints G-67 thru G-68: N32W84NE; N59E80NW; N85E85N; N59E74N; N65E88N; N54W84NE; N85E86N; N52W88N. Small shear w/ approximately 0.1' gouge, 25' u/s of G-68 (photo 9-4, brunton for scale) N24W66SW. Joints: N54W87N, N70E85N

(13)

G-65? watch photos why no notes?

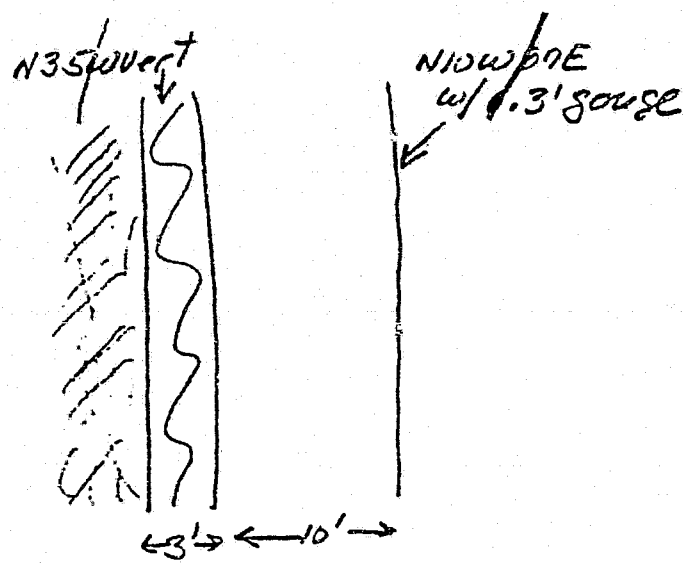
Photos 9-5 thru 9-17. Pan RB sedimentary series from P-17; N55E thru N85W. 9-17 looks D/S at cliffs immediately u/s of ~~Tsuena~~ Tsusena Creek.

G-69 Spl 27 Gabbro?.
Shear N35W vert approximately 3' across. Signs of baking, red/brown staining. Highly weathered; yellow/brown gouge. Joints: N15W82E, N25W86SW, N76W85S, N85E86S and N10Wvert, N05W20W (0.2' - 0.1' spacing) Small shears w/ gouge: N79E75S, N78E78S, N08W84W, N62E74SE.

(11)

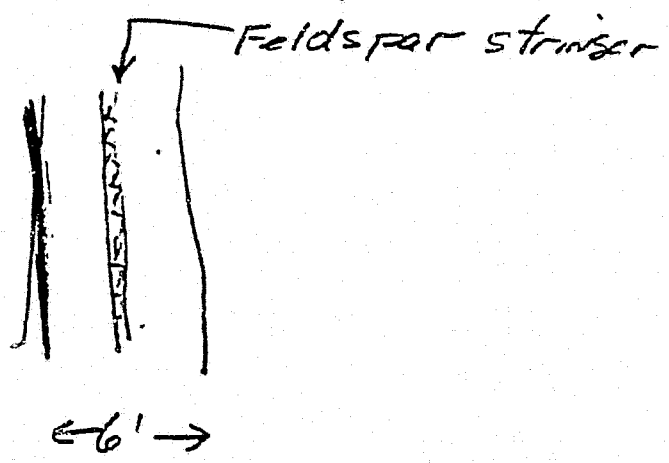
50 pts for stereo

G-69 Sketch.



(1) G-70 Fault contact between gabbro (?) and graywacke. N75W82S approximately 6' wide. Spl 28 of feldspar stringer. Highly jointed w/ gouge; weathered light red/brown.

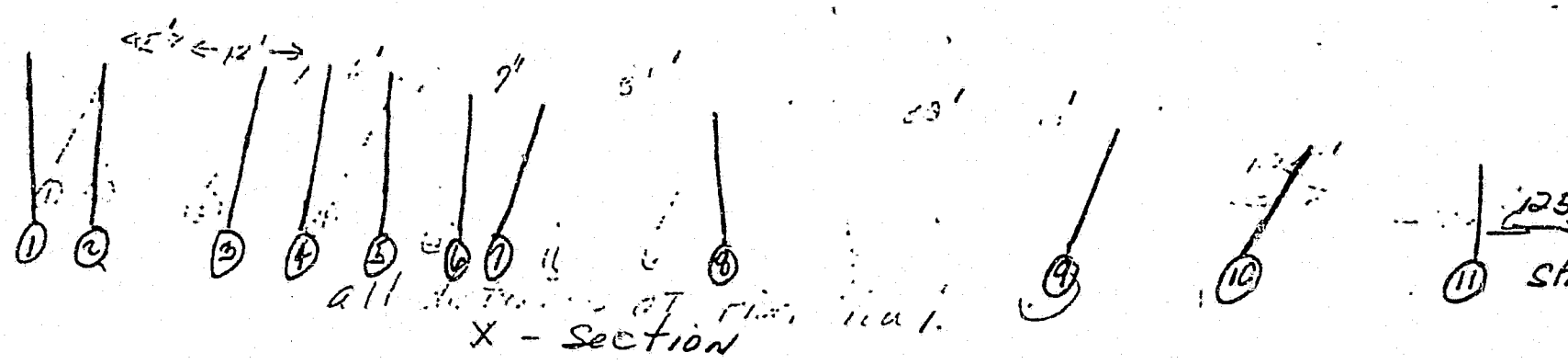
Sketch G-70

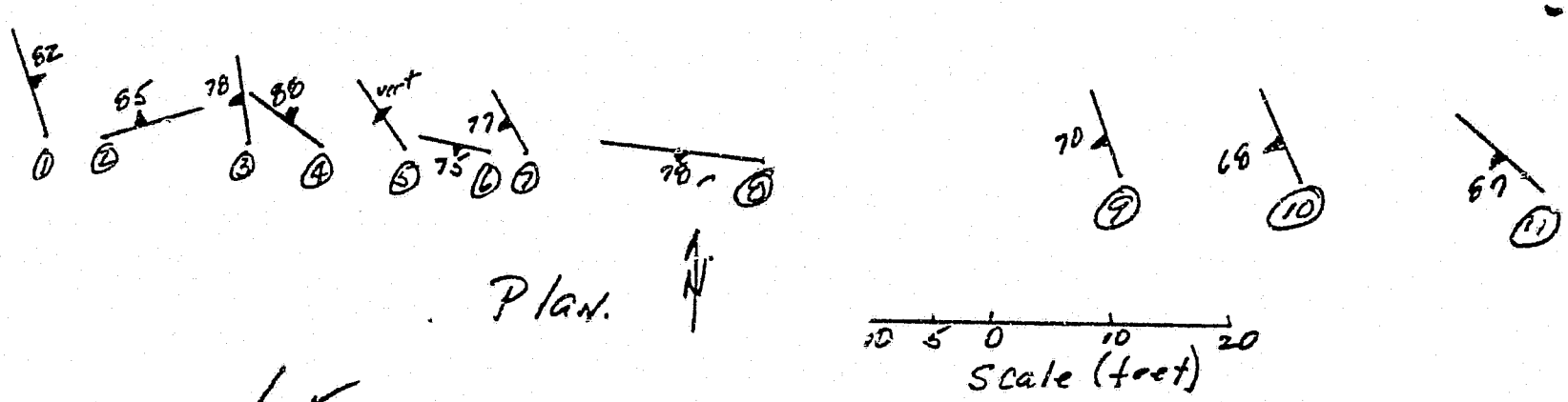


1 pt for Stereo

(12) Joints; N70Wvert and N75W80S in fault; N77E51S, E-W85N, N55W65NE, E-W72S, N60W47NE, N-S30E, N80E21S, N16E41E, N65E73S, N60W57NE w/ gouge.

G-71 "fault zone" in gabbro





1. N22W82E 0.1' gouge
2. N72E85W 0.1' gouge weathered
3. N10W78W 1' gouge
4. N55W88N 0.4' weathered gouge
5. N35Wvert 0.1" weathered gouge
6. N80W75S 0.1' weathered gouge
7. N22W77W 0.1' - 1.0' gouge
8. N85W78S 0.3' highly weathered gouge
9. N20W70W 0.5' highly weathered gouge
10. N25W68W 0.5' - 1.5' weathered gouge
11. N50W87S highly weathered 125' more u/s to shale (Spl 29)
    bedding N28E26NW Graywacke over shale

(11)

23 pts for stereoplot

G-72 Contact between graywacke (top) and shale (bottom)
(6) Spl 30 from 50' D/S of G-71 Joints: N74W88N; N64W82W; N54E83NW; N85E88N; N52W81N; N22W14W; N60E34SW. — impossible
bedding?

G-73 Shale; as far as Greeley and Galbraith got u/s of Tsusena Creek in June 75. Shale/sandstone series; distinct bedding. Thick bedded sandstone Spl 32 N05E16W. Thin bedded, hard, brittle shale Spl 31. Joints: N74W84S, N39W86SW, N55W87SW, N26E73SE, N52W78NE,
(13) N56W85SW, N54W85SW, N52E57SE (open fracture,) N66E40SE.
Bedding 100' u/s of G-73 N18E17NW
Bedding 260' u/s of G073 N49E15NW
Small shear 150' u/s of G-73 N40W85SW
Paced distance G-73 to G-74: (330')

G-74 Major gut; N10W near vert approximately 25' wide
(2) 20' u/s of G-74 small shear N30W82SW
40' u/s of G-74 small shear N25W74SW

(1) G-75 125' paced u/s of G-74
Major gut N15W70SW

G-76 75' u/s of G-75 paced
(5) Two major shears crossing
N20E75SE; N20W vert
20' u/s G-76 bedding N26E08NW, joints; N46W75SW and N50E81SE

(2) G-77 Paced 50' u/s of G-76; major shear N20W73SW
Bedding 10' u/s of G-77 N07E11W

G-78 Paced 85' u/s of G-77 major shear N35W82NE

G-79 Paced 20' u/s of G-78 (joint N30W76SW)
20' u/s of G-79 joint N43W83NE bedding N07W09W, joint N40W85NE,
(9) 70' u/s of G-79 small shear N33W85SW
90' u/s of G-79 bedding N38E13NW
100' u/s of G-79 N35W47SW (small shear)
105' u/s of G-79 bedding N41E10NW

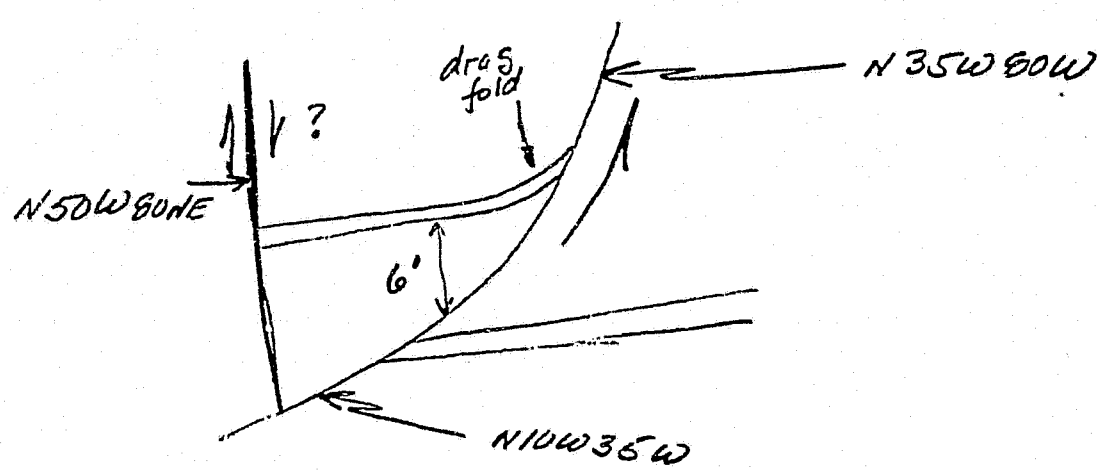
~~39~~ 38 pts for stereo

varies from/to

G-80 Very large shear 20' across at base 15' on top 200' vertical cliff; N15W80W/N40Wvert bedding N30E07W Small shears 15' u/s N37W85NE 0.2' movement and N40W80NE 0.1' movement, both normal

G-81 Two shears

G-81 sketch



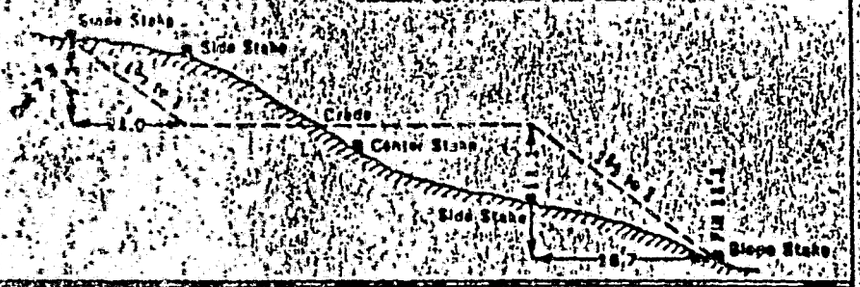
N50W80NE
N10W35W (bottom) N35W80W (top)

Note: Spl 33 of float from black bed in Tsusena Creek cliff

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width, Side Slopes 1½ to 1

In the lines below opposite 1 under "Cut or Fill" and under .9 read 11.0, the distance out from the side stake at left, then opposite 11 under "Cut or Fill" and under .1 read 16.7 the distance out from the side stake at right.



Cut	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.5	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
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31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
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34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE Working Book 10

① G-50

"GRAYWACKE(?)" RAVELLING EXPOSURE

N65W 90° MAJOR 1'-2'

N56E 53 SE " 1 2'-3'

N53E 61 SE " 2'-3'

N44W 64 NE

N38W 24 SW (BEDDING? ROUGH UNDULATING SURFACE)

N17E 82 W MINOR 1'

N74E 74 S MAJOR 1'

N64W N80°

N57W 25 SW (BEDDING?)

N56W 62 N MAJOR <1'

N13W 69 W 6" ODD

N40W 76 SW: MAJOR

N47W 83 SW MAJOR

N50W 65 NE 0'-0" MAJOR

N51W 82 NE 0'-0" "

EXPOSURE OVER 100' HIGH, V. FRACTURED

FRACTURING BLOCKY—CLOSE

N27W 77 SW

N53W 82 SW

N50E 65 SE MINOR

N70E N12 BEDD.

N 30 W 11 SW BEDDING (BEST GUESS)

G-51	N 66 W	90	MAJOR 1-2
JUST DOWNSTREAM OF G51	N 66 E	87 S	MAJOR 2
	N 85 W	82 S	
	N 21 E	54 E	
	N-S	58 E	OPEN MINDSET

G-51 SHEAR - ~~same road~~
PHOTO 8-1
N 55 W ~ VERT
ZONE ~ 5' ACROSS, W GOUGE,
weathers to pale yellow
shot from P-13 + P-14
Photo 8-2 bedding ≈ 15' D/S
of G-51 hammer for scale -
trend are bedding. Note
weathering of joints -
fissile(?) weathering on
bedding.

bedding? N 60° W 14° SW
bedding ~~N 84° E~~ N 74° W 3° S

JTS N 68° W 80° N
MAJOR JTS N 10° W 39° W

SMALL SHEAR approx 50 feet downstream of
G-51 N 09° W 32° W photo 83
10 photos taken in a span from G51 to G52
(8-4 → 8-13)

G-52 Shear zone
N 20° W 80° E

G-53
N 65 W 75 NE major shear w/ gut.
2.75' across
Note G-52 → G-54. minor lithology
change. - Fault contact?

G-54 major shear N 50 W 85 NE
photos 8-14 & 8-15
u/s of shear
major N 30 E 68 SE N 19 W 64 E
major N 10 E 72 N
N 30 E 46 SE
N 62 E 71 S
photo 8-16 typical of
shattered rock u/s of G-54

G-55

Contact lower Greywacke
w/upper Sandstone
Spl #12 greywacke
Spl #13 Sandstone

bedding contact N15°W 16°W
between greywacke and SS

MAJOR Joint N35E 25SE
" " N52E 56SE
" " N74W 37S
bedding sandstone N09E 14W
N35 25E 84S
6' Spacing N52W 78 SW
→ Bedding plane fault's summary ←
jt N75E 86 N
N55E 79 S
N65W 81 SW
N85E 80 ~~N~~ S

Bedding plane fault.

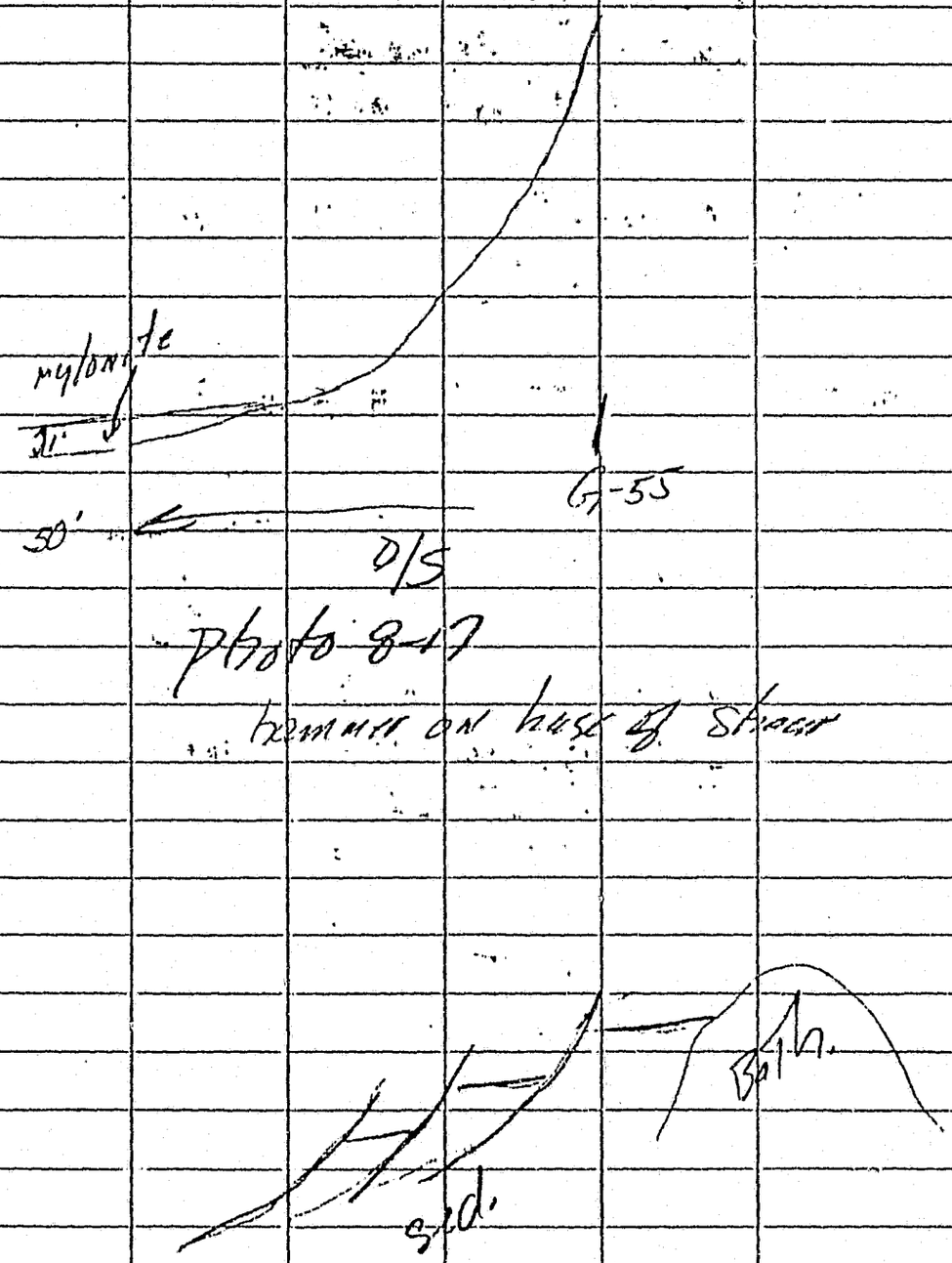


Photo 8-17
hammer on base of shear

G-56

Shear N35W 75NE ≈20' across
photo 8-18 & 8-19
Very closely spaced vert to near
vert joints u/s of shear
Sh Main shear would day lite
8' u/s of stadia point G-56

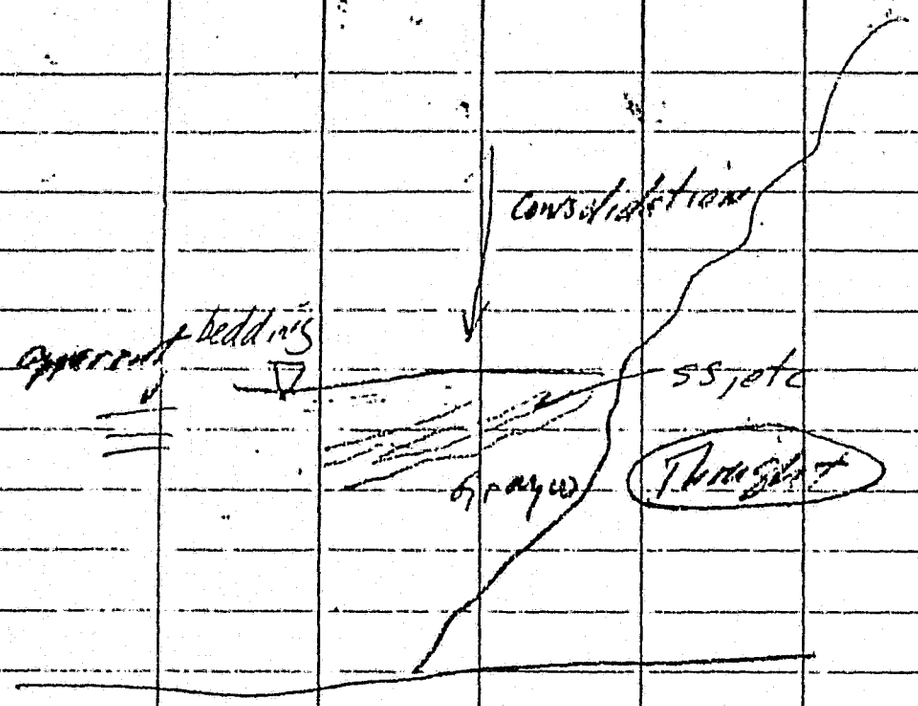
→ SPL 14 taken immediately
Downstream of G-56.
Series thru G-56 is
greywacke / sandstone / shale -
very little / grey wacke.
Beds gently dipping; graded
bedding seen occasionally. Beds
are upright. E-W trending
joints form near vertical cliffs -
overhangs common. Unweathered
rock is medium gray w/ red &
white particles. weatheress
grey-brown to yellow-brown.
Thin bedding ~~plain~~ plane shears
common. Rock (all sedimentary
series) is highly jointed - almost
diced. Bedding, where distinct,

P1 (7)

P1 P2

is from 0.1' to 1.5'. Lower greywacke
bedding is very indistinct as noted
in variations of bed attitudes taken.
The lower unit weathers to almost
fissile pieces of scree indicating
thin beds (may be indistinct relief
joints) From G-55 & up section,
beds are very distinct.
Attitude at G-56 N20W 20SW

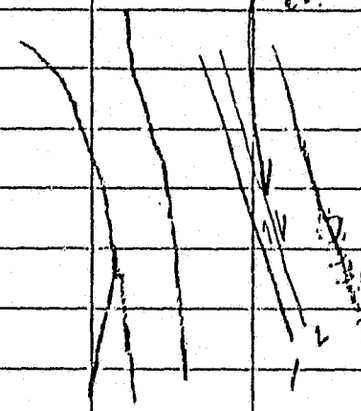
DOWNSTREAM OF G-56
ROCK WALL N62E 84S JT
BEDDING INDISTINCT BUT BREAKS FISSILE
MANNER. N69W 20S IS STRIKE & DIP OF
BEDDING(?).
UPSECTION: F-GRAINED (SILTSTONE?)
FISSILE, GRAY
JT N60E 80S MAJOR 1'
" N22W 78 E " 1'
" N14W 73W MINOR
BEDDING?: N56W 16NE FISSILE PREFERENCE



G-57
Gut N 48° W 75 NE
photo 8-20
Numerous small sub parallel
shears u/s of gut.
① N35W 67NE
② N26W 67NE
③ N31W 60NE

18 Apr 1978

G-57 sketch



bedding undulates ~N12E ~10E

JTS	N 74 E	75°	MAJOR
	slab/slate locally silicified		
JTS	N 24W	82 E	MAJOR
	N-5W	70 E	"
	N70E	77 S	"
	N 80E	59 N	MINOR
	N 66 E	30 S	"
	N 29 W	67 NE	MAJOR
	N 50W	VERT	"
	N 17 W	70 E	MINOR

W/GRAYWACKE INCLUSIONS?

DOWNSTREAM ~100' of G-57 BEDDING IS N-S, 25 W POSITIVE

19 Apr 1978

Sample 15 ~ slate? 100' D/S
from G-57 marked Top
Med gray, weathers dark gray.
w/some brown iron staining.
Hard - bedding indistinct.

G-58 Right Bank - Sedimentary rock
Contact between
Spl 16 (bot.)
Spl 17 (top)
bedding N80W 07S
joints major N30E 82S 1' spacing
major N 56W 78SW 1' spacing oles
odd N 02E 74 E
major N 34E 84S
N 32E 84S
cliffmaker N64E 82 S
N24W 70E
N70W 88 S
N84W 64 S 2' spacing
N70W 85 S
cliff maker N56E 86 S
N02E 69 E
N50E 84 SE

G-59
Sandstone & shale (or top)
Spl 18 shale
Spl 19 Sandstone

Sandstone light gray weathers
red-to yellow-brown. Appears
massive but breaks into thin beds.
Occasional ripple marks. beds
upright.

Shale - medium gray weathers
darkred brown Fissile structure

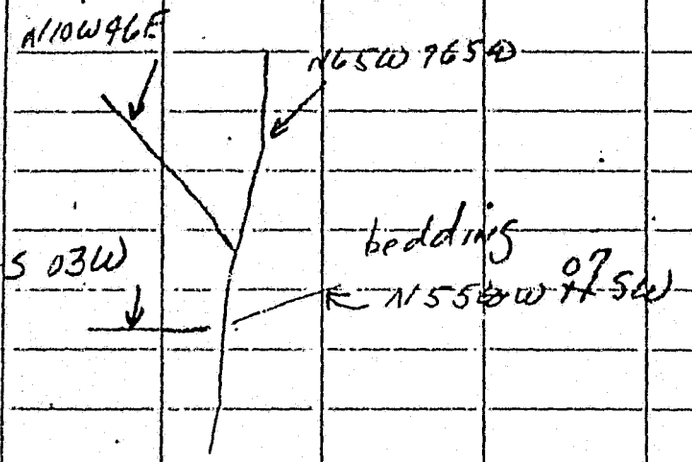
Both highly jointed.

Photo 9-1 outcrop
9-2 ripple marks.

maj jt. N 74 E 87S
maj N 62 E 87S
N62E vert
cliffmaker N80E 89 S
N23W vert
N16W vert
N80E 86 S
N10W 84 E
N10W 46 E

Small shear 20' D/S
of G-59 (~ 0.1' shattered)
N63W 76SW
No significant movement.
N15W 82W
N60E 82SE

sketch of small shear



G-60 Spl 20
Diorite? close to contact.

G-61 Spl 21
Diorite? close to contact
D/S edge of glacier ice

G-62 Spl 22
? Close to contact

G-63 Spl 23
graywacke?

downstream of big vefael graywacke/[illegible]

Major JCT 2' spacing	N36E 88S
	N85E 80N
Cannot determine bedding plane	N35E 65SE
	N45W 74 NE
	N63E 48 NW
	N59E 75 NW
	N58W 75 NE
	N40E 81 SE
	N60E 44 NW
MINOR JCT	N15E 80 E
Minor JCT	N36E 66 SE
MAJOR JCT	N81E 50 N

MASSIVE S/S BLOCKY G 64
bedding? N 25W 07 NE SPL 24

BIG JCT N 62E 84 N

MAJ JCT N 44W 82NE
N 17W 60 W
N 82E 85S
N 50W 61 NE
N 80E 86N

G 65 Spl 25
Bedding N 20 E 10 NW
MAJ JCT 2' spacing N 41 E 73 SE
1' " N 56 W 74 SW
N 34 W 78 NE

G 66 MASSIVE BLOCKY SHALE
spl 26
bedding plane N S 21 W

MAJOR JCT N 64 W 87 S
Minor Jct N 70 W 74 S
" " N 34 W 82 S
MAJOR Jct N 14 W 60 E
major Jt cliff maker N 55 W 85 S
photo 9-3
G-67 interface SS on top / shale on bottom
Jt N 52 E 80 NW
Distinct difference in sediments on each side of river
Jt N 32 W 84 NE
G-67 → G-68 N 59 E 80 NW
N 85 E 85 N

G-67 → G-68 Jts con't
N 59 E 74 N N 85 E 86 N
N 65 E 88 N N 52 W 88 N
N 54 W 84 NE

Small shear ≈ 0.1 gouge
N 24 W 66 SW
≈ 25' u/s of G-68
photo 9-4 of shear
brunton from for scale

Jt N 54 W 87 N
N 70 E 85 N

Photos 9-4 Thru 9-16 (9-5 Pat. 9-17 Pat.)
Pan Right Bank - sedimentary series from P-17
N 55 E thru N 85 W
9-16 looks D/s at Clifts immediately u/s of Tsusena Ck

Plotted G 36 → G 68 + may features
C 8/3/81

e
~~Bell~~ Needs 047-0410-492

752-4810

1. Core box blocks
2. Map table & 2 stools
3. Cork board for wall 5'X3'

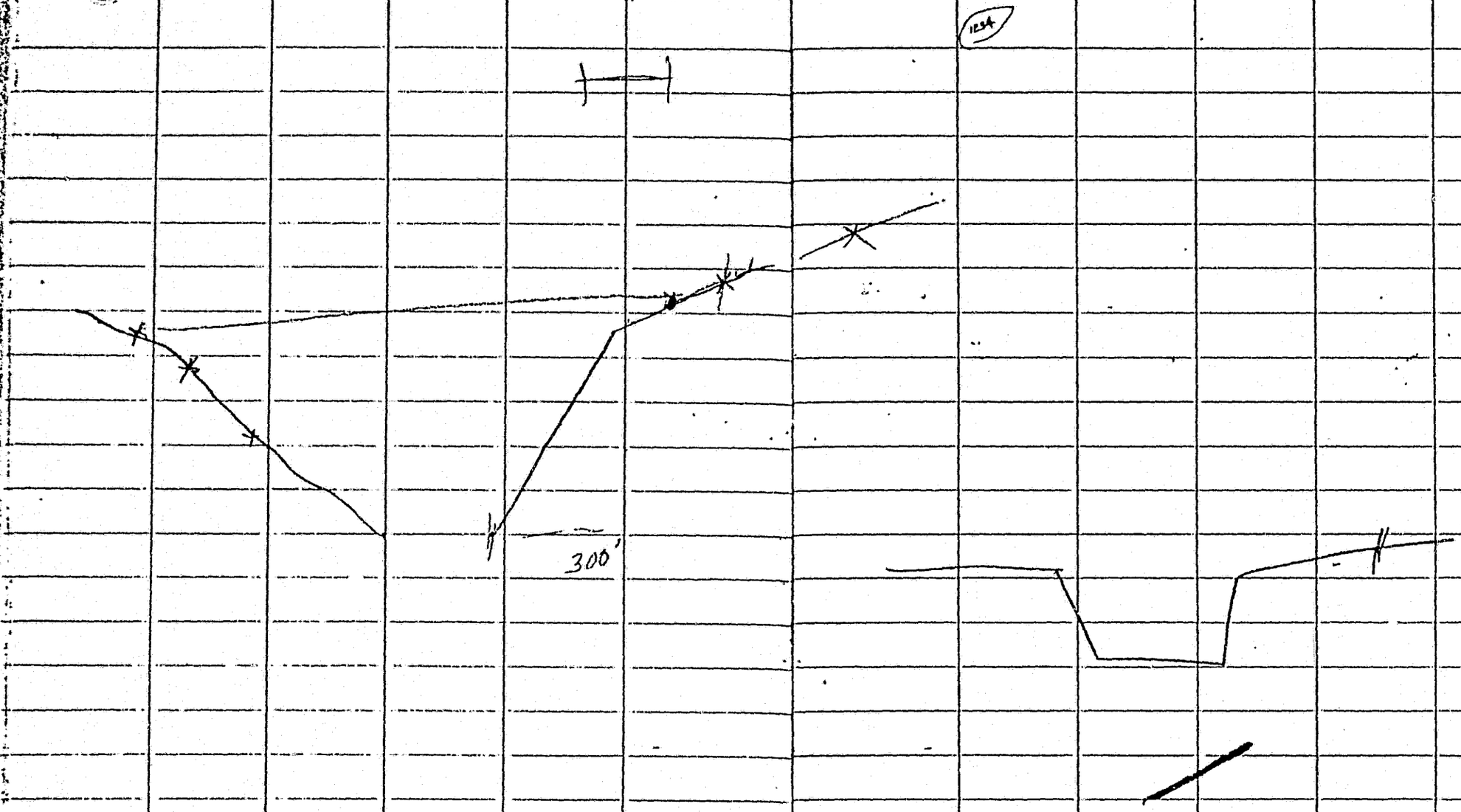
5. More survey crews for south side.
6. Hydrology for river ice.
   River flight - blocks breaking loose. Ice getting rotten. Jambs

blank

121-555-1212

[Hod 279-8393 -]

047 # 22 Apr
Ron Hallmark 344-0047
Del. → 274-
Chopper problems. —


1234
300'

G-69

SPL 27 Gabbro

G-69 fault. N35W Vert ≈ 3' across

signs of baking, red-brown staining. Highly weathered. Yellow-brown gouge.

jts N 15W 82E

N 79E 75S w/gouge

jt N 25W 86SW

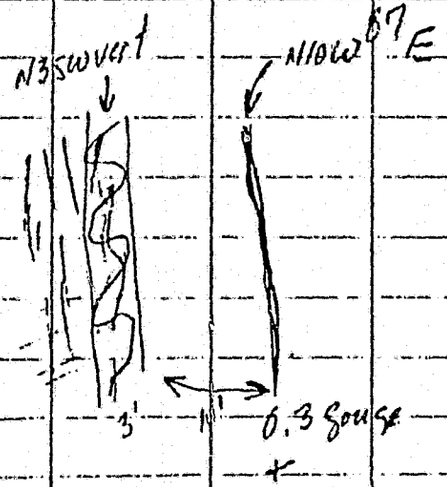
N78E 78S w/gouge

N08W 84W w/red-brown gouge

N62E 74 SE w/red-brown gouge

jt N76W 85S

jt N85E 86S N10W vert W



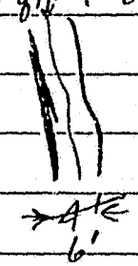
jt N05W 20 W

8.2-1.0' spacing

G-70

Fault contact between gabbro & graywacke

qtz? 80° XL face (feldspars)



highly jointed w/ gouge, etc

weathered light red-brown

SPL 28 of dike

N 75° W 82S MAIN FAULT

6' wide fault

JCTS N 70° W VERT } FAULT

N 75° W 80S

MAJOR JCTS

N77E	51 S	graywacke
EW	85 N	
N 55W	65 NE	
EW	72 S	
N60W	47 NE	
NS	30 E	
N80E	21 S	
N16E	41 E	
N65E	73 S	
N60W	57 NE	gouged

Plotted 7/30/81

671 FAULT ZONE

"gabbro"

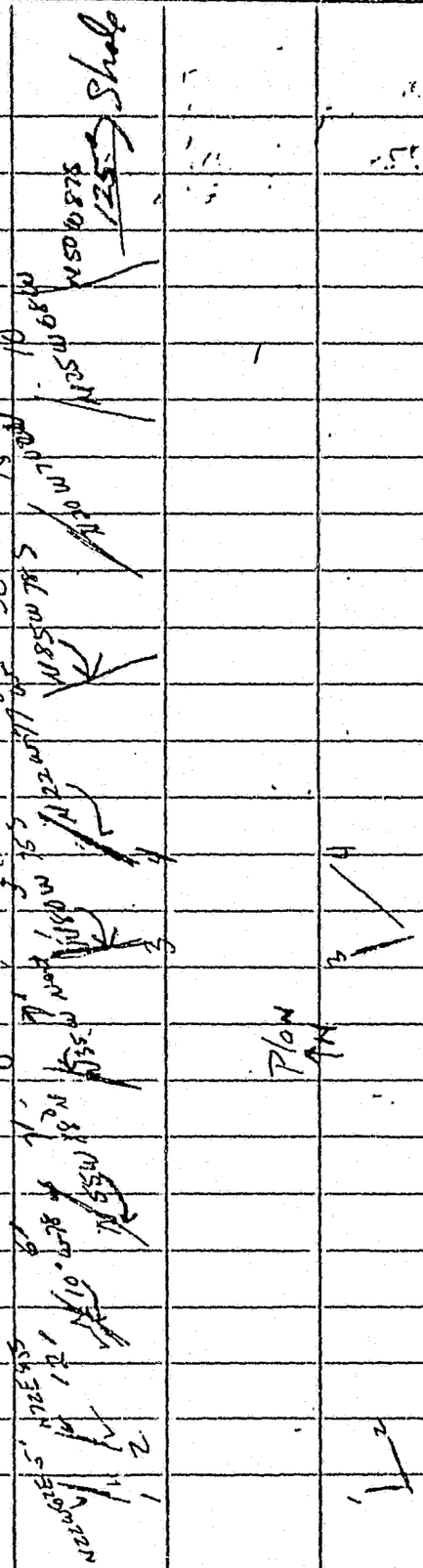
FAULT	N 22° W	82E	.1'	gouge
	N 72° E	85S	1'	gouge weathered
	N 10° W	78 W	1'	gouge weathered
	N 55° W	88N	.4	" "
	N 35 W	vert	.1	" "
	N 80 W	75S	.1	" "
	N 22 W	77W	.1	1' topsoil gouge weathered
	N 85 W	78 S	.3	very weathered
	N 20 W	70 W	.5	" "
	N 25 W	68 W	.5 - 1.5	gouge weathered
	N 50 W	87 S		very weathered

Gabbro → Shale approx 125'

good bedding N 28 E 26 NW

SPL 29

JCT grayvacke N 85 E 26 continuous shale



Plotted 7/30/81

G 72 Contact between graywacke shale below SPL 30 50' from d/s G71

JCT N74W 88 N
N64W 82 W
N54E 83 NW
N85E 88 N
N52W 81 N
N22W 14 W
N60E 34 SW ? Pat

G 73 Shale Greely + Gaithwaite
Extreme range of exploration from Tsunemen Creek in June 75

Shale + SS series
Extremely distinct bedding
Thick bedded SS
- Thin bedded Shale Lt gray green hard brittle SPL 31

Sandstone SPL 32
bedding
N05E 16 W Bedding

~~G 74 MAJOR GUT~~
BIG JOINT
N74W 84S
N39W 86SW major jct
N55W 87SW " "
N26E 73SE " "
N52W 78NE " "
N56W 85SW } MAJOR Set
N54W 85SW
N62E 57 SE MAJ OPEN fracture
bedding 100' upstream N 18E 17 NW
N66E 40SE
Small shear N40W 85SW 150' u/s
FR G-73
Bedding 260' from G-73 N49°E 15°NW

G-74 FROM G-73 → G-74 330 feet

MAJOR GUT N40W near vertical
Approx 25' across Pat.

20' from G74 SMALL Shear N30W 82SW
40' " G74 Small Shear N25W 74SW

G-75 125' from g 74
MAJOR BUT N 15 W 20 SW

G 76 25' from g 75

2 Major shears cross

N 20 E 75 SE
N 20 W vertical
bedding N 26 E 08 NW
major set N 46 W 75 SW
N 50 E 81 SE
appr 20' from G 76

G-77 Appr 50' fr g 76
major shear N 20 W 73 SW
bedding 10' U/S fr G-77 N 07 E 11 W

G-78 appr 85' from g 77
major shear. N 35 W 82 NE
G-79 20' U/S fr g 78 N 30 W 76 SW

20' U/S from g 79
N 43 W 83 NE
bedding N 07 W 09 W
major set N 40 W 85 NE
70' U/S fr g 79
small shear N 33 W 85 SW
bedding 90' up fr g 79
N 88 E 13 NW
100 U/S fr g 79 N 35 W 47 SW
bedding 105 up fr g 79 N 41 E 10 NW

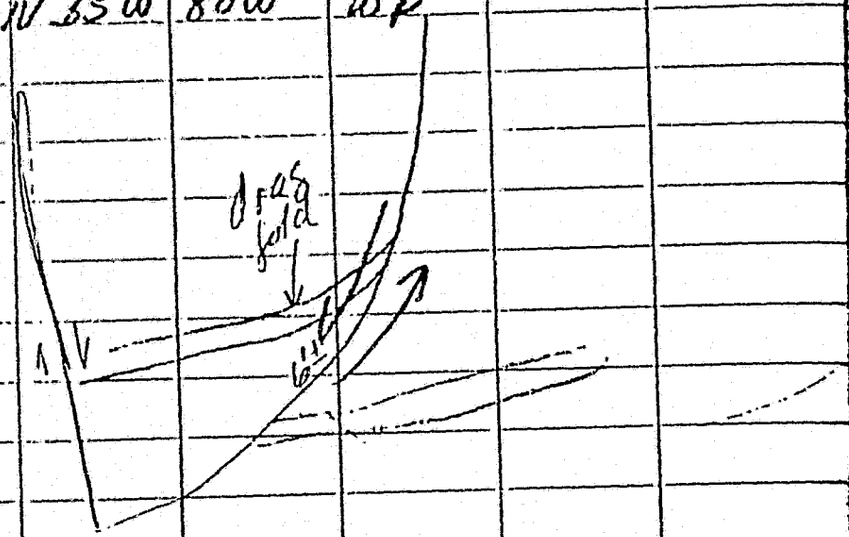
G 80
Very large Shear 20' at base to 15' on top
several strikes during
N 15 W 80 W approx 200' To Top
~~N 80 W~~
~~N 15 W~~
N 40 W vert

bedding N 30 E 07 W
15' up butts into G 80 shear but does not cross N 37 W 85 NE, 2 movement
sm shear N 40 W 80 NE little movement
1' normal

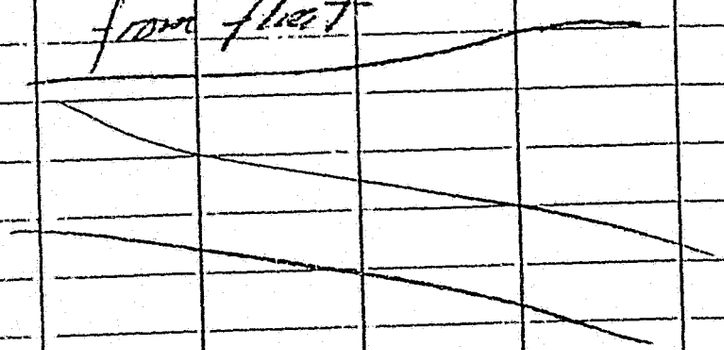
Rec'd 11/30/81

681 Shears:

N 50 W 80 NE
N 10 W 35 W bottom
N 35 W 80 W top



SPL 33 of Black bed
in Tsusena Creek Cliff -
from float



Time:
John Comp. time only

M	8
T	8+2
W	8+1
T	8+5
F	8+2
Sat	~~8+4~~ 12 ~~+~~ Comp
Sun	14 Comp.

Last entry.

0500
1700

Plotted & checked 7/30/81

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width, Side Slopes 1½ to 1

In the figure below, opposite 7 under "Cut or Fill", and under 0 read 11.0' the distance out from the side stake at left. Also opposite 11 under "Cut or Fill" and under 11 read 16.7' the distance out from the side stake at right.

Cut or Fill	0	1	2	3	4	5	6	7	8	9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE Whitana
Book 1

North point Sta. 0+00
Nail on top of 7" birch stump.

South point Sta 5+66.5
Nail 5' high on NW
side of 8" spruce tree.

FSS Anchorage
Talkeetna Flying
Hot Line to Talkeetna
Merrill - 279-8491
Watch Supr 278-2063

Del. 274-7366
Kathy 333-6737

120 + number

Glen 694-2656
733-2424

✓ = etton Acres geology & survey
control map, calculations completed

2/

8 Mar 1978
eliminate O/S neff
to Tsusenack -
a bitch

Oz 1 OK for ruff E-W
approach.

Oz 2 ≈ 3/8 mile from
~~pink~~ flag
orange on seismic TP
centers on "high" terrain.

Miles in #2? -
easy.
#1 for Miles is a problem

#3 along seismic line
≈ 250 yds up line
from +. This gets us
on hi pt ≈ 2500 con tour

3

14 Mar 1978

W Anch 1300 GA
Gr Talkeetna 1530
settled in by 1600

Talked w/pilot - he doesn't want
to fly double shifts yet - dark

15 Mar 1978

0545 1st decent light -
bare minimum in my opinion

DAMSITE LEFT
ABUT. GEOLOGY

15 Mar 1978

set over 7" birch w/ PK Nail

Send Dmc shoot spruce @ 180°00' arbitrary ∡

i/RB
g/LB

HI = 3.2'

vert ∡ ~~0.00~~ 0°00' No go.

el. Nail 1400.0 MLLW

arbitrary

Rod	vert ∡	Full Int.	Horiz ∡	
✓ 3.2	-2°54'	5.75	180°00'	PK nail → spruce
✓ 3.2	-16°55'	1.37	180°00'	PK nail → Pt 1

Set PT1 el. ? notes Frye ↑ Galbraith rod Macleod

HI 5.1

Rod	vert ∡	Full Interval	Hor ∡	~~PT1 →~~
✓ 5.1	-3°00'	0.55	South	PT1 → D+E
✓ 8.0	+0°04'	1.45	L0°15'	PT1 → C (mast)
	all horiz. ∠'s		left or right	from south (PK-PK line)
10.0 ✓	-0°06'	½ int. 1.80 (3.60)	L0°15'	PT1 → A
10.0 ✓	-0°09'	2.56	0°00'	PT1 → B
5.1 ✓	-0°24'	4.40	L63°20'	PT1 → f
5.1 ✓	-0°16'	16.80	R77°03'	PT1 → h

15 March 1978

Rod	vert ∡	Interval	hor ∡ (North) *	Shot
			0°00'	a → ~~0+00~~ PK nail & mast
	H.I. =	5.4'		
5.4	+0°06'	18.80	R72°30' from N 0°00'	a → Hole g i Pat 17 Mar

Pat 17 Mar

could not see hole ∡ g from hole a

Seismic line is 600-~~600~~ 650 feet u/s ✓

from theoretical ℄ on maps. We go with seismic line. Pat 17 Mar

* → 29 Mar 78

Shot from A to N. PK nail is not from 0°00' azimuth because A is offset to west of N-S grid line 100000 E.

DAMSITE LEFT ABUT. GEOLOGY

16 Mar 1978

Snow - no 80 @ 0700

18 Mar 1978

Things to do

1. Recheck u/s & D/S

Cofferdam stakes.

2. Map major structure
LB - Tsusena creek
to Deadman

3. Two pairs watch gloves.

Lv Anc 0430 -
mechanical trouble at
Wasilla - no 80.
No work 18, 19, 20, 21 weather

22 Mar 1978
Lv Talkeetna 0730.
weather clearing to east & north -
snow squalls.

Cut contract ends 22 Mar
needs extension.

DAMSITE LEFT
ABUT. GEOLOGY

9

	Time Sun 12	13	14	15	16	17	18	19	20	21	22
Bill	12	12	12	Hav.	→						
Kieth	↓	↓	12	13	15	10	12	12	16	12	12
Dan	↓	↓	13	13	14	↓	↓	↓	12	↓	↓
Richard	↓	↓	12	13	14	↓	↓	↓	16	↓	↓
Charlie	12	↓	12	13	15	↓	↓	↓	12	↓	↓
Swede	15	12	13	13	14	↓	↓	↓	12	12	↓
Cat Time	—	—	11	12	14	10	12	12	15	11	12

(est)

Cat

7 Mar	11
8	12
9	12
10	17
11	5

DAMSITE LEFT
ABUT. GEOLOGY

Note: brunton set at 29° E declination actually corrected to 25° E declination.

13

Geology (River)

25 March 1978

set Brunton declination @ 29° E

P2 ≈ ℄ River (closer to RB) ≈ 100'
can see most ℄ LB structure
from here & its on RB
Kodacolor Roll #1
1. look O/S to LB from P2
Note NE trend structure
≈ 400' u/s from ℄

P3 ≈ ⊙ of River
RB vert cliff
thin strat? plenty jts.
LB slope wash
photo 2 RB from P3
≈ 125' away

P4 slightly to Rt of ⊙
of River on hard
drift. RB minor outcrops
LB small cliff &
very straight creek
≈ 150' u/s of Point

Photo 3 LB from P4
look u/s ≈ 45° from River
P4 is ≈ 200' u/s of u/s cofferdam

Lunch

P5 left side of gravel bar
≈ ⊙ of river. RB nothing
much
LB. low cliff - step to
top - not much structure
photo 4 - look u/s
from P5 - slide block.
photo 5 - look D/S from P5
in distance is cliff at dam
℄

P6 ≈ ⊙ of River
RB - nothing much
LB - low cliff
NW trending linear
deep erosion
photo 6 look u/s at slide block
on LB
photo 7 LB at eroded linear

6-9

6-9

DIMSITE LEFT
ABUT. GEOLOGY

P-7 opposite fault zone on RB, The ✓ ✓
just D/S of slide block (?)
on LB
photos 8 ⇒ 14 pan U/S ⇒ D/S ✓
of fault zone on RB. Trends
N55W ± ≈ 100 yds across
Seven distinct shears
≈ 10' thick (guess). Dips ≈ ✓
70° NE

P8 on pressure ridge
≈ ⊙ of River
Cliff on LB w/ minor
D/S dipping shears
RB - nothing much ✓
visible but not too far
U/S from P7 fault zone
photo 15
look D/S at RB ✓
P7 fault zone - The Fins

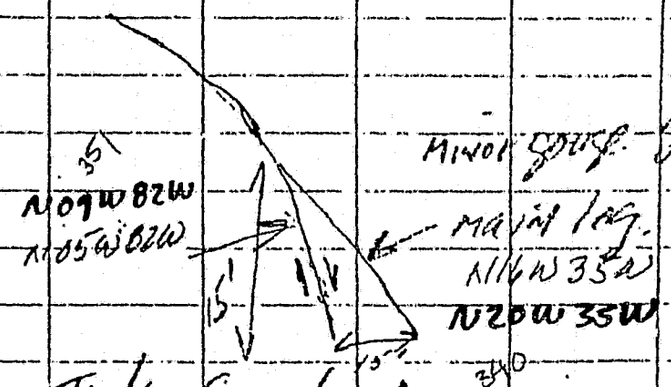
photo 16 tourist
open lead at Susitna
River - far enuf! ✓
≈ 840' U/S from P8

LB - jts -
prom dip D/S ≈ 10°-15° ✓
No major structure

RB blocky weathering ✓
No major structure -

standing on pressure ridge ✓
near flowing water

G-1 LB on cliff



Took Sample 1 ✓

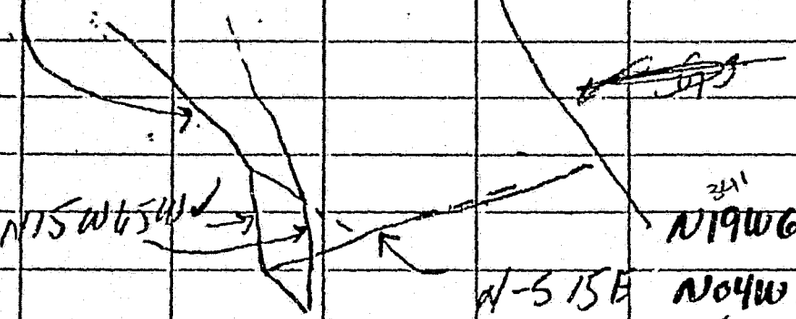
Photo 1-17 ✓

G2 ~~RB~~ LB

N15W 45W ✓ N19W 45W ✓

(companion to G-1

341



N15W65W ✓ N19W65W ✓

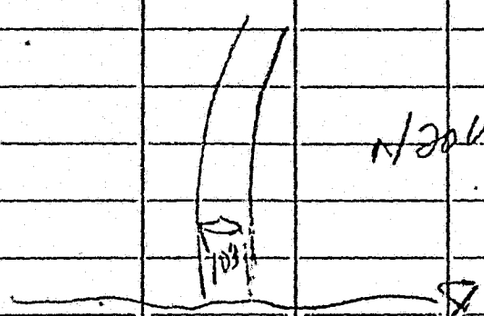
341

N-S 15E N04W 15E

356 ✓

photo 18 ✓

G-3



N20W 80W N24W80W

336

diced rock u/s + D/S ✓

looks like major piece of structure ✓

photo 19

Note

G-1, G-2 & G+3 on slide block on ~~RB~~. LB Pat ✓

28 Mar

G-4 u/s end of P7 RB zone 276 ✓

- N60W 75E ≈ 8' across N64W75

Roll 2 ✓

photo 1, 2 & 3 pan vert ✓

prom jts: N45W 65E 311 N49W65E

N50W 65E 306 N54W65E

511

G-5 N45W 70E N49W70E

very prominent shear (?) ✓

photos 4, 5 & 6. ✓

Narrow ≈ 6' across ✓

wide ≈ 15' across (at river) ✓

Strong but not common jt set

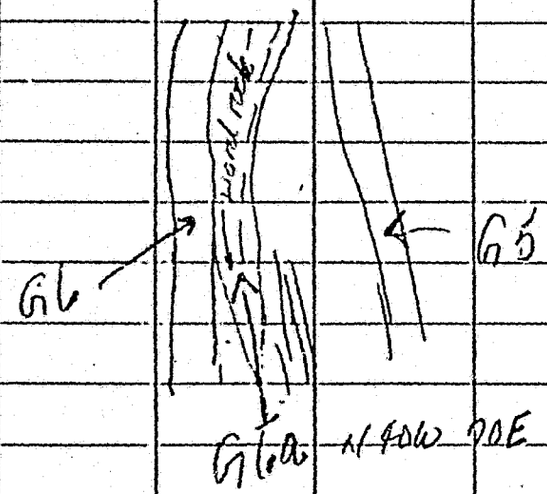
N20W 80W N24W80W

336

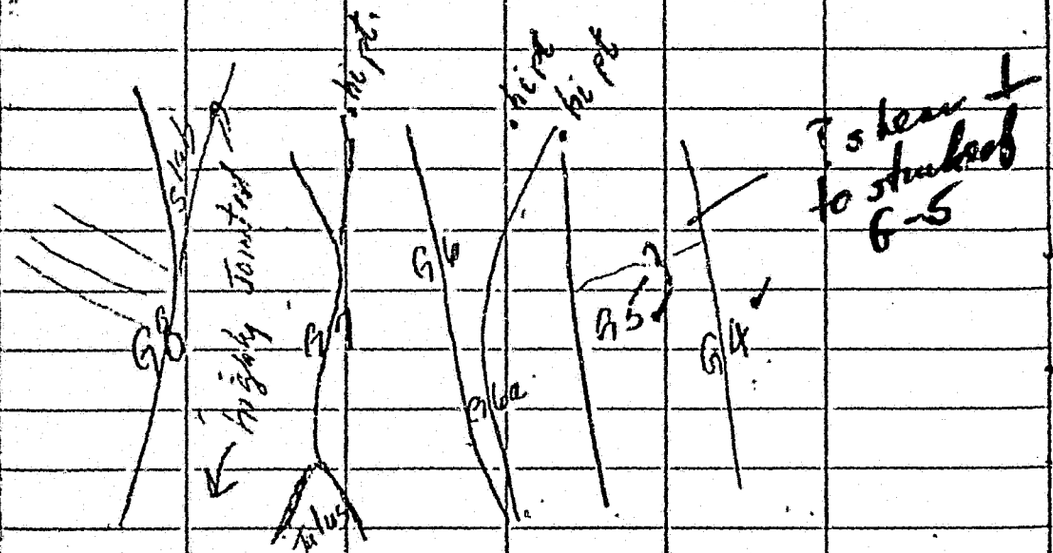
Room + Board 21-25 March $155 ✓

DAYMSITE LEFT
ABUT. GEOLOGY

26 Mar 1978 breezy w/ light snow
at P7 can't dip // to strike-delete
G6 N60W dip?
G6a to the right of G6 ✓



Roll #2 photos 2-8 ✓
pan u/s
G-6, G6a, G-5 ✓



all show signs of weathering
strong red brown stain G6, 6a + G7 ✓

jts between G7 + G8 ✓
N89W55S N 85 W dip S 55° all ✓
N79W70S N 75 W dip S 70° prominent ✓
N69W75S N 65 W dip S 75° ✓
* G6 - green snow in notch ✓

jts downstream of G8 ✓
N 85 W dip 67 S N89W67S
N 40 W dip 40 NE 10' specm. N44W 40NE

G8 N 80 W dip 67 S shear ✓
N84W 67S

between G7 & G8 - another shear
N 80 W dip 67 S N84W67S

photo 2-9 Look S35W from P7 ✓
(Look D/S), note lineaments
on left bank

2/ ✓

G-9 Gut on cliff LB at P6 ✓

jts u/s of Gut spac moderate spacing ✓

Cliff maker N45E 78N — N41E ✓
N55E 72N — spaced N51E ✓
N58E 81N — 0.5'-2.0' N54E ✓
N50E vert — N46E ✓

⊥ set to cliff
N22W 81E No to prominent N26W 334 ✓

others N86W 40S 1'-2' spacing N90W ✓ 290
N75W 80S 1'-2' spacing N79W ✓
N54W 70N 284

Gut N50W 70N 12-15' across ✓
more chopped up D/s than u/s
more joints D/s of Gut

cliff maker. N50E 65S overhang N46E ✓
N55E 38N N51E ✓
N23W 60S N27W ✓ 333

Photo 2 #10 = D/s of gut, chopped up rock ✓

2-
Photo #11 - general view of gut

G-10 Big gut LB@P6 ✓

jts u/s of gut
N16W 75E — N21W 339 ✓
N15W 70E — Prominent, clean 1'-4' spacing N19W 341 ✓
N22W 78E — N26W 334 ✓
N60E 50N — N56E ✓
N25E 60N — N21E ✓
N60E 83N — N54E ✓
N33E vert — N29E ✓
N53E 64N — N49E ✓
N40W 78N — N44W 316 ✓

photo 12 G-10 Gut ✓
Bearing S45E S49E ✓

photos 13 → 17 ✓
pan D/s → u/s, LB ✓
from P5 → G-10 Gut (in ✓
far left hand part of ✓
photo 17 ✓

photo 18
D/S RB from P5
(G 11)
prominent joint sets

G11 at qtz stringer
photo 19 closeup of G11
look N55W, note qtz - N59W
stringer on u/s end
note prominent jts

N59W	N55W	30	85N	0.4-2' spacing
N59W	N55W	30	87N	
N86E	E-W	80	76N	minor gouge
	qtz stringer crosses, not offset			
N64W	N60W	29	84N	
N51W	N47W	30	87N	
N62W	N58W	29	67N	
N90W	N86W	27	77N	very prominent
N77W	N73W	26	73N	
N56W	N52W	30	77N	
N21E	N25E	21	88S	~~minor~~, common
N11E	N15E	11	71S	
N81W	N77W	27	53N	
N16E	N20E	19	72S	

Jts at G-11 - cont.

