Analogs

CNWRA #35

Bret Leslie

"Rite in the Rain"
ALL-WEATHER
LEVEL BOOK
No. 310

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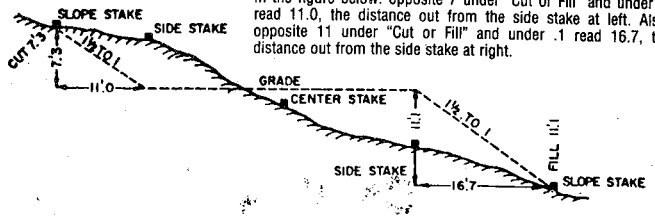
SOUTHWEST RESEARCH INSTITUTE

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	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

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Scientific Notebook #035
Supporting the Geochemical
Natural Analog Research

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

CNWRA
CONTROLLED
COPY 035 Bret Leslie

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 Fedor 10/24/94

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le to write sharp, legible field data in any kind of weather.

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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 my 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 carried 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 films. 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 (Nopal I)
BWL

Initial readings of the pocket dosimeter were at 10 mRem prior to leaving the city.
EH standards were prepared in motel room prior to leaving upon 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 200ml 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 clearing a borehole was discovered in the orebody 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	—	8.0m - 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_2O	Total Depth
BH-16	~~9m-7"~~ BWL 3/31/19	1m-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
O	O
I-BD-5	NI
70°	B-D-5
N52°E	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 H_2O did not rise any further. The drop of H_2O 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 Nacho.

Left Nopal I at 4:55 PM

3/4/92

BWL 1st stop is at La Parita Spring looking at Dike in Corrales Fm

Photo #13 English

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

Photo #15

Photo #16 views of La Parita Spring

Photo #17

out flow pool (#16) & flow downstream

flow ≈ 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 bimbos

We are now at Nopal I site there was no water in borehole located at the front of ore body 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 splites

Temp = 22.8 °C 1st draw into Bottle #40

pH = 7.38

visible odor of H_2S

O_2 ≈ 1 ppm

BH-12 Alk taken 3/92

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

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

Eh s+ds 160 B mV 1st 160
280 A mV 2nd
-382 mV -213

Borehole Water level
BH-12
9m-13" is H_2O 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. 15)

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 Nacho's university (Chichuahua)

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 H_2O.

ECP 8/25/94

3/6/92 Fluid sample summary
2-liter samples were filtered and
A) acidified they are in bottles #
40 & 41.
B) 1-1-liter sample of distilled H_2O from
UACH water chemistry lab with
no acid
C) 1 - 125ml bottle filled to brim unfiltered
no acid for alkalinity
D) 1 - 125ml bottle unfiltered no acid SI
E) 1 - 125ml bottle filtered for anions
F) 1 - 125ml bottle filtered only about
60mls total.

ECP note (3/25/92)
re: sample NOPE-BWL-1
Sample of caliche from vein
vertical fractured 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 WMM
~~ECP~~ CNWRA #22 p. 24.
ECP
5/25/94

ECP 8/25/94

ECP 8/25/94

9/15/92 Lathrop Wells

Field deposits & evidence
2 spots Quarry spot
Crowe & Northern surface
fo

NW Trending feeder dike
main cinder cone
on older aglutinated
cold deposits
Tephra sequence
~~[illegible]~~ Beating up Brent
cone - slope
grain size is not the way to
go to determine the source
soils

R1 photo #1 "slope deposit" of Turrin & Champion
R1 #2 base of soil on scoria

#1 is not accordingly slope deposit but another small deposit
TLD of lower soil 10,000 ky

ash in new trench in Solitario
canyon.

#3 Close-up of continuous

#4 erupt it is black
#5 Classic strombolian of
Xsection

site #3
~~#3~~ looking to east

site #4 looking N
rills & trenchs
#6 looking down slope cars
#7 looking N to Black Cone.

