

# LABORATORY NOTEBOOK

#476

CNWRA/SwRI

CNWRA  
CONTROLLED  
COPY 476

NOTEBOOK NO. \_\_\_\_\_

ISSUED TO JAMES P. EVANS

ON \_\_\_\_\_

*RNF 4/12/02*

DEPARTMENT DEPT OF GEOLOGY, UNIVERSITY OF UTAH  
RETURNED UTAH STATE UNIVERSITY

*See page 1 for contact information*

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"Rite in the Rain"

ALL-WEATHER WRITING PAPER



Return to:

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	Notes on investigations of non-welded joints at Yucca Mtn, NV, & Bishop, CA	
	W/ Randy Fedors (CNRWA)	5/12/01
	6/01, & 7/01	
	Dani Or, Craig Foster	7/01
	Kathy Brubaker, Jim Heath	
	Randy Fedors, Craig Foster	6/01
	RWF = Randy Fedors; JPE initials = Jim Evans	

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2 Location Yucca Mtn Date 5/22/01  
Project / Client CNWRA - PTn Fracture Fault  
Flow problem

Yucca Mtn visit with Randy Fedors  
CNWRA / SWRI, San Antonio

Purpose of Trip. Randy Fedors getting  
samples for his Col. Hills work. I am  
here to collect Pointbrush Tuff in order  
to start work on the in situ measurements  
on Fractured PTn.

Basin Stratigraphy of PTn

Time Cyn Tuff Tpe } PTn  
Yucca Mtn Tuff Tpy }  
Pah Cyn Tuff Tpe }  
- - - - - }  
Colico Hills fm  
Crater Flats Gey

Left in Las Vegas on 4/10/02

RF 4/10/02

3 Location Yucca Mtn Date 5/22/01  
Project / Client CNWRA - PTn Fracture Fault  
Flow Issues

Reports to get

WRIR - 97-4243  
WRIR - OF - 95-280  
WRIR - 95-4061

References to get - see other notebooks  
Journel et al, or Jonsen

Drive to North Pad for loading and  
furns, then to Busted Butte to get samples  
w/ Randy Fedors.

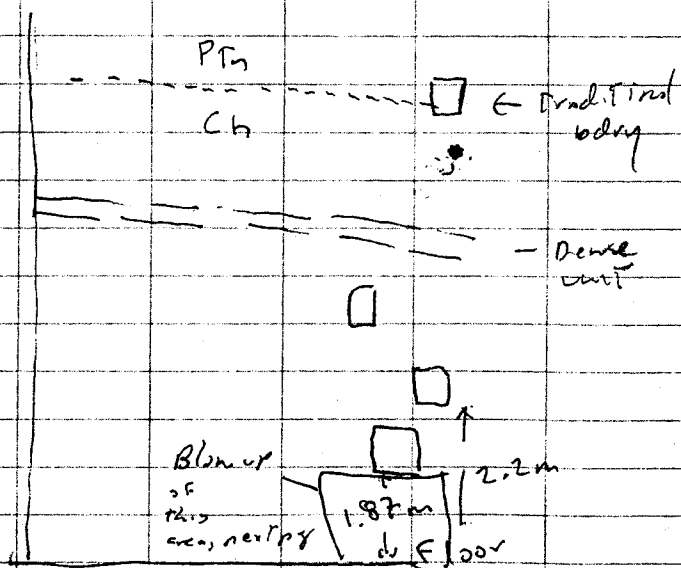
Busted Butte tracer test experiment.

LANL experiment to test unsaturated  
flow in the Colico Hills unit - near top of  
Colico Hills. See sketch on next page.

LANL people have class / left / 12:00

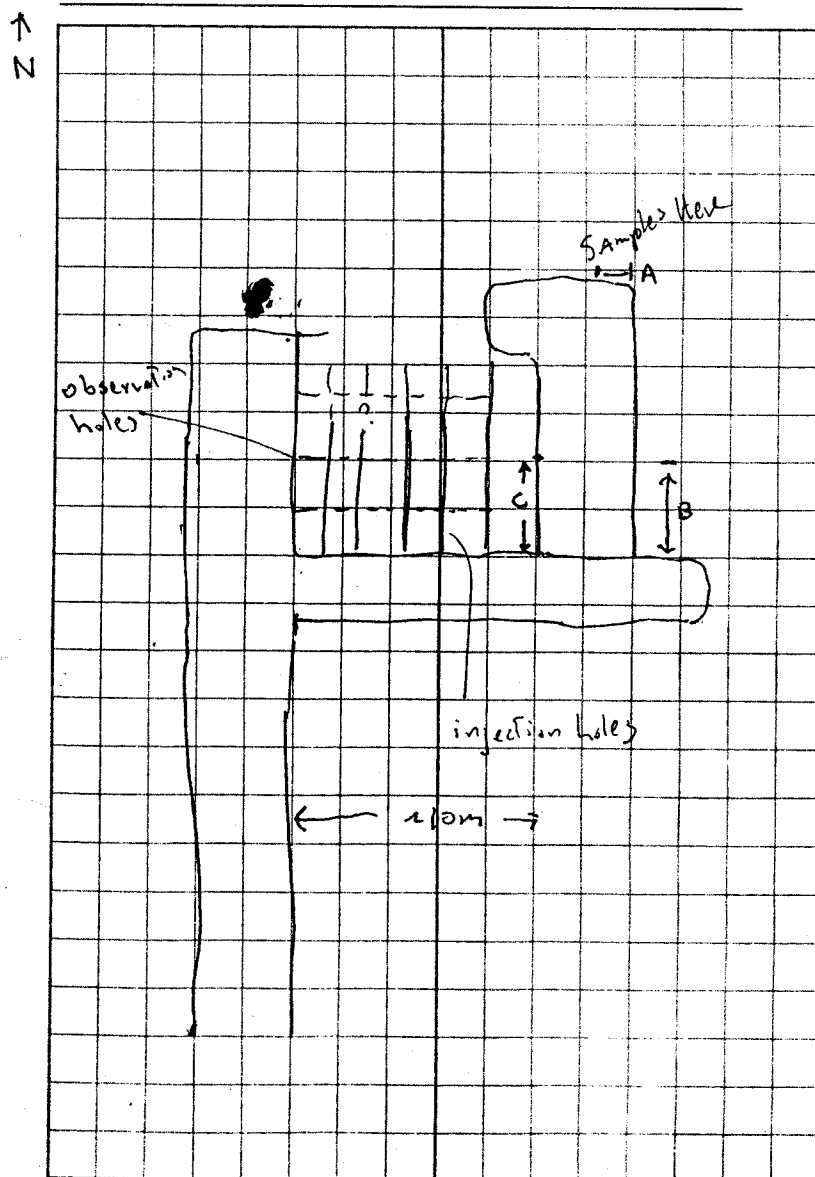
4 Location Yucca Mtn Project Date 5/22/01  
Project / Client CNWRA / SWRI  
RF 4/10/02

Randy collected marked 4 samples  
from Fracture



Photos taken w/ CNWRA camera

Location Yucca Mtn Project Date 5/22/01  
Project / Client CNWRA



meet w/ Jim Aldrich - working  
little experiment - doing the last -  
gondry

Nice small set of conjugate normal faults  
on the north wall - sketch on next pg  
Fault has light colored deforming material -  
could be deformational boudin like materials

Small fault cuts the densely welded  
layer at the near the base of the exposure  
okay, RAB 4/10/02

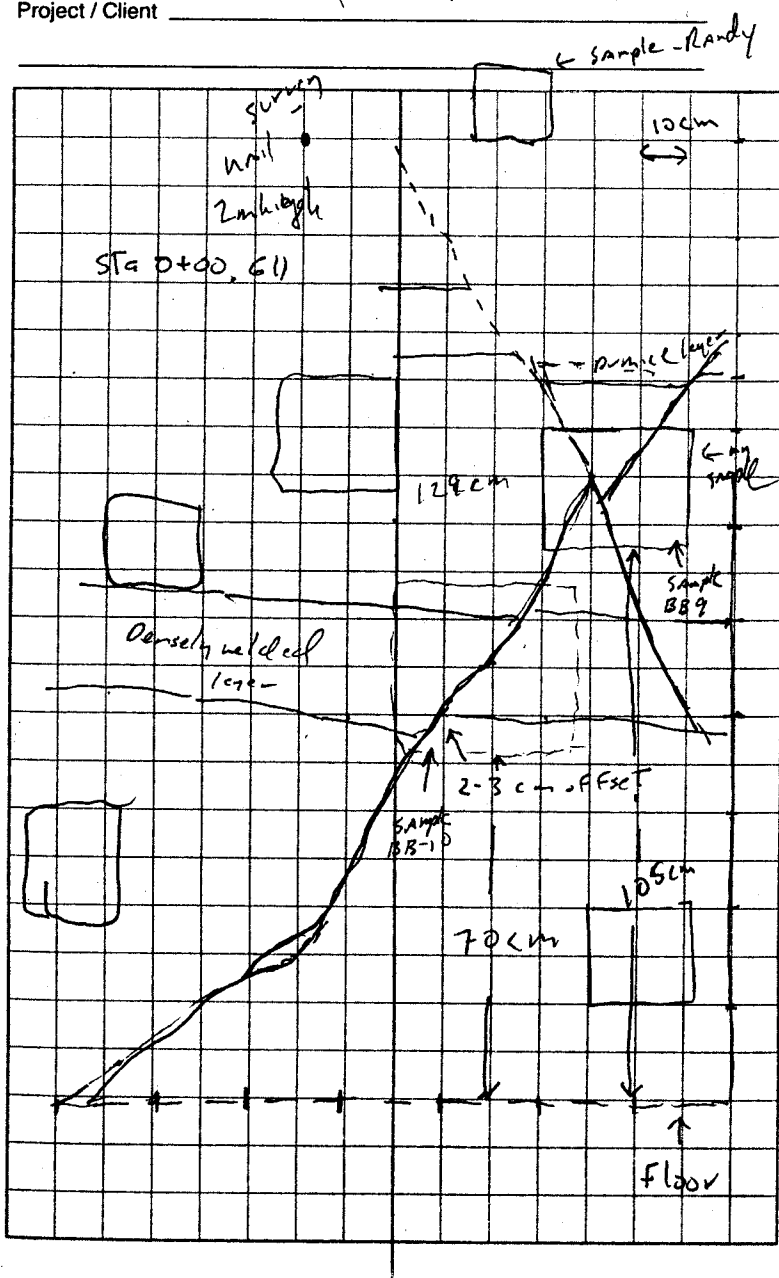
A good question is whether there was  
flow along this

Faults described above from region (A)

We were able to get two samples of faulted  
material - BB-9 - BB-10

Recorded by

4/15/02



From Page No.