N81E	N85E	81	10S	not prominent
N24W	N20W	33	22W	2-4' spacing

G-12
photo 20 G12 from P5
prominent joints

SAMPLE #2 - u/s end of G12

N79W	N75W	21	85N
N24W	N20W	33	60N
N47W	N43W	31	12NE
N80W	N76W	28	78N
N84W	N80W	21	88S
N44E	N48E	44	83N
N56E	N60E	56	77N
N36W	N32W	32	13E
N18E	N22E	18	52E
N53W	N49W	30	85E
N46E	N50E	46	85N
N76E	N80E	76	35N
N57W	N53W	30	85N

25

27 Mar 1978

G-12 prominent joints

N54E	N58E	54 80S	
N49E	N53E	49 84N	
N74W	N70W	286 74S	
N61E	N65E	61 65S	
N38W	N34W	322 45E	
N51E	N55E	51 50S	
N59W	N55W	301 54SW	some crushed rock, red weathering, some gouges
N44W	N40W	316 75SW	crushed rock, some gouge, red weathering, 1" across
N56E	N60E	56 59N	
N38E	N42E	38 84N	
N44W	N40W	316 25NE	
N69E	N63E	59 76N	very prom. cliff
N64E cliff maker	N68E	64 75N	very prominent
N11W	N7W	349 60W	prominent
N24W	N20W	336 35W	
N47W	N43W	313 87S/W	movement?
cliff maker N41E	N45E	41 87S	prominent

Bearing P4 → P5 N85E w/ 29° E declen. thrown in

G13 Left Bank opposite P4

Prominent joints - cliff makers w/ orth set G-13

NO gross signs of movement (gouge, etc)

Roll #3

1,2+3 C-130's 003027 Mar

G13b

N51W	N50W	85NE	310
N18W	N14W	vert	342
N01E	N05E	35E	01 (not common)
N89W	N85W	83N	271 cliff maker Left bank
N49W	N45W	66NE	311 (NE facing cliff-minor)
N15W	N11W	65W	345
N59W	N55W	57SW	301
N53W	N49W	58SW	307
N36E	N40E	08SE	36
N78E	N82E	67N	78
N54E	N58E	85S	54
N01E	N05E	35E	01

over

12

G 15 joints cont'd

N44W	N50W	60SW 36				G-13 jts cont'd		
N87W	N83W	82N 23	cliff maker but rugged		N64E	N70E	12° N 70	
N71W major	N67W	79N 29	SMOOTH cliff maker				H.W. ~ 4' up on rod	✓
N59E	N18E	89N 24	SMOOTH cliff maker		N36E	N40E	12°S UP	horz jt/fault?
N86E	E-W	19N 8	MINOR				continuous across previous fault	
N59E	N63E	23S 5	MINOR	2-3' spacing				G-13 ✓
N28E	N32E	83N 27	MINOR	on major jt	photo 5			
N58W	N54W	60S 30	MINOR			N-S	50° W	jt/fault?
N59E	N63E	70°S 5	Major cliffmaker	5 ft	N04W			w/ 1' gouge 262°10
N25W	N21W	35°W 33	minor	244° 20				red-brown when frozen had
		27°W			N71W	N67W	81°S	.3' gouge red-
N18W	N06W	77E 29						gouge ✓
N44W	N40W	83°E 36						
N44W	N40W	04°S 36			photo 5 - & fault junction @ 5' on rod			✓
N45E	N49E	83°N 45						
N31E	N35E	58°N 31			photo 6 = (big fault)			✓
N15W	N11W	74°W 35						
N21W	N17W	15°E 39			rest of face identical			
N54E	N58E	72N 41						
N19W	N15W	77W 32			Extra: Stadia shot P4 → U/S Cofferdam			
N19W	N15W	88W 32	85' down face		stake: no stake may be on trace of			
			so far		fan 14(?) N59E 79W			[redacted]
N79W	N75W	87N 18	0.5-1.0' wide	25'			N59W	
N71W	N73W	89S 18	red-brown ↑ gouge?				N63W	one side of fault thru

photo 4 roll 3

no apparent vert. movement - continuous joint across
slight apparent slip - strike dir

photos 7 → from P3

photo 7 G-14 fault(?) that has trace under u/s cofferdam. ✓

photo 8 G-15 small shear ✓

photo 9 G-16 twin shears ✓

all on Right bank at P3

G-16 Twins

little visible gouge

brecciated rock w/ each

very minor gouge(?) on u/s face of O/S twin w/ red brown weathering (also here is birds nest I took feather from for 10.)

photo 10 close up of weathering + nest. ✓

photo 11 same w/ brain tam for scale ✓

u/s twin N~~75~~ 79 W 85W, 281

D/S twin N~~55~~ 59 W 83W. 301

other Jts N~~66~~ 58 E 86N cliffmaker smooth ✓

N~~18~~ 22 W 28E N~~40~~ 24 E 60E

89 N~~85~~ W 59N N~~30~~ 34 E 74S (cliffmaker) smooth ✓

67 N~~63~~ W 72W

271

293

G-16 con't

N~~85~~ 81 E 66N

G 15

N~~45~~ 41 W 85°E ✓ fault normal

≈ 10' offset E side downcast

12' face fa joint - 6' on side of fault.

N15E	N19°E	75°E	✓	1-5' spacing
				main cliff-maker
				minor exfoliation type weathering
N57W	N55°W	301 85°E	✓	smooth joint
N69W	N65°W	291 75°E	✓	strong jt set
N85W	N81°W	75 62°N		minor set
				sample 3 small, gray
N25E	N29°E	25 81°S		very weak
N25W	N21°W	335 60°E		rough surface, grazing
N52W	N48°W	308 86°E	✓	smooth
N18E	N22°E	18 73°S	✓	smooth
N66E	N10°E	06 66°E		
N14W	N10°W	346 46°E		
N54W	N50°W	306 89°E	✓	smooth face

N~~52~~56W 42°NE flat fault will
≈ 0.2' breccia show in photos

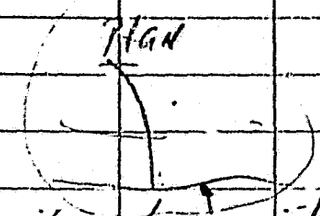
offset by G-~~16~~ 15 fault

G-14 fault - wide talus of blocky
cobbles & boulders (gray)
≈ 150' wide

photo 12 ≈ 100' above river level
straight face, dip slightly w.
highly jointed ≈ 1' spacing
vertically .1-.3 spacing on jts
sample 4 - flat ≈ 2 12
brown vein-like weathering
fairly smooth surfaced

bunch

G-17
Big gut Right bank
≈ 300' O/S of P3



major tine jts
N25W 16E 29
Major gut trend N55W 59 vert
curves stronger west near top
gut 12'-15' across.
red-brown weather stain on all
rubble.
sample 5 from talus in gut
≈ 20' above river (uncommon rock)
both sides are granitic

G-18 Major Gut RB.
O/S of G-17
Major gut N60W 64 80NE
15'-20' across - widens
from bottom to top

over

DIAMSITE LEFT
ABUT. GEOLOGY

G-18 major joints

64 N60W 86E (U/S face)
48 N44W 81W
26 N30E 37W
N04W N-S 58E
76 N80E 66 S secondary
64 N60W 77E main set
~~N60~~
63 N67E 74 N } ortho set
N04W N-S 66E
56 N60E 65 S
14 N10W 38E

G18(a)
Major gut 30' U/S of G-18
w/ gouge
highly weathered rock.
N60W 77E (Rock face LB on
line with gut G18a
G18a N60W 86E
Photo 13 Gut 18a
plenty gouge weathered rock.

G18a Con't

07 N 03W 57E
66 N 70E 74S
~~N 06W~~
11 N 15E 35S minor gouge
24 N 20W 65W Major gouge (0.2')
strong weathering
61 N 65E 69 S
31 N 27W 50W 0.1' gouge
N04W N-S 59 E minor gouge

Note:
E-W faces smooth
N-S faces rough, grainy, more weathered

G18a: Major structure
D/S of U/S cofferdam (watch + try to follow on aerials; no chance to get in here this summer). Get a hole thru here & hole
60 N64E 74S jt. 0.05' grey gouge
34 N30W 70 W
11 N15E 24W jt. crosses last two
32 N28W 53W
06 N10E 41E

Fault

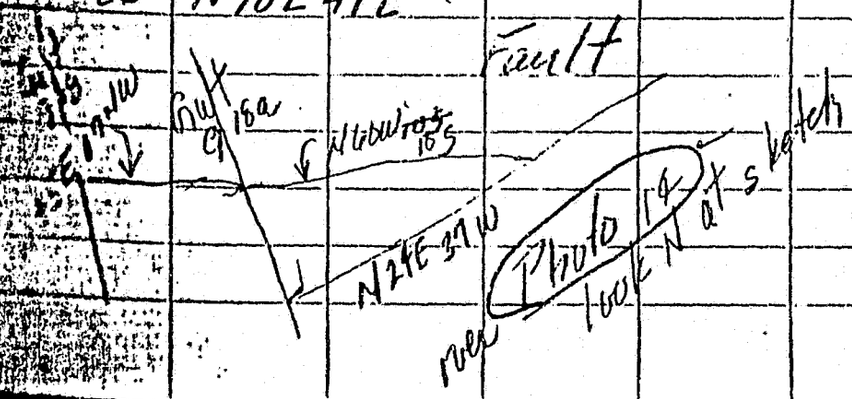


photo 15, 16, 17 & 18
Gross view of G18 & G18A, G-17
look N to Right Bank
Lance D & Stadia for scale

G-19 Right Bank -
shot from P-3
N 39W N35W82W main fault
Highly weathered - light
orange brown - brecciated
2'-3' across
another 25' u/s from G-19
N 69W N65W 74NE

Major jts G-19
52 N48W 83W 300
89 N85W 26S 271
36 N40E 64SE 34
51 N54E 69SE 51
22 N26E 81SE 22
38 N42E 30NW 30 this cuts across
gut (u/s → d/s) & gets stopped
against N57W 84E jt on d/s
side of gut.
N 61 60 89E

G-19 jts con't
44 N40W 60SW 316
33 N37E 56S 33
58 N54W 88E 302
46 N42W 74W 314
24 N20W 59W 336
66 N42W 80E 294
54 N50W 74W 306

photo 19
39
G-19 look N35W
from 100' out in River

Start Roll #4 Kodacolor
1440 hrs 27 Mar 1968

G-20 & G-21 used for back sites
for structural continuity

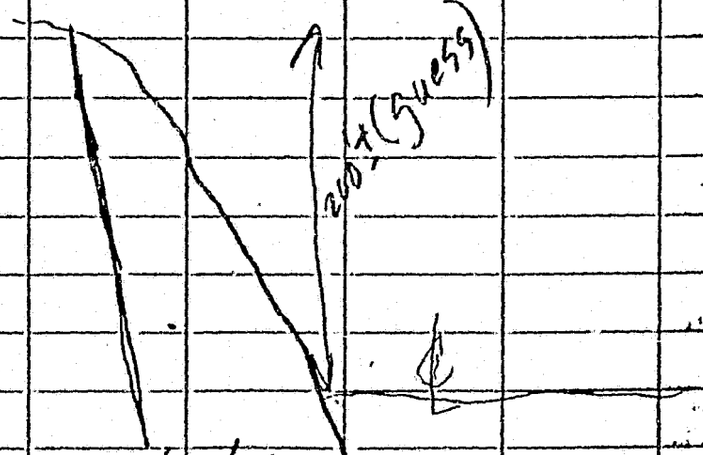
over

DIAMSITE LEFT
ABUT. GEOLOGY

G-22
Left bank opposite P2
Trends S05W
09

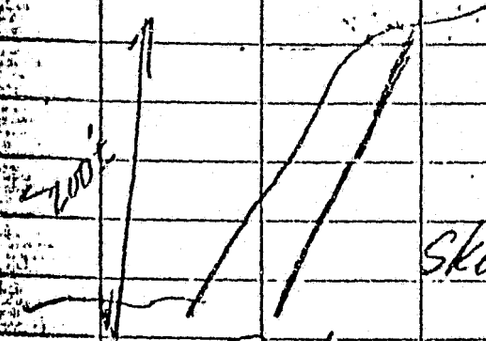
G-23
Left bank deep gut
Trend S05W
09

G-24
Bad open fracture
84
S80W80N
276
photo 1 Roll #4
May ~~represent~~ be open fracture
making left abut detached
photo looks S80W - no scale.
note open fracture.
≈ 3' wide



Sketch looks W

G-25
290
S10E72E
open fracture at left abutment
more detached block



Sketch looking S10E
06

Photo 2 Roll #4

Temperature @ 1545 hrs 32°F
wind down river 15-20 mph
Low last nite + 4°F
Hi 27 Mar + 36°F
Thermometer faces sun!

over

G-26

Major gut Trend S05W 76E
15'-20' wide; looks like
small amphitheater in there
photo 3 Roll 4

Note: Seismic Line Trends N13E

jts at G-26

17	N13W 84W	343
61	N65E 87N	
34	N30W 82W	326
46	N42W 17SW	34
N04W	N-S 82E	356

offshoot of G-26 34
Trend 2 N30W but
cannot get up there to check

G-27 open fracture
S85W 70N
photo 4 89 roll 4

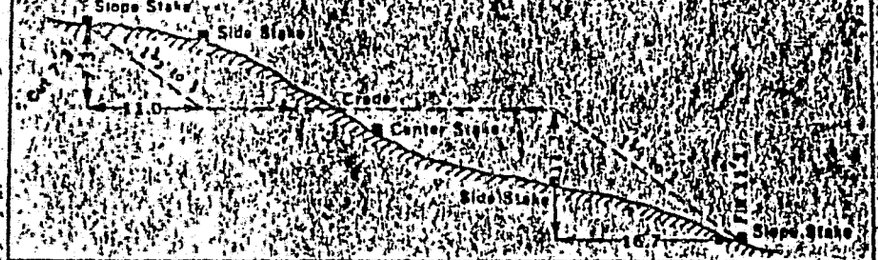
G-28 open fracture (gut)
N-S 85E N04W
will cross G-27 making
large detached block.
photo 5 roll 4

End 27 Mar 1978
1700 hrs

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width, Side Slopes 1½ to 1

In the figure below opposite 9 under Cut or Fill and under 13 read 11.0, the distance out from the side stake at left. Also opposite 11 under Cut or Fill and under 1 read 16.7, the distance out from the side stake at right.



Cut or Fill	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

① overcast, ≈ 20°F light wind downriver

Survey in book 4 Watana Book 3

Photos this book start w/ Roll #5 Kodacolor II ASA 80

checking geology - decl @ 26°E set

G-10 Wedge out - outcrop across river, ice flow bears N45W dip unmeasurable but high angle

jts 18 N17W dip 342 45W 342

34 N33W 326 69E

61 N62E 61 88N ✓

45 N44W 315 85E ✓ cliffmaker + river

63 N64E 64 75 ✓ cliffmaker ll river

44 N65E 65 80S "

41 N40W 319 79N

43 N42W 317 65N

51 N50E 51 79 NO

more jts N25E 24 31N

N40E 39 67N

N70E 69 20W ✓

~~[illegible]~~ 20's

fault appears to be N44W 85E ✓

45

5 Apr 1978

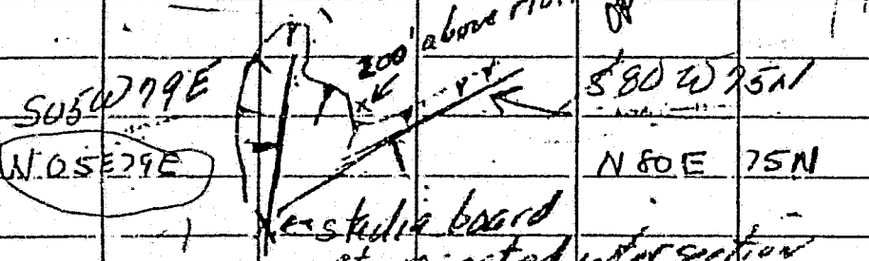
G-14 (fault) appears to line up G-13 (1st fault, 65' west of edge = at 4th stadia reading on G+3)

Line up?

G-14 u/s Sect

major ~~crack~~ crack N70W 79S

G-24 recheck



Plan view.

Brunton set 26°E

G-30 5 Apr 1978 Pat & Lance

open fracture ≈ 0.3' open

Attitude N-S88W 359

No sign of movement

joints on face going D/S

51	N38W 87°N	221	Granodiorite
	N-S06W	359	medium grained,
14	N85E 50S	84	strong dk. gray &
19	N20E 81E	19	red-brown stain
66	N65W 24N	294	on joints.
major cliff maker 47	N46W 87N (irregular surface)	313	weathers light purple in some spots; usually dark gray-green
major cliff maker 66	N65W 71N	294	qtz on joint
63	N62W 61S	297	
36	N35W 61S	224	
14	N65E 13N (we	44	Rock is Hard 2 tough
76	N75W 57N	234	
11	N10W 81E	349	
65	N64W 40N	295	Granodiorite dike N40W N25W 41W
21	N20W 75E	339	
43	N42W 63N	317	Sample 6 just u/s of dike
43	N42W 54N	317	

Diorite grading to Granodiorite dike at G-30a

5 Apr 1978

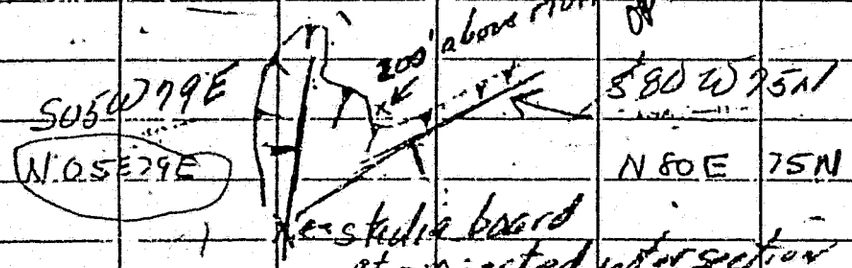
G-14 (fault) appears to line up G-13 (1st fault, 65' west of edge = at 4th stadia reading on G+3)

Line up?

G-14 u/s gut

major ~~crack~~ crack N70W 79S

G-24 recheck



Plan view.

Brunton set 26°E

G-30 5 Apr 1978 Pat

Lance

open fracture ≈ 0.3' open

Attitude N-S88W 359

No sign of movement

joints on face going D/S

31	N38W 87°N	221	Granodiorite
	N S06W	359	medium grained,
14	N85E 50S	84	strong dk. grey &
19	N20E 81E	19	red-brown stain
66	N65W 24N	294	on joints.
major cliff maker 47	N46W 87N	313	weathers light
	(irregular surface)		purple in some spots; usually dark grey-green
major cliff maker 66	N65W 71N	294	qtz on joint
63	N62W 61S	297	
36	N25 35W 66S	224	
14	N65E 13N	144	Rock is Hard
76	N75W 57N	234	2 tough
11	N10W 81E	349	
65	N64W 40N	295	Granodiorite dike
21	N20W 75E	339	N40W N25W 41W
43	N42W 63N	317	Sample 6 just
43	N42W 54N	317	u/s of dike

Diorite grading to Granodiorite dike at G-30a

G-30 Con't
Sample 7 of dike
Roll 5 photo 1 of open fracture
" 2 of dike
~~Shot to 30a w/o stadia. [Cliff purly straight]~~

G-31 open fracture. (≈0.3' open)
photo 3 roll 5
looking S20W (21) working towards
At 4 N05E80E → Thru G-32
other joints ✓N50W 46NE 309
36 ✓N35W vert 324
69 ✓N68W 68NE 291
37 ✓N30W 77S w/ asperites 323
65 ✓N64W 70N 295
73 ✓N72W 66S 288
77 ✓N76W 29N 284
41 ✓N42E 76SE 41
79 ✓N78W 52S 282
63 ✓N75 62W 65S 298
59 ✓N60E 74SE 59
59 ✓N60E 80SE 59

From jt O/S grades from med grained diorite → med coarse grained granodiorite in ≈ 15'

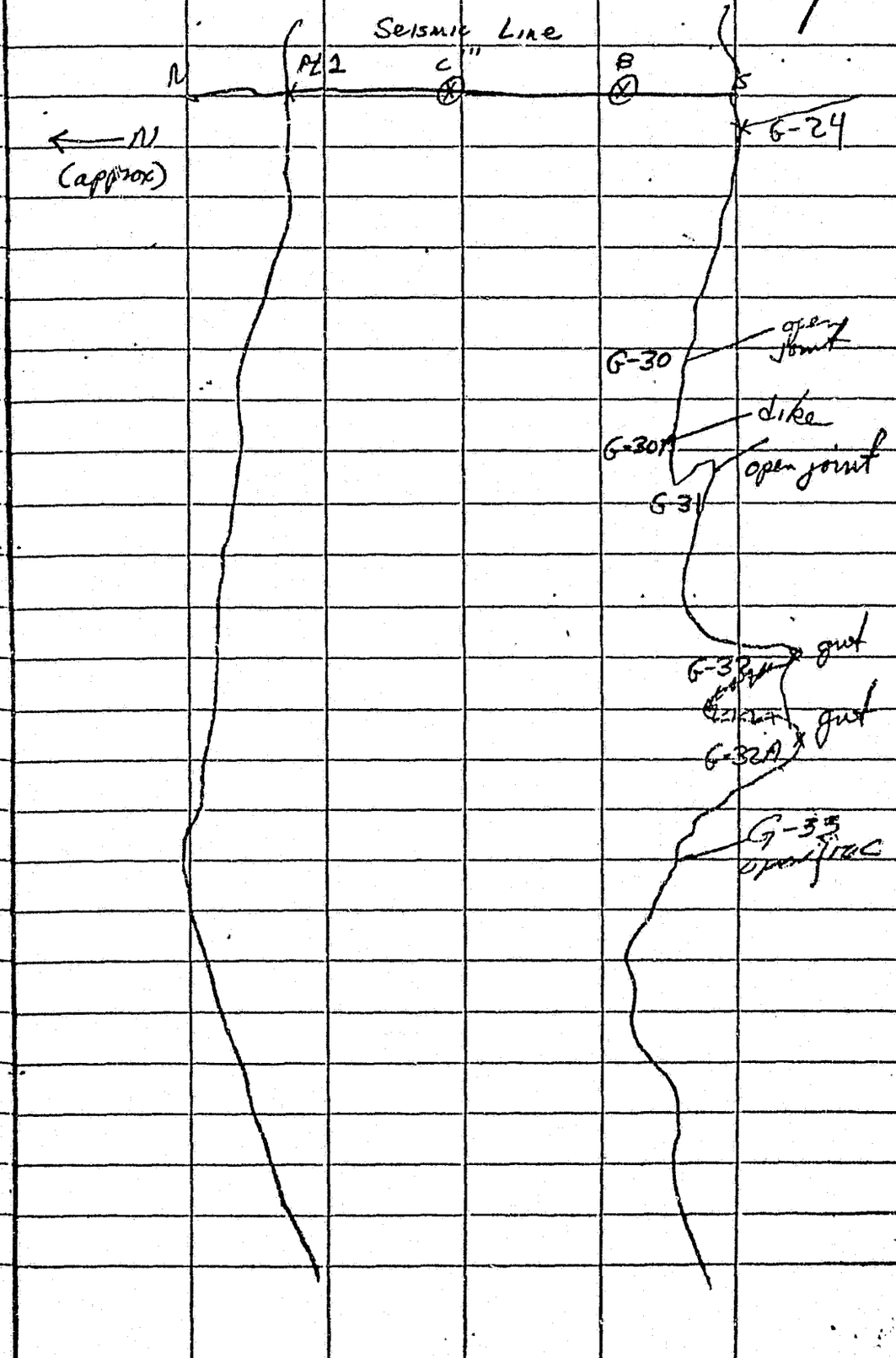
roa →

G-31 Con't
(Flat) dip N01E NSEW ✓N30W 81NE 29 331
✓N30W 75E 31 329 ✓N68W 74N 69 292
✓N30W 88N 31 329 ✓N40E 30NW 37 321
✓N68W 66N 61 291 ✓N65W 66N 66 294
✓N68E 25NW 67 293 ✓N75W 73S 76 284
E-W-N-S (flat) 260 ✓N68E 70NSE 67 29

From p-9
G-32 Large Gut, Left bank -
open fracture S05E81E (N05W) ✓
G-32a Large gut just O/S of G-32 ✓
✓S22E61E (N22 75) another amphitheater
photo 4-5 roll 5 -
stadia board at G-32
photo 6 roll 5
Stadia board at G-32a -
note G-32

G-32a – G33 dark bluff

N10°E 01	12°W 69	
N35W 36	79 E 34	
N02W 02	68E 357	
N31W 32	85E 358	rough joint
N02W 03	66E 357	green, mineral, rough joint
N55E 54	21NW 54	
N61W 62	65NE 298	
N15E 14	25W 14	
N67W 68	63N 272	
N30W 31	03NE 229	
N70E 69	02N 69	
N25E 24	13W 24	
N70W 71	22N 289	
N85W 84	56N 274	
N72W 73	71N 287	
N28W 29	08NE 281	



G-33

photo 7 Roll 5 Looks - South

stadia for scale. - note

~~S43E~~ 70°NE 71 ✓

N 43° W

& 0.5 open fracture, tightens @ top

grano-diorite:

jts ✓ N80E 79 50N 79 weathered rock

✓ N60E 57 84S 59 below high water

✓ N22W 23 74W 337 mark is gray-

✓ N85E 84 47S 84 purple - looks like

✓ N72E 71 53N 71 a dacite.

✓ N02E 01 84E 01

✓ N75W 76 16N 284 Cliffs gray, joints weeping w/ white stain marks.

G-34 5 Apr 1978

Thrust Fault?

photo 8 roll 5 looks South.

hammer for scale

photo 9 roll 5, some from further away. Stadia board for scale

photo 10 roll 5, close up showing measureable movement of joint ≈ 1" → west

Fault + EW 15-20N- 10 ✓

not very uniform

note large number of Low ∠ joints taken today.

photo 11 from p 9 looking south at Fault.

Some red-brown gouge on fault.

5 Apr 1978

~~G-35, end of left abutment. -~~
~~Gut Pat.~~

photo 12 roll 5 - look SE from ℄ river to Thrust. Board for scale

photo 13 roll 5 - my foot to ID roll.

Shore points, left bank, after G-34, go across wide flat fan. - look at aerial photos - these are O/S of G-34.

End 5 Apr 1978

Flew over Dam ℄ & local spotted holes from air. Fair number of open areas we can use.

Spot at least one hole at G-34 & O/S of G-33. Find out condition of hanging wall on Thrust - it does not look too good

6 Apr 1978

G-35 Up the weathered hill Stadia shot on Pat's body - no rod.

Strong signs of hydrothermal alteration. Rock moderately to highly weathered Granodiorite (?) Altered rock weathers pink & red-brown. Rock very highly jointed - almost shattered.

photo 14 roll 5 - drill rigs from G-35 - for record only

Attitude of altered material

FAULT S 60 E 82 S 240

strong jt trend SE&E but not a good spot to be working

photo 15 roll 5 - altered material.

rock hammer for scale

picked up piece of float very similar to altered area

G-35 con't
photo 16 roll 5
highly jointed rock below
altered zone ≈100' vertically
below - No scale rocks
0.1 ft³ to 1 ft³, may be a shear
but cannot get there.

G-36
Shear (Major) ≈10' across
photo 17 roll 5 looking N60W
Highly weathered in shear
Soft clay gouge, iron stained.
N-S description
0.4 white gouge (sericitization)
No Fe stain N40W vert ✓ shear
(2' of altered granodiorite
0.3' gouge E-W vert ✓ white ✓
3' of highly jointed granodiorite
0.3' breccia
0.2' gouge (N edge of main Fault) ✓
N80W87S ✓
0.3 breccia
2' breccia w/ gouge
0.3' red-brown → yellow hard
gouge

13

Main shear N51W 70 ✓ S? Patio Ark.
irregular dip
N50W43N ✓

Joints. N75W86S 76 284
13 N14E vert ✓ 13 N80W84S ✓ 81 279
N-S 15E ✓ N80W72S ✓ 81 279
E-W 80S ✓ 274 N50W11N ✓ 51 309
21 N22E77W ✓ 21

irregular jts
73 N72W47N ✓ 287
77 N78E10S ✓ 78
57 N58W48S ✓ 301

Major Jts — Rock has strong magnetic attraction
327 33 N32W87W ✓ N62W88S ✓ 63 217
274 86 N85W87S ✓ N39W86W ✓ 40 320
344 16 N15W85E ✓ N80W08S ✓ 81 279

G-37 Shear N50W 88 N ✓
Close up photo 18 Roll 5
General photo 19 roll 5

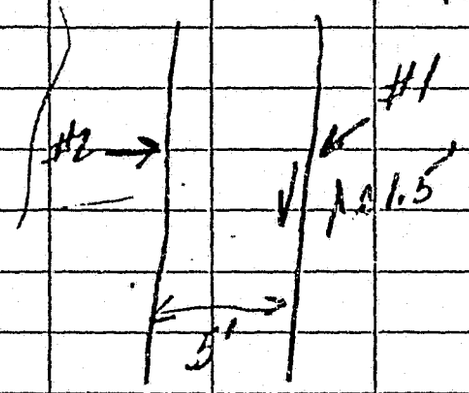
G-38 Major Gut
N28W vert ✓
Roll 6 photo roll 1 my pencil for ID
photo 2 Gut

G-39 Major Gut Gneissic struct starts @ G-38
photos 3+4 - G-39 Gut
N40W 74W

Low ∠ shear ~~ofs~~ between
G-38 & G-39 N65W 25N ✓ ✓
photo 5

No sign of slicks, gouge, etc
in gut
joints
61 ✓ N60W 42S 299 ✓ N25E 90S (vert) 24 24
51 ✓ N52E 88S 52 ✓ N-S 04E
28 ✓ N27W 84E 332 ✓ N25E 12S ✓ open jt
✓ E-W 67N 289 24
photo 6 - low ∠ shear
between G-38 & G-39

G-39 con't
Two shears on D/S edge of gut
~~photo 6~~ roll 6 ← Photo 7 Pat 9 May '78
#1 0.6' wide w/ 1' gouge highly fractured
right hand side N43W 85E ✓
44



#2 - gouge N80W 77N ✓
81

sample 8 ←
rock appears to have gneissic
structure ~~started~~
photo ~~7~~ 8 Pat 9 May - close up of ~~layering~~
gneissic structure -
photo ~~8~~ 9 Pat 9 May 1978 - close up of sedimentary
zenolith.
zenoliths appear to be
alligned
Foliation (?) N10W 10W

G-40 47

Shear N46W 85N ✓

photo 10 Pat 9 May 1978 roll 6

Note some gnessic structure (see sol 8)

G-41 open fracture N60W 81N ✓ 70-80

photo 11 Pat 9 May 1978 roll 6

joints between G-40 + G-41

✓ N51W 85N 308 ✓ N62W 70 N 297

85 ✓ N84W 85N 275

64 ✓ N65E 73 N (cliff maker)

16 ✓ N15W 72 E 344

56 ✓ N57E 89S 57

joints O/S of G-41

34 ✓ N33W 12E 326 ✓ N21W 79E 338

28 ✓ N27W 26E 332 ✓ N38W 82E 321

✓ E-W 89 N ✓ N60E 10S 59

73 ✓ N72W vert 297

✓ N-S 12E

✓ EW 89N

✓ N89E 79N diff maker 212

✓ N-S 19E - Thrust

G-42 12, 13, 14, 15 + 16 Pat 9 May 1978

photos ~~11, 12, 13, 14 + 15~~.

near vert shear + thrust (?)

rock diced up badly.

≈20' O/S of rod, inclusion

change from sedimentary (?)

to diorite very abruptly.

note open, flat shear (?)

No gouge, etc.

→ Note - get core hole above G-42 + through this stuff.

→ Bottom fracture open 0.3' ± ✓

→ N25E 13S 24

~~Vert shears~~ (at rod in pics)

~~N10E maybe~~ E-W (by eye - cannot get)

dip N10 (upper shear)

Verts at rod in pic

✓ N22W 81W ✓ N85E 34S ✓

Photo ~~16~~ 17 Pat 9 May 1978 ≈ 30' u/s of shore pt.

+ 100' u/s of G-42.

breccia from Thrust?

photo ~~17~~ 18 closeup + ~~#18~~ 19 ← Pat 9 May 1978

Roll 7 #1 Glacier Ice from
GW table left bank
from P 10

G-43
photo 2 hook S55E at
[illegible] from [illegible]

G-43 small shear right bank
✓ N05W 57E
photo 3 roll #7

G-44
Shear left bank
has slick, gouge, etc
w/chatter marks on sticks
u/s up
D/s Down
Reverse ~~Normal~~ movement

notes ↓
✓ N-S 59°E rest limb (main)
✓ N17°W 85°E
photo 4 roll #7
5 " " closeup

✓ G-45 gut N-S 75°E (east of G-44)
≈ 10' wide

jts G45-G44
✓ N30°W 65°E major open
✓ N58°W 75°NE
✓ N25°E 60°SE rough
✓ N80E 63 N
✓ N35E 32 NW → NW (Pat 10 AM.
✓ N25E 42 W minor, unusual
✓ N87W 56N
sample 9 small greenish diorite?

✓ N85E 89°N cliffmaker
✓ N15W 84 W
✓ N08 E 75° W

jts G-44-G46
✓ N30W 59 NE irregular
✓ N80W 09°S
✓ N27W 86°W
✓ N85E 80 S
✓ N54 W 85NE
✓ N30 E 13°NW unusual one
✓ N75W 87°N

~~G-46 gut~~

G-44 to G-46. N25W 90°E ✓

joints (cont) N85°W 87°S ✓

G-46 gut glacier ice

S20W 70°E ✓

(N20E)

End 6 Apr 1978
@ G-46

7 Apr 1978

G-47

Glacier ice up to 20' above river

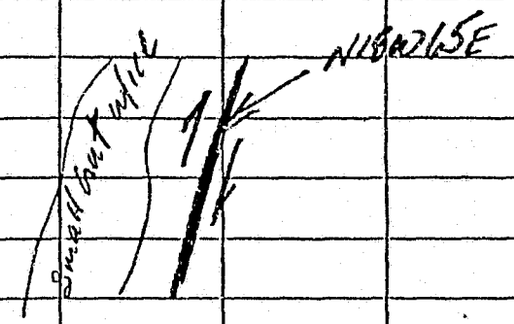
Flat joints prominent

Creep O/S of G-47 w/ large rounded boulders

joints

✓ N10W 70E

Small shear w/ slicks



Rock has strong inclusions (granitic)

prefered orientation ✓ N50W09SW (guestimate)

more joints

✓ N20W 73E 340 ✓ N56W 67NE

✓ N85E 81N 85 ✓ N44W 88NE

✓ N07E 64E 07 N61E 88N

~~N74~~ 67S → w/ green coating

✓ N74W 67S 286

✓ N22W 10W

338

G-48
For joints
Rock has granitic & mafic (greywacke?)
Xenoliths.
Sample 10 taken
photo 4 roll 7 General
photo 5 7 Jan 9 May 1978 D/S edge
of G-48, columnar joints
Prominent joints
✓N66W69S 294
✓N32W65E 328
✓N54E87W 54
✓N69W66S 291 major
✓N39E23W 39
✓N54E59W 54
✓N21E84W 21
✓N81E66S 81 irregular
✓N60W70S 300 major

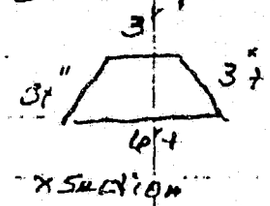
Column joints
✓N60W09N 300 (Top + bot)
✓N25W80E 335
✓N72E89W 72
✓~~N54W~~ N58W03SW
302

Photo 6 8 Jan 1978 - Glacier-ice left bank
Shore point ≈500' D/S of G-48
photos 9 7→12 Roll #7
Lance & pan u/s → D/S Right
bank opposite 1st Island. —
Major shears?

CLOSED

20 May Greeley - Shotzko

COE Watana Book 12

From	To	Forsite AZ	Bk site	For ∡	Bk ∡	Dist	Notes
PT 215							
1833.5	216	255°	N82°E	+8°	-9°	85'	Fine grained diorite porphyry greenish jts S32°W (217); 81°NW AZ 319° (217); 83°NE S47°E 84°NE
216							
	218	248°	N74°E	+3	-1°	100'	diorite boulders at toe of slope
218							
	220	253°	N77°E	+2'	-4	100	diorite, greenish porphyritic fracs into rectangle posts
220							
	222	239°	N61°E	+1°	-1	100	3 to 6" on a side outcrop is just below crest.  x section
							moss covered talus - diorite
222							
	224	202°	N22°E	+11°	-11°	34'	jts 319° AZ; 78° SW diorite? greenish fine grained stuf.
224							
	226	283°	N80W	+15	-15°	100'	grassy mossy slope -
226							
	228	207°	N30°E	-1	+2	100	mossy area - wet
228							
	230	200°	N25°E	+6	-8°	100	mossy area

Cont. next page

plotted 7 Nov 78

Plotted 9 June 81 RCP

20 May 78 Greeley - Shotzko A2

From	To	Forsite	Bksite	For ∡	Bk ∡	Dist	Notes
230							
	232	203°	N27°E	-6	+5	57	west edge of low rock ridge trending N40°W
232							
	234	209°	N33°E	-4	+6	100'	xing a wet trench trending N40°W.
234							
	236	216°	N36°E	+7	-8	100	xing trench some 15' up on talus slope
236							
	238	208°	N32°E		-20	20'	top of talus & edge of cliff, trends N65W vert.
238							
	240	284°	S75°E	+1	-3	60'	on moss covered talus slope
240							
	242	207	N27°E	+36	39	57'	up over cliff - diorite ? greenish fine grained porphyritic
242							
	244	229°	N45°E	+6	-6	100	moss covered - diorite ?
244							
	246	247°	N72°E	-4	+6	61	East edge of trench trending N47°W
246							
	248	243°	N72°E	0°	+2°	80	80' across gut - wet mossy
248							
	250	274	S82°E	-3	+3	100	E. edge of minor fractures trending S10W no dip
250							
	252	279	S82°E	-1	0°	61	E edge of minor shear S9°W 189 ✓ 74°W

checked 7/30/81

plotted 7 Nov 78
Plotted 9 June 81 RCP

May 78 Greeley - Shotzko

7

From	TO	Forsite	Bksite	For ∡	Back	Dist	Notes
252							
	254	288	S75°E	-2	+3	100	Xing a shear zone from sta 252
254							
	256	256	N75°E	+3	-3	100	on ridge - diorite moss covered
254							
	258	248	N70°E	-11	+8	48	gut N45°W mossy & wet
258							
	260	252	N68°E	-2	+2	100	along mossy ridge
260							
	262	273°	S87°E	-3°	+2	95'	tied off at lone spruce on EW ridge (west of c/L)
		End	20 May 78				

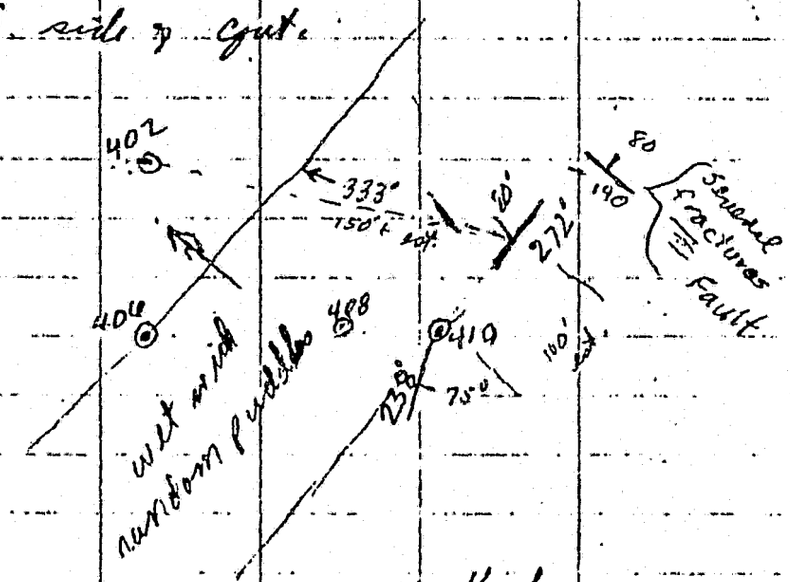
plotted 7 Nov 78

Checked 7/30/81

Plotted 9 June 81 RCP

1 June 78 Greeley - Barbara

From	TO	Forsite AZ	Bksite AZ	For∡	BK∡	Dist	Notes
262 Common 400							diorite outcrop E. side of narrow
	402	310°	137°	-14°	+12°	51'	gut or fracture trending 167° 12
							gut abt 12' wide covered w/ ground
							cover. Pt. 402 is on edge of
							bench or at the break in slope to
							bench above pic. pt. above fins
402							near seismic line
	404	235°	60°	-4	+5	100'	random boulders on surface, dense
404							(distributed here & there →) ground cover
	406	201°	26°	-5	+2°	82	N. side of gut trending 90°. gut
406							is wet w/ H_2O standing in puddles
	408	150°	332	+1	-3°	100'	part way across shallow swale
408							no rock outcrop
	410	144°	327°	+9	-12	60'	S. side of gut.



Plotted Nov 78

11 JUN 81
LDZ

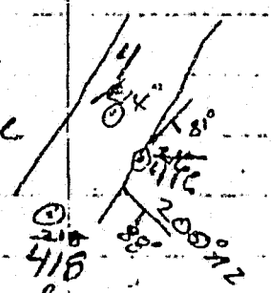
Plotted 15 June 81
RCP

Checked 6/30/81

1 June 78 Greeley - Smith

107 11

From	To	Forsite AZ	Bk site AZ	For ∡	Bk ∡	Dist	Notes
410							
	412	284	100°	-14	+11	100'	down to gut w/ & boggy
412							
	414	275	96°	-6	+5	96'	wet - random boulders on surface
414							
	416	200	20°	-1°	-.5° ?	59'	Diorite weathered surfaces. AZ 107, 81 S this surface appears to be close to fault plane
			~~122°~~				
416							
	418	302	122°	-10	+11°	100'	in marshy area - no rock - sta. near break in slope El. 2470 by alt.
418							
	420	32	210°	-7°	+4	81'	starting over break in slope moss covered gnd.
420							
	422	55°	245°	-14°	+9°	27'	AZ 94°, 75°S to 85°S rock is broken by a series of jts as above. I wonder if it is representative of shearing
422							rock is weathered diorite. alt. 2455
	424	20°	196°	-6°	+5°	41'	AZ 115°, 87°S rock is weathered diorite surface along jt plane is ✓ hackely and drummy and appears to be close to a fault plane



plotted 7 Nov 78

11 JUN 81 LDZ

Plotted 15 June 81 RCP

checked 7/30/81

June 78 Graeley - Smith

From	To	Forsite Az	Bksite Az	For ∢	Bk ∢	Dist	Notes
424							
	426	15°	190°	-15	+12°	100'	steep moss covered slope just below break in slope
426							
	428	34°	208	-50°	-2°	41'	Alt. 2410 rock is weathered diorite porphyritic AZ 25°; 62° E 4 fractures exposed at this site. AZ 94'; 84° W ? one pt showing.
428							
	430	311°	141°	-33°	+32°	70'	toe or bottom of slope Alt 2365
430							
	432	58°	234'	0°	-1	91'	19' off set to Rt. or AZ 160° to out crop. pt. is at toe of slope rock is slightly weathered Dacite. AZ 135°; 83° W several fractures 1-3' apart. AZ 175°; 58° E several fract. 1-2' apart. AZ 74'; 83° N only 1 frac observed. Toe of slope trends 73° AZ
432							
	434	330°	147°	-6°	+4	100'	down gradient towards the river. no outcrops.
434							
	436	314	198'	-3	+3.5'	100'	same as above
436							
	438	330°	153'	-7°	+6°	100'	Alt. 2338 same as above boulders appear to be near surface rock is Diorite Plotted 7/20/78

Plotted 15 June 81 RCP

Checked 7/30/81

RCP 12 June 81

From	1 June TO	Greeley Forsite AZ	- Smith Bksite AZ	For ∡	Bk ∡	Dist.	Notes
438							
	440	325°	147°	-4°	+8°	100'	down gradient - same as above
440							thru trees & over moss covered grd.
	442	330°	153°	-9°	+12°	100'	Alt. 2315 same as above
442							
	444	325°	149°	-6°	+7°	100'	Alt 2300 same as above
444							
446	446	338°	169°	-10°	+11°	77'	Alt. 2280 same as above
	448	350°	177°	-7°	+5.5°	100'	Alt. 2270 same as above
448							
	450	25°	207°	+4°	-5.5°	100'	Alt. 2280 same as above
450							
	452	35°	216°	+1	-3°	100'	Alt 2285 same as above
452							
	454	50°	232°	-2°	+2	100'	Alt. 2280 same as above
454							
	456	48°	240°	-2°	+2	69'	Alt 2280 same as above
454							
	458	341°	162°	-7	+7°	100'	Alt 2270 going towards the river
458							same as above.
	460	333°	155°	-2	+1.5°	100'	Alt. 2250 old chopper pad 75 alt 125' East. D cavity boulder along route.
460							same as above
	462	345°	167°	-6	+4.5°	100'	same as above

Plotted 7/30/81

Plotted 7/30/78

Plotted 15 June 81 RCP

RCP 12 June

1 June 78 Greeley - Smith

From	To	Forsite AZ	Bk site AZ	For∢	Bk∢	Dist.	NOTES
462							
	464	321	145°	-11	+9.5°	100'	Alt. 2235 diorite boulders scattered along root.
464							
	466	313	138°	-10	+7.5°	100'	Alt. 2222 break in slope moss covered grd.
466							
	468	13	194°	-11	+12.5	100	Alt. 2210 xing diagonal to slope slope is 24° random boulders
~~468~~	~~470~~						
(468)	2 June 78	Greeley - Campbell					
470							
	472	25°	197°	-16°	+17°	100'	Alt. 2165 same as above random boulders.
472							
	474	12°	193°	-16	+17°	100'	same as above
474							
	476	9°	187°	-13°	+14°	100	same as above
476							
	478	15°	198°	-8°	+10°	68'	same as above Alt. 2100'
478							
	480	35°	219°	-17°	+17°	100'	Alt. 2000 - same as above boulder patch Eastward abt. 150'
480							
	482	39°	219°	-19°	+17°	81'	same as above. boulder patch to the east.
482							
	484	32°	216°	-16	+16	81'	Alt. 2012' same as above. density of trees increasing

Plotted 7 Nov 78
Plotted 15 June 81 RCP

checked 7/30/81

12 June 81

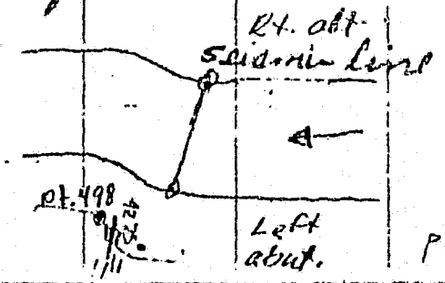
2 June 78 | Greeley – Campbell

From	To	Horiz.	Obsne	Vert	Elev	Dist	Notes
484							
	486	83°	257°	−2°	+4	100	turned eastward to intersect pic. pt.
486							
	488	105	281°	+1°	−0.5'	100'	Alt. 2018' below boulder patch.
488							
	490	106	282°	+2°	−2°	83'	Alt. 2012' at pic. pt. above seismic line across river.

Next sta will be 300' NW which is end of previous traverse.

From	To	Horiz.	Obsne	Vert	Elev	Dist	Notes
x?(377) ✓							
	492	307	137°	−13°	+12'	88'	Alt. 1895' on rim in dense alders this sta appears to be on small fracture trending AZ 208'? may be incorrect due to going down gradient.
492							
	494	349°	171°	−14°	+12'	91'	Alt. 1865 thru alders on rim.
494							
	496	60°	237°	−24°	+24'	75'	Alt. 1840' on rim shear cliff below will turn & go upstream as far as possible. Turn pt. is 5 long red streams
496							
	498	15°	196°	−28	+27.5°	46'	Alt. 1830' on pt. of shear cliff forming ~~46~~ a small fin.

rock is diorite closely broken as if in a multifrac. zone mod. weathered on surface.



Jds. AZ
354°, vert.
53°, 88° E
349° 87° E

Plotted 15 June 81 RCP

plotted 1 Nov 78

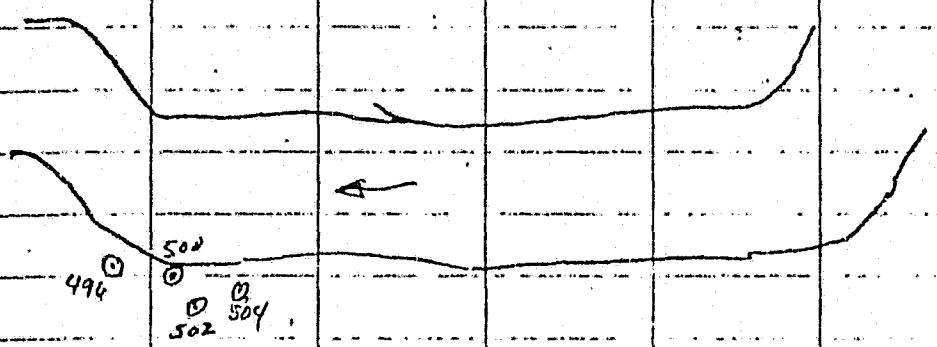
Checked 1/30/81

Checked 1/30/81

2 June 78 Greeley Campbell

21

From	To	Forsite	Bk site	For ∡	Bk ∡	Dist	Notes
496	Note sta. of turn pt						
	500	124°	306°	−6.5°	+7°	27'	on edge of cliff. jts AZ 312°, vert.
~~500~~							weathered diorite 19°, 87° E
	~~502~~						Closey jted in surface 245°, 84 E
500							exposures Alt. 1842'
	502	208°	33°	+13°	−12	40'	Alt. 1850 edge of shallow reentrant.
502							
	504	144°	346°	+4°	−4°	32'	starting to X reentrant gut. no outcrop
504							intermittent stream - As. 36°
	506	134°	315°	+10°	−10	57'	Out crop, weathered diorite jts. AZ
							E. edge of reentrant gut. 265°, 51° N
							rock is clog bkn. 356° 86° E
506							Alt 1810' cldy rainy 305° 71° W
	508	91°	266°	+0.5°	10°	49'	Alt. 1845 cldy - misting jts AZ
							all rocks appear to have been displaced
							no data taken



Plotted 7/30/81

Plotted 7 Nov 78

Plotted 15 June 81 RCP

RCP 12 June 81

2 June 78 Greeley - Campbell

From	TO	For site	Bk site	For ∡	Bk ∡	Dist.	Notes
508							
	510	105	284°	-0.5°	+1°	20'	weathered diorite clsy, frac. jts AZ. 134°, vert. 101°, 76° N
510							
	512	103°	274°	-7°	+7°	39'	Alt. 1850' altered diorite clsy. Jtd. jts. AZ 235°, 85° N — 143°, 67° N rock blocks are displaced slightly
512							
	514	116°	293°	+13.5°	-14°	36'	Alt. 1865' weathered diorite clsy. Jted. Jts AZ 277°, 65° N 168°, 72° E
514							
	516	70°	246°	-7°	+8°	31'	Nose of little fin. AZ 27° tiend Alt 1860' Misting Jts AZ 243° Vert. 296° Vert.
516							
	518	33°	216°	-26°	+26.5°	46'	at nose of fin moss covered no data obtainable
		518 spur line to pt. of fin over river					
(516)	520	150°	330°	+6°	-7°	58'	Alt. 1870' weathered diorite biotite showing up. Jts AZ 98°, 72° N 182°, 73° E

plotted 7 NOV 78

Plotted 15 June 81

RCP

RCP 12 June

2 June 78 Greeley - Campbell

From	To	Forsite	Bk site	For ∡	Bk ∡	Dist.	Notes
520							
	522	86°	264°	+5°	−6°	42'	on moss covered flin trending AZ 25° No data avail.
522							ALT. 1870
	524	159°	342°	−7°	+7°	45'	Alt 1865 in a reentrant gut jts AZ 134°; 87° E Many-many jts 1-3' apart.
							jts AZ. 74°; 88° N
524							weathered diorite clsy jtd,
	526	81°	260°	−36°	+37°	45'	Alt. 1840 jt. 70°, 84° N
526							edge of shallow gut. - weathered diorite
	528	98°	274°	−24°	+24°	25'	Alt. 1825 in bottom of shallow gut. jts AZ 54°, 85° S rainy
							(can't tell if rock are detached) AZ. 161° 62° E
528		?					weathered diorite
	530	158°	257°	−7.5°	−1°	43'	weathered diorite - clsy jtd,
530							" jts AZ 246°; vert
	532	112°	287°	−4°	+4°	65'	pile of rock rubble near ice in gut.
532							
	534	90°	268°	−28'	+28°	46'	Alt. 1800 at edge of ice filled shute. This shut appears to be a major fract. Jumbled rock - no data available

plotted 7 Nov 78

Plotted 15 June 81 RCP

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RCP 12 June

2 June 78 Greeley - Campbell

From	To	Forsite	Bk site	For ∡	Bk ∡	Dist.	Notes
534							
	536	202°	195°	-45°	+44°	95'	Alt. 1730 going down west edge of snow shute jts in rock are AZ 310°, 82° NE ?? 316°, 84 SW
536							
	538	195°	199°	-34°	+34°	90'	Alt. 1675 no data avail in gut.
538							
	540	173	176°	-35°	+34°	78'	Alt 1625 along west edge of snow filled shute
540							
	~~542~~		~~190°~~		~~+33~~	AZ of	jts 86°, 74°N a whole series of these shoot up along E & W side of shute. 1 & 2" wall aplite strings
	542	185°	190	-34°	+33	100'	Alt. 1600' along west edge of shute
542							
	544	201°	203°	-31°	+32	100	Alt. 1530 on talus out wash of avalanch shute.
544							
	546	185	186°	-34°	+34°	38'	Alt 1510 at rivers edge
546							
	548	97°	272°	+1°	-0.5°	100	along rivers edge
548							
	550	85	259°	0°	+0.5°	100'	ditto
550							
	552	85°	261°	+1°	-1.5°	100'	same as above - along River edge

Plotted 7 Nov 78

Plotted 15 June 81 RCP

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2 June 78 Greeley – Campbell

From	TO	Forsite	Bksite	For ∡	Bk ∡	Dist.	Notes
552							
	554	85	261°	0°	+1'	100'	along river edge
554							
	554	79°	252°	0°	+1	100'	same as above
556							
"d" =	558	168°	352°	+18	−18	68'	drill site at river. Alt. 1515 set ∡ hole at AZ 350° and 60° down from horiz.

END OF TRAVERS
2 June 78

plotted 7 Nov 78

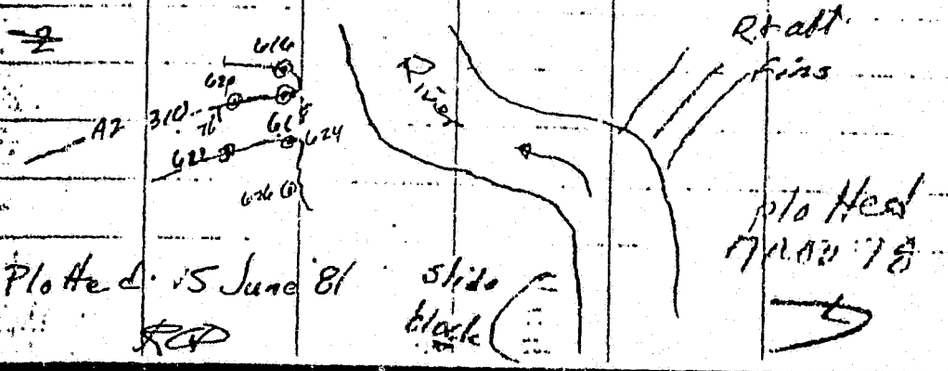
Plotted 15 June 81 RCP

✓ RCP 12 June 81

checked 7/30/81

3 June 78 Greeley - Campbell

From	TO	Forsite AZ	Bk site AZ	For ∡	Bk ∡	Dist	Notes
434 Rego 600							This travers is on so. side starting
NO. IS ACTUALLY 452 WC 30JUN78	602	334°	150°	-17	+17°	100	where Rage / Duncan landed. — going down slope to follow along west edge of low ridge. Alt. 2370'
602							
	~~604~~ 604	356°	177°	-11°	+13°	100'	Alt. 2360' following along edge of ridge going towards river. Grd. is moss covered.
604							
	606	349°	173°	-12°	+12°	100'	Alt. 2280 same as above
606							
	608	338°	156°	-19°	+19°	100'	Alt. 2235 same as above
608							
	610	344°	163°	-15°	+17°	100'	Alt. 2175 same as above
610							
	612	337°	160°	-15°	+15°	100'	Alt. 2155 same as above (mossy)
612							
	614	337°	157°	-20°	+21°	100	Alt. 2120' same as above
614							
	616	335°	157°	-12°	+16°	94'	Alt. 2080 on west edge of nose of fin
616							
	~~618~~		~~242°~~		~~+1°~~	~~2~~	



Plotted 15 June 81

Plotted 7 Aug 78

RCP

12 Jun

3 JuNE 78 Greeley - Campbell

From	TO	Forsite AZ	Bksite AZ	For ∡	Bk ∡	Dist	Notes
614							
	618	58°	242°	-5°	+4°	24'	Alt. 2080 E. edge of fin above River gut to the east is est. 50' wide & 40' deep see previous page for pin. Trend is AZ 310°, 76° E
618							
"	620	132°	318°	+15°	-17°	76'	Alt 2100' - gut disappears into ridge weathered diorite.
620							
	622	68°	248°	+5°	-7°	40'	Alt. 2110' x gut - starting riverward
622							
	624	323°	143°	-14°	+19°	89'	Alt. 2085 at west side of nose above Riv. weathered diorite js. AZ 242°; Vert 255'; Vert
624							
	626	51°	232°	-6°	+6°	51'	Alt. 2080' loose diorite boulders moss covered.
626							
"	628	135°	318°	+16°	-18	50'	Alt. 2110' faint gut merges w/ hill slope. more biotite is appearing in the weathered diorite.
628							
	~~630~~						
	630	55°	237°	+7°	-6.5°	95'	Alt 2115' x head wall filled w/ loose boulders
630							
	632	132°	314°	+15°	-19	22'	Alt. 2120 following along rim diorite is weathered.

plotted 7 NOV 78 →
ted 15 June 81
RCP

✓ RCP

12 June 81

3 June 78 Greeley Campbell - Pt. Cldy

FROM	TO	Forsite Az	Bk site Az	For ∡	Bk ∡	Dist	Notes
632							
	634	45°	227°	+4°	-3°	28'	A. 2120 + edge of fin trendy
634							Az 300' weathered diorite
	636	111°	292°	+8°	-7.5°	43'	Alt. 2120 + head of fin -
636							
	638	38°	223°	-14°	+13°	29'	Alt 2115' x head of fin
638							
	640	311°	131°	-21°	+21°	84'	Alt 2075 towards river to cliff
640							many boulders - diorite - moss covered
	642	39	218°	-8'	+7'	90'	Alt. 2065 along bank in slope of
642							top of cliff above River - moss covered
	644	72°	252°	+4°	-5°	47'	Alt. 2075 - along moss covered rim
644						4	
	646	145	327°	+23°	-24°	67	Alt. 2105 along rim of fin.
646							
	648	56	239°	-2°	+1.5	100	Alt 2085 x headwall of gut.
648							
	650	341°	162°	-25°	+23°	100'	Alt 2045 along boulder edge of gut
650							
	652	330°	151°	-17°	+17°	86'	Alt 2030' along edge of gut.
652							
	654	286°	101°	-24°	+24	54'	Alt 2010 not to bk in slope this
654							fin may slope clear to River.
	656	35°	213°	-8'	+7°	78'	Alt. 1990 moss covered slope

Plotted 7/30/78

Plotted 15 June 81 RCP

Checked 7/31/78

✓ R

17 Jun

3 June 78 Greeley - Campbell pt. Clay

From	TO	For site	Bk site	For ∡	Bk ∡	Dist.	Notes
656							
	658	45°	223°	−14°	±14°	26'	Alt 1985 edge of gut.
							rock in gut wall ~ Az 323°; 84° E
							308°; 73 E
							counted 18 jts in 22' of exposure 60°; 69° N
							can these control the river in 230' 42° N
							this reach of the river??
							diorite is mod. weathered. This narrow
							gut is clay fractured. The 60° jts
							dip into river which are cut by the 323°
							& 308° jts - the resultant cubed rock
							forms a shute to the river
658							
	660	148°	338°	+35	−33°	23'	Alt 2000' top of narrow gut.
660 ~~664~~							
	662	51'	233	+6°	−5°	9'	X head wall of narrow gut
642							
	664	347°	163°	−28'	+29°	42'	Alt. 1990 along narrow gut
664							
	666	46°	224°	−8°	+7°	50'	Alt 1980 East to edge of big wide
							gut.
666							
	668	147°	326°	+28	−27'	62'	Alt 2010' going up slope along west edge
							of wide gut
668							
	670	169°	353°	+27°	−26.5°	30'	Alt 2045' at pct. of short gut trending 20°

plotted 7 Nov 78 [illegible]

Plotted 15 June 81 RCP

RCP

12 June 81

3 June 78 Greeley - Campbell rainy

FROM	TO	Forsite	Bksite	For ∡	Bk ∡	Dist.	NOTES
670							
	672	174°	357°	+28°	-22.5°	54	Alt 2040' at apex or head wall of spur gut trending 20'.
672							
	674	55°	239°	+2.5°	-3°	49'	Alt 2045' back on edge of major wide gut. Slick moss covered rock
674							
	676	138°	322°	+17°	-17°	77'	Alt. 2065' edge of gut. rocks appear to be all slightly displaced thus no data - Weathered diorite
676							
	678	141°	322°	+15	-14°	24'	Alt 2075' near apex of gut Will x over on down hill leg. many displaced boulders.
678							
	680	24°	203°	-1°	+1°	61'	Alt 2075 across on east edge of gut
680							
	682	325°	143°	-25°	+26°	31'	Alt 2050 on corner of gut
682	684	59°	238°	+1.5°	-1.5°	60'	Alt 2050 snossy covered rocks.
684							
	686	315°	138°	+23°	+23°	54'	Alt. 2040 again on edge of cliff.
684							
	688	38°	215°	-11°	+12°	80'	Alt 2020 Xing head wall or break in slope
688							
	690	36°	215°	-9°	+10°	92'	Alt. 2000' Rock along this traverse appears to be sheared and healed. Very nearly opposite of fine on north side of River. This area may be where N. side shears pass thru S. side rock.

can't find any conclusive evidence of shears xing river on this traverse

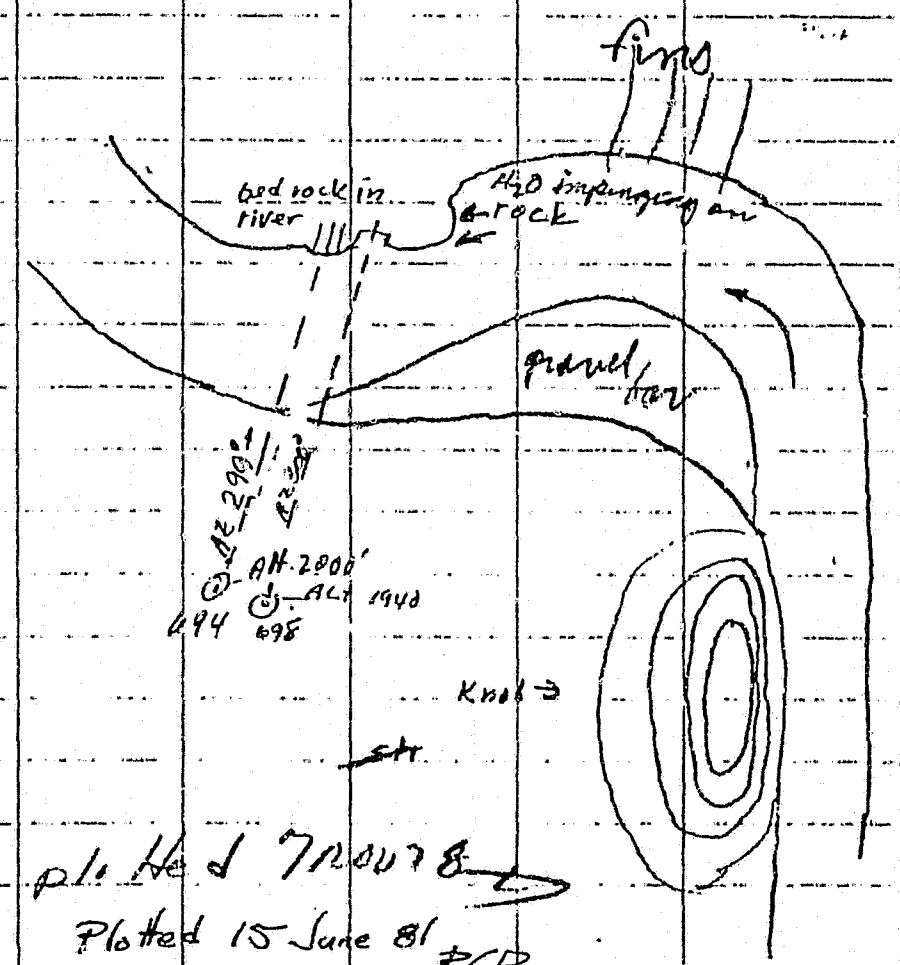
Plotted 15 June 81 RCP

Checked 15 June 81

RCP
15 June 81

3 June 78 Greeley - Campbell

From	TO	Forsite AZ	Bksite AZ	For ∡	Bk ∡	Dist.	Notes
690	692	37°	214°	+2°	-1°	53	Alt 2010' I have the feeling rocks are all sheared & healed along this traverse. To much moss and slightly displaced rock boulders to find any data.
692	694	315	134°	-36°	+37°	41	Alt. 2000 loose boulders covered with slicks. (Hit say dirt) why does a nose form?



plotted 7 Nov 78

Plotted 15 June 81 RCP

Checked 7/31/81

RCP 15 June 81

3 June 78 Greeley – Campbell Rly Cdy

From	To	Forsite	Bksite	Fors	Bk ∡	Dist	Notes
694							
	696	356	177°	-35°	+35°	51'	Alt 1975' exposed detached boulders have slicks all over them. rock appears to be well healed.
696							
	698	49°	227'	-31°	+34°	25'	Alt 1940 Edge a shallow gut which trends 340° Az into notch across R.
698						698 +	24' slicks trending 350° - block is slightly displaced. Alt 1930'
	~~700~~						
	700	324	146°	-40°	+39°	80'	Alt 1900' jts 250° Az all blocks have open cracks at top up to 12". There are Reversal jts trending 250° all exert. surfaces have slicks. these jts should not be plotted.
700							
	~~702~~					700 +	40' Fract. 220° covered w/slicks dips Vert.
	702	329	147°	-42°	+42'	100'	Alt. 1840' steep boulder covered slope rocks covered w/moss, thick alder and some birch and spruce.
702							
	704	318'	142°	-38°	+38°	100'	Alt. 1770' Very thick moss covered floor.
704							
	706	325	143°	-37°	+37°	100'	Alt. 1700' very thick moss covered boulder slope
706							
	708	329	145°	-30'	+31°	100'	Alt 1650' slope covered w/ thick moss

Plotted 15 June 78
RCP

RCT
15 June 78

3 June 78 Greeley - Campbell

From	TO	Forsite	Bksite	Fore	Bksite	Dist	Notes
708							
	710	325°	144°	-18°	+20°	100'	Alt. 1630' moss covered slope
710							
	712	325	144°	-11.5°	+12°	100'	Alt 1600' moss covered slope
712							
	714	322	138°	-6°	+7°	78°	Alt. 1595 at river bank. End of this traverse.

