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Scientific Notebook # 499

LABORATORY NOTEBOOK

CNWRA/SwRI

NOTEBOOK NO. # 499
ISSUED TO _____
ON _____ 20_____
DEPARTMENT _____
RETURNED _____ 20_____



CNWRA
CONTROLLED
COPY No. 499

Name _____

James Evans

Address _____

Phone _____

Project 20-01402-861 - CNWRA -

analysis of non welded Tiffs -

For analysis To Yucca Mtn, NV HLNW

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RWF
9/30/02

INSTRUCTIONS

1. **The primary purpose of this notebook is to protect your and the Company's Patent-Rights by keeping records of all original work in a form acceptable as evidence if any legal conflict arises.**
2.
 - When starting a page, enter the title, project number, and book number.
 - Use ink for permanence -- avoid pencil.
 - Record your work as you progress, including any spur-of-the-moment ideas which may be developed later.
 - Avoid making notes on loose paper to be recopied.
 - Record your work in such a manner that a co-worker can continue from where you stop. You might be ill and to protect your priority it could be urgent that the work continue while you are absent.
3.
 - Give a complete account of your experiments and the results, both positive and negative, including your observations.
 - Record all diagrams, layouts, plans, procedures, new ideas, or anything pertinent to your work including the details of any discussions with suppliers, or other people outside the Company.
 - Do not try to erase any incorrect entries; draw lines deleting them, note the corrections, sign and date the changes. This extra care is worthwhile because of the necessity of original data to prove priority of new discoveries.
4.
 - After entering your data, sign and date the entries.
 - Explain your work to at least two witnesses who are not co-inventors, and have them sign and date the pages in the place provided.
 - Record the names of operators and witnesses present during any demonstration and have at least two witnesses sign the page. If no witnesses are present during an experiment of importance, repeat it in the presence of two witnesses.
5. Since computer programs can be patented these instructions apply to the development of computer software. In this case a description of the structure and operation of the program should be recorded in the notebook, together with a basic flow diagram which illustrates the essential features of the program. In the course of developing the code, the number of lines of code written each day should be recorded in the notebook, together with a statement of the portion of the flow diagram to which the section of code is directed.
6. This notebook and its contents are the exclusive property of the Company. It is confidential and the contents are not to be disclosed to anyone unless authorized by the Company. You must return it when completed, upon request, or upon termination of employment. It should be kept in a protected place. **If loss occurs, notify your supervisor immediately, and make a written report describing the circumstances of the loss.**

[illegible]

2/4/02

Bishop CA 2/14/02

Field @ 8¹⁵ cm

W/ David Farrell, Alan Morris (w/ Texas San Antonio)
 L CNUWRA L CNUWRA

Fieldwork in Bishop, CA, & examine FITed Bishop Tuff

Betty Phelps - FA For Kelly Bindbury
Analy site for RT_n at Yucca Mtns

Overview of Tablelands From West Line Road West
of Bishop.

Fennell/Morris Displacement Story

- White Mtn Fault on East Side of the valley - master Fault; Ruptured in 1986, M 6.0

- 10-15 m surface rupture

- 25 1st of ground rupture in the Faults in the
Tobehund.

- Alan & David have kinematic models for the deformation in the hanging wall

- ISSA Paper in 1987 - by Lienen/Sunper

- Switching of Fault polarity here

6-3 my on Sierra Nevada FLT

3-0 on - on White Mtn F1T

second postage record of this

- Mariposa Sheet -

RWF = R. Fedors

JPL

Photos 16, 17 of small fault die out up section to welded layer w/ monoclinal.

Morning Session Spent Time @ the borrow pit site. Discussed walls close to date, and i'd'd several new faults.

- 1) Bigger Pavement map at NE end of point
- 2) do we get's mapping along small road out to west, correlated w/ monoclinal.

Discussions centered around the applicability of the area here to Yucca Mtn. Concluding was this is an excellent site for an early site.