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TITLE

(B) ON east panel, see several well-exposed  
fault/fractures, with clear offset and  
white gouge - in some cases clay gouge?

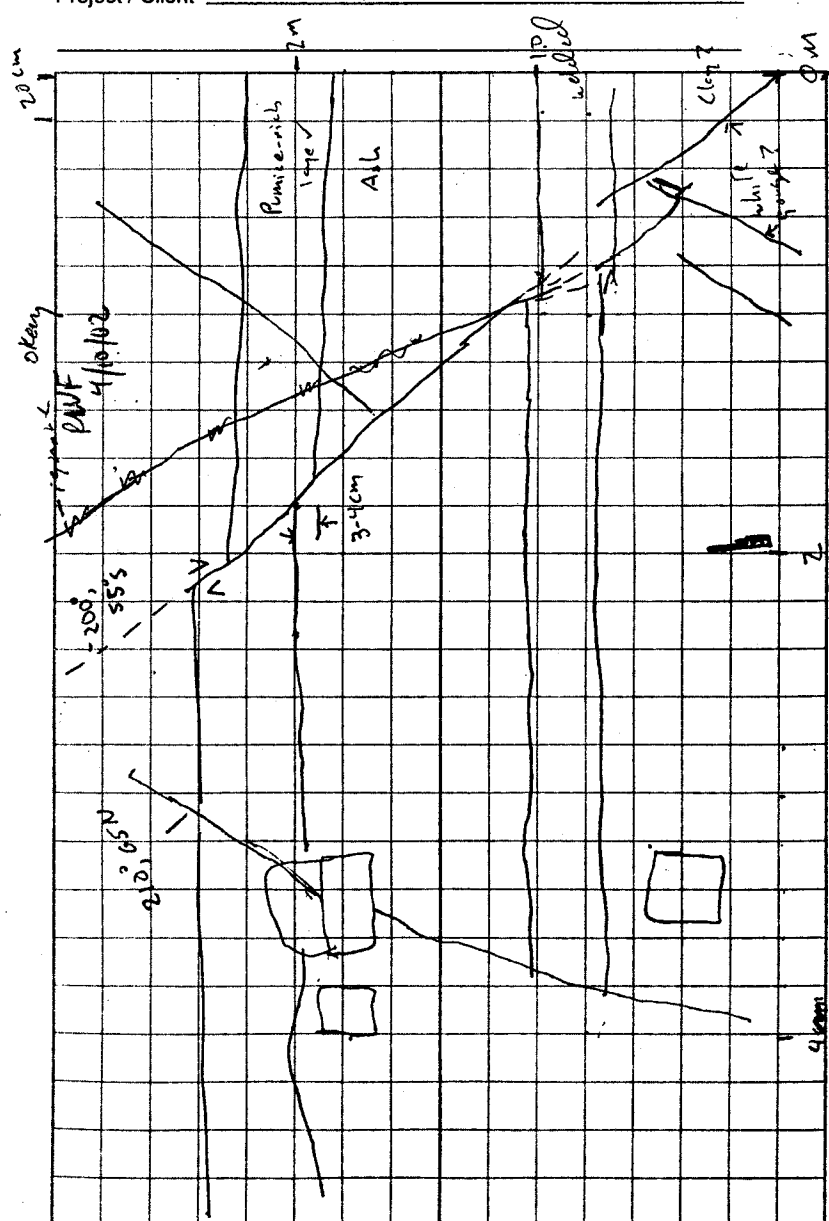
On southern end of wall, see ~ 60° (apparent dip)  
~ 200' ~ 50'.

Completed field with out @ 420 m

I took photos w/ my small  
camera & various walls of the  
Aldrich

Recorded by

4/15/02



From Page No.

Project No.  
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TITLE

Location Yucca Mtn Date 5/22/01  
Project / Client CNU WPA

Randy - Photo of obs. well w/ VM  
in background NE-E WPA-20

JPE  
5/22/01

Recorded by

4/15/02

Location Yucca Mtn Project Date 5/23/01  
Project / Client CNU WPA

> Left Longwell's Inn - Alamogosa  
Valley ~ 650

> Arrived YMP - East North  
Pole Rd → ~ 820

Della - Front Desk 1st  
Richard Karsch - dealt with  
him for permits and samples

> Drive to Crest of Yucca Mtn  
to look at Pin or to Crest  
Road - arrive 9 am

Morning Traverse - starting near site  
H-5 on map of 1997 Map 1:6000.  
Start at top in

Tuff - crystal rich, finely mottled  
tuff with numerous flattened  
calciferous fragments (5) holes

Exp. 6 - View N of Solitario Fm  
7 - View S of Yucca Ridge

Location YMP Date 5/23/01  
Project / Client CNU WPA

Side Hill Traverse down to Pin units  
go through the upper lower lithophysal  
units, with rocks near base the  
top of Pin, all thin  
ST YMP-101

RT Tpy - Yucca Mtn Tuff - Brown  
Flow-unit - some still and good welding.  
along the block's lithic fragments

elev here 1332  
VM 0547427 10<sup>03</sup> am, NV  
4078383 time

Good degree of welding here, w/ nearly vertical  
fractures 2.5 - 0.25 m spacing. Below  
this see what we think is the top of  
the Pin Canyon Tuff, w/ numerous  
pumice fragments - mostly light pink

Photo 8 - outcrop at the base of  
Tpy -  
9 - Top of Pin Cyn Tuff  
note Fr - N-S, r

Recorded by

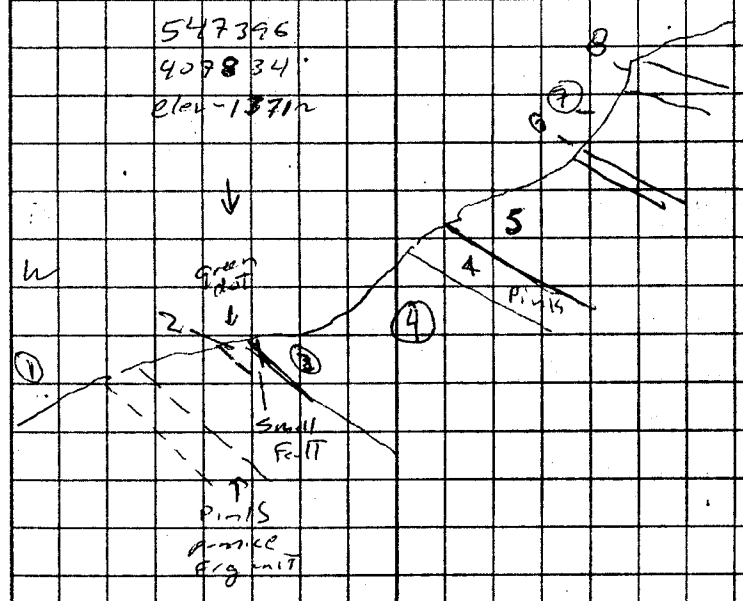
4/15/02

Location YMP Date 5/23/01  
Project / Client CNU WPA

St. VM 2-01 excellent array exposure  
of Pin units here.

Exposure appears to be of a sequence of Pin-Pin  
Canyon bedded units.  
Crude strat column up base of outcrop

547396  
407834  
elev - 1371m



14

Location

YMP

Date

5/23/01

Project / Client

UNIT ①

RMP 4/10/02

Partly sorted massive gray - gray  
brown sequence w/ rounded - subrounded  
pumice and ash clasts. Crystal poor  
matrix, massive

② Thin fine grained bedded coh, gray  
ash

at this point, small east dipping fault  
w/ calcite mineralization along it;  
Photo & Photo mosaic taken.

Beddy here = 350, 11'E

Fault 340-70'E 2-6 cm offset

③ Pinks - brown - fine grained coh, gray

④ Way to ~ 2m thick pumice  
sequence & thin - med bedded  
pumice sequence - grad to pinks in  
upper 1/3

The samples collected from the  
Fault

Location

Date

5/23/01

15

Project / Client

⑤ Poorly - Moderately thick bedded -  
little bedding, gray, brown with small  
pumice clasts - highly fractured  
w/ N-S vertical Fract. 20-50 cm  
spacing and a E-W vertical fracture

⑥ Top of 1st denser welded unit in  
underledge, w/ 60 cm thick  
non-bedded pumice fragment bed - white

⑦ Pinkish pumice - clast med. welded  
tuff. Prob - Syn Tuff?

⑧ Nice MTN Tuff - densely welded - pinks  
pumice frag + elongate black clasts

16

Location

Date

5/23/01

Project / Client

The section we examined is the  
same as Meyer et al, 1996 (at  
95-357)

Note mention of small fault in  
outcrop & description of B  
units total.

Location

Date

5/28/01

17

Project / Client

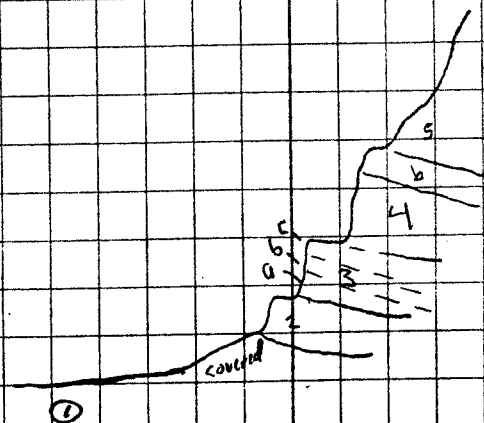
5/23/01 intended

RMP 4/10/02

Afternoon - Hills down to bedded tuff units  
of section B, Meyer et al, west of  
intersection of crest road and access road  
to top.