END OF TRAVERSE

Reduced + partially plotted 6/6/78

END OF BOOK

plotted 7/20/78

Plotted 15 June 81 RCP

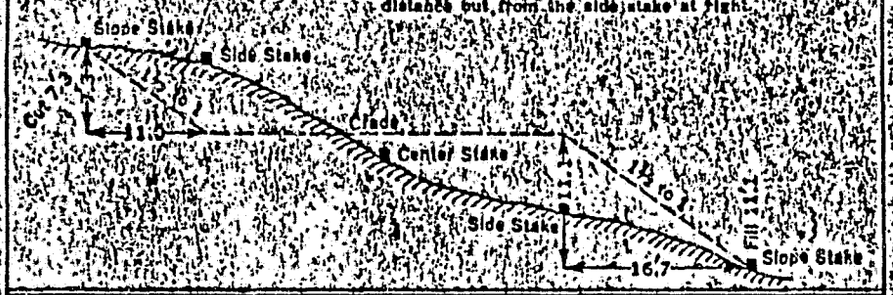
✓ RCP 15 June 81

Plots checked 1/31/81

DISTANCES FROM SIDE STAKES FOR CROSS SECTIONING

Roadway of any Width, Side Slopes 1½ to 1

In the figure below, opposite "7" under "Cut or Fill" and under "3" read "11.0" the distance out from the side stake at left. Also, opposite "11" under "Cut or Fill" and under "1" read "16.7" the distance out from the side stake at right.



Cut or Fill	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE Untrang
Book 13

Left Abutement
Macleod

ABREVIATONS:

BRG - BEARING
BLDR - BOULDER
u/s - UP STREAM
d/s - DOWN STREAM
E-W - EAST WEST
N-S NORTH - SOUTH
PT - POINT

1 JUNE 1978 A. HACLEOD W. CAMPBELL

3

From	TO	Forsite	Bksite	Fork	Bk ∡	Dist	Notes
251	403	151°	N32W	D 4°	U 3°	100	PT 401 (251?) IS THE U/S PICTURE PT ON L. ABUT ON TOP
	405	146°	N31W	U 1°	D 1°	100	OUT CROP @ 60' HIGHLY WEATHERED & SHEARED DIORITE. LINEATION BEARING N 67° W
	407	158	341°	D 1°	0°	94	NORTH SIDE OF LARGE GUT. WEATHERED DIORITE OUTCROP
	409	173	354	D 9	U 9°	100	SWAMPY AREA IN CENTER OF GUT
	411	177	358	U 1	D 1	100	BEARING OF VALLEY EAST/WEST STILL SWAMPY AREA
	413	177	355	U 6	D 6	100	SOUTH SIDE OF VALLEY DIORITE(?) OUT CROP. HIGHLY WEATHERED
	415	174	357	U 25	D 25°	76	TOP EDGE OF S. SIDE OF GUT ROCK SAMPLE 1-A TAKEN JOINTS - N 60 W E-W
	417	258	76°	D 5	U 5°	81	SWAIL CUTTING N SIDE OF MAIN VALLEY BRG N 50° E
	419	265	84°	D 3	U 2	131	SWAIL BRG N 40° E
	421	250	70°	0	0	100	TUNDRA MOSS

Geology plotted 16 JUN 78 D

Plotted 10 June 81 RCP

RCP

FROM	TO	FORSITE	BRSITE	FOR ∡	BR ∡	DIST	NOTES
421	423	249	69	+1	-1	100	TUNDRA MOSS
	425	253	70	+1	-1	100	
	427	253	71	0	+1	38	ROCK FACE - BRG N65°W MAFIC ROCK TYPE (GABBRO?)
	429	275	91°	+4°	-4°	90	GUT CROSSING N65°W GUT BRG N60°E
	431	243	60	+5	-4	100	FLAT AREA W/SLOPE TO
	433	206	29	+1	-1	100	THE NW BETWEEN ROCK FACES
	435	194	19	+2	-2	100	ALDER GROVE + BOGGY AREA
	437	208	26	+3	-4	100	
	439	226	41	+3	-2	88	S.W. SIDE OF LARGE GUT BRG N65°W ROCK OF BASALT - ANDESITE PORPHYRY TYPE
	441	289	110	-6	+6	100	NOTCH IN BANK OF GUT BRG N50°E
	443	296	114	-3	+4	100	
	445	299	117	-3	+3	104	ROCK OUT CROP OF BASALT ANDESITE PORPHYRY TYPE EDGE OF N65°W GUT
	447	303	121	-4	+4	100	SIDE SLOPE OF GUT 40° SLOPE
	449	287	109	-5	+5	100	B-A-PORPHYRY OUT CROP

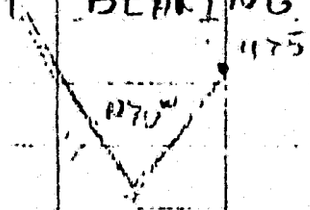
plotted 1 Gen 78 RCP
Plotted 10 June 81

replotted/checked 7/3/81

FROM	TO	FORSITE	BKSITE	FOR ∆	BK ∆	DIST	NOTES
449	451	23	199	-35	+35	32	BOTTOM OF SIDE SLOPE ON SW SIDE OF GUT
	453	16	191	-1	+1	100	SWAMPY TUNDRA W/ FLOWING WATER
	455	7	187	+1	-1	100	APPROX NE EDGE OF GUT
	457	5	182	+15	-15	100	
	459	353	169	+8	-8	100	TOP OF RIDGE
	461	351	172	-5	+6	100	SWAIL BRG N65 W
	463	7	185	-5	+5	100	TILL etc
	465	4	184	-6	+5	100	BOULDERS (DIORITE)
	467	295	115	-1	+2	100	
	469	300	117	-10	+10	100	
	471	299	117	-9	+9	100	RIBBON TIED ON LONE SPRUCE ABOVE DAM AXIS

plotted 16 NOTE

Plotted 10 June 81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
	2 JUNE 1978			A. MACLEOD		+ B SMITH		MAPPING
000	PT ~ point 000 IS LOCATED ON A BRG OF 284° FROM "SLIDE BLOCK" ON THE NORTH SIDE OF THE SUSITNA RIVER AT AN ELEV OF 2110' (BREAK IN SLOPE) 14° FROM LOWER UP STREAM PICTURE POINT ON LEFT BANK							
000	473	315	129	+16	-12	100	2145	ALONG EDGE OF GUT
	475	305	121	+5	-6	100	2150	GUT BEARING N70W 
	477	322	143	+9	-7	100	2160	GUT FILLED W/DIORITE BOULDERS 1-3' DIA GUT WIDENING OUT AT THIS POINT
	479	412	224	+1	-2	28	2160	ROCK OUT CROP ON EAST SIDE OF GUT WEATHERED DIORITE
	481	48	230	+27	-33	45	2180	BENCH BRG N55W ABOVE GUT BEARING

Checked 7/30/81

Plotted [illegible] 78

Plotted 10 [illegible]

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
1181	1183	55	233	+17	-19	83	2210	RIDGE BETWEEN 2 GUTS. AXIS OF RIDGE BRG N 70 W

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
495	497	39	215	+1	-3	100	2105	DIORITE BOULDER &
								FIELD LARGE BOULDERS
								4-6 FT DIA. LOTS OF
								BIOTITE + HBL. W/PLAG + QTZ
	499	80	264	-12	+14	94	2090	@ BREAK IN SLOPE
								IN WIDE GUT BRG
								N55W. STILL IN DIORITE
								BLDR. FIELD
	501	13	191	+1	-4	100	2100	ROCK BOULDER FALL THAT LOOKS
								LIKE B.R. FROM A SHORT
								DISTANCE AWAY
								BOULDERS ARE OF THE
								"ANDESITE PORPHYRY" TYPE
	503	41	223	-8	+7	100	2090	
	505	59	244	-13	+13	67	2070	
	507	25	207	0	-2	98	2075	@ 41' SMALL GUT
								BRG. EAST - WEST
								PT 507 ROCK OUT CROP
								(AT LAST!) [SPOKE TOO SOON]
								DIORITE - LARGE GRAINED
								VEINS OF FINE GRAINED
								GRANITE (!) AND PEGMITITE
								SHEARED + WEATHERED
								ATTITUDE OF MAIN
								JOINT SYSTEM ✓ RC
								N55W @ 85° NE

checked 7/30/81

plotted 8 Nov 79

Plotted 19 June 81 RCP

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT.	NOTES
507	509	52	235	-34	+35	53	2045	CENTER OF LARGE GUT / BRG N35W
								3 JOINTS VISIBLE IN ROCK WALL
								1 BRG N40E DIP 66° NW
								1 BRG N60W " 65° SE
								1 BRG N60E " 16° NW
								DIP OF AT WALL 80° NE (D/S SIDE OF GUT)
								ROCK IS DIORITE W/ Lg HBL + BIOTITE XTLS
	511	53	237	+11	-12	49	2060	
	513	58	237	-14	+15	100	2040	@ 34' - SMALL GUT - N60W
								NOSE OF RIDGE @ 513 BRG N35° W
	515	37	213	-5	+5	78	2025	
	517	36	217	-13	+14	87	2010	1 GUT BRG N55W
								1 SMALL-GUT BRG E-W
								DIORITE BLDRS
	519	14	194	+8	-6	100	2050	ROCK SLIDE (DIORITE)
	521	105	283	-15	+16	100	2015	
	523	163	284	-15	+15	100	1995	BOULDER FIELD
								LARGE BLDRS OF DIORITE
								COARSE GRAINED

Checked 7/30/78

Plotted 8 Nov 78 →

✓RCP

FROM	TO	FOR SITE	BR SITE	FOR ∆	BR ∆	DIST	ALT	NOTES
523	525	131	310	-17	+17	100	1950	BREAK IN SLOPE
	527	67	247	-2	+1	92	1950	@ 67' A SMALL GUT
								BRG: N35W
	529	21	202	+7	-12	100	1975	
	531	03	183	+9	-14	100	1990	
	533	347	163	+24	-25	100	2040	CROSSED OVER COBBLES
								OF GNIESS + SCHIST
								ROCK OUTCROP @ PT 533
								DIORITE
	535	22	188	+5	-7	100	2050	GUT BRG N35W
	537	54	237	+20	-21	100	2090	SIDE SLOPE OF 30°
	539	64	245	+10	-15	100	2120	
	541	27	213	+12	-14	68	2145	
	543	21	204	+6	-7	84	2150	CENTER OF GUT
								BRG N40W
	545	59	238	+2	-4	100	2155	CENTER OF GUT BRG
								N10° E
	547	65	247	+14	-16	127	2200	BREAK IN SLOPE
								FROM 25° TO 7° SLOPE

PT 547 - BRG 35° FROM SITE K
23° FROM LOWER U/S PICTURE PT

checked 7/30/81

Plotted 8 Nov 78

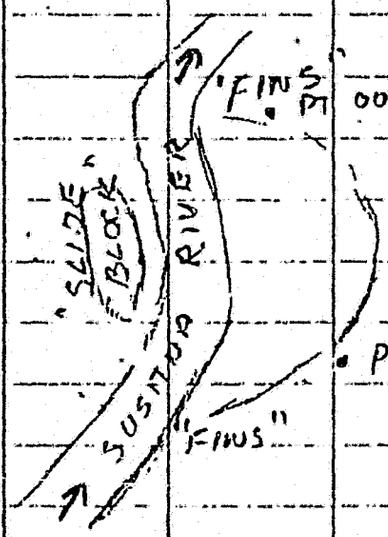
✓RCP

Plotted 19 June 81 RCP 15 June 8

3 JUNE 1978 A. MACLEOD + B. SMITH

21

FROM	TO	FORESITE	BKSITE	FOR ∠	BK ∠	DIST	ALT	NOTES
547	549	105	285	-9	+8	100		SWAIL IN BROAD GUT. SWAIL BRG N55E
	551	107	287	-7	+7	100		ANOTHER SWAIL IN SAME GUT BRG N55E
								GUT HAS A BRG OF N10E
	553	119	299	-3	+3	100		U/S EDGE OF GUT NO ROCK OR BLDRS SEEN IN GUT
	555	155	342	-2	+3	100		BREAK IN SLOPE ALONG UPPER EDGE OF GUT CHANGES FROM 8° SLOPE TO 26° SLOPE DOWN TO BOTTOM OF GUT
	557	160	337	-6	+8	100		
	559	140	320	-8	+7	100		U/S EDGE OF VERY BROAD INDENTATION IN "CANYON WALL" THAT STARTS @ "FINS" AND ENDS @ A SECOND SET OF "FINS" U/S. THIS INDENTATION IS DIRECTLY ACROSS FROM THE "SLIDE BLOCK"



Checked 7/30/81

plotted 8 Nov 78

Plotted 19 June 81

JRCP

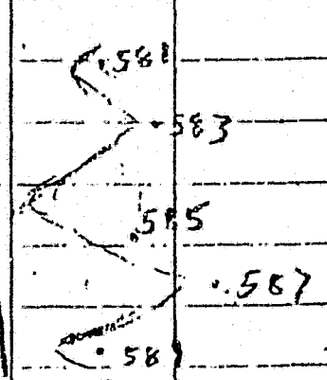
FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
559	561	120	304	-4	+4	100		BREAK IN SLOPE FROM a 10° SLOPE TO A 30° SLOPE
	563	110	294	-4	+2	100		ALONG BREAK IN SLOPE. NO ROCK OR BLDRS SEEN
	565	134	318	-14	+14	93		STAIR STEP DOWN ALONG BREAK IN SLOPE "STEP" ABS ABRG N60E A FEW LARGE "DACITE" BLDRS ARE SEEN
	567	142	321	-13	+12	100		
	569	126	311	-8	+9	100		
	571	118	301	-7	+7	100		STILL ALONG BREAK IN SLOPE. FROM A 10° SLOPE TO A 30° SLOPE
	573	96	279	-3	+4	100		
	575	115	295	-11	+10	100		
	577	216	34	-14	+15	62		CENTER OF GUT BRG N 30W ALSO BREAK IN SLOPE FROM 30° SLOPE TO 45° SLOPE. ROCK OUT CROP IN GUT - COARSE GRAINED WEATHERED DIORITE

Checked 7/30/81

Plotted 19 June 81 RCP

plotted 8 Aug 78 ✓ RCP

FROM	TO	FORSITE	BKSITE	FOR∠	BK∠	DIST	ALT	NOTES
577	579	82	265	+1	-1	100		
	581	121	298	-8	+7	76		NOSE OF RIDGE (FIN) @ BREAK IN SLOPE 10° TO 30° TO 45-50° BRG NORTH-SOUTH
	583	78	259	-11	+8	50		TOP OF GUT BRG N 10 E. ROCK OUT CROP IN GUT BUT I'LL BE DAMNED IF I'M GOING TO CHECK IT OUT
	585	62	238	+1	-1	73		ACROSS A "FIN" BRG S47E TO EDGE OF A GUT
	587	9	187	+13	-13	74		TOP CENTER OF A GUT BRG N 25 E ROCK OUT CROP OF DIORITE (FOR WEATHERED ROCK THIS STUFF IS AWFULLY HARD)
	589	97	279	-11	+11	64		NOSE OF "FIN" BRG NORTH-SOUTH



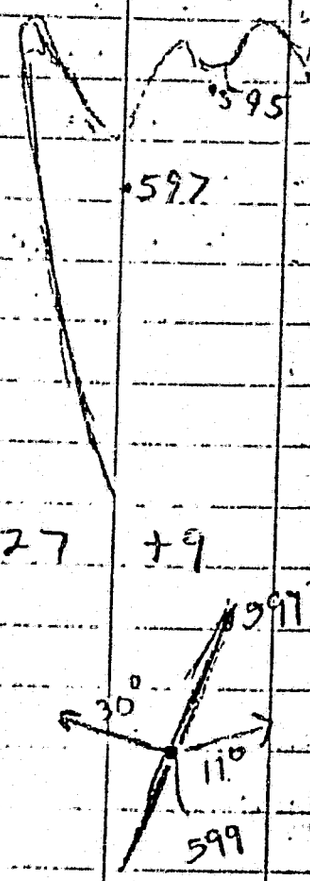
checked 7/30/81

plotted 8 AUG 78

Plotted 19 June 81
RCP

✓ RCP
15 June 81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	OBT	NOTES
589	591	38	214	+5	-9	100	ALONG BREAK IN SLOPE (EDGE OF FIN) FROM a 15° SLOPE TO a 60° SLOPE
	593	15	195	+18	-15	100	TOP CENTER OF A GUT BRG N 30 E
	595	25	203	+12	-12	100	GUT NOT AS VEED AS PREVIOUS GUTS BRG N 55 W
	597	37	212	+11	-12	98	INTERSECTION OF 2 RIDGES AND ONE GUT
							ONE RIDGE BRG N 35 W
							GUT BRG N 55 W
							RIDGE BRG N 70 W
							THE RIDGE BRG N 70 W ALSO FORMS ONE SIDE OF A DEEP AND WIDE VEE CUT
	599	306	127	+9	-9	100	LINE ALONG "CENTER" OF RIDGE. DOWN SLOPE OF 11° TO THE SW AND A DOWN SLOPE OF 30° TO THE NE



Checked 11/30/81

plotted 8 AUG 78

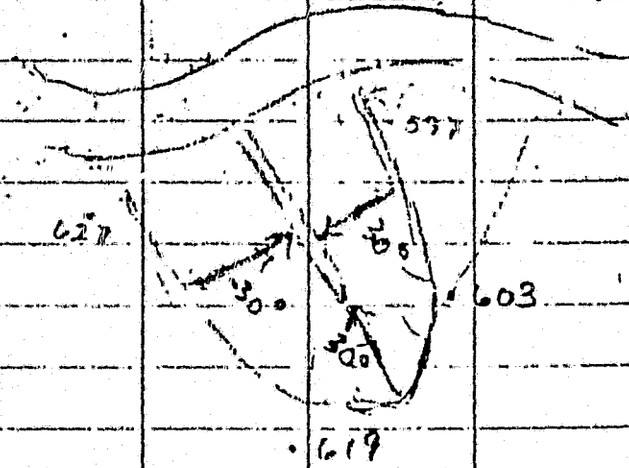
Plotted 19 June 81 RCP

✓ RCP 15 June 81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
599	601	321	134	+9	-10	100	
	603	314	130	+4	-5	100	INTERSECTION OF TWO GUTS 1 BRG E-W 1 BRG 160°
	605	9	184	+4	-4	100	
	607	24	200	+1	-1	66	TOP CENTER OF "DEEP VEE" BRG 130° BREAK IN SLOPE FROM 5° SLOPE TO 30° SLOPE
	609	28	205	+9	-10	83	SMALL GUT IN SIDE SLOPE OF "DEEP VEE" BRG 135°
	611	43	223	+10	-10	95	ANOTHER SMALL GUT BRG 160°
	613	72	257	+1	-1	100	
	615	82	265	-8	+7	56	SMALL GUT BRG 197°
	617	110	293	-2	+2	70	
	619	96	274	-20	+19	100	
	621	108	290	-12	+11	100	SWAIL BRG 87°
	623	116	297	-6	+7	100	INTERSECTING SWAILS 1 BRG N20E 1 BRE E-W
	625	136	310	+1	-1	75	
	627	127	311	-7	+7	100	U/S ARM OF "DEEP VEE" BRG APPROX 310 (SEE MAP) ✓RCP

plotted 7 MAY 78

Checked 7/30/81



FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
							NO ROCK SEEN AROUND TOP EDGE OF "DEEP VEE". NO BOULDERS SEEN
627	629	54	230	-10	+11	42	SWAIL THAT TURNS INTO A SMALL GUT BRG N60W
	631	47	231	-5	+5	100	
	633	39	217	+3	-2	100	MOSS, SPRUCE, BIRCH AND ALDER ALONG W/VARIOUS GROUND PLANTS, BIRDS + SQURRALS
	635	45	221	-5	+5	100	OH YES, AND IRRITATING FLIES!
	637	9	191	+4	-4	100	WIDE SWAIL BRG E-W
	639	62	242	+5	-6	100	STAIR STEP UP TO ANOTHER E-W SWAIL CROSSED OVER SOME BLDRS OF "DACITE" (FAIRLY FINE GRAINED INTRUSIVE.

checked 7/30/81

✓ RCP
15 June 81

plotted 7 NOV 78
[illegible] 19 June 81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
639	641	87	270°	-5	+6	100	
	643	106	289	0	-2	100	ROLLING HUMMOCKY AREA
							SLOPING TOWARD RIVER
							IN A STAIR STEP FASHION
		PT 643					BRG APPROX E-W
		LOOKING WEST					VERY FEW BLDRS SEEN
	645	84	285	+4	-4	100	
	647	46	227	+1	-11	100	
	649	57	244	+10	-11	79	ALT 1960 (WRONG!!) actually quite close

plotted 9/20/78

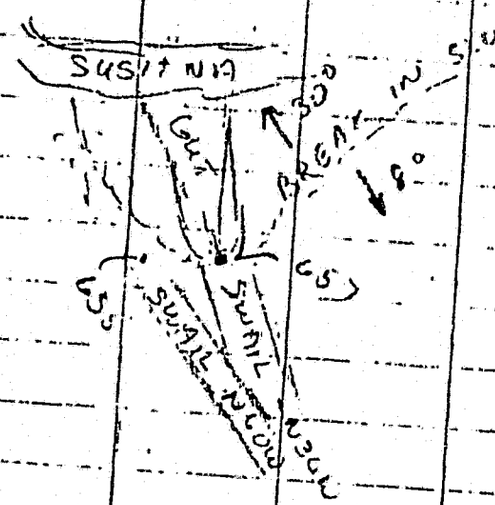
Checked 7/30/81

Plotted 19 June 81 RVP

✓ RCP 15 June 81

4 JUNE 1978 A. MACLEAN B. SMITH

FROM	TO	FORSITE	BK SITE	FOR ∡	BK ∡	DIST	ALT	NOTES
649	651	147	328	-8	+8	100	1950	
	653	144	324	-2	+2	100	1950	
	655	158	337	-13	+13	100	1940	
	657	235	54	-11	+11	100	1925	CROSSED OVER A SWAIL BRG N60W @ 40' GUT @ 657 BRG S30E AND SWAIL BRG N30W
	659	101	282	+4	-6	106	1930	ROCK OUTCROP OF WEATHERED DIORITE
	661	127	308	-4	+4	95	1925	ALONG BREAK IN SLOPE FROM 30° SLOPE TO 60° SLOPE (ROCK CLIFF)
	663	97	274	+2	-2	92	1925	INTERSECTION OF SWAIL AND SMALL GUT SWAIL BRG E-W GUT BRG S20W



Checked 7/30/81

Plotted Nov 78 ✓ RCP

Plotted 19 June 81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
663	665	129	311	-10	+8	79	1915	NOSE OF "FIN" @ THE BREAKIN SLOPE FROM 20° TO 55°. BRG N-S
	667	37	215	+10	-10	100	1925	TOP CENTER OF A GUT BRG N55° W. ROCK OUTCROP IN GUT OF DIORITE
	669	97	276	-1	+1	100	1925	
	671	71	257	-2	+1	87	1925	AT 40' - GUT BRG S10°E AT 671 GUT BRG S10°W
	673	130	314	-2	+2	100	1920	DOWN CENTER OF A "FIN". PT 673 AT BREAK IN SLOPE FROM ~1° TO 50°
673	675	7	183	+3	-4	46	1925	
	677	4	181	-8	+6	23	1920	LARGE GUT (FAULT GOUGE) BRG S60E DIORITIC LOOKING ROCK OUTCROPS IN GUT
	679	48	224	+7	-7	100	1930	
	681	87	269	0	+1	100	1925	
	683	90	270	-1	0	81	1925	GUT BRG S60E

Checked 7/30/81

plotted 9 Nov 78 → ✓ RCP

Plotted 19 June 81 RCP

15 June 81

FROM	TO	FORSITE	BRSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
683	685	17	194	+9	-10	100	1940	(SEE MAP ON LAST PAGE)
	687	29	202	+1	-2	93	1936	U/S END OF CLIFF SYSTEM
	689	13	187	-8	+6	100	1915	STARTING DOWN INTO
	691	10	190	-12	+11	100	1895	BROAD U-SHAPED GUT
								SYSTEM
	693	9	191	-10	+10	100	1880	CENTER OF A GUT
								BRG E-W
								ALSO IN BADR FIELD
								ANGULAR TO SUB-
								ROUNDED BLDRS OF
								DIORITE.
	695	15	193	+2	-3	100	1890	
	697	8	187	+8	-7	100	1905	BIRCH AND SPRUCE
								TREES
	699	359	174	-1	+1	61	1905	SMALL GUT BRG E-W
								SLUMP FEATURES
								PRESENT AT THIS PT
								ROUNDED GRAVELS OF
								VARING LITHIC TYPES
								ALSO PRESENT
	701	356	179	+8	-8	100	1925	
	703	38	216	-4	+3	100	1930	PASSED OVER WATER
								SEEPING OUT FROM
								UNDER MOSS. ROUNDED
								GRAVELS + COBBLES
								EXPOSED

Plotted 19 June 81 ✓ RCP

Checked 7/30/81

Plotted 9/10/81

FROM	TO	FORSITE	BKSITE	FOR Δ	BK Δ	DIST	ALT	NOTES
703	705	21	197	+2	-1	100	1935	
	707	37	224	-12	+10	82	1920	GUT BRG S 60 E
								RUNNING WATER
								(NO GRAVELS SEEN)
								ALDER GROVE
	709	38	217	+3	-4	100	1925	FORESTED SLOPE
	711	13	194	+8	-8	88	1940	TUNDRA MOSS, ETC
	713	7	184	+7	-7	100	1950	NO ROCKS SEEN
	715	16	194	+7	-7	100		
	717	66	252	-2	+2	100	1975	
	719	359	181	+7	-6	100	1985	SAND ON SURFACE
								LOOKS LIKE IT IS
								EMPLACED BY RUNOFF
								(ALDER GROVE)
	721	5	187	+8	-7	95	2000	
	723	13	193	+7	-7	100	2010	BOULDERS, COBBLES,
								GRAVELS OF VARIOUS
								LITHIC TYPES
								GNIESS, SCHIST, GRANITE
								ETC
	725	2	183	+7	-8	100	2030	
	727	351	167	+6	-8	100	2050	
	729	16	199	+7	-8	78	2060	BREAK IN SLOPE
								FROM 25° SLOPE TO
								81° SLOPE

Checked 7/30/81

✓ RCP

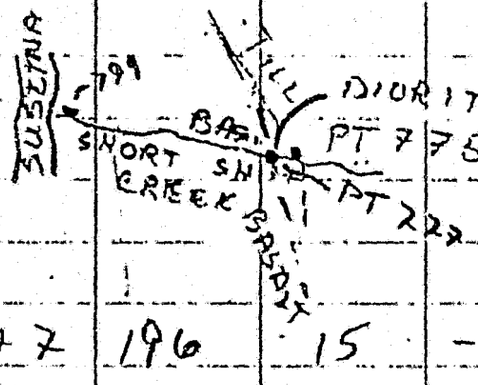
FROM	TO	FORSITE	BKSITE	FORA	BKA	DIST	ALT	NOTES
729	731	326	150	+12	-12	100	2090	BASE OF SLIDE SCARP. MATERIALS: GLACIAL TILL
729	733	158	334	-11	+11	100	2025	TOE OF SLUMP
	735	120	302	-6	+6	100	2015	FOLLOWING SMALL
	737	147	327	-8	+8	100	2010	STREAM - TILL MATERIAL
	739	155	335	-11	+11	100	1990	BREAK IN SLOPE FROM 8° SLOPE TO 20° SLOPE
	741	83	260	-1	0	100	1990	GENTLY SLOPING
	743	139	322	-11	+11	100	1980	HUMMOCKY TERRAINE
	745	181	359	-10	+11	100	1965	LOTS OF SURFACE WATER
	747	149	332	-5	+6	100	1955	IN MANY SMALL CHANNELS
	749	168	347	-8	+8	100	1950	BASIC DIRECTION OF
	751	121	306	-3	+4	95	1945	CHANNELS - S60W
	753	140	324	-3	+4	100	1945	LOTS OF SAND BUT
	755	231	46	-8	+9	85	1920	VERY LITTLE DOWN CUTTING
	757	186	10	-9	+10	93	1910	OR GRAVELS
	759	155	335	-4	+5	100	1905	
	761	169	353	-9	+9	40	1900	ANGULAR BLOR OF GNIESS
	763	178	354	-12	+11	74	1895	CENTER OF CUT BRG S 30W

Checked 7/30/81

Plotted 9 Nov 78 RCP

Plotted 19 June 81

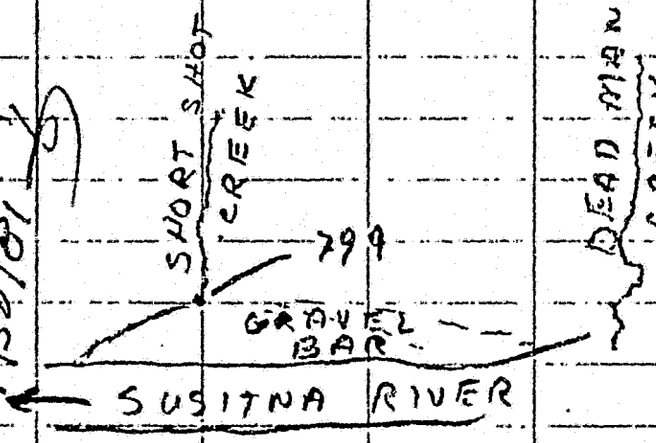
FROM	TO	FORSITE	BKSITE	FOR ∢	BK ∢	DIST	ALT	NOTES
763	765	217	35	-8	+9	100	1880	
	767	232	46	-7	+8	100	1865	COBBLES & BLDRS (TILL)
	769	184	5	-14	+14	100	1840	ALONG UPPER EDGE
	771	187	9	-17	+16	100	1800	OF EAST CREEK BANK
	773	320	135	+1	-1	68	1800	
	775	305	124	-19	+17	83	1780	MIDDLE OF CREEK BRG S 10 W. APPROX CONTACT BETWEEN TILL AND BEDROCK
	777	196	15	-19	+19	100	1740	CONTACT BETWEEN BASALT AND DIORITE BEST GUESS: CONTACT RUNS N60E - S60W NEARLY VERTICAL
	779	171	353	-20	+20	100	1700	
	781	189	5	-14	+14	100	1675	FOLLOWING CREEK DOWN
	783	198	17	-15	+15	100	1650	
	785	204	25	-16	+14	100	1625	
	787	203	24	-8	+10	100	1610	
	789	248	66	-9	+10	21		OFF SET FOR BETTER RUNS.
	791	178	358	-11	+11	100	1600	"IRON SPRING" - EVERY THING IRON STAINED



Checked 7/30

FROM	TO	FORSITE	BKSITE	FOR'A	BK'A	DST	ALT	NOTES
791	793	176	357	-13	+12	100	1680	
	795	178	355	-13	+14	100	1650	
	797	150	335	-13	+17	100	1500	
	799	165	345	-21	+25	100	1555	

POINT 799 IS LOCATED AT THE CONFLUENCE OF SHORT SHOT CREEK AND THE SUSITNA RIVER



Checked 7/30/81

plotted 9 Aug 78

✓ RCP
15 June 81

Plotted 19 June 81 RCP

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width: Side Slopes 1½ to 1.

In the figure below opposite 7 under "cut or Fill" and under 10 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "cut or Fill" and under 1 read 16.7, the distance out from the side stake at right.

Center Fill	0	1	2	3	4	5	6	7	8	9	Center Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE Uhrum Book 14 117

Note odd Nos.
Pt 117 → Pt 199
not used

Also note:
during snow melt; no rills or creeks were seen from ice. Rock is permeable — watch snow estimates — could be high.

20 May Left Bank - high

From	To	Forsite	Backsite	For ∡	Back ∡	Dist	Notes
Hole "M"	Pt201	S13E	N15W	+12°	-10°	100'	Brush & diorite boulders
Pt 201	Pt203	S12E	N13W	+12°	-11°	98'	Same
Pt203	Pt205	S15E	N13W	+15°	-13° ~~-12°~~	100'	Same
Pt205	Pt207	S11E	N13W	+14°	-12°	100'	Same
Pt207	Pt209	S~~06~~ 09 E	N10W	+15°	-13°	90'	Same
Pt209	Pt211	S14E	N16W	+14°	-11°	100'	Same & mostly brush
Pt211	Pt213	S11E	N15W	+11°	-9°	69'	to break in slope. Boulders of
Pt213	Pt215	~~S22E~~ S					andesite porphory, etc. [illegible] diorite
↓	↓	S23E	N24W	+24°	-22°	54'	Andesite porphory boulders
Pt215	Pt217	S75E	N76W	+4°	-3°	100'	up west side (SW side) of gut.
							Gut bears S65E (mag set) - SW side
							has greenish andesite porphory.
Pt217	Pt219	S66E	N65W	+9°	-9°	100'	up SW side of gut.
Pt219	Pt221	S56E	N56W	+12°	-11°	~~100~~ 96'	Gut turned direction a bit
							end in faint swale ~~N~~ S70E avg.
							Side slopes on main gut 35-40 SW
							near vert NE (10-15' high to NE)
							Rock - glassy grey w/ black
							~~obsidian~~ hornblende + beautifully twinned plag (clear)
							clear → light greenish qtz.
Pt221	Pt223	N~~32~~ 34 E	N36W	+4½°	-4½°	76'	⊥ to gut. side to side. same rock as 221
Pt223	Pt225	N45E	~~N~~ S47W	+33°	-32°	26'	

plotted [illegible] 78

Plotted 16 June 81 RCP

15 JUN 81 LDZ

Checked 1/30/81

From	to	Forsite	Backsite	For ∡	Back ∡	Dist.	Notes
Pt225	Pt227	N68E	S67W	-1°	+2°	109'	To edge of bluff & next swale
Pt227	Pt229	N80E	S80W	-11°	+12°	100'	Bottom of swale SW side (S70E)
Pt229	Pt231	S80E	N80W	+1°	0°	100'	SW side of swale rock same somewhat coarser grained
Pt231	Pt233	S85E	N83W	-1°	+2°	100'	up swale ±
Pt233	Pt235	S74E	N75W	+2°	-1°	75'	Small outcrop - Same - slightly more dense (heavier), & finer matrix
							HIGHLY JOINTED, MOD TO HIGHLY WEATHERED
							N33W DIP 70° NE
							N20W " 70° "
Pt235	Pt237	S80E	N75W	+9°	-8°	100'	Spinsup shear zone rock to left & right Highly weathered & soft - breaks down easily. Bluff trends E-W Swale ends here & blends into bluff.
Pt ~~234~~ 237	Pt239	S59E	N59W	+13°	-12°	100'	Glacial Striations
						~~100'~~	photo 11-~~15~~ 16 & -~~16~~ 17 took East. pens on striae. direction N82W
Pt239	Pt ~~231~~ 241	S58E	N58W	+11°	-11°	100'	Same rock
Pt ~~231~~ 241	Pt ~~233~~ 243	East	West	-2°	+3°	100'	Top of ridge
Pt ~~233~~ 243	Pt ~~235~~ 245	S61E	N58W	+8	-7°	100'	More signs of HW & gouge (?) attitude (?)
Pt ~~235~~ 245	Pt ~~237~~ 247						
↓	↓	N65E	S68W	-6°	+7°	100'	Small swales

15 JUN 81
LDZ

Plotted 16 June 81 RCP

11-14 (Flexible shot)
11-15 Tourist shot

Plotted 18 Nov 78

From	To	Forsite	Backsite	For ∡	Back ∡	Dist.	Notes
Pt ~~237~~ 247	Pt ~~239~~ 249	S69E	N68W	+10°	-3°	100'	HW & chewed up rock at Pt 237 & at Pt 239
Pt ~~239~~ 249	Pt ~~241~~ 251	S87E	N87W	+2°	-1°	82'	to point HW & diced rock. General Grung Zone ≈75' across to the SW. Drops off to NE. Photo 11-~~19~~ 18
							Bearings N70W vert.
							~~N30W~~ N60W 45NE
							N86W vert. ?
							photos 11-~~18~~ 17 & ~~19~~ 20 - closeup of diced HW rock. - Same rock as before.
							11-21 shot of FINS
							plotted 6 nov 78

C

15 JUN 81
LDZ

Plotted 16 June 81
RCP

Checked 7/30/81

From	To	Forsite	Backsite	For ∡	Back ∡	Dist	Notes
K	Pt347	N76W	S77E	−9°	+10°	100'	Break in slope
Pt347	Pt349	S84W	N81E	+2°	0°	100'	" " "
Pt349	Pt351	S53W	N49E ?	+6°	−6°	50'	Alders + diorite boulders
Pt351	Pt353	N89W	S89E ?	−1°	+2°	100'	center of + top of small glacier @ 60' bearing "N" even. rock frags of weathered diorite - may be shear.
Pt353	Pt355	N83W	S85E	+4°	−4°	100'	diorite outcrop @ 20' trend N60W No evidence of shears
Pt355	Pt357	N84W	S87E	+1°	+1° ?	100'	diorite - may be big boulder - M10 on surf.
Pt357	Pt359	S88W	N88E	−4°	+4°	100'	
Pt359	Pt361	S71W	N74E	+3°	+2° ?	107'	edge of large glacier U/S edge bears "N" 40° down to river
Pt361	Pt363	N81W	S84E	−2°	+2°	100'	diorite outcrop out of reach down nothing significant seen fair amount of water coming thru glacier
Pt363	Pt365	N77W	S79E	+2°	−1°	104'	brush
Pt365	Pt367	S71W	N72E	+14°	−13°	97'	bottom of +
Pt367	Pt369(D)	S11W	N13E	+17°	−17°	57' ~~44'~~	X
Pt369	Pt371	N58W	S58E	−6°	+7°	100'	diorite boulders
Pt371	Pt373	N49W	S45E	−10°	+12°	100'	
Pt373	Pt375	N31W	S31E	−13°	+16°	50'	Break in slope

15 JUN 81
LDZ

Plotted 16 June 81
RCP

plotted [illegible] 78

From	To	Forsite	Backsite	Fork	Back	Dist	Notes
Pt375	Pt377	N11W	S11E	-25°	+2[illegible]	131'	edge

top of fin. 100' u/s
N30-35W. Usual diorite boulders w/ subangular basalt cobbles - have been moved but not too far. - River deposit?

REDUCED

plotted 5 Nov 78

END OF BOOK

CLOSED

Plots checked 7/31/78

15 JUN 81 Plotted 16 June 81
LDZ RCP

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width, Side Slopes 1½ to 1.

In the figure below opposite 7 under "Cut or Fill" and under .3 read 11.0, the distance out from side stake at left. Also, opposite, 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.

Cut or Fill	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE Weekly Book 11

Misc Notes

1) Need to check with BLM on whether we can leave fence posts in holes, survey stakes, etc. Also on how much flagging can be left @ survey points & lines.

2) leave BM's @ picture points?

3) place rebar (stamped) @ picture points?

4) need fence posts for holes put in as completed - holes are being wasted by mud & lost.

5) calculate liquidated damages for chopper down time.

6) calculate cost due to pilots being late.

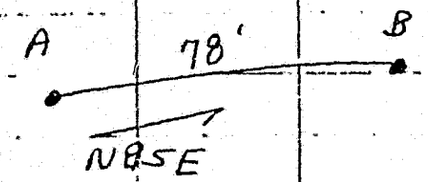
7) need pad changes as learning - savings in chopper & probably pilot time.

S. abutement
U.S. of C.L
Geology
Traverse
Notes

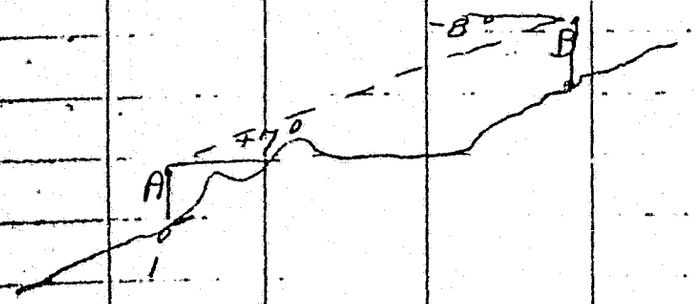
Note Taking Scheme

FROM	TO	BS	FS	BS VA	FS VA	DIST
A	B	(B to A)	(A to B)	B to A	A to B	A to B
sample						
A	B	S85°W	N85E	-8°	+7°	78'

backsight foresight (in degrees) (in feet, slope dist)



plan



section

compass set @ 26°E mag dec — direction are true north azimuths.

26MAY78

3

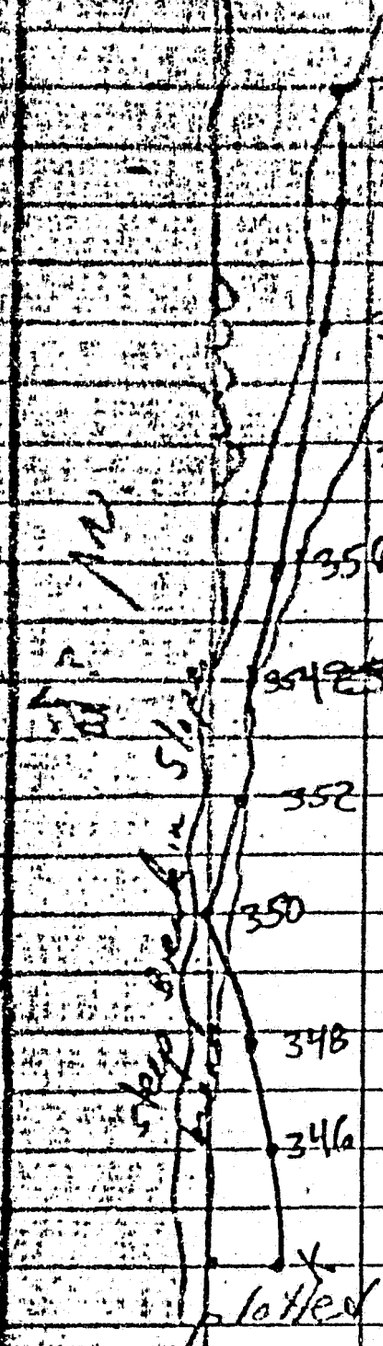
Starting G #'s same as Pt #
Traverse #'s evens Pt 346
Photo #'s Roll 14
Sample #'s 46 plus

set 1pt or rin 1000' U.S. - hole "J"

start @ K @ S Slope

45° 26 May L Duncan Deck @ 26°F
rain from SW 0730 Tape John Rigo

FROM	TO	BACKSIGHT	FWD AZIMUTH	BACK VA	FWD VA	DIST
Hole K	Pt 346	236°	N54°E	+8°	-10°	98'
Pt 346	Pt 348	220°	N45°E	+15°	-13°	100'
		222°	N43°E ✓			
Pt 348	Pt 350	232°	N57°E ✓	+5°	-5°	100'
		236°	N57°E ✓			
350	352	240°	N64°E	-2°	+2°	100'
		242°	N63°E ✓			
~~350~~	~~352~~					~~92'~~
352	354	235°	N55°E	+2°	-3°	92'
354	356	242	N64°E	+5°	-5°	80'
356	358	252°	N74°E	-4°	+3°	60'
358	360	245°	N69°E	+3°	+0°	98'
		247°	N68°E ✓	+1°	+0°	
360	362	261°	N78E	-2°	+1°	97'
			N80E ✓			
362	364	245	N67°E	+5°	-6°	100'
362 left offset 1'		~~246~~	~~N70°E~~			
364	366	~~252°~~ 344°	S14E	-23°	+24°	100'



tundra
tundra
alders 38-78' out - stream
mixed alders & spruce
trending ≈ N40°W
tundra
alders, mud, streams
45' out to 352
trending ≈ N40W
tundra
tundra, 10' trees
boulders - tundra
fine grained diorite
tundra - 45° hill slope
boulder till, tundra
diorite
plotted 8 NOV 78
Plotted 17 June 81
RCP

16 JUN 81
LDZ

FROM	TO	BS	FS	BACK FWD	

0906 pulled out on account of rain & snow.

Flagged Pt 366 w/red.
swale @ 356 lines up w/ topsoil
swale east of pad 1.

MAY 0900

SUNNY - CALM THANK - GOD !

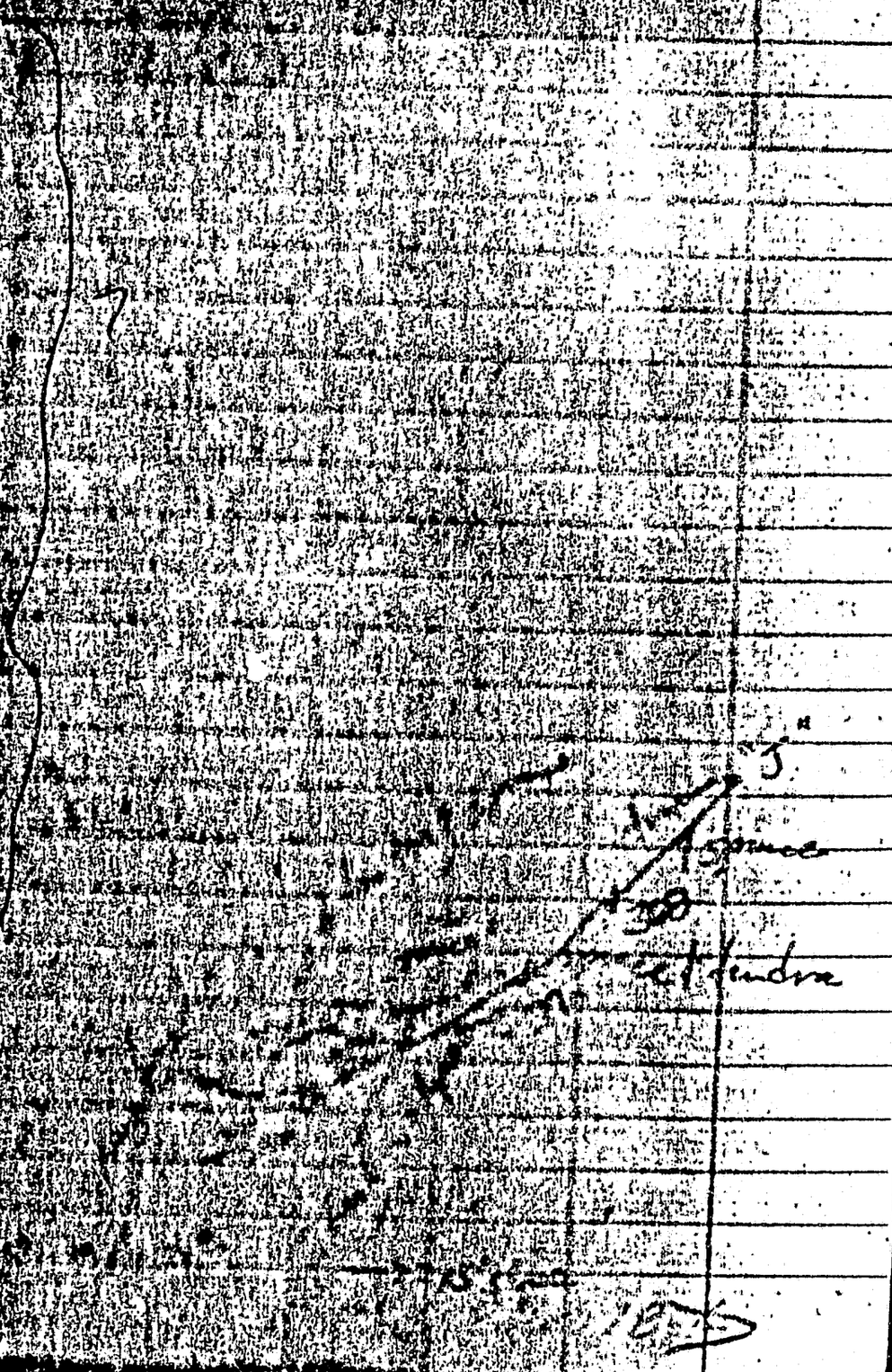
FROM	TO	BS	FS	BACK VA	FWD VA
"J" hole	368	144°	N44°W	+9°	-7°
		143°	N42°W ✓	slope of hill	
		143	N42°W		
		180			
		323	= 318°		
Pt 368	370	147°	N35°W	+9°	-10°
Pt 370	372	139°	pencil in mag field N45°W	+13°	-14°
			~~48°~~ 43°	slope of hill	
372	374	157°	N24°W	+15°	-14°
374	376	122°	N67°W	+8°	-9°
		123°	N67°W ✓		
376	378	112°	N70°W	+10°	-11°
		113	N69°W ✓		
	64' to 378 - alders & stream, slight swale				
378 - alders & swale to 22' out, small stream	380	115	N75°W	+9	-7°
		107	N75°W	+8 ✓	

N-S trend.

94' - stream 40' w. de

16 JUN 81 LDZ

Plotted 17 June 81 RCP



FROM	TO	BS AZIM	FS AZIM	BACK VA	FS VA
380	366	90°	due W	+2°	-2°

stream @ +3' to 366
to +13', alders, mud

386	382	158°	N25°W	+23°	-22°

slope of hill

382	384	266°	N88°E	-2°	+3°
384	386	246°	N67°E	+7	-8

Wedge gut - landslide/rockslide downslope
open joints trend N50°W
dip 74°SW to 84°NE
2 major sets
sample 46 diorite w/pink weathering
photo #2 roll 14
stream in gut

trends sort of through hole "T"

photo #1 roll 2 #1 on sack &
rock hammer upside down
in red pack

[illegible] stream 80' - sta 384
[illegible] hillside 320° strike
[illegible] 386 53°W dip
[illegible]

16 JUN 81
LDZ

Plotted 17 June 81
RCP

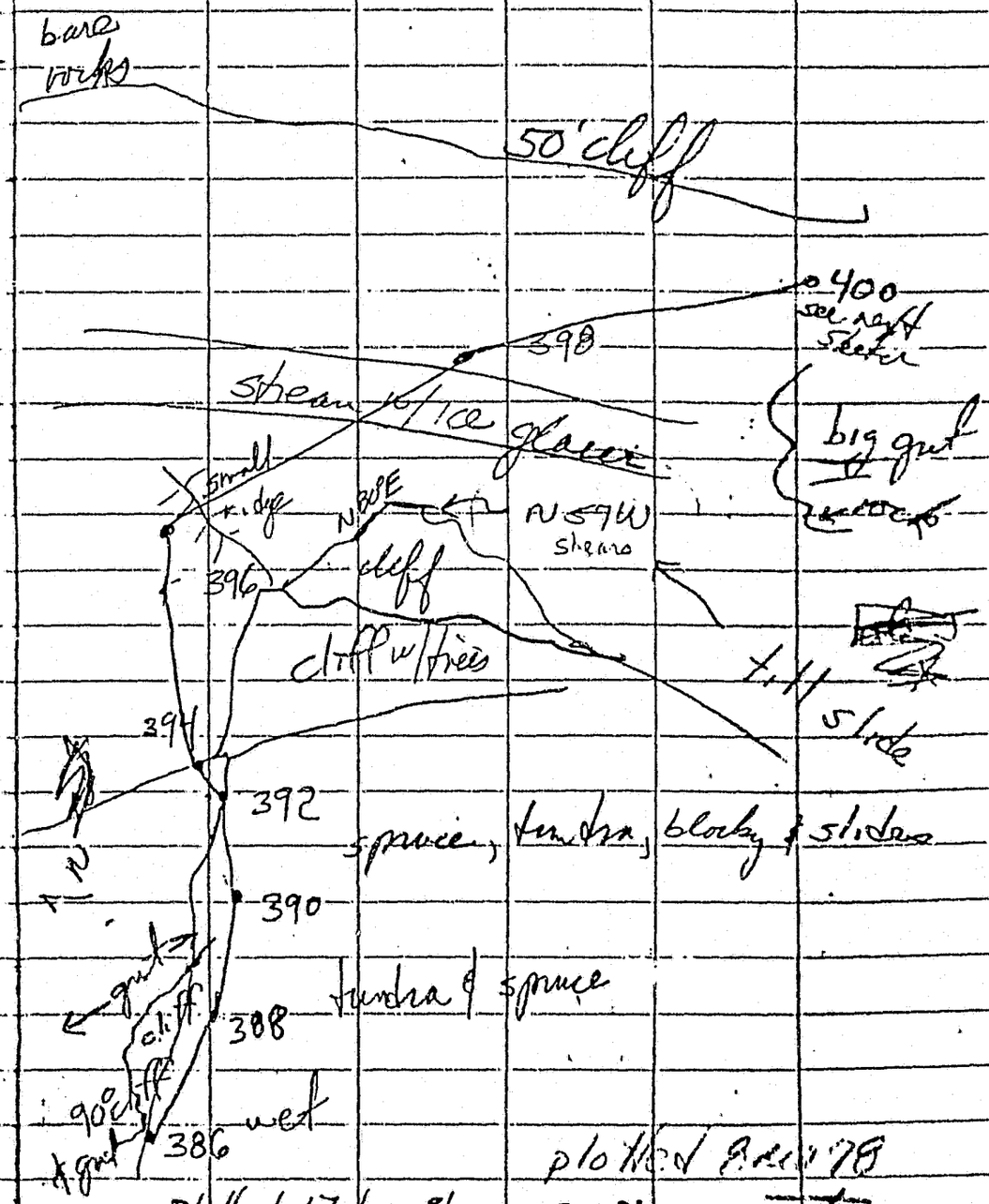
TO	BS	FS	BS VA	FS VA	DIST
388	305°	S49°E	-16°	+16°	98'
		S50°E ✓			
390	282°	S73°E	-2°	+1°	100'
392	264°	due E → 5 July 78 ~~due W~~	-1°	+2°	100'
				+1°	
	265°	N85°E			
394	229°	N~~62~~ 52°E	+20°	-21°	49'
396	239°	N61°E	+40°	-39°	90'

...ge slips / alter swale
...inite blocks to ~~#~~ 50' out.

