Oil Fields in Railroad Valley Nevada*

Louis C. Bortz[1]

Search and Discovery Article #20376 (2016)**
Posted December 19, 2016

*Adapted from oral presentation given at 2016 AAPG Pacific Section and Rocky Mountain Section Joint Meeting, Las Vegas, Nevada, October 2-5, 2016

[1]Advantage Resources, Inc., Denver, CO, USA (chrisp@advantage-resources.com)

Abstract

Nevada's first oil field, Eagle Springs, was discovered by Shell Oil in 1954. What led Shell Oil to explore for oil and gas in a remote valley in east-central Nevada? Possibly, because some droplets of live oil were found in *goniatites* in 1946 by Walt Youngquist in the Mississippian Chainman shale, 30 miles northwest of the Eagle Springs field. Since 1954, nine oil fields have been discovered in Railroad Valley, and to-date have produced a total of 47,000,000 barrels of oil. Production is from Oligocene volcanics, Eocene lacustrine limestones and Paleozoic carbonates. Case histories of three fields will be summarized (Eagle Springs, Trap Spring and Grant Canyon-Bacon Flat). Future exploration will be for both conventional and unconventional fields.

References Cited

Bortz, L.C., 1994, Petroleum geology of the Eagle Springs oil field, Nye County, Nevada: in Oil fields of the Great Basin, Nevada Petroleum Society, Reno, Nevada, p. 285-294.

Duey, H.D., 1979, Trap Springs oil field, Nye County, Nevada: in G.W. Newman and H.D. Goode, eds., Basin and Range Symposium: Rocky Mountain Association of Geologists and Utah Geological Association, p. 469-476.

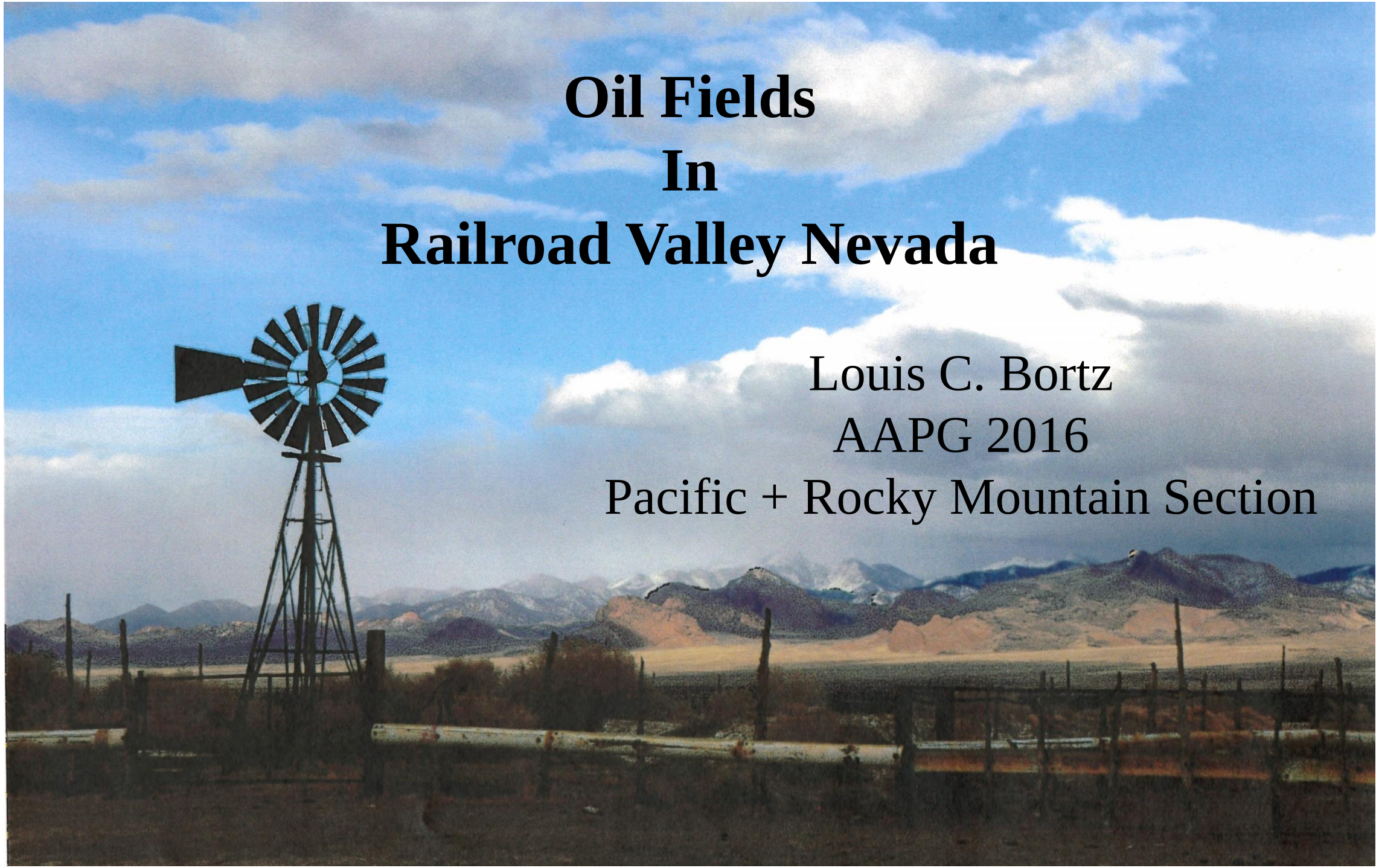
French, D.E., 1994, Petroleum geology of the Trap Spring oil field, Nye County, Nevada: in Oil fields of the Great Basin, Nevada Petroleum Society, Reno, Nevada, p. 253-269.

Johnson, E.H., 1994, Geologic and Seismic Analysis of the Bacon Flat-Grant Canyon area, Nye County, Nevada: in Oil fields of the Great Basin, Nevada Petroleum Society, Reno, Nevada, p. 227-240.

Meissner, F.F., 1995, Pattern of maturity in source rocks of the Chainman Fm., central Railroad Valley, Nye County, Nevada, and its relation to oil migration and accumulation: in 1995 Fieldtrip Guidebook: Nevada Petroleum Society, Reno, Nevada, p. 65-74.

Vreeland, J.H., and B.H. Berrong, 1979, Seismic exploration in Railroad Valley, Nevada: in G.W. Newman and H.D. Goode, eds., Basin and Range Symposium: Rocky Mountain Association of Geologists and Utah Geological Association, p. 557-569.

Youngquist, W.L., 1949, The Cephalopod Fauna of the White Pine Shale of Nevada: Journal of Paleontology, v. 30, p. 56-64.