Hills down section to top of Popoah Springs  
Tuff > thin section.

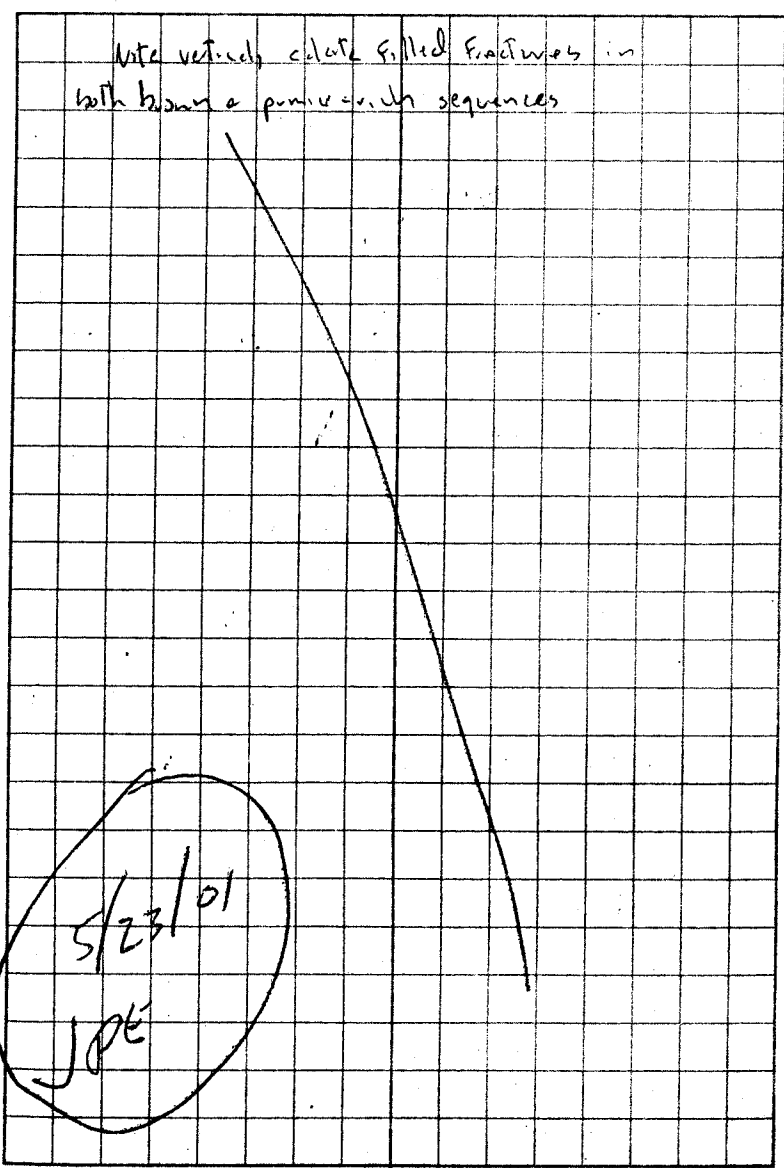
Nice section of Pumice deposits



18 Location YMP Date 5/23/01  
Project / Client CNURA

- unit desc.
- 1 massive brown Pumice Fig rich sequence
  - 2 massive clast supported pumice deposit w/  
brown grading to white sequence.
  - 3 Fine sagged massive ash, with overlying  
unit
  - 3b - bedded pumice rich deposit. Fine grained  
white
  - 3c massive tan/brown, fine grained deposit
  - 4 - rally a continuation of 3. Total thickness  
is ~ 5-6 m?
  - Top of 3 - 4b - pumice rich layer,  
white, v. fine grained
  - 5 sharp contact w/ a brown - brown-filly  
laminated fine grained sequence which  
grades to brown - reddish brown  
pumice-clast sequence

19 Location YMP Date 5/23/01  
Project / Client CNURA



20 Location \_\_\_\_\_ Date \_\_\_\_\_  
Project / Client \_\_\_\_\_

Location Bishop, CA - Date 6/12/01  
Project / Client CNURA - SWRI

- FLY SLIP - Looking Drive to  
Bishop, CA to Wilson Bishop, CA
- 1) Faults in Fig 4, Form 1 etc  
GPS 0373766 E 4142023 N  
1296 M
  - 2) Base Nonwelded Tuff,  
CLIFF BLUFF  
0373488 E  
4142115 N 1315 M
  - 3) Top Bishop welded  
0373366 E  
4142183 N 1365 M
  - 4) Quarry - east of Fish Slough
  - 5) Fault zone westward of  
CLIFF BLUFF  
0367805 E  
4141028 N
- JPE/6/12/01

ok  
BLUFF 4/10/02



Location Bishop, CA Date 6/13/01  
Project / Client CNWRA

X Purpose. Examine Bishop Tuff sequences  
for caling study to YM - PTH sites.

Drive N from Bishop on Hwy 6 - To  
Five Bridges Road, Then To base of  
Challis cliffs.

Step 1. Abandoned borrow pit  
east of Fish Slough. Here, see what  
is probably F8-F9 of Wilson & Hildreth,  
with significant cut of ash, pumice  
and some poor stratification. Numerous  
Fracture faults @ ~340, at a 1-2  
m thick outcrop of the pumice-rich  
unit. Total unit thickness ~  
~2 m - F8-F9

Fish Slough Quad  
T6S, R 33E, sect 18 borrow pit

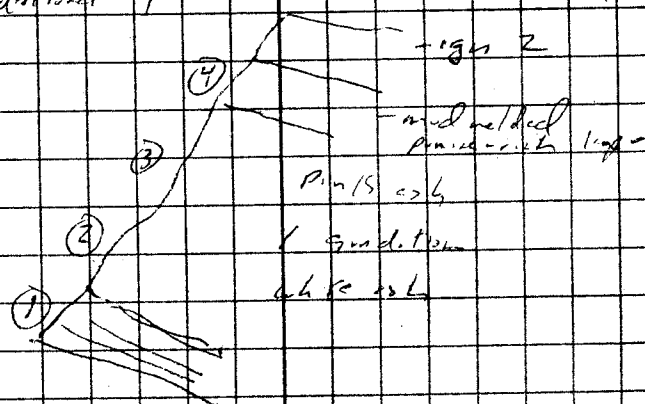
Location Bishop, CA Date 6/13/01 23  
Project / Client CNWRA

Site 2 - Fish Slough T6S, R 32E SP 23  
excellent exposure over 50 m cliff face

at road - moderately welded Bishop Tuff

Basal sequence consists of beautiful grey-white  
10-30 cm thick sequences of ash, ash-  
pumice deposits; planar to x-bedded,  
with soft sediment deformation.

This is overlain by thick (10 m)  
sequence (F6?) of poorly welded  
white, ash and pumice fragments,  
separated by thin ash/pumice contact  
gradational



24 Location Bishop, CA Date 6/13/01  
Project / Client CNWRA

The Pm is ash grades to a denser pumice  
rich sequence, that is underlain by  
densely welded Tuff

White Gray sequences - thin-medium  
pumice-ash - layers cut by numerous  
small faults. See well-developed  
e-fault parallel Fracture shear, & F11 (11)  
Fracture in the outcrop. Photos  
taken

Excellent Faults: more difficult  
to see YMA equivalence here

Step 3 - Pleasant Valley Reservoir -  
Beautiful fresh exposures of massive pumice  
& white ash-pumice sequences

Romana Quad, CA  
Sec 24

Location Bishop, CA Date 6/13/01 25  
Project / Client CNWRA

See Wilson & Hildreth out short

Step 4 Excellent exposure of pumice-rich  
layer in fault contact, ~20 m thick,  
against the grey-massive ash beds.

Fault strikes 010°E, 70°E.  
disrupted by 1-2 m thick fracture  
contact that has pumice fragments  
encapsulated. Sample

see 6/13/01  
BT-101 collected

BT-101

To North, see ~5 m spaced fractures  
in the pumice beds, with mineralization.

Fish Slough Quad

T6S, R 32E, sect 29 along  
Horton Creek



Stop 5

Exposure of Faults in Pumice & partly  
welded Tuff, n. of Owens River.

see Thin slip surface, with very narrow  
mineralized surface, with slip on it.

see Fault along up section to zone  
with 10 slip surfaces ~ 1m wide. at  
base fault is one narrow slip surface.

At higher levels, numerous fractures parallel  
the fault zone.

Interesting outcrop!

BT 2-01 samples of slip surface  
and BT 3-01 1/4m pumice  
collected

Fault - N10E, 35W - fault  
estimate the offsets ~ 10m? t.

Good questions - what sort of questions/  
problems can be addressed here?

1) In situ measurements of hydr. properties  
- esp. south the pumice

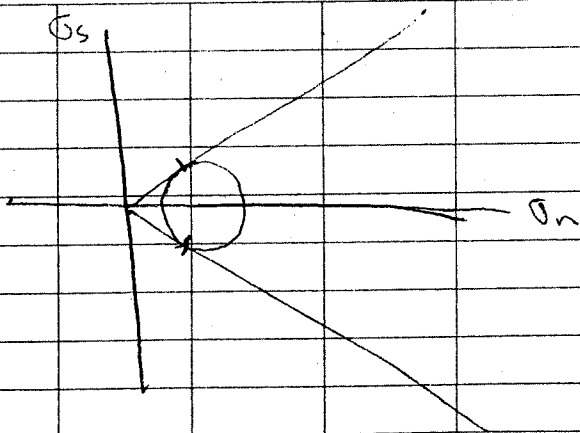
2) 3 excellent exposures of Faults  
in Pumice-rich units

3) some fracture-dominated flow  
questions.