...ed gut
photo 2 3 looking east across gut

...+15' cliff 8' high
...ts N56°E 77°E
...ed S37°W 77°S
(N37°E)

greener diorite - slight loss of
crystal structure possible
...e thin pink weathering halo
...joints as sample # 46



plotted 8 Jun 78

Plotted 17 June 81
RCP

16 JUN 81
LDZ

FROM	TO	BS	FS	BS VA	FS VA	DIST
396	398	272	~~N79°E~~ S79°E	-3	+5 +4	81'

sketch on previous page

till & dinite boulders in gut
very poorly sorted
28' back from 398 -
strike & dip of gut & rock → strike through pt 396 approximately

other joints N57°W
~~[illegible]~~ 76 °E dip
N80°E 73°N

sample 48 @ W side gut
diorite - weathers to
fine tan sand about 1/4"
deep. Slight exfoliation tendency -
possible
photo 3 looking east
photo 4 5 up gut

arsenopyrite disseminated in rock -
garlic smell when hit
hardest diorite I ever saw - chips
rock hammer. Weathered surface
thinds, all fresh pieces ring.

plotted 8 NOV 78

Plotted 17 June 81
R/R

16 JUN 81
LDZ

Plots checked 7/31/81

TO	BS	FS	BS VA	FS VA	DIST
400	S55°W	N54°E	0°	0°	22'
402	302	S63°E	−33°	+33°	100'
	301	S63°E			
	−180	= 117°			
	121				

~~404~~ ~~50~~

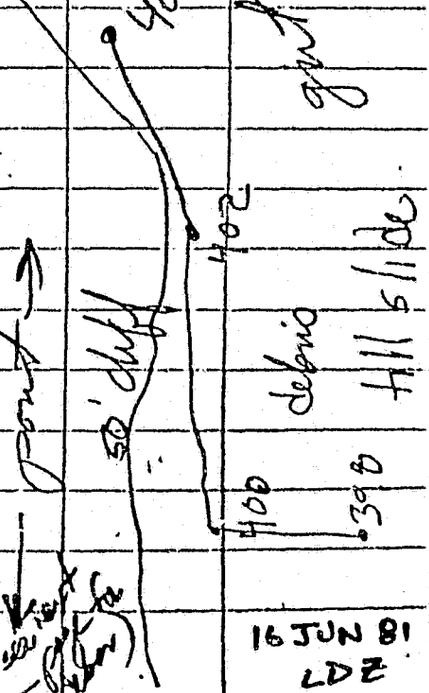
400 - major joint faces - joints open to 1-3' in downhill direction
N57°W 88°W dip
photo 56 ⊥ to this set
open joints - N06°E 66°E
N42°E 81°N

402 3 faults w/ 1/2" breccia - some mylonitized
① N83°W 67°N sample 50
photo 67 & 78
looking NE
② N73°W 70°N parallel to plane of photo 8
brecciated face - sample 52
③ N86°W N11° dip photo 89
1/4" breccia

possibly lines up with next gut to east of, also

this fault (N83°W) matches steep side of cliff across river - 614? steer side on cliff pat climbed.
N63°W to hole T
N53°W to hole V
N57°W to John on high point (HP)

sound diorite, 1/4-3 yd³ angular & trapezoidal blocks



Plotted 17 June 81 RCP

16 JUN 81
LDZ

TO	BS	FS	BS VA	FS VA	DIST
404	297°	S65°E	-39°	+39°	50'

tree-
B.M.
w/pk nail on each side
red flagging

plot 10 - downstream shot from point
east of gut
" - upstream " " "

would be a fantastic survey point
for opposite side of canyon

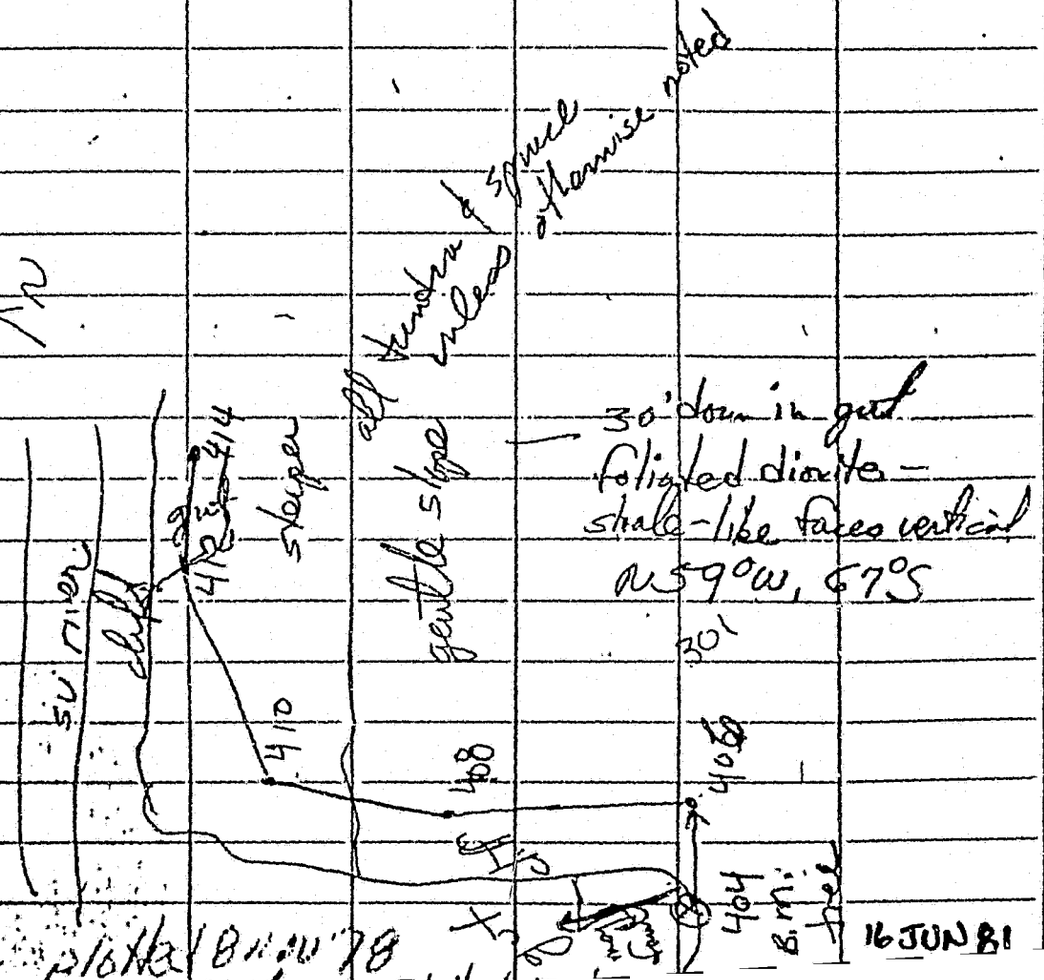
406	~~162°~~ S54°W	N50°E	~~+16°~~ -20°	~~-16~~ +19°	25'
408	162°	N17W	+16°	-16°	100'
410	166	N13°W	+19°	-19°	100'
412	210°	N34°E	+16°	-16°	55'

edge of alder - grown gut

414	248°	N74E	+18	-18	50'

N72E ✓
sample #54

outer of gut -
shot 12' back
towards 412



plotted 8 Nov 78

16 JUN 81

FROM	TO	BS	FS	BS VA	FS VA	DIST
414	416	310°	S49°E	-29°	+28°	60'
416	418	359°	S03°W	-20°	+20°	89'
418	420	350°	S04°E ~~S49°E~~	-15°	+15°	96' ~~100'~~
		355°	S03°E ✓			
420	422	328°	S32°E	-13°	+15°	100'
422	424	3067 206	S49°E	-22°	+23°	97'

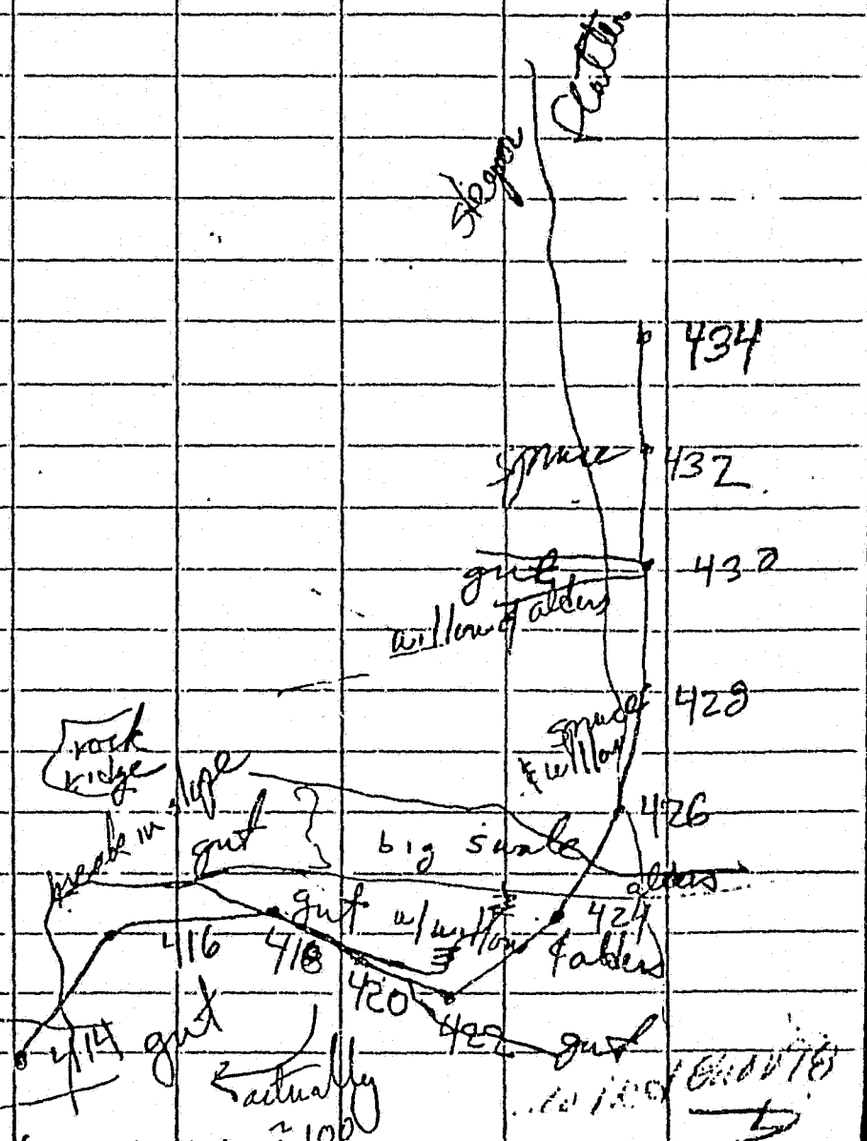
following up a gut - diorite (foliated) boulders - greenish, '116' dark bands

424	426	295°	S66°E	-18°	+15	90'
				-16°	+15° ✓	
426	428	292°	S65°E	-9°	+9°	96'
428	430	320°	S40°E	-13°	+14°	115'

flagged in V pointing east

430	432	320°	S40°E	-11°	+11°	100'
432	434	269°	due East	-3°	+5°	100'
					+4°	

REDUCED 5/30/78



Plotted 17 June 81 RCP

16 JUN 81 LDZ

[illegible]	TO	BS	FS	BS VA	FS VA	DIST
[illegible]6*	438	292°	S70°E	-5°	+7°	92'
[illegible]9	440	267°	~~[illegible]~~ lead broke	0°	0°	100'
		267°	N84°E ✓			
440	442	248°	N64°E	0°	-1°	100'
442	444	267°	[illegible]	-5	+7°	100'
444	446	230°	N55°E	-2°	+2°	100'
[illegible]6	448	246°	N66°E	-1°	+2°	100'
[illegible]8	450	258°	N80°E	-12°	+10°	100'
[illegible]	452	283°	S75°E	-16°	+17°	83'

flagged & P.K nail

Reduced 5/30/78

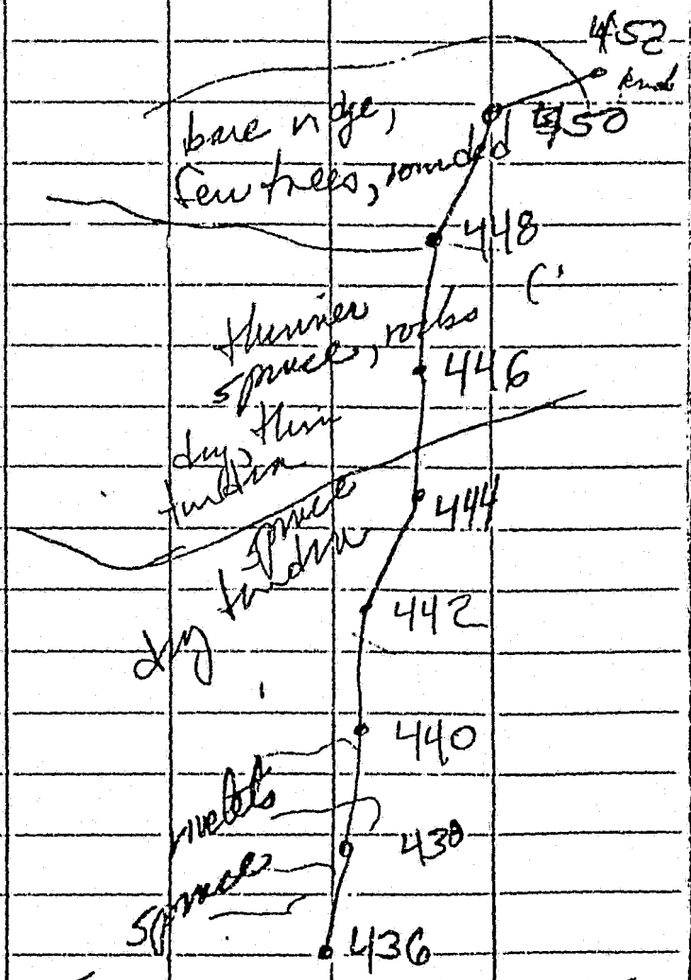
fine

river

?

?

?



* assume mis-numbered
434 & 436 same point
6 JUNE 78

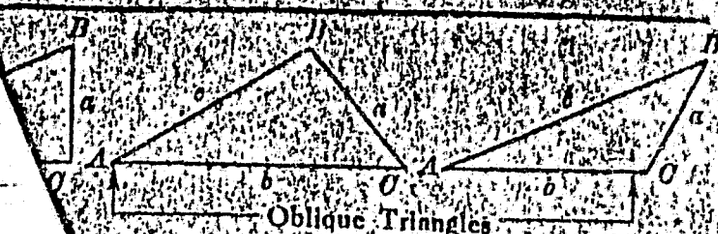
16 JUN 81
LDZ

Plotted 17 June 81 RCP

FROM	TO	BS	FS	BS VA	FS VA	DIST

END OF BOOK

TRIGONOMETRIC FORMULÆ



Oblique Triangles

ution of Right Triangles

$\cos = \frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

$= \frac{a}{b} = \cot B$, $c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$

$\frac{a}{c} = \cos B$, $b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$

A, $b = a \cot A$, $c = \frac{a}{\sin A}$

$a = b \tan A$, $c = \frac{b}{\cos A}$

$= c \sin A$, $b = c \cos A$

lique Triangles

$180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$

$180° - (A + B)$, $c = \frac{a \sin C}{\sin A}$

$(A - B) = \frac{(a-b)\tan\frac{1}{2}(A+B)}{a+b}$

$\frac{a \sin C}{\sin A}$

$b)(s-c)$

$b\,c$

$(s-c)$ $C = 180° - (A + B)$

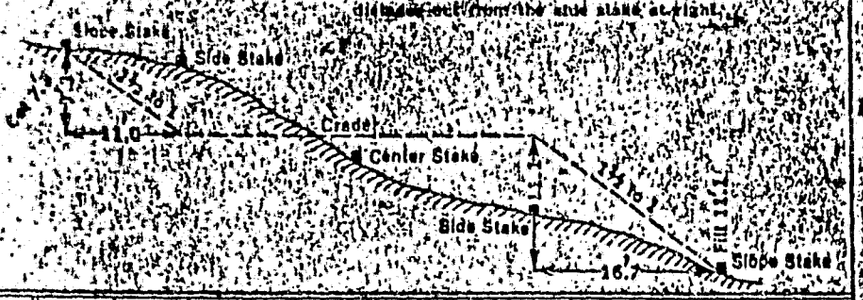
$-b)(s-c)$

tiplied by the
nce = 510.4 ft.
cos 5° 10′ =
0 ft.
nus slope
With the
follow-
= .0041.
dist
4 ft.

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width: Side Slopes 1½ to 1.

In the figure below, opposite 7 under "Cut or Fill" and under 3 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under 1 read 16.7, the distance out from the side stake at right.



Cut or Fill	0	1	2	3	4	5	6	7	8	9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE Writing Book 17

start @ Point 452 on bare ridge up hill from "slide block" across from fins (C-1)

Start with

Roll 14 photo #12

~~pt 454 next~~ ~~one exception~~

Sample 56 next

next roll # = 16 if need

Note:

1) Mag decl set @ 26°E so azimuths reference true north

2) this book is in same note form as book 16 — see pg 2 of bk 16 for sample

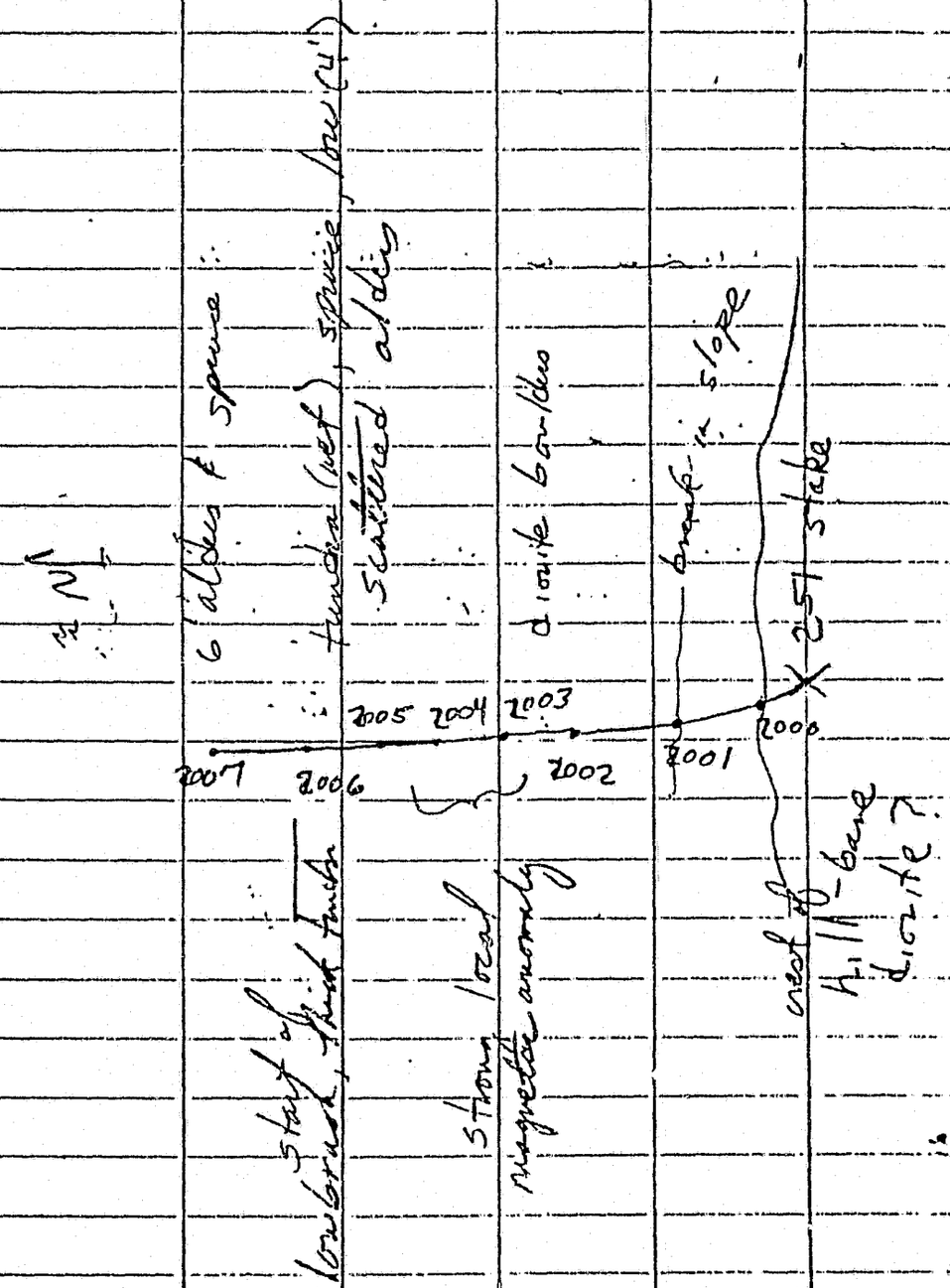
Plotted 15 Nov 78

13 JUN 78 rainy, cool

FROM	TO	BS	FS	BS VA	FS VA	DIST
251	2000	~~S06°E~~		+5°	-5	100'
		S06°W	N05°E			~~100'~~
2000	2001	S32°E	N30°W	+12°	-12°	100'
2001	2002	S35°E	N34°W	+22°	-22°	97'
	weathered diorite boulders, tundra					
2002	2003	S23°E	N24°W	+18°	-19°	100'
	diorite boulders, weathered, tundra					
2003	2004	S41°E	N35°W	+7°	-7°	100'
	boulders, tundra, low spruce					
		S38°E	N35°W			
2004	2005	S15°E	N24°W	~~+8°~~	-8°	100'
		S14°E	N22°W			
2005	2006	S15°E	N11°W	+8°	-9°	100'
		S15°E	N08°W			
2006	2007	S07°E	N13°W	+10°	-10°	100'

Lance Tape - Barbara Smith 3

start @ pt 251 picture point on south ridge. 26° deel set



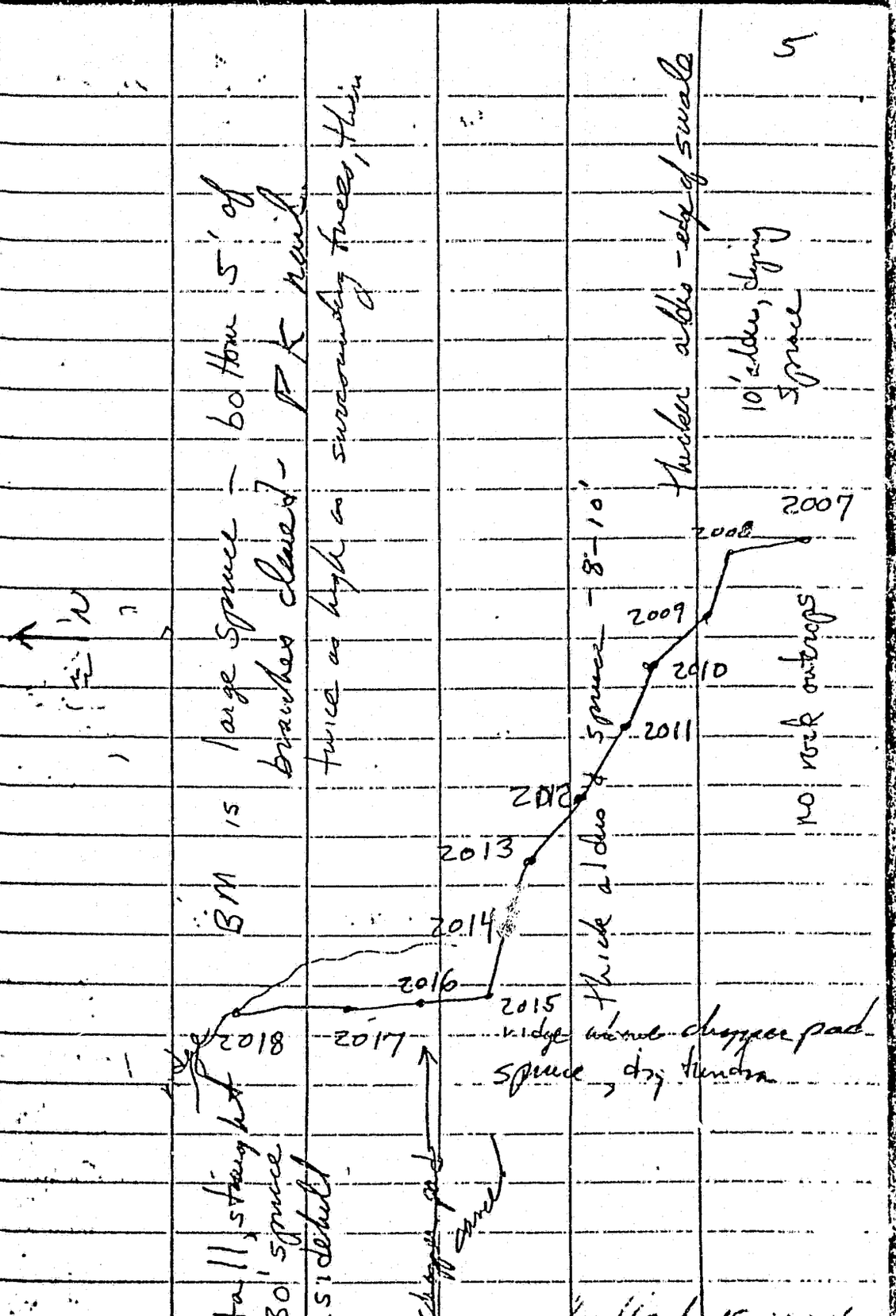
Plotted 15 JUN 78

Plotted 10 June 81 RCP

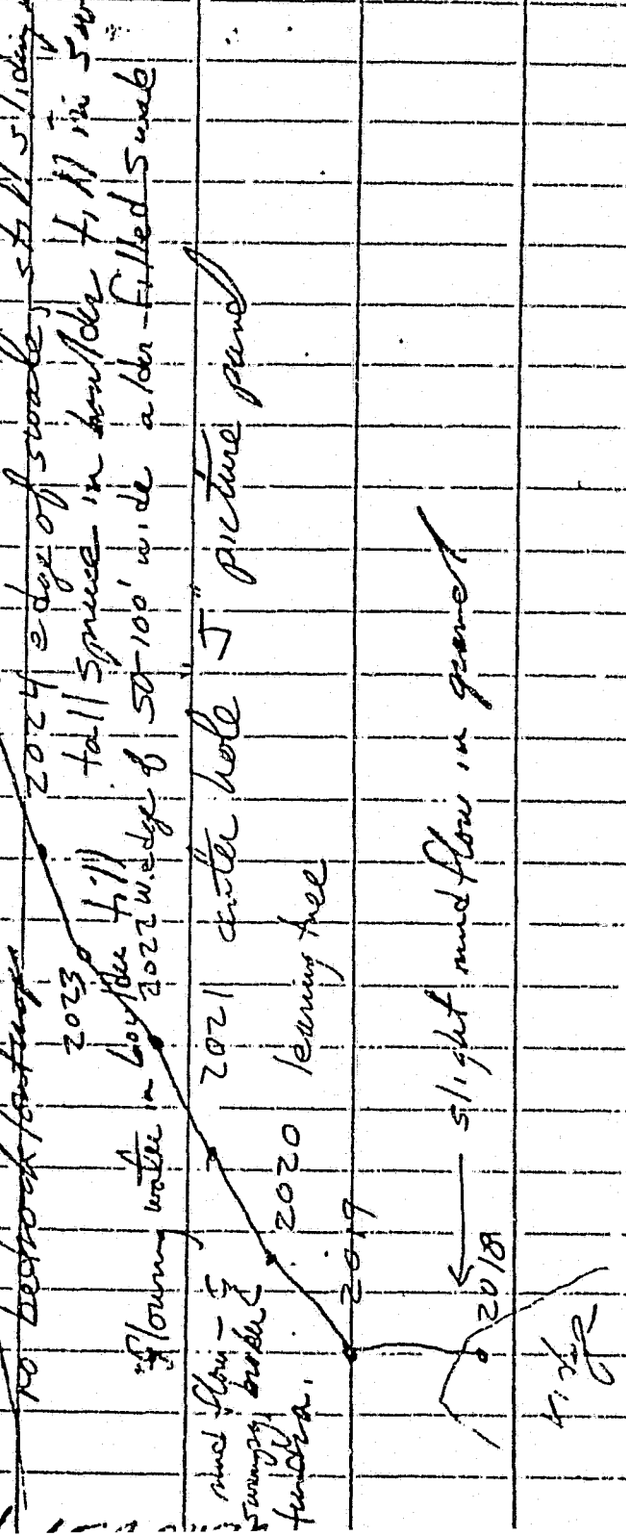
✓ RCP

81

FROM	TO	BS	FS	BS VA	FS VA	DIST
2007	2008	S02°E	N03°W	+9°	-11°	100'
008	2009	S61°E	N66°W	+2° +3°	-3°	100'
009	2010	S29°E	N27°W	+9°	-11°	98'
010	2011	~~S12°E~~ S18°E	N24°W N23°W	+11°	-11°	50'
011	2012	S50°E	N51°W	+9°	-8°	100'
012	2013	S43°E S44°E	N54°W N53°W	+9	-9°	50'
013	2014	S64°E	N74°W	+4°	-4°	96'
014	2015	S41°E S43°E	N53°W N54°W	+4°	-6°	73'
015	2016	S03°E	N08°W	+10°	-10°	100'
016	2017	S07°E	N17°W	+14°	-14½°	100'
017	2018	S05°E	N01°W	+20°	-20°	108'



FROM	TO	BS	FS	BS VA	FS VA	DIST
2018 BM	2019	S01°W	N08°W	+15°	-17°	100'
		S01°W	N12°W	+15°	-17°	
2019	2020	S42°W	N43°E	+10°	-12°	75'
2020	2021	S61°W	N62°E	+12°	-13°	110'
0915 - 1215 cut "J" hole pad						
1215 - 1245 lunch						
1245 - 1345 cut "J" pad						
2021	2022	S67°W	N71°E	+4°	-6½	90'
		S67°W	N73°E	+6½°	-6½°	
2022	2023	S15°W	N15°E	-8°	-10°	75'
2023	2024	S74°W	N74°E	-1°	+4°	65'
				-1°	+3°	
2024	2025	S37°W	N37°E	+6°	-6°	100'
2025	2026	S22°E	N26°W	+18°	-16°	97'



FROM	TO	BS	FS	BS VA	FS VA	DIST
2026	2027	S25°W	N25°E	+11½°	-11½	30'
2027	2028	S62°E	N63°W	+15°	-15½°	100'
	middle of landslip					
2028	2029	S12°W	N16°E	+4°	-6°	55'
2029	2030	S25°W	N24°E	-4° -3°	+1°	54'
2030	2031	S74°E	N°63°W	+21°	-21°	20'

~~Cliff-maker joint set - extremely smooth-face N57W~~

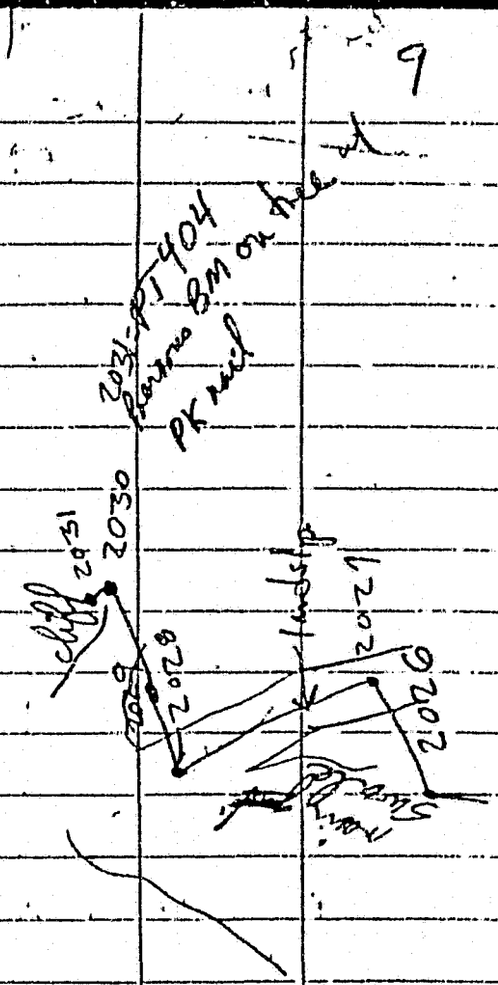


photo ~~11~~ 12 up gut, ~~12~~ 13 down

2026 + 18' landslip

2026 + 47' perpendicular to slide

starts 35' above survey line

wet, quick-sandy ≈ 5gpm on surface

mostly rounded felsic intrusives esp granite

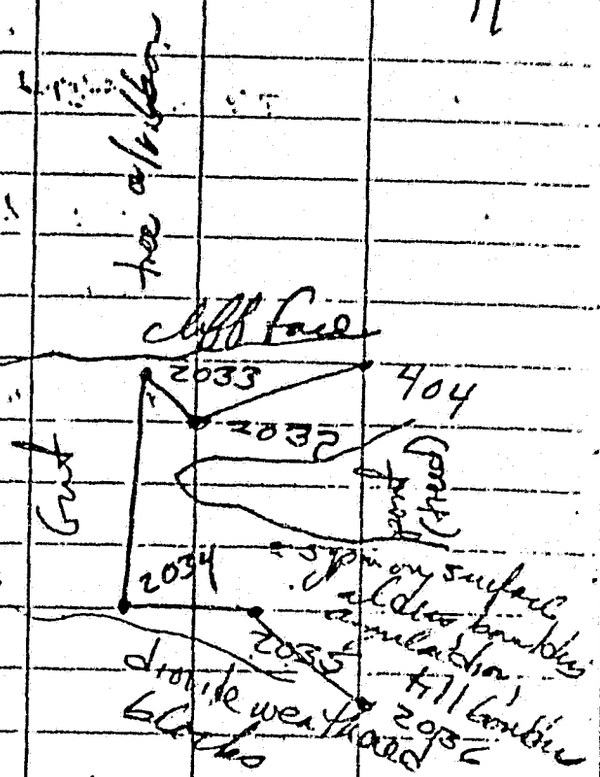
some meta-sandstones to gneisses

darker minerals are subangular/subrounded

FROM	TO	BS	FS	BS VA	FS VA	DIST
new leg from 404 up gnt						
404	2032	~~S75°E~~ S65°E	N69°W	+38°	-37°	63'
2032	2033	S19°E	N22°W	+18½ +20	-21°	15'
2033	2034 flagged photo ~~13~~ 14 looking towards 2033	N68°E	S60°W	+5°	~~+4½~~ ~~-4½~~ -5°	105'
2034	2035	N03°W	S03°E	-26°	+26°	105'
2035	2036	N23°E	S25°W	-23°	+23½	100'

gnt appears on surface (no cliffs) @ 2035 + 35'

red ribbon 2 rows on tree ~~-23° +23½~~



@ 404 - on top edge of cliff

2033 - @ bottom of 30' cliff 90° (vert)

2034 - " " " 15'

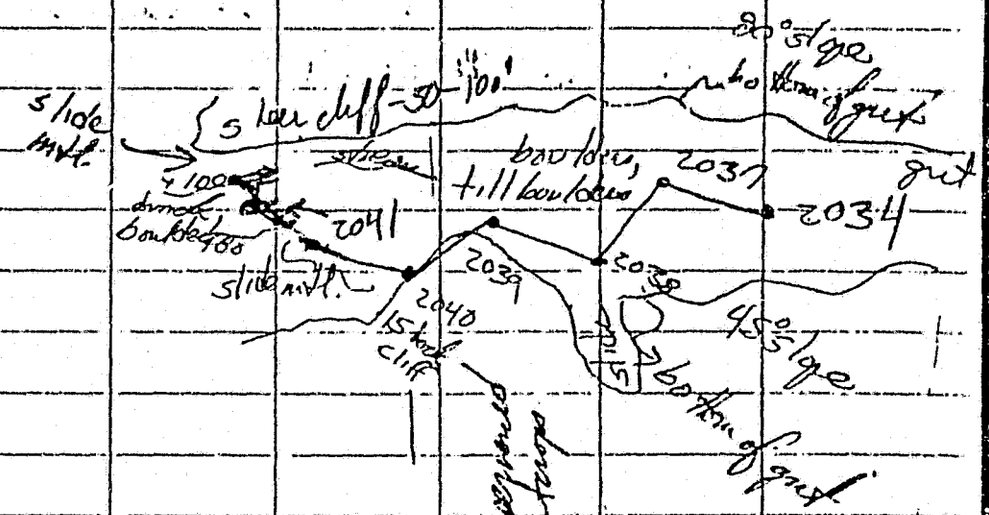
2035 " " " 8' "

plotted 15 Nov 78

Plotted 10 June 81

15 JUN 78 TAPE - B. SMITH
L. DUNCAN 60's, cloudy, calm

FROM	TO	BS	FS	BS VA	FS VA	DIST
2034	2037	S09°W	N66°W	+28°	-28°	55'
starting down gut						
		S09°W	N09°E			
2037	2038	S50°E	N55°W	+30°	-32°	78'
		S50°E	N58°W			
		S57°E	~~N ° W~~ no reading			
ok well - apparent magnetic anomaly						
2038	2039	S25°E	N22°W	+29°	-28°	92'
2039	2040	S67°E	N70°W	0°	0°	77'
~~2040~~	~~2041~~					
@ 2040 main weathering (gut) face N48W						
		@ N48W	89°NE			
	joints @ N50E 64°N					
		N80W	18°S			
	open set @ N28E 89°N					
2040	2041	S37°W	N29°E	+30°	-34°	91'
photo ~~14~~ 15 up gut						
		S36°W	N29°E	+31°	-34°	



2 samples diorite
2 200-250 g. ea.
all bank rock & soil has experienced downhill movement - no outcrops

rock falls on E. side
rock/earth slides W. side

gut has angular diorite boulders, rounded granite boulders. Creek flowing est. 50 gm, more under boulders

dolomite bending / altered - in place
1 unaltered (possibly float)

FROM	TO	BS	FS	BS VA	FS VA	DIST
2041	2042	S32°W	N22°E	-4°	+5°	55'

apparent anomaly affect
S32°W N22°E

Cliff-maker joint set - extremely smooth face N57W 81°SW

Tight joints N50E 83N
ANOTHER SET N-S 12°E

all reddish we altered diorite

2042	2043	S49°E	N60°W	+35°	-37°	73'

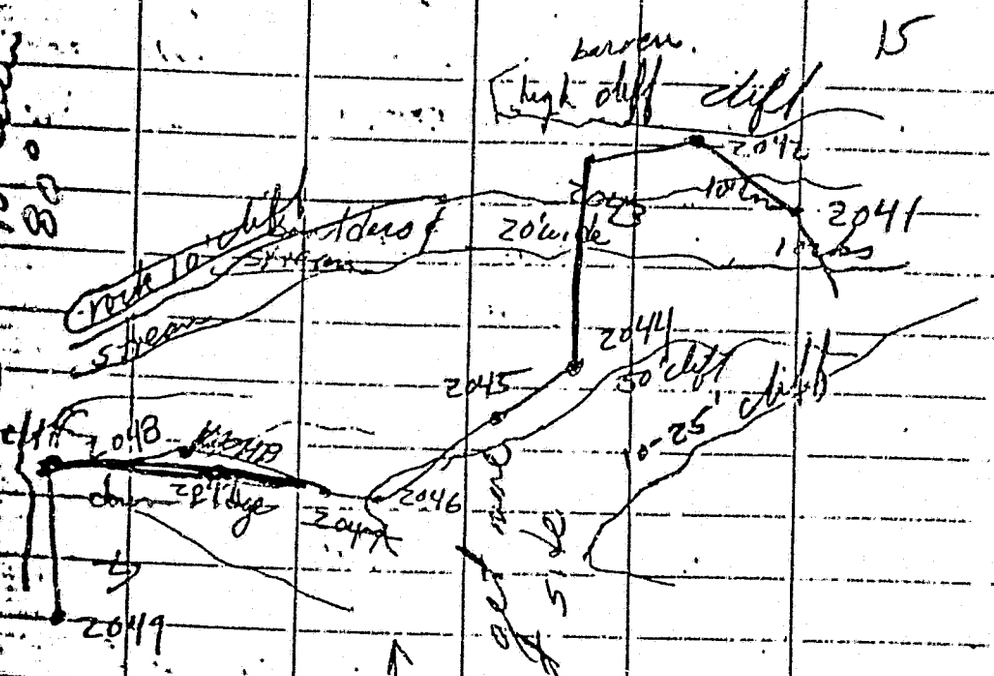
backsight S50°E by barbara - apparent anomaly.

2043	2044	N76°E	S71°W	+7°	-8½°	76'

backsight by Barbara from 2044
N74°E
N66°E ?

2044	2045	S20°E	N24°W	+30°	-33½°	58'

major joints
N78°W 76°S
N46°W 24°S
N16°E 72°E
+32° -33°



see pg 17

entire ridge shows deepsented weep

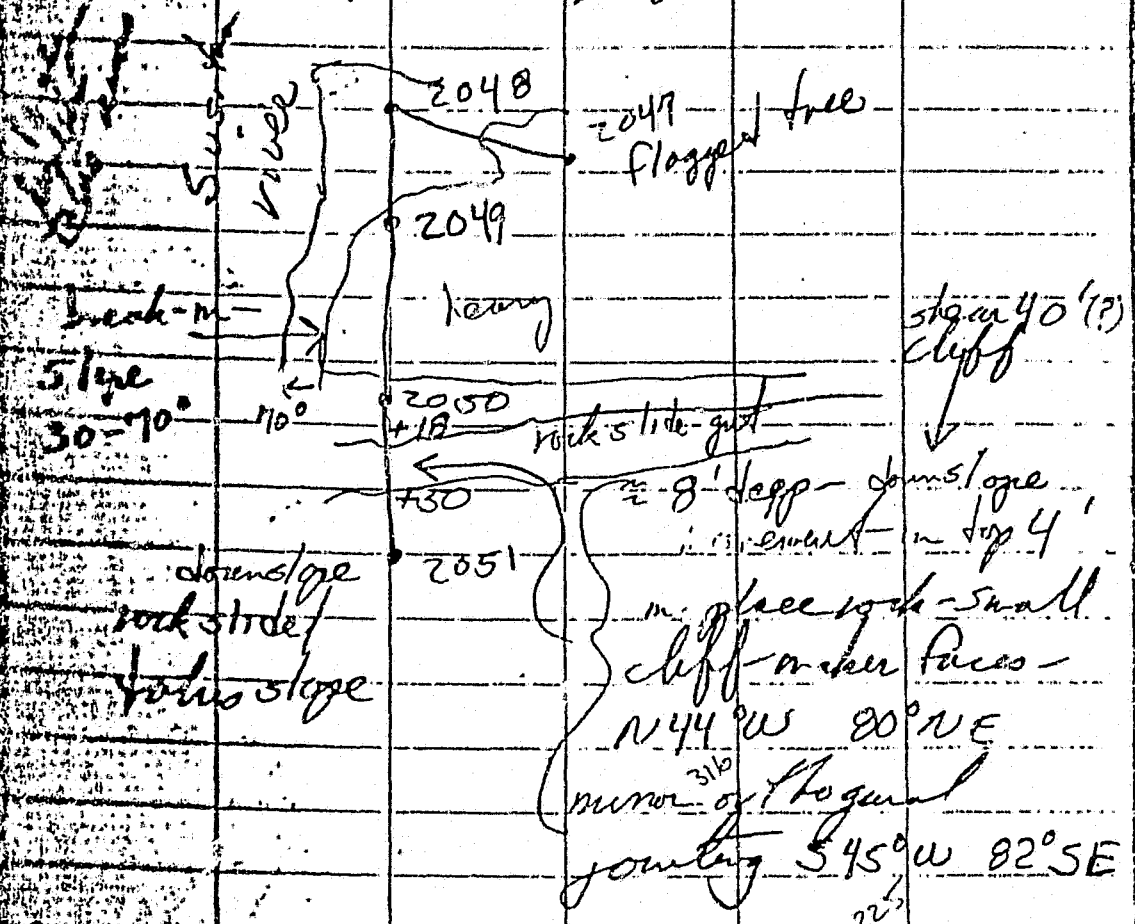
diorite blocks get more red colour on west side of gut

Plotted 10 June 81 RCP

FROM	TO	BS	FS	BS VA	FS VA	DIST
2045	2046	S30°E	N40°W	+10°	-12°	80'
2046	2047	S25°W	N24°E	+16°	-19°	22'
	flagged dead tree					
	~~swipped each~~					
2047	2048	S24°W	N27°E	+34°	-35°	100'
2048	2049	N78°E	S74°W	-11°	+12°	100'
2049	2050	N64°E	S58°W	+3½°	-3½°	91'
2050	2051	due east ~~N44°W~~	S85°W	+3½°	-3½°	93'
~~2051~~	~~2052~~ (next page)					

moving along base of cliffs from 2052 on.

see previous page for sketch



≈ 50% "clear" (whitish + green) diorite,
50% reddish colored diorite

same types of rock as Pt 2040 samples

Plotted 10 June 81 RCP

Plotted 10 June 81 RCP

FROM	TO	BS	FS	BS VA	FS VA	DIST
2051	2052	N14°W	S13°E	-33½°	+35½°	100'

photo ~~15~~ 16 up slide
17~~16~~ S. up cliff
-34° +35½

set red flagging across gut @ 2052

2052	2053	N80°E	S72°W	-15°	+15°	50'

side shot off line (not used as part of survey)

major joints @ photo 16 & above

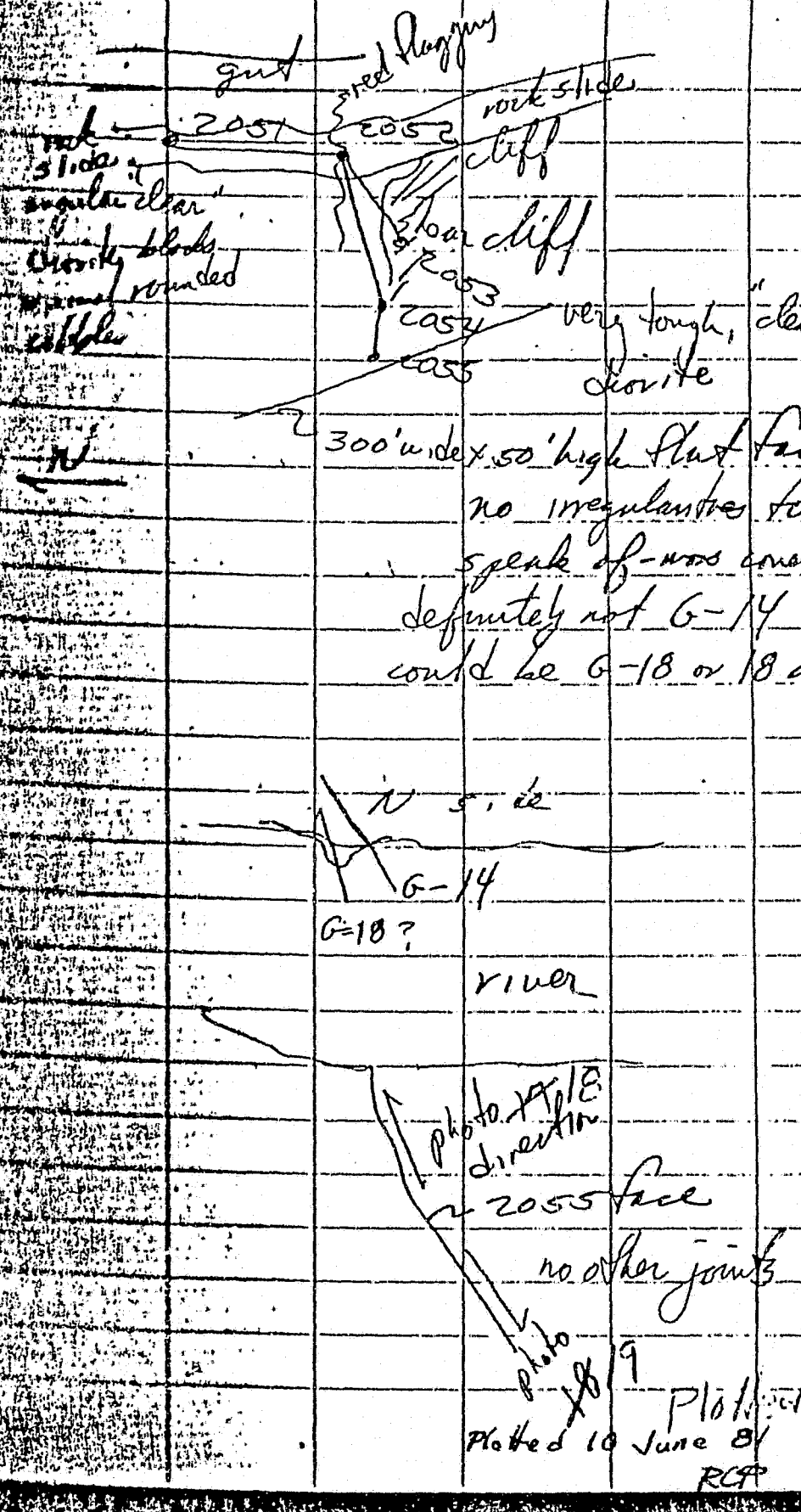
major set N65°W 2ab 85°N photo 15 set
minor N65°E 75°N
N50°W 3ab 34°W

rock is fractured @ ≈ 1' intervals into cubes but healed joints

need to check rock slide & cliff from above on return run.

2052	2054	N84°E	S73°W	-14°	+12	78'
		N83°E	S77°W			
2054	2055	N79°E	S76°W	-8½°	+8°	27'

big face N55°W 81°NE
no sign of faulting
photo ~~17~~ 18 & ~~18~~ 19



Plotted 15-10
Plotted 10 June 81
RCP

FROM	TO	BS	FS	BS VA	FS VA	DIST
2055	2056	S40°E	N43°W	+34°	-34°	36'
2056	2057	S30°E	N33°W	+47°	-48°	27'
2057	2058	N76°E	S74°W	-7°	+6°	61'
2058	2059	N32°W	S37°E	-34°	+32°	53'

6' out from straight face — on small outcrop

sideshot

cleft-maker fault/joint? N40°W N3°
no sign of alteration

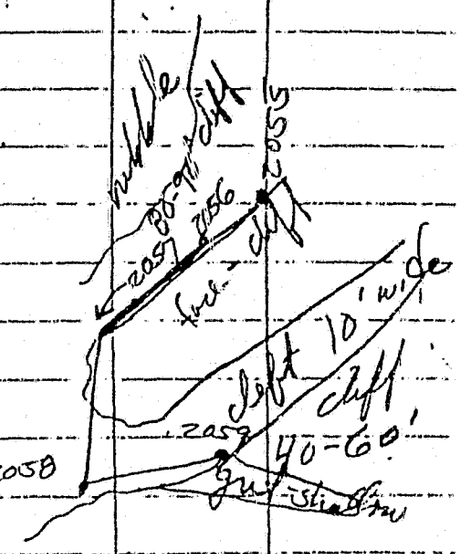
maj cliff-making joints N50°E 88°N

minor discontinuous flat (0-10' tip) joints basically N30-N60°E

photos 20-21 ~~19 & 20~~ up cleft
~~21~~ 22 to east from 2059

numerous 10-30 yd³ blocks breaking free esp on N50°E
std greenish-clear diorite

Plots checked 15 Nov 78



Possible injection @ 2057

east edge
2057A mafics in diorite - 1 large pc. (in place)
B " " " - alt 3pcs
C sugary white ? 3pcs
D monzonite ? 2pcs
E alt diorite (in place) 3pcs.

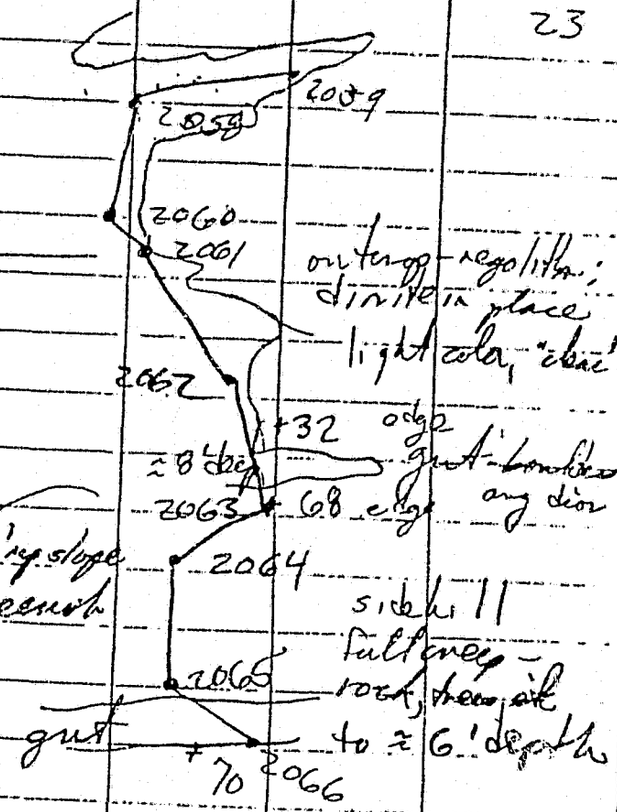
@ 2057

2057A
2057B
2057C
sheer cliff
2057D
sample 2057 E

Plotted 15 Nov 78
Plotted 10 June 81
RCP

FROM	TO	BS	FS	BS VA	FS VA	DIST
2058	2060	~~N77°E~~ 6	~~N70°W~~	-2°	+2°	49'
		~~N87°E~~				
	was 77	N77°E	N78°W			
		N77°E				
		S77°E from sketch RCP				
2060	2061	N26°E	S28°W	-34°	+33°	24'
	joints	N45°W 25	89°N			
		N45°E	86°N			
2061	2062	N65°E	S67°W	-18°	+17°	90'
2062	2063	N57°E	S57°W	-4°	+5°	68'
2063	2064	S46°E	N47°W	+20°	-21°	53'
2064	2065	N74°E	S69°W	+1°	0°	77'
		N74°E	S72°W			
2065	2066	N23°W ?	S24°W	-26°	+27°	64'
~~2066~~		NE 17 Jun 78 per sketch				~~53'~~

slumping blocks
hill movement
from cliff ≈200' up slope
half rock half greenish
waste



Plotted [illegible] 79

Plotted 10 June 81 RCP

✓ RC

FROM	TO	BS	FS	BS VA	FS VA	DIST
2066	2067	N12°W	S19°E	-38°	+39°	50'
		N12°W	S20°E			
2067	cliff	N62W	87S			

recrystallized diorite - phaneritic
slicks on West face - left lateral
no vertical component
½ inch brown gouge on East face
apalitic rock
(~~[illegible]~~ rock here same as
Spl 2057C)
4" recrystallization zone w/
argillite alteration each side
joint set N75W ½ 82°N

2067	2068	S67°E	N71°W	+7°	-7°	76'

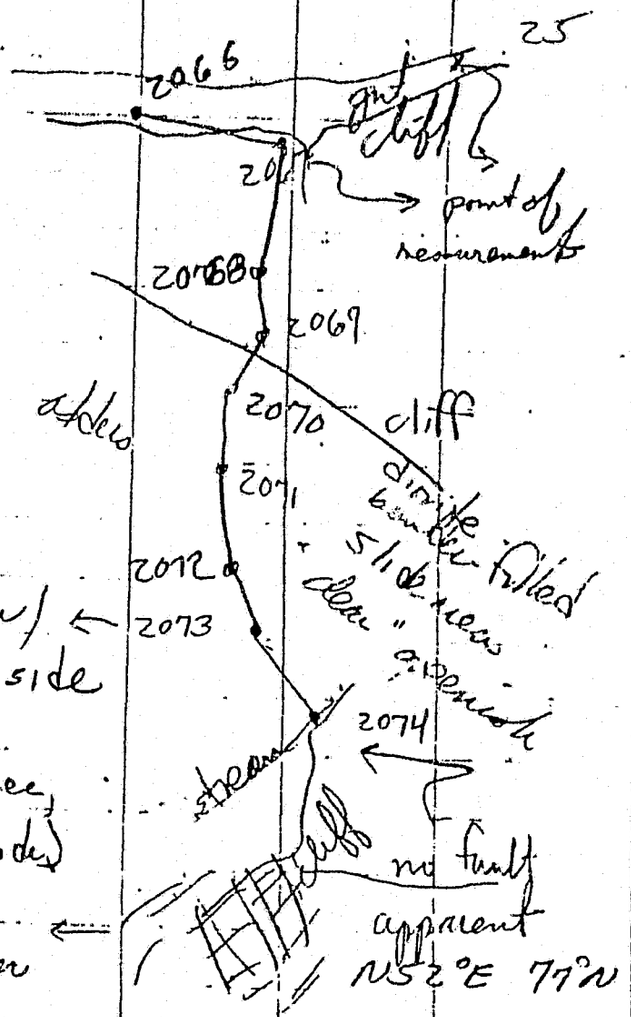
photo arrs over of G-14 +
photo ~~[illegible]~~ 23

2068	2069	N88°E	S88°W	+3°	-3°	12'
2069	2070	S40°E	N36°W	+62°	-61°	55

only 1 major jt set - cliff wall
N22°E vertical
oddball set - note NE strike

line tall spruce w/ ← tall aspen on S side
14' away
to base of tree,
North side (low side)

very large jumbled boulder patch. ←



Plotted 15 Nov 81
Plotted, 10 June 81 RCP

RCP

photo ~~26~~ 27

15W on river pad N. side

END OF BOOK

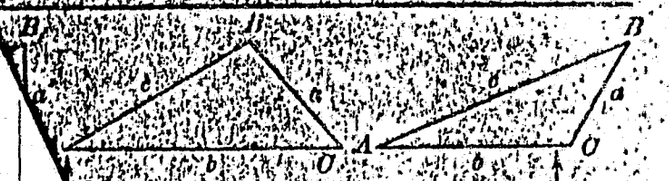
REDUCED 6/19/18

BFJ

CLOSED

plotted 13 JUL 18

TRIGONOMETRIC FORMULÆ



Oblique Triangles

n of Right Triangles

$\frac{b}{c}$, $\tan = \frac{a}{b}$, $\cot = \frac{b}{a}$, $\sec = \frac{c}{b}$, $\operatorname{cosec} = \frac{c}{a}$

$= \cot B$, $c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$

$\cos B$, $b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{a^2}{c^2}}$

$= a \cot A$, $c = \frac{a}{\sin A}$

$b \tan A$, $c = \frac{b}{\cos A}$

$\sin A$, $b = c \cos A$

Triangles

$-(A + B)$, $c = \frac{a \sin C}{\sin A}$

$-(A + B)$, $c = \frac{a \sin C}{\sin A}$

$B) = \frac{(a-b)\tan\frac{1}{2}(A+B)}{a+b}$

$\frac{\sin C}{A}$

$-c)$

$C = 180^\circ - (A + B)$

$(s-c)$

led by the
e = 319.4 ft.
5° 10′ =

s slope
th the
ollow-
.0041.

dist-
ft.

(1)

COE Watana
NOTES Book 19

2

FROM	TO	FORSITE	BKSITE	FOR ∆	BK ∆	DIST
577	1258	279	100	+1	-1	75
*	1259	286	99	+3	-2	100
	1260	258	76	+6	-6	78
	1261	12	192	-21	+22	51
	1262	290	106	-9	+9	63
	1263	255	72	+2	-1	82
	1264	270	88	-10	+10	45
	1265	213	33	+9	-11	58
	1266	215	34	+6	-8	73
	1267	260	80	-1	+2	46
	1268	234	53	+9	-8	81
	1269	238	57	+9	-9	88
	1270	227	42	+16	-15	50
	1271	218	36	+17	-16	68
	1272	209	28	+17	-17	67

GUT BRG 25°

AT EDGE OF LARGE DEPRESSION IN BANK ACROSS FROM "FINGER BUSTER" EDGE OF DEPRESSION HAS APPARENT BRG OF N 15° E IT IS IMPOSSIBLE TO SEE ANYTHING OF INTEREST DUE TO THE LARGE NUMBER OF TREES (SPRUCE & ALDER)

plotted 16 JUN 78

Plotted 11 June 81 RCP

RCP 11 June 81

plots checked 7/31/81

FROM	TO	FORSITE	BKSITE	FOR Δ	BK Δ	DIST	NOTES
1272	1273	204	23	+15	-14	53	GUT BRG 340°
	1274	160	334	+16	-16	77	BREAK IN SLOPE. ALSO ALDERS
	1275	169	348	+11	-10	100	DISAPPEAR
	1276	186	9	+9	-8	100	
	1277	179	2	+10	-10	77	
	1278	176	358	+15	-14	100	BREAK IN SLOPE. ON WHAT
							LOOKS LIKE A RIDGE BETWEEN
							TWO GUTS - 1 BRG 165°
							1 BRG 235°
	1279	167	346	+16	-15	100	BLDR FIELD - DIORITE
	1280	194	14	+7	-5	100	STILL IN BLDR FIELD
	1281	153	331	+10	-9	100	
	1282	91	268	+6	-6	100	SHALE BRG 165°
	1283	121	302	+14	-14	100	
	1284	115	299	+15	-14	90	
	1285	139	323	+10	-11	100	
	1286	61	240	+1	0	100	
	1287	104	281	+2	-2	100	
	1288	79	258	+2	-2	106	TIED OFF @ 1275 HELI PAD

Plotted 11 June 81
RCP

RCP 8 June 81

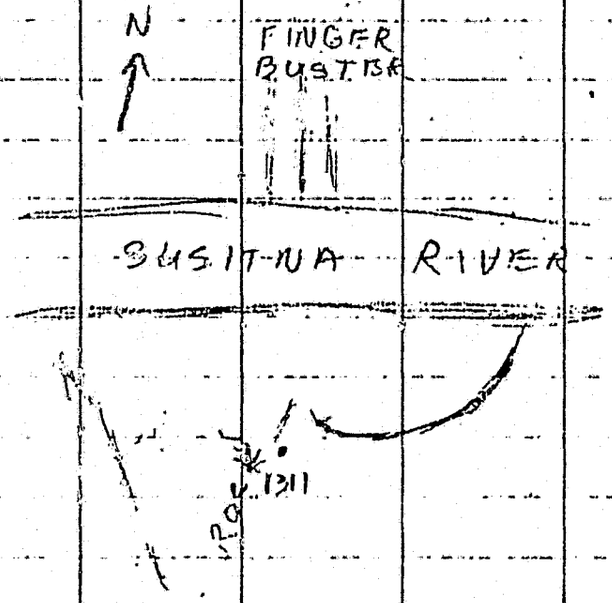
FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
	17	JUNE	1978	A. MAC LEOD, W. CAMPBELL			
1288	1289	314	129	-8	+9	100	*
	1290	316	132	-10	+10	100	
	1291	315	129	-9	+9	100	*
	1292	345	158	-18	+18	100	*
	1293	347	164	-24	+23	100	
	1294	343	162	-15	+16	100	
	1295	350	167	-12	+12	72	DIORITE BOULDER FIELD ALL MOSS COVERED
	1296	330	146	-13	+14	100	
	1297	353	174	-16	+17	100	
	1298	335	147	-16	+16	76	*
	1299	18	194	-16	+17	100	
	1300	345	159	-16	+17	84	*
	1301	334	152	-22	+23	75	OVER BREAK IN SLOPE FROM 16° SLOPE TO 73° SLOPE
	1302	345	159	-23	+24	100	*
	1303	348	161	-21	+21	93	*
	1304	359	174	-18	+18	100	* SWAMPY AREA. STANDING POOLS OF WATER
	1305	259	75	-8	+10	42	SMALL CREEK RUNNING
	1306	337	150	-10	+10	83	* DOWN SLOPE
	1307	296	111	-14	+15	100	*
	1308	310	126	-15	+17	53	

* ALL BEARINGS CHECKED TWICE

Plotted 11 June 81
RCP

RCP June 81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1308	1309	288	106	-10	+12	81	
	1310	294	108	-17	+17	76	* BREAK IN SLOPE FROM 20° SLOPE TO 35° SLOPE. PROBABLY LARGE GUT THAT WAS SEEN FROM THE AIR
	1311	271	84	-13	+14	90	* CLIFFS OF "ANDESITE PORPHYRY" W/ INCLUSIONS CLIFFS FORM A "FIN" BETWEEN TWO GUTS AND ARE DIRECTLY ACROSS THE RIVER FROM "FINGER BUSTER"
	1312	180	1	+18	-17	85	FOLLOWING ALONG EDGE OF GUT. ROCK CLIFFS ALONG THE SIDE OF GUT "ANDESITE PORPHYRY"
	1313	127	309	+24	-25	52	
	1314	172	350	+22	-22	79	
	1315	141	321	+19	-18	79	
	1316	181	1	+22	-21	87	



Plotted 11 June 81
RCP

plotted 16 [illegible] 81
✓ RCP

FROM	TO	FORSITE	HIND SITE	FOR ∡	BK ∡	DIST	NOTES
1316	1317	142	321	+21	-20	100	
	1318	151	333	+21	-20	66	
	1319	251	70	-7	+7	60	CENTER OF GUT BRG 330°
	1320	258	76	+7	-7	90	
	1321	250	65	+1	-1	100	CENTER OF GUT BRG N-S
	1322	259	74	+9	-7	89	
	1323	208	28	+22	-22	31	
	1324	251	71	+1	0	100	
	1325	246	70	+1	0	100	
	1326	161	338	+19	-18	100	
	1327	152	331	+20	-20	100	
	1328	159	334	+19	-19	100	
	1329	168	346	+14	-13	100	
	1330	170	348	+8	-7	81	
	1331	135	313	+5	-5	100	
	1332	147	328	+3	-4	100	OPEN AREA - SWAMPY POSSIBLE CHOPPER PAD
			REDUCED	6/19/78			

plots checked 7/31/81

CLOSED

plotted 16 [illegible] 19

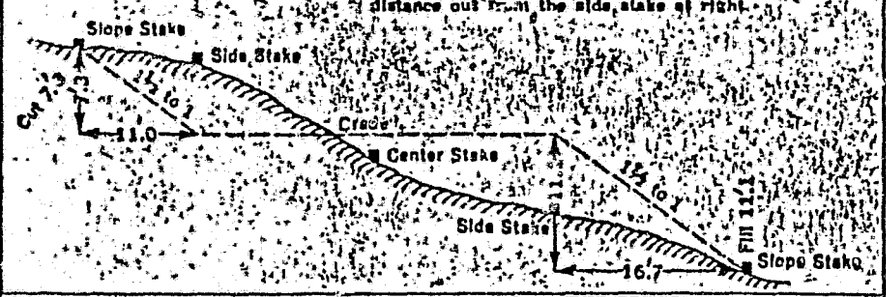
Plotted 11 June 81
RCP

RCP
8 June 81

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width. Side Slopes 1½ to 1

In the figure below opposite 7 under "Cut or Fill" and under .8 read 11.0, the distance out from the side stake at left. Also, opposite 11 under "Cut or Fill" and under .1 read 16.7, the distance out from the side stake at right.