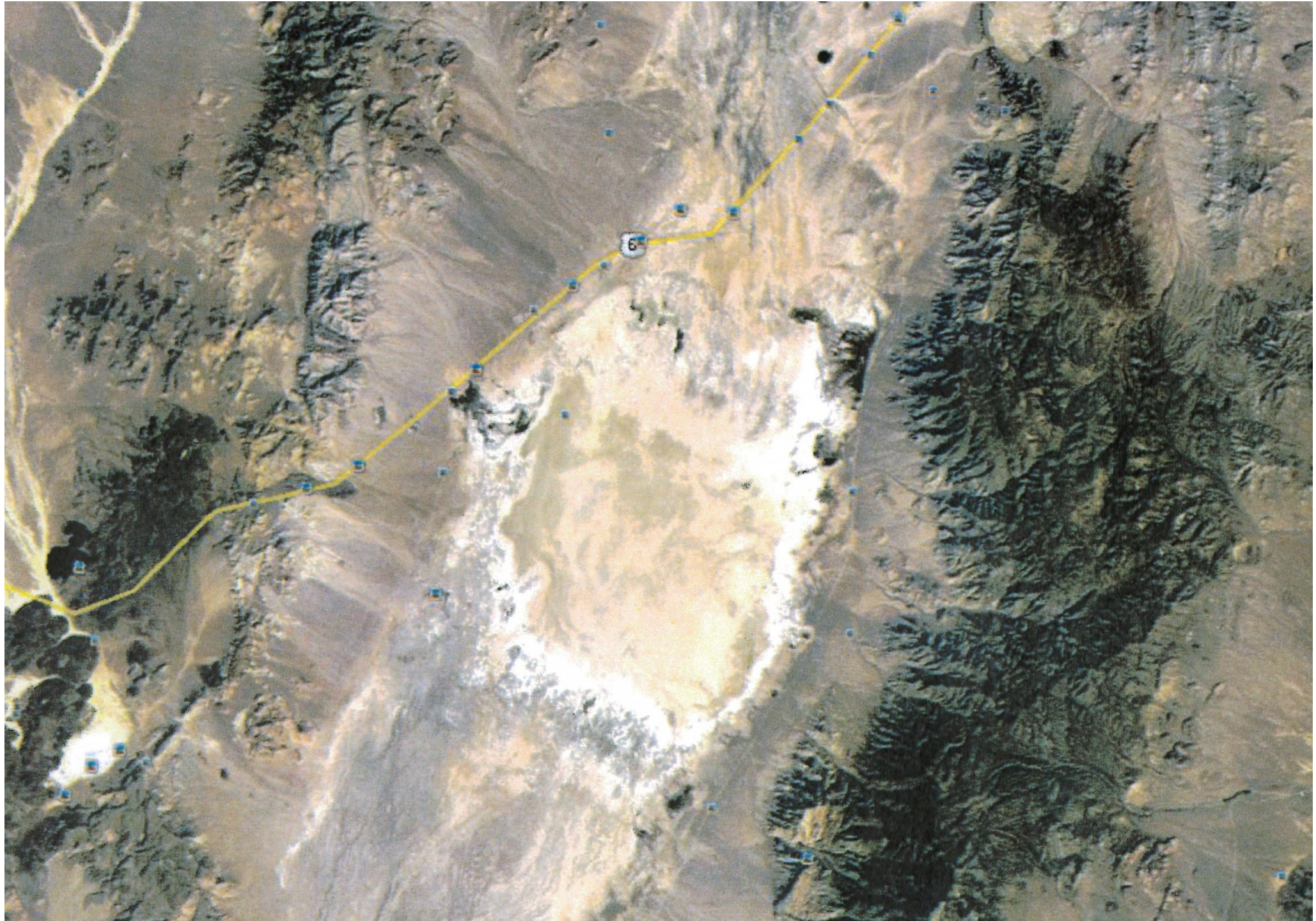


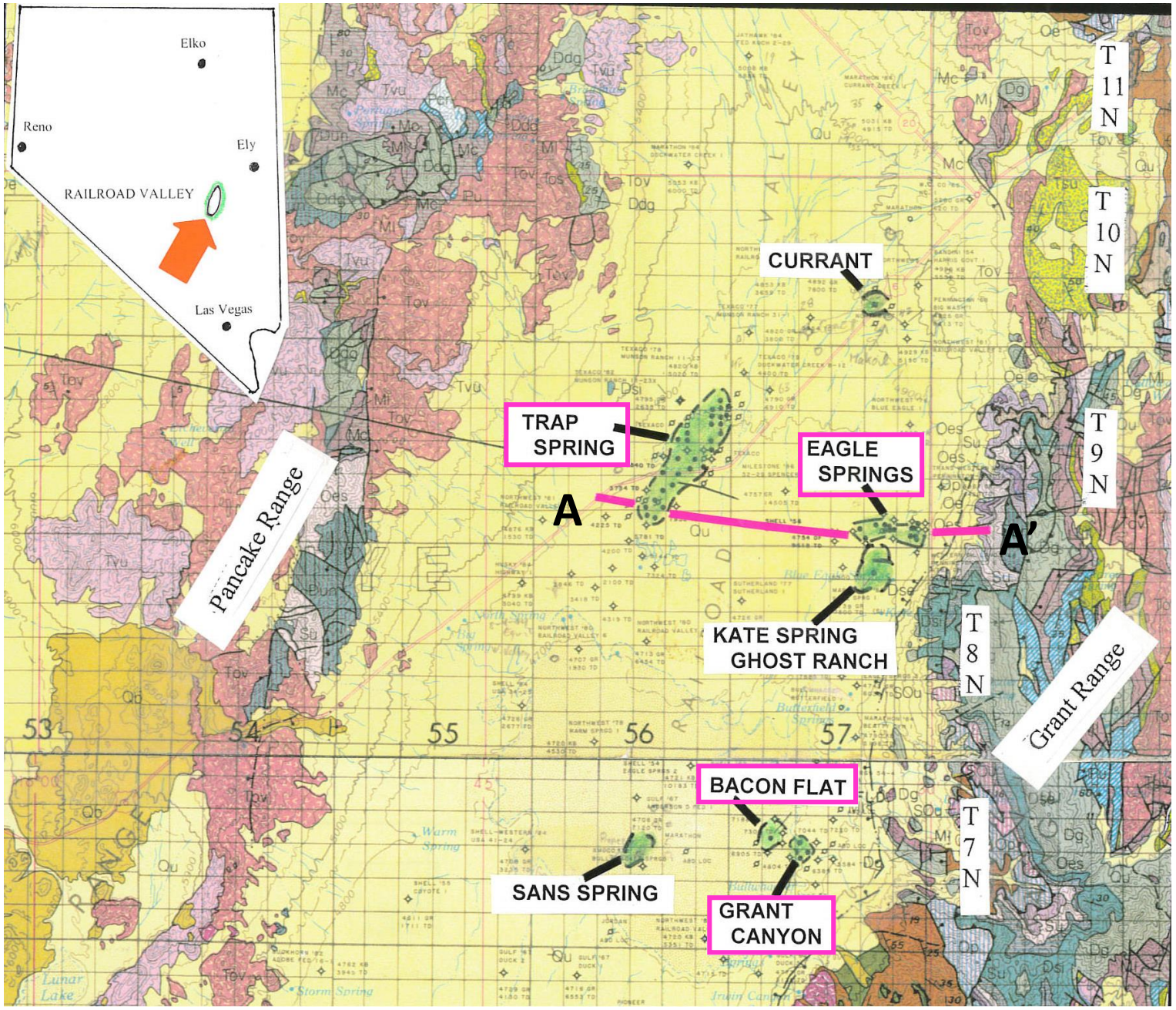
Oil Fields
In
Railroad Valley Nevada

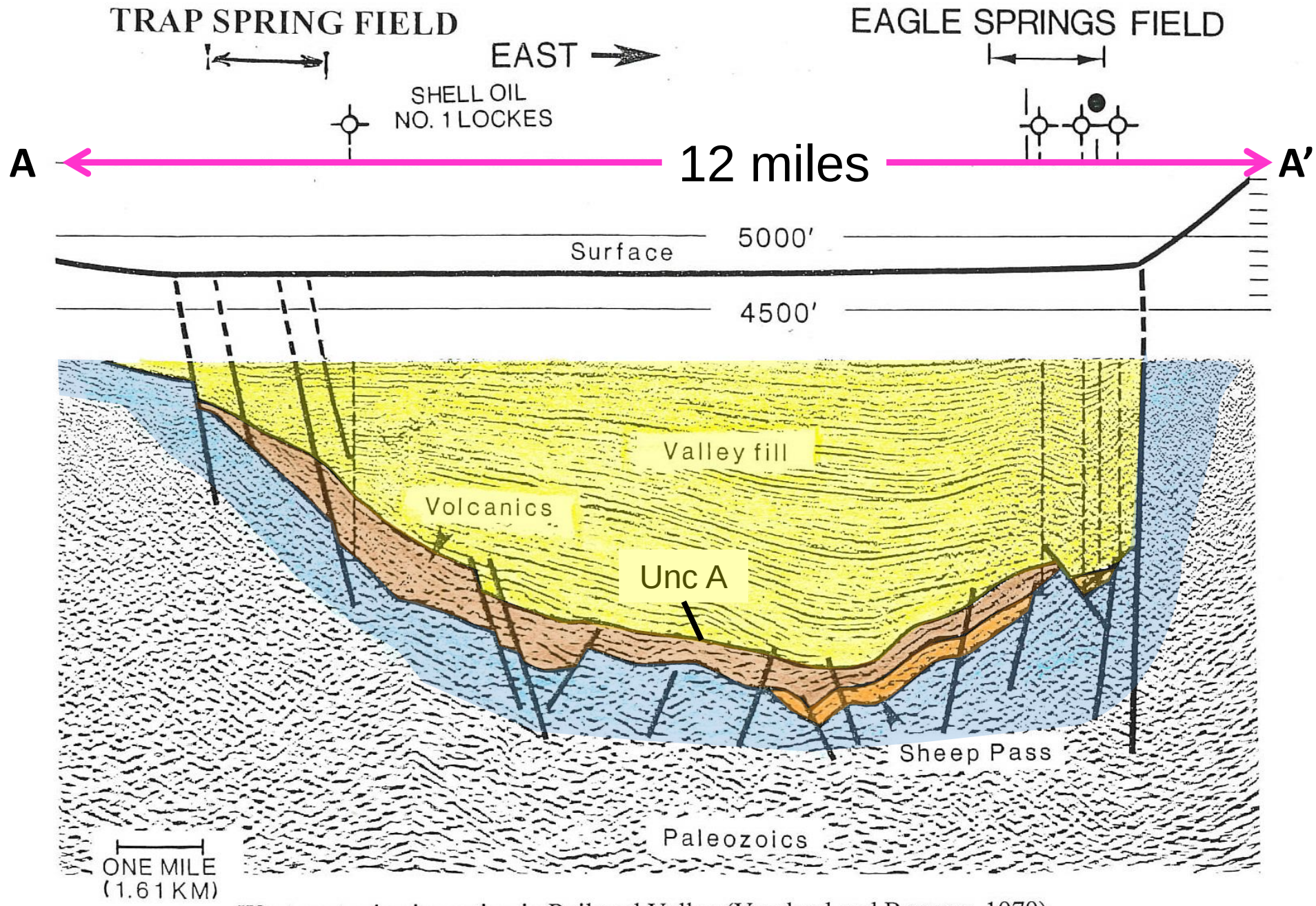
Louis C. Bortz

AAPG 2016

Pacific + Rocky Mountain Section


6


Elko
Reno
Ely
RAILROAD VALLEY
Las Vegas
T 11 N
T 10 N
T 9 N
T 8 N
T 7 N
CURRANT
TRAP SPRING
EAGLE SPRINGS
A
A'
Pancake Range
KATE SPRING
GHOST RANCH
Grant Range
BACON FLAT
SANS SPRING
GRANT CANYON
53
54
55
56
57
Warm Spring
Lunar Lake
Storm Spring