AT Crucifix site discussions

- > clean up map
- > focus on damage zone
- Thin section samples at this site to correlate w/ xrd samples

Get photo of Lover's Quarry, from distance

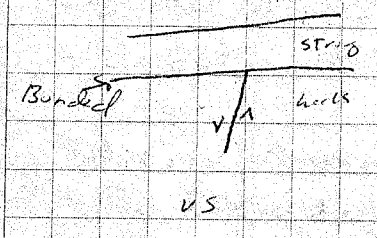
JPLE

2/4/02

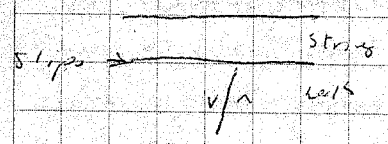
Morton Creeks S.T.

Alan Morris points out that Faults here didn't have the intact, strong up rills so nature of fault zone here is different.

Also had discussions about nature of damage zone near the strong up rills.

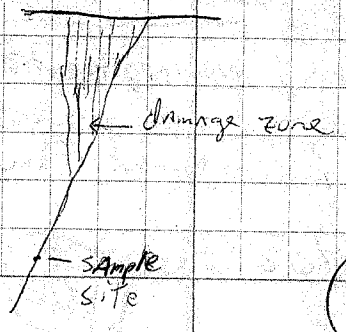


What is difference between these two?



How would this work when there is not a free surface?

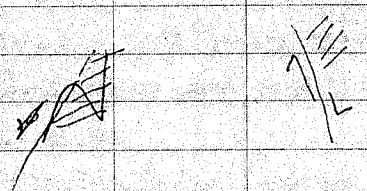
Lover's Quarry Site.



2/4/02

JPLE

AT the Fault zone east west of borrow pit, see Fault zone w/ shalldy dipping Frx

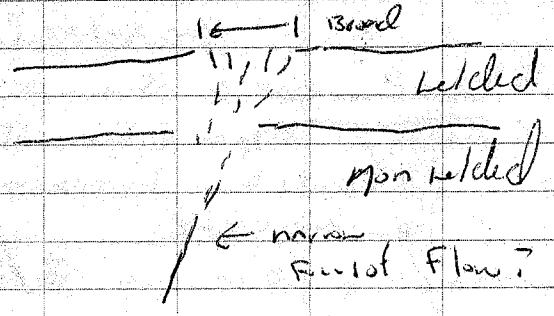


Left Field @ 5:30 pm

Note The mission focus here!

We need to stay focused on what are the hydrologic impacts of fracturing and faulting on Flow?

Do we have a funnel?



2/4/02

JPLE

Evening Discussions ~ 8:00-10:00 pm

Listing of things to do / Prioritize

The Bishop site provides direct analog issues to Yucca Mtn. Motivate the paper directly from this.

- > See Flint et al, 2001 for example
- > Also see

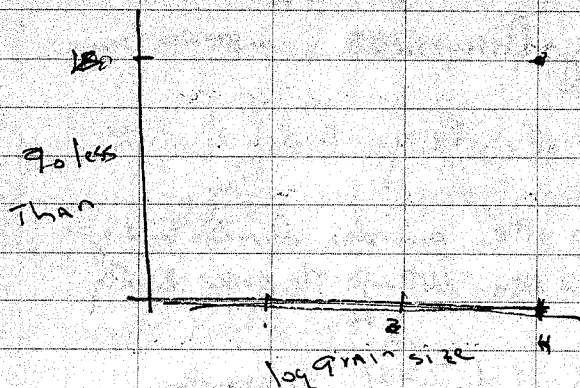
> The Two Things we can focus on here are that the faults here provide data on how structural positions / setting, and volcanic stratigraphy, impact fault structure.