Cutter Fill	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	Cutter Fill
	Distance out from Side or Shoulder Stakes										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	38.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE Whitana

starting points Park 21

"J" hole = 2021

2018 tall spruce above "J" hole

404 = 2031 = PK @ fault on large gut.
("J" gut)

2034 flagged twig in big gut,
near top on west side. SAME STARTING
PT AS LAST LINE FROM THIS GUT

2047 flagged dead tree on W side
near bottom of "J" gut

2052 strip flagged big chasm/gut

2073 lone spruce in alders above "d"

2078 flagged on C/L

d = 2089

next roll = 16

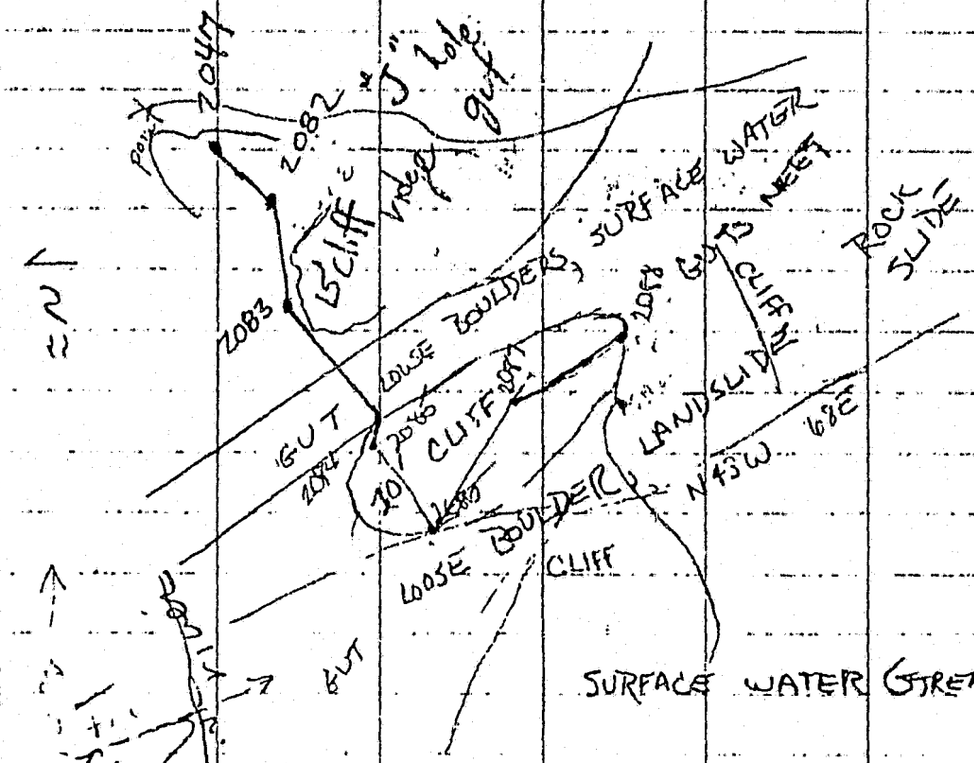
next photo in roll 14 = ~~29~~ 28

next Pt # = 2082

plotted 15-0078

FROM	TO	BS	ES	BS VA	ES VA	DIST
2047	2082	N42E	S32W	-22	-21	73'
		N40E	S42W			
2082 + 20'W		2 CLIFFMAKER JOINTS				
12-15' CLIFFS		(1) N79W	87°N			
		N32W	69°N			
		(2) N12E	85°E			
GREENISH CLEAR DIORITE						
MINOR JOINT SET (ROUGH MEASURE)						
~E-W		0→10° S		POSS 2" FAULT		
2082	2083	N67E	S69W	-25	13	48'
2083 + 48' TO EDGE OF GUT						
2083	2084	N46E	S46W	+8	+6	79'
CLIFFS - FRESH DIORITE WEATHERING						
IN PLACE						
PREDOMINANT DIRECT. = N63W 80°N						
NO OTHER APPARENT MAJOR JOINTING						
2084	2085	N18E	S23W	+67	+60	29'
		N18E	S18W			
2085	2086	N38E	S43W	-15	+15	94'
		N39E	S43W			
SAME GUT AS 2052						
2086	2087	N43W	S54E	-33	+34	34'
		N63W	S63E			
2087	2088	N6W	S4E	-39.5	+34	45'

ALDERS; TUNDRA-COVERED BOULDERS



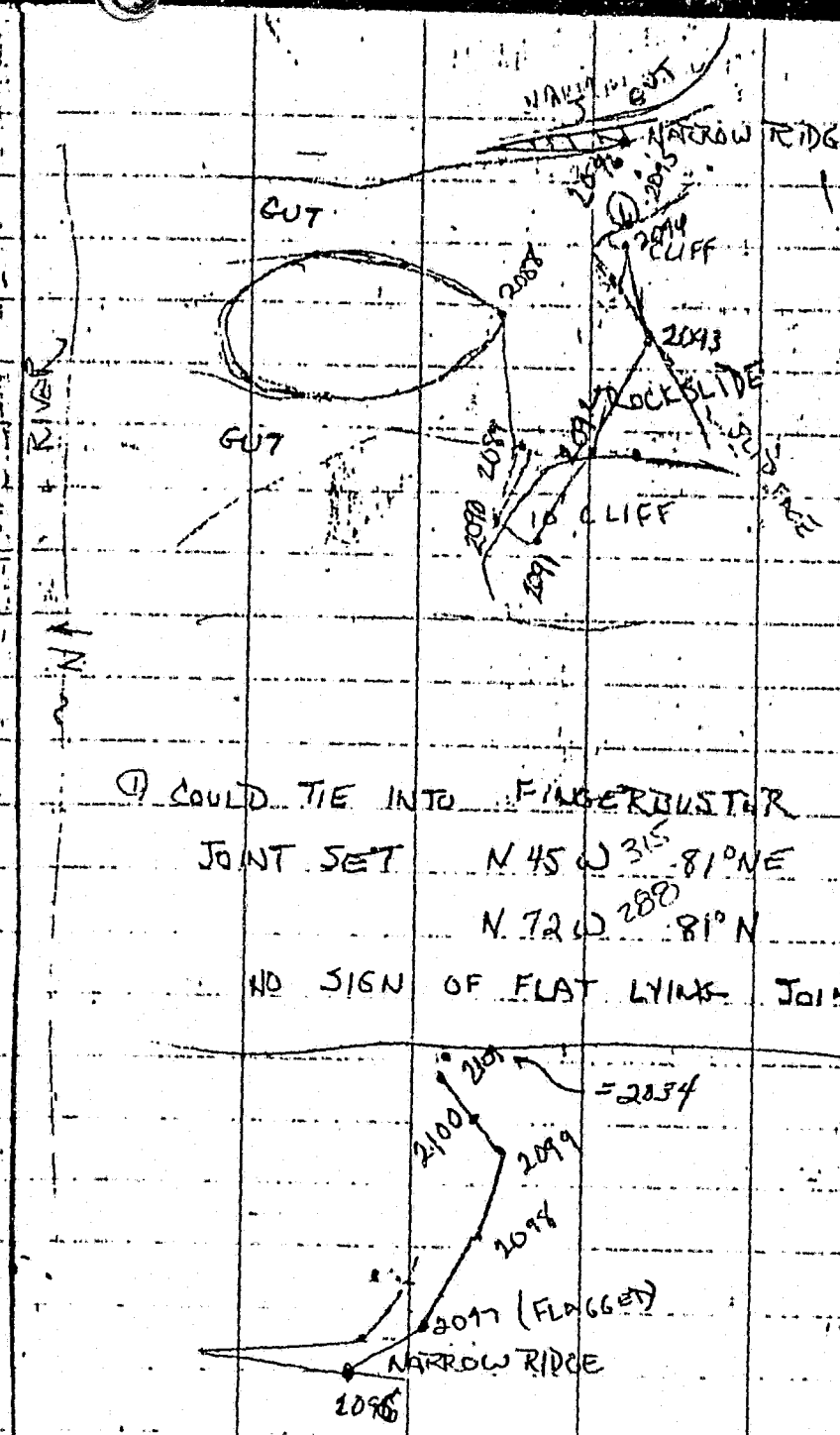
PROBABLY INTERSECTS W/ NEXT UPSTREAM FIN OF G-14

PHOTO ~~27~~ 28: DOWN GUT W/ SHEER FACE
~~28~~ 29: UP ROCK FALL FACE
~~29~~ 30: UP GUT, TO LEFT
GOING UPHILL

TALUS: PINKISH DIORITE; WHITE CLEAR DIORITE W/ 5% ROUNDED GRANITICS + ANDESITE LAVA

Plotted 10 June 81 RCP

FROM	TO	BS	FS	BS VA	FS VA	DIST
2088	2089	N28E	S30W	-37	+37	56'
	MAJOR SLIP FACE	N50W	80°NE			
			N50W	35°N		
	PHOTO 31 - LOOKING ACROSS TO					
	SLIP FACE; EXPOSURE SHOWN: 10' LENGTH					
2089	2090	S43E	N45W	+8	-10	34'
	CLIFF-MAKER SET	N69W	87°N			
2090	2091	N9E	S9W	-50	+49	30'
2091	2092	N40W	S55E	-3½	+2½	23.5'
		N43W	S43E			
2092	2093	N70W	S69E	-13	+13	50'
2093	2094	N60W	S59E	-24	+24	51'
2094 ± 20' → EDGE OF GUT						
2094	2095	N84W	S83E	-23.5	+24	88'
	CLEAR GREEN DIORITE					
2095	2096	S77W	N79E	-37.5	+38	59'
	2 SCRAGGLY SPRUCE TREES FLAGGED					
2096	2097	N37W	S37E	-17	+17	11.1'
	DEAD SPRUCE BENT @ 90° & FLAGGED					
2097	2098	N41W	S39E	-15	+14	78'
2098	2099	N85W	N1E	-1.5	0	67'
		N87W	S88E			
2099	2100	S51W	N45E	-11.5	-13	57'
		S50W	N46E			



① COULD TIE INTO FINGERBUSTER

JOINT SET N45W 81°NE

N72W 81°N

NO SIGN OF FLAT LYING JOINTS

plotted 15 Aug 78

Plotted 10 June 81 RCP

FROM	TO	BS	FS	BS VA	FS VA	DIST
2100	2101	S75W	N76E	+47	-46	41
2097	2102	N73E	S70W	-1	+2	81'
		ROCKSLIDE AREA				
2102	2103	S67E	N70W	+5	-7	87'
2103	2104	S79E	N71W	+18.5	+19	13'
		S77E	N75W			
2104	2105	S73E	N76W	+4	-4	76'
NEAR EDGE OF ROCKSLIDE IN GUT NEAR TOP						
2105 + 36' → TOP OF GUT						
2105	2106	N87E	E-W	+5	-7	49'
2106	2107	S36E	N37W	+32	-33	76'
2107 + 10' → EDGE OF SLIDE MATERIAL						
2107	2108	S67E	N70W	+15	-16	85'
2108	2109	S85E	N85W	+7.5	-8	66'
2109	2110	S12E	N13W	+32	-33	43'
2110	2111	N63E	S60W	-12	+11	63

SIDE SHOT TO CLIFFS IN GUT

32' HORIZ S72W

PHOTO ~~31~~ 32 - SHOWS INTERSECTING FLAT LYING JOINTS DIPPING N & S

6' VERT FACE

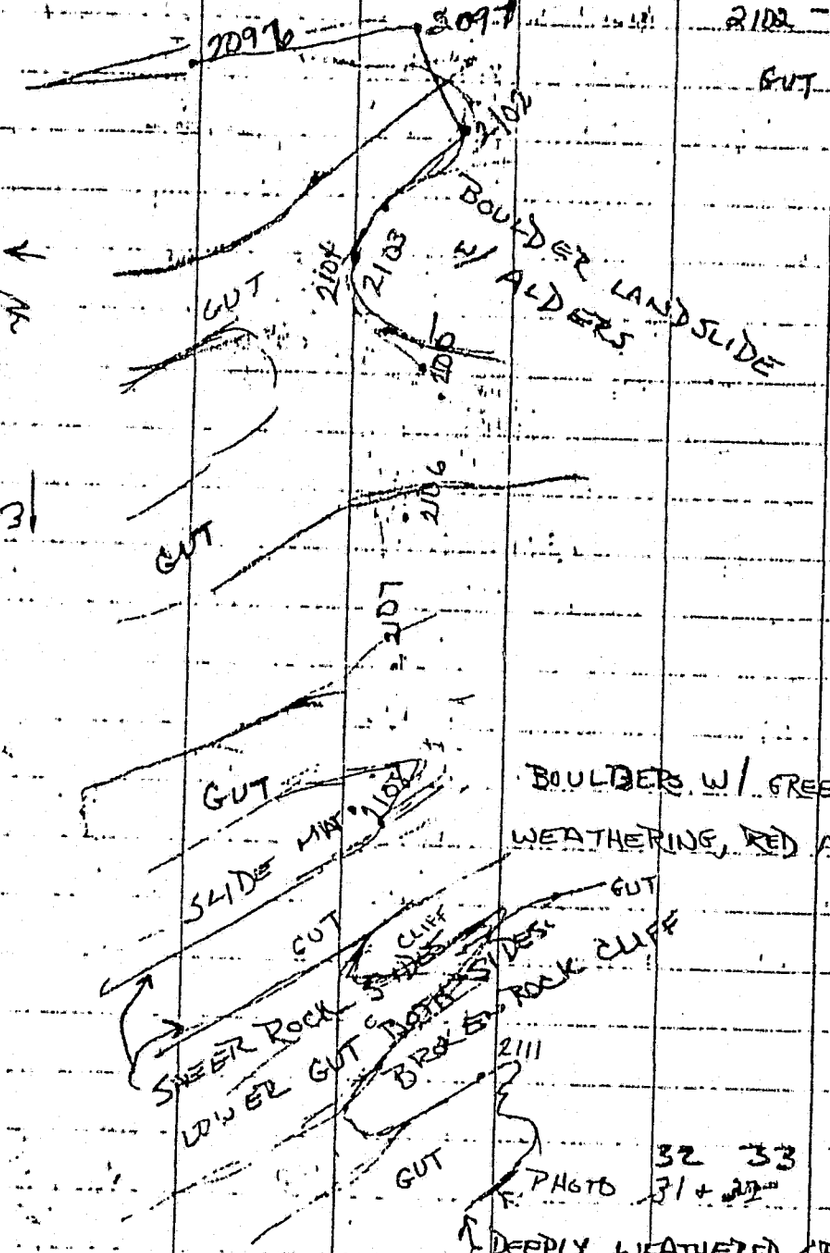
PHOTO ~~31~~ 32 - SAME AS ABOVE 318

MAJOR CLIFF FACE N42W 89°NE

FLAT LYING JOINTS ~ N25E 11°W

N25E 27°W

MAJOR SET IN LOWER R. GUT N43W ~ 81°N



Plotted 15 Jun 78

Plotted 10 June 81 RCP

FROM	TO	BS	FS	BS VA	FS VA	DIST
2111	2112	S82E	N79W	+33	-35	48
2112	2113	S85E	N88W	+8	-10	52'
2113	2114	S68E	N70W	+24	-26	20'

MAJOR SET BELOW FALLS, R-HAND
SIDE OF GUT → N43E 85°S
N81W 80°NE
N34W 77 SW (MINOR)
GREEN DIORITE

2114	2115	S64E	N59W	+32	-34	43
		S60E	N59W			
2115	2116	N60E	S65W	-20	+20	21
		N63E	S65W			
2116	2117	0	S11W	-45	+46	27
		N10E	S11W	PHOTO ~~33~~ 34		

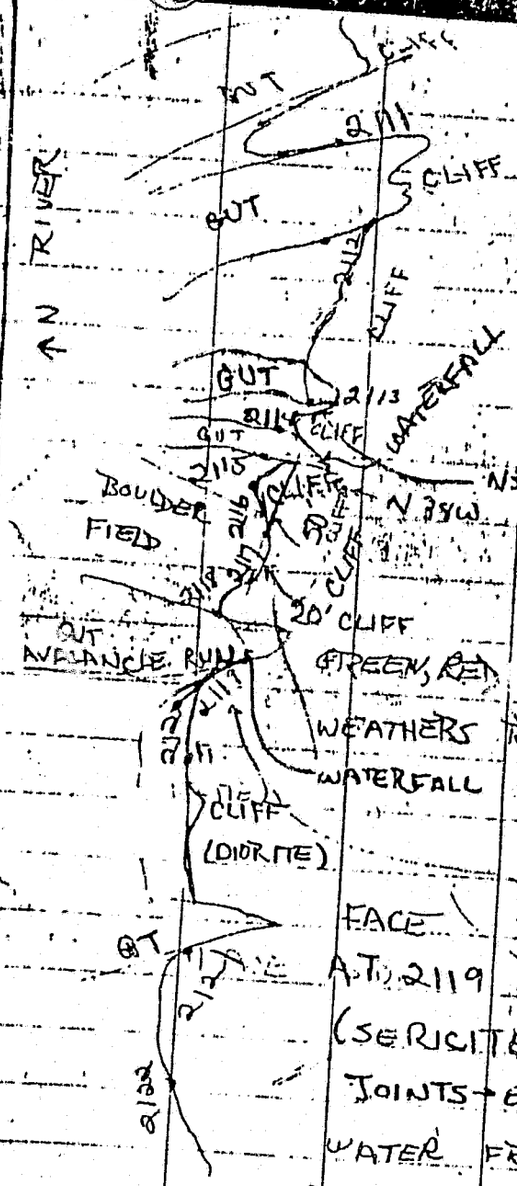
+18 → OTHER SIDE OF BOULDER FIELD

2117	2118	N70E	S74W	-2	+1	53
2118	2119	N5E	S5W	-36	+36	52

SPL 2119 PHOTO ~~34~~ 35
PHOTO ~~35~~ 36 LOOKING UP MAIN
FACE FROM FACE AT 2119', LOW
F-STOP

2119	2120	S87E	N87W	+7	-7	51'

CLIFF (FAIRLY STRAIGHT, SMOOTH)
S81W 83° NE



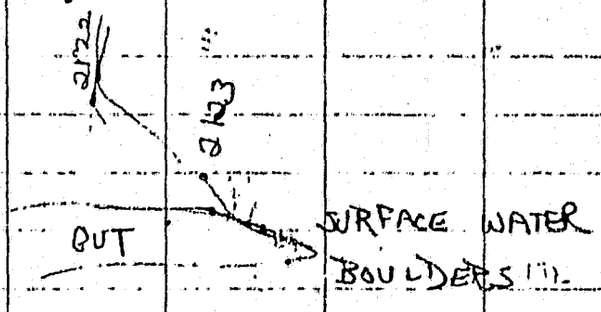
plotted 15 Nov 78

Plotted 10 June 81 RCP

Checked 1/31/81

FROM	TO	BS	FS	BS VA	FS VA	DIST
2120	2121	DUE E	N88W	+24	-26	87'
2121	2122	N68E	S67W	-9	+7	78'
	2122 + 48' → CLIFF FACE		N63W	83°N	(TOP)	
		N32E	73°S	(BOTTOM)		
2122	2123	N15E	S14W	+21½	+21	85'
2123	2124	N5DE	S58W	-17	H6	70'
		N5DE	S55W			
2124	2125	N60E	S58W	-3	+3	80'
	FLAGGED ALDER ALONG CENTER LINE					
	2120	S12E	N41W	+30	-30	95'
	2127	S50E	N50W	+35	-34	100
	2128	S20E	N20W	+34	-37	100
	2129	S85E	N83W	+15	-15	61

REDUCED 6/19/78



CLOSED

plotted 15 NOV 78

Plotted 10 June 81 RCP

(1) FROM

COE Watson Book 23 (2)

TO FORSITE BKSITE FOR 4 BK 4 DIST NOTES

20 JUNE 1978 A. MACLEOD W. CAMPBELL

STARTED MAPPING AT "K" HOLE.

K	1300		141	-15	+16	81	FORSITE NOT TAKEN AS WAYNE WAS TOO CLOSE TO RIG 1. AT BREAK IN SLOPE. FROM 17° SLOPE TO 35° SLOPE
	1301	54	229	-19	+20	77	DIORITE BOULDERS
	1302	305	126	-34	+35	54	GUT BRG 348°
	1303	333	153	-43	+43	74	OUTCROP OF DIORITE
	1304	9	191	-39	+40	52	
	1305	282	103	-11	+13	100	
	1306	231	48	+13	-11	45	DIORITE OUTCROP
	1307	344	159	-40	+41	88	*
	1308	300	116	-30	+28	80	
	1309	287	105	-41	+41	16	MIDDLE OF A GUT W/ WATER FLOWING DOWN BRG N 10° E, UP THE STREAM 150' IS A CONTACT BETWEEN A BASALTIC DIKE AND THE DIORITE

plotted 15 Nov 78

Plotted 11 June 81 RCP

plot checked 7/31/81

FROM	TO	FORSITE	BK SITE	FOR ∡	BK ∡	DIST	NOTES
1309	1310	20	199	-33	+34	91	SHEAR ZONE - DIORITE HIGHLY WEATHERED - BRG 318° PLAGS WEATHERED TO CLAYS OR MISSING (HOLES IN ROCK) CROSSES GUT
	1311	12	184	-29	+28	81	*
	1312	319	128	-29	+29	97	* STREAM CHANGES DIRECTION. GUT NO LONGER APPARENT. GUT LOST AT PT 1311. ROCK CLIFFS AT PT 1311
	1313	317	132	-30	+30	74	ALL WATER IN STREAM DISAPPEARS UNDER TALUS SLOPE. ALTHOUGH STREAM BED IS STILL PRESENT
	1314	342	163	-26	+27	100	SUSITNA RIVER
	1315	84	255	0	0	100	*
	1316	75	249	0	0	50	*
	1317	141	319	+16	-16	70	HOLE "d"

plotted 15 [illegible] 78

plot checked 7/31/81

Plotted 11 June 81 RCP

Watana Book 28 2

COE BOOK 28

S. ABUTMENT

LOW CLOUD ~45° F

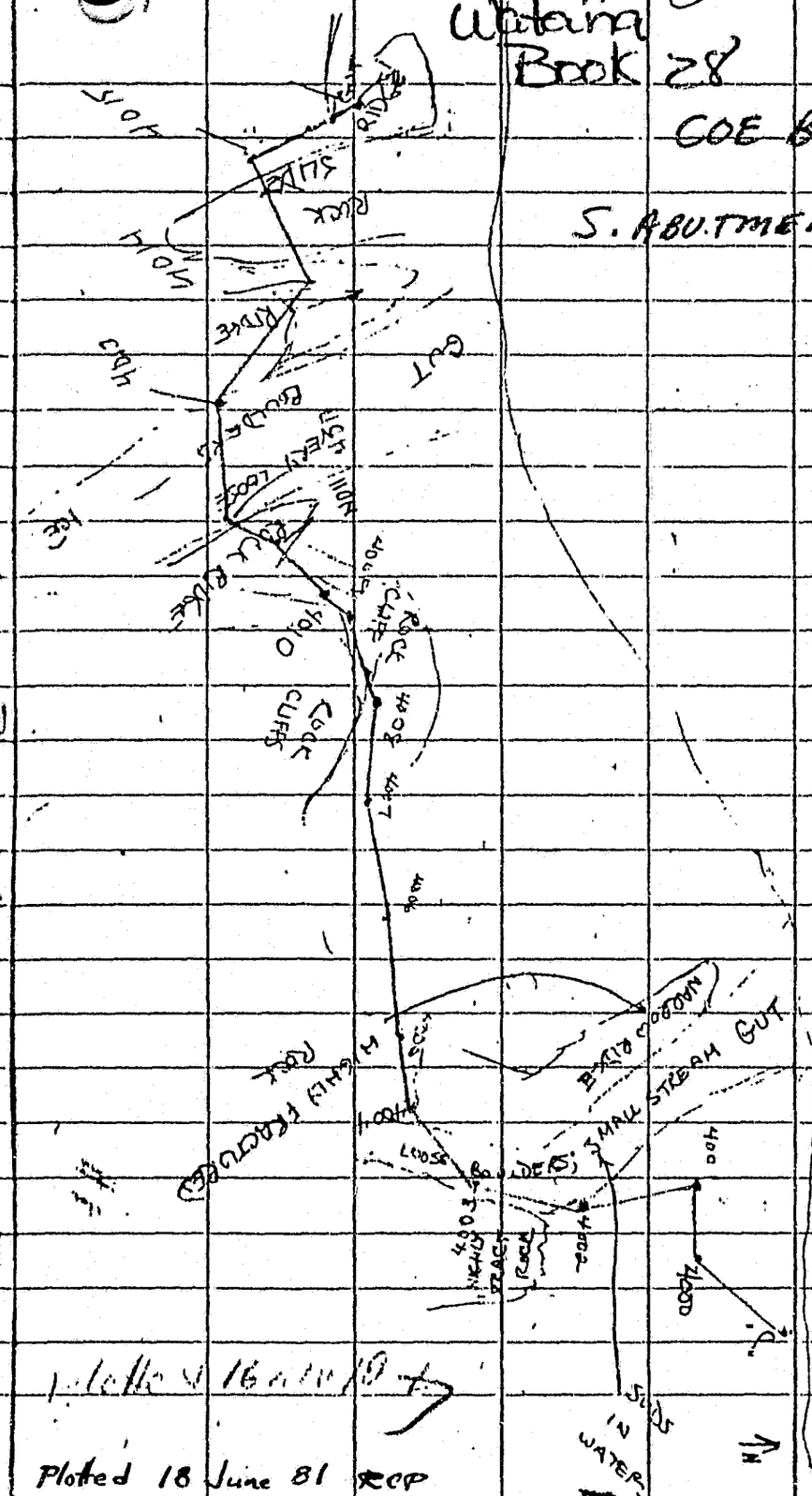
7/15/78

B. SMITH - [illegible]

W. CAMPBELL - TAPE

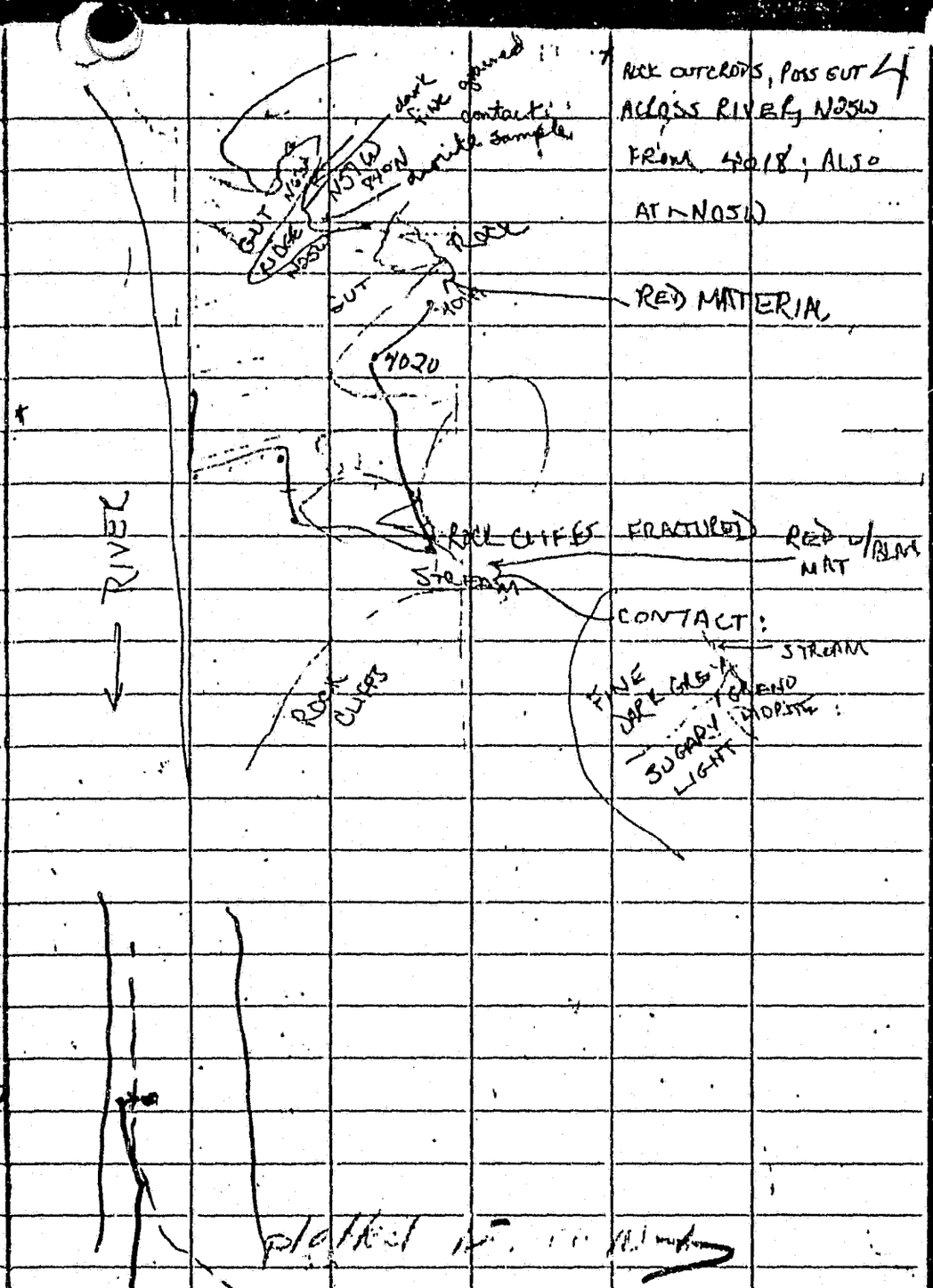
FROM	TO	VERT ∠ FS	VERT ∠ BS	BEARING FS	BEARING BS	DIST
D	4000	+26	-25	237 *	N29E	100
"D"	4001	+2	-2	264	N83E	35
				S87W	N83E	
	4002	+35	-34	S12E	N10W	90
	4003	+28	-27	S04W	N05E	96
	4004	+33	-33	S59W	N62E	95
	4005	+38	-37	S74W	N74E	78
	4006	-10	+10	N83W	S83E	62
	4007	-2	+2	S69W	N70E	85
	4008	+3	-3	N81W	S80E	95
	4009	+2	-2	N62W	S67E	61
	4010	+41	-39	S71W	N73E	11
	4011	-3	+4	S54W	N36E	60
	4012	-31	+30	N85W	N57E	60
	4013	-4	+4	N41W	S38E	60
	4014	+10	-9	N69W	S71E	32
	4015	-12	+11	N83W	S88E	65
	4016	-5	+7	N07W	S04E	40
	4018	-42	+42	N57W	S54E	48
	4019	-14	+13	N64W	S65E	82
	4020	+14	-14	N57W	S50E	50
				N55W	S52E	

* MAY BE OFF DUE TO LARGE AMT OF METAL AT D



Plotted 18 June 81 RCP

FROM	TO	VERT Δ FS	VERT Δ BS	BEARING FS	BEARING BS	DIST
4020	4021	-26	+27	N51W	S60E	41
				N52W	S60E	
	4022	-38	+39	N66W	S71E	50
	4023	-41	+41	N27W	S04E	55
	4024	-31	+31	N83E	S74W	23
				N80E	S15W	
	4025	+1	-1	S77E	N79W	92
	4026	-54	+51	N03W	S19E	31
				N05W	S05E	
	4027	-1	+1	S77E	N80W	100
	4028	0	0	S88E	N88W	100
	4029	0	0	S85E	N88W	100
	4030	0	0	S84E	N84W	100
	4031	0	0	N83E	S81W	100
	4032	-1	-1	N88E	S87W	100
	4033	-1	+1	N80E	S80W	100
	4034	+1	-1	N78E	S76W	82
	4035	+19	-20	S42E	N24W	100
						6.76



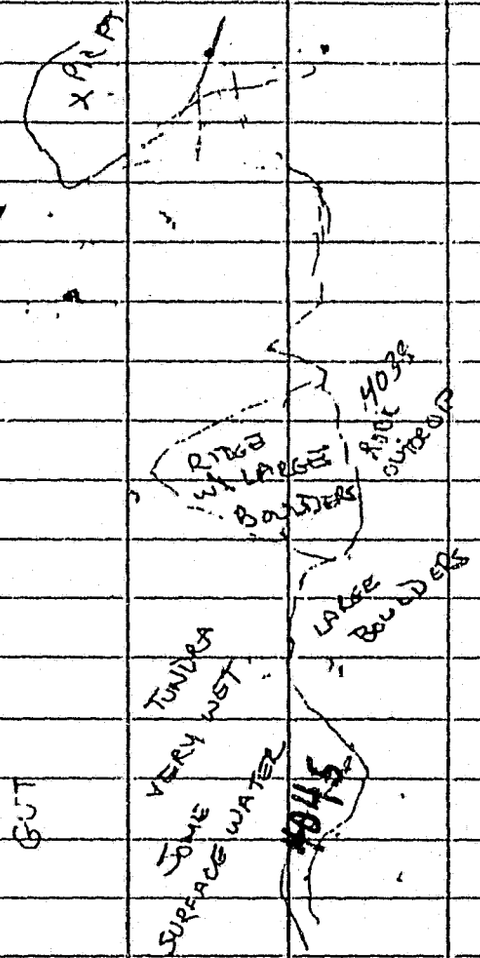
ROCK OUTCROPS, POSS OUT ACROSS RIVER, N25W FROM 4018; ALSO AT N05W

Plotted 18 June 81 RCP

✓ RC

FROM	TO	VERT Δ FS	DEADMAN VERT Δ BS	CREEK BEARING FS	2:20 BEARING BS	DIST
PIC PT	4036	-5	+5	S71E	N75W	100
@ Falls	4037	-6	+6	S52E	N24W	66
	4038	-11	+11	S51E	N54W	50
		ROCK OUTCROP		S52E 80'S		
		WEATHERED COARSE DIORITE				
	4039	+13	-13	S44E	N44W	36
	4040	-4	+5	S65E	N68W	100
	4041	+9	-10	N68E	S67W	100
	4042	-5	+5	S78E	N80W	90
	4043	-21	+21	S77E	N79W	95
	4044	-12	+12	S46E	N46W	100
	4045	-16	+16	S19E	N24W	100
	4046	-1	0	S17E	N20W	100
	4047	-4	+5	S34E	N37W	75
	4048	-22	+21	S41E	N43W	100
	4049	-6	+5	S18E	N21W	100

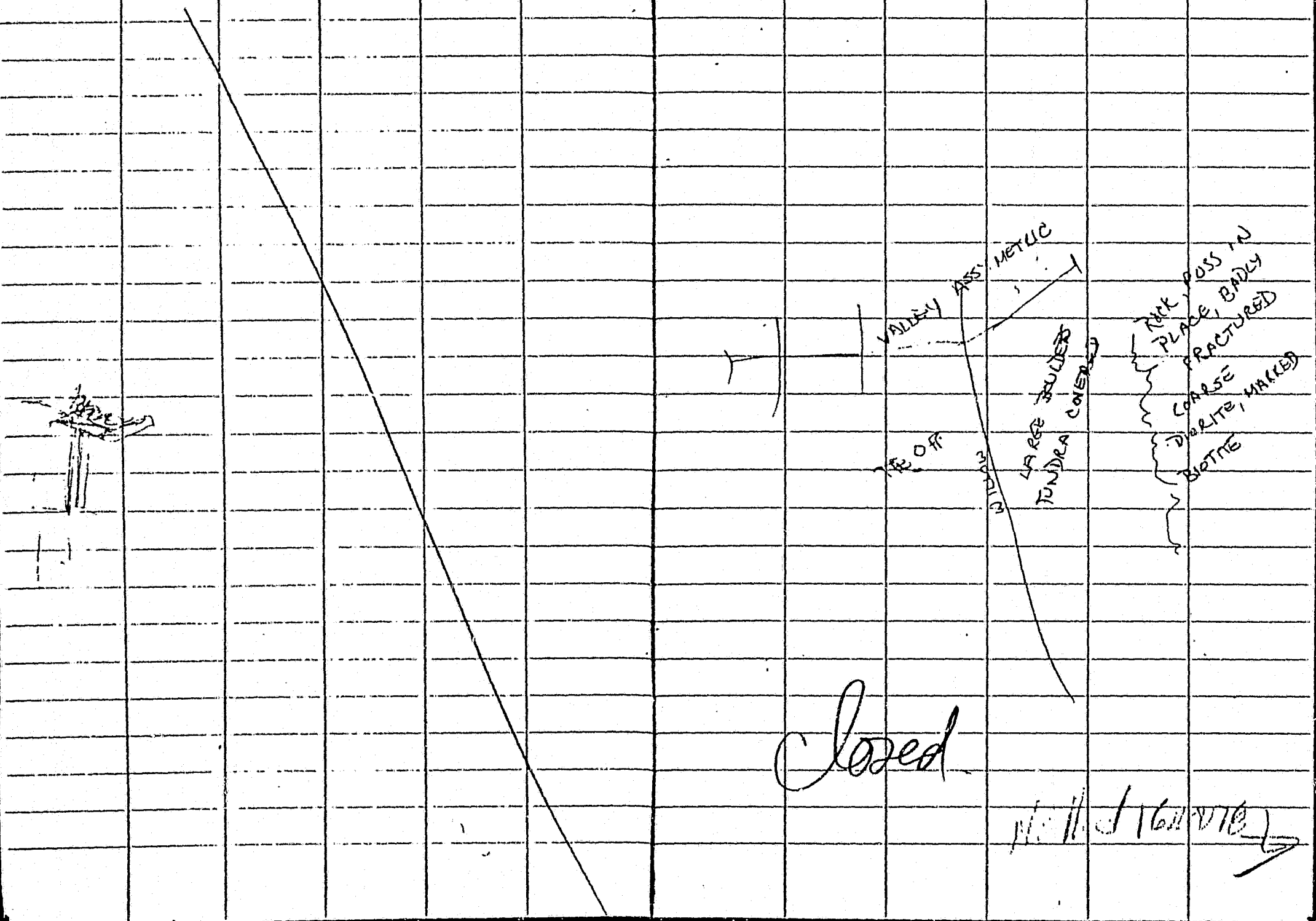
BOULDERS, COBBLES, DIRT; LARGE BOULDERS AT SURFACE (2-5' DIAM); FINE BROWN SANDY SOILS



Checked 9/30/81

plotted 15 Oct 78

Plotted 18 June 81 RCP



Closed

11/16/78

"J" → SLIDE BLOCK 7/18/78 L. DUNCAN B. SMITH

COE BOOK 30 (11)

S. ABOTMENT

FROM	TO	VERT ∆ FS	VERT ∆ BS	BEARING FS	BEARING BS	DIST
1712	2130	-34	+34.5	N28W	S25E	54
	2131	-34.5	+36.5	N56W	S58E	34
	2132	-9	+9	N34W	S33E	2

CLIFF: N55W 305 DIP 63°E CLEAR GREENISH DIORITE

N33E 79SE TIGHT JOINT SET

2133	-31	+31	N31W	S32E	33
2134	-3	+1.5	N74E	S76W N66W	29
2135	+9	-10	S58E	N64W	50

N57W 86SW

2135 +51' TO EDGE OF GUT

N68W 81° N GRANODIORITE

2135 +87' TO FAR EDGE OF GUT

2136	-35	+34½	N56E	S57W	87
2137	-21	+18	N37E	S37W	29
2138	+29	-30	S79E	N80W	25
2139	+50	-49	S05E	N15W	33
			S10E	N15W	
2140	-4	+8	E-W	S88W	19
		+4			

SIDE SHOT: 2140 + 10'

JOINT SETS GRANODIORITE

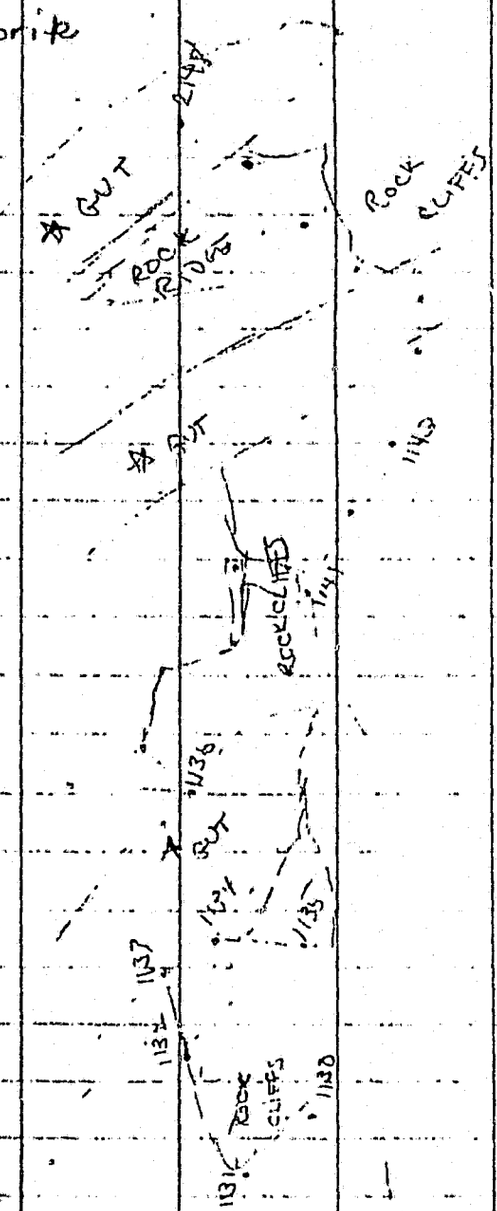
N70W 290 85° N ✓

N40E 79° N

geology plot checked 1/31/81

N AC LEAD + CAMPBELL FROM PT. 404

1130 + granodiorite



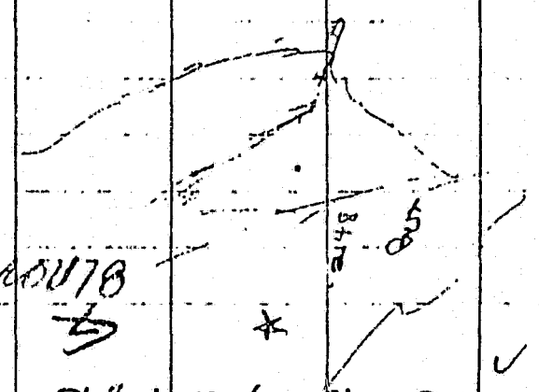
1100's are actually 2100's

Plotted 18 June 81 RCP

RCP 8 June 81

(13)

	VERT ∆ FS	VERT ∆ BS	BRG FS	BRG BS	DIP
2140 2141	+49	-50	S28W	N21E	32
2142	+28	-27½	S63E	N60W	49
2143	+6	-5	S50E	N52W	73
	JOINT SETS				
	N52E	88°N		✓	
	N66W	87°SW		✓	
	DIORITE W/ MARKED BIOTITE				
2144	-11	+8	S86E	E-W	33
	-11	+10	S86E	N87W	
	SIDESHOT TO 1718		S08E	+40°	
2145	+18	-18	N58E	N60W (S60W)	67
2146	+35	-34	N80E	S77W	25
2147	+11	-12	S67E	N69W	25
2147 1720	+40	(SIDE SHOT)	S51W		20
2148	-30	+30	S73E	N70W	42
	CLIFF FACES EAST SIDE GUT				
		N54W 306	83°S	CLIFF MAKERS	
		N10E	54°W	MINOR JOINT SET	
		N71W 28	85°N		
	WX TO 20'				
2149	+25	-25	S79E	N87W	75
			S85E	N85W	



Plotted 16 NOV 78

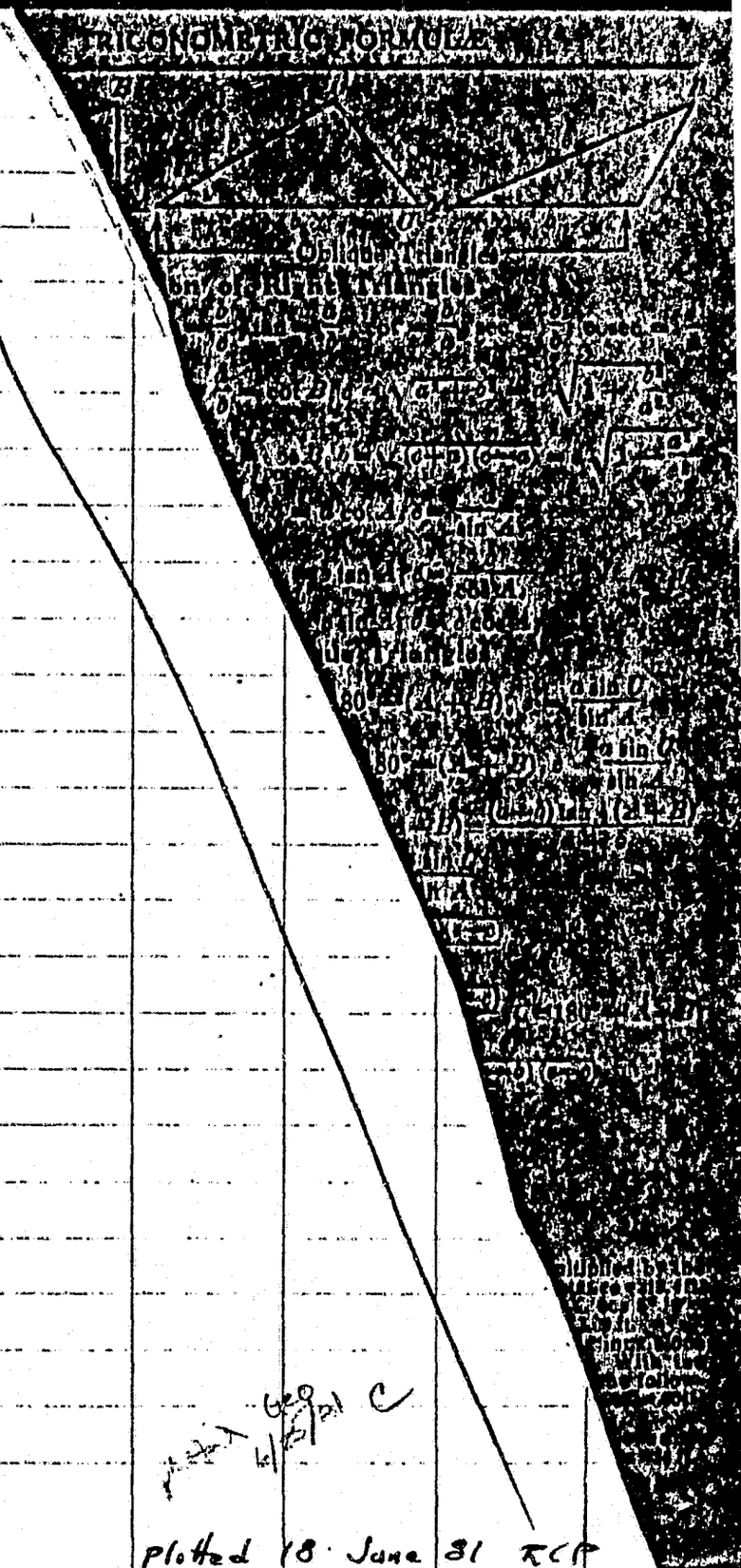
Plotted 18 June 81 RCP

✓ RCP

	VERT Δ FS	VERT Δ BS	BRG FS	BRG BS	DIST
2149 2150	+49	-49	S21E	N23W	34
2151	+36	-38	S36E	N42W	47
	+37	-38	S36E	N39W	
1724	+26	-29	N15E	S77W	12

Closed

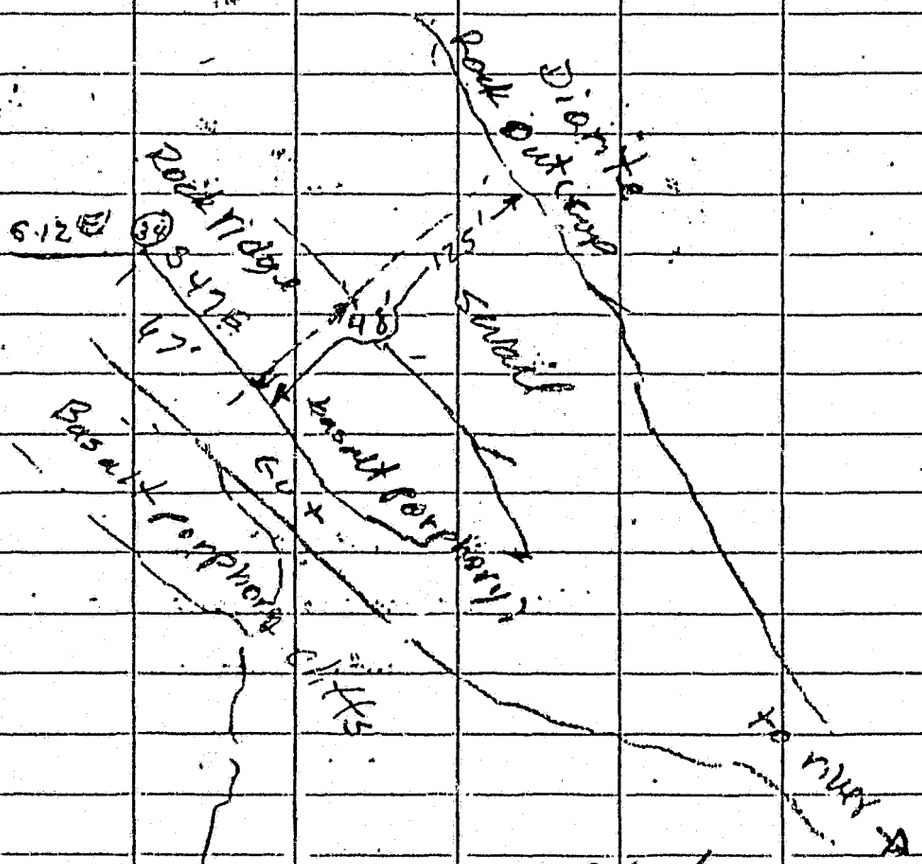
plotted 16 AUG 78

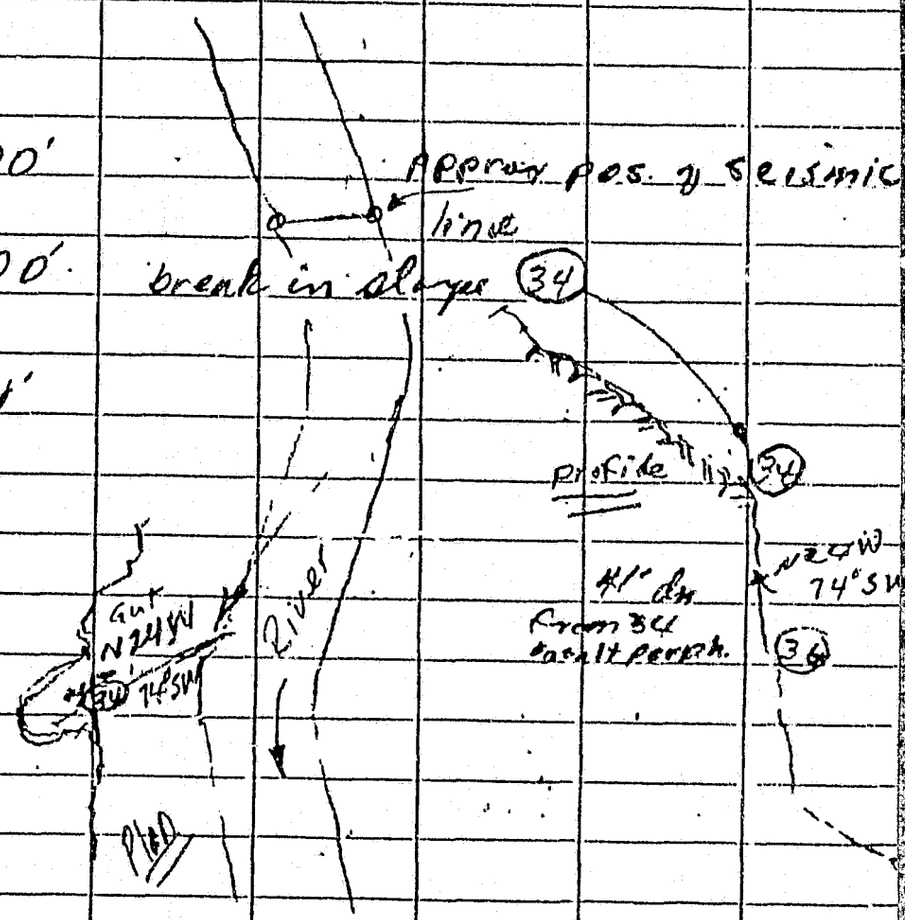


plotted 18 June 81 RCP

EVEN NOS. Greeley - REGO | COE 17 May 78 | Wadana Book 9 | start 36

From	To	Bearing Foresite	backsite	Fore ∡	back ∡	Dist	NOTES & Samples
P+31		El 889.5					
	32	S 24° E	Az. 339°	−34.5°	+ 34.5°	100'	
32							
	34	S 12° E	Az 342°	−33°	+33°	100'	
34							
	36	S 47° E	Az 325°	−44.5°	+ 45°	101'	





Sta 36 basalt porphory ??
Sta 34 + 59' gaseous vesicles or surface
or xtals weathered out ??

Sta 34 + 67' N 70° W ; 87' S

GEOLOGY TRAVERSE - RIGHT / NORTH ABUTMENT

plotted 15 NOV 78 — RCP

Plotted 11 June 81 — June 81

From		Foresite	backsite	Fore ∡	back ∡	Dist	NOTES
34							
	38	S24°E	AZ 335°	−35°	+36°	100	
38							
	40	S67°E	297°	−2°	+2°	100	sta 40 basalt porphyry - is really a chilled zone of diorite which gives the glassy ground mass w/ feldspar xlats. GG. dacite or trachy-andesite
40							
	42	N90E	275°	+0°30'	−0°30'	100	
42							
	44	N82E	273°	−1°	0°	100	
44							
	46	N56°E	248°	0°	0°	100	sta 42 - diorite w/ feldspar xlats. sta 42+69' some biotite showing in rock.
46							
	48	S92E	293°	−1°	+1°	80'	sta 46 diorite random rocks on surface - no structure
48							
	50	S62°E	301°	+1	0°	35'	traverse line is at top of rock shutes shears must be trending NW some degree
50							
~~50~~	52	N85°E	271°	−4°	+2°	100'	1225 hrs 1/8" dia Hole
52							
	54	N85°E	273°	+3.5°		90'	sta. 48 is in middle of wide shute.
54							
							sta. 50 is at E edge of shute
							sta 52 is pt of rock fin
							sta 52, 54, 50 diorite - loose cobbles on surface
							sta plotted 15 Nov 78

Plotted 11 June 81

RCP

RCP
9 June 81

From	To	Foresite	Backsite	Fore ∡	bk ∡	Dist	Notes
54			A2				
	56	N 77°E	265°	+1°	-4	100'	diorite boulders on surface in small avalanche shute
56							
	58	N90°E	270°	+1°	0°	100'	sta. 58 - random cobbles & boulders.
58							
	60	N67°E	254°	+9.5°	-10°	85'	sta 60 diorite - N67W° 263 west Edge of rock fin. Dip unobtainable, rock is fractured w/ stain and weathered jt. surfaces.
60							
	62	S83°E	275°	-4°	-1°	65'	
62							
	64	S84°E	295°	+1°	0°	100'	sta 62. west side of rock fin trending 314° A2 dip 82S rock is weathered on surface. dip face stands as a slab some 15-20' high.
64							
	66	N72°E	262°	+16°	-16°	90'	
66							
	68	S85°E	270°	0°	+1°	100'	
68							
	70	S67°E	290°	-2.5°	0°	95'	Station 64 + 60' jt. surface N49°W dips 84°S color is quite pinkish and weathered on surfaces. Adjacent rock has normal diorite color
70							
	72	see next page					

sta 64 fine grained diorite - Fresh.
sta 68+20' " " " - weathered
can't get a regional trend but think the trend is regional; N45°W.
sta 68+87' diorite fins N47°W; 79S
sta 70 in boulder patch next to fin.

plotted 15 Oct '78

17 May 77 Greeley-Reyes

From	to	Foresite	Backsite AZ	Fore ∢	bk ∢	Dist.	Notes
70							
	72	S75°E	284	+19°	-20°	37'	sta. 72 top of rock fin w/ overburden
72							dark diorite fresh
	74	N82E°	262	-2°	+4	100'	dark diorite fresh
74							
	76	S86°E	276	+2	-2	100'	normal greyish diorite, fresh
76							very hard.
	78	S72°E	286°	+6°	-6°	100	in boulder patch
78							
	80	S86°E	284°	+9°	-8°	78'	diorite no structure avail.
80							
	82	S82°E	281°	+2°	-2°	72'	loose diorite boulders on surface.
82							
	84	S76°E	287°	0°	-2°	100'	boulder surface
84							
	86	S67°E	298	+2°	-6°	100'	boulders on surface
86							
	88	S90°E	274°	+15°	-18°	67'	pipeline. drill H_2O line
88							only temporary.
	N "D"	~~335°~~ AZ		-8° below sta 88		9.7'	
				-11° ∢			

plotted 15 Nov 78 → RCP

Plotted 11 June 81 RCP

9 June 81

18 May 78 Thursday

Greeley - Rego

FROM "D"	TO	Foresite	Bksite AZ	Fore ∡	Bk ∡	Dist:	NOTES
	90	S85°E	279°	+1°	-2°	100	no out crops - boulder surfac
90							
	92	S78°E	279°	+3.5°	-3°	100	no out crops sta. 92 + 45'
92							slab sided ft. S88°E; 64'S fine
	94	N82°E	267°	-2°	0°	100'	grained diorite - mod. weathered on
94							surfaces mafics are starting to
	96	N72°E	256°	-1°	+2°	100'	weather out.
96							
	98	N66°E	245°	-1.5°	+2°	100'	sta. 94 - no out crop
98							sta 96 no out crop.
	100	N90°E	276°	-17°	+15°	100'	sta 98 " "
100							sta 101 diorite - N60W no
	102	N63°E	246°	-2.5°	+2	100'	dip. mod. altered appears
102							to be close to a shear - rock
	104	N60°E	242°	-2°	+1	87'	is closely fractured, the
							mafics & feldspars are badly
	see next page						altered.
							Sta 102 on west edge of gut
							some 20' wide and 10' deep. Gut is
sta 102 to			is spanning a				N 60° W ; 72° SW
	series of shears					plotted 15 Jun 79	sta 102 + 60' small gut
							that goes into the one at sta 10
			Plotted 12 June 81 RP		RCP 9 June 81		sta 104 diorite fine talus below

18 May 78 Greeley - Regd

From	To	Fore site	Bk site	Fore ∡	Bk ∡	Dist	NOTES
104			AZ				
	106	N52°E	229°	-10.5°	+8	62'	bottom of gut. no rocks showing
106							gut trends N 25° W
	108	S73°E	288°	-6°	+4	97'	diorite fin - mod weathered
108							sta. 108 is on west edge of fin.
	110	S69°E	297°	+13	-17	22'	Diorite - on east edge of gut
110							
	112	N78°E	275°	+5.5°	-10	100'	some random boulders showing
112							
	114	N80°E	266°	+1°	0	100'	some diorite boulders
114							
	116	N75°E	250°	-3°	-1° ??(+)	100'	no rocks showing - duff on forest
116							floor.
	118	N77°E	265°	-3°	-1°	100'	diorite boulders.
118							
	120	N77°E	246°	+1°	~~-1~~ -2	100'	sta 118 + 50' jagged rock
120							ridge trends N45W no dip.
	122	N70°E	250°	+1	+ 2° ??(-)	100'	sta 120 cobbles on surface
122							
	124					100'	65' N. of sta 124 large diorite
							outcrop. Jts. are N 75° W, 74 SW
		Cont. next page					and N50°E, 81° SE
							rock is highly fractured as if
							close to a shear.