West-east seismic section in Railroad Valley (Vreeland and Berrong, 1979)

WALTER YOUNGQUIST
P.O. BOX 5501
EUGENE, OREGON 97405

STATE OF OREGON
REGISTERED GEOLOGIST

June 7, 2015

Dear Lou-

RE- the matter of oil in Nevada, enclosed is a copy of three pages from my thesis on The Cephalopod Fauna of the White Pine Shale of Nevada (Note: Bruce Heezen was my field assistant- never did I think that kid would become a world famous ocean floor scientist, and eventually have a 330-foot naval research named for him -the BRUCE C. HEEZEN).

But back to the White Pine shale, I simply noted in passing that one could crack open cephalopods and find live oil in the cavities. At the time it never occurred to me that I had discovered oil in Nevada. That dawned on me several years later.

The thesis was published as an article in the May 1949 issue of the JOURNAL OF PALEONTOLOGY. I only got 50 reprints for it was a fairly expensive article with 9 plates. Being fresh out of grad school as Assist. Prof. at Univ. of Idaho, I didn't have much money for reprints.

Nothing much happened for a couple of years, and then, rather suddenly, I began receiving requests from oil companies for copies of my paper. I thought it rather odd that oil companies would have such an interest in cephalopods, but concluded that somehow I had inspired a great renaissance in cephalopod study. This as in 1952.

Apparently, one of the companies, Shell, decided to find the White Pine shale (Chainman member- the black shale with the oil-bearing cephalopods) at depth and moved south. And in 1954 drilled, and blundered into the Tertiary lacustrine Sheep Pass Formation, with its odd quality of oil (90 degree pour point as I recall).

What Shell expected would be the reservoir rock for the oil from the White Pine shale I don't know, as the underlying member of the Chainman is the Joanna Limestone, not very porous at least in outcrop, or the overlying Diamond Peak Quartzie- very tight!.

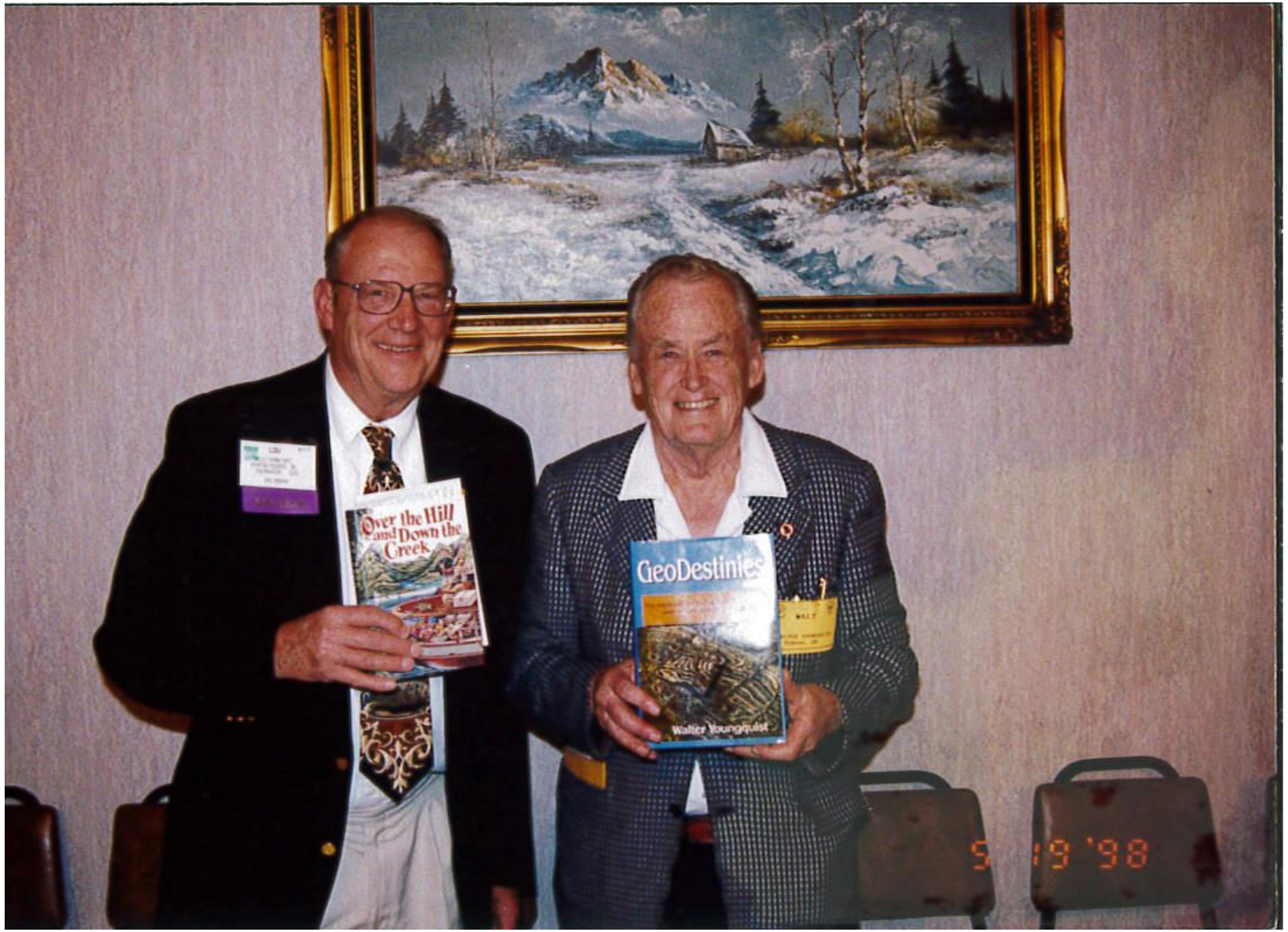
Best-

Walt

But back to the White Pine shale, I simply noted in passing that one could crack open cephalopods and find live oil in the cavities. At the time it never occurred to me that I had discovered oil in Nevada. That dawned on me several years later.

.....

Nothing much happened for a couple of years, and then, rather suddenly, I began receiving requests from oil companies for copies of my paper. I thought it rather odd that oil companies would have such an interest in cephalopods, but concluded that somehow I had inspired a great renaissance in cephalopod study. This was in 1954.



Lou Bortz Walt Youngquist
(1998)

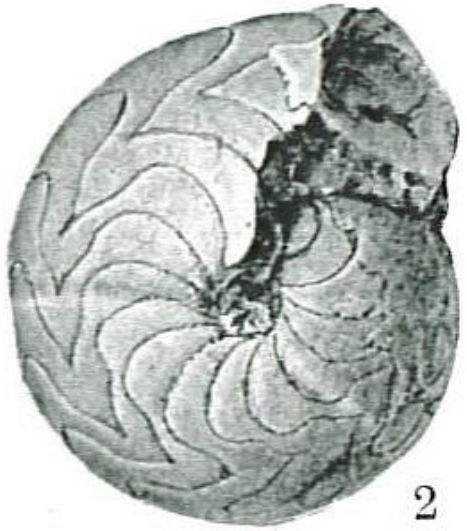
THE CEPHALOPOD FAUNA OF THE WHITE PINE SHALE OF NEVADA

WALTER YOUNGQUIST

Location: 20 miles NW of Eagle Springs oil field

JOURNAL OF PALEONTOLOGY, VOL. 23

1



2

3

Goniatites choctawensis

5 miles north of
Duckwater, Nye Co., NV

Bruce Heezen, Youngquist's assistant, collecting fossils for Walt's Ph.D. thesis, 1946

