

Analogs

CNWRA #35

Bret Leslie



"At the Rain"
ALL-WEATHER
LEVEL BOOK
No. 310



BRET W. LESLIE, Ph.D.

Research Scientist

**CENTER FOR
NUCLEAR WASTE
REGULATORY ANALYSES**

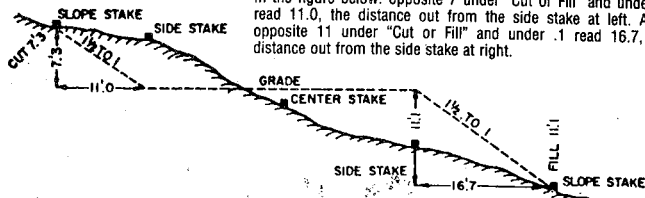
6220 Culebra Road
San Antonio, Texas 78228-0510
(512) 522-5077
FAX (512) 522-5155

SOUTHWEST RESEARCH INSTITUTE

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	Distance out from Side or Shoulder Stake										Cut or Fill
	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
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

308 --- 0199602290006
Scientific Notebook #035
Supporting the Geochemical
Natural Analog Research

"Rite in the Rain"
ALL-WEATHER WRITING PAPER ©



CNWRA

CONTROLLED
COPY *Bret Kestie* 035

Pages 1 through 53 of this Scientific Notebook were reviewed for compliance with QAP-001 in response to Corrective Action Request 94-02. Corrections and clarifications were made as appropriate. In some cases, the date of a change will reflect the date of this review rather than the date of the original Scientific Notebook entry.

Randy Zell
5/26/94
10/12/94

"in the Rain"—a unique all-weather writing surface created with shed water and to enhance the written image. Makes it easy to write sharp, legible field data in any kind of weather.

a product of

J. L. DARLING CORPORATION
TACOMA, WA 98421-3696 USA

3/2/92

Initial Entries by Bret Leslie

This notebook will document details of all fieldwork performed by me.

It will contain descriptions of field sampling activities, and any other pertinent observations made in the field.

My entries will be signified by the initials BWL.

Bret W. Leslie

3/2/92 Peña Blanca Field trip
BWL March 1-6, 1992.

Proceeded up to Santa Eulalia in two vans, one containing the Mexican officials and the other carrying the U.S. delegation. This stop south of Ciudad Chihuahua was used to provide a geologic overview of Peña Blanca area and the regional geology.

Photos were taken on the 1st roll of 24 slide film. These photos were taken primarily to document participants. Photos 1-5 were taken at two different locations at the top of the Santa Eulalia peak.

3/3/92 First day at Peña Blanca (Nopa I)
BWL

Initial readings of the pocket dosimeter were at 10 mR prior to leaving the city.

EA standards were prepared in motel room prior to leaving for Peña Blanca. These were prepared from preweighed reagents and transferred quantitatively by rinsing with water (clean) sent from SWRI to El Paso that was brought down here. They were brought up to 200 ml volumetrically. The standards are labelled STD A & B.

at level 0 Photo 6 group 12:00
Photo 7 "

Photo 8 up to level 10
workers

Photo #9 closeup on level 10
of cleaned surface

Photo #10 group of Mexican
looking east

During cleaning a borehole was discovered in the ore body it is about 2m deep with no H_2O in it.

There is also rain puddles from rainwater yesterday which may be sampled.

Photos #11 & #12 of borehole at near the edge of level 10 surface

14:30 I am going to reoccupy the boreholes that Ron Green measured on the 9/91 trip.

The device to measure well-depth is calibrated in meters & the tape measure is in feet.

I will measure both total depth & depth to H_2O
length below contact point = 30"

1" = 2.54

BWL 3/3/93

~~Borehole #~~

~~depth (m) + inches~~

Code for depth

white = 1 meter

orange = 5 meter

green = 10 meter

Blue = 50 meters

Borehole #	Depth to H_2O	Total Depth
BH-1	—	4.875 m
BH-2	—	6.875 m
BH-3	—	8.0" - 1.9"
BH-4	—	9m - 2' 3"
BH-5	—	9m + 3"
BH-5.1	—	11m - 2' 2.5"
BH-6	—	10m - 2'
BH-7	—	11m
BH-8	—	11m + 2"
BH-9	—	9m - 1' 5.5"
BH-10	—	6m - 2' 7.5"
BH-11	—	11m - 1' 8.5"
BH-12	8m - 1.5"	11m + 1"
BH-13	—	11m + 1"
BH-14	—	11m - 1' 7"
BH-15	—	1m - 8"

Borehole #	Depth to H ₂ O	Total Depth
BH-16	9m-7" ^{BWL 3/31/9}	7m-7"
BH-17	-	11m-2'2.5"
BH-18	-	7m-1'9.5"
BH-19	-	7m-1"

John Bradbury found 2 inclined boreholes
89 feet from Back wall

the distance was measured to I.
Reyes #19 on wall extending vertically
from level 10 surface

Shot to back wall N35W strike

they were covered by cement caps

they are located 2.5' apart

They are

West



East



I-BD-5

70°

N52°E

VI

B-D-5

N52°E

50°

~2m

50° & 70° are from horizontal

1m - 1'3" borehole in ore body
92-BH-OB-1

Water 19859.9g into
@ 16:45

water level is 1' below surface

The water appeared to rise uniformly
until it reached close to the
surface at which point, the level
of H₂O did not rise any further.
The drop of H₂O was immediate
from 6" to 1'.