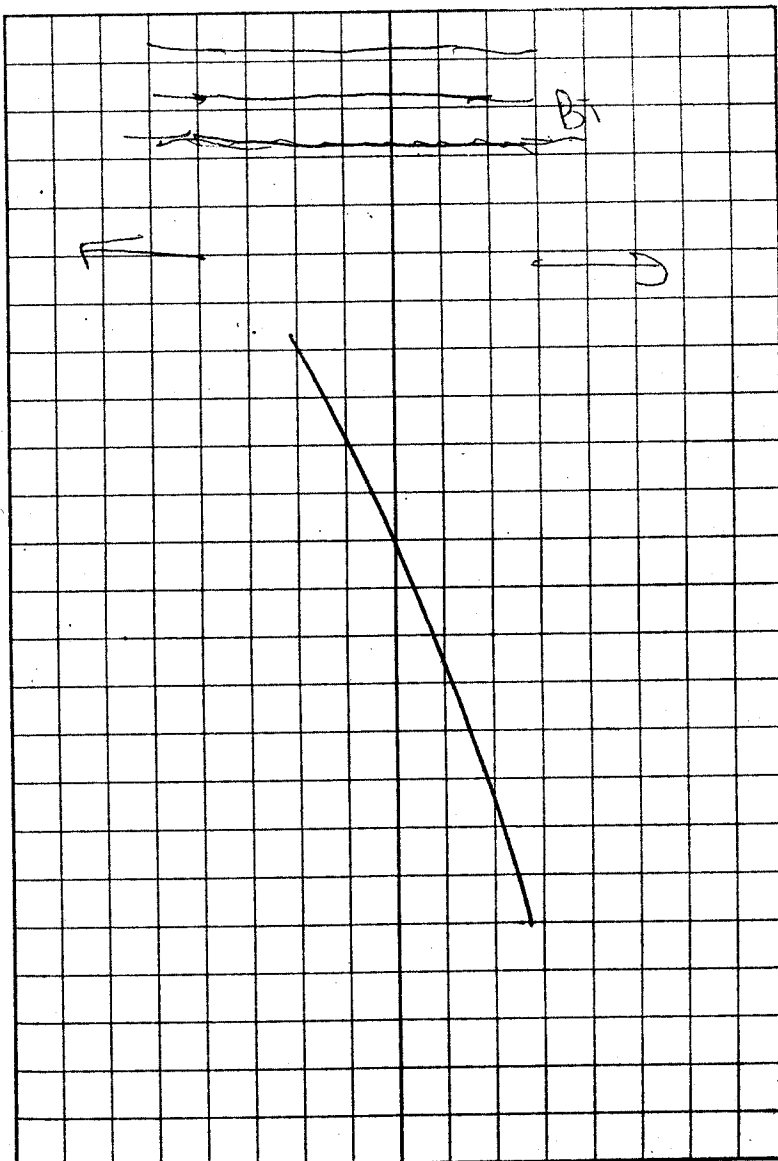
Stop 6. Old quarry. T55, R33E, S4E, 30.  
Large fresh excavated exposures of the pumice-rich  
at the outfall deposits shows excellent stratigraphy  
and access to samples. Same area as in  
Baker's 1965 monograph. Possibly  
near the upper and part of Fall deposits.

OK  
RWR  
4/10/02

6/13/01  
JPE



Sketches of Mohr-Coulomb  
Behavior, for JAS47



**From Page No.**

To Page No.

**Witnessed & Understood by me,**

Date

Invented by

Recorded by

Date \_\_\_\_\_

From Page No.

To Page No.

Witnessed & Understood by me,

Date \_\_\_\_\_

Invented by

Recorded by

Date \_\_\_\_\_

After the reconnaissance day, will spend time @ two sites working on some detail on rocks / outcrop walls. Randy & Craig will do hydrologic testing, and I can do geology.

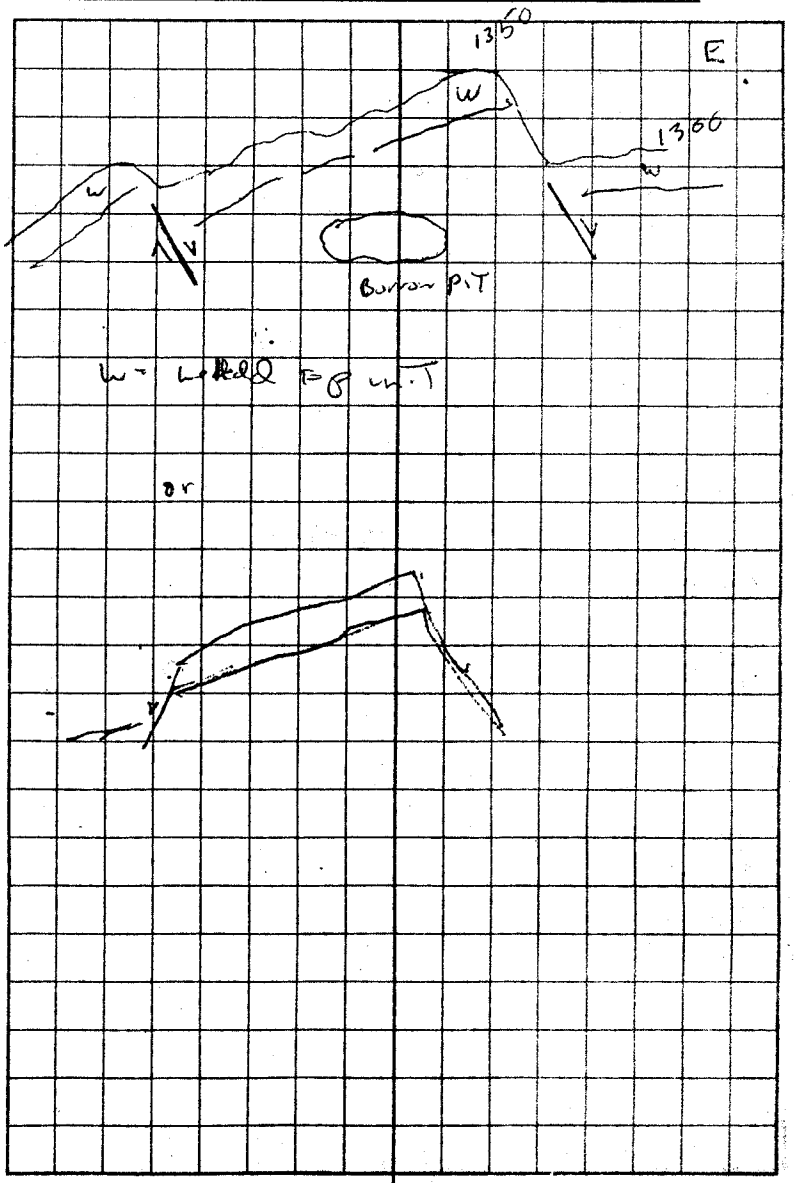
OK  
4/10/02  
RMP

Traverse to top of hill overlooking borrow pit at site 1.

Borrow pit lies at south end of a series of small normal faults at eastern margin of the tablelands fault complex.

Easternmost of the faults may have up to 40 m of throw. Bishop rift here dips west.

OK  
4/10/02  
RMP



Randy & Craig are running some field infiltration tests, while we did a quick air photo interpretation, followed by a map of the quarry. See field map for details.

OK  
4/10/02  
RMP

Quarry area consists of 4 exposures of the white, ash-pumice rich unit below the welded tuff. North bench is a 3-4 m high and has numerous small fractures & faults exposed.

Parent exposure has numerous small displacement faults with calcite coatings.

South bench has a zone of what is likely the continuation of the swarm of its east end, and then some sparse Frx. to west.

Exposure four is the small lump in middle, where #1 - infiltration test and (2) permeation test were done.

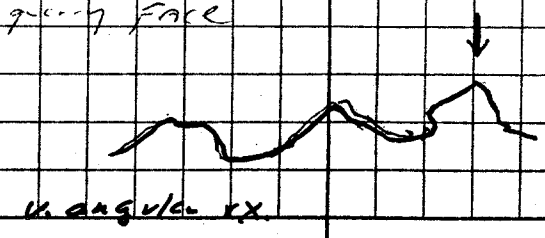
At west end of the north bench, the small normal faults are exposed. See thin vertical calcite coating, and in one case, a 3 cm thick red-brown gouge.

Two imp. questions

1. What is origin of the Frx here?

2. They clearly communicate Frx's down from the surface 10-50 cm to base of thicker calcite zones. But, any deeper? Some Frx clearly go extended further down, but are not mineralized.

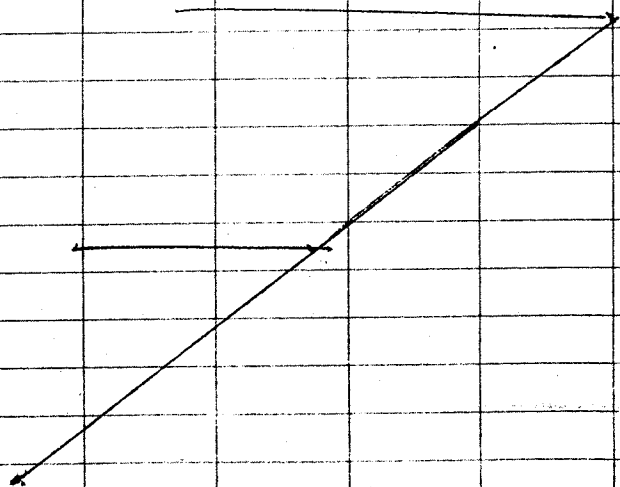
Tals hidden - west side of large rocks @ 290° from east end of north quarry face



Recorded by  
4/15/02

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4/15/02

10 m 38°  
21 m - 38°



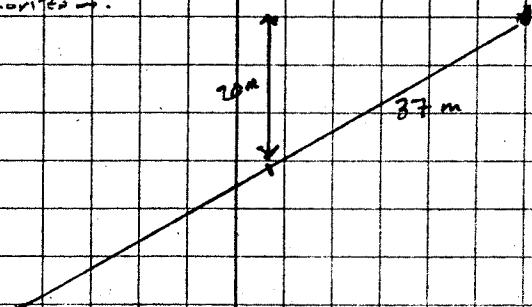
Site ZB - Fault exposure  
measured slope distance from road  
To top of ~~clastic~~ - prominent white-grey  
shale bed, on both sides of fault & SK  
ZB. Results.  
West side D = 10 m east D = 21 m  
' $\alpha$ ' = 38° ' $\alpha$ ' = 37°  
~ Throw = 6 m

Same as site 4 of 6/14/01

Normal Fault that just passes grey-green lacustrine  
deposits in fault against pumice-rich horizons  
in hanging wall.