Plotted 12 June 81 ✓ RCP 9 June 81

From	To	For site	Bk site AZ	For ∡	Bk ∡	Dist	Notes
122							
	124	N69°E	253	+9°	-8°	100'	boulders on surface.
124							
	126	N77°E	262	+4°	-6°	100'	sta 124 + 45' and 40' uphill is outcrop. N 35° W; 83° NE N52° E; Vert. jt. faces are highly fractured as if close to a shear.
126							
	128	N87°E	264°	+4°	-4°	100'	
128							Sta. 128 - no outcrops.
	130	N75°E	260°	+1°	-3°	96'	sta 128 - diorite in small outcrop. no jt. data
130							
	132	N24°E	205°	+27°	-26	100'	diorite - slight ridge trending N 55° W - no slip. at sta 132 + 25
132							
	134	N32°E	217°	+10°	-13°	96'	no out-crop - comming around nose towards fins - 400' wide fins (spillway)
134							
	136	N35°E	216	+1	-2	100'	no outcrops
136							
	138	N32°E	212	-1.5°	0°	100'	grass covered slope
138							
	140	N50°E	249	-6.5°	-1°	97'	edge of wide gut no rock showing.
140							
	142	N45°E	227°	-26°	+22°	48'	west edge of bottom of gut.
142							
	144	N62°E	240	+2	-2	75'	east edge of gut - weathered diorite rock may not be in place.

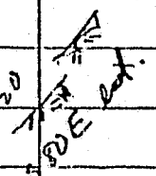
Plotted 12 June 81 RCP

RCP 12 June 81

18 May 78 Greeley-Rego

From	TO	For site	Bk site	For ∡	Bk ∡	Dist.	NOTES
144							
	146	N52°E	237°	+27°	-26°	56'	on east side of gut shut covered
146							crest of ridge. no outcrops.
	148	N25°E	206°	+4°	-6	100'	sta 148 +12' west edge of
148							swale
	150	N68°E	249	-19.5°	+20°	100'	far side of swale below out
150							crop. trends N 35°W; 70°SW
	152	N79°E	264	+7°	-11	80'	closely frac. diorite as if near
152							a shear.
	154	N24°E	202	+12°	-11°	100'	sta. 152 edge of rock cliff
154							weathered diorite - rocky fin
	156	N28°E	209	-1°	+1	60'	goes to river.
							sta 154 - boulder surface
							sta 156 on west edge of 400'
							wide shear. Rock on edge is
156							weathered diorite - just upstream
	158	N48°W	136°	+28°	-25°	100'	of these shears & on so. side are
158							two straight lines that form the
	160						so. bank.

cont next page



sta 158. on west rim of fine
est. of trend is N 55° W no dip.
sta 158 is near top of shute

Plotted 12 June 81

RCP 9 June 81

18 May 78 Greeley-Regr

From	TO	For site	Bk site AZ	For ∢	Bk ∢	Dist	Notes
158							
	160	N60°W	121°	+21°	-19°	100'	no out crops - grassy slope
160							
	162	N27°W	151°	+17°	-15°	100'	grassy slope
162							
	164	N66°W	124	+9°	-11°	100'	grassy swale
164							
	166	N48°W	133°	+14°	-16°	100'	grassy swale
166							
	168	N55°W	128°	+17°	-15°	100'	grassy swale
168							
	170	N67°W	116°	+14°	-12°	100'	grassy slope
170							
	172	N45°W	139°	+7°	-10°	100'	grassy slope
172							
	174	N32°W	151°	+13°	-11°	100'	grassy slope
174							
	176	N57°W	125	+11°	-14°	100'	grassy slope
176							
	178	S65W	71°	+6°	-10°	100	grassy slope
178							starting west under crest
	180	S35°W	40°	0°	-4	100'	grassy slope
180							
	182	S52°W	50°	+4	-5°	100	grassy slope

Plotted 12 June 81 [illegible]

RESERVOIR 1

18 May 78 Greeley-Rego

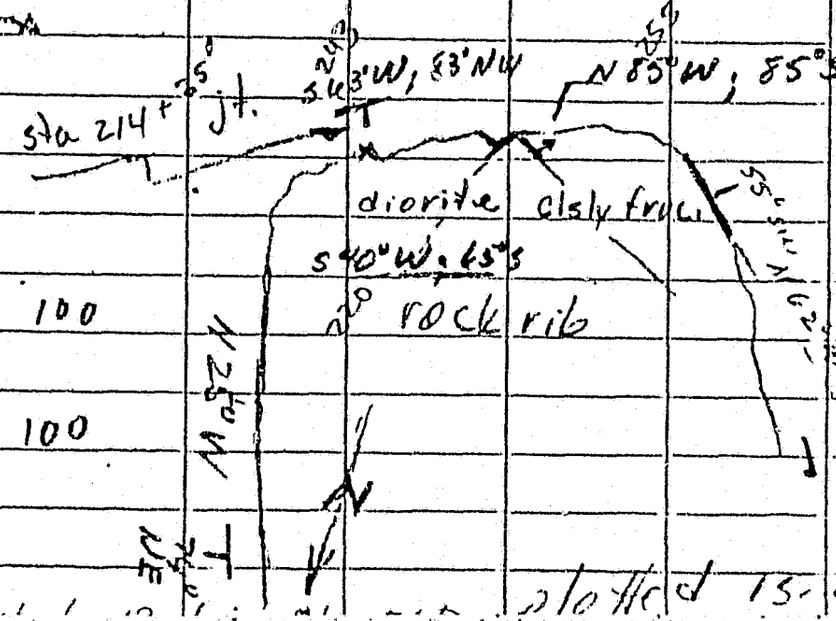
From	TO	Forsite	Bksite AZ	For ∡	Bk ∡	Dist	Notes
182							
	184	S37°W	33°	+4°	-5°	100'	grassy slope
184							
	186	S49°W	50°	+9°	-10°	100	grassy slope
186							
	188	S67°W	69°	-2°	+0	100'	Brush
188							
	190	S80°W	80°	+2	-6	100	brush
190							
	192	S82°W	75°	-1	0	100	brush
192							
	194	S85°W	84°	-6°	+4°	100	brush xing swale
194							
	196	S75°W	70°	+3	-4°	100	brush random diorite boulders on surface
196							
	198	S67°W	70°	-1°	(-1°) ??	100	Brush
198							
	200	S85°W	86°	-2°	+1°	100	brush & spruce
200							
	202	N50°W	124°	+9°	-10°	100	brush covered boulders
202							
	204	N65°W	104°	+4	0	60'	west edge of rock fin jt face N37°W; 74°SW mod. weathering on jt. surface.

Cont Next Page

Plotted 12 June 81

18 May 78 Greeley - Rego

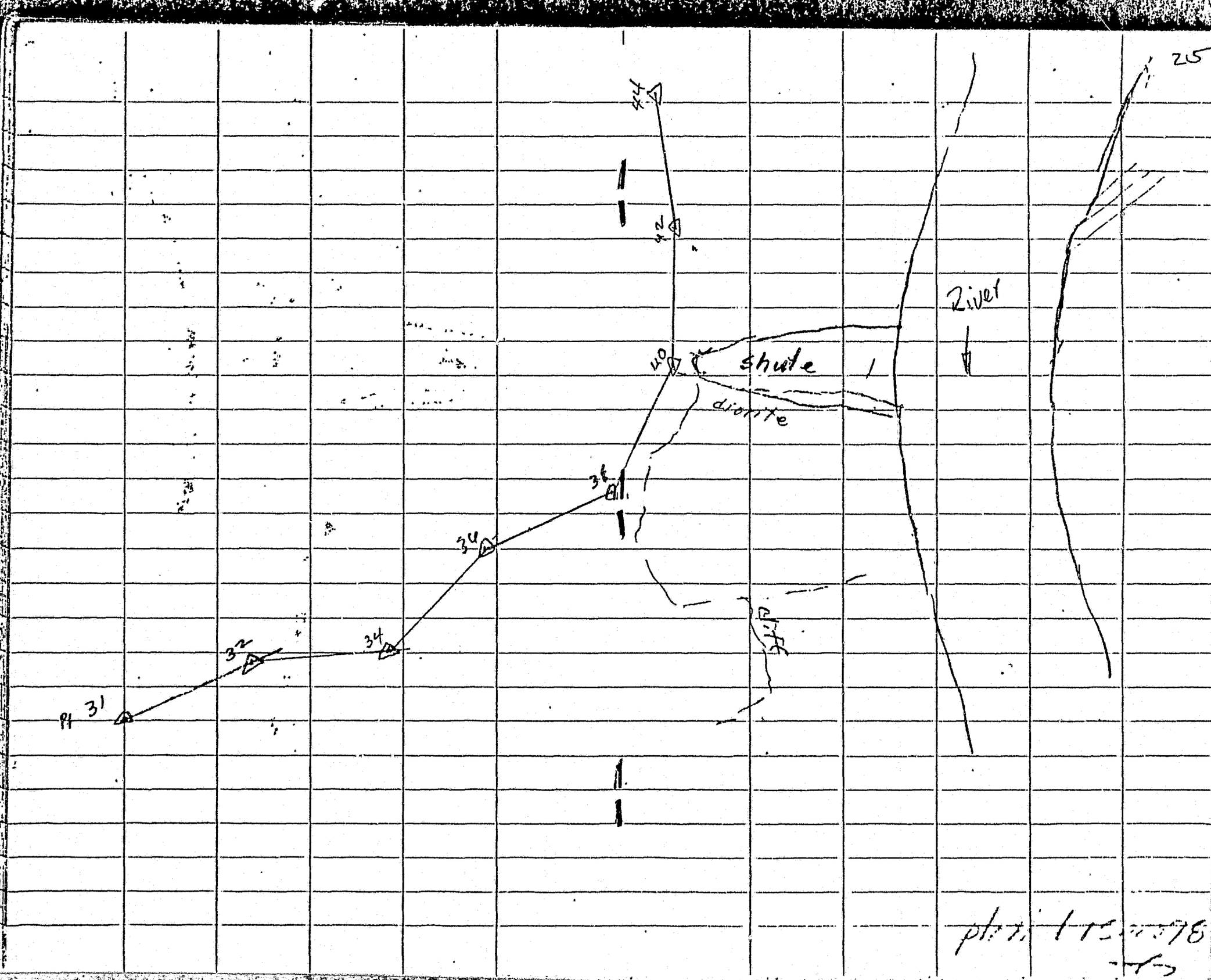
From	To	For site	Bk site Az	For ∡	Bk ∡	Dist.	NOTES
204							
	206	N84°W	90°	+4°	-5°	100'	brush - com 40' N. rock ridge trends N40° W; 58° SW mod. weathered diorite
206							
	208	S88°W	91°	-0.5°	-1°	100'	sta 208 - in wet moss - brush and spruce.
208							
	210	S47W	46°	-3°	+2°	100'	sta 210 - spruce & brushy.
210							
	212	S47°W	51°	-0.5°	+2°	100'	sta 210 + 60' east edge of rock rib - rounded & moss-brush covered no data. sta 214 on so toe of rock rib - jumbled moss & displaced rocks.
212							
	214	S69°W	69°	-3.5°	+1°	100'	
		End for today 17 May 78					
		19 May 78					
	214 + 25'	see details on opp page →					
	214 + 40'	2 jts N85°W; 85°S S40W; 65S					
	214 + 65'	maj. jt. N62°W; 55°SW					
214							
	216	S72°W	66°	-1	+1	100	
216							
	218	S74°W	100°	+11.5°	-12°	100	
	216+60' @ nose of rock outcrop						



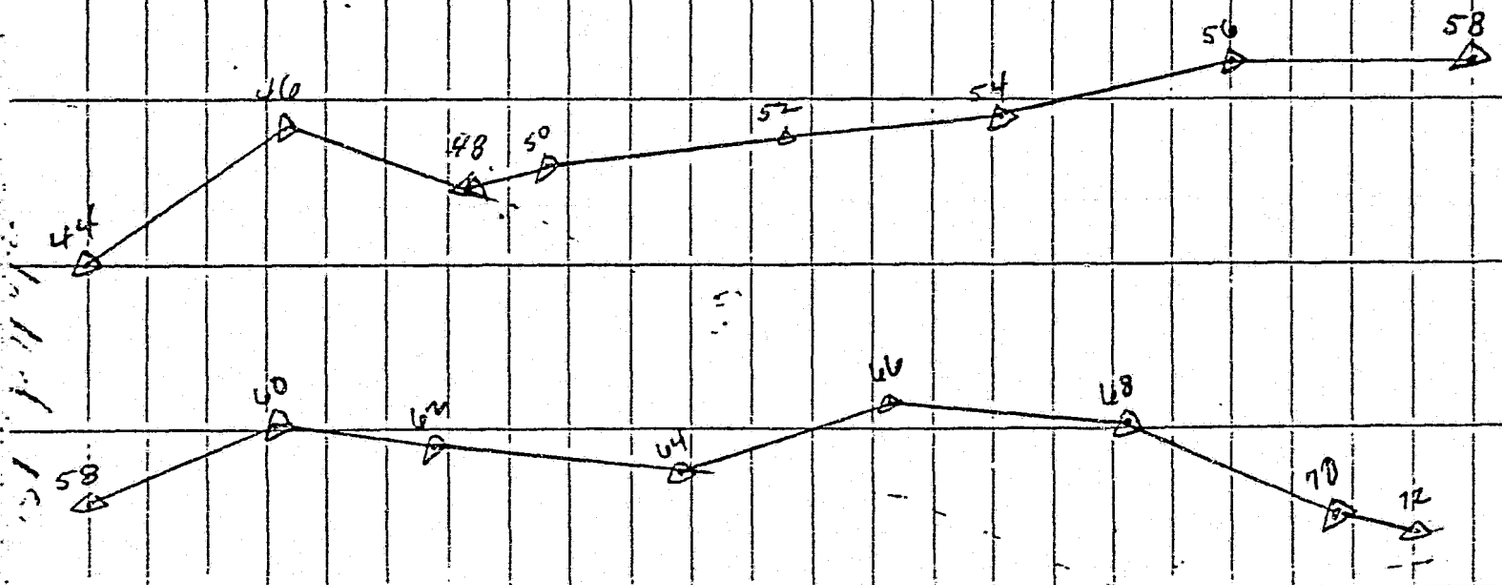
TURN TO PAGE

plotted 15 May 78

RESERVOIR



RESERVOIR
DESIGNATED AREA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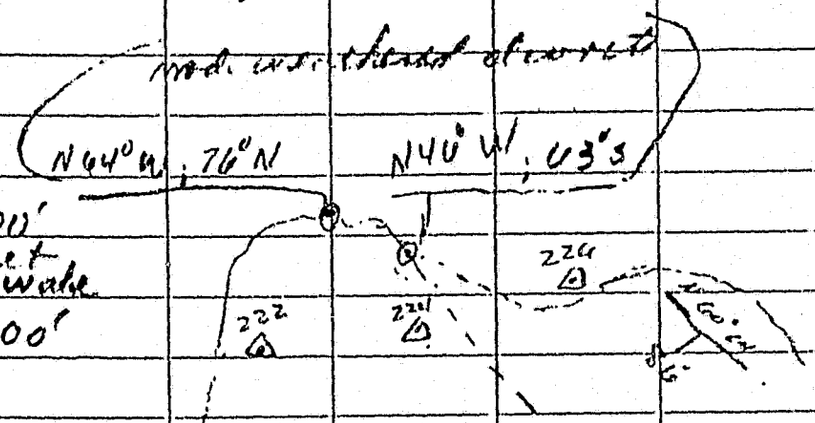
Plotted 15/1/18

RESERVOIR
DESIGNED FROM

page 19 May 78 Gresley-Reyd

From	To	For site	Bk site	For ∡	Bk ∡	Dist	Notes
218			AZ				
	220	S90°W	89°	+1°	-1°	100	brushy area between ribs
220							across sch top
	222	S87°W	86°	+3.5°	-4°	100'	crossing - nose of rib - moss
222							lichen & brush covered. random
	224	S81°W	78°	+4°	-3°	100'	diorite boulders.
224							
	226	S44°W	40°	-17°	+18°	100'	at toe of rock rib. rubble shown
226							
	228	N88W	92°	-5°	+2	72'	diorite mod weathered
	226 +	30'	jt. N40°W; 86° N				mod. weathered diorite
			jt N80E; 71° S				
228							N64°W; 76°N N40°W; 63°S
	230	N82°W	95°	-10	+4	100'	
230						Brushy wet swale	
	232	N79°W	103°	-7	+6	100'	
232							
	234	N82°W	101	+2	-2	100'	brushy swale wet
234							
	236	N84°W	97°	0°	+2	100'	brush
236							
	238	N81°W	101	+2	-2°	100'	brush Plotted 12 June 81 RCP
238							
	240	N68°W	110°	0°	-1°	100	brush random boulders on E edge of [illegible]



11 Jun 81 CDZ

19 May 78 Greeley - Rego

From	TO	For site	Bk site	For ∡	Bk ∡	Dist	NOTES
240			AZ				
	242	N82°W	103°	+7°	-7	100'	Xing ridge - moss-brush covered
242							
	244	N52°W	125°	+5	-4	37'	top of rock outcrop
244							jt. N90°W; 79° N dk intermed
	246	S74°W	78°	-2°	0'	88'	jt. N82°W; 82° N diorite
246							
	248	N57°W	126°	+3	-3	82'	rock is covered w/ moss. rock
248							moss has diff. fract. pattern
	250	N25°W	157°	+7	-7	80'	sta 250 + 34' jts N30°W; 65° S
							intermediate diorite S77°E; 84°
250							N53°W; 80°W [illegible] STAT 250
	252	N12°W	175°	+11°	-12	100'	along west side of rock rib
252							same rock type - jts N38°W, 51° SW
	254	N27°W	165°	+15	-11°	100'	jts N70°W; vert. Int. diorite
254							
	254	N49°W	133°	+9	-13	95'	jts N67°W; 54° S : N40°E; Vert.
256							Int. diorite
	258	N40°W	143°	+1	-3	100'	jts N66°W; 70° S : N32°W; 72 SW
258							S73°W; 78° NW
	260	N45°W	136°	-3°	+3°	70'	jts N72°W; 89° S

We are following along the West edge of a ridge trending some N40°W. The wide shallow swale to the west appears to be structural controlled. Rock on west side of

Checked by 7/30/81

11 June 81 LDZ

Plotted 12 June 81 RCP

plotted [illegible]

RESERVOIR 1

19 May 78 Greeley - Regd

From	TO	Forsite	Bksite	For ∡	BK ∡	Dist.	NOTES
260			AZ				
	262	N10°W	174°	+13°	-11°	100'	brushy slope
262							
	264	N21°W	155	+8°	-7°	100'	brushy slope on toe of rock
264							
	266	N7°W	173°	+24°	-23°	46'	jts N72°W; 81°S int. diorite
266							mod. weathered & clay jtd.
	268	N85°W	95°	-2°	+2	65'	jts N63°W; 83°S weathered surfa
268		N77W					is a hackely surface.
	270	283°	S78°E	+6°	-6°	65'	jts N52°W; 87°W int. diorite
270							N25°W; vert. xtals are more
	272	S85°W	80°	-11°	+10°	100'	xing small gut, defined
272							at top of ridge
							jts N78°W; 72°N altered Hrnbd xt
	274	S77°W	70°	-6	+8	100	brushy [illegible]
274							
	274	S61°W	61°	-6	+5	100	brushy
274							
	278	S41°W	41°	-6	+5	100	brushy
278							
	280	S46°W	50°	+4	-4	85	jts N60°W; 84°W altered Hrnblde
							S60°W; 88°S xtals in
		End for 19 May 78					diorite

Checked 11/5/78

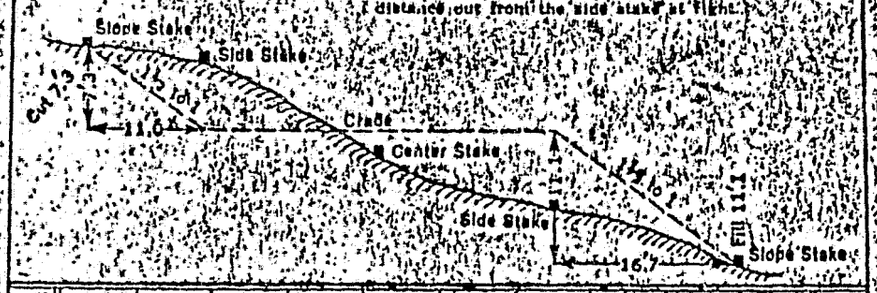
11 June 81

Plotted 12 June 81

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width: Side Slopes 1½ to 1

In the figure below, opposite 7 under "Cut or Fill" and under 0, read 11.0, the distance out from the side stake at left. Also, opposite 11, under "Cut or Fill" and under 1, read 16.7, the distance out from the side stake at right.



Cut or Fill	0	1	2	3	4	5	6	7	8	9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	0
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	1
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	2
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	3
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	4
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	5
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	6
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	7
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	8
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	9
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	10
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	11
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	12
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	13
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	14
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	15
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	16
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	17
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	18
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	19
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	20
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	21
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	22
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	23
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	24
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	25
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	26
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	27
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	28
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	29
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	30
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	31
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	32
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	33
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	34
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	35
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	36
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	37
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	38
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	39
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	40

COE [illegible] BOOK 11

Hwd 279-8393 ①

Notes:

Start samples at SPL #39
Photos start ROLL #10
Survey points start P-24
Geology points start G-82 ✓

Relict Channel & Spillway
Samples: every 10' or change
every 5' or change if material ~~is~~ changes rapidly
- Shelbys - Clay - wrapped wax on site -
top of clay - middle & bottom if possible

Gravel samples w/o breaking particles. 10' intervals

observation holes

Get a few basic holes first.

Pump tests

going down hole
Find out what materials
are first. —
pump out hole &
measure rising head.

push casing ahead of mud -
take sample - pump out &
either slowdown pump to
set recharge rate or
measure rising head.

Bag observation wells.

If in good clear gravels -
push ahead & pump out mud -
pump out & check rising head -
get samples.

Air Rotary Samples -
double tag
1 inside
1 outside

Put Hole no.
Sample No.
depth from to
date
on each tag
Type of material
ex. Hole CC
Sample CC-3, etc
From 48.6 - 51.9
28 July 1984.
Clay

Call Glen Thursday
694-2656
time

5 May 1978

figured pipe lengths for Bill to get up left bank.

ran out & finished trying to T.P. on seismic line

tried to run to hole w- bad start & no go- do later from top.

Made sketches for Bill & crew on South side holes

total linear on south

drills off river on ~~E~~ Wed & Thurs. — finished misc friday.

5 May 1978

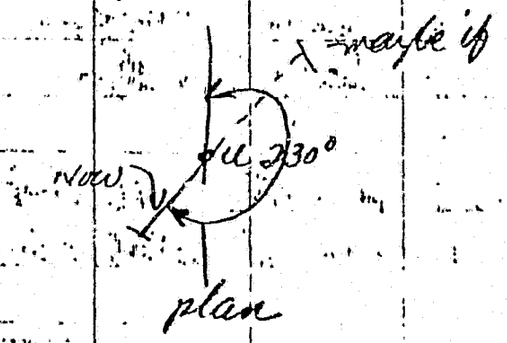
(5)

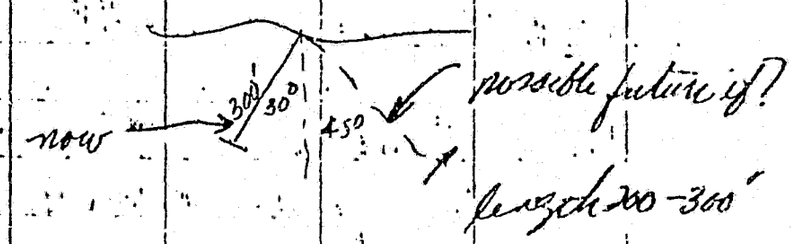
OOHU

Sketch to Bill, Wayne, Allan, Neil, John, et al.

Be ready to to angle 180° opposite present angle - just in case we hit something screwy.

present idea





12 May 1978

Each time someone gets behind wheel he has to put his name on trip ticket - even for 0.1 miles.
Argue with Corine - that's a lost cause.

---

13 May

Danny needs M series board on V-hole - sift broken, etc.

2	2 + 1
1	2 + 1 + Neil
3	6
	1 Lab

Blank

(4)

From	To	Foresite	backsite	Fore ∡	back ∡	Dist	Notes
Stake above V	Pt1	269° ~~+59.5~~	S88E	+5°	-2°	100'	brush - outcrop above V
							get later
Pt1	Pt2	254°	N78E	-2°	+7°	100'	open timber - Near upper break in slope
Pt2	Pt3	245°	N64E	-8°	+8°	100'	down slope
Pt3	Pt4	202°	N23E	-25° ~~-28°~~	+25½°	60'	edge of outcrop

Note - Watana
Right Bank -
Tape & Brunton D/S
from Stake set up base line
from "V"-hole

Diorite

JTS	N85W 275	78S	
	N14W 340	80E	
	N50E	80S	
	N5W 355	65E	
	N30E	82E	
	N60W 300	8N	
	N73W 287	81N	PROMINENT
	N41W 319	90	
	N32W 328	53NE	

PHOTO 10 ~40' UPSTREAM OF Pt4

Bodey 78 Photo 9 blank, Photo 10 starts at 10

NO SIGNS OF SHEARING, Qtz crystals on surfaces, tight jointing

Plotted 14 Nov 78

Plotted 12 June 81
RCP

11 Jun 81
LDE

		Forsite	backsite	Fore ∡	back ∡	Dist	
PT4	Pt 5	230	N50E	-22	+26	50'	~~outcrop~~ D/S u/s face of outcrop Pt4-Pt5

moderately jointed diorite, blocky, moderately weathered, MED. GRAINED

PROMINENT JNT N75W 88N

ALSO N60W 50S

W CHERTY FILLINGS (REHEALING

SOS

JNTS N 26 W 354 90°

N 9W 35 59W

N 33 W 327 61 NE MAJOR

N 49 E 75 SE

N 50 W 30 60 SW MAJOR

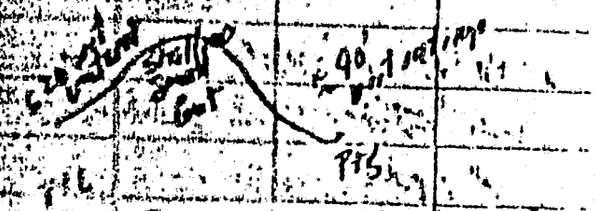
N 58 E 81 S MINOR

N 22 W 330 66 W MAJOR

N65E 71 SE MAJOR

PT5	PT6	285	S72E	+6°	-5°	100	Cross face of outcrop

med grained moderately weathered diorite. Light to moderate jointing; fairly massive jts prominent.



Small shear @ 20° ≈ 0.1' HW diorite

N30E 65SE

plotted 14 Nov 78

Plotted 12 June 81

RCP

11 JUN 81 LTJE

From	To	For S	Back S	For ∠	Back ∠	Dist	Notes
Pt6	Pt7	N78W	100°	+1½	-2°	100'	end of outcrop @ 25'±
							outcrop trends NW uphill-low
							profile +5'-6'
Pt7	Pt8	N87W	~~26~~92°	+1°	-1°	37'	mid outcrop (starts @ 20'
							same diorite
Pt8	Pt9	300°	S62E	+5°	-5°	70'	fairly continuous outcrop ≈20'
							uphill (North) - same old diorite
			JTS	N59W ≈ 62 S	MAJOR		
				N11E 81 E	MAJOR		Set ribbon for OD H-W
				N75W ≈ 77 S	MAJOR		≈ 30' back from Pt9
				N20E 80 W	MINOR		
				N60W ≈ 55 S	MAJOR		
				305 56	W		
PT9	PT10	N82W	096°	+11°	-09°	82'	Diorite angling uphill (NW
P10	P11	S67W	070°	-1°	+2°	100'	open timber
P11	P12	N84W	094°	-3½°	+5°	100'	open timber above break in slope
							outcrop of diorite mw
							mod ↓ jointed ≈ 200' Down slope
							≈ 70'± down veh
Pt12	Pt13	S78W	085°	-1°	+2°	85'	open timber
Pt13	Pt14	N72W	105°	-3½°	+4°	84'	open timber, boulders
							diorite & altered (greenish)
							diorite.
PT14	Pt15	S84W	085°	-3°	+4°	100'	Boulders - no evidence of
							sliding (arched trees) 19³ + cyl. angular → sub angular
	Plotted 12 June 81 RCP			✓ 11 JUN 81 LDZ		Hd	how about post popping?

From	To	Foresite	Backsite	For ∠	Back ∠	Dist	
PT15	PT16	N39W	144°	+27°	-25°	52	outcrop (boulder!)
		end 13 May					
		Start 14 May 1978					
Pt16	Pt17	S86W	090°	+2°	-1°	110'	small diorite outcrop @ 20' 10' 10'
Pt17	Pt18	S74W	074	-13°	+11°	92'	
Pt18	Pt19	S38W	037°	-21° ~~-16°~~	+22°	74'	u/s edge of outcrop

large exposure JNT N15E 76 W
just getting above N40E 25 SE
slide scar N71E 89 N
40-50' cliff (N55W≈) N16 W 51 E
MOD JNTED, BLOCKY, SLIGHTLY ALTERED (LED)
PROMINENT N66E 81S
" N59E 90 SIO FILLING
" N71W 71 S WEATHERED

Entire outcrop seems slightly altered
slightly D/S of amphitheater at
river seismic line - almost opposite
end of rock on left bank + ≈ 500'
above river (check G-point)
Seems I can see first evidence
of shear (G-35?) from this point.
(D/S & below)

Pt19	Pt20	152°	N27W	-33°	+36°	45'	Diorite
Pt20	Pt21	292	S69E	0°	0°	52'	across moderately weathered

JNTS PROMINENT N60 W 70 SW
3' spacing: N10E 81W
N81W 47S
N80E 41S
N60W 90
N63W 78 N

moderately to highly jointed
diorite face.
silicified dike 30' back from
PT 20 WOBBLES AROUND

Blocked 14 Nov 78 —

(17)

From	to	Fore site	Back site	Fore ∡	Back ∡	Dist	Notes
Pt21	Pt22	N80W	103	+9°	-9°	66'	Crossed over plenty orange flagging. Proved below one line. Seems to be a line bearing N10W ribbon is fresh.

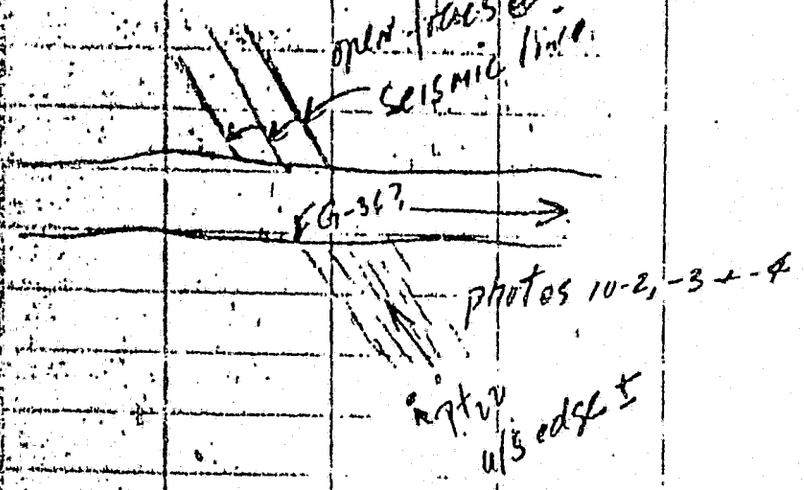
low swale @ Pt22 -
bearing N65W photo 10-~~5~~ 11
Neil for scale ≈15' across

photo ~~10~~ 10-~~6~~ 15
look west - broken

Qtz Diorite
Highly jointed stained
moderately weathered
No grass, etc noted but
lines up with open fracs
on left bank at seismic
line.

V. PROMINENT SHEAR in SWALE
N50W 30 65SW
JNTS: N42E 50 NW
MANY JNTS OPEN
N35E VERT

photos 10-2, -3 + -4 from ribbon marker @ Pt22
look S25E at major open fractures on left bank.
Many open fractures on this side too. 20' vertical cliff ≈ 100' Down slope from Pt22



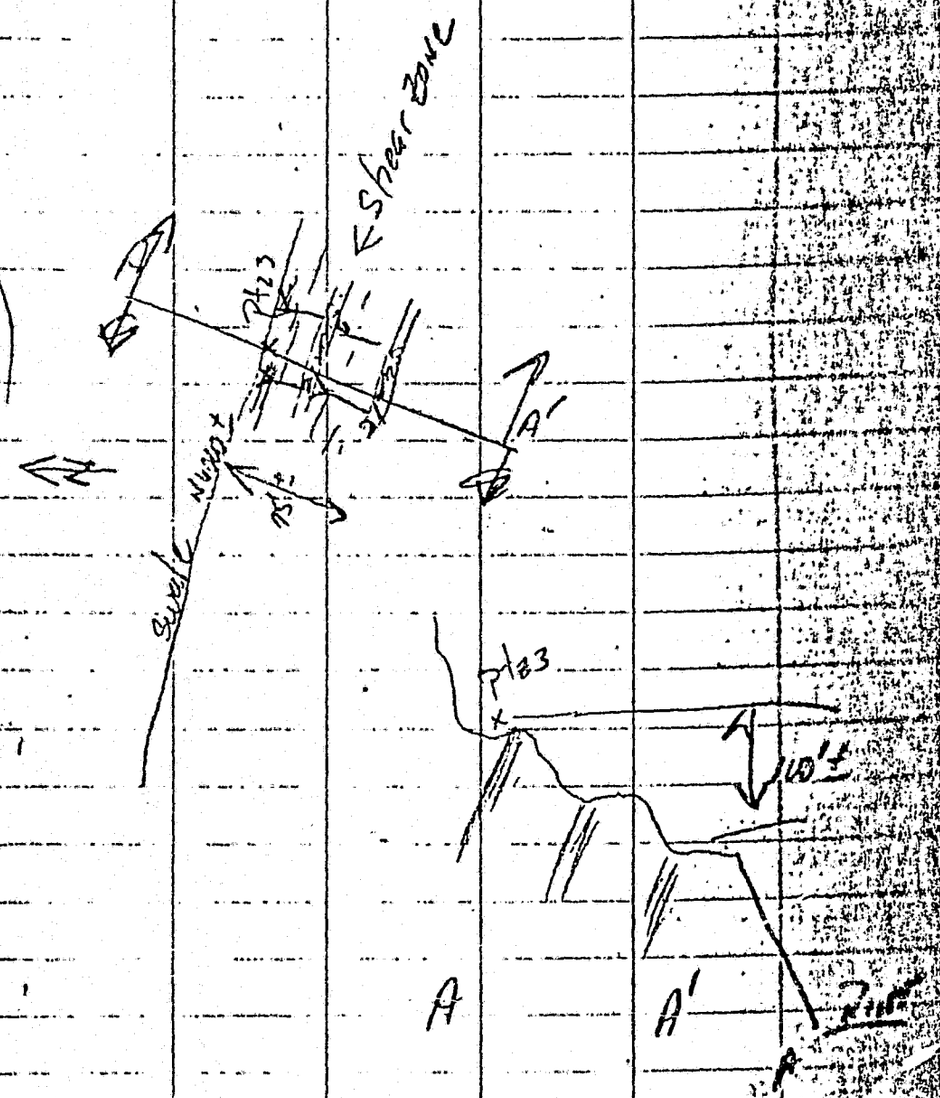
Plotted 14 Nov 78

Plotted 12 June 81
RCP

√ 11 JUN 81
LDZ

Plots checked 7/31/81

From	To	Foresite	Backsite	Fore ∠	Back ∠		
Pt22	Pt23	S79W	077°	-7°	+1°	(3)	Scale (definite shear zone)



plotted 14 Nov 78

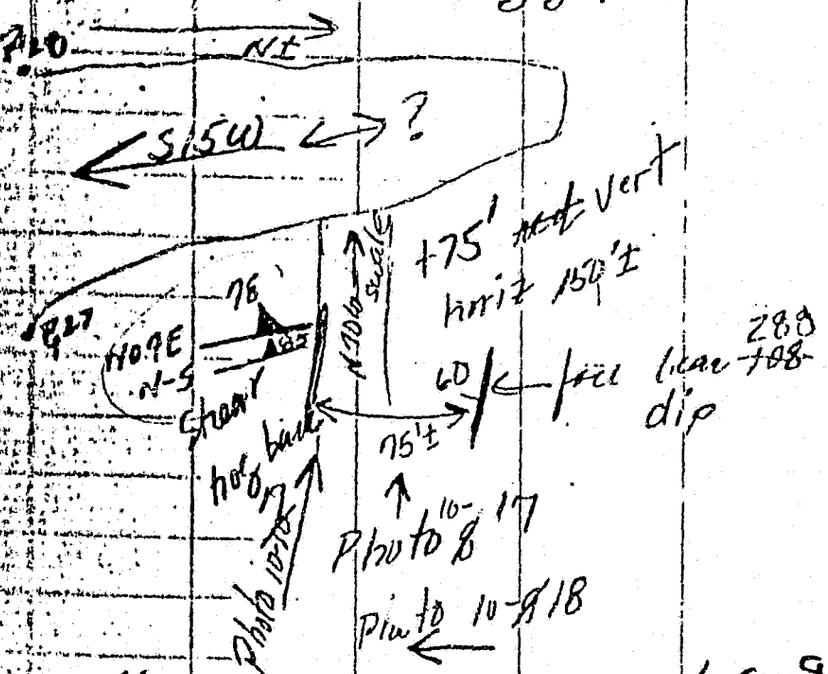
Plotted 12 June 81
RCP

✓ 11 Jun 81
LDZ

Plot checked 7/31/85

From	To	Forsite	Backsite	Fore ∠	Back ∠	Notes
Pt 23	Pt 24	N89W	093	+10°	-11°	42 Shear
						Photo 10-9 16
		N65W, 75N SHEAR				
		[redacted]				
Pt 24	Pt 25	320°	S46E	+21°	-11°	41 up swale
Pt 25	Pt 26	293°	S60E	+3°	-6°	26 up swale MW diorite, highly jointed, up hill.
Pt 26	Pt 27	302	S56E	0°	+1°	66 up swale - ends here - blends into major erosional feature ≈ 30 yd across.
Pt 27	Pt 28	N83W	097	-12°	+13°	86 across rock slide? (Fault?) swales do not appear to continue across big gut.

Gouge & etc not always visible in swales. OB?



Plotted 14 Nov 78
Plotted 12 June 81 RCP

11 Jun 81 LDZ

Plots checked 1/31/81

From	To	Foresite	Backsite	Fore	[illegible]	[illegible]	[illegible]
Pt28 ↓	Pt29 ↓	225	N45E	+6°	[illegible]	2 3	[illegible] Out. [illegible] from diorite & [illegible] diorite (standard fore)
		SLIX	N 45E	78SE	R [illegible]		[illegible] Spl 34. Basalt [illegible] porphory w/ diorite [illegible] + minor scoria. (BRECCIA)
							[illegible] 10-11 Closeup
							[illegible] 21 closeup - note dioritic clasts,
Pt29	Pt30	S51W	051	-9°	[illegible]	7	[illegible] andesite (Basalt)
Pt30	Pt31	S87W	063	+4°	[illegible]	2	[illegible] @ 20' all diorite
							Basalt porphory above breccia ~20'
					plotted [illegible]		Contact along Pt30 - Pt31
		17 May 1978	N60E 6°				[illegible] even numbers
Pt31	Pt33				[illegible]	7	Spl 35 Rhyolite? porous - soaks up ink fast
							Gradational from darker basalt porphory
							[illegible] some weathering
							[illegible] 83 S } prominent joints
							[illegible] 87 S }
							[illegible] 85 E 0 [illegible] 0.1' spacing
							[illegible] 15 MAY 78

Plotted 12 June 81 RCP

11 JUN 81 LDZ

Plots checked 17/31/81

Plots checked 7/31/81

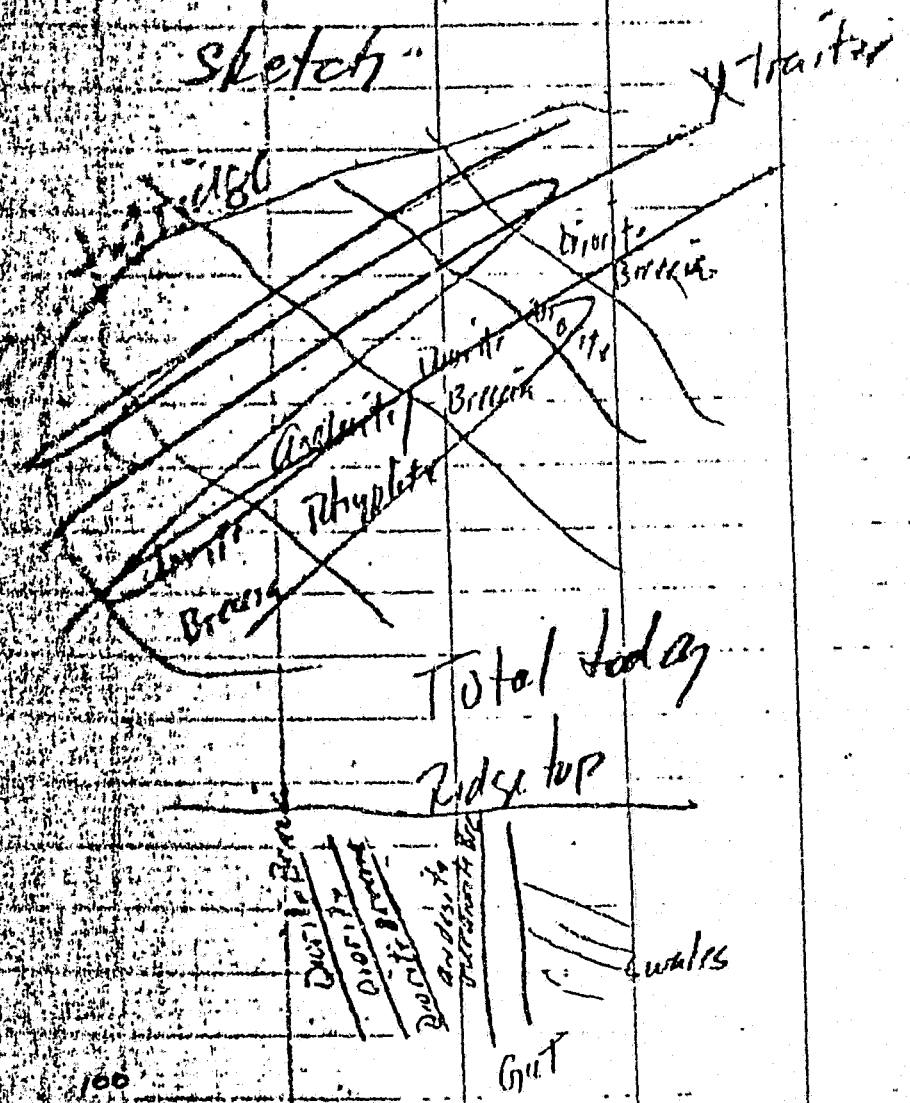
From	To	17 May Foresite	1978 - cont Backsite	Fore			
Pt33	Pt35		N70E				Just past D/S end of
~~Pt35~~	~~Pt37~~						Rhyolite? & into large boulders
Pt35	Pt37		N61E				on steep hill w/ Rhyolite?
							Andesite boulders mixed.
							Hill avg 35° down.
Pt37	Pt39		S88E				Outcrop; Rhyolite.
Pt39	Pt41		N70E				Steep hillside w/ Rhyolite? boulders
Pt41	Pt43		N62E				Crossed small Rhyolite outcrop
							≈30'. End 30' below diorite
							breccia, altered - evidence
							of fault N15W 70E (footwall?)
							Photo 11-1 2 footwall
							11-1 3 closeup of typical
							diorite breccia
							Also note - slope becomes gentler
							D/S of breccia.
							shear N35W 55SE in breccia
Pt43	Pt45		S64E				to N35W 55SE shear in breccia.
Pt45	Pt47		S57E				Going along breccia to top
							pertain by altered diorite -
							Spl 37
Pt47	Pt49		S69E				along diorite face
							diorite & diorite breccia
							[illegible]
							Plotted 15 Nov 78
							Plotted 12 June 81 RCP

✓ 11 JUN 81 LDZ

RESERVOIR 1 REGIONAL GEOL

Plots checked 9/31/81

From	To	Forsite	Backsite	Fore	[illegible]	[illegible]	Notes
							Sketch
Pt49	Pt51		N80E		+[illegible]	100	Very large diorite boulders
Pt51	Pt53		N74E		+[illegible]	100	Same
Pt53	Pt55		N36E		+[illegible]	100	Same
Pt55	Pt57		N41E		+[illegible]	90	Same to edge of vertical gut
P57	Pt59		S30E		-[illegible]	100	up u/s edge of gut / gut S15E



Plotted 15 JUN 81

Plotted 12 June 81 RCP

✓ 11 JUN 81 LDZ

RESERVOIR 1 REGIONAL GEOL

From	to	Forsite	Backsite	For A	Back	Dist	Notes
							Gut edges altered diorite - boulders at top of gut - dark grey aphanitic - almost basalt - flat but could not have gone far - altered diorite - look for dike in gut - can not see rock in place. Spl 39 - boulder just below flat on top of gut - basalt! Some diorite boulders show signs of backing (heat alteration) + highly weathered.
Pt59	Pt61		N65E		-5½°	100'	across top of gut - very large diorite boulders 25' west of Pt61 - small gut trending S40E - rock is a mixture diorite - basalt(?) altered diorite - dike in here? Spl 41a+b
Pt61	Pt63		N27E		+8°	[illegible]	Altered diorite boulders - top of Gut + cliff
Pt63	Pt65		N70E		+7°	70'	Middle of small gut ≈ 40' across bearing S60E photo 11-14 look S60E down gut not very wall + allignment with cliffs on river (S. end of seismic line)

✓ 11 JUN 81 LDZ

Plotted 12 June 81 RCP

Plots checked 1/31/81

RESERVOIR 1 REGIONAL GEOL

From	To	Forsite	Backsite	For ∡	Back ∡	Dist	Notes
							P65 con't.
							Spl 43 - basalt
Pt65	Pt67		N34E		-5°	64'	top of Cliff
Pt67	Pt69		S78E		+8°	100'	" " " open area
							Andesite (?) boulders - or highly altered diorite
Pt69	Pt71		S76E		-3°	100'	Boulders - top of cliff.
Pt71	Pt73		S77E		+3°	100'	Boulders - MW diorite & basalt mixed - very gentle slope above most boulders close to in place.
Pt73	Pt75		N82E		+6°	100'	Boulders mixed
Pt75	Pt77		S87E		+2°	100'	Boulders mixed
Pt77	Pt79		S68E		-3°	110	Mixed Boulders 20' vertically above bridge in slope.
Pt79	Pt81		S75E		-1°	100'	Same
Pt81	Pt83		S65E		-4°	100'	OB
			18 May 1978			46	
Pt83	Pt85	255	N68E	-13°	+13°	76'	edge of slope. 40° slope to river Boulders - my andesite porphory.
Pt85	Pt87	~~310~~ 306	S55E	+5°	-5°	42'	Same down slope ∡ 38° up " " 20°
Pt87	Pt89	277	S83E	-5°	+7°	91'	1st Mid sed float
Pt89	Pt91	289	S75E	-5°	+4°	89	37' to 1st pink arkose/greywacke outcrop.
Pt91	Pt93	203	N22E	-34°	+35°	115	Down sediments
							Plot 15 Jun 78 →
							Plotted 12 June 81 RCP

✓ 11 JUN 81 LDZ

From	to	Forsite	Backsite	For ∠	Back ∠	Dist	Notes
Pt93	Pt95	194	N10E	-41°	+43°	100'	Down sediments - outcrop 23' u/s
Pt95	Pt97	170	N12W	-35°	+36°	100'	" "
Pt97	Pt99	109	N70W	+2°	-2°	100'	Side hill - loose greywacke (pink) under moss.
Pt99	Pt101	104	N73W	+4°	-3°	100'	Same.
Pt101	Pt103	123	N60W	+1°	0°	100'	minor diorite boulders showing up - greywacke getting scarce.
Pt103	Pt105	119	N56W	-1°	+2°	100'	Dioritic boulders start 50' from Pt103. Actual contact cannot be seen
Pt105	Pt107	114	N61W	-1°	+2°	100'	Boulders, basalt or andesite porph. minor pyrite
Pt107	Pt109	100	N72W	-2°	+3°	100'	Same.
Pt109	Pt111	104	N75W	0°	0°	100'	Mixed boulders - some breccia, gabbro?, diorite, etc.
Pt111	Pt113	083	West	+12½°	-10°	100'	Narrow ridge of what looks like contact - inclusions of sediments, etc.
Pt113	Pt115	037	S38W	+25°	-23°	37'	On Point Spl # 45
Pt115	Pt117	060	S65W	-17°	+20°	81'	Sloping gut.
P117	Pt119	080	S78W	-1°	+1°	100'	boulders - andesite porphyry greenish gray.
Pt119	Pt121	111'	N68W	-16°	+17°	80'	Base of cliff

Plotted 15 Nov 18

Plotted 12 June 81 RCP

11 JUN 81 LDZ

Plots checked 7/31/81

From	To	Forsite	Backsite	For ∡	Back ∡	Dist	Notes
							Photo 11-~~4~~ 5 closeup of diorite inclusion in green andesite (many other inclusions - particularly shale)
							Photo 11-~~5~~ 6 Cliff - tourist photo Cliff ≈300 high. - Cannot go across & have been up above - go down from here. Approx 50' up - no inclusions - greenish andesite. Rock must have ridden over & included diorites & sedimentaries.
Pt121	Pt123	119°	N64W	-23°	+24°	64'	base of cliff
Pt123	Pt125	97	N80W	-14°	+15°	95'	" "
Pt125	Pt127	85°	S85W	-6°	+7°	73'	" " "
Pt127	Pt129	124°	N55W	-34°	+36°	100'	" " " Same w/o inclusions
							Photo 11-~~6~~ 7 tourist of Cliff - look vertical.
Pt129	Pt131	120°	N65W	-31°	+31°	83'	base of cliff - occ. diorite inclusions.
Pt131	Pt133	153	N30W	-38°	+38°	64'	base of cliff - same rock
Pt133	Pt135	067	S74W	-7°	+8°	100'	" " Same " some andesite porphory float.
Pt135	Pt137	023	S30W	+~~23~~ 34	-31°	60	up Gnot on u/s edge of cliff

plotted 15 JUN 78

Plotted 12 June 81 RCP

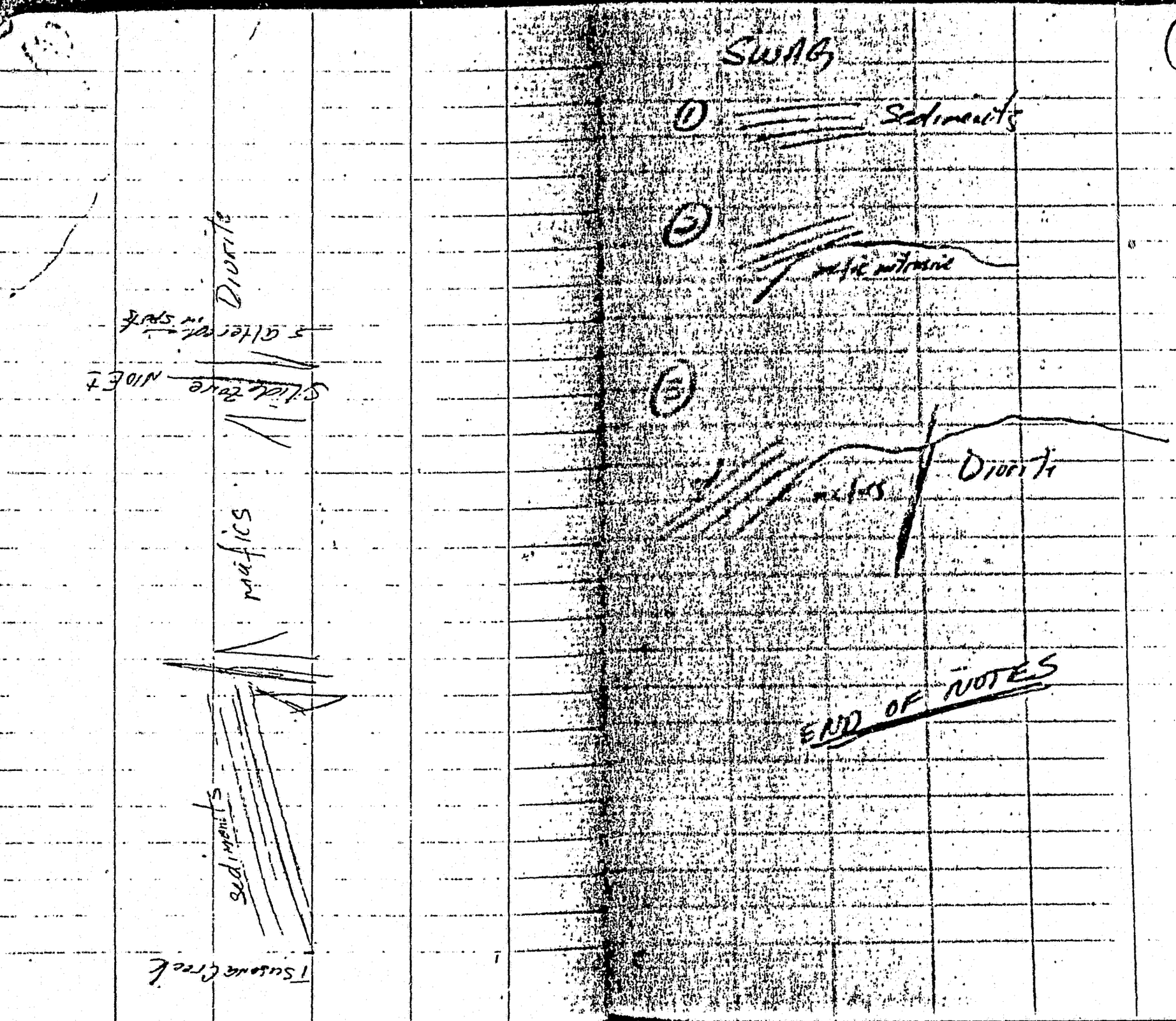
✓11 JUN 81 LDZ

Plots checked 1/31/81

From	To	Forsite	Backsite	For ∠	Back ∠	Dist	Notes
Pt137	Pt137	083	S89W	+18°	-17°	53	Small ridge below cliff & D/S of gut. No bay to river — finish from "U" hole back.
							Thrust fault (~~[illegible]~~ N05W 20W
							photos 11-18 close 11-19 general.
							≈ 100' above river / 1500' D/S of seismic line in basalt porphory.
		Plotted 12 June 81 RCP					
N-F Pt 20 May		19 May	1978				Start stake N-F work ~~u/s~~ D/S
~~Pt139~~ X	Pt141	240	N61E	-12°	+13°	100'	Sidehill
Pt141	Pt143	251	N76E	-7°	+9°	100'	Break in slope up 23° down 40° diorite boulders
Pt143	Pt145	289	S73E	-3°	+5	100'	Break in slope ≈ 50' above.
Pt145	Pt147	302	S50E	+7°	-6°	90'	Base of outcrop. - MW diorite
Pt147	Pt149	280	S85E	-3°	+5°	100'	Base of outcrop ≈ 100' uphill qtz diorite - little plag much pink qtz clear orthoclase - dark grey plag. Massive to blocky -
Pt149	Pt151	259	N80E	-2°	+4°	100'	side hill to next outcrop straight across river from fin cliffs.
11 JUN 81 LDZ	Plotted 12 June 81 RCP						plotted 15 [illegible]

plots checked 7/31/81

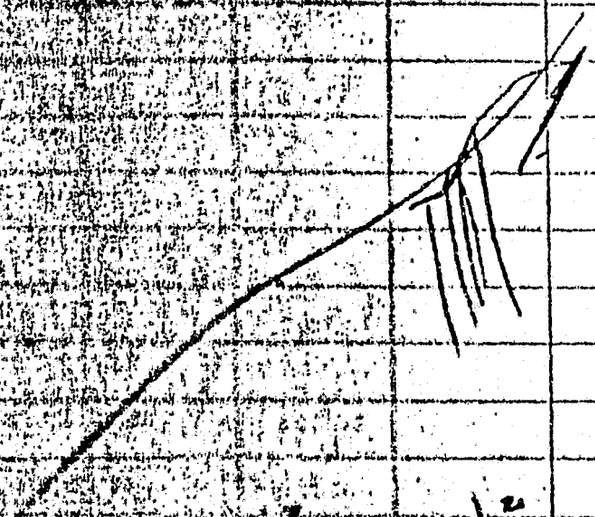
RESERVOIR 1 REGIONAL GEOL



END OF NOTES

RESERVOIR 1
REGIONAL GEOL

(1) Where is "e" shift periods?