Linda Kovach reports of dripping
water in the adit at the junction
of the breccia pipe & host rock.

This will be collected tomorrow
or will be collected long-term
by Nicks.

Left Nopal I at 4:55 PM

3/4/92

BWL 1st stop is at La Purita Spring
looking at dike in Corrales Fm

Photo #13 English

Photo #14 Jaime taking samples
Photo #15 of dike for K-Ar dating

via Philippe

Photo #16 views of La Purita Spring

Photo #17

out flow pool (#16) & flow downstream

flow \approx 1 liter/min

Location of same site where samples
of Mesa formation were obtained during
original sampling by ECP.

Two samples were taken of calcite & U minerals
Mn-oxide veins which appear to be Uraniferous
document in photos 18 & 19 calcite veins

They will be

MESA-ECP BWL

PB-BWL

MESA-ECP 3/4/92

PB-BWL

U-minerals on surface photo #20

Photo #21 cores
#22 core house at Margarita

Photos 23 & 24 are of himbos

We are now at Nopal I site
there was no water in borehole
located at the front of orebody
on level 10.

Fluid Sampling of BH-12

1 sample for pH Eh & Temp
Alkalinity
Silica

Will Take photo #9 of I Reyes
put water into #40 & take
splitters

Temp = 22.8 °C 1st draw
pH = 7.38 into Bottle #40
visible odor of H₂S

O₂ \approx 6 ppm

BH-12 ALK taken 3/92

BWL 3/4/92
~~92 BH-12~~

Sample for Silica 93-3/BH-12 Si
is unacidified no filter

EH stds 160 B mV 1st 160
280 A mV 2nd
-382 mV -213

Borehole Water level

BH-12

9m-13" is H₂O level
after 4 liters

BH-12 water acidified w/ 10ml Nitric
& filtered into Bottle #42.

Photo #16 inside to collect water
scheme

#17, #18, #19

Photo #20 of caliche WMM sampled
(ECP NOTE on p. 13)

Filtered 2nd liter & acidified into Bottle #41

@ 22:00 after returning from field

3/5/92

BWL

It was suggested by P. Goodell
that we obtain 1 liter of distilled water
from the water chemistry lab at Nacoso
University (Chihuahua)

It was collected from 5 gal. glass
bottle that was distilled yesterday. It
appears that they would be able to produce
~25 gal / 8 hours. This is only an estimate.
This sample will be analysed for the
conductivity & Si. It is presently unacidified

Sample Bottle #39 is used for distilled H₂O.

ECP 8/25/94

3/6/92 Fluid sample summary

- 2-liter samples were filtered and acidified they are in bottles # 40 & 41.
- A) 1 - 1-liter sample of distilled H_2O from UACH water chemistry lab with no acid
- B) 1 - 125ml bottle filled to brim ~~unfiltered~~ no acid for alkalinity
- C) 1 - 125ml bottle unfiltered no acid Si
- D) 1 - 125ml bottle filtered for anions
- E) 1 - 125ml bottle filtered only about 60mls total.
- F)

ECP note (3/25/92)

re: sample NOPE-BWL-1

Sample of calcite from near vertical fractures on Level 0 of the Nopal I deposit, S.W. of the ore body. collected by BWL on

3/4/92. This sample is

A duplicate of NOPE-ECP-17 which was lost in

TRANSIT. see Notebook WMA

~~ECP~~ CNWRA #22 p. 24.

ECP
5/23/92

ECP 8/25/94

9/15/92

84 8/25/94

Lathrop Wells

Field deposits & evidence

2 spots

Quarry spot

Crowe
fo

& Northern surface

NW trending feeder dike

main inner cone

on older agglutinated

old deposits

Tephra sequence

~~Base~~ Steating up Brent
cone - slope

grain size is not the way to

go to determine the source
soils

R1 Photo #1 "slope deposit" of Turrill & Champion

R1 #2 base of soil on scoria

#1 is not accordingly slope deposit but another small deposit

THD of lower soil 10,000 y

ash in new trench in Solitario
canyon.

#3 close-up of continuous

#4

erupt it is black
#5 classic Strombolian of
X section

Site 2

site #3

#3 looking to east

site #4 looking N

rills & trenches

#6 looking down slope cars

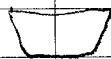
#7 looking N to Black Cone.