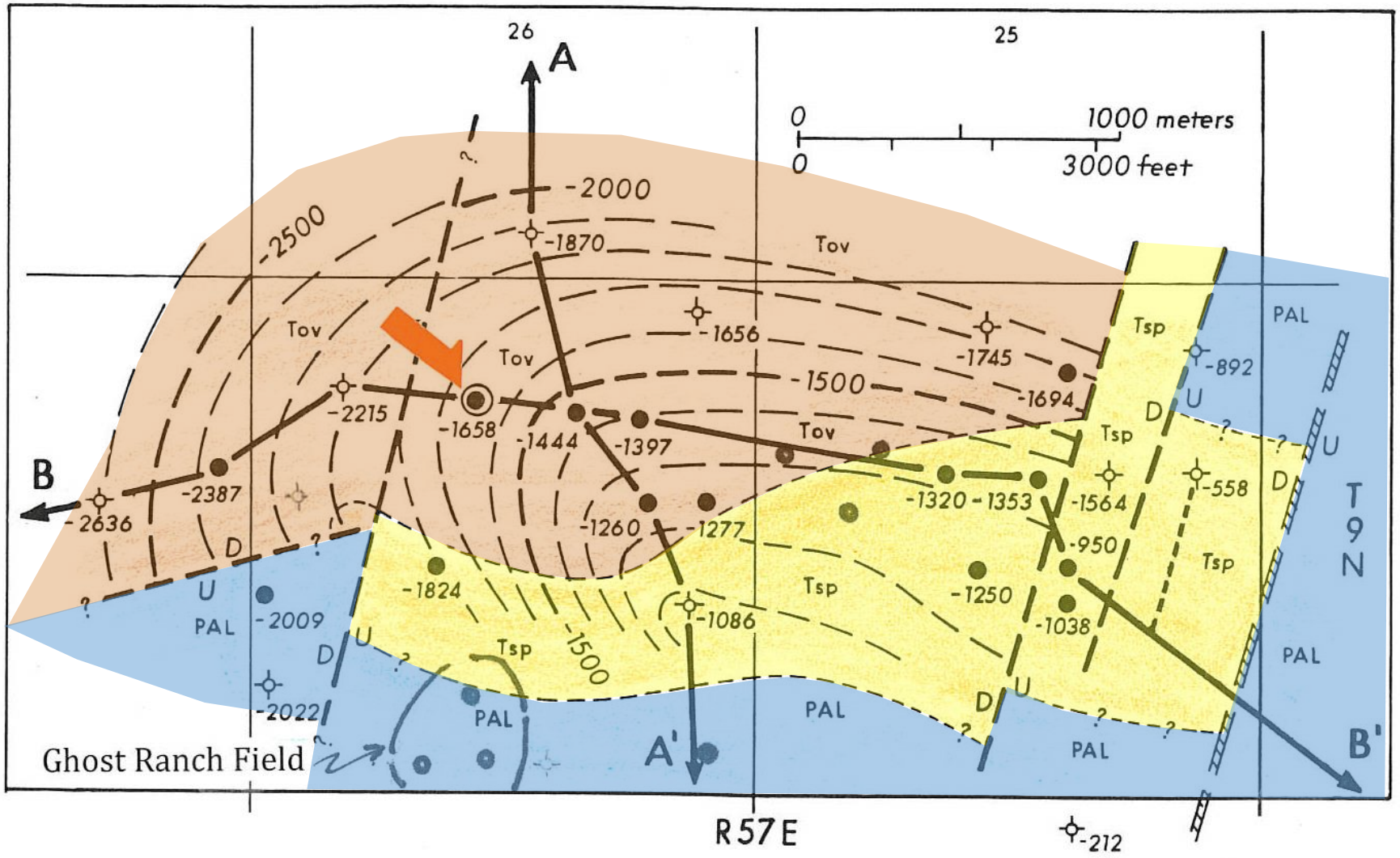
Summary of Oil Fields – Part 1

Oil Field (Disc.)	BO Cumulative	Prod. Wells	Ave. Cum/Well	Prod. Fm	Gross Column	Productive Areas (acres)	API
Eagle Springs 1954	5,615,504	20	280,775	Tov Tsp Pe	1600’	640	26-29 85-90°F pour pt
Trap Spring 1976	15,425,759	41	376,482	Tov	2100’	2440	21.5
Grant Canyon 1983	21,407,314	6	3,567,886	Dg	950’	300	26
Bacon Flat 1981	1,055,833	2	527,816	Dg	450’	80	28

Summary of Oil Fields – Part 2

Oil Field (Disc.)	BO Cumulative	Prod. Wells	Ave. Cum/Well	Prod. Fm	Gross Column	Productive Areas (acres)	API
Kate Spring 1986	2,514,570	6	419,095	Dg Thc	300’	200	10.7
Ghost Ranch 1996	662,626	4	165,657	Dg	?	160	?
Sans Spring 1993	279,130	3	93,043	Tov	150’	160	28
Sand Dune 1998	160,736	1	160,736	Tov	?	40	?
Currant 1979	2,336	1	2,336	Tsp	?	40	9-14
TOTAL	47,139,880 BO						

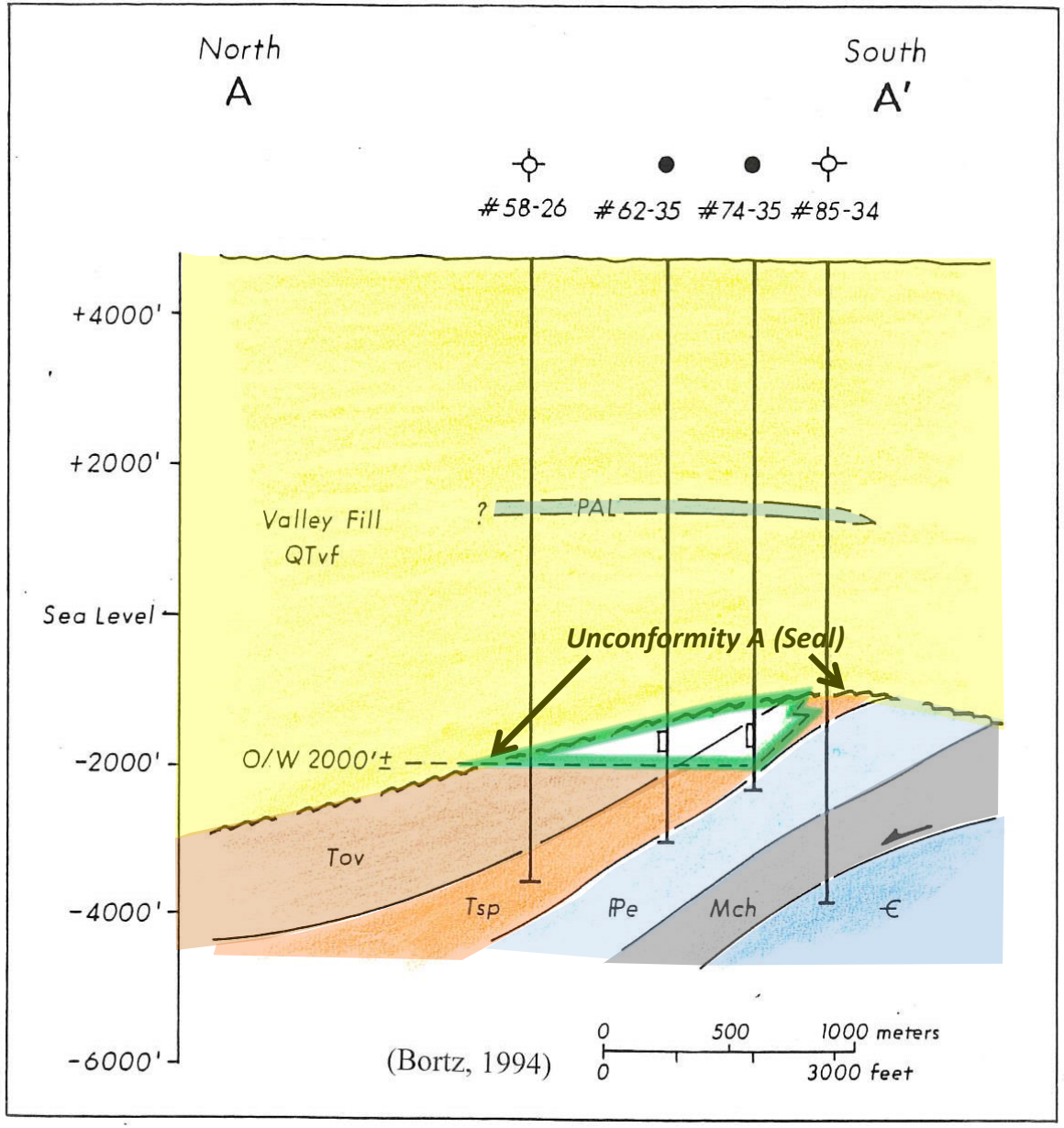
Eagle Springs Oil Field – Nevada's First Oil Field (1954)