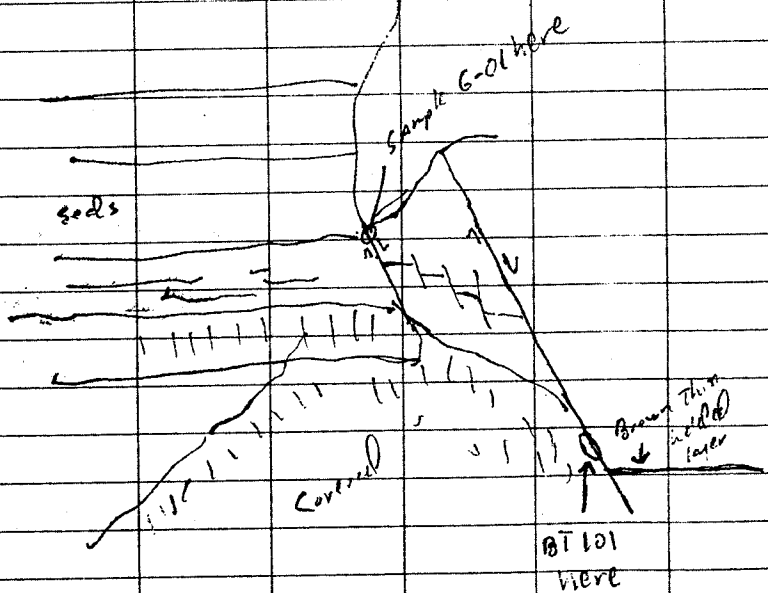
Fault strike = 011, 70° E

measurement of slip: in fault wall, slope distance  
of 35 m @ 30° to thin brown welded  
horizons in the pumice. On low, 1.65 m to  
same horizon.



35 m - 1.65 m = 18.4 m Throw

OKay RWP  
4/10/02



Note the iron oxide staining on the fault -  
certainly looks like water flow here!!  
very good, small sample collected here of  
pumice bed in the fault

OKay  
RWP  
4/10/02

6/14/01

JPE

~ 30 m east of Fault, see several well developed  
fractures in the pumice unit. They extend  
the length of the outcrop, and near the  
upper part they are 1-2 m wide. There  
is a notable decrease in width as we go  
lower in the fracture.

Interestingly, can see where the fractures  
cut the pumice layer. In outcrop, this  
is expressed mostly by large 'cavities'  
weathering out of the rock. However, in  
a few places the fractures can still be  
seen. The distinct cracks are irregular, but  
distinct.

Perhaps where such beds are slightly  
more welded, or banded, fractures might  
be more well developed?

An interesting topic for field work -  
fracture characteristics & rock properties?

John P. 6/14/01

After the day in the field, drove Bishop → Beatty. 133 miles; but curvy and two mtn passes made for a slow trip.

Several discussions in the drive help clarify some issues.

1) Calcite (?) on fracture & fault surfaces are indicative of flow. And understanding these could be important in understanding the flow in fractures in the inset zone. Why, in the unsaturated zone, with relatively high IS ridges, would flow occur in a fracture or along a fault?

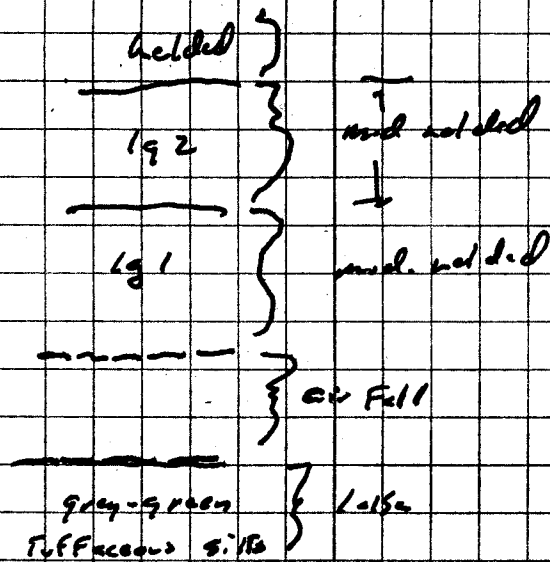
2) Some discussions on the lines of how this process could be examined. That is, how to model, or experiment, the processes of flow of a frx. in high IS ridges. CBF would like to make a fracture, or insert a frx., and try to do some experiments on

The Flow.

3) As far as role, some basic characterization should be done, but on some fracture systems and faults.

4) Analog considerations

The Bishop Tuff is probably a reasonable analog. It's thicker than but broadly similar to the PTH. See below:



5. I should probably look into literature on fracture of partly consolidated materials.

6) Perhaps design some experiments in columned faults to examine on hyd. properties conditions in faults.

*John Hunt*  
6/15/01

Conference call - From Randy Fellers

Scheduling - Field work  
→ After 4th

Maybe

6-9th July

References - For the Tuff  
Lalson & Holdreth

> Get These To Dan & Randy

> Determine the sites to examine in situ IS →

→ How matrix properties vary through the system

Randy - a thin big of less effect on the matrix - photo time, effect

6/22/01

Tech Kessler - may have on air  
K test

Dani - What are IS values of  
matrix - un deformed  
and "representative" values

> What are IS values  
of Filtered / Fixed matrix

✓ ~~Barney~~ - *okay Puck H/10/02*

Dani - wanting to get decided in on  
the project

- Has a nice infiltration test

- Need to get LAWD permission

- How to get @ whether the  
Fractures Transmit

- Run a dye test?

6/22/01

Dani can get some permissions  
- has connex. @ Inyo Co  
- LAWD

- me - check on good long exposures  
for sampling

JPÉ  
6/22/01

Bishop, CA

7/6/01

CNWRA

*okay Puck H/10/02*  
Drive Fly SLR - Las Vegas

Drive Logan → SLR to that

Arrived Las Vegas 0915

> Left LV @ 11<sup>30</sup> to get  
going

Arrived Bishop @ 0830

Purpose

Drive quickly to Site 1 - quarry site,

To set up a small infiltration  
test. Decided (Dani, mostly)

To run two ~~small~~ tests @  
south well. Here there are

a swarm of small ~~fast~~ fractures  
spaced ~ 10 cm, lined w/ calcite,  
and a more widely spaced  
single fracture ~ 7 m west of  
the swarm.

*okay Puck H/10/02*

Bishop CA

7/6/01

CNWRA

Dani set up two float valves

Site 2 - test site. PIT  
Pond - 13 cm well  
130 cm long  
~ 24 cm deep

Tests started @ 0445  
PIT 1 - massive site w/ one Frx

Dani dug down below several sub horz.  
Frx.

PIT 1 - 30 cm long  
12 cm wide

AT both sites - PIT in Brilliant  
Blue (CFC) dye

*JPÉ*  
7/6/01



A brief summary of Friday activities.

- Set up two small infiltration tests in the ignimbrite of the eastern quarry site (site 1) for 2 days of filling.

- Today, will spend more time at the quarry running some tests, and hopefully sampling & characterizing samples.

Dry begins - 0815 at outcrop. Pulled up some miscellaneous supplies at Kmart.

We are doing three activities today.

1) Continuing with the trench & infiltration tests - on the south side of the quarry. Also, Dani, Randy, and Jason run infiltration tests.

2) Kelly made a quick 2x3 m grid map of the fracture sets on the quarry floor, which we think is a similar setting to pit one test.

test site 3

3) Craig set out a small inset on a small fault in the poorly welded tuff - where there is a pin's gauge zone dipping steeply west. Dani is running a small diameter slotted disk infiltration tests on it. Set = 40 cm deep x 45 cm inset.

4) I experimented with epoxies on an outcrop surface to collect some samples along a calcite-hosted fault. However, the epoxy doesn't take well until the epoxy is wetting the rock surface, or where there are cracks along the surface.

5) I think this afternoon we'll map the fractured face under the pit 2.

Afternoon.

Jason & Kelly mapping the face under test pit 2 @ Bishop Quarry.