Possible work Flow

- | | |
|---|---|
| <ul style="list-style-type: none"> - Kelly - Pavement - small Fault west of quarry - help on Crucifix | <ul style="list-style-type: none"> - sample crucifix, c flow quarry - help / do crucifix site |
|---|---|

2/4/02

JPLE



341 - T. Tol

108 > 4

341 - 108 = 90 < 4m

341 - 108 =

341 - 108

x.100 = 90 < 4mm

341

341 - 108 = 55

x.100 = 90 < 2m

341

Discussion of grain size analysis
w/ Kelly Bredberg

2/4/02

JPE

2/6/02 Bishop CA.

Started at 0930 am

→ Continuing field work on Faulted and Fractured Bishop Tuff for CUWRA

Notes for 2/5/02 in previous note books. (X)

#476

JPE 2/6/02

I am leaving this afternoon so need to finish up sampling and tests Kelly before I go.

Several thoughts here.

1. I suggest that further permeability could be done along these outcrops.

a. There are 4-5 different lithologies here - non-bedded tuff, coarse pumice-rich tuff,

fine pumice-rich tuff, and several different welding units.

b. Can capture the different degrees of fracturing and faulting in the same units, across the fault zone.

c. accessible, simple.

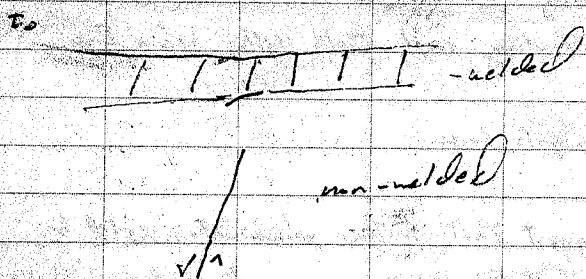
d. good place to do new permeability testing

9 need to rewrite outline to include figures

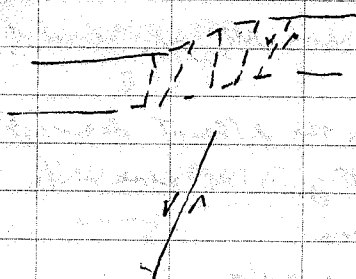
JPE

2/6/02

2. A point I've overlooked here wrt Fracturing and Faulting - Recall that welded units have more and "cleaner" fractures in general than partly welded units. So, when faults propagate from below there is a pre-fractured system in place. So, evolution is perhaps

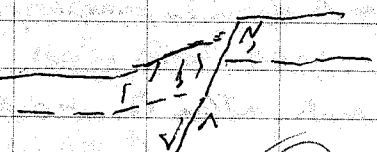


c,



small extent of slip along pre-existing and new? fractures enable monocline to form

c2



Breaks through w/ fault Fault welded blocks enhancing damaged zone.

JPE

2/6/02⁹

Samples collected at Coneix site

BT 68 A-D series

A, B & D - From outcrop of Fault

Thin gauge zone + slip surface

C - ~ 5cm wide gouge

69 - small fractured sample from right white tuff

70 - large fractured sample from white tuff bed

JPE

2/6/02

Some summary thoughts regarding Bishop
works

I will revise our outline, and send it out
to everyone by Wed, 13 Feb.

Points to accomplish

→ Improve motivation w/ Yucca Mtn

→ Write up Fiquelati Assign people to
write up

→ develop better connections of fault work

Left site @ 1240 pm: Drive to Reno

JPE

Figure List

2/6/02 evening

① structural setting: Strike map w/ inset fig of
location of southern edge of Pabb/mbly
- DAVD JPE 2/6/02

② stratigraphic section, w/ comp. to YM! JPE JE
Macroscopic descriptions in x section

③ a) Simple Faults JPE 2/6/02
- Cuccifex east 3a 3a b 18
- Lower Cherry 2b 4c-b JE
- Horton Creek 3c 5c b' JE

④ b) complex Fault - Cuccifex west 18
JPE 2/6/02

⑤ Fault arrays - Barron Pit site

⑥ Map, showing structural setting w/ the
Faults in the near field DF/AM? JPE 2/6/02
b. Cross section of Barron Pit - AM?

c. Detailed Map of Barron Pit - KB/JE

8. Microstructures.

Panel of representative micro structures JE

JPE

2/6/02

Another point.