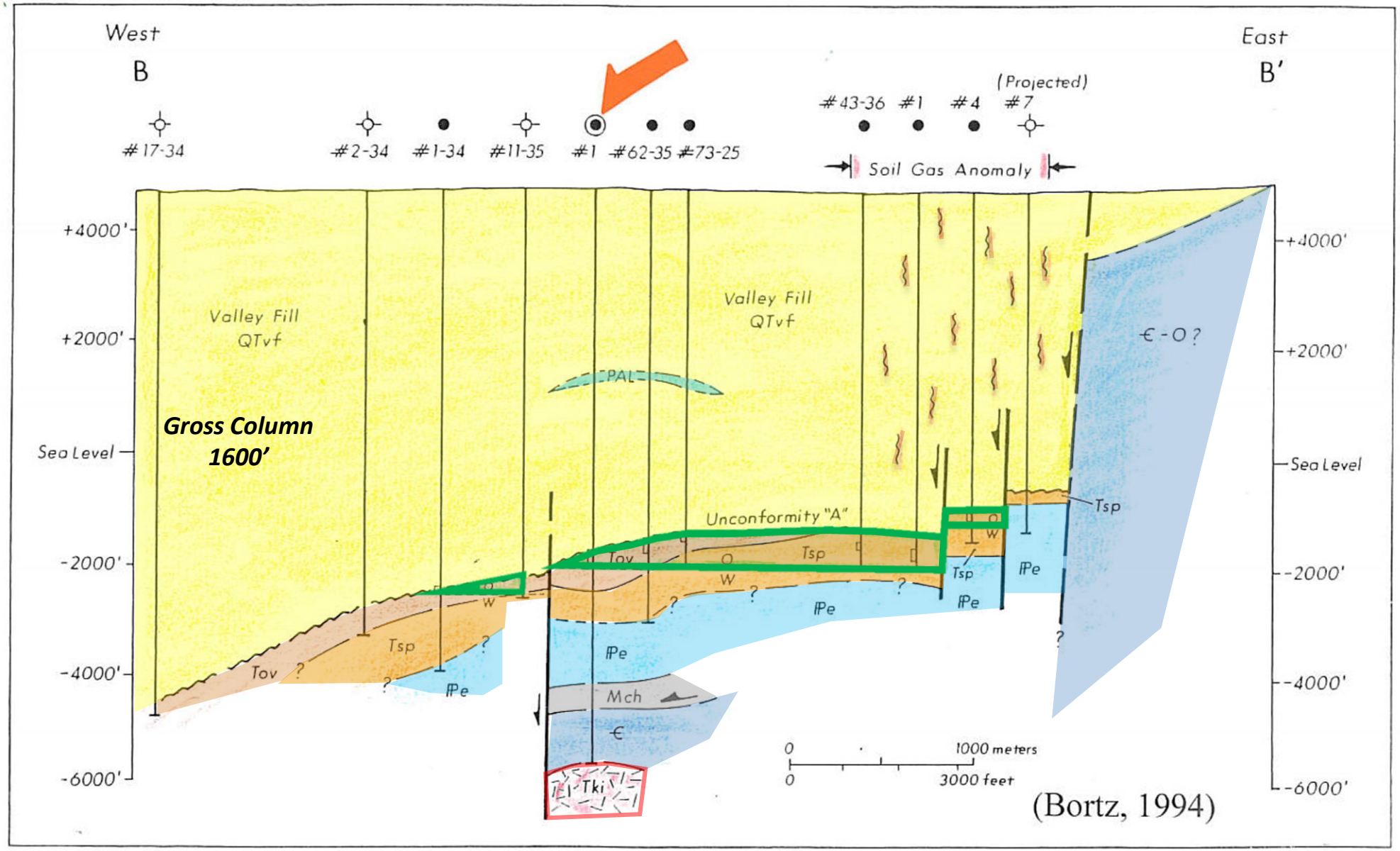
Structure map on unconformity "A" with subcrops below Unconformity "A." C.I. 100 feet.

(Bortz, 1994)

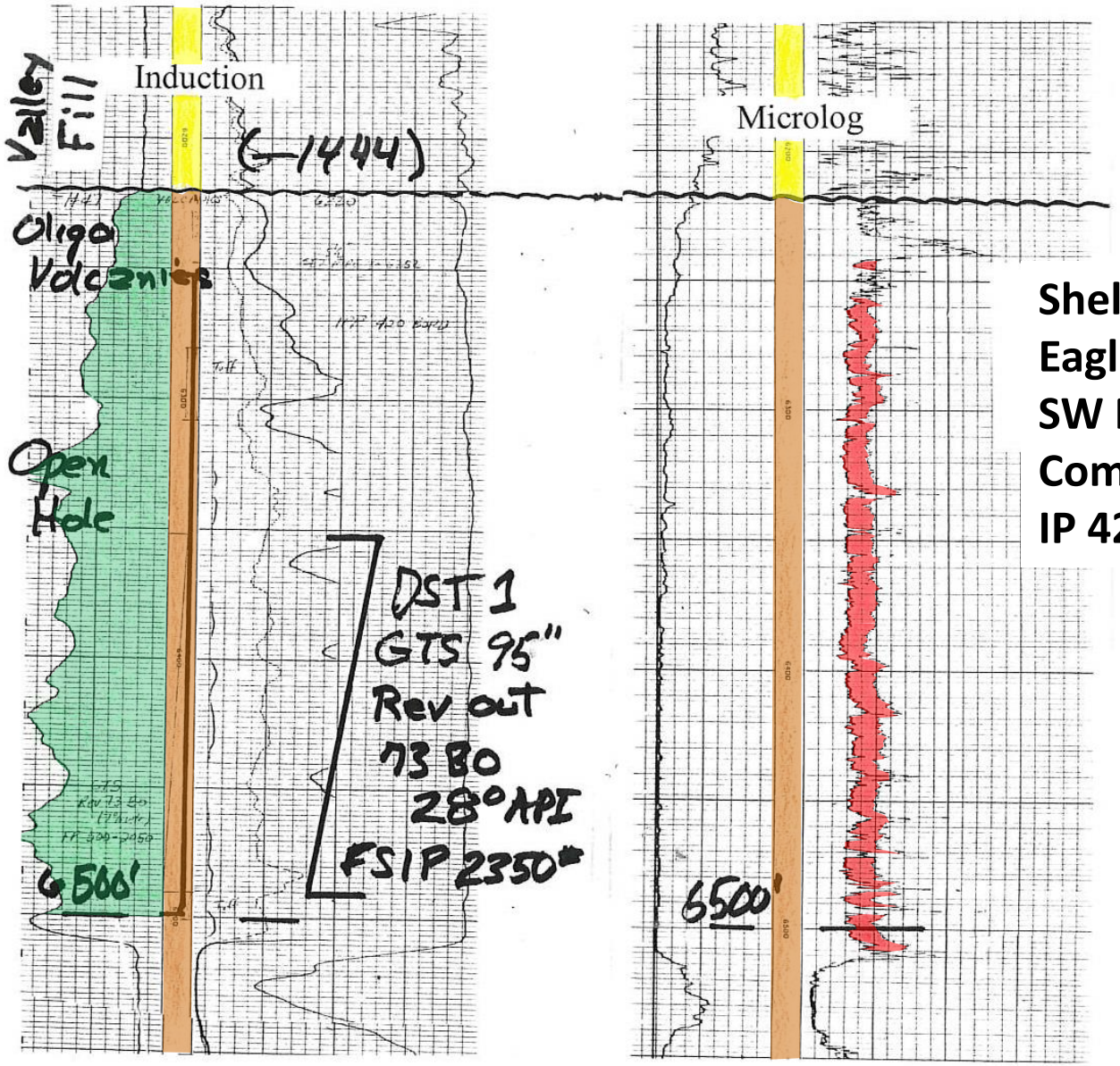
Eagle Springs North-South True Scale Cross Section A-A’



Eagle Springs West-East True Scale Cross Section B-B’