$(-i)^2 = (-\sqrt{-1})^2 \quad \sqrt{-1}\,(-1)$

$+(-1) \quad (\sqrt{2})^2 = +2$

$(+i\sqrt{-1})^2 \quad (2^{1/2})^2$

$[-i(+i)]^2 \quad \left[+(-1)^{1/2}\right]^2 = -1$

$-1\sqrt{1} = \sqrt{-1}$

$-\sqrt{1} = \pm 1$

RESERVOIR / REGIONAL GEOL

COE WATANA BOOK 14 (7)
NORTH BANK

Start Pt 281 + Spl ~~46~~ 47
photo Roll 12

From	To	Forsite	Backsite	For ∡	Back ∡	Dist	
"V."	Pt281	—	307	-7°	+7°	91'	Brush + swale
Pt281	Pt282	S43E	320	-9°	+10°	50'	Brush + swale
Pt282	Pt283	S59E	306	-6½°	~~+9~~ +7°	100'	" "
Pt283	Pt284	S50E	311	-8°	+10°	100'	" " & Pad 1
Pt284	Pt285	S57E	304	-11°	+13°	92'	" "
Pt285	Pt286	S70E	290	-13°	+11°	91'	swale bearing S08W
							main swale is NE of us now
							off set?
Pt286	Pt287	N41E	2~~24~~ 19	-2°	+2°	100'	brush + heading to main swale
Pt289	Pt290	N49E	232	0°	0°	100'	outcrop ≈100' left. Strong N80E vert
							joint - Outcrop trends N85W
							rock diced to blocky MW diorite +
							NE edge of swale
Pt290	Pt291	N49E	231	+4°	~~-5~~ -4°	100'	To ~~NW~~ NE edge of swale
Pt291	Pt29~~3~~2	S88E	272	+2°	~~-3°~~ -2°	100'	½ 50' - 60' up hill of edge of swale
Pt292	Pt293	N83E	262	0°	-2°	100'	brush
Pt293	Pt294	N82E	264	+8°	-6°	100'	brush - slight up hill to low bench
Pt294	Pt295	N86E	266	+2½°	-2°	93'	" " on low bench
Pt295	Pt296	N62E	238	+5°	-4°	100'	Steep down hill
Pt296	Pt297	East	273	-3°	+3°	100'	diorite boulders
Pt297	Pt298	N84E	262	+2°	-1°	100'	

15 JUN 81
LDZ

Plotted 16 June 81
RCB

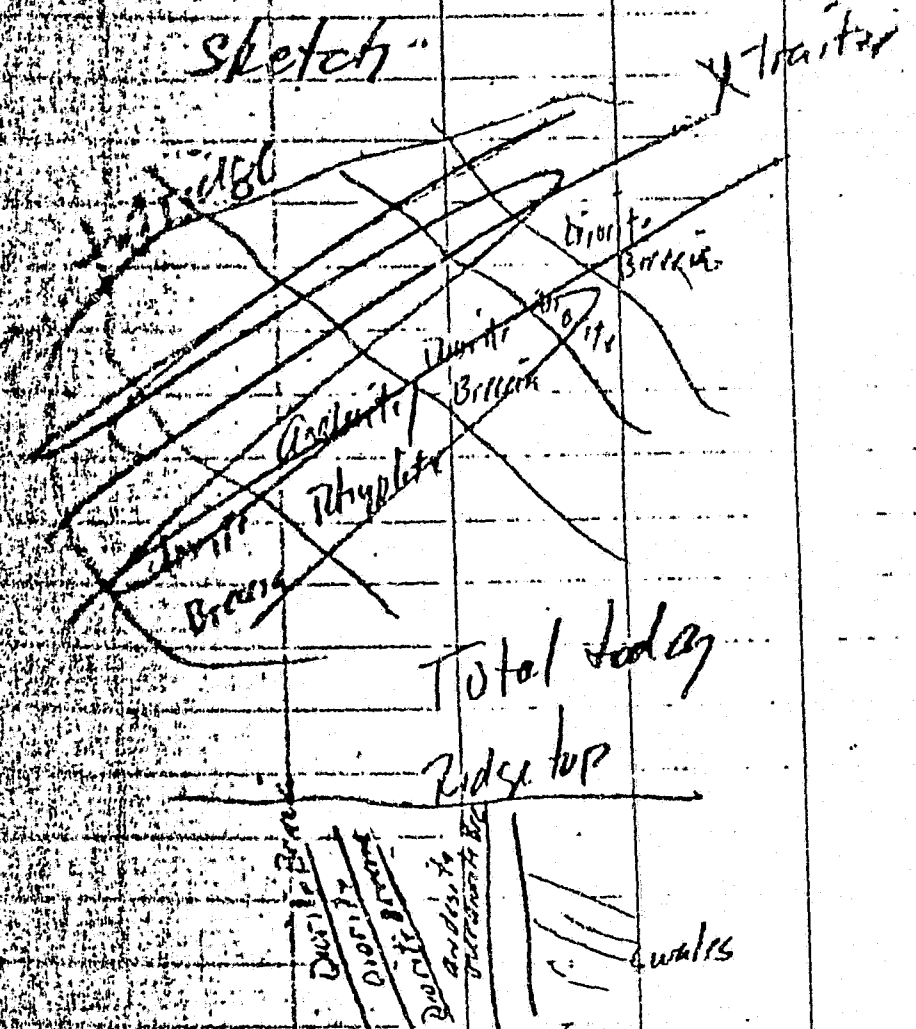
plotted 15 NOV 78

Plotted 1/31/81

RESERVOIR 1
REGIONAL GEOL

Plots checked 9/31/81

From	To	Forsite	Backsite	For Δ	[illegible]	[illegible]	Notes
							Sketch
Pt49	Pt51		N80E	+[illegible]		100	Very large diorite boulders
Pt51	Pt53		N74E	+[illegible]		100	Same
Pt53	Pt55		N36E	+[illegible]		100	Same
Pt55	Pt57		N41E	+[illegible]		90	Same to edge of vertical gut
P57	Pt59		S30E	-[illegible]		100	up u/s edge of gut / gut S15E



Plotted 15 [illegible] 78

Plotted 12 June 81 RCP

✓ 11 JUN 81 LDZ

RESERVOIR 1 REGIONAL GEOL

From	to	Forsite	Backsite	For A	Back	Dist	Notes
							Gut edges altered diorite - boulders at top of gut - dark grey aphanitic - almost basalt - flat but could not have gone far - altered diorite look for dike in gut - can not see rock in place. Spl 39 - boulder just below flat on top of gut - basalt! Some diorite boulders show signs of backing (heat alteration) + highly weathered.
Pt59	Pt61		N65E		-5½°	100'	across top of gut - very large diorite boulders 25' west of Pt61 - small gut trending S40E - rock is a mixture diorite - basalt(?) altered diorite - dike in here? Spl 41a+b
Pt61	Pt63		N27E		+8°	[illegible]	Altered diorite boulders - top of Gut + cliff
Pt63	Pt65		N70E		+7°	70'	Middle of small gut ≈ 40' across bearing S60E photo 11-14 look S60E down gut not very wall + allignment with cliffs on river (S. end of seismic line)
	✓ 11 JUN 81 LDZ						

Plotted 12 June 81 RCP

Plots checked 1/31/81

RESERVOIR 1 REGIONAL GEOL

From	To	Forsite	Bandsite	For ∡	Band ∡	Dist	Notes
							P65 cont.
							Spl 43 - basalt
Pt65	Pt67		N34E		-5°	64'	top of Cliff
Pt67	Pt69		S78E		+8°	100'	" " " open area
							Andesite (?) boulders - or highly altered diorite
Pt69	Pt71		S76E		-3°	100'	Boulders - top of cliff.
Pt71	Pt73		S77E		+3°	100'	Boulders - MW diorite & basalt mixed - very gentle slope above most boulders close to in place.
Pt73	Pt75		N82E		+6°	100'	Boulders mixed
Pt75	Pt77		S87E		+2°	100'	Boulders mixed
Pt77	Pt79		S68E		-3°	110	Mixed Boulders 20' vertically above bredein slope.
Pt79	Pt81		S75E		-1°	100'	Same
Pt81	Pt83		S65E		-4°	100'	OB
			18 May 1978			~~46~~	
Pt83	Pt85	255	N68E	-13°	+13°	76'	edge of slope. 40° slope to river Boulders - my andesite porphory.
Pt85	Pt87	~~310~~ 306	S55E	+5°	-5°	42'	Same down slope ∡ 38° up " " 20°
Pt87	Pt89	277	S83E	-5°	+7°	81'	1st Mid sed float
Pt89	Pt91	289	S75E	-5°	+4°	89	37' to 1st pink arkose/greywacke outcrop.
Pt91	Pt93	203	N22E	-34°	+35°	110'	Down sediments
							Plotted 15 Oct 78
							Plotted 12 June 81 RCP

✓ 11 JUN 81 LDZ

From	To	Forsite	Backsite	For ∡	Back ∡	Dist	Notes
							Photo 11-~~4~~ 5 closeup of diorite inclusion in green andesite (many other inclusions - particularly shale)
							Photo 11-~~5~~ 6 Cliff - tourist photo Cliff ≈300 high. - Cannot go across & have been up above - go down from here. Approx 50' up - no inclusions - greenish andesite. Rock must have ridden over & included diorites & sedimentaries.
Pt121	Pt123	119°	N64W	-23°	+24°	64'	base of cliff
Pt123	Pt125	97	N80W	-14°	+15°	85'	" "
Pt125	Pt127	85°	S85W	-6°	+7°	73'	" " "
Pt127	Pt129	124°	N55W	-34°	+36°	100'	" " " Same w/o inclusions
							Photo 11-~~6~~ 7 tourist of Cliff - look vertical.
Pt129	Pt131	120°	N65W	-31°	+31°	83'	base of cliff - occ. diorite inclusions.
Pt131	Pt133	153	N30W	-38°	+38°	44'	base of cliff. same rock
Pt133	Pt135	067	S74W	-7°	+8°	100'	" " Same " some andesite porphory float.
Pt135	Pt137	023	S30W	+~~23~~ 34	-31°	60	up Gnot on u/s edge of cliff

plotted 15 [illegible] 78

Plotted 12 June 81 RCP

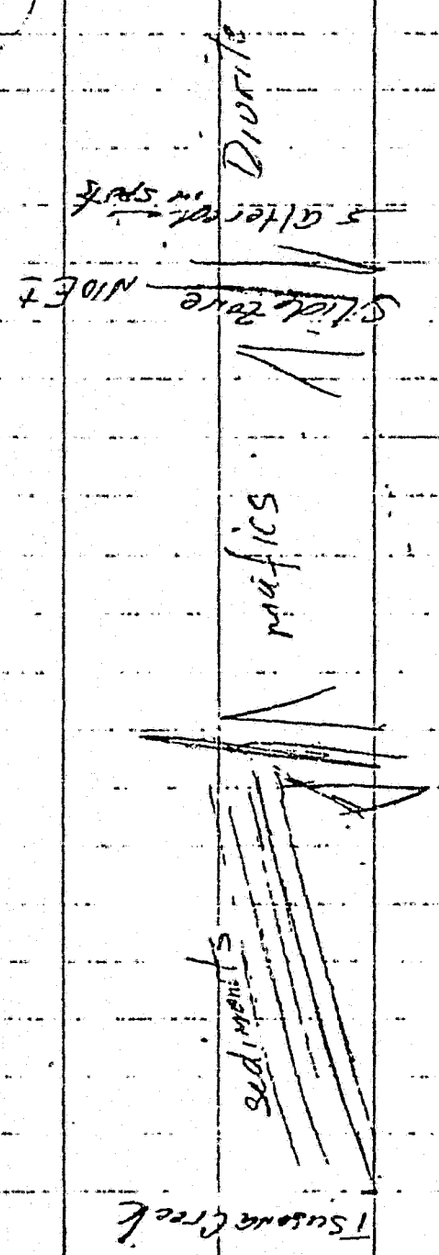
√11 JUN 81 LDZ

Plots checked 1/31/81

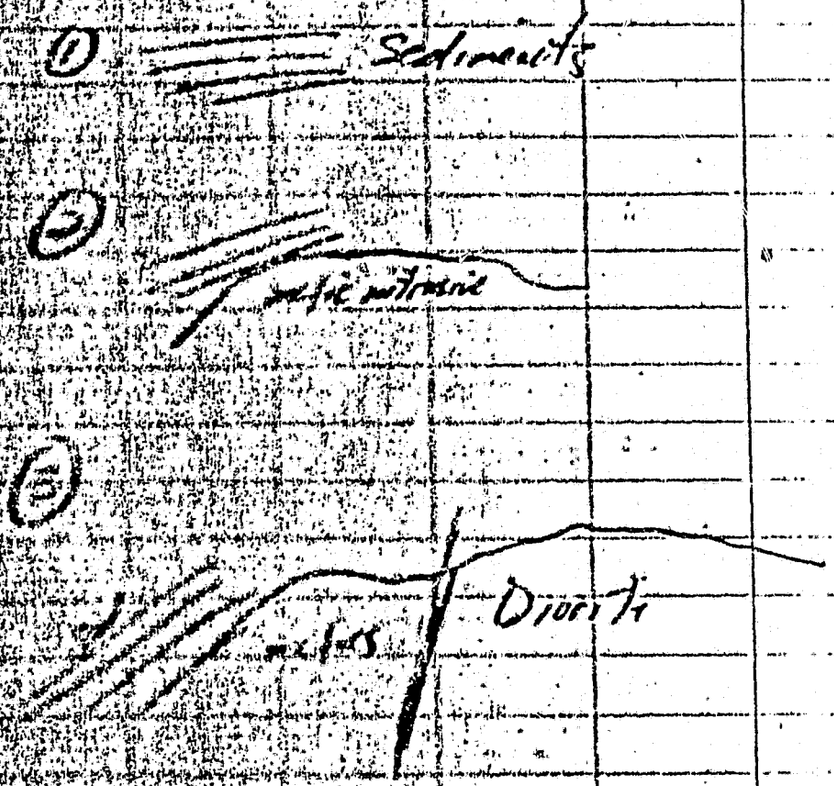
From	To	Forsite	Backsite	For ∠	Back ∠	Dist	Notes
Pt137	Pt137	083	S89W	+18°	-17°	53	Small ridge below cliff + D/S of gut. no bay to river — finish from "U" hole back.
	plotted 15 Nov 79						Thrust fault (~~[illegible]~~ N05W 20W photos 11-~~[illegible]~~ 8 close 11-19 general. ≈ 100' above river / 1500' D/S of seismic line in basalt porphory.
	Plotted 12 June 81 RCP						
N-F Pt 20 May		19 May	1978				Start stake N-F work ~~u/s~~ D/S
~~Pt139~~ X	Pt141	240	N61E	-12°	+13°	100'	Sidehill
Pt141	Pt143	251	N76E	-7°	+9°	100'	Break in slope up 23° down 40° diorite boulders
Pt143	Pt145	289	S73E	-3°	+5	100'	Break in slope ≈ 50' above.
Pt145	Pt147	302	S50E	+7°	-6°	90'	Base of outcrop. - MW diorite
Pt147	Pt149	280	S85E	-3°	+5°	100'	Base of outcrop ≈ 100' uphill qtz diorite - little plag much pink qtz clear orthoclase - dark grey plag. Massive to blocky -
Pt149	Pt151	259	N80E	-2°	+4°	100'	side hill to next outcrop straight across river from fill cliffs.
11 JUN 81 LDZ	Plotted 12 June 81 RCP						plotted 15 Nov 79

plots checked 17/31/81

RESERVOIR / REGIONAL GEOL



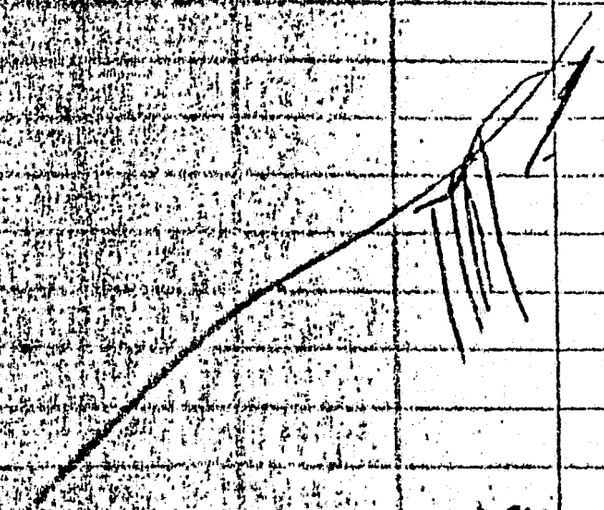
SWAG



END OF NOTES

RESERVOIR 1
REGIONAL GEOL

(1) Where is "e" shift periods?



$(-i)^2 = (-\sqrt{-1})^2$ $\sqrt{-1}\,(-1)$

$+(-1)$ $(\sqrt{2})^2 = +2$

$(-1)(\sqrt{-1})^2$ $(2^{1/2})^2$

$[-1(+i)]^2$ $\left[+(-1)^{1/2}\right]^2 = -1$

$(-1)(-1)$

$-1\sqrt{1} = \sqrt{-1}$

$-\sqrt{1} = \pm 1$

RESERVOIR / REGIONAL GEOL

COE WATTAMA BOOK 14 (7)

NORTH BANK

Start Pt 281 + Sp 77 ~~46~~

photo Roll 12

From	To	Forsite	Backsite	For ∡	Back ∡	Dist	
"V"	Pt 281	—	307	-7°	+7°	91'	Brush + swale
Pt 281	Pt 282	S43E	320	-9°	+10°	50'	Brush + swale
Pt 282	Pt 283	S59E	306	-6½°	~~+9~~ +7°	100'	" "
Pt 283	Pt 284	S50E	311	-8°	+10°	100'	" " ∡ Pad 1
Pt 284	Pt 285	S57E	304	-11°	+13°	92'	" "
Pt 285	Pt 286	S70E	290	-13°	+11°	91'	swale bearing S06W
							main swale is NE of us N70
							off set?
Pt 286	Pt 287	N41E	2~~34~~ 19	-2°	+2°	100'	brush + heading to main swale
Pt 289	Pt 290	N49E	232	0°	0°	100'	outcrop 200' left. Strong N60E vert
							joint. Outcrop trends N85W
							rock sliced to blocky MW diorite.
							NE edge of swale
Pt 290	Pt 291	N49E	231	+4°	~~-2~~ -4°	100'	To ~~NW~~ NE edge of swale
Pt 291	Pt 292	S88E	272	+2°	~~-3°~~ -2°	100'	50' - 60' up hill of edge of swale
Pt 292	Pt 293	N83E	262	0°	-2°	100'	brush
Pt 293	Pt 294	N82E	264	+8°	-6°	100'	brush - slight up hill to low bench
Pt 294	Pt 295	N86E	206	+2½°	-2°	93'	" " on low bench
Pt 295	Pt 296	N62E	238	+5°	-4°	100'	Step down hill
Pt 296	Pt 297	East	273	-3°	+3°	100'	diorite knolls
Pt 297	Pt 298	N84E	262	+2°	-1°	100'	

15 JUN 81 LDZ

Plotted 16 June 81 RCR

plotted 15 NOV 78

Plots attached 15 JUN 81

RESERVOIR 1
RESERVOIR 1 0202

From	to	Forsite	Backsite	For ∠	Back ∠	Dist	Notes
Pt298	Pt299	N31E	215	+14°	-11°	100'	Alders & grass w/birch (well drained
Pt299	Pt300	N19E	198	+13°	-12°	100'	to clearing w/brush &
							faint swale. S70E bearing.
Pt300	Pt301	N57E	232	+8°	-7°	100'	∠ up open slope - birch & grass
							well drained. ≈ 60' horiz left
							very faint swale (?) N75W
Pt301	Pt302	N55E	233	+4°	-1°	100'	∠ up open slope.
Pt302	Pt303	N33E	210	+7°	-6°	100'	" "
Pt303	Pt304	N42E	217	+5°	-3°	100'	low brush
Pt304	Pt305	N62E	242	0°	+1°	100'	into spruce-drainage problem.
Pt305	Pt306	N67E	240	-1½°	+4°	98'	to start of large swale
Pt306	Pt307	N41E	219	0°	+2°	97'	~~bra~~ shale, wide swale S65E
Pt307	Pt308	N34E	212	+1½°	+1° ?	100'	" "
Pt308	Pt309	N49E	223	+1°	-1°	100'	in swale on NE edge.
Pt309	Pt310	N26E	202	+11°	-9°	93'	up to low ridge
Pt310	Pt311	N47E	226	+3°	-3°	100'	edge of swale
Pt311	Pt312	N56E	236	-5°	+5°	100'	in swale bearing S45E
Pt312	Pt313	N74E	252	0°	+3°	100'	Swale?
Pt313	Pt314	N78E	257	-3½°	+5°	100'	D/S edge of fins.

Note: Slide Block may just be a slide block from left bank - Photo 12-4 5 look S66E from ≈ 150' down fin from Pt 314.

15 JUN 81
LDZ

Plotted 16 June 81
RCP

plotted 15 Nov 78

over →

RESERVOIR 1
REGIONAL GEOL

From	To	Forsite	Backsite	For ∡	Back ∡	Dist.	Notes
							see two rows of deciduous trees that have not leafed out - no such trend continues across slide block. Photo 12-8 looks S80E at ↓ that Glen mentioned
							If slide block had slipped ≈ 150yds, the ↓ would line up with double row of trees. Something to think about.
							Fins show highly diced rock - strong red brown staining - evidence of faulting.
Pt314	Pt315	N52W	124	+7°	-6°	110'	Up D/S side of fins
Pt315	Pt316	N40W	141	+13°	-13°	100'	" " " w/ small creek.
Pt316	Pt317	N45E	224	+7°	-5°	100'	Cross D/S fin Δel between Pts of 20'±
							High biotite almost gneissic qtz diorite boulders in small creek. Mw-Hw diorite on U/S edge of 1st fin.
Pt317	Pt318	N80E	264	+15°	-14°	91'	up to ridge
Pt318	Pt319	S88E	173 ?	+7°	-5°	90'	up ridge
Pt319	Pt320	N29E	211	-10°	+14°	66'	Crossing top of fins
15 JUN 81 LDZ		Plotted 16 June 81 RCP					plotted 14 Nov 78

From	To	Forsite Bade	Backsite	For ∠	Back ∠	Dist	Notes
Pt320	Pt321	N45E	228	−11°	+10°	100'	into swale
Pt321	Pt322	N45E	226	+1°	0°	100'	across top of fins.
Pt322	Pt323	N45E	220	−3°	+1°	100'	" "
Pt323	Pt324	N27E	201	+2°	−2°	100'	" " "
							top of swale S.65 E
Pt324	Pt325	N35E	216	0°	+2°	100'	across fins
Pt325	Pt326	N30E	210	−3°	+3°	100'	"
Pt326	Pt327	N33W	142	+7°	−5°	100'	up O/S side of BIG swale and across
Pt327	Pt328	N80W	101	+19°	−19°	100'	up O/S side of Swale
Pt328	Pt329	N61W	121	+8°	−4°	100'	" "
Pt329	Pt330	N55W	124	+5°	−4.5°	100'	" " " "
Pt330	Pt331	N35W	145	+16°	−12°	100'	up to small ridge
Pt331	Pt332	N19W	204	+7°	−6°	95'	cross top of swale
Pt332	Pt333	N38E	216	+8°	−7°	100'	" " "
Pt333	Pt334	N70E	249	+4°	−2°	100'	" " "
Pt334	Pt335	N31E	209	0°	+1°	100'	To edge of large valley w/hill visible on other side
Pt335	Pt336	N41E	221	−6°	+7°	100'	down into valley
Pt336	Pt337	N41E	224	−6°	+2°	100'	" " bears S65E
Pt337	Pt338	N42E	221	−4°	+5°	100'	" "
Pt338	Pt339	N40E	217	0°	+3°	100'	in valley
Pt339	Pt340	N30E	206	+2°	−3°	100'	"
Pt340	Pt341	N41E	222	+3°	−1°	100'	"
15 JUN 81 LDZ		Plotted	16 June 81 RCP				Plotted 14 NOV 78

From	To	Forsite	Backsite	For ∡	Back ∡	Dist	Notes
Pt151	Pt153	west	N86E	-5°	+6°	90'	diorite boulders - just above cliff.
Pt153	Pt155	271	N89E	-4	+5°	100'	Top of cliff
Pt155	Pt157	254	N72E	+6°	-4°	72'	" " "
							photos 11-~~8~~ 10, ~~9~~ 11 & ~~10~~ 12
							look at fins on left bank across.
							from seismic line pan u/s → D/s
							~~11-9~~ 11 look S10W from Pt157.
							Note follow the deciduous
							trees N10E± & N60W±
Pt157	Pt159	278	S N87E	-5°	+7°	52'	top of steep gut bearing S30E
							≈25 across.
Pt159	Pt161	278	S81E	-6°	+7°	100'	diorite outcrops above.
Pt161	Pt163	263	N81E	-4°	+6°	100'	just below (15' vert) outcrop
							diorite w/slight greenish tinge
Pt163	Pt165	271	N86E	+4°	-3°	80'	Top of cliff 400'± above river
							Avg Down slope 48°; 39° to river.
Pt165	Pt167	293	S71E	-4°	+6°	77'	1st andesite porphyry - boulder -
							float - step up hill - check
							upper traverse. Diorite 15'
							vertically above. Finer grained
							but still medium grained
					19'		Greenish tinge to ground mass
Pt167	Pt169	248	N63E	-13°	+19°	100'	Small shear N38W60NE
							HW diorite w/ gouge
							≈ 4' visible
11 JUN 81 LDZ	Plotted 12 June 81 RCP						plotted 15 Nov 78

From	to	Forsite	Backsite	Fore	Back	Notes
Pt169	Pt171	West	East	-1°	+3°	32 altered zone, breccia u/s, soft area, your general grunge photo 11-#13 highly altered - sample taken but not numbered
Pt171	Pt173	265	N72E	-1°	+2°	66 edge of cliff - can see slide area
Pt173	Pt175	294 ?	S77E	0°	+2°	100 metal on rock? No! - rechecked white backsite ok
Pt175	Pt177	N65W	S67E	+18°	-15°	45 ? edge of slide 43

rechecked + good use

[illegible] area w/ biotite 200' D/S of Pt177

350' D/S very rapid change to basaltic looking rock - high [illegible] blende & then (in 10'±) andesite porphyry. Cannot see contact between diorite & mafics

plotted 15 NOV 78

11 JUN 81 LDZ

Plotted 12 June 81 RCP

(15)

From	To	Forsite	Backsite	For ∡	Bank	Dist	Notes:
Pt341	Pt342	N18E	196	+4°	[illegible]	95	Crossing boulder till filled valley
Pt342	Pt343	N05W	174	+5°	-4°	100	" " " " "
Pt343	Pt344	N13W	169	+6°	-4°	100'	" " " " "
Pt344	Pt345	N10E	196	+6°	-7°	70'	marker bush

Till olive fine sand silt + boulders.

Grains angular - some frosted. Packs good - crumbles easy.

by eyeball we are at top pool. ≈ el 2000± (check this)

to the NW 600'± there is a scale that is 10'-15' above this position. check this.

REDUCED

May 27 1978 use odd

May 25 1978 set 5 pic pts W, S, K, M + N

May 26 1978 set 2 pic pts Deadmen mouth + Left bank ridge. Located RR + River ∡ hole "d"

Fog Creek trip - purple rock basalt - dark gray - purple is baking between flows. Hint of columns but not very strong.

Scoria zones.

photo 12-67 flows

" 12-78 "

plotted 14 Nov 78

15 JUN 81 LDZ

pillows ?

Plotted 16 June 81 RCP

Right Bank Geology Traverse

COE Watana Book 18 2

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
	7 JUNE 1978			A. MACLEOD			, W. CAMPBELL.
799	801	176	352	-16	+15	53	DIORITE OUT CROP AT RIVER'S EDGE (INTERSECTION OF SHORT SHOT CREEK AND SUSITNA RIVER) 2 MAIN SETS OF JOINTS 1 SET BRG N 78 W 54 S 1 SET BRG N 16 W 66 N
	803	260	83	0	0	100	ALONG ROCK OUT CROP @ RIVERS EDGE (DIORITE) ANOTHER JOINT SYSTEM HAS BECOME APPARENT BRG - N35E 78 SE
	805	279	96	0	0	100	CONTACT BETWEEN DIORITE AND META SEDIMENTS (PHYLLITE?) CONTACT HAS AN ORIENTATION OF APPROX N45°W 87°N (SAME AS BEDDING OF PHYLLITE)
	807	262	86	-1	0	100	
	809	216	66	0	-1	100	SMALL OUT CROP OF META SANDSTONE ALSO MORE PHYLLITE OUT CROPS MOST LIKELY AT OR NEAR D/S CONTACT W/ DIORITE plotted 12 Nov 78.
						16 JUN 81 LDZ	Plotted 18 June 81 RCP

Checked 7/30/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
809	811	227	47	-1	+1	66	MASSIVE DIORITE OUT CROP. SEVERAL JOINT SYSTEMS PRESENT
							1 BRG N45 W 55 SW
							N 57 E 48 S
							N 76 E 85 S
							NOTE: THESE JOINTS DON'T MATCH THE JOINTS OF THE DIORITE OUTCROPS U/S OF THE META SEDIMENTS
799	813	115	289	-6	+8	131	OUTCROP OF METASANDSTONE (GREY WACKE?) ALSO @ CONTACT W/ DIORITE. DIORITE HAS LARGE INCLUSIONS OF PHYLLITE MIXED IN
							NO OUTCROP OF PHYLLITE SEEN
	815	105	291	0	0	74	GUT BRG N 10 E
							LOTS OF ANGULAR CHUNKS OF PHYLLITE
	817	101	287	+1	-1	100	ANGULAR PIECES OF DIORITE AND PHYLLITE
	819	163	283	-1	+1	100	END OF OUT CROPS ALONG RIVER. START OF WHAT APPEARS TO BE A FLOOD PLAIN
					16 JUN 81 LDZ		

Plotted 18 June 81 RCP

Plotted 7/30/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
819	821	11.5	296	0	0	100	FOLLOWING EDGE OF RIVER. GRAVELS AND BLDRS A FEW ANGULAR BLDRS OF WHAT SEEMS TO BE A CROSS BETWEEN BASALT AND PHYLLITE. VERY HARD, AND BREAKS ACROSS BANDING VERY FINE GRAINED
	823	120	295	0	0	100	
	825	122	306	0	0	100	STILL ALONG RIVER'S EDGE
	827	120	313	0	0	100	GRAVELS, COBBLES + BLDRS
	829	123	308	-1	0	100	
	831	115	301	0	0	100	
	833	109	289	0	0	100	
	835	105	281	0	0	100	
	837	105	283	0	0	100	
	839	98	278	0	0	100	
	841	112	294	0	0	100	
	843	105	281	0	0	100	
	845	103	283	0	0	100	
	847	103	287	0	0	100	
	849	97	274	0	0	100	
	851	95	281	0	0	100	
	853	102	284	0	0	100	

Plotted 18 June 81 RCP

16 JUN 81 LDZ

Checked 1/30/81

FROM	TO	FORSITE	BKSITE	FOR Δ	BK Δ	DIST	NOTES
853	855	99	282	0	0	100	
	857	100	280	0	0	100	
	859	90	277	0	0	100	
	861	87	264		0	100	

Plotted [illegible]

16 JUN 81 LDZ

Plotted 18 June 81 RCP

Checked 7/30/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
8 JUNE WC	7 JUNE	1978		A. MACLEOD,		W. CAMPBELL		
	STARTING	POINT:		BENCH	MARK -	WA-5	ELEV	2260
BM-WA-5	863	208	26	-2	+3	100		
	865	207	24	-5	+7	100	2125	GENTLE DOWN SLOPE
	867	224	40	-11	+11	100	2110	W/LOTS OF WET BRUSH
	869	212	31	-7	+8	100	2100	
	871	217	34	-8	+8	100	2095	
	873	214	35	-8	+8	100	2090	
	875	225	38	-6	+6	100	2080	BROAD SCALE BRG 125°
	877	192	13	-3	+3	100	2080	DIORITE BLDRS (FLOAT
	879	162	342	-9	+9	95	2055	SMALL GUT GOING INTO SCALE BRG 65°
	881	155	338	+1	0	100	2055	
	883	163	343	-5	+6	100	2050	DIORITE BLDRS
	885	161	342	-5	+6	100	2045	@ BREAK IN SLOPE
	887	163	341	-18	+17	89	2020	OUT CROP OF "BASALT PORPHYRY" BREAK IN SLOPE FROM 6° TO 35°

Checked 7/31/81

Plotted 10 June 81 - RCP

RCP 6/8/

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
887	889	63	251	-4	+4	100	2015	
	891	122	303	-13	+14	75	2000	SHALE BRG 232°
	893	119	305	-11	+11	87	1985	ANOTHER SHALE BRG 232°
	895	128	310	-6	+6	100	1975	AND YET ANOTHER SHALE BRG EAST-WEST (FOLDED VA!)
	897	147	331	-5	+5	100	1965	ANIMAL TRAIL BRG EAST-WEST
	899	87	269	+3	-1	100	1965	
	901	117	297	+1	0	100	1965	
	903	111	293	+1	+0	100	1970	
*	905	123	299	-3	+4	76	1965	OUTCROP OF SHALE, GREYWACKE W/ BASALT (?) DIKE INBETWEEN
	907	263	83	-8	+9	100	1940	DAMN ALTIMETER NOT WORKING RIGHT
	909	265	85	-8	+9	100	1875	
	911	278	90	-3	+2	129	1875	CONTACT! BETWEEN SEDIMENTS AND "BASALT ANDESITE PORPAYRY" (APPROX) MARKED WITH RIBBON X. WILL TRACE CONTACT @ A LATER TIME

Checked 7/31/87

Plotted 10 June 81 RCP

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
905	913	91	279	+5	-4	100	1945	
	915	112	291	-1	+2	100	1945	
	9 JUNE		1978		A. MACLEOD, W. CAMPBELL			
	STARTING ELEV FOR 9 JUNE =					2010		
915	917	130	312	-6	+7	100	2005	
	918	126	304	-5	+8	100	2000	APPROX CONTACT BETWEEN META SEDIMENTS AND BASALT-ANDESITE PORPHYRY
								BIRCH TREE MARKED W/ THREE RED RIBBONS
	919	190	16	-34	+35	45	1975	OVER THE EDGE TO FOLLOW THE ELUSIVE CONTACT
	921	191	13	-40	+40	100	1900	DOWN SLOPE - TALUS LIKE MATERIAL COVERED W/ THIN SOIL
	923	213	30	-37	+37	100	1855	
	925	215	29	-35	+35	100	1800	
	927	215	33	-38	+39	100	1740	
	929	207	22	-37	+37	100	1675	
	931	210	28	-37	+37	100	1605	

Plotted 10 June 81 RCP

Checked 7/31/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
931	933	200	17	-36	+37	82	1545	STILL ALONG APPROX CONTACT LINE
	935	234	53	-30	+32	84	1500	
	937	185	9	-33	+34	100	1450	
	939	187	4	-27	+28	63	1420	EDGE OF THE BIG SU
	941	281	95	0	+1	100	1420	FOLLOWED BIG SU
	943	288	104	0	0	151	1420	D/S.
	945	301	116	0	0	100	1420	LEFT RIVER'S EDGE IN PURSUIT OF THE ELUSIVE CONTACT
	947	330	147	+16	-14	100	1445	
	949	345	159	+26	-25	88	1475	OUT CROP OF CONGLOMERATE SAMPLE TAKEN VERY INCOMPENTENT, ROCK - GRAVELS W/ COARSE SAND MATRIX NO FINES SEEN
	951	312	132	+42	-42	40	1505	SLIDE OF SANDSTONE
	953	345	158	+39	-39	100	1580	CROSSING OVER SEDS
	955	303	119	+17	-17	100	1605	
	957	295	110	+15	-16	100	1650	SAND STONE
	959	286	108	+17	-16	100	1680	SLATE

plotted [illegible]
Plotted 10 June 81 RCP

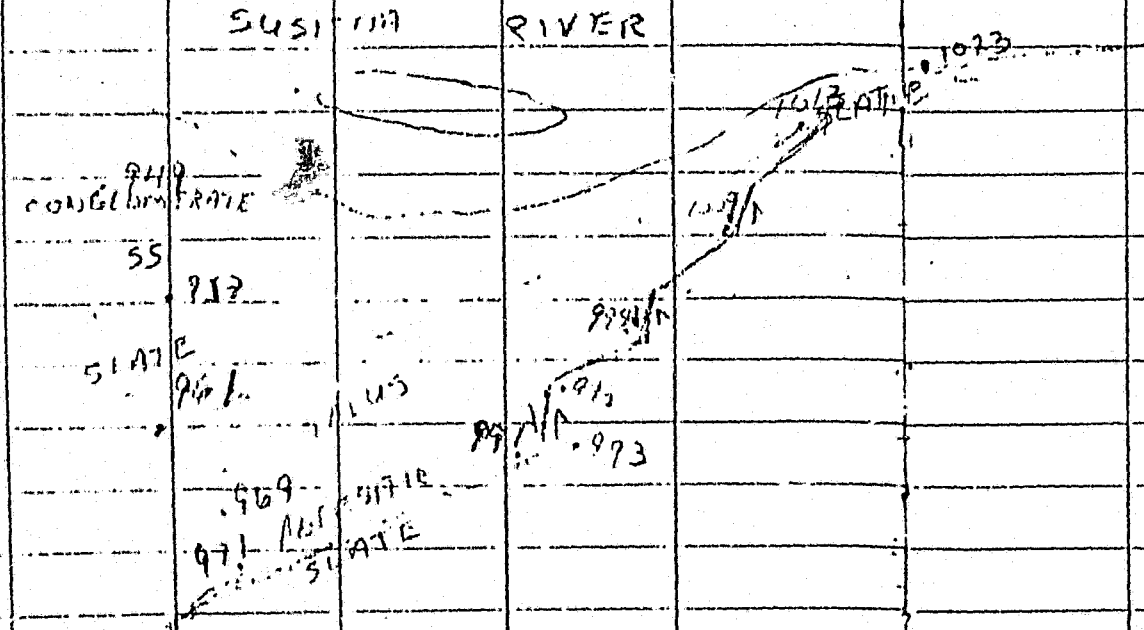
Checked 7/31/81

FROM	TO	FORSITE	BK SITE	FOR ∡	BK ∡	DIST	ALT	NOTES
959	961	340	158	+35	-33	100	1715	LARGE OUTCROP OF WEATHERED SHALE, FORMING NEAR VERTICAL CLIFFS
	963	277	103	+12	-10	73	1740	
	965	268	84	+1	-1	63	1740	D/S. EXTENT OF SHALE
	967	58	242	+25	-23	44	1775	CLIFFS
	969	340	156	+33	-31	100	1815	LARGE ANGULAR BLOCKS OF "BASALT - ANDESITE PORPHYRY"
	971	327	141	+31	-31	85	1855	CLIFFS OF PORPHYRY NEAR VERTICAL, CONTACT PROBABLY RUNS FROM PT 911 THRU PT 969
	973	240	56	-17	+17	89	1845	FOLLOWING ALONG
	975	261	77	-8	+9	52	1840	BASE OF CLIFF
	977	230	47	-24	+25	100	1790	MIXED PORPHYRY AND SLATE IN TALUS
	979	248	64	-9	+9	100	1775	
	981	248	64	+1	-1	100	1775	GUT BRG 10° ROCK IS LESS PORPHYRITIC AND MORE BASALTIC. SLATE SEEN AT TOP OF CLIFF

Plotted 10 June 81 RCP

Checked 7/31/81

TROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
981	983	236	47	-20	+19	84	1750	STILL FOLLOWING CLIFF OF BASALTIC MATERIAL W/SEDS ON TOP
	985	228	44	-16	+16	82	1735	
	987	177	357	-44	+43	33	1700	
	989	252	76	-7	+8	58	1700	
	991	272	88	+7	-5	90	1710	
	993	268	83	+2	-1	92	1710	



Checked 7/31/81

Plotted 10 June 81 RCP

FROM	TO	FORSITE	BKSITE	FOR ∆	BK ∆	DIST	ALT	NOTES
		10 JUNE 1978			A. MAC LEOD, W. CAMPBELL			
993	995	144	328	-23	+21	63	1700	OFF SET IN CLIFFS (LEFT LATERAL STRIKE SLIP?) DIRECTION OF MOVEMENT - NORTH-SOUTH BETWEEN PT 991 AND 993. ONE STARTS AT THE BASE OF THE CLIFFS AND ENDS UP ON TOP OF THEM WHILE MAINTAINING THE SAME ELEVATION
	997	179	355	-40	+41	42	1680	
	999	269	87	+3	-2	58	1680	ANOTHER OFFSET IN CLIFF BRG S30W
	1001	211	30	-25	+25	67	1655	CLIFFS BECOMING LESS DISTINCT MOSS COVER THICKENING, CLIFFS NOT AS HIGH. SLOPE OF FACE STILL 60° (APPROX)
	1003	203	16	-36	+39	57	1620	AT BASE OF CLIFF AGAIN

Plotted 10 June 81

Checked 7/31/81

RC 6/

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
1003	1005	261	82	-1	+2	100	1620	GUT BRG 310°
	1007	242	55	-10	+10	86	1600	
	1009	235	56	-13	+14	40	1590	CLIFFS OFF SETTING AGAIN APPROX S35W
	1011	224	39	-24	+25	95	1550	
	1013	219	34	-14	+15	88	1515	CONTACT BETWEEN ANDESITE AND SLATE CONTACT STRIKE IS N-S DIPPING 12° TO THE WEST
	1015	227	43	-6	+7	95	1500	
	1017	247	65	+7	-6	100	1515	HORIZONTAL EAST WEST LINEATION FOUND ON CLIFF FACE (SLICKS?) FACE DIPPING 70° S
	1019	207	25	-8	+9	100	1495	STILL ALONG ANDESITIC ROCK OUTCROPS
	1021	229	49	-8	+8	100	1490	
	1023	183	358	-13	+11	100	1460	TOP OF SUSITNA RIVER BANK 80° SLOPE TO RIVER NEAR G-78

Checked 7/31/81

plotted 16 Aug 81

Plotted 10 June 81 RCP

FROM	TO	FORSITE	BKSITE	FOR ∠	BK ∠	DIST	ALT	NOTES
	11 JUNE 1978		A. MAC LEOD		, W. CAMPBELL			
	STARTING @ PICTURE POINT ON THE HIGH POINT WHERE THE PORTA-POTTY IS LOCATED							
H.P.	1025	133	312	-7	+8	93	2385	START OF TREND
H.P.								WILL TRY TO FOLLOW TO RIVER
	1027	139	315	-14	+14	100	2370	
	1029	139	318	-9	+8	100	2355	
	1031	138	320	-11	+11	100	2345	
	1033	138	322	-8	+9	100	2340	ANOTHER PARALLEL
	1035	131	312	-8	+9	100	2325	TREND MERGES W/
								THIS ONE @ 1033
	1037	132	311	-6	+8	100		
	1039	122	307	-3	+4	100	2310	
	1041	135	312	-3	+4	100	2305	
	1043	133	316	-12	+12	100	2290	
	1045	133	318	-7	+6	100	2275	
	1047	137	315	-10	+10	100	2260	TREND APPEARS TO
								BE PINCHING OUT
								OR PERHAPS BENDING
								AROUND THE HILL
	1049	124	307	-4	+4	100	2255	
	1051	139	324	-10	+10	100	2245	
								Plotted 14 Nov 18
								Plotted 10 June 81 RCP

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
1051	1053	148	329	-9	+9	100	2220	
	1055	147	329	-11	+11	100	2200	OLD HELI-PAD FROM SEISMIC LINE DAYS
	1057	150	337	-13	+14	100	2180	
	1059	151	338	-19	+20	100	2150	
	1061	126	309	-10	+10	100	2130	
	1063	126	307	-11	+14	100	2100	
	1065	129	311	-9	+10	57	2095	HOLE "V". TREND IS GETTING HARDER TO DEFINE
	1067	109	297	-5	+5	100	2080	
	1069	102	283	-4	+4	100	2075	
	1071	105	284	-8	+8	90	2045	JUST UP HILL OF PAD 1
	1073	106	293	-17	+18	100	2025	DIORITIC CLIFFS PARALLELING TREND
	1075	105	292	-14	+16	100	2015	
	1077	104	287	-7	+8	100		
	1079	113	303	-8	+9	100		ALTIMETER NOW READING 2100 FT. WILL NOT USE AGAIN ON THIS TRAVERSE
	1081	120	303	-9	+8	100		BREAK IN SLOPE
	1083	120	307	-17	+17	100		
	1085	109	287	-15	+17	100		BUT BRG 150°

plotted 14/10/79 [illegible]
Plotted 10 June 81 RCP

Plots Checked 7/31/81 [illegible]

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES

IT IS NO LONGER POSSIBLE TO DISTINQUISH THE TREND
PT 1085 IS AT THE BREAK IN SLOPE (FROM 25° TO 45°)
THERE IS SOME SORT OF LINEATION ALONG THE SLOPE, BUT
IS MOST LIKELY DUE TO SLUMPING. THERE IS NO SIGN OF THE
TREND ABOVE OR BELOW PT 1085.
FROM THE AIR IT CAN BE SEEN THAT THE TREND DOES
END @ THE GUT.

Plotted May 78

Plots checked 4/31/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
	12 JUNE	1978	A. MAC LEOD		W. CAMPBELL			
STARTING POINT - NAIL IN LOG W/ YELLOW RIBBON TIED ON AT THE CONFLUENCE OF TSUENA CREEK AND THE SUSITNA RIVER								
STARTING ELEVATION: 1410'								
NAIL	1087	34	213	0	0	100	1410	FLOOD PLAIN OF TSUENA CREEK
	1089	29	208	+1	0	100		
	1091	31	212	0	0	100		
	1093	32	213	0	0	100		
	1095	39	222	+1	-1	100		
	1097	30	209	0	-1	100	1420	
	1099	41	221	-2	+2	100		CREEK BANK DROPS DOWN TO EDGE OF CREEK
	1101	59	244	+1	-1	100		*
	1103	52	238	0	0	90	1440	*
	1105	78	259	+1	0	100		
	1107	78	258	+1	-1	100		
	1109	84	271	+1	-1	122	1445	* U/S EXTENT OF FLOOD PLAIN ON NORTH SIDE OF CREEK. SLOPE CHANGES FROM 0 ALONG CREEK TO 30°

* COMPASSES RECHECKED TWICE BEARINGS REMAINED THE SAME

Plotted 14 Nov 78

16 JUN 81 LDZ Plotted 18 June 81 RCP

Checked 7/30/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
1109	1111	63	242	+13	-12	100		ALTIMETER SCREWED UP AGAIN (WE WENT DOWN 60' ON A 13° UP SLOPE!) 30° SLOPE DOWN TO CREEK EDGE. OUT CROP OF INTRUSIVE & META-SEDIMENTS AT CREEK. THREE SAMPLES TAKEN
	1113	55	235	+5	-4	42		
	1115	82	257	-4	+5	85		MIDIST OF A GUT BRG 132° FROM CREEK APPEARS TO BE A BAKE ZONE DOWN BY CREEK 4" TO 6" THICK. BANDED MATERIAL BELOW ZONE GLASSY TO ANDESITIC MATERIAL ABOVE BAKE ZONE ROCK BELOW ZONE HAS A BLOCKY FRACTURING WHEN HIT W/ HAMMER. ROCK ABOVE HAS IRREGULAR FRACTURING WHEN HIT. ALL ROCK VERY HARD EXCEPT IN BAKE ZONE

Plotted [illegible] 16 JUN 81 LDZ

Plotted 18 June 81 RCP

TFD 6/23/81

Checked 7/30/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	ALT	NOTES
1115	1117	40	225	-2	+3	60		
	1119	355	179	-29	130	39		BACK DOWN @ CREEK EDGE. AT BOTTOM OF 30° SLOPE
	1121	30	204	+1	-1	100		
	1123	25	204	0	0	100		SLOPE IS BREAKING BACK FROM STREAM EDGE
	1125	23	202	+1	-1	100		
	1127	34	211	0	0	100		
	1129	19	200	+1	0	100		FOLLOWING ALONG STREAM EDGE. ALSO PARALLELING A STREAM TERRACE
	1131	22	202	+1	0	100		
	1133	15	192	0	+1	100		
	1135	14	191	+1	0	100		
	1137	18	197	+1	-1	100		
	1139	25	203	0	0	100		
	1141	36	215	+2	0	100		
	1143	40	222	+2	-2	100		
	1145	32	210	+1	0	100		
	1147	25	203	-1	+1	100		
	1149	39	219	+5	-5	100		UP ON A NATURAL LEVEE AREA CUT BY OLD STREAM BED
	1151	23	200	0	0	100		
	1153	12	196	0	0	100		

checked 7/30/81

plotted 14 NOV 79 16 JUN 81 LDZ

Plotted 18 June 81 RCP

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1153	1155	10	192	-1	+2	100	FOLLOWING ALONG TSUSENA
	1157	22	204	+3	-3	100	CREEK. FLOOD PLAIN CUT
	1159	13	193	+1	-1	100	BY LEVEES AND OLD
	1161	20	200	+1	0	100	CHANNELS. CREEK STARTS
	1163	22	206	0	+1	100	NARROWING DOWN AT
	1165	34	219	+5	-5	100	1149
	1167	33	214	+3	-2	100	
	1169	49	235	0	0	100	
	1171	48	228	0	0	100	
	1173	42	225	0	0	100	
	1175	43	224	0	0	100	
	1177	64	247	+1	0	100	
	1179	59	237	+1	0	100	
	1181	53	238	0	0	100	
	1183	50	233	0	0	100	BIRD'S NEST IN TREE
	1185	47	232	0	0	100	
	1187	50	232	+2	-1	100	
	1191	48	231	+2	-2	100	
	1193	32	216	+1	0	100	
	1195	51	227	+2	-1	100	
	1197	67	248	+1	-1	100	
	1199	68	247	-1	+3	100	
	1201	75	253	+2	-1	100	
	1203	105	290	-2	+2	100	

Plotted 14 Nov 78

Plotted 18 June 81

16 JUN 81
LDZ
RCP

checked 7/30/81

FROM	TO	FORSITE	BKSITE	FOR ∆	BK ∆	DIST	NOTES
1249	1251	336	154	+1	0	100	
	1253	62	244	+1	-1	100	
	1255	67	250	0	0	100	
	1257	86	269	-1	+2	89	

checked 7/30/81

Closed

Plotted 13 JUN 78 — 16 JUN 81 LDZ

Plotted 18 June 81 RCP

FROM	TO	FORSITE	BKSITE	FORΔ	BKΔ	DIST	NOTES
STARTING POINT: 1400 LOCATED ON TSUSENA CREEK APPROX 8400' FROM INTERSECTION w/ SUSITNA RIVER. AN ENDING POINT FROM A PREVIOUS TRAVERSE							
1400	1401	113	293	+5	-5	100	FOLLOWING TSUSENA
	1402	87	264	-2	+3	100	CREEK. NO FLOOD PLAIN
	1403	86	263	0	0	100	
	1404	83	256	+2	-2	100 *	
	1405	73	252	+3	-4	100	
	1406	111	287	+9	-9	41	
	1407	34	208	-14	+14	70 *	
	1408	56	232	-1	0	100	
	1409	48	224	0	0	100	
	1410	42	217	+1	0	100	
	1411	37	214	+1	-1	100	
	1412	25	203	+1	-1	100	
	1413	22	198	+1	-1	100	
	1414	88	267	+16	-15	31	
	1415	25	202	0	0	100	
	1416	40	216	+2	-2	90	
	1417	79	258	18	-7	122	BEDROCK! DIORITE w/ META-CONGLOMERATE INCLUSION (2'x3')

Checked 7/28

* BRGS DOUBLE CHECKED

Plotted 11 June 81 RCP

RCP 9 June 81

FROM	TO	FORSITE	BFSITE	FORΔ	BKΔ	DIST	NOTES
1417	1418	13	189	-4	+4	100	
	1419	25	198	-2	+2	100 *	
	1420	29	207	+1	-1	90	
	1421	19	197	+1	0	100	
	1422	51	227	0	0	100	
	1423	60	237	+2	-1	85	
	1424	106	286	0	0	90	
	1425	62	241	-5	+5	66	ROCK OUT CROP AT RIVER "ANDESITE PORPHYRY" VERY HARD
	1426	86	262	0	0	94	SHEAR ZONE BRG 160° ROCK HIGHLY WEATHERED
	1427	130	307	+50	-50	60	WEATHERED DIORITE
	1428	119	300	-3	+4	45	DIORITE AND META CONGLOMERATE (GRAVELS AND COBBLES AND SEVERAL LARGE BOULDERS 2'-3" dia) INTERSECTION OF 2 GUTS. ONE BRG 300° ONE BRG N-S
	1429	41	217	120	-19	29	
	1430	117	297	+26	-25	37	TOP CENTER OF GUT BRG 330°
	1431	9	188	-25	+26	65	OUTCROP OF METACONGLOMERATE

Checked 7/30/81

Plotted 13 Nov 78
Plotted 11 June 81 RCP

RCP
9 June

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1431	1432	77	254	-9	+6	45	GUT. BRG 305°
	1433	301	118	-34	+32	61	BACK AT EDGE OF TSUSENA CREEK (LEFT CREEK AT PT 1426)
							QTZ DIORITE OUTCROP
	1434	24	206	+1	-1	88	META-SANDSTONE OVERLAIN BY META CONGLOMERAT-DIORITIC MATERIAL
	1435	10	183	0	0	100	FANTASTIC FISHING HOLE NEAR 90° BEND IN CREEK ROCK DOES NOT LOOK THE SAME ON WEST SIDE OF CREEK AS THAT ON EAST SIDE OF CREEK. MARKEDLY DIFFERENT WEATHERING PATTERN
	1436	103	283	+29	-29	56	DIORITE BRECCIA - ANGULAR PIECES (COBBLE SIZE) OF DIORITE IN FINE GRAINED MATRIX
	1437	54	241	+19	-20	43 ∡	
	1438	121	303	+25	-25	53	DIORITE BRECCIA MATRIX MORE XTALLINE
	1439	170	353	+28	-28	48	

Checked 7/30/81

Plotted 11 June 81 RCP

✓ RCP 9 June 81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1439	1440	115	302	-15	+15	79	
	1441	31	210	-35	+35	100	BACK AT EDGE OF TSUSENA CREEK (LEFT CREEK @ 1235) ENORMOUS BLDRS OF DIORITE BRECCIA
	1442	94	277	+1	-1	100	HELIO PAD
	1443	90	272	0	0	104	
	1444	77	254	0	0	100	
	1445	77	257	+1	-1	100	
	1446	88	269	+2	-2	102	
	1447	69	253	+0	-1	100	
	1448	57	238	0	0	102	
	1449	52	238	+1	0	100	
	1450	48	230	+2	-2	100	
	1451	41	218	+1	0	100	
	1452	25	204	0	0	100	

CLOSED

Plotted 13 Nov 78

Plotted 11 June 81 RCP

Checked 7/30/81

RCP
9 Ju

COE Watana Book 25

2

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1452	1453	81	261	+2	-2	114	START OF SHEAR ON WEST SIDE
	1454	72	248	+7	-7	96	OF CREEK
	1455	73	254	0	0	21	
	1456	79	262	0	0	100	TSUSENA CREEK
	1457	94	274	0	0	79	
	1458	116	295	+1	0	100	
	1459	113	294	+1	-1	100	U/S EXTENT OF SHEAR
	1460	108	290	-8	+8	48	
	1461	127	307	0	0	100	
	1462	119	299	+1	0	100	
	1463	118	298	0	0	100	DIORITE - W/ GLASSY
							BASALT DIKE - SOME
							SHEARING OR BAKING - N50°W
	1464	109	291	0	-1	100	FOLLOWING BASE OF
							CLIFF - DIORITE.
							CLIFF CUTS BACK SHARPLY
	1465	122	299	+2	-2	100	CROSSING THE MOUTH
	1466	96	278	+1	-2	100	OF LARGE CUT IN
	1467	89	273	0	-1	100	BANK LOTS OF WATER
	1468	70	247	0	0	103	RUNOFF FLOWING INTO
	1469	62	245	+1	-0	100	CREEK
	1470	66	243	+2	0	100	
	1471	55	231	+2	-1	97	
	1472	51	231	0	0	53	BASE OF CLIFF THAT ENDS
							IN CREEK, DIORITE W/ LARGE
							EUHEDRAL PLAG PHENOCRYSTS

Checked 7/30/81

TS Plotted 16 June 81 RCP

RCP 8/

FROM	TO	FORSITE	BKSITE	FOR Δ	BK Δ	DIST	NOTES
1472	1473	95	276	+20	-21	38	LEFT CREEK DUE TO CLIFFS
	1474	18	193	+24	-28	50	TILL APPROX 300 ABOVE
	1475	119	278	+18	-22	41	CREEK
	1476	36	206	+5	-5	37	
	1477	73	257	-13	+11	51	CENTER OF GUT BRG N55°W
							DIORITE ON BOTH SIDES
							OF GUT (GRANITE)
							W/ FINE GRAINED INCLUSIONS
	1478	300	116	-22	+20	100	BACK AT CREEK
							GRANITE OUT CROP W/
							FELSITE DIKE
	1479	349	170	+2	0	92	
	1480	350	171	-2	+1	100	
	1481	335	155	0	0	100	
	1482	329	148	0	-1	83	ALONG BASE OF
	1483	330	149	+1	-1	100	GRANITE CLIFFS W/ FELSITE
	1484	336	155	0	0	100	INTRUSIONS.
	1485	341	164	-1	+1	71	GRANITE CLIFFS IN CREEK
							CAN GO NO FURTHER
							UP CREEK BELOW FALLS

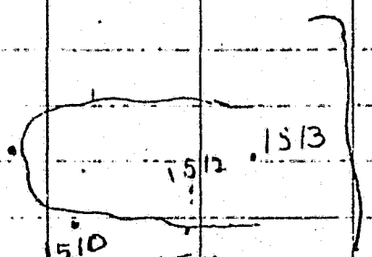
Checked 7/30/81

Plotted 13 Jun 78

Plotted 16 June 81 RCP

✓ RCP June 81

FROM	TO	FORSITE	BKSITE	FORΔ	BKΔ	DIST	NOTES
	3 JULY 1978						
	STARTING POINT: 1500 LOCATED AT PICTURE POINT ABOUT FALLS ON TSUSENA CREEK						
(T-3) 1500	1501	38	218	+5	-4	100	FOLLOWING TOP OF CLIFFS ABOVE TSUSENA CREEK
	1502	88	271	+4	-4	100	
	1503	34	214	-14	+13	100	
	1504	20	199	-2	+3	100	LARGE GUT BRG N 50° W GOES ALL THE WAY TO CREEK
	1505	13	193	-5	+6	63	
	1506	28	208	-2	+1	100	
	1507	12	188	-8	+6	100	OUTCROP OF MEDIUM GRAINED QTZ DIORITE
	1508	22	201	+5	-6	115	MORE QTZ DIORITE
	1509	60	238	-5	+4	100	
	1510	12	192	+2	-3	100	
	1511	329	150	-4	+5	84	ALONG TOP EDGE OF WHAT APPEARS TO BE A CATCH BASIN FOR OLD SET OF FALLS



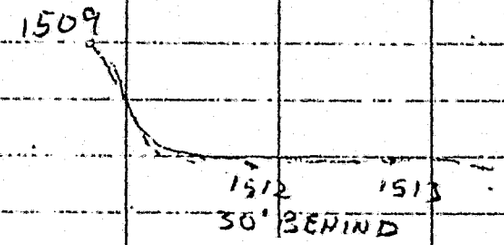
Plotted 14 JUL 78

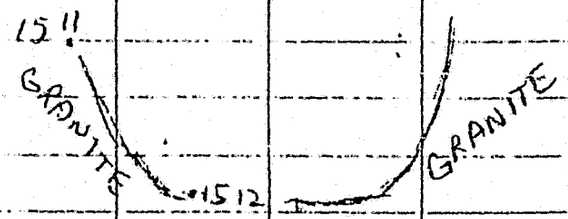
Plotted 16 June 81 RCP

15 JUN 81 LDZ

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1511	1512	248	64	-28	+27	100	GRANITE OUT CROPS
	1513	278	94	-5	+6	100	ON BOTH SIDES OF BASIN (BRG 340°)

X SECTIONS





	1514	322	142	-1	0	132	
	1515	344	162	-16	+14	169	SCALE BRG 250°
T.P.	1516	310	129	-24	+26	195	BOTTOM OF STEEP SLOPE AT EDGE OF TSUSENA CREEK FLOOD PLAIN. IN GRANITIC ROCK ALL THE WAY DOWN
	1517	273	94	-8	+6		EDGE OF TSUSENA CREEK

Plotted 14 Nov 18

15 JUN 81 LDE

Plotted 16 June 81 RCP

Checked 7/30/81

FROM	TO	FORSITE	BKSITE	FORΔ	BKΔ	DIST	NOTES
	1517						GRANITE DOWN TO CREEK EDGE. APPROX 300' ABOVE CAILEIGH FALLS. TILL ABOVE ROCK ON WEST SIDE OF CREEK CANNOT GO D/S TOWARDS FALLS
1516	1518	30	208	-2	+3	351	ALONG RIVER TERRACE GRANITE OUTCROPS EAST SIDE OF TERRACE ON WEST SIDE OF CREEK - FROM 1516 TO 1518 TILL CAN BE SEEN WITH NO SIGN OF BED ROCK
	1519	73	252	? +7	-6	246	RIVER TERRACE
	1520	57	238	-1	0	113	
	1521	75	257	+7	-7	148	[illegible] OF OLD STREAM BEDS, LOBES AND TERRACES ALL STREAM DEPOSITS
	1522	85	286 ~~275~~	+2	-3	329	
	1523	146 34	? 333 27	+8	-5	5.7	GRANITE OUTCROP [illegible] WEATHERED
	15 JUN 81 LDZ	Plotted 16 June 81 RCP					Plotted 14 Nov 18

Checked 1/30/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1543	1544	43	225	0	0	156	ALONG BASE OF TALUS SLOPE
	1545	63	245	+5	-5	300	FELSITE DIKE ALSO END OF TALUS SLOPE. COARSE GRAINED DIORITE PRESENT IN OUT CROP
	1546	40	218	-1	0	136	
	1547	47	225	+2	-2	100	
	1548	45	225	+1	-1	780	ALONG CHANGE FROM 20° SLOPE AND RIVER TERRACE. LARGE DIORITE BLDRS EXPOSED ON SLOPE FACE
	1549	37	218	0	0	522	RIVER TERRACES: EAST SIDE - 3 CAN BE DELINEATED; WEST SIDE - 4 CAN BE SEEN WITH A POSSIBLE 5TH
	1550	72	251	+20	-20	390	
	1551	15	196	-4	+5	[illegible]	
	1552	54	235	-8	+6	[illegible]	CENTER OF GUT. BRG 255° MOST LIKELY AN EROSIONAL FEATURE AS STREAM IN GUT HAS ONLY CUT THRU RIVER GRAVELS AND TILL