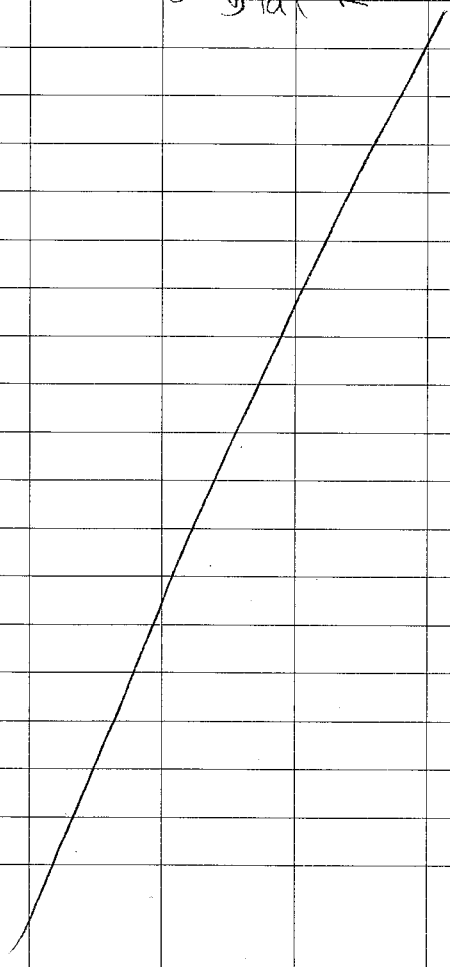
Smith more arguing
N-NE trending of vents on
each Black & Red Cone.

#8 true air fall scoria
uniform deposition
B. Crowe
H_2O @ 300' 93°F
mine operater well
@ Lathrop well.

site 2

#9 Flow Q24
surge
Flow

Stop #5 Steve's Pas
#10 #11 on Red Cone Shooting
to black



Badge #886

9/17/92 Midway Valley
Field Operating Center
Tom Biersted
no hardcopies no transcript
Trench Wall Mapping
answer NRC staff questions

ECP 8/25/99

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
Ghost Dance Fault.
tomorrow discussion

ECP 8/25/89

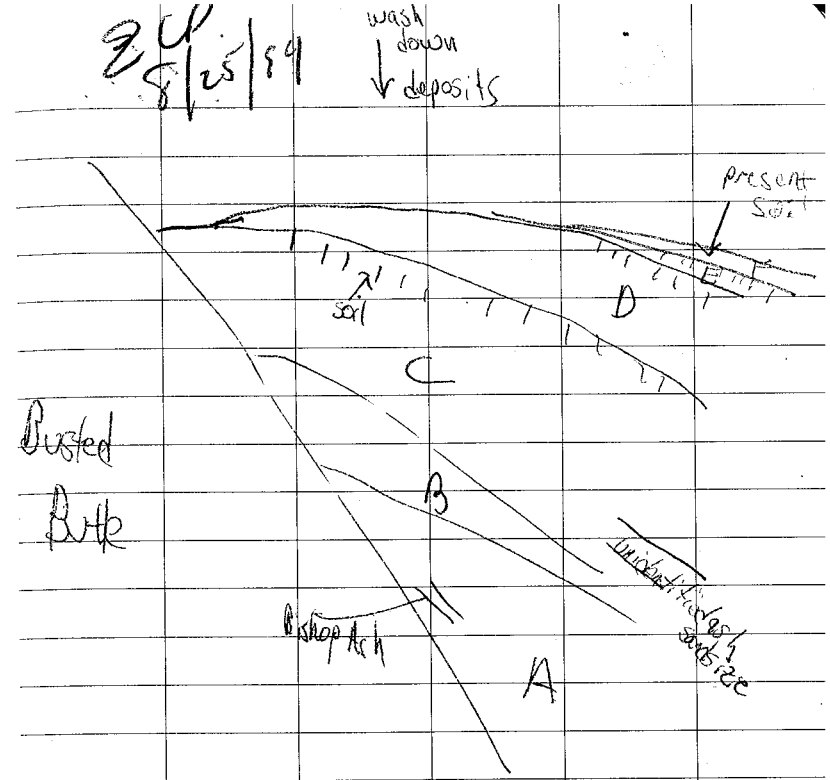
Units of Quaternary mapping in Midway Valley.
landform
height of deposits
surface morphology.
state of preservation
vegetation
6 alluvial fans Q0 → Q5
Q6 & Q7
↑ floodplain

Busted Butte 10% complete
Trench 14 30%
Trench 17 60-70%

long trench tomorrow 60-70% done.