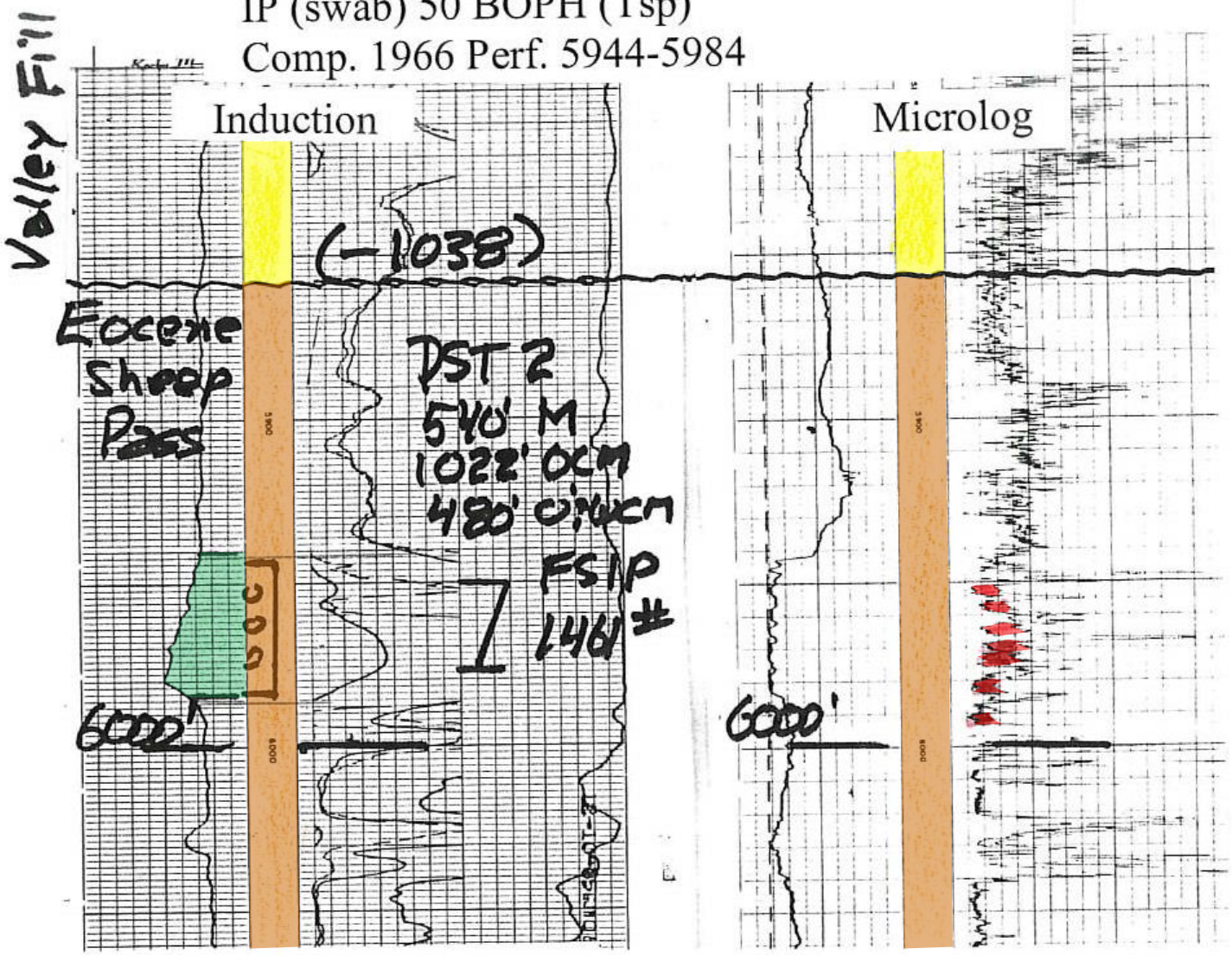


West-east structural-stratigraphic section B-B’ Open boxes show perforated intervals.



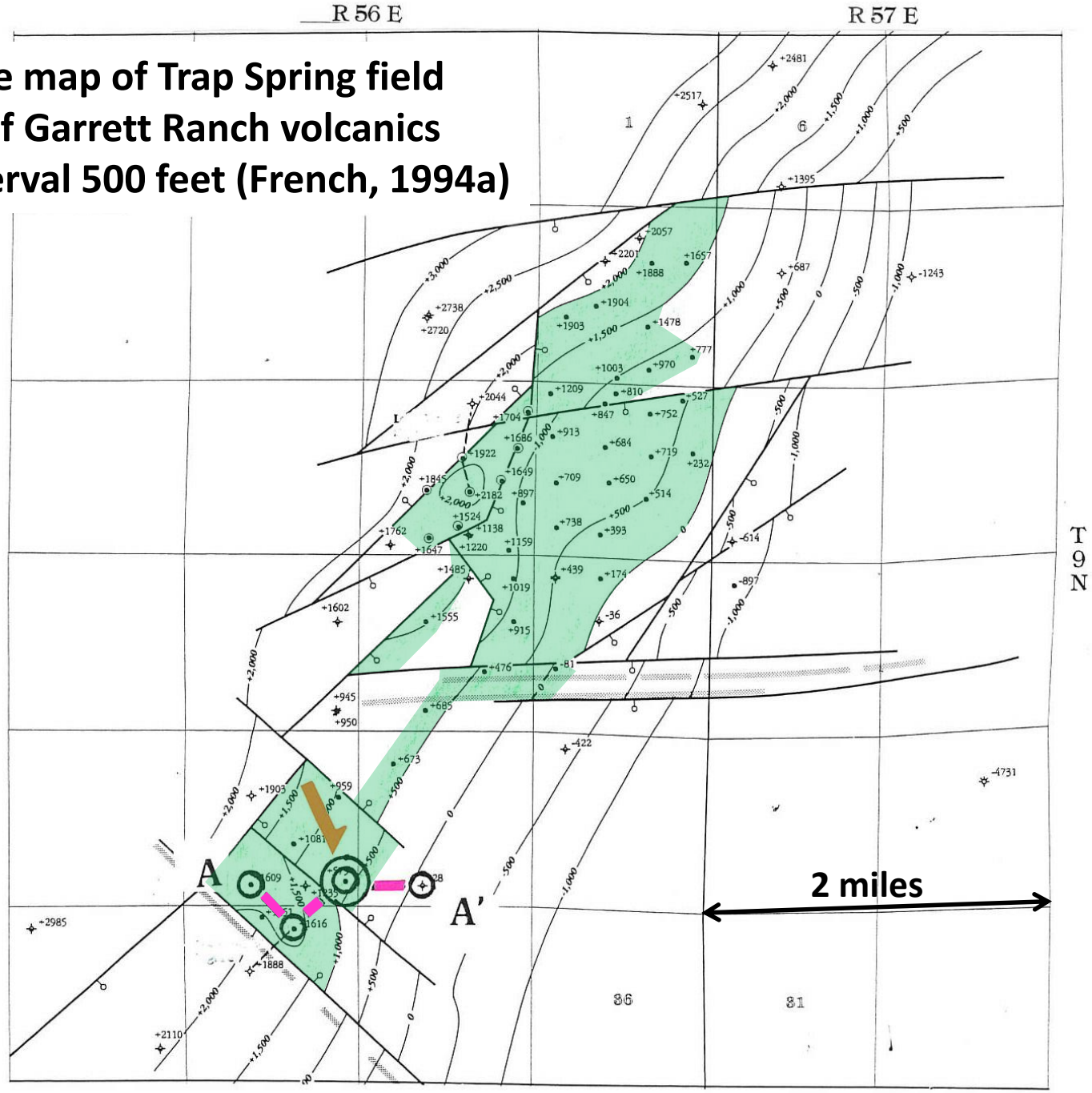
Shell Oil
Eagle Springs #62-35
SW NE Sec. 35, T9N-R57E
Completed 1961 Open Hole 6250-6500'
IP 422 BOPD Tov

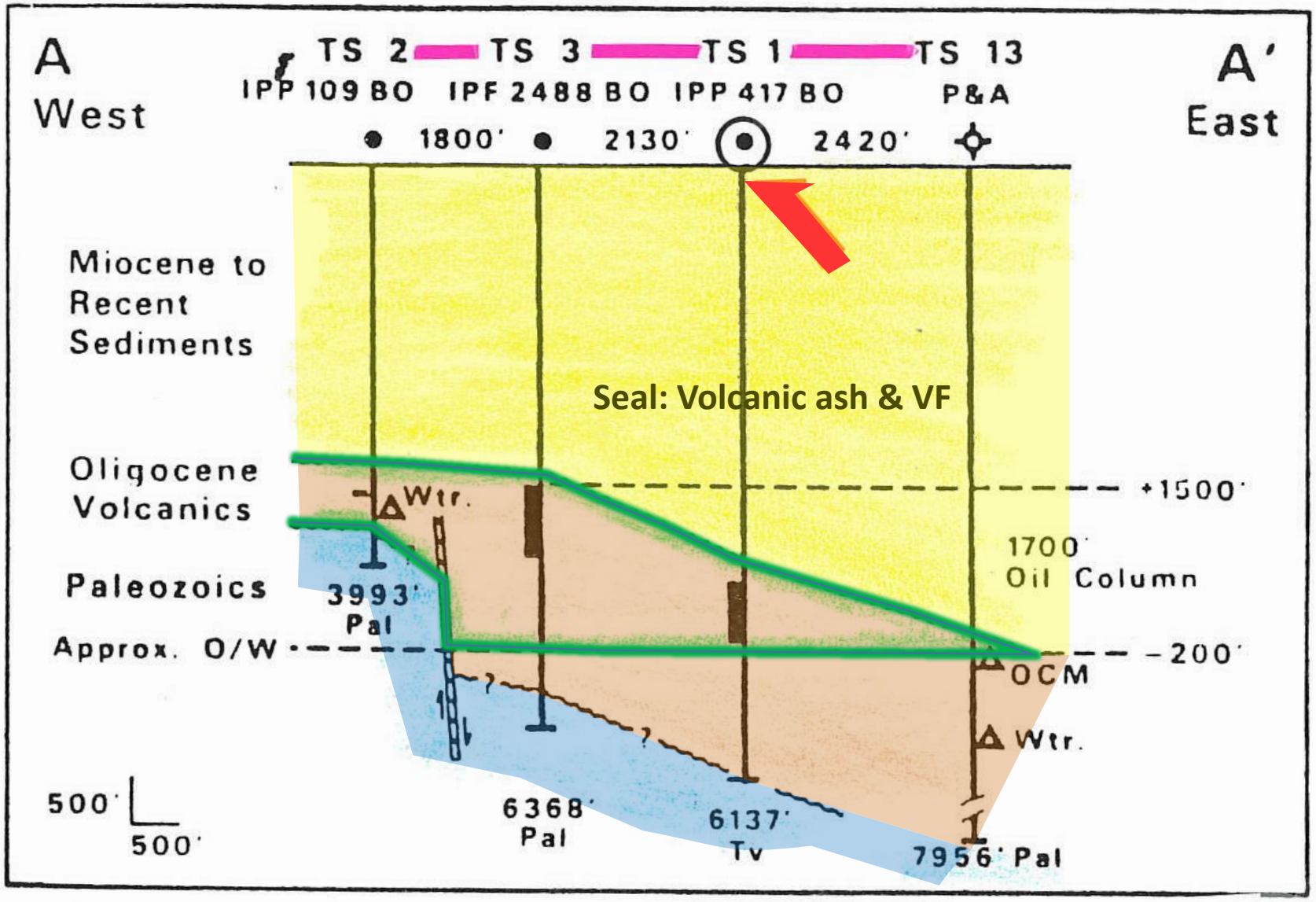
Western Oil Lands Pennington-Federal # 2-36
NW SE Sec. 36, T9N-R57E
IP (swab) 50 BOPH (Tsp)
Comp. 1966 Perf. 5944-5984