Smith more arguing

N-NE trending of vents on
each Black & Red Cone.

#8 true air fall scoria

uniform deposition



B. Crowe

H₂O @ 300' 93°F

mine operator well

@ Lathrop well.

#9 Flow Q44
Surge
Flow

Stop #5 Steve's Pas

#11 on Red Cone Shooting
to black

Badge #886

9/17/92 Midway Valley
Field Operating Center
Tom Biersted

Σ CP
8/25/99

no hardcopies no transcript
Trench Wall Mapping
Answer NRC staff questions

Some of it is preliminary unpublished
trench maps.

Tim Sullivan Technical Lead work for
Rush (Dwyer) Tectonics Program.

We are to review the trenches & to review
log detail & content.
conclusions will go into licensing

Quaternary faulting

Bert Swan geoMatrix

Chris Mingus USGS

NRC is 1st 15 minute presentation
then

visit H-4 Rich Spengler

1:240 results along

Host Dance Fault.

tomorrow discussion

ECP 8/25/89

Units of Quaternary mapping in
Midway Valley.

landform

height of deposits

surface morphology.

state of preservation

vegetation

6 alluvial fans Q0 → Q5

Q6 & Q7

Floodplain

Busted Butte 10% complete

Trench 14 30%

Trench 17 60-70%

long trench tomorrow 60-70% done.

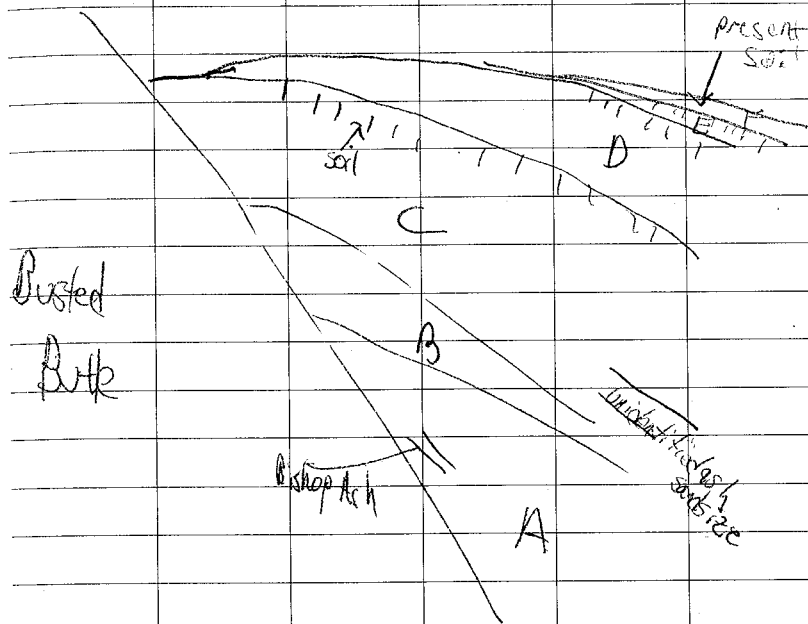
Busted Butte Ramps Cleared w/ air
Paintbrush Fault

merges w/ Stage Coach

3 new trenches on Stage Coach Road
From Ridge trench this fall
Alice Ridge

ECP 8/25/89

wash
down
↓ deposits



D & E well developed

4 inches sinking new soil
dry interphased lots of sand up here
1-2 meters of sand onto top
of B B

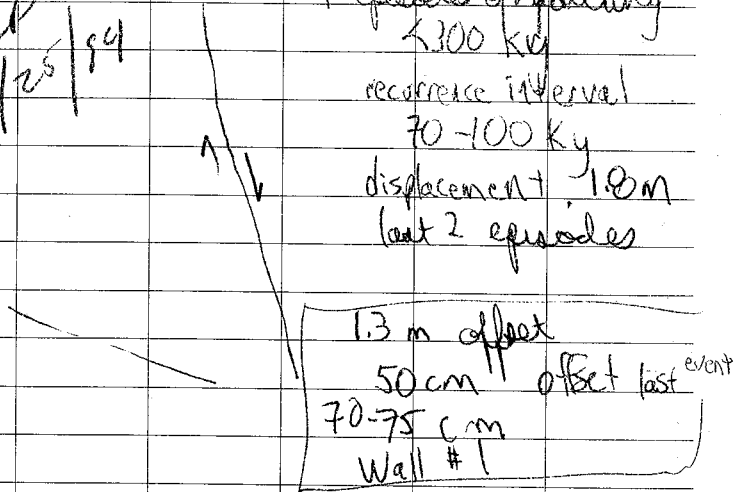
deposits blown up then worked
down

= < 700,000 years

Busted Butte
Wall #4

ECP
8/25/94

uppermost soil
not offset
4 episodes of faulting
2300 Ky
recurrence interval
70-100 Ky
displacement 1.8m
last 2 episodes