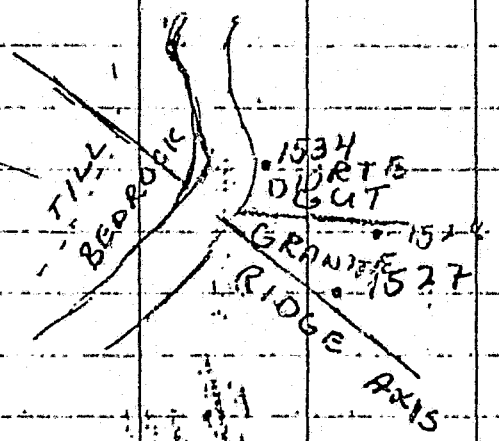
Checked 7/30/81

15 JUN 81 LDZ

Plotted 16 June 81 RCP

Plotted 14 Jun 79

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1523	1524	66	246	0	0	64	
	1525	179	0	+30	-33	100	
	1526	103	288	+8	-7	391	
	1527	60	240	+1	-1	200	BEDROCK OUT CROPPING IN CREEK ON WEST SIDE



	1528	99	281	+4	-2	279	EDGE OF GUT W/ STREAM, BRG 305° ROCK OUT CROP IN GUT - GRANITE - HIGHLY WEATHERED AND SHEARED
	1529	40	216	0	0	325	DIORITE BOULDERS
	1530	35	211	-8	+11	172	
TP	1531	08	186	-22	+22	[illegible]	RIVER GRAVELS ACROSS CREEK
	1532	293	110	-8	+9	70	SOME BEDDING PRESENT, SLIDE
	1533	286	103	-14	+13	78	SCARP - 250' WIDE
	1534	224	43	0	[illegible]	[illegible]	ON TOP OF ROCK OUT CROP - QTZ DIORITE

Plotted 16 June 81 RCP

Plotted 14 Nov 78

15 JUN 81 LDZ

Checked 7/30/81

RESERVOIR / REGIONAL GEOL

FROM	TO	FORSITE	BKSITE	FORA	BK A	DIST	NOTES
	1534						CHANGE BETWEEN GRANITE AND DIORITE IS MOST LIKELY AT GUT (PT 1528) AS CHANGE DOES NOT APPEAR GRADUAL BEDROCK CROSSES CREEK (I.E. BEDROCK IS STREAM BED)
1531	1535	15	192	0	0	217	
	1536	36	214	+1	0	176	
	1537	73	251	+14	-14	277	
	1538	93	277	+19	-19	22	
	1539	103	286	+8	-8	110	GUT W/ FLOWING WATER BRG 305°
	1540	18	198	-2	+1	665	
	1541	20	197	+1	-2	202	
	1542	270	89	-12	+15	191	DIORITE OUT CROP ACROSS TALUS SLOPE OF DIORITE (FINE GRAINED, VERY LIGHT GREY, PLAG AND HBL PHENO CRYSTS)
	1543	350	171	-18		273	PT 1543 AT BASE OF TALUS SLOPE

Checked 7/30/81

Plotted 14 AUG 78

Plotted 16 June 81 RCP

15 JUN 81 LDZ

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1543	1544	43	225	0	0	158	ALONG BASE OF TALUS SLOPE
	1545	63	245	+5	-5	300	FELSITE DIKE ALSO END OF TALUS SLOPE. COARSE GRAINED DIORITE PRESENT IN OUT CROP
	1546	40	218	-1	0	136	
	1547	47	225	+2	-2	100	
	1548	45	225	+1	-1	780	ALONG CHANGE FROM 20° SLOPE AND RIVER TERRACE. LARGE DIORITE BLDRS EXPOSED ON SLOPE FACE
	1549	37	218	0	0	522	RIVER TERRACES: EAST SIDE - 3 CAN BE DELINEATED; WEST SIDE - 4 CAN BE SEEN WITH A POSSIBLE 5TH
	1550	72	251	+20	-20	390	
	1551	15	196	-4	+5	[illegible]	
	1552	54	235	-8	+6	[illegible]	CENTER OF GUT. BRG 255° MOST LIKELY AN EROSIONAL FEATURE AS STREAM IN GUT HAS ONLY CUT THRU RIVER GRAVELS AND TILL

15 JUN 81 LDZ

Plotted 16 June 81 RCP

Checked 7/30/81

Plotted 14 Jun 79

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
	6 JULY 1978		A. MACLEOD,		J. RIGO		
	STARTING PT: 1600 LOCATED AT PT JUST D/S OF THE INTERSECTION OF DEAD MAN CREEK AND SUSITNA POINT PREVIOUSLY REACHED BY A MACLEOD AND W. CAMPBELL						
(861) 1600	1601	78	256	0	0	100	
	1602	73	251	0	0	106	CONFLUENCE OF DEAD MAN CREEK AND SUSITNA RIVER
	1603	13	194	+24	-23	43	TURNED UP DEAD MAN CREEK
	1604	13	189	+3	-5	100	
	1605	7	182	+1	-2	100	FOLLOWING FLOOD
	1606	4	184	0	0	96	PLAIN AND TERRACES
	1607	8	183	-2	0	100	OF DEAD MAN CREEK
	1608	10	186	-1	+1	100	
	1609	16	193	+1	0	100	
	1610	8	186	0	0	100	
	1611	22	199	-2	+1	100	
	1612	24	201	-2	0	100	
	1613	21	196	+1	-2	100	
	1614	356	173	+12	-12	88	DIORITE OUT CROP ON BOTH SIDES OF CREEK
		Plotted 17 June 81 RCP			15 JUN 81 LDZ		Plotted 12 Nov 78

Checked 7/30/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1614	1615	323	144	+24	-23	100	UP SLOPE BETWEEN DIORITE CLIFFS
	1616	296	112	+32	-33	100	
	1617	276	96	+39	-38	71	
	1618	324	142	+36	-37	50	
	1619	000	179	+29	-30	88	AT BREAK IN SLOPE FROM 0° SLOPE TO 30°-40° SLOPE. DIORITE BLDRS AND OUTCROPS ON STEEP SLOPE
	1620	37	214	+1	-1	100	
	1621	52	229	+12	-13	94	
	1622	341	159	+5	-6	100	
	1623	315	133	+11	-10	100	
	1624	308	126	+12	-12	100	
	1625	320	144	+17	-18	100	
	1626	336	154	+7	-9	100	
	1627	305	126	+5	-5	100	
	1628	224 ?	146	-6	+6	70	LARGE GUT BRG 73° DIORITE OUT CROP IN GUT WALLS
	1629	341	163	+18	-19	100	
	1630	325	143	+14	-15	100	
	1631	350	171	+17	-17	100	GUT BRG 205°
	1632	336	154	+13	-15	100	

15 JUN 81 LDZ

Plotted 17 June 81 RCP

Plotted 12 Nov 78

TFD 6/18/81 Checked 7/30/81

FROM	TO	FORSITE	BK SITE	FOR ∡	BK ∡	DIST
1632	1633	330	140	+11	-12	100
	1634	342	158	+14	-14	100
	1635	350	167	+11	-12	100
	1636	0	179	+5	-5	100
	1637	353	169	+3	-4	100
	1638	342	160	+4	-4	100
	1639	336	158	+18	-16	77
	1640	50	227	-1	+1	176
	1641	60	238	0	0	100
	1642	35	216	+3	-3	100
	1643	70	248	+3	-2	100
	1644	70	250	-2	+3	221
	1645	70	247	+3	-3	311
TP	1646	152	334	-6	? +[illegible]	205
	1647	99	278	-12	? +1[illegible]	228
	1648	83	264	-2	? +1[illegible]	165
1646	1649	51	226	-10	? +[illegible]	[illegible]0
	1650	67	243	-16	? +1[illegible]	[illegible]0
	1651	58	236	-11	? +[illegible]	[illegible]5
	1652	75	257	-10	? +[illegible]	[illegible]0
	1653	66	243	-13	? +[illegible]	[illegible]
	1654	113	292	-11	? [illegible]	[illegible]

NOTES

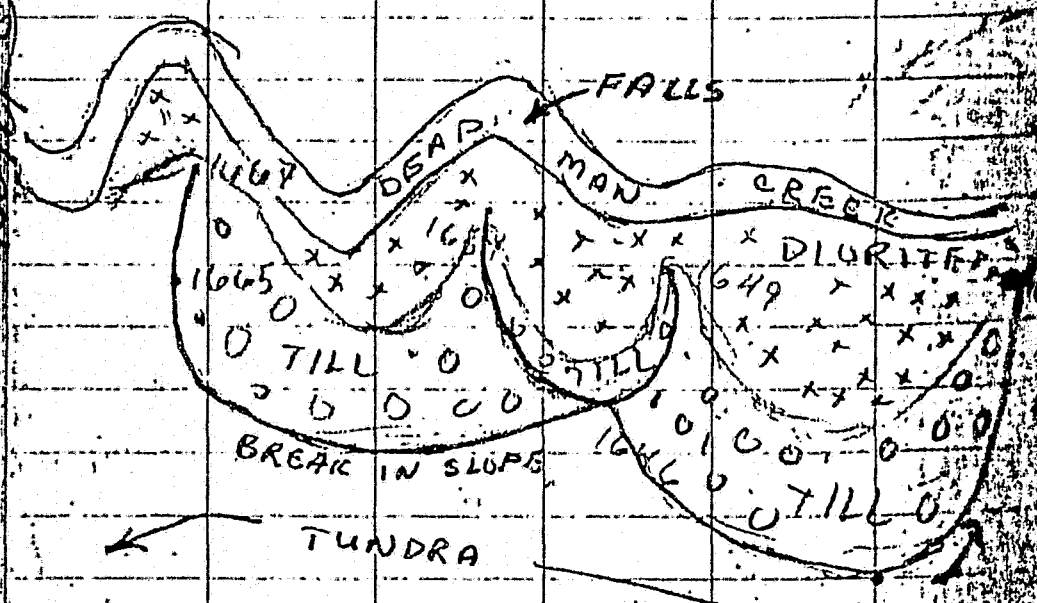
FROM PT 1622 TO 1648 DESCRIBES A LARGE CUT IN WALL OF DEAD MAN CREEK (UPPER EDGE)
PT 1648 IS AT THE TIP OF A RIDGE - DIORITE CAPPED BY TILL (CONTACT APPROX 30' DOWN.

FROM 1648 BACK THRU 1646 ON TO 1654 DESCRIBES ANOTHER LARGE CUT AT 1654 DIORITE OUT CROP FROM 1646 TO 1653 - TILL

Pl. Nec 12 Nov 18
Plotted 17 June 81 RCP

16 JUN 81
LDZ

FROM TO FORSITE BKSITE FOR 4 BK 4 DIST NOTES



1646	1655	317	137	+5	-6	20	
	1656	308	128	+4	-5	20	
	1657	305	123	+7	-3	20	2
	1658	310	128	+2	-3	20	
	1659	333	149	+2	-2	20	
	1660	346	164	+3	-3	20	
	1661	339	157	+5	-4	20	
	1662	19	201	+2			

Plotted 17 June 81 RCP

Plotted 12 Nov 78

16 JUN 81 LDZ

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1662	1663	67	247	+1	-1	92	SLIDE SCARP - TILL SHOWING
	1664	65	243	0	-1	258	
	1665	130	306	-7	+9	212	AUGER HOLE - GALVINIZED 3/4 PIPE W/ RIBBONS TIED ON
	1666	120	301	+4	-3	95	
	1667	142	320	+3	-3	86	FROM 1646 TO 1667 ANOTHER LARGE DEPRESSION IN THE DEAD MAN VALLEY WALL PT 1667 ON A RIDGE ABOVE CREEK, REWORKED TILL ALL THE DOWN TO CREEK (AS IT APPEARS FROM 1667)
1664	1668	352	170	+3	-3	[illegible]	
	1669	285	107	0	0	[illegible]	AUGER HOLE BY PICTURE POINT
1668	1670	351	171	+3	-3	[illegible]	?
	1671	93	269	-15	+16	[illegible]	OVER BREAK IN SLOPE - SLIDE AREA, REWORKED TILL
	1672	143	326	-16	[illegible]	[illegible]	
	1673	96	277	-17	+1	[illegible]	

Plotted 17 June 81 RCP

16 JUN 81 LDZ

TFD 6/18/81
checked 7/30/81

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1673	1674	114	292	-23	+24	89	
	1675	130	307	-21	+24	63	
	1676	94	270	-14	+15	53	
	1677	91	269	+5	-6	7	
	1678	47	226	-1	+2	59	
	1679	75	249	-10	+11	64	
	1680	109	285	-16	+16	75	
	1681	105	288	-22	+21	72	
	1682	117	291	-23	+22	90	
	1683	130	304	-27	+27	100	
	1684	128	302	-16	+15	100	
	1685	117	297	-14	+14	82	
	1686	114	292	-13	+14	68	
	1687	63	237	+1	-1	80	
	1688	105	284	-7	+7	95	
	1689	71	248	-1	+2	95	
	1690	112	292	-7	+7	100	
	1691	104	281	-3	+3	73	EDGE OF DEAD MAN CREEK
	1692	92	268	+1	-2	77	BEDROCK OUT CROPS ON EAST SIDE OF CREEK
	1693	101	284	+1	-1	77	
	1694	79	257	+3	-4	100	
	1695	94	271	+2	-1	73	

Ckd 7/30/81

Plotted 17 June 81 RCP

Plotted 17 [illegible] 18

16 JUN 81 LDZ

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	
1695	1696	36	217	+2	-2	100	
	1697	13	198	+3	-3	100	
	1698	11	191	+3	-2	72	
	1699	94	276	-5	+6	125	
	1700	22	203	+3	-4	93	
	1701	6	184	+3	-3	100	
	1702	36	219	+2	-2	100	
	1703	57	242	+2	-2	100	
	1704	67	246	+2	-2	100	
	1705	82	264	+3	-3	16	OUTCROP OF DIORITE- WEATHERED
	1706	42	222	+56	-55	33	UP TO CROSS OVER TOP OF OUTCROP
	1707	35	214	+11	-12	50	
	1708	2	178	+10	-9	100	
	1709	21	204	-1	+2	100	

Checked 7/30/81

plotted 12/10/18

Plotted 17 June 81 RCP

16 JUN 81
LDZ

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
18 JULY	1978	A. MACLEOD			W. CAMPBELL		NOTE: LINE RUNS ALONG TOP OF CLIFFS
HOA	1710	50	228	+16	-15	21	
	1711	344	165	-17	+17	100	
	1712	337	157	-16	+16	76	
	1713	9	187	-18	+18	40	
	1714	93	271	+1	0	69	
*	1715	91	268	-1	+3	33	GUT BRG 324°
	1716	95	271	+11	-9	27	
	1717	137	316	+11	-10	81	
*	1718	92	269	-0	+1	47	CENTER OF GUT BRG 345°
	BEARING	FROM		1718	TO	2144	348°
	VERT ∡		-41°				
1718	1719	69	246	+15	-14	40	SIDE GUT ENTERING GUT OF 1716
DOUBLE C	1720	44	218	-4	+4	75	BRG 315°
							DIORITE ST. - 299° D - 46°N } JOINTS
* 1720	2147	55	S51°W	-40	+40	20	335° D - 62°W }
1720	1721	172	353	+31	-31	32	
	1722	108	287	+19	-20	60	
*	1723	114	291	+5	-5	68	GUT BRG 333°
	1724	80	259	+18	-19	40	
	1725	79	251	-1	0	70	
	1726	78	248	-5	15	66	

Plotted 16 June 81 RCP

Plotted 16 June 81 RCP

8 June 81

FROM	TO	FORSITE	BKSITE	FOR ∆	BK ∆	DIST	NOTES
1726	1727	93	268	+4	+3	100	DIORITE BOULDER
	1728	85	259	-3	+2	57	SLOPE - MOSS COVERED
	1729	116	288	+10	-11	88	
	1730	154	331	+27	-26	65	DIORITE OUTCROP
							JOINTS: S-174° D-66° W
							168° 17° W
	1731	80	257	+1	-2	73	
DBL CHECKED	1732	336	S36E	-26	+26	100	
"	1733	18	S8W	-13	+13	100	
	1734	333	S26E	-27	+26	44	
	1735	N64W	S70E	+37	-37	94	ROCK OUTCROP - DIORITE
							N64W 74° S
							S73W 23 N } JOINTS
							S63W VERTICAL
						47	
1734	1736	85	261	+20	-20		
	1737	139	317	+23	-24	20	
	1738	66	238	-7	+7	32	CENTER OF GUT BRG 324°
		64	242				
							N76W 85N QUARTZ DIORITE 1" FAULT
	1739	54	232	+13	-12	41	
	1740	25	202	-18	+16	63	8' ft DIKE, 6' WIDE BRECCIATED
							DIORITE, QUARTZ INJECTION N50W 80°NE
							BRECCIATED W/ LOT OF NARROW
							FAULTS (W/SLICKS)

Plotted 16 June 81 RCP

Plotted 16 [illegible] RCP

FROM	TO	FORSITE	BKSITE	FOR ∡	BK ∡	DIST	NOTES
1740	1741	198	278	+31	-30	GUT:	JOINTS S85W 67N DIORITE
						MAJOR	CLIFFMAKER N32W 77N
							BROWNISH DIORITE; NO FAULTING
						70	N56W 77N
							SMALL REVERSE FAULTS
							COARSE GRAINED DIORITE
1741	1742	54	S49W	+37	-37	35	N47E 37S ~10' WORTH
	1743	121	298	+16	-17	69	JOINTS IN GUT: N47W 86N CLIFFMAKER
							BRECCIATED STRIKE\SLIP FAULT
							IN DIORITE ← LEFT LATERAL
	1744	78	254	+8	-8	64	N54W 80SW } PROBABLY IN
							N47E 69S } PLACE
	1745	38	217	-4	+4	100	N35W VERTICAL BRECCIATED FAULT
							FACE
							N82W 70S } COARSE GRAINED
							N45E 87SE } GRANODIORITE JOINTS
	1746	68	247	+6	-5	62	N75W 82°S SPL GRANODIORITE
	1747	31	211	-64	+64	17	
	1748	28	205	-6	+7	66	
	1749	71	247	+3	-3	100	N32W VERTICAL } GUT
							N55E 67°N } JOINTS
							N88W 06°N
	1750	74	247	+4	-3	70	
	1751	32	209	-10	+9	[illegible]	

MUCH SURFACE WATER IN GUT - NONE IN TUNDRA ABOVE

Checked 7/31/81

Plotted 16 June 81 RCP

RCP 8 June 81

RESERVOIR / REGIONAL GEOL

FROM	TO	FORSITE	BKSITE	FORΔ	BKΔ	DIST	NOTES
1751	1752	18	192	-13	+12	100	N30E 88E DARK DIORITE RUNS TO MIDDLE OF FINS
	1753	97	276	+10	-9	42	
	1754	107	282	-5	+5	32	WX DIORITE W/ ANGULAR GRANITE BLOCKS ON TOP (TILL); LINES UP WITH FINS: N27E 84E
	1754						
	1755	74	251	+27	-28	35	
	1756	96	272	+16	-15	100	ON LINE W/ LARGEST ANGLED FIN; PHOTO
	1757	187	8	+9	-9	151	NEXT ONE ON RESEVOIR ROW
	1758	DUE S	DUE N	8 +7	~~DUE~~ 7	120	ANGLED FIN: N30E 75°E
	1759	215	35	+3	-3	124	
	1760	214	N32E	+9	-9	396	
	1761	198	N18E	+11	-11	452	

checked 7/31/81

Closed

pl. [illegible] 16 [illegible]

[illegible]

RCP
8 June 81

Plotted 16 June 81 RCP

RESERVOIR 1
REGIONAL GEOL

DISTANCES FROM SIDE STAKES FOR CROSS-SECTIONING

Roadway of any Width, Side Slopes 1½ to 1

In the figure below opposite 7, under "Cut or Fill" and under 15 read 11.6, the distance out from the side stake at left. Also, opposite 11, under "Cut or Fill" and under 1 read 16.7, the distance out from the slope stake at right.

Cut or Fill	0	1	2	3	4	5	6	7	8	9	Cut or Fill
	Distance out from Side or Shoulder Stake										
0	0.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.2	1.4	
1	1.5	1.7	1.8	2.0	2.1	2.3	2.4	2.6	2.7	2.9	
2	3.0	3.2	3.3	3.5	3.6	3.8	3.9	4.1	4.2	4.4	
3	4.5	4.7	4.8	5.0	5.1	5.3	5.4	5.6	5.7	5.9	
4	6.0	6.2	6.3	6.5	6.6	6.8	6.9	7.1	7.2	7.4	
5	7.5	7.7	7.8	8.0	8.1	8.3	8.4	8.6	8.7	8.9	
6	9.0	9.2	9.3	9.5	9.6	9.8	9.9	10.1	10.2	10.4	
7	10.5	10.7	10.8	11.0	11.1	11.3	11.4	11.6	11.7	11.9	
8	12.0	12.2	12.3	12.5	12.6	12.8	12.9	13.1	13.2	13.4	
9	13.5	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7	14.9	
10	15.0	15.2	15.3	15.5	15.6	15.8	15.9	16.1	16.2	16.4	
11	16.5	16.7	16.8	17.0	17.1	17.3	17.4	17.6	17.7	17.9	
12	18.0	18.2	18.3	18.5	18.6	18.8	18.9	19.1	19.2	19.4	
13	19.5	19.7	19.8	20.0	20.1	20.3	20.4	20.6	20.7	20.9	
14	21.0	21.2	21.3	21.5	21.6	21.8	21.9	22.1	22.2	22.4	
15	22.5	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7	23.9	
16	24.0	24.2	24.3	24.5	24.6	24.8	24.9	25.1	25.2	25.4	
17	25.5	25.7	25.8	26.0	26.1	26.3	26.4	26.6	26.7	26.9	
18	27.0	27.2	27.3	27.5	27.6	27.8	27.9	28.1	28.2	28.4	
19	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.6	29.7	29.9	
20	30.0	30.2	30.3	30.5	30.6	30.8	30.9	31.1	31.2	31.4	
21	31.5	31.7	31.8	32.0	32.1	32.3	32.4	32.6	32.7	32.9	
22	33.0	33.2	33.3	33.5	33.6	33.8	33.9	34.1	34.2	34.4	
23	34.5	34.7	34.8	35.0	35.1	35.3	35.4	35.6	35.7	35.9	
24	36.0	36.2	36.3	36.5	36.6	36.8	36.9	37.1	37.2	37.4	
25	37.5	37.7	37.8	38.0	38.1	38.3	38.4	38.6	38.7	38.9	
26	39.0	39.2	39.3	39.5	39.6	39.8	39.9	40.1	40.2	40.4	
27	40.5	40.7	40.8	41.0	41.1	41.3	41.4	41.6	41.7	41.9	
28	42.0	42.2	42.3	42.5	42.6	42.8	42.9	43.1	43.2	43.4	
29	43.5	43.7	43.8	44.0	44.1	44.3	44.4	44.6	44.7	44.9	
30	45.0	45.2	45.3	45.5	45.6	45.8	45.9	46.1	46.2	46.4	
31	46.5	46.7	46.8	47.0	47.1	47.3	47.4	47.6	47.7	47.9	
32	48.0	48.2	48.3	48.5	48.6	48.8	48.9	49.1	49.2	49.4	
33	49.5	49.7	49.8	50.0	50.1	50.3	50.4	50.6	50.7	50.9	
34	51.0	51.2	51.3	51.5	51.6	51.8	51.9	52.1	52.2	52.4	
35	52.5	52.7	52.8	53.0	53.1	53.3	53.4	53.6	53.7	53.9	
36	54.0	54.2	54.3	54.5	54.6	54.8	54.9	55.1	55.2	55.4	
37	55.5	55.7	55.8	56.0	56.1	56.3	56.4	56.6	56.7	56.9	
38	57.0	57.2	57.3	57.5	57.6	57.8	57.9	58.1	58.2	58.4	
39	58.5	58.7	58.8	59.0	59.1	59.3	59.4	59.6	59.7	59.9	
40	60.0	60.2	60.3	60.5	60.6	60.8	60.9	61.1	61.2	61.4	

Watana COE Book 26

Allan MacLeod 7 July 78

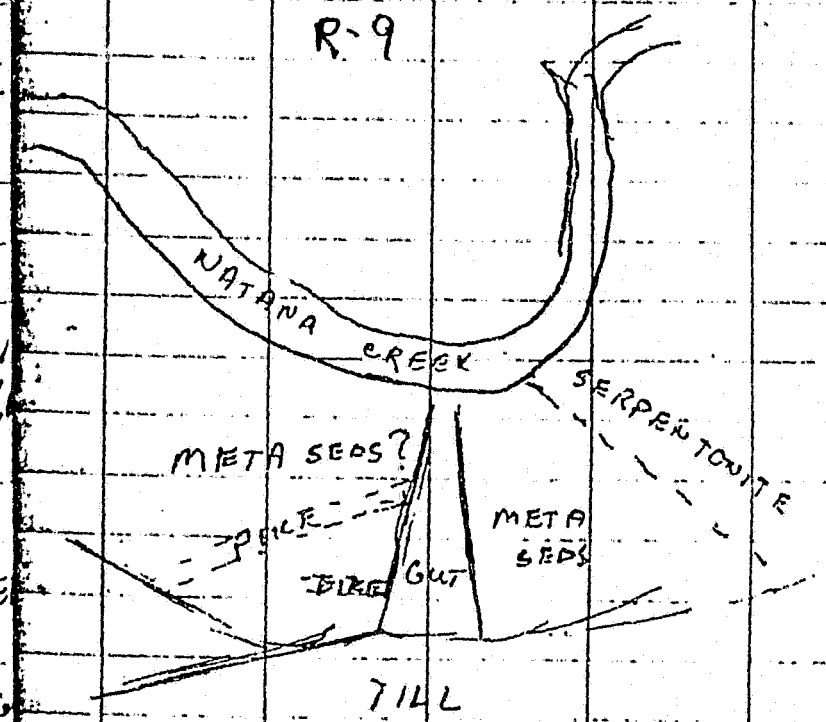
(1)

METASEDIMENT (PHYLLITE)
FINE GRAINED, HARD BUT BRITTLE,
QTZ VEINS THRU OUT OUT
CROP. SOME DEFORMATION
IN BEDDING AROUND QTZ
VEINS
STRIKE - N77°E
DIP 27° TO 45° N
PREDOMINANT JOINT SYSTEMS:
N-S' AND N38°W
IRON STAINS ALONG
CERTAIN BEDDING PLAINS
PICTURE: 7 + 8
ROCK HOLDS A 60° TO 70°
SLOPE WITH SOME OVER
HANGS. NO SIGN OF MASS
MOVEMENT

COE BOOK 26
RESERVOIR / REGIONAL
MAPPING

R-8 BASALT WITH LARGE XTLS OF OLIVINE

R-9 LARGE SHEAR BRG N45
ROCKS HIGHLY WEATHERED
RIGHT AT GUT
ROCK SOUTH OF SHEAR
HIGHLY SERPENTINIZED (W
PROBABLY OF BASIC ORIGIN (
CONTACT BETWEEN BASALT
AND META SEDS N70° E
TILL APPROX 75' ABOVE CRE
AT GUT
NOT POSSIBLE TO GET G
SAMPLE OF META SEDS



R-10 CONGLOMERATE:
STRIKE N85° W
DIP 35° N
HAS SAME APPERENCE AS CONG OF R-6. ALTHOUGH GRAVELS HERE ARE OF LARGER SIZE

R-11 MASSIVE BEDDED SANDS UNCEMENTED ALTHOUGH HOLDING NEAR VERTICAL CLIFFS AND SHOWING SIG OF JOINTING
BEDS SHOW VARING ATTIT ALONG CREEK. FROM HORIZONTAL TO DIPS OF UP TO 30°
PHOTO 13+14

BEDS ALSO SHOW SOME SIGNS OF SOFT SEDIM DEFORMATION

12 SANDSTONE AND PEBBLE CONGLOMERATE INTER BEDS
STRIKE N10° E
DIP 4° W

13 SHALE - COAL - SANDSTONE CONGLOMERATE INTERBEDS
0 COAL LOOKS LIKE IT
6 HAS BEEN BURNT. LOTS OF PLANT FOSSILS IN SHALE.
LOTS OF PARTIALLY BURNT PIECES OF WOOD IN COAL SEAMS. SOME PIECES REPLACED BY MINERALS OTHERS STILL WOOD

4 OLIVINE BASALT - MASSIVE, FINE GRAINED W/ OLIVINE PHENOCRYSTS - SOME SERPENTINIZATION

R-15 BASALT AND SOME BRECCIA
W/ GREEN & QTZ VEINS

joints dip = N60°W 15-20°N
samples of agglomerate and basa
rock w/ green dikes/veins
(possible secondary injection?

2 small qtz veins in rock, other
essentially massive

4 pcs

R-16 fine-grained greenish rock
probably basalt

R-17 greenish schist on river
a) pre-mm bedding @ N60°E at in sequence red bedding plane slicks
b) iron-stained heavy silicified slicks N55°W
c) qtz veins - discordant N15°W
(sample C is massive sample

d) overlying greenish (extensive)?
(grayish)

R-18 SCHIST - FINE GRAINED gray 19
SCHISTOSITY - STRIKE N 80°
DIP 52° S
N24°W NORMAL FAULTING -
62° E APPROX 1" OFF SET

SAMPLE R-18-a u/s OF R-18

→ brown color on cliffs are from iron-stained quartz filling of joints & faults.

Not a feasible site for quarry schist weathers back to shaly pieces - not viable rip-rap or aggregate source.

possible phyllite?
(→ 18 July per Pat's suggestion)

(11)

all gravels are granite / granitic schist.

outcrop is granitic gneiss ~~schist~~
minor mica content →

13 July Duncan

R-13 again

Upper Watana Creek - @ 1/4 mile DS
jct w/ Fox creek -

coal beds & sed ss, shale, conglom

samples -

W-1 red coal burnt shale
W-2 coarse gray ss
W-3 whitish tan ss
W-4 small gravel conglomerate
W-5 gravel "
W-6 coal (lignite)
W-7
— chunk of white petrified wood
— " " fossiliferous coal.
W-7 2 loose pieces of shards (ejecta
at base of cliff - probably n
place in this cliff - look l
recent (post-glacial pieces

LOOKING WEST

(13)

all heights est by eye from bottom

6' → SCORIA (caprock) red
4' → fine ss congl tan - brown
10' → coal, bone, gray shale gray
10' → coarse ss (clay cement?) tan, white
3' → fine ss
small gravel congl brown
6-9' large " " brown
10 coal, bone, petrified wood black & white
sandy silt.
White creek →

all sandstone & gravel conglomerate
pieces are rounded.

17 July

R-20 Mt Fuzz/Mt ~~Watana~~ Macbregor

climbed peaks on upper WATANA CREEK - no evidence of glaciation. Especially - see next pages on locale description

R-20a top coarse angular dacite w/ white & green amygdules (fill vugs)

20b top slightly vesicular dacite w/ slickenslides

20c ½ way up assorted talus of "lock" dacite w/ veins, flow struct

20d piece of weathered dacite w/ dacite clay

20e bottom of bedrock outcrop (see sketch next page over) note possible qtz sand & andesite grains in flow. Possible contact line.

R20-h 3 pieces andesite granitic chert? all from red spot near top of N finger on Mt. Macbregor

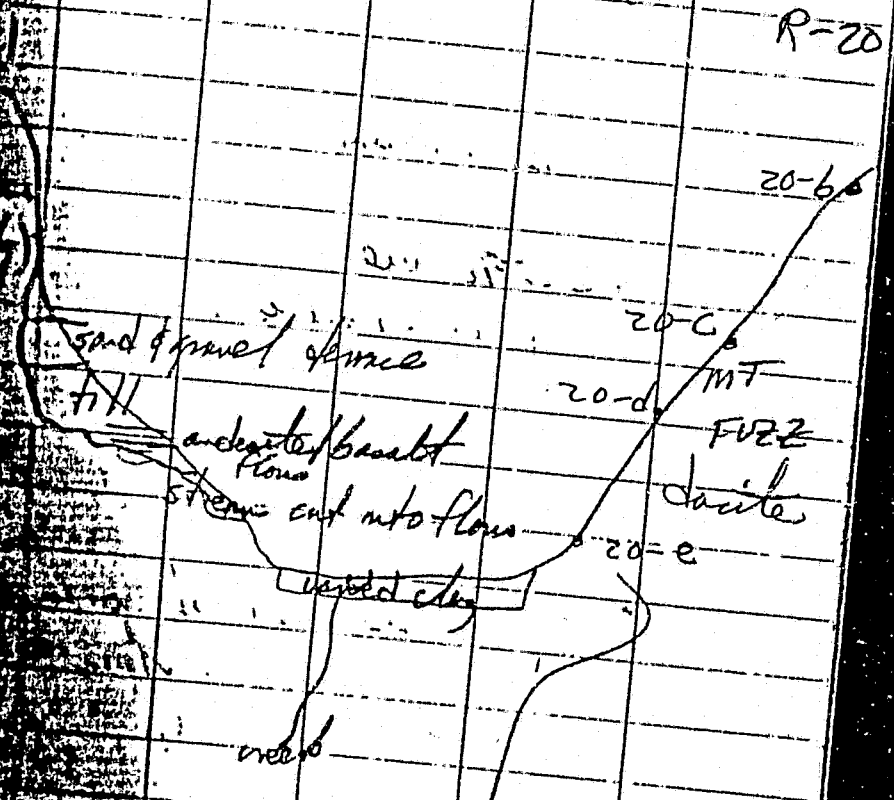
20f fine-grained greenish rock under dacite cliff.

also - under cliff but on top of green rock - burrow waste pile have rounded gravels coming from under dacite cliff.

20-g stream deposits of Mt Fuzz note included piece of granitic rock, possible qtz andesitic sand grain.

stream (Watana Creek) grav predominately granite/granitic gneiss & schist except for mini dacite near juncture of creek from dacite (R20, R21)

Upper Watana Creek looking east (upstream)



note +4 to +5° from 20-e to sand terrace other side of valley.

R-21 peak across from R-20 (da

R-21a dacite w/ andesite inclusion

R-21b scoraceous dacite w/ serpent banding & inclusion.

R-21c greenish andesite? ontc
≈ 3500' elev.

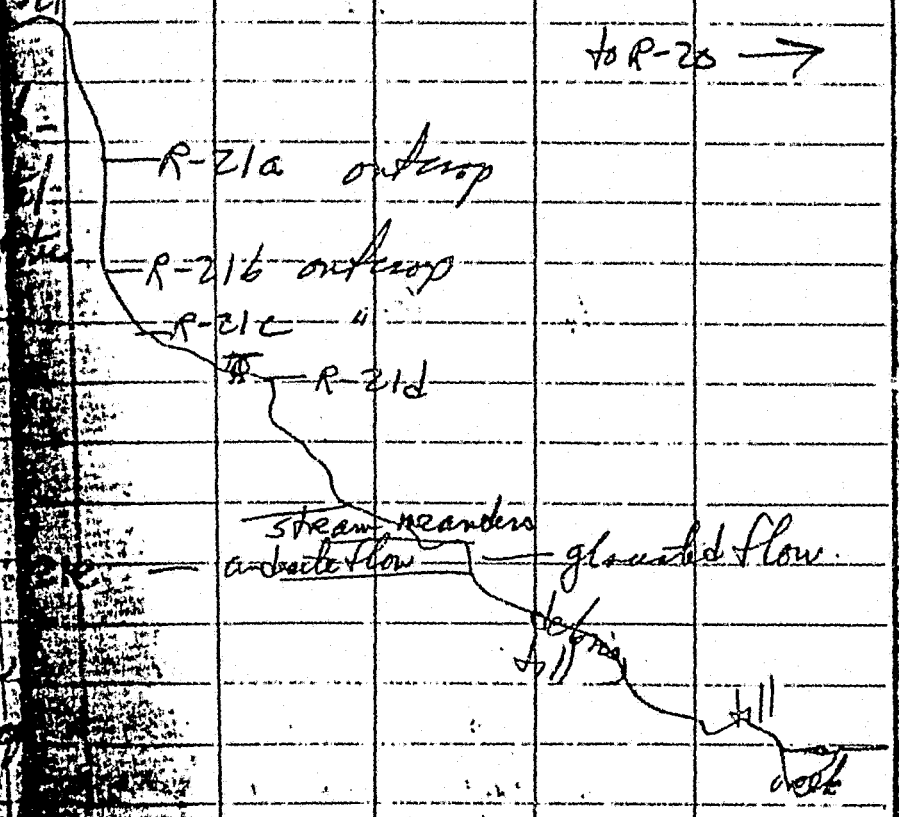
R-21d ≈ 3590' elev
river gravels?

R-21e andesite/basalt? flow
has been glaciated ont
but looks like it could
possibly overlie till or ont
deposits.

R-21 peak

looking east
(upstream)

to R-20 →



all samples below:

R-22 upper Watana Creek gravel between R-20 & R-21 & downstream up to 1 mile

R-22a dacite tuff?

22b dacite gravel aggl w/ andesite gravels (flagged in creek)

22c qtz veined andesite/dacite cobbles

22d andesite w/ rounded gravel

22e rhyolitic flow material

looks like a recent ash at end of upper Watana creek valley - need to check into it.

22f clay "hats" - sed cover in water in creek - must be

22g qtz injected dacite & andesite

23 glacial striated dacite bedrock elevation 2600'

24 diorite/granite schist

not a clue to what it is but it looks weird - reddish stuff next to dacite on top of ridge. Possible tightly welded tuff or ash deposit reheated and welded. In ultimate contact with dacite. No sign of scoria on ridge.

Sec. 28 R2W T22S FM

19 July
start new roll film –
1st shot = briefcase on bed

R-26 Fred's crane SS sample
brown w/some gravel

1/4 mile DS of point @ jct of
Fox & WATANA
(1/4 mile from coal)

mostly extensive coarse sands

Note scarps on mountains
to E of Stephan Lake –
left lateral plus scarps
at base of hills.

Possible "Fog Creek" Basin
to E edge Stephan Lake
Prairie Creek and along
E. edge prairie creek.

(23)

Question for USGS – Why do the
lakes D.S. of Stephan Lake
(Prairie Creek area) align E-W
rather than N-S (down-valley?)

R-13 VP Watana @ red coal burn?

≈6' red coal scoria? on top - slight SE dip
≈4' fine SS congl - tan
≈10' coal, bone, pet wood, gray shale
≈4-10' coarse SS - hard, like cap rock (clay? cement)
3-4' white/tan fine SS
UW6 - fossiliferous coal shale out of bog,
6 in bog - coal

3' small gravel/coarse sand conglomerate
6-9' coarse " "
10' lignite/bone/pet wood, clay
20' (bottom not exposed) fine, loose sand/silt

all sand/conglomerate well rounded

loose pieces of shards/ejecta found at base of cliff - probably not in place in this cliff - look like recent (post-glacial) pieces.

copied in book 26 →

13 JULY

5

W1 scoria (cap rock)
lignite 1a → coal bed
W2 coarse SS cap rock
W3 fine SS (tan / white)
W4 small gravel congl - brown
W5 large gravel congl - brown
W6 coal w/ bone, silicified wood
W7 loess - type dune sand? tan/white

copied in book 26 →

(6)

ation. Fog Creek & [illegible] of [illegible] creek, East of Stephen Lake several high seas that have all dead trees - looks like liquefaction but is high ground.

Closed

plotted

CLOUDY: ~3000' ceiling B. SMITH
~50°F 7/17/78 W. CAMPBELL
(FROM TOP DOWN)

W-8: SANDY BROWN SOIL ~ 1'

BROWN SANDSTONE - 2'

GRAVELS - PARTIAL CONSOL W/ CLAY - 2'
RIVER DEP.; W/ PETRIFIED WOOD

RED CLAY CONSOLIDATED - 2'-3'
MANY PLANT IMPRESSIONS
BURNED CLAYS - 1-2'

EST STRIKE = 245°

PEBBLE CONGLOMERATE - 3'

LIGHT → DARK BROWN CLAY - 3-4'
MANY WOOD INCLUSIONS - GOING TO LIGNITE

FINE LIGHT SANDSTONE W/ MUDBALLS
DIP = 11° S STRIKE ~ 245°
1-1.5'

PARTIALLY CONSOLIDATED SANDS
~20' W/ NARROW LIGNITE

COE Watana Book 30 (3)

WATANA CREEK

SEAMS INTERBEDDED

GRAVEL CONGLOMERATE ~ 2'

PARTIALLY CONSOLIDATED SANDS
W/ NARROW LIGNITE SEAMS +
GRAVEL SEAM INTERBEDDED
20'

SANDSTONE - 1½'

CONSOLIDATED CLAYS

W-9 SANDS 25-30'

PEBBLE CONGLOMERATE } 30'
GRAVEL CONGLOMERATE

LIGNITE - 1'

CLAY 1½

PARTIAL CONSOL CONGLOM 2'

CONGLOMERATE - PEBBLE 1'

SANDSTONE - VERY SOFT

SANDSTONE - 1'
MANY PLANT IMPRESSIONS

CONSOLIDATED SANDS - 2'

WELL CEMENTED GRAVEL CONGLOM
STRIKE - 250° DIP - 10° S

COARSE (PEBBLY) SS - 1'

FINE SS 1/2'

LIGNITE - 2'+ (GREAT CHUNKS SPLIT OFF)

FLOAT: WELL ROUNDED DIORITIC/GRANITIC TYPE MATERIAL; SOME GNEISSIC

OTHER SIDE OF CREEK: LOOKS TO BE SAME - CANNOT CROSS CREEK

(2) PEBBLY SANDS - RIVER DEP.

(3) PARTIALLY CONSOLIDATED SANDS - BROWN - 2'

SANDY SILT - 3' (?)

PARTIALLY CONSOL SANDS - 3' (?)

COARSE SANDSTONE (PEBBLY) - 30-35'
CROSS-BEDDED
W=10 APPARENT DIP 10° N

(4) CANNOT CROSS CREEK BUT LOOKS LIKE SAME TYPE PREV: SS, SILTS, PEBBLY SANDS; DIPPING S

(5) COARSE SANDSTONE 126'+

(6) PARTIAL CONSOLIDATED PEBBLE CONGLOM

(7) SANDSTONE 15' NO GOOD BEDDING FOR DIP
W-11

FLOAT: SAME AS ABOVE BUT PARTICULATE GETTING SMALLER

SAMPLES LEFT

plotted

STREAMS AT (7) VERY DISCOLORED
(IRON RED → GRAY RED → ORANGE → CLEAR)

PEBBLY SANDS, PART CONSOLIDATED

(8) W-12 SANDSTONE 15' } LOOSE
15' + PEBBLE CONGLOM } CONSOLID
DIP - 5°

(9) PEBBLY SANDSTONE 50'

(10)
SANDS - 10-20'
GRAVELS - 10-20' } W-13
MUDSTONE - 25-30'
~DIP - 15° W - 14° STRIKE
CHANGES DIP AT SMALL RAVINE
D - 13° W 12° STRIKE

(11) W-14
PART CONSOL SANDS - 40+'
(12) PART CONSOL SANDS 30+' + MUDSTONE
SOME ISOL GRAVELS + CLAYS
(13) CONSOL MUD 20'

(14) SANDSTONES 40'
DIPPING S

(15) SANDSTONES - 75'

Plotted

9 Aug 1978

Reservoir mapping

1. Goose Creek @ big bend D/S of
R-27 Oshetna Rr. on left bank of
Susitna: left bank of creek
≈ 1/4 mi u/s of Susitna.
Jam (?) schistose quality.
Sample #1.
Moderately jointed, moderately
weathered. Schistosity N-S
50 W. Micas common w/ some
Chloritization.
Big bend on Sus is till covered
w/ out crops of rock (can't
get at) ≈ 50' high on u/s
right bank of Sus. Appears to
be the same as this outcrop
but cannot be certain.
Till ≈ 1-30' above creek.
Creek boulders from till.
Photo 1 look D/S at outcrop
Remainder needed on Goose
Ck is till covered.

9 Aug 1978 CDE BOOK 37 (11)

RESERVOIR MAPPING

2. Small Creek left bank of
R-28 Sus. Rr. ≈ 1 mi D/S of Goose
Creek: Med to large grained
diorite to qtz diorite - large
hornblende XLs. hint of preferred
orientation, clear Qtz ≈ 10%
Outcrop ≈ 150' above Susitna Rr,
both sides of creek. Some
boulders in creek are till derived
Most are bedrock derived - angular -
probably frost wedging. Creek has
not yet cut much of a valley.
Flat lying jts on 2'± spacing.
N-S joints dominant.
Sample #2, Photo 2 (right
bank looking upstream).
Right bank of Sus - Till - no
out crops. El. at mouth ≈ 100
by C.S. - Slide problem on
right bank at drawdown.

9 Aug 1978

3. Amphipolite "augen" gneiss
R-29 sample #3. Strong schostic.
Hint of "drag" folding on schistosity -
may represent shearing along cleavage.
Contact between 2 & 3 - till
covered. 2600' by C.S altimeter

4. Amphibolite - assuming continuity
R-30 down to creek. Change between
here & "U" canyon - again till
covered. Mark this creek for
look under GOM. Augen structure.
Till covering rock. Phyllitic.
Much hornblende.
"Amphibolite" schist w/ large
hornblende xls. Very similar to
number 3 above. "Augen".
personal specimen of large (½")
hornblende xl inside of augen.
Upper reaches of creek till
covered. w/ typical "U" shape.
Photo 3 look u/s. 4 & 5.
lens sounds sick.
Sample 4 taken
altimeter 3550.

9 Aug 1978 (13)

5. Amphibolite - hint of schistocity
R-31 but maybe magmatic differentiation.
Lower creek till filled.
Photo 8 outcrop on left bank
& till plain below - photos 6 & 7
of cow moose w/ calf.
Sample #6. Large hornblende
xls. Right bank of stream
appears till covered - smooth
slope. Left bank steeper w/
outcrops. Near vertical joints
prominent. N45E.
White plag, no qtz mostly
hornblende. El. 3000± by C.S altimeter
Till plain 2800'±

over

9 Aug

6. Photos 9, 10 + 11

R-32 9 look down NE trend creek coming from near Clarence Lake.

10. look straight ~~west~~ east ±

11 " up towards Clarence Lake – Large till plain all.

Fine grained + medium grained Amphibolite (?) Sample #6 occ. (?) garnet (?) in fine grained portion. Sample of both varities. El. 3350 ± by CS altimeter

7. Amphibolite – 70%-80% pure

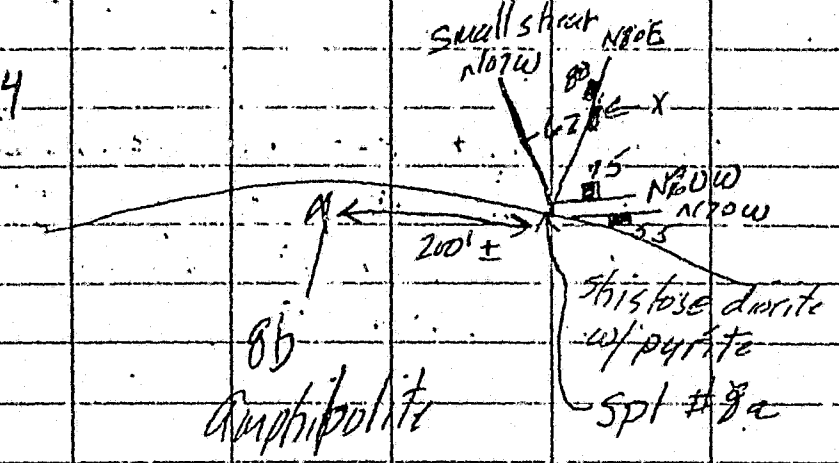
R-33 hornblende w/ very large XIs. Grades to med grained amphibolite higher. Occ. Rhodonite (poor quality) Occ. large biotite XIs in veins. (Large zone of mag diff) Qtz stringers common – no mineralization apparent. Definite game watch area Sample #7 El. 3700'

9 Aug 1978

(15)

8.

R-34



end 9 Aug 1978

10 Aug 1978 River popping in P.M only.

9. Sharp point across river (left bank)
R-35 from pt. 8.
Amphibolite (?) schist - pyrite rare but present
schistosity E-W 23S.
completely different rock than #8
sample #9 for petro.
its N83W 46N
N03E 59E
Rock moderately blocky up to 10 ft³ pieces. Mostly 50#-100#.
2800' by altimeter

10 Aug 1978

10. Mica schist (?) above
R-36 #8 on Right bank.
Alt. 3000'
Schistosity N43E 30SE
(may not be in place)

Sample #10.

Rare inclusions of some material as #9

11. 3400'± by altimeter.
schistose Medium grained amphibolite (?)
R-37 occ. garnet. on O/S point of ridge (100yd±)
schistosity N72E21S (in place?)
Qtz stringers common.
Upper 100yd finer grained

Sample #11 has a little of every thing.

12 Left bank of Sensitive
R-38 Amphibolite el. 2250 by alt.
hornblende dominant.
Quartz stringers common;
inclusions of medium grained
Lighter amphibolite common
(some material as D/S point #11 –
inclusions that is)
Qtz stringers are brittle,
equigranular, 1-2 mm, with
few impurities.
Lighter inclusions contain micas.
one sample of each.

Dominant jt. N57E 53NW

Jam?

10 Aug 1978

13 ≈ 1000' of varing forms of Jam (?)
R-39
Schistosity N54W 33SW

Various samples of everything
in sequence of rock.
Occ. qtz stringers

Sample #13

End 10 Aug 1978

11 Aug 1978

Crack 2 50' above J hole –
may be sliding
two stakes in ground
marks 5.55'
thread ~~at~~ over crack

~~Fred call Earl~~

11 Aug 1978

14. Across river & slightly
R-40 u/s of #13.

Amphibolite again but
fine grained, very mafic.
Hornblende dominant.
Some qtz stringers.
Distinctly different than
No. 13.
Schistose, occ augen
Schistosity N66W 45S
joints N77E 75N
N-S 71E
occ. gneissic structure
qtz dominant acidic

below ridge is colluvial/Alluvial
plain 300 yd N-S ~ 1 mi long.
Alt. 3100'

11 Aug 1978

15. Creek, Left bank.
R-41. Amphibolite (?) an
schist (some chlorite schist)
Mafic mass of rock is dense
hard & blocky. Schistose portions
tend to be fissile, especially
chlorite schist

Schistosity: N80E 33S

Creek has cut deeply into schist —
low resistance rock. The area
has glacial remnants.
joints (3 prominent w/ close
spacing for all)
N55W 67N
N45E 65NW (tends to arc)
N85W 60S

Alt. 2700-2800'

11 Aug '78

16 ≈ 1 mi u/s of mouth of Jay Creek
R-42 River Level. Contact between
Hornblendite & Clorite schist.

Hornblendite - blocky, dense, ~~black~~
joints N40W 85 ~~N~~ SW
N55E 39 NW
N50W 37 SW
N75E 74 S
N40E vert
E-W 45 S
occ. pyrite & purple/silver (metallic?)
mineral. Hornblende is green-black.
Hornblende ≈ 200' thick.

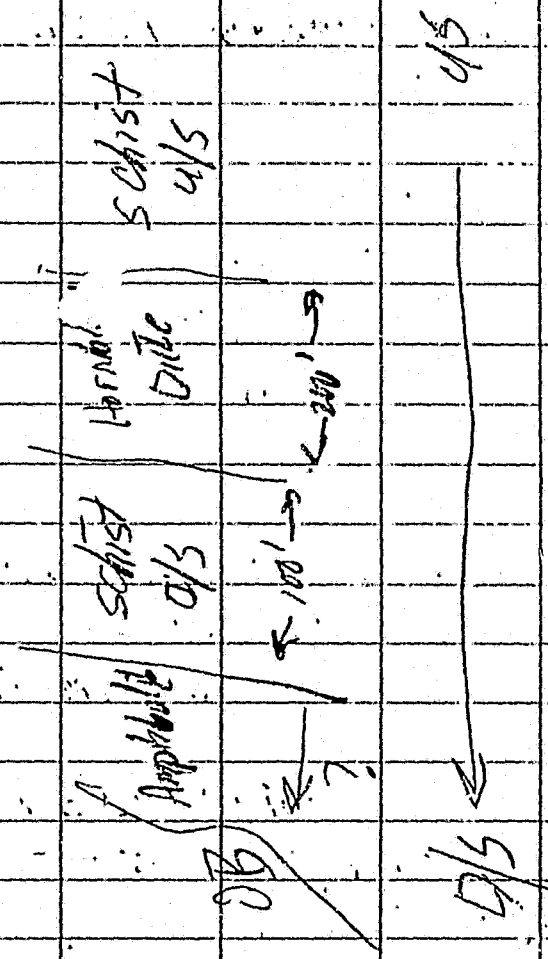
Chlorite schist D/S of
Hornblende dike.
Schistosity N40W 73 SW
jts
N40E 37 NW
N67E 77 SE

Qtz stringers common in
schist. Absent in Hornblende

16 con't 11 Aug '78

(23)

16. Sketch looking N



16 con't.

Amphibolite

joints N18E 45 E
N45W 45 SW
N50W 85 SW
N10E 40 E

17. Interbedded argillite/meta-
R-43 sandstone, Mostly argillite.
beds average 1'-3" Medium gray, hard,
Sand stone lenses in argillite.
Bedding N25W 50SW.
jts (N33W 46NE
N30W 47N
N55E 55 SE
N43E 73 NW

occ. mica.

Sand lenses - maybe stretched
as in

or possibly cross bedded as
in

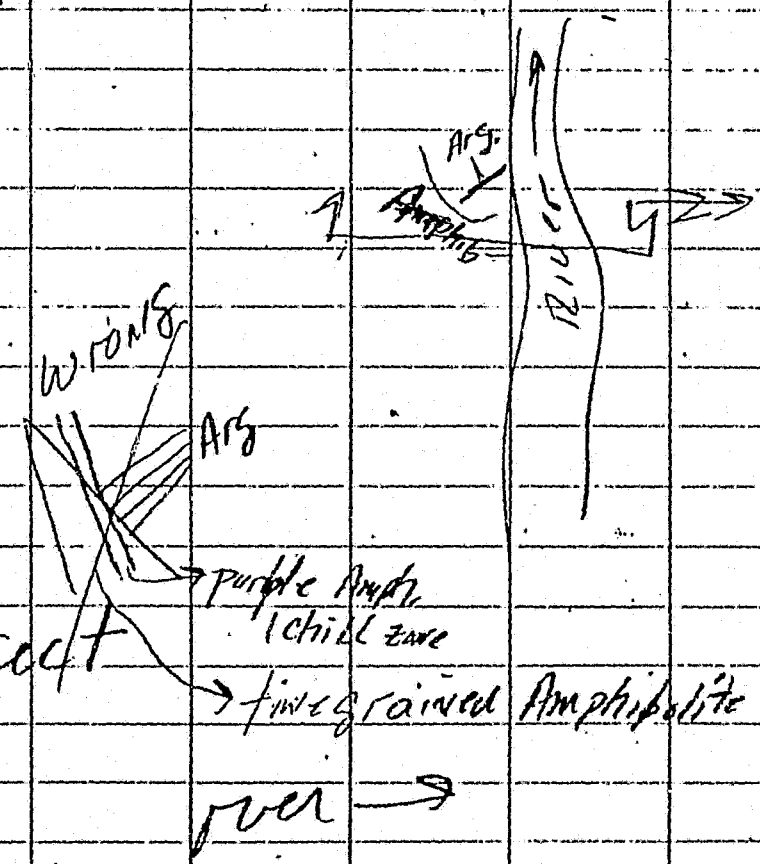
Spl. 17 includes everything

17. con't.

Rare bedding plane shearing.

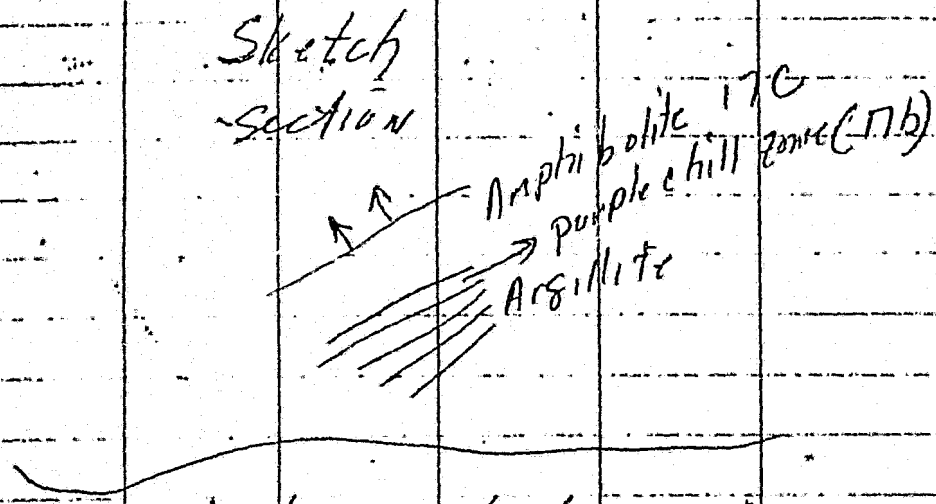
17a. 200' u/s of 17
amphibolite!

Sketch

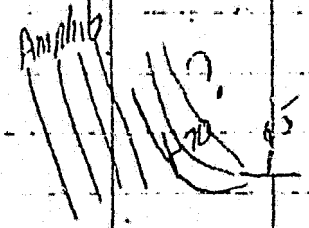
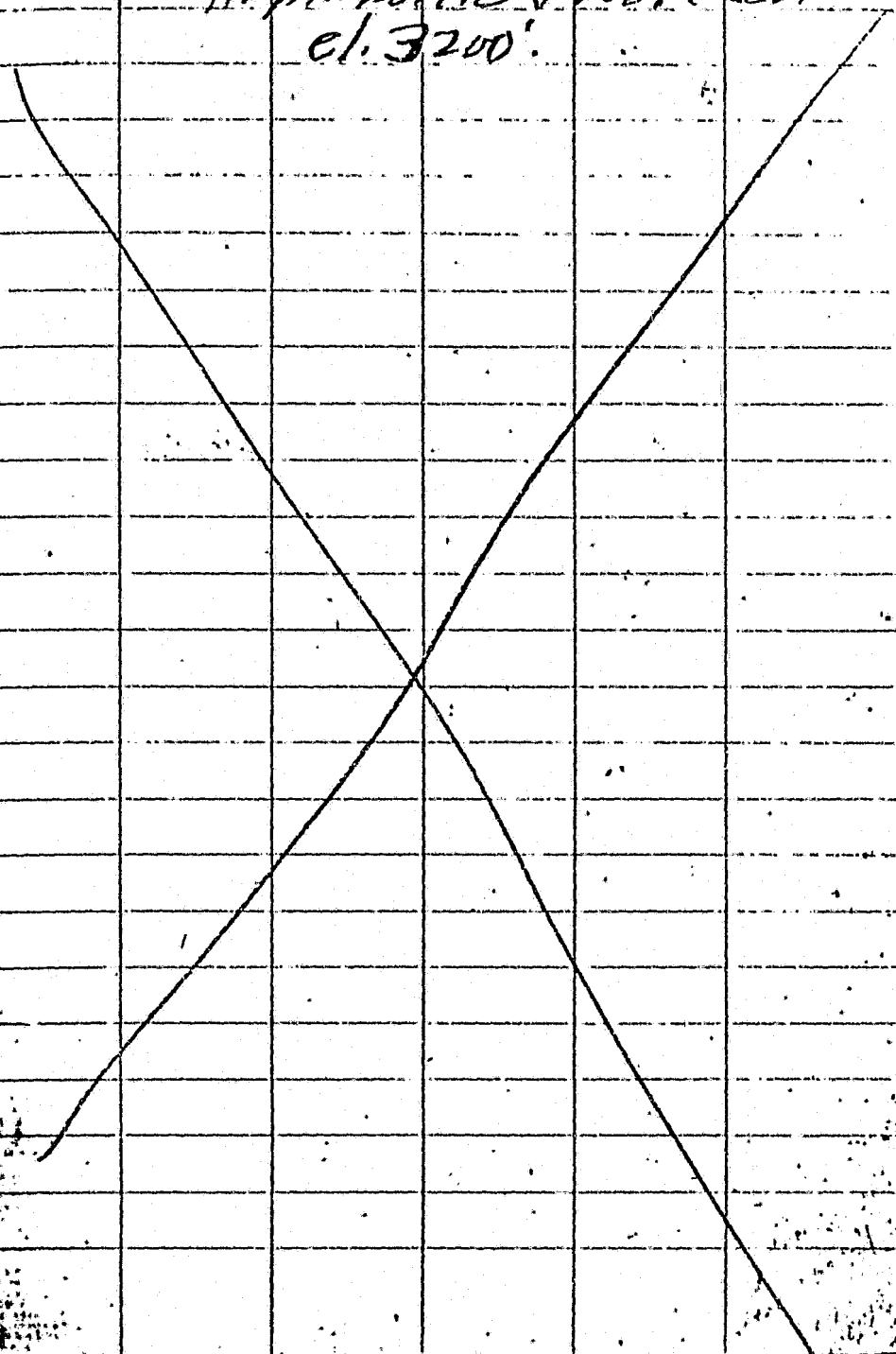


17 Con't

Sketch
-section



baked contact - elusive



18.
R-44 Contact ?
Amphibolite + meta sed
el. 3200'.