Lou Bortz
Sheep Pass Outcrop
Grant Range (c. 1974)

Structure map of Trap Spring field on top of Garrett Ranch volcanics Contour interval 500 feet (French, 1994a)



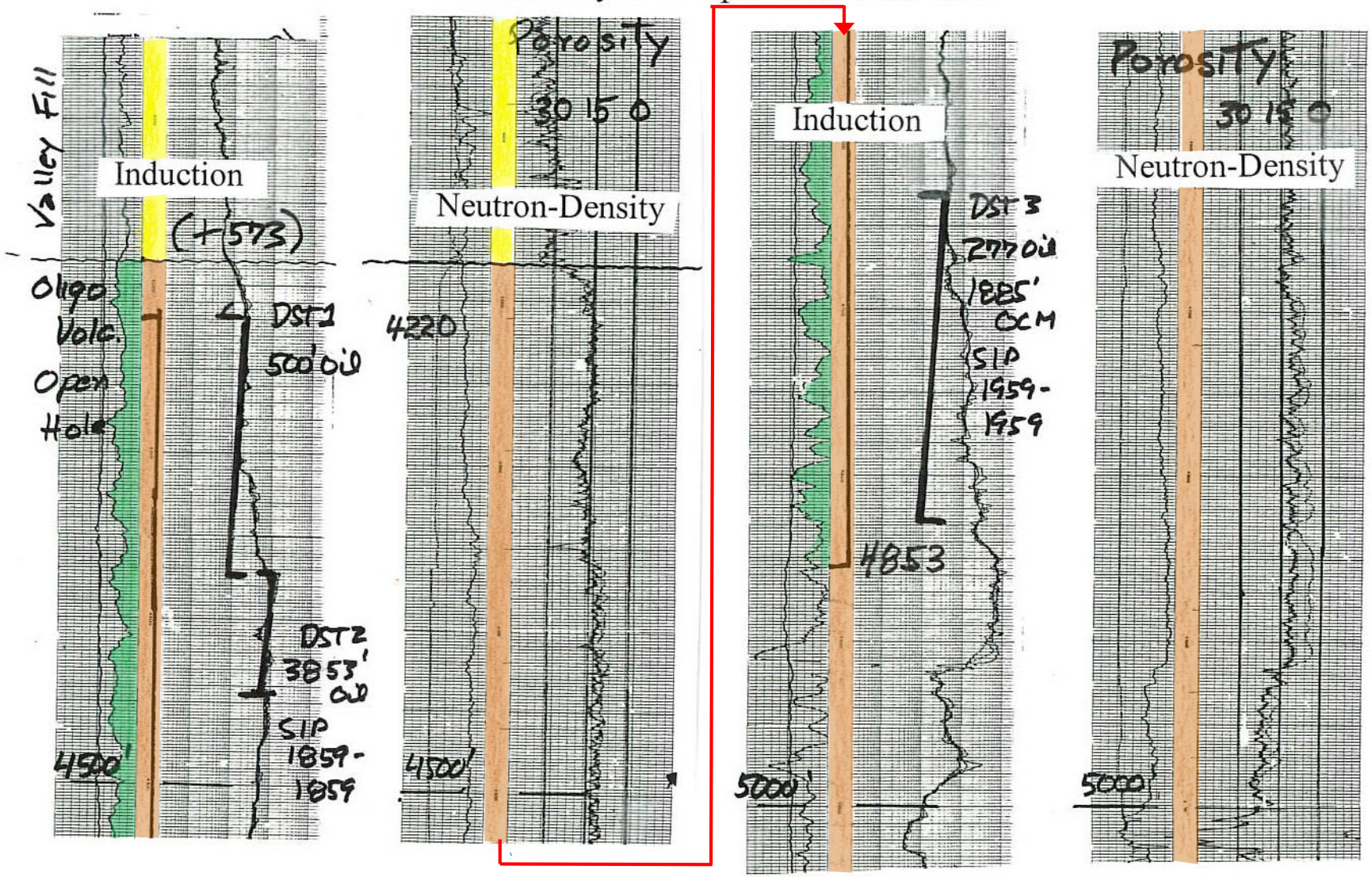


West-east, true-scale cross-section through Trap Spring discovery well (TS1).
(Duey, 1979)