People in the group

Craig Foster - U

Dani Dr - USU

Randy Feders - CNWRA

Kelly Bradbury - USU

Jason Hoek - USU

Arnon Steinwand - Inyo County

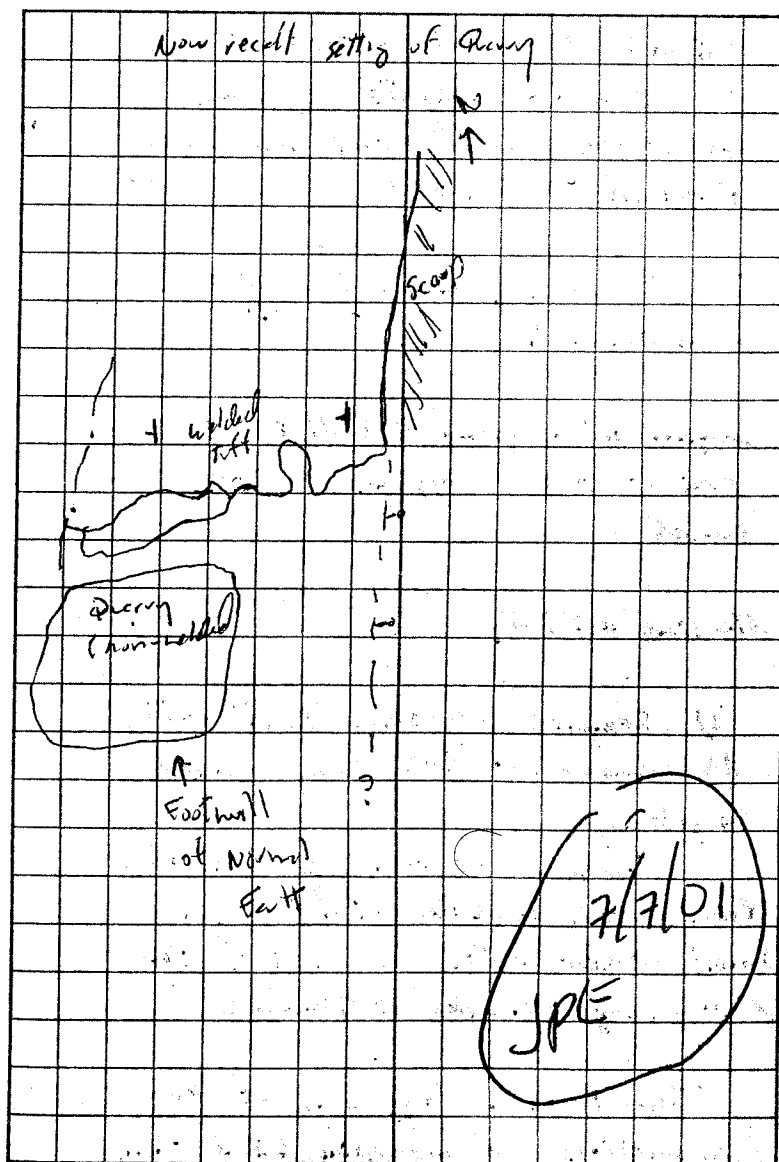
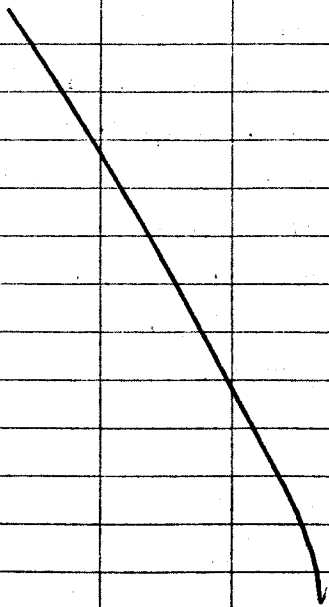
some notes on sampling these friable rocks

1. I tested epoxies in the morning. I think the system will work with cleaned surfaces, perhaps prepped w/ a bristle brush, and then wetted with a thin layer of epoxy to get the epoxy to take. He'll have to sample carefully with foam described below.

2. Sampling friable materials. When we can get a decent sample, a good system is to use a urethane foam insulation in a ziploc bag. Craig Foster found a source in Las Vegas, and a trick is to fill the bottom of a ziploc bag with a small mat, then drop sample in, then cover w/ more foam. Foam sets quickly, and then we have an intact sample.

I sketch mapped a vertical quarry face below test pit 3. See numerous fractures filled with calcite, and dip both out + west. Eastern edge of outcrop has 2 major east dipping fractures, a small top of outcrop.

Need to make a small geologic map of the site.



Pt. Cloudy, Warner: left Bishop 0745 am

Return to borrow pit north of Bishop to dig out the three pits and examine how they've adsorbed water; also sampling for faulted + fix. rocks.

> Pit 3 was dug over a thin pink fault on north wall.

Sampling with epoxy of fault zone to west of pit 3 appears to have worked.

Mining activity

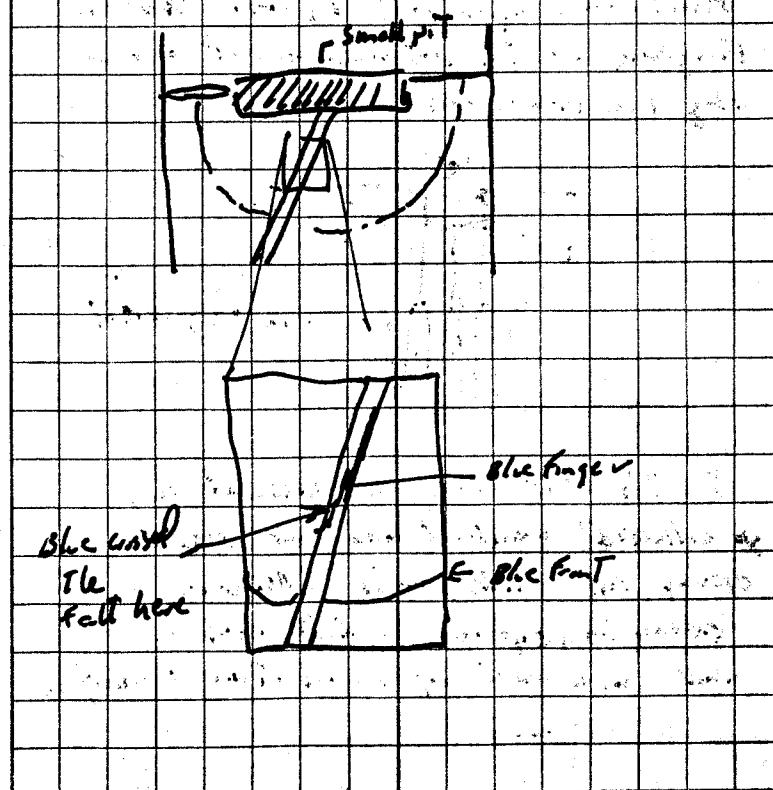
1) Sampled the small fault on the NW corner of the quarry-exposed samples.

While at sampling the small fault where they (Dane et al) did a small tracer tests, he collected two fairly large samples of the fault.

This took a large amount of foam in solution and wrapping, but I think

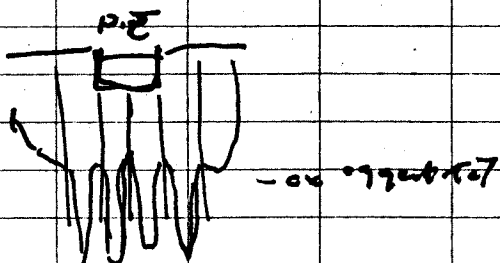
We were successful. Craig also collected several samples from the pavement map Kelly worked on. These samples are both between and along the fractures.

The dye test at small fault, with scale was fairly successful.



The other experiment was on the south side of the quarry. Here there were two experiments. One was edge pit into parallel Frx, & the second was in pretty homogeneous Tuff.

Fractured experiment showed excellent fingering - with retardation of flow along the fractures:



In the afternoon, we successfully collected samples where we poured epoxy into little ponds. (Mixing epoxy in ziplines didn't work - and we worked w/ several other techniques.

OK  
RWF  
4/10/02

Late afternoon we looked for sites where mod. welded Bishop Tuff

OK  
RWF  
4/10/02

we hiked up to the exposure of Bishop Tuff - then turned it to be about 10' high - the infiltration needs a some base and even to work with

retard 6:45 PM

Things we need to do in the next day +

1. Detailed study of the small faults - look's quarry & crucifix
2. Small map @ broken pits
3. 1d and perhaps test on infiltration the mod. welded Bishop Tuff
4. get samples @ Horton Creek  
OK  
RWF  
4/10/02
5. sample a few grain size samples & broken pit
6. Drive to Tablelands quickly

7/8/01  
JPE

7 Ship samples

8- Ref. Tools

7/9/01 intended  
RWF for JPE  
4/10/02

Leave Hotel 0735 am, enroute to town. Arrive @ 845.

Objective: Drive to top of Tablelands, and get Jason & Kelly started on a perm test in partly welded Bishop Tuff, to test west of Crucifix site.

I completed a quick geologic map of quarry site over to Chalk bluffs.

At quarry. Collected two unconsolidated samples - P1 & P2, RT 1 samples had some piece Frags also.

Afternoon working at crucifix site. Detailed cartography, perfide & sampling done here - samples 135-50 & 135-51. From Fracture zone, 135-51 from Frx. GSH.

OK  
RWF  
4/10/02

7 Ship samples

8- Ref. Tools

7/9/01 intended  
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OK  
RWF  
4/10/02

Location Bish.p. CA

Date: 7/9/01

Project / Client CNWRA

Vertical	Free Map	notes	
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Used the tape up the wing to examine faulted poorly s. n. n.-molded r.f.f.

Technique have had types at various  
 For 4.1 m, the a 40° slope to 34 m  
 all inserts are type distances, so they  
 have to be corrected

See numerous small Fe. lls. in ash.  
parallel rich sequences, numerous fractures,  
and calcite fillings.

Mass fault zone marked by offset  
of granitic units on p.s. - ~ 7 m  
at slip.

Kelly collected many samples.