Discussed w/ Dave Furr the opportunities at
Cuccifex site: Good exposures, Excellent analogs
etc.

B.T. Good outcrops may not like us climbing
around or doing permeability there!

JPE

5/22/02

SEM analyses of Bishop Tuff samples.
From a suite of thin section samples from
the Bishop Tuff study area.

The purpose of this investigation is to examine
the microstructure of deformed nonwelded,
partially welded, and densely welded portions
of faulted Bishop Tuff. To examine
deformation structures in the rocks,
and to evaluate the potential impact these
faults and fractures may have on fluid flow in
the rocks.

I had 23 thin sections made by Specimen
petrographists, Winston, OR.

Michael DePanger

541-679-5163

499 Oillard Center Road, Suite 2

Winston, OR 97496

Samples were tracked from an master
sample list at USU, Logan, UT 106,

Where Kelly Bradley has our samples.
The samples we had made into thin sections are:

BT-1-01	BT 53-01
BT 3-01	BT 54-01
BT 4-01	
BT 5-01	YM-1-01
BT 6-01	YM 2-01
BT 7-01	
BT 8-01	
BT 9-01	
BT 10-01	
BT 16-A 01	
BT 16B-01	
BT 16C-01 11	
BT 16C-01 +	
BT 31-01	
BT 32-01	
BT 50A-01	
BT-50R-01	
BT 50C-01	
BT 52-01	

From These, Leave Suskind of Univ. Oregon
Thin section lab polished these samples for
SEM Analysis. The following thin sections
were polished:

BT 1-01	
BT 3-01	
BT 4-01	
BT 5-01	
BT 6-01	
BT 7-01	5/22/02
BT 8-01	5/22/02
BT 9-01	
BT 31-01	
BT 50A-01	5/22/02
BT 50B-01	5/22/02
YM 1-01	5/22/02

Purpose of Electron microscopic
work is to examine fine-grained
samples - faulted, non-faulted samples.

EM work is being done on a JEOL
JSM-6300 FXV - doing back-scattered
EM, secondary EM, and perhaps CL
works on these.

The JEOL 6300 specifications are
copied and included in a notebook.

Images are captured and stored on the
EM lab computer. EM computer is a
DEC 590 XL; From there, they get
transferred either by CD-ROM or
via network's ~~system~~ system.

JPB
5/22/02

BT 7-01 small fault in Pumice-rich
sample.

Images BT 701-1 Through
BT 701-16 JPB 5/22/02

are a set of images taken across the
sample, and which are a representative
transect from faulted to non-faulted.

Faulted zone consists of low porosity
material w/ angular fragments. Host rock
exhibits many undeformed pumice fragments,
crystals, and ground mass - pumice frag.
show excellent primary textures.

BT 701-10 + 11 are 170 to 200 X
images of zone.

BT 7-01-12 image of pumice fragment.

BT 7-01-13 - 16 Traverse of an
open fracture across the pumice-
rich sample. See fracture cutting highly
porous groundmass, around most large
grains, and through some others,

and see well-developed open Fracture.

(JPE) 5/22/02

BT 7-01-17- shows Fracture
in v. porous region.

Taped together the two masses, and see
nicely the impact of Fault on the structure
of the rocks.

Main difference is the presence of
pumice fragments in the host rocks, and
the preservation of the delicate bubble textures
in these fragments. As with the localized
Faults, see well developed primary porosity &
structure adjacent to the Fault.

Last entry 9/30/02
RUF
2 Fedors



Project No. _____

TITLE _____

Book No. _____

From Page No. _____

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. Pearson
10/1/2002

To Page No. _____

Witnessed & Understood by me,

Date

Invented by

Date

Recorded by