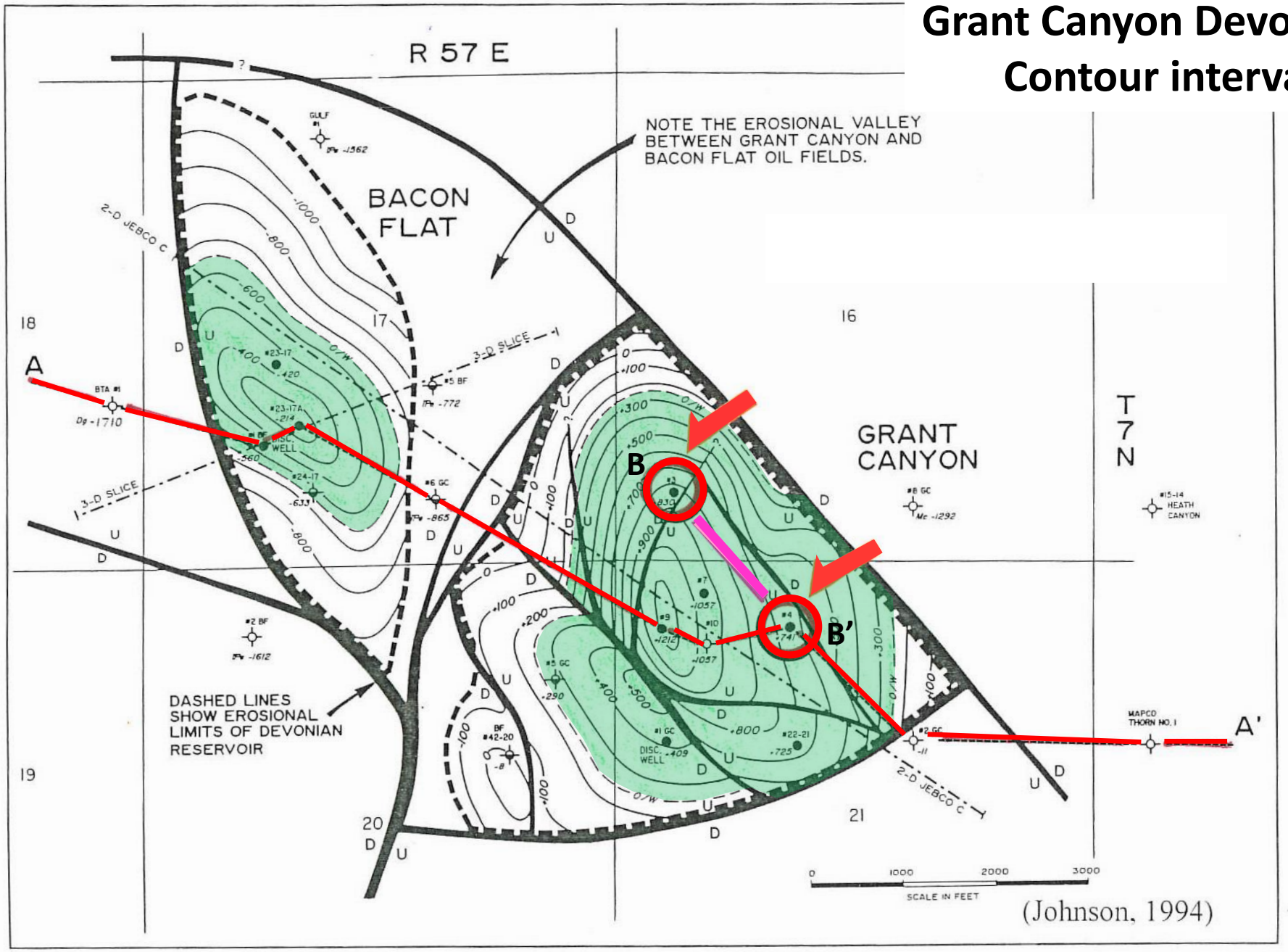
Northwest Explr. Trap Spring #1

Comp. 1976 IPP 417 BOPD

Discovery Well open hole 4220-4853

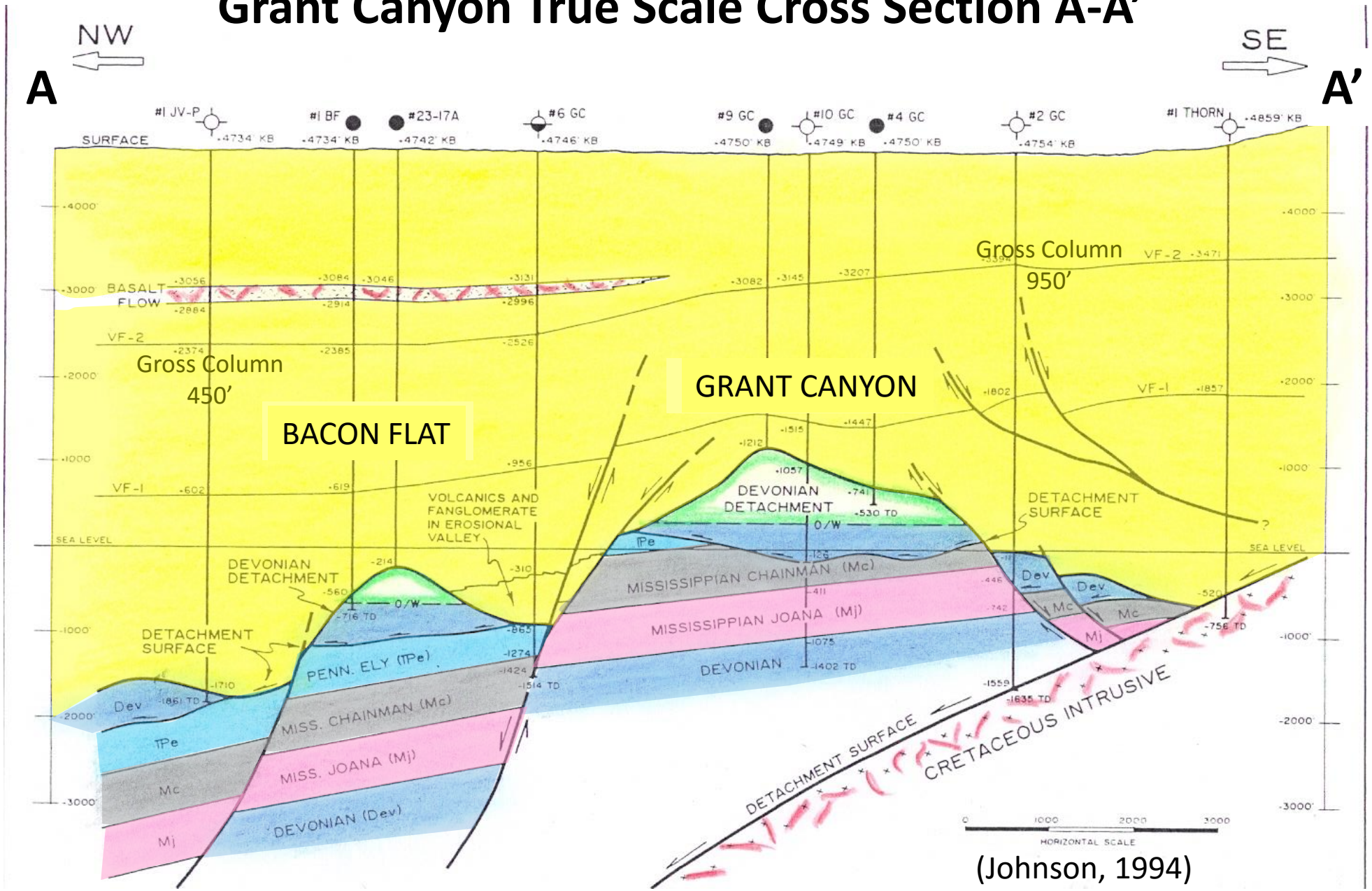


Grant Canyon Devonian Structure
Contour interval 100 feet



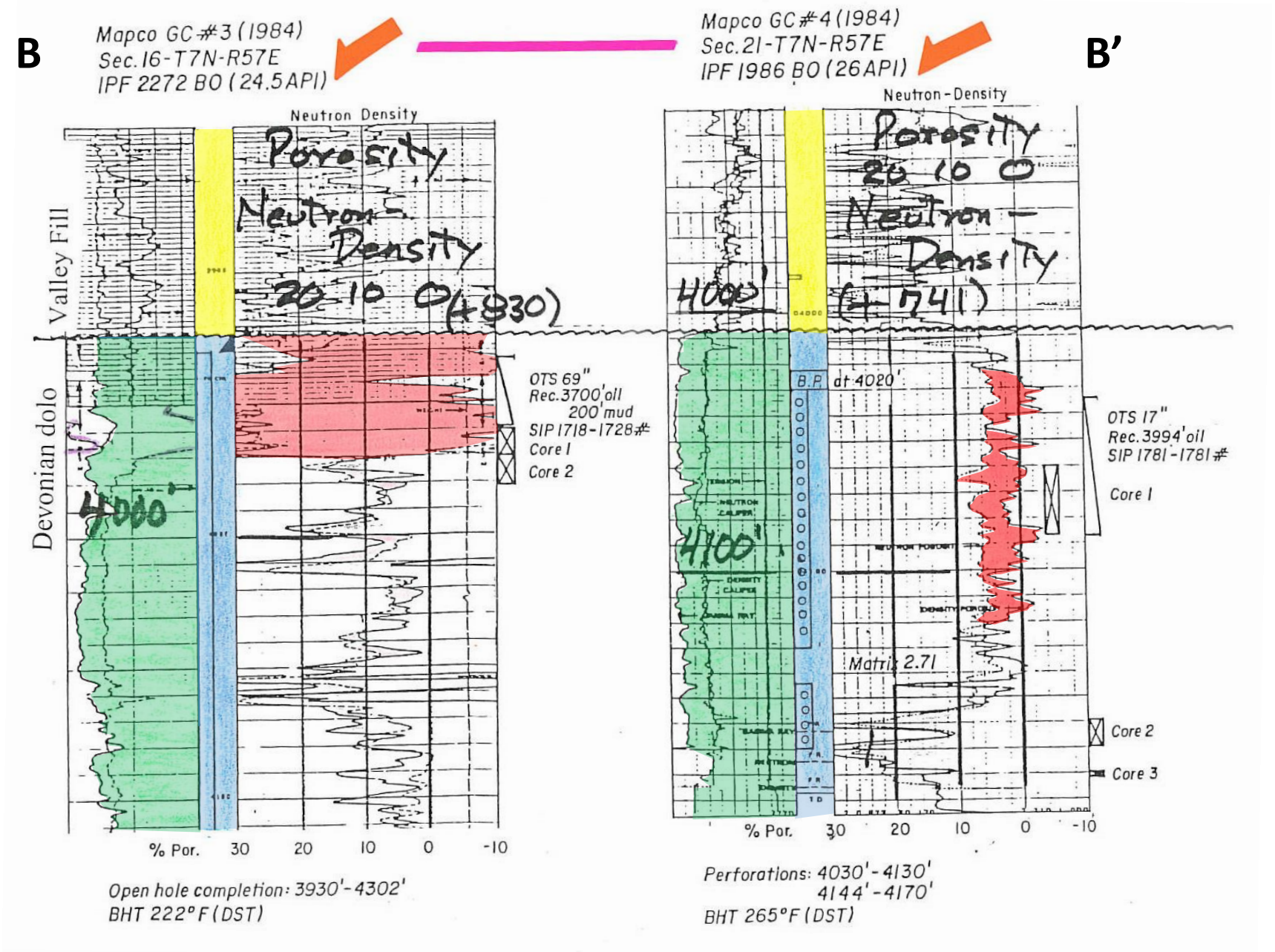
(Johnson, 1994)