Fault zone consists of ~ 80 cm thick  
damaged zone w/ small disp. conjugate  
faults in footwall.

left - Turp @ 6<sup>00</sup> pm

Bishop, CA

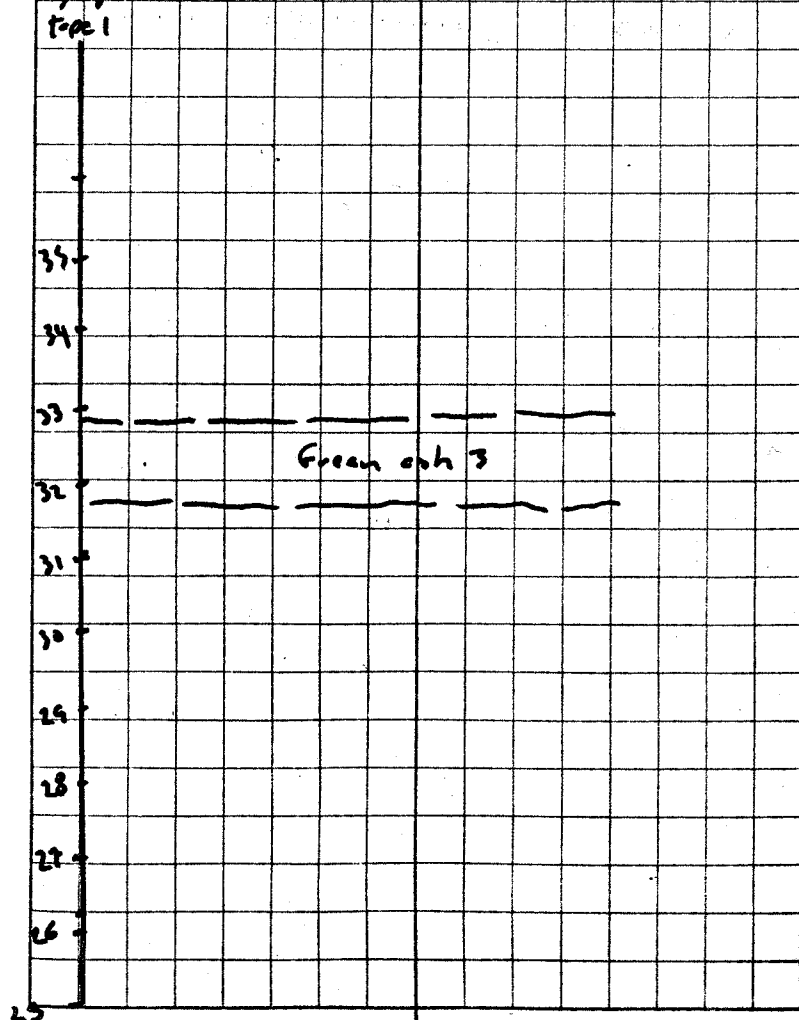
Date 7/9/01

59

Project / Client CNHIZA

Chalk Bluff Road

Sketch Map of Fall 2019. This page is a small add. To large map on 8.5 x 11 graph paper. 1 cm = 1 m



Location Bishop CA

Date: 7/10/01

Project / Client CWRLA

We are talking quickly at 7<sup>00</sup> Am

"Lover's quarry" site - name  
Fault in the Bishop Tuff west  
edge of Fish Slough Gulch.

Narrow Fault zone - Strike &

196-734, 30' + 65" Rn/Bc

Very narrow slip surface - 2 mm

Thick w/ a damaged tree of  
sunks ~ 1-2 in wide in hwy  
w/ly Fe oxide staining - sure  
of which 10 lbs lifted Fingerprint

7/10/0

JDE

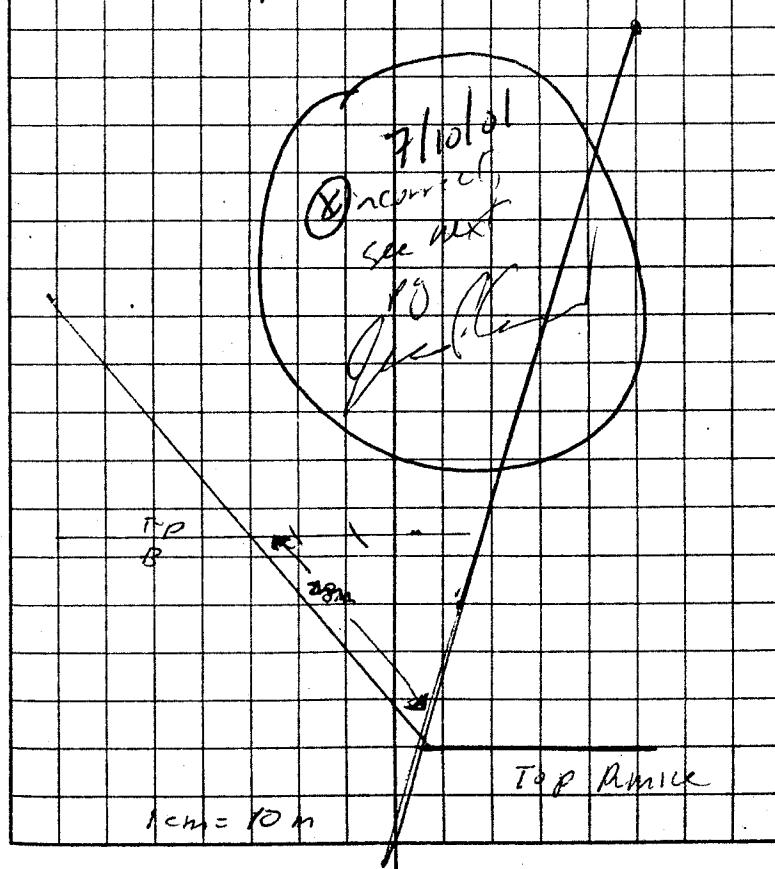
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Date 7/10/21

61

Project / Client

To get a crude estimate of offset, we measured 28 m from top of primary rock unit to top of the ledge at top of the lower col. flow (top of zone "B") at a slope angle of  $50^\circ$ .



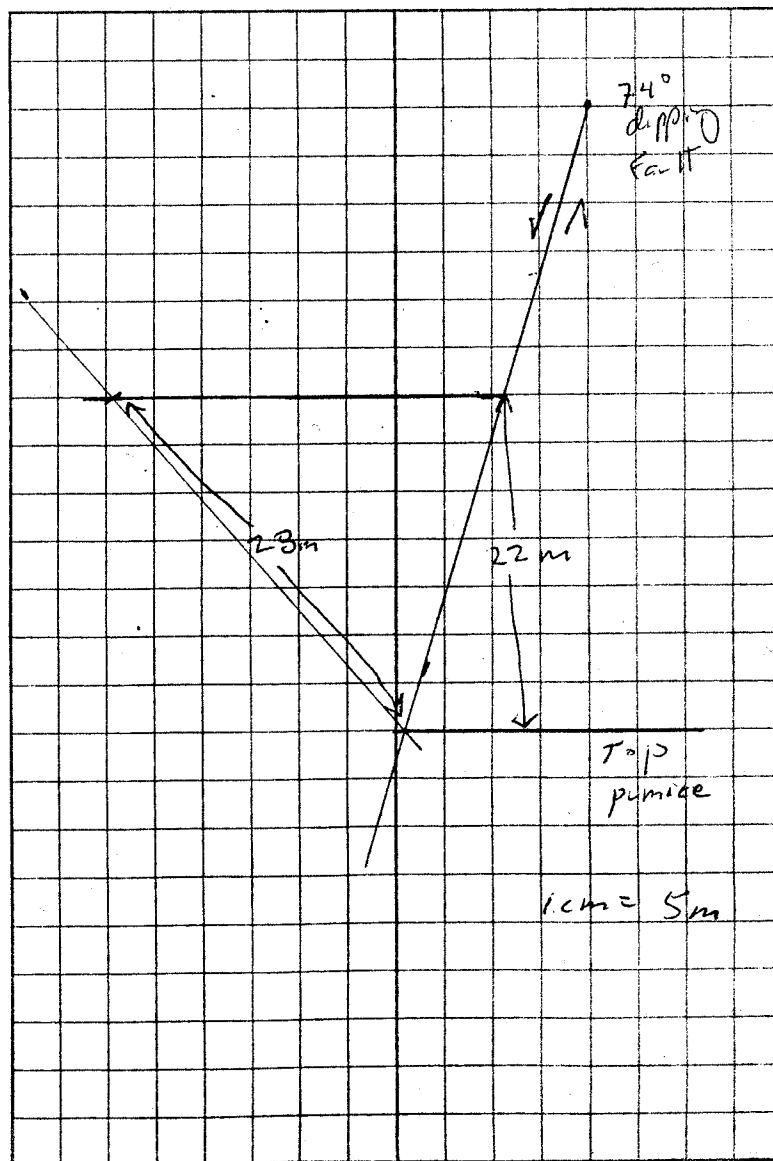
Sketch of fault offset @ Louis's quarry - shot a 23m line @ 50° vertical angle from top Pumice to top of unit B Ash.

This gives a vert. strat. separation of 22m.

What is left is to determine the thickness of Ash (B).

Along the narrow zone that Kelly walked on, the fault consists of a wide damaged zone - Kelly points out the fault seems to split off to form a ~ 6-7m fault damaged zone.

Damaged zone consists of fractures 3-20cm apart, irregular traces, with abundant Fe-oxide staining that has a finger-like appearance between fractures.



Shot two chert outcrops to top pumice & top of Ash B, B.C. to (down).

Map distance = 228m (~375 x 200)

Angle to top pumice = 40°

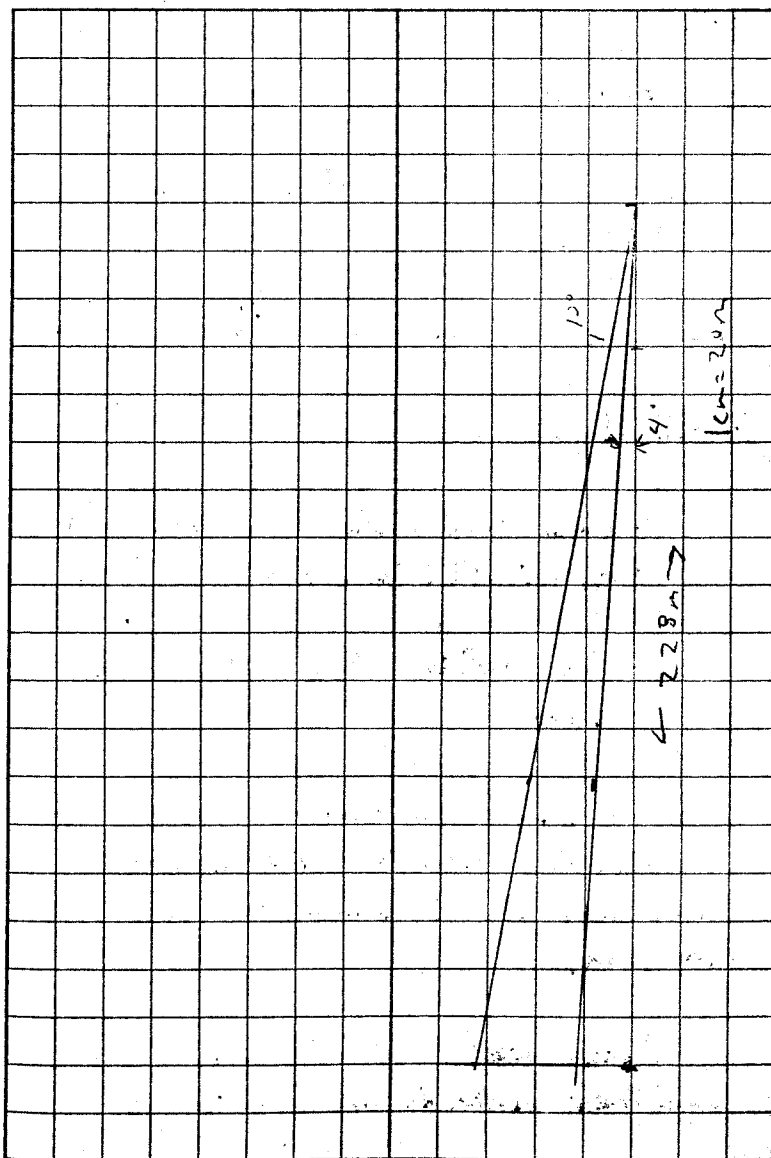
Angle to top Ash = 130°

Sketches unit pg - Ash ~ 23m thick.