Fault exposure offsets

1.3m offset not accounted for yet
strip mapping

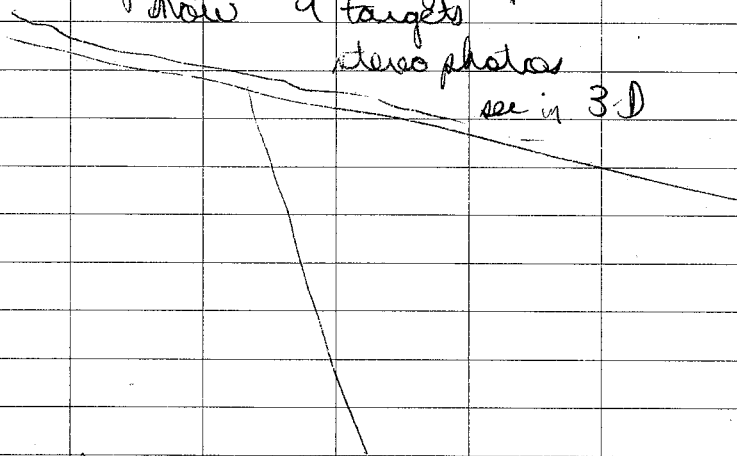
40° rake slickenside
adding 50% more displacement
due to horizontal component

exposed 4 walls w/i 150m

ECP 8/25/94

next fault segment next

Photographs show a targets
average dip 80°
stereo photos



log from photographs

B = orange

A = purple

C = pink

D = yellow

E = blue

F =

V-series

carbonate rhynomes

D soil ~~200~~ 250-300

★ pure carbonate dating

E soil 100 Ky

2CP
8/25/84

* talk to John
Stickle

soil levels above carbonate
carbonate decreases down dip of
fault discontinuous
& thin w/ depth

possibility of latter half Pleistocene
clustering
5 cm resolution with photos

Harold has photo of Wall #4 of Southval
events \approx slip displacement

420 Rockin ash is possible
Mono ashes Late Pleistocene
nearby source

fault plane $\frac{1}{4}$ - $\frac{1}{2}$
unbroken carbonate in face

2CP
8/25/84

Wall #2

hole biogenic hole with
1 meter wide fault zone
2 cm wide root cast
w/ last 50 kyr
last displacement w/ 70-100 kyr

40 kyr soils for developed soil
this is best shot for clustering of earthquakes

Wall #1

2.7 m basalt 150' in Windy Wash

on Wall 14 m offset

D&E welded on downthrown side
no D&E have on upper side

Wall #1 soil
C offsets 4 m
B soil offsets

maybe upper
down

Holocene movement only to W
of P Mtn

all or oblique is from slicks

9/17/92

Lunch stop flat front tire
changed

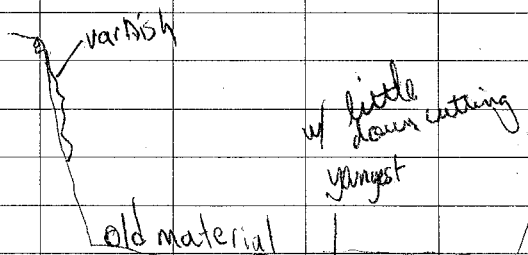
DOE had truck picked up

Flat taken to Betty

Tim Sullivan DOE arranged to have
it fixed & returned or left at some
location

Hillslope Erosion
very slow

looking at Rock Varnish
has test Pleistocene not as old
& intense as middle Pleistocene
based on Cation-ratio & varnish
dates all are old no young dates
Shull Mtn 5.6 earthquake



we assume no burial

ECF 8/25/94

ECF 8/25/94

biased selection. Looking
for rocks not turned over
or buried.

We are in active erosion cycle
if cooler vegetation & stable
assuming continuous deposition

strong Varnish Q 2, 3
early-mid Pleistocene

less varnish

Ken Veroseth paleomagnetism
on varnish.

tomorrow buried bedrock scarp

DOE Topical report on
crossed
due mid
DEC

loading now to trench 17.

talk to Stuckless on U-series dating
effort. Busted Butte pavement.
reread Szymanski report.

EC 8/25/84

MW V-T4 = Trench 14

on splay of Paint
to see if extend into Midway Valley

to calibrate Quaternary versus
Tertiary slip rate
gravity & magnetic Dave Bonds
across

3 distinct faulting
all Q3 mid to late Quat
cap of Q4

thin veneer of Q5
oldest event. clastic wedge
cumulative displacement

2.2 ± .5 m net dip slip

0.5 m/event

most recent per Q4 128-70 kyr

Q3 = 700ky - 128ky
V-series & V-trend
250-270

sol horizons used to distinguish
layers here Q3 has no calcrete
but placed there by BT horizon

EC 8/25/84

Bowridges Windy Wash some slick
in carbo

splay of
opal sample along Panther Creek Canyon
fault. Record as PCF-1

on NW side of Exile Hill

Trench 14 Box Trench

older 3 rupture periods

last 2 events 40 cm

1) no bedrock exposure

2) mismatching of units

14D in fire of this year

no obvious displacement yeslope
no major offset in Quat column

4 events in 14D EC 8/25/84

Total offset ~~about~~ 15 cm

Q4

Pink flags are brown

yellow soil

Q3

blue - tect

Q2 at bottom of Y's scarp

N5E dipping SE 30

fault filled w/ carbonate

plunges 19 to 5

30-65

→ left lateral

max 58 cm/cy

9/17/92

Chris Spangler

ECP 8/25/94

Ghost Dance Fault

mapping in Tertiary

in Tiva Canyon

Scott & Bond 1:1200

north of this

1:5000 Chris Barton

1:240 of Ghost Dance Fault

south from Antler Ridge

to past

3800 feet.

61 200' x 200'

corners surveyed in

6' or more = fracture

resolution of 3' offset in plane view

745 fractures

N10W

Prelim 4 slopes

3-6 anastomosing faults w/ system each contain breccia

Type 1 brecciated 200-400 wide

80-160 ft offset

5-120 individual

width of fault zone 700' wide

Float of basal vitrophyre

ECP 8/25/94

Type 1 Breccia clastic supported

crushed zone

merges w/ matrix-supported

carbonate Type 2

sculpt-facings ridge better mapping
clean

BB6

B₂

ECP 8/25/94

7/18/92

ELP 8/25/94

Find a site free of significant Q faulting
5cm or less < 100 Ky
edge of Exile Hill

John Westling = Quaternary mapping

Q3 mid-Pleistocene 2 pits

Q5 Holocene

1:6000 aerial photographs
Don't have map

shape

geomorphic

vegetation

preservation of morphology

pavement

varnish development

Yucca Wash degrading landforms
distribution

Northmost oldest 2 surfaces
large fans

Southern part oldest Q3 Q4, Q5

Q0 is oldest just 1 little pit

Q1 older is well-developed

calic = 5m

2nd silica laminar

ELP 8/25/94

Q2 well developed desert pavement

Q3 dark varnish diffuse
basal wale topography

Q4 varnish less good point

Q5 Holocene little pavement
poor soil

minimum age of deposit

35 soil pits

about 1/2 described

Q3 well developed
not alot of carbonate stage 2
BT horizon is being used

carbonate = K

no BT in Holocene

as we are getting variable

John Bell questioning

Quaternary stratigraphy controversy

Q5 over Q3 yet

different elevation not the
same Q3

ECP 8/25/84

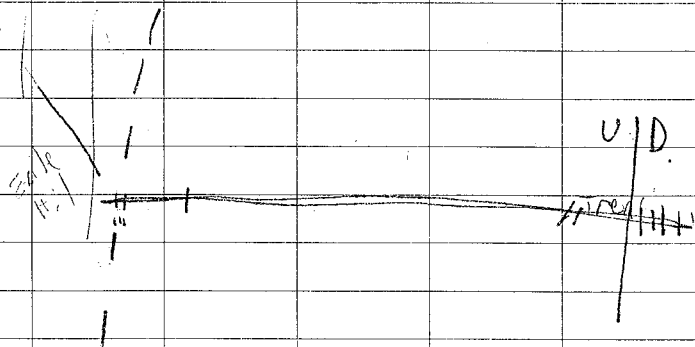
only checked 1 lineament directly
but long trench covers it
down to west block

expecting Tertiary displacements
structure into mid of Valley

detailed mapping of Exile Hill 1:200
NW trending - then 20-30° down to East
into Tertiary

ECP 8/25/84

fractures in caliche
but wrong trend @ N30E
bedrock step // trend of hill
construct ESF and start NOV2



fracture not fault
evidence for no vertical offset

scale 1:40 mapped

ECP 8/25/84

Dave Ponce density & magnetic
properties

between steep gradients
only between Fremont Bridge (Busted
Butte

Middle of Valley there is a kick

200' offset on Paintbrush in
gravity data at Trench doesn't show
strong evidence for Midway Valley
clear in magnetics that Midway Horst is
Middle of Valley.

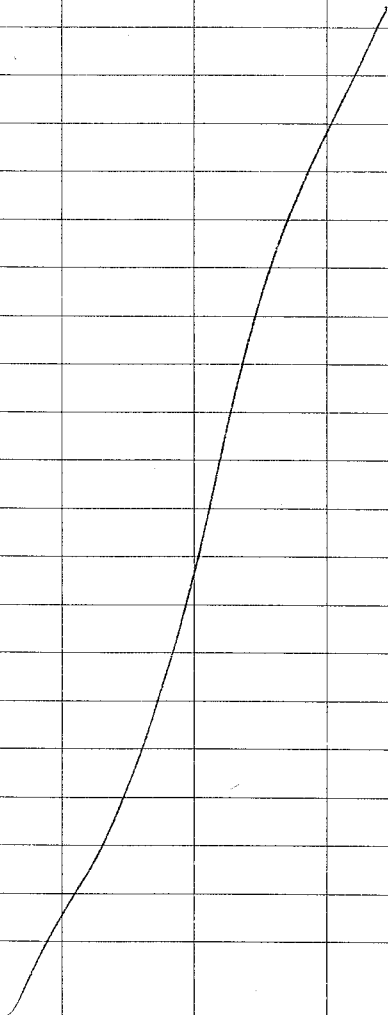
Gravity modeling supports
Tiva & Topopah members

50-100 m trench across most
prominent feature after gravity

NRG-1 Fracture study upper lithophysical
of Tiva Canyon

ECF 8/25/94

June 29th Furnace Creek CalO₂ sample FC-1
Earthquake
LLNL, USGS Golden, Reno Lab
1 1/2 day after Landers
Ken Smith at Reno Lab:



ECF 8/25/94

9/19

Trench B in Solitaire Canyon
west side

basaltic ash from fissure
in Bow Ridge, Windy Wash
ash from Lathrop well
in open boulder matrix
Wind Blown in

eruption-time in fissure
simultaneous

little mixing between ash
not the most recent faulting
event. not heavily carbonate
cement

QTA previously called
surface to 1/2 m late Black Cone
Photos 12-16 Trench B

Photos 17 & 18

Test Pit 5 m south of B
showing alluvium into
arques 20-30 cm displacement
rotation of material opal
contains maybe Holocene

#19 offset

some opal
using low sun-angle #20 #22

ECF
8/25/84

SCF#2

2 extensional gashes with
downslip from
50° dip

airfall
below tuff

this exposure
is on level of fault

buried

most recent #23 up thru
alluvium

#24

#1 tension gash w/ ash

ECF 8/25/84

Trench CF-1 called part of
Windy Wash
now called Fatigue
Chris Minges will work on
this

youngest Holocene not displaced
back tilting into fault
pockets of basaltic ash

(F-2 is thermoluminescence
N: of #10 & #11 fault Fatigue
strike slip?)

ECF 8/25/84

9/19/92

EC 8/25/99

1500 - 2300 ft in ground H₂O
Mercury Valley = Las Vegas Shear Zone

Tertiary undeformed
Spry Mtn ss & shales oldest

SE is younging Penn

NN is Red Mtn carb

upper aquifer

Alluvium

S

upper aquifer

carbonates

walkable aquifer

Evaporite

clastes

15,000' carbonate

Lower

aquifer

mid

lower

EC 8/25/99

3/22/93

Bret Leslie

Nopal I

checking boreholes to see if H₂O still in them.

Ignacio Reyes indicates last rain was 12/92. The

numbering system, as I recall is based upon #s on +10 m wall. In the past, BH-2 was contained H₂O and a few others have been wet.

Code for depth:

White = 1 m

Orange = 5 m

Green = 10 m

I will first check the Olympic Well probe. Test is positive.

Note the depth below contact point is 78 cm.

3/22/93 BWL

Borehole #	Depth to H ₂ O	Total Depth
BH-1		
-2		
-3		
-4		
-5		
-6	dry	10.28
-7	damp	10.78
-8	dry	10.95
-9		8.75
-10		3.86
Black -11	11.1 m	10.25
2/24/93 -12	9 m	11.29 m
1045 -13	ECP	11.29 m
-14	8/25/94	10.38
-15		
-16		
-17		
-18		
-19		

Depth to H₂O &
 Total Depth just read not corrected
 in any manner
 BH-12 is located between 14 & 15
 on + 10 m wall

3/23/93

Nopal I Butlerie
 preparation of adit dripping
 fracture collection and H₂O sampling.
 Nanopure H₂O from SWRI was transported
 to the site and will be used in all
 manipulations. A five gallon container
 from 3/92 visit will be used as last
 resort. It has remained sealed and
 stored in the mouth of the adit since
 that time. It will be necessary to
 acidify sample water and to wash
 garbage bag down with acidified
 water as well.

1100-25+78

Nitric Acid to be used is Lot # E20056
 Approved 2/24/92 Bruce Malbrino

pH Buffer solutions

pH 7 Lot # 913188-24

pH 10 Lot # 910863-24

pH 4 Lot # 91379-24

Note buffers will expire in
 8/93 so, perhaps next trip
 down will require new buffers.

3/23/92 BWC

Acid solution to be used in squirt
bottles will be 10 ml concentrated HNO_3
in 1000 ml diluted to 1000 ml with nanopure
 H_2O .

This is accomplished with addition using a
variable volume Oxford pipet set to 10 ml
and added to the 1000 ml volumetric flask.

Bottle A39301 is being used as DIW
container.

Bottle A39305 will be used to store
acid solution.

313A0-1 collected from acid fracture with 200 ml
PM DIW & 100 ml of 1% HNO_3 solution. Fracture @ 12/28

Sampling BH-12 Standardization of pH
electrode:

used pH 7 & pH 4 buffer solution
with ATC Accumet Series 11000 meter
and combination electrode.

Temperature 26°C

temperature is rising fastly

pH 4 = 4.00

pH 7 = 7.00

slope = 58.47 @ 26.6°C

Scheme drop done & up
into holder
valve in closed

O_2 chemit bit	25 ml	cup for pH Eh
H_2S via syringe	20 ml	
1st Alkalinity	2	60 ml Full
Hall Silica	60 ml	
Nutrient	dark	125 Filter

Rest to filtration

First try lost entire liter
2nd time only 300 ml
Dissolved O_2 1 ppm

pH = @ 1 min 7.30
after 10 minutes 7.36

Temp:

Eh A = +275 mV @ 23.9°C
Eh B = +161 mV 24.7°C

Sample = + 89 @ 2 min 133 @ 2 min

3/23/93

2nd try was ~500 ml

3rd try was ~700 ml

We will remeasure the depth to H_2O tomorrow and sample if possible.

It rained twice for a total of 35 minutes at 7:15 PM & 10:00 PM.

This was first rain since 12/19/92

3/24/93

	Depth to H_2O	Total depth
BH-12	9.30 m	10.74 m

on 9:10 AM

1st Try - 300 ml measured O_2 , H_2S , pH, Eh, Temp, 2 Alkalinities (393BH12-1, -2)

1 Silica Sample (393BH12-3) 393HS-1 = 19 ml

part of 1st (~50 ml try filtered (Fil-1))

2nd Try ~500 ml all of which filtered 0.45 micron filter size (Fil-2)

125 ml used for anions and stored in dark PP bottles as 393BH12-4.

3rd Try Sample 393BH12-5 and 393BH12-6.

"-5 is part of draw #2. Both have 10.0 ml of concentrated HNO_3 added and were filtered using 0.45 micron filter. (Fil-3)

3/24/93

Remeasure & resampling BH-12

at 9:10 AM

BH-12

Depth to H_2O
9.30 m

Total depth
10.74 m

total depth is what is read and has not been corrected for loader below copper (78 cm).

pH meter restandardized with pH 4 & 7 buffers
slope 58.42 @ 18.8°C

AT 9:30 AM withdraw 900 ml 1st Try

O_2 first $\ll 1$ ppm

H_2S is much stronger today
first H_2S draw after O_2

is 3/24/93 BH-12 H_2S -1
consists of 1 ml Znacolor & 19 ml H_2O
just as yesterday

pH = 7.27
after 5 min

pH = 7.30
after 10 min

T = 23.1°C
after 10 min

3/24/93

BWL Took 60 ml Alkalinity Sample
393BH12-7

60 ml silica sample = 393BH12-8

125 ml anions sample = 393BH12-9

32493 Fil-1 Filter kept

Eh A = +298 @ 22.2°C

Eh B = +173 @ 21.4°C

2LP8/25/84

Eh = 215 @ 23.2°C after 10 minutes

202

155 @ 24.2°C after 45 minutes

10:45 AM BH-12 = 9.48 m depth to H₂O

2nd draw 500 ml

Eh = -32 @ 2 min -47 @ 5 min -45 @ 10 min

T = 22.7

pH = 7.26 @ 23.7°C

H₂S-2 3/24/93 BH-12 H₂S-2

Depth after 2nd draw = 9.60 m @ 11:30

32493 Fil-4 & 32493 Fil-5 are 4th & 5th filters used.

393BH12-10 is part draw #1 & #2

acidified with 10 ml HNO₃ and
filtered with 0.45 micron filter

Level 0 adit photos

#2#6 at edge of ore body
sample of EW fracture 13.5 m N
some 5 cm away from edge of
ore-body

7-10 at 5 m on ceiling
rad badge scale on 13.5 m N fracture
SW adit

photos 11-14 80 cm from edge of fracture
rad badge scale

15-17 photos at 6.3 on SW 50
arm of adit along 135 m N
fracture
90% Rel Humidity
59.8 °F

18-20 at 11/36 rad badge

21-22 at 8/36

23-24 at 7/36

3/24/93 BWL

Sample 393-5.2/35.7/1.0 was collected from a fracture whose orientation is N10W. It is crumbly red material collected at waist level at was temporarily labelled as 7/36 in the adit under poor lighting conditions.

Sample 393-7.4/36.0/2.0 was collected from the ceiling in a fracture whose orientation is N70E. The material was dry and sample temporarily labelled 8/36, while in the adit.

Sample 393-11.6/30.0/1.7 was crumbly wet soil like fracture-filling material collected from eye-level along the NE wall. This was temporarily labelled as 11/30, while in the adit, under poor lighting conditions.

Sample 393-12.2/45/2.0 is fracture material collected from the ceiling about 5 cm from the edge of the orebody. This fracture system is laterally continuous for 10's of meters.

Sample 393-11.2/14.7/1.5 is fracture-filling material collected from eyelevel from the same "13.5" on +10m level fracture.

3/24/93 BWL

Sample 393-5.0/14.2/2.0 is part of the fracture and associated wall-rock of the fracture. This was collected from the center of the ceiling and is similar to samples taken at 4.5m E along 13.5m N fracture on the +10 level. This will allow for sampling on a mm scale.

Sample 393-3.2/14.0/1.7 is more of the fracture-fill from the "13.5m N" fracture which was collected from eyelevel.

Note that all of "13.5m N fracture" material was entirely dry, unlike material collected in the NNE trending arm of the adit (i.e. samples ³⁹³5.2/35.7/1.0 & 393-7.4/36.0/2.0, 393-11.6/30.0/1.7).

8/25/94
ZCP

7/28/93

BWL

at Nopal I on Level +10m

In an effort to follow out fracture (E-W) at "13.5m North" away from deposit a further 5 meters have been cleared. At about -10m E the fracture system becomes much more complicated as there appears to be several smaller splays of the fracture. The width of splays is smaller and they are much less well defined than the main fracture further east.

Samples of the fracture filling are almost impossible to obtain, since fracture width is 1 mm on the splays. Thus most of the following samples have sizable portions of wall rock attached to fracture fill material. Further separation of samples in the lab are necessary prior to any analysis.

Samples were taken at

793-(-10.07)/14.7 is fracture fill material

7/28/93

BWL

Sample 793-(-11.07)/14.75 is fracture fill material & wall rock

Sample 793-(-11.23)/14.91 is fracture fill material & wall rock.

Sample 793(-11.81)/14.95 is fracture fill material & wall rock.

Sample 793-(-12.2)/15.17 is fracture fill material and wall rock

Sample 793-(-13.1)/15.2 is fracture fill material & wall rock.

It now appears, with the additional 5 m of clearing that this fracture system dies off and is probably not related to fracture at 10/7 on wall between level 10 & level 20.

4 large samples (>1 gram) were taken of the fracture fill material by prying out 1 side of wall rock to a depth of 8-10 cm.

7/28/93

BWL

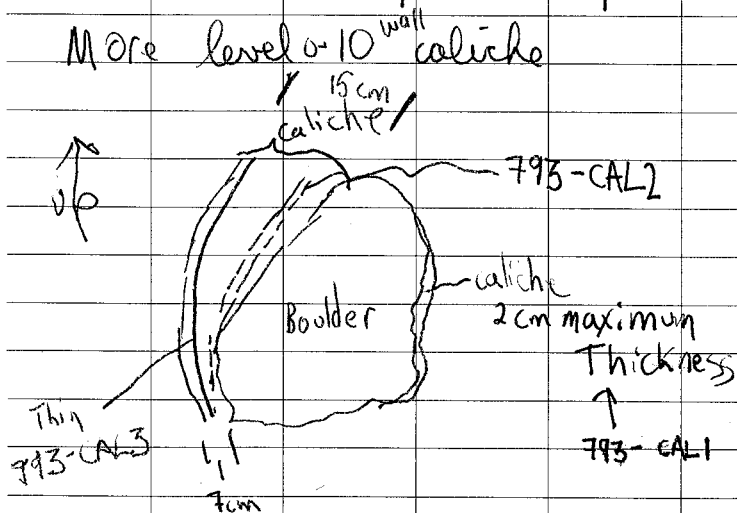
The material was then scraped
or flaked off.

793-4.6/13.8 is fracture fill material

793-6.1/14.0 is fracture fill material

793-8.4/13.8 is fracture fill material

793-10.0/13.5 is fracture fill material.



Photos on roll 2 taken of area
5-9

Notes on these caliches
on the natural slope leading
down from level 10 to level
zero just east of deposit there is
abundant caliche float and
caliche parallel to pile-slope
at the edge of the road near
Narrows #51 on wall between
level 0 & level 10 almost all
surfaces have some carbonate
deposited. Detrital grains are
from silt to sand and appears
to be detrital rich with some
layers more carbonate rich
Two of the more rich (CaCO_3)
portions of a 7cm-15cm vertical
deposit were collected (CAL28 CAL3)

An additional 1cm thick layer
was collected on vertical face
of boulder.

Activities documented in this notebook were concluded due to Bret Leslie's leaving the NWRA.

This notebook is hereby turned over to QA records.

DJP

12/20/95

(David Pickett)