Busted Butte Ramps Cleared w/ air
Paintbrush Canyon Fault
merges w/ Stage-Coach
3 new trenches on Stage Coach Road
From Ridge trench this fall
Alice Ridge

ECP 8/25/89



D&E well developed

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

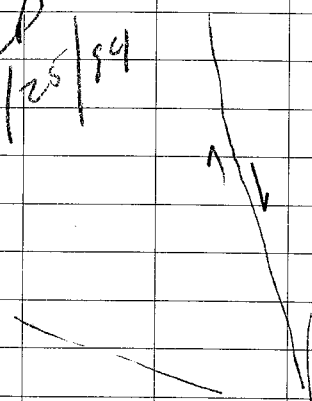
deposits blown up then reworked down

= < 700,000 years

Busted Butte
Wall #4

ECP 8/25/94

upper most soil
not offset
4 episodes of faulting
<300 ky
recurrence interval
70-100 ky
displacement 1.8m
last 2 episodes



1.3 m offset
50 cm offset last event
70-75 cm
Wall #1

Fault exposure offsets

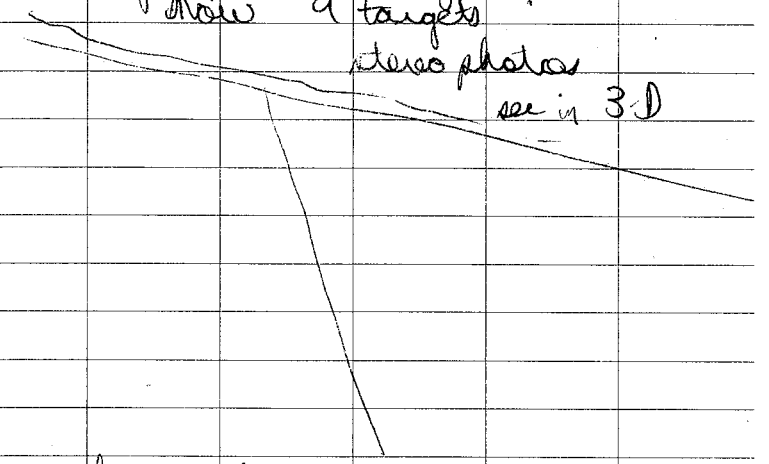
1½ m offset not accounted for yet
strip mapping
40° rake slickenside
adding 50% more displacement
due to horizontal component

exposed 4 walls w/i 150 m

ECP 8/25/94

next fault segment next

Photographs average dip 80°
show 9 targets
stereo photos
see in 3-D



log from photographs
B = orange
A = purple
C = pink
D = yellow
E = Blue
F =

U-series

carbonate rhizomes
D soil ~~200~~ 250-300
☆ pure carbonate dating
E soil 100 ky

ECP 8/25/94

John

☆ talk to Stickless

soil levels above carbonate

carbonate decrease downdip of fault discontinuous & thin w/ depth

possibility of latter half Pleistocene clustering

5 cm resolution with photos

Harold has photo of Wall #4 of Southwal

events ? = slip displacement

420 Rodin ash is possible

Mono ashes Late Pleistocene nearby source

fault plane 1/4-1/2

unbroken carbonate in face

ECP 8/25/94

Wall #2

hole biogenic hole with 1 meter wide fault zone

2 cm wide root cast w/i last 50 Kyr

last displacement w/ 70-100 Kyr

40 Ky soils for developed soils

this is best shot for clustering of earthquake

Wall #1

2.7 my basalt 150' in Windy Wash

on Wall <4 m offset

D&E welded on downthrown side

no D&E have on upper side

Wall #1 C soil offsets 4 m

B soil offsets

maybe upper down

Holocene movement only to W of Y Mtn

all of oblique is from slicks

EAP 8/25/94

9/17/92

Lunch stop flat front tire changed

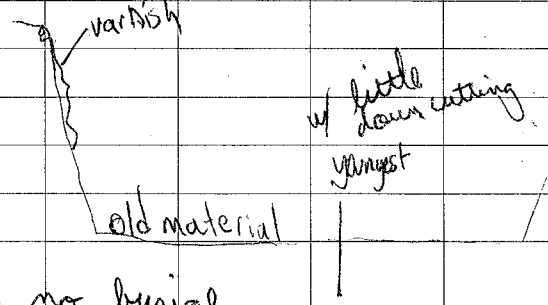
DOE had truck picked up

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
Holocene Pleistocene not as cold & intense as middle Pleistocene
based on Cation ratio & varnish dates all are old no young dates
Skull Mtn 5.6 earthquake



we assume no burial

EAP 8/25/94

biased selection. Looking for rocks not turned over or buried.
We are in active erosion cycle
If cooler vegetate & stable.
assuming continuous deposition

strong Varnish Q 2, 3
early-mid Pleistocene
less varnish
Ken Neroult paleomagnetism on varnish.

tomorrow buried bedrock scarp

DOE Topical report on erosion
Quaid
Dec

heading now to trench 17.

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

ECP 8/25/84

MWV-T4 = Trench 14
on splay of Paint
to see if extend into Midway Valley

to calibrate Quaternary versus
Tertiary slip rate
gravity & magnetics Dave Ponce's
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 dipslip
0.5 m/event
most recent per Q4 128 - 70 kyr
Q3 = 700Ky - 128Ky
U-series & U-Trend
250 270
soil horizons used to distinguish
layers here Q3 has no calcrete
but placed there by BT Harrington

ECP 8/25/84

Bow Ridge & Windy Wash some slick
in caliche splayed
opal sample along Paintbrush Canyon
fault. Record as PCF-1
on NW side of Exile Hill
Trench 14 Box Trench
3 rupture periods
last 2 event 40 cm
1) no bedrock exposure
2) mismatching of units
14D in face of this year
no obvious displacement upslope
no major offset in Quat colluvium

4 events in 14D ECP 8/25/84
Total offset 145 cm

Q4 Pink flags are bouncy/
yellow soil
Q3 blue = tect
Q2 at bottom of Ws scarp
N55E dipping SE 80
fault filled w/ carbonate
plunges 19 ⊗ 5
20-65
⇒ left lateral max 58 cm/ev

ECP 8/25/84

9/17/92 Chris Spangler

Ghost Dance Fault

mapping in Tertiary

in Tiva Canyon

Scott & Bonk 1:1200

north of this

1:5000 Chris Bartos

1:240 of Ghost Dance Fault

south from Antler Ridge

to past

3800 feet.

61 200'x200'

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/i

system each contain breccia

Type 1 brecciated 200-400 wide

80 ft/60 ft offset

5-120 individual

width of fault zone 700' wide

Float of basal vitrophyre

ECP 8/25/84

Type 1 Breccia clast-supported

crushed zone

merges w/ matrix-supported

carbonate Type 2

ridge

south-facing better mapping

clear

886

B'

ECP 8/25/84

ECP 8/25/84

7/8/92

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

John Westling = Quaternary mapping
Q3 mid-Pleistocene ? pits
Q5 Holocene
1:6000 aerial photographs
thanks base map

shape	preservation of morphology
geomorphic	pavement
vegetation	varnish development

Yucca Wash degrading landform
distribution
Northernmost oldest ? surface
large fans

Southern part oldest Q3 Q4, Q5
Q0 is oldest just a little bit
Q1 older is well-developed
calcic = 5m
2nd silica laminar

ECP 8/25/84

Q2 well developed desert pavement

Q3 dark varnish diffuse
bar & swale topography

Q4 varnish less good pavmt

Q5 Holocene little pavement
poor soil

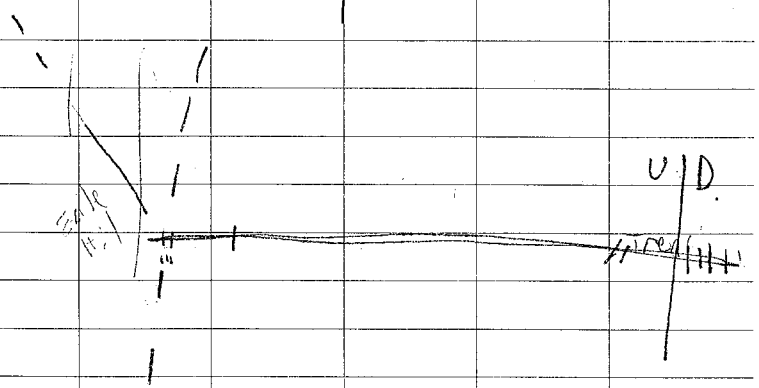
minimum age of deposit
35 soil pits
about ½ described

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 quantifying
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 blocks
expecting Tertiary displacements
structure into mid of Valley
detailed mapping of Exile Hill 1:200
NW trending - thru ~~20-30m down to East~~
cuts Tertiary
ECP 8/25/84
fractures in coalluvium
but wrong trend @ N30E
bedrock step // trend of hill
construct ESF pad start NOV2



fracture not fault
evidence for no vertical offset

scale 1:40 mapped

ECP 8/25/84

Dave Ponce density & magnetic properties

between step gradients
only between Frambridge (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 member

50-100 m trench across most
prominent feature after gravity

NRG-1 Fracture study upper lithophysal
of Tiva Canyon

ECL 8/25/54

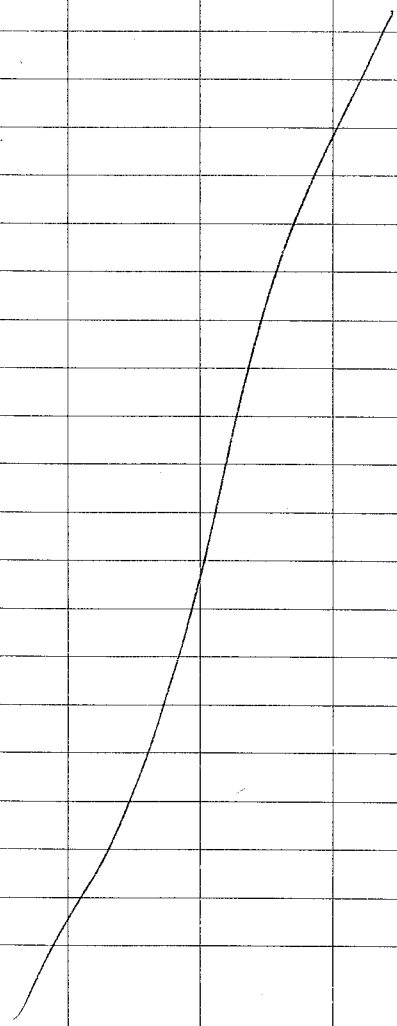
Furnace Creek $CaCO_3$ sample FC-1

June 29th Earthquake

LLNL, USGS Golden, Reno Lab

1½ day after Landers

Ken Smith at Reno Lab:



ECL 8/25/54

9/19

Trench 8 in Solitaire Canyon

west side

basaltic ash from fissure in Bow Ridge, Windy Wash

ash from Lathrop Wells 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 ½ m late Black Cone

Photos 12-16 Trench 8

Photos 17 & 18

Test Pit 5 m south of 8

showing alluvium into

argues 20-30 cm displacement

rotation of material opal

contains maybe Holocene

#19 offset

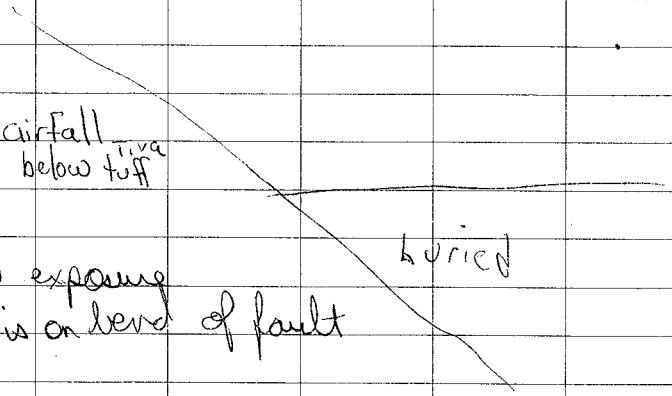
some opal

using low sun-angle #20 #22

ECP 8/25/84

SCF #2

2 extensional gashes with downslip from 50° dip



this exposure is on level of fault

most recent #23 up thru alluvium

#24

#1 tension gash w/ ash

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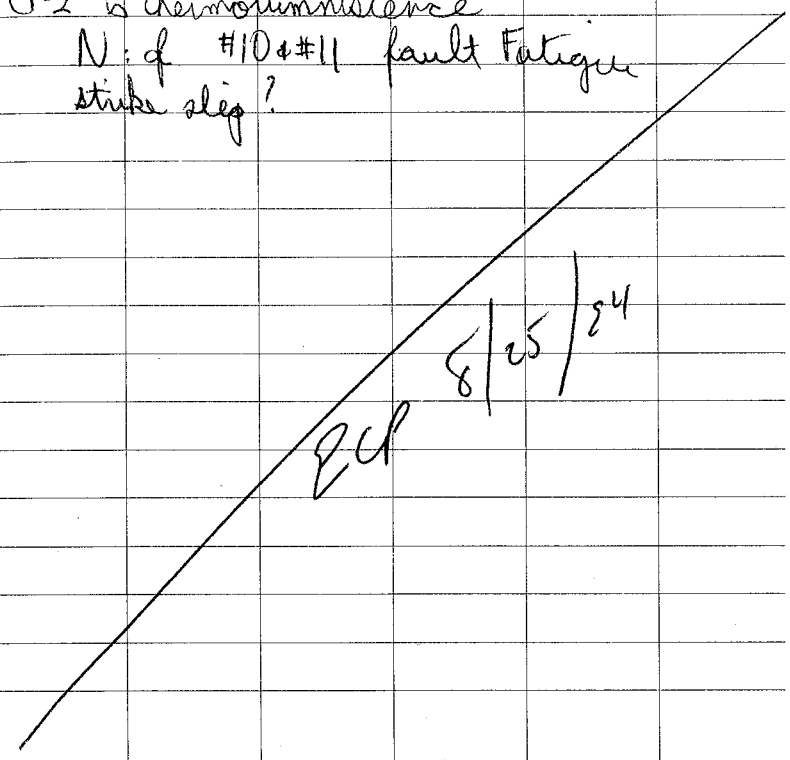
Trench CF-1 called part of Windy Wash now called Fatigue Chris Mingus will work on this

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

CF-2 is thermoluminescence N. of #10 & #11 fault Fatigue strike slip?



ECP 8/25/94

9/19/92

1500 - 2300 ft is gnd H_2O

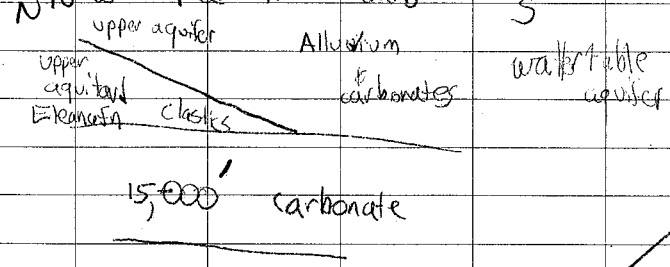
Mercury Valley = Las Vegas Shear Zone

Tertiary ly undeformed

Spry Mtn SS shales oldest

SE is younging Penn

NN is Red Mtn carb



ECP 8/25/94

3/22/93 Bret Leslie

Nopal I

Checking boreholes to see if H_2O still in them.

Iganacio 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-12 has contained H_2O 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_2O	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 10.25
Black -11 Z = 11.1 "	11.91 m	11.29 m
3/24/93 -12	9 m ECP 8/25/54	~~11.53m~~ 10.74m
10:45 -13		
-14		10.38
-15		
-16		
-17		
-18		
-19		

Depth to H_2O & 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 Bret Leslie

Preparation of adit dripping fracture collection and H_2O sampling.

Nanopure H_2O 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+75~~

Nitric Acid to be used is Lot# E20056
QA approved 2/24/92 Bruce Mabrito

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 BWL

Acid solution to be used in squirt bottles will be 10 ml concentrated HNO_3 ~~in 100~~ BWL 3/23/92 diluted to 1000 ml with nanopure H_2O.

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

Bottle A39301 is being used as DIW container.

Bottle A39305 will be used to store acid solution.

393A0-1 collected from acid fracture with 20 ml PM DIW & 100 ml of 1% HNO_3 solution. Fracture @ E 12/N 28

Sampling BH-12 Standardization of pH electrode:

used pH 7 & pH 4 buffer solution with ATC Accumet Series 1000 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 Kolder valve in closed

	O_2 check kit	25 ml	cup for pH Eh
	H_2S via syringe	20 ml	
1st Hall	Alkalinity	2 60 ml	Full
	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 24.4°C

Sample = +89 @ 2 min 133 @ 12 min

3/23/93

2nd try was ~500 ml
3rd try was ~700 ml

We will remeasure the depth to H_2O tommorow and sample if feasible.
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) 393H_2S-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	Depth to H_2O	Total depth
BH-12	9.30 m	10.74 m

total depth is what is read and hasn't 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 Znacetate & 19 ml H_2O just as yesterday

after 5 min T = 22.9

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

60ml Silica sample = 393BH12-8

125 ml anions sample = 393BH12-9

32493Fil-1 Filter kept

Eh A = +298 @ 22.2°C

Eh B = +173 @ 21.4°C

8LP 8/25/94

Eh = ~~215~~ 202 @ 23.2°C after 10 minutes

155 @ 24.2°C after 45 minutes

10:45 AM BH-12 = 9.48 m depth to H_2O

2nd draw 500ml

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

T = 22.7

pH = 7.26 @ 23.7°C

H_2S-2 3/24/93 BH-12 H_2S-2

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

32493 Filt 4 & 32493Fil-5 are 4th & 5th Filters used.

393BH12-10 is part draw #1 & #2 acidified with 10ml HNO_3 and filtered with 0.45 micron filter

Level 0 adit photos

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

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

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

15-17 photos at 6.3 on SW50 drum of adit along 13.5m N fracture 90% Rel Humidity 59.8°F

18-20 at 11/30 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 collated at waist level at was temporarily labeled 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 9/36, 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 393-12.2/14.5/2.0 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 4.5 mE along 13.5 m 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 "13.5 m N" fracture which was collected from eyelevel.

Note that all of "13.5 m N fracture" material was entirely dry, unlike material collected in the NW trending arm of the adit (i.e. samples 393-5.2/35.7/1.0, 393-7.4/36.0/2.0, 393-11.6/30.0/1.7).

ECP 8/25/94

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 analyses.

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 & wallrock

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 wallrock

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

It now appears, with the additional 5m of cladding that this fracture septa ends (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 8-10cm.

7/28/93
BWR

The material was then scraped on flaked off.

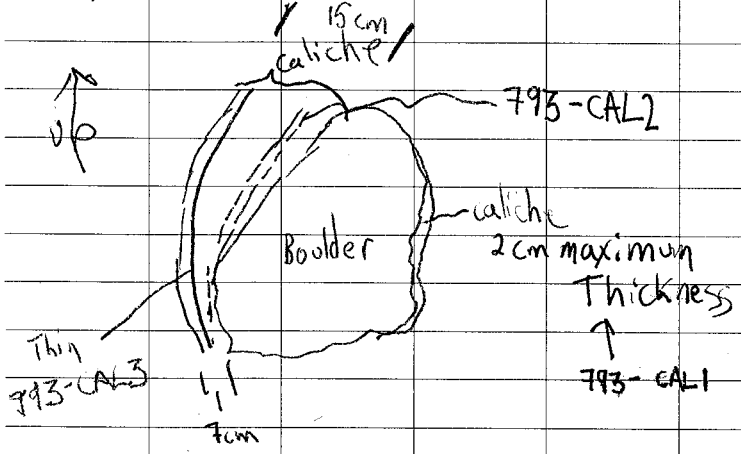
793-4.6/13.8 is fracture fill material

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.

More level 0-10 wall caliche



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 paleo-slope at the edge of the road near Narhos #5 on wall between level 0 & level 10 almost all surfaces have some carbonate deposited. Detrital grains are from silt to sand and appear 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 (Cal2 & 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 CNWRA.
This notebook is hereby turned over to QA records.

DAP 12/20/05

(David Pickett)