Thru fault ~ 6m,

Slip = 3m

7/10/01  
JPE





Meeting w/ Dani Jr - in his Lab

Samples for retention and water conductivity

> 10cm 5cm dia, x 3-5cm long

> other topics

> Dani Found some good refs on Frx in Tuff! Jason has

> we need to look @ NM Tech mols also

> To sample for these soil samples we can do a table top ring sampling and then slide the sample over to the ring.

Clearly need to be thinking wrt how these materials are processed

B: N Mage - Dani - Foch  
Scott Jones

Research Strategy for this

- ME: ① Mesoscopic Structural Analysis  
② Micro-structural Analysis  
③ Chemistry of system of coatings

Dani →

- ① Retention & Hydraulic Conductivity on samples - 3-5cm high, 5cm dia, across sat. zone

Kelly → ② Grain size, grain shape of poorly sorted / non-sorted samples

↳ Through the welded sequence

Field → Relative mols

② & Big Sampling

& shearing

① oil permeability

↳ get paper from Clemson Paper!!

JPE 7/12/01

Scanned photos & worked on reports & Figs  
2 hrs

7/14/01

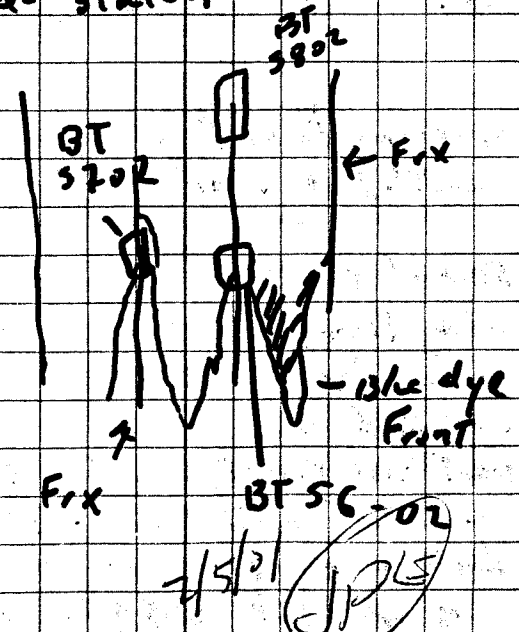
JPE

Bokis getting samples at Pit 2 in the borrow pit. Fish slough Quad

w/ Kelly Broadbent  
Vance Ferrill  
Alan Morris  
Betty Proctor

Pit 2 samples

Cr-Lo sketch





70 Location Bishop CA Date 2/05/02  
Project / Client CNWRA

### Sample Descriptions

56-02 - small sample from along  
one of the small fractures w/ dye

57-02 as above

58-02 Large sample from fracture,  
w/ dye

All 3 are in foam.

Working to west along area next to  
(west) of road, west of Garraupit.

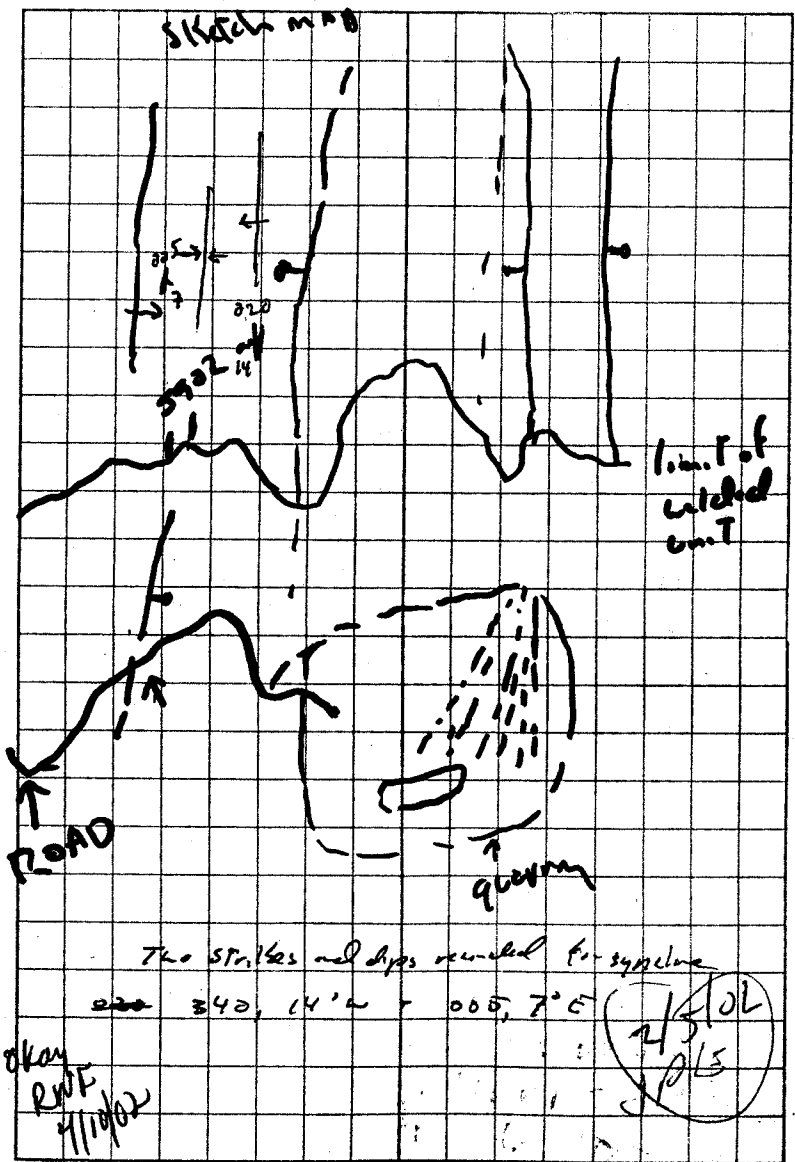
Several small faults w/ mineralization  
along them, south of two monoclines  
in welded de unit. See in  
welded unit series of narrow  
vertical fractures @ 020. For.

maybe small faults? or at least  
have a coating on them.

sup BT 59-02 collected.

JPE  
2/5/02

Location Bishop Date 2/05/02  
Project / Client CNWRA



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Project / Client \_\_\_\_\_

for BT 59-02 thin section the  
surface w/ label on it.

Samples BT 60-02

Face @ 05, 84

Sample BT 61-02 005, 26

Faults and mineralization in welded  
units

BT 67-02 - very nice samples of  
Fault on east edge of crucifix site  
Sample from white ash bed

JPE  
2/5/02

Location Bishop CA Date 2/5/02  
Project / Client CNWRA

### Crucifix site Sampling

BT 62-02 partly welded tuff w/  
1-2 mm purple fragments, with fractures  
1-3 cm apart. yellow thin purple layer  
at the top. Collected 9 m east of the  
biggest fault at this site.

BT 63-02 collected 1.5 m east of  
the main fault at this site - similar  
stratigraphic level as 62. Fractured  
tuff w/ purple. Thin yellow purple-rich  
layer at top of sample.

BT 64-02 - collected from gray-green  
ash layer 2.5 m in hanging wall of  
the largest fault.

For all of these see the copy of the outcrop  
map of the fault from 2/4/01.

2/5/02  
JPE

74

Location Bishop CA

Date

2/5/02

Project / Client CNWRA

Two samples From RFF at Test pit 1 (dye test)

Samples collected From 50 cm below pit  
BT 65-02 BT 66-02  
unoriented samples, both embedded in spray foam.

End of Day Met back @ crucifix site  
to look at pick up samples. Collected  
one Fault sample from Fault at eastern end  
of outcrop - narrow slip surface w/ ~ 4 m  
slip. Notes on this zone in other notebook  
for 2/6/02 activities.

Sample # BT 67-02 collected.  
oriented sample 50 of Fault surface  
is 15, 67E.

2/5/02  
JPL

Recorded by

okay RNF 4/10/02

Location

Date

75

Project / Client

NO  
ENTRIES  
Past p. 74  
New Notebook  
(#499)  
Supersedes this,

Jan RNF

okay RNF  
4/10/02

Project No.

Book No.

TITLE

From Page No. \_\_\_\_\_

No entries past this page of Notebook # 476; RUF 4/12/02

I have reviewed this scientific notebook and find it in agreement with QAP-001. There is sufficient information regarding methods used for conducting tests, acquiring and analyzing data so that another qualified individual could repeat the activity.

E. C. Perry  
4/16/2002

To Page No. \_\_\_\_\_

Witnessed &amp; Understood by me, \_\_\_\_\_

Date \_\_\_\_\_

Invented by \_\_\_\_\_

Date \_\_\_\_\_

Recorded by \_\_\_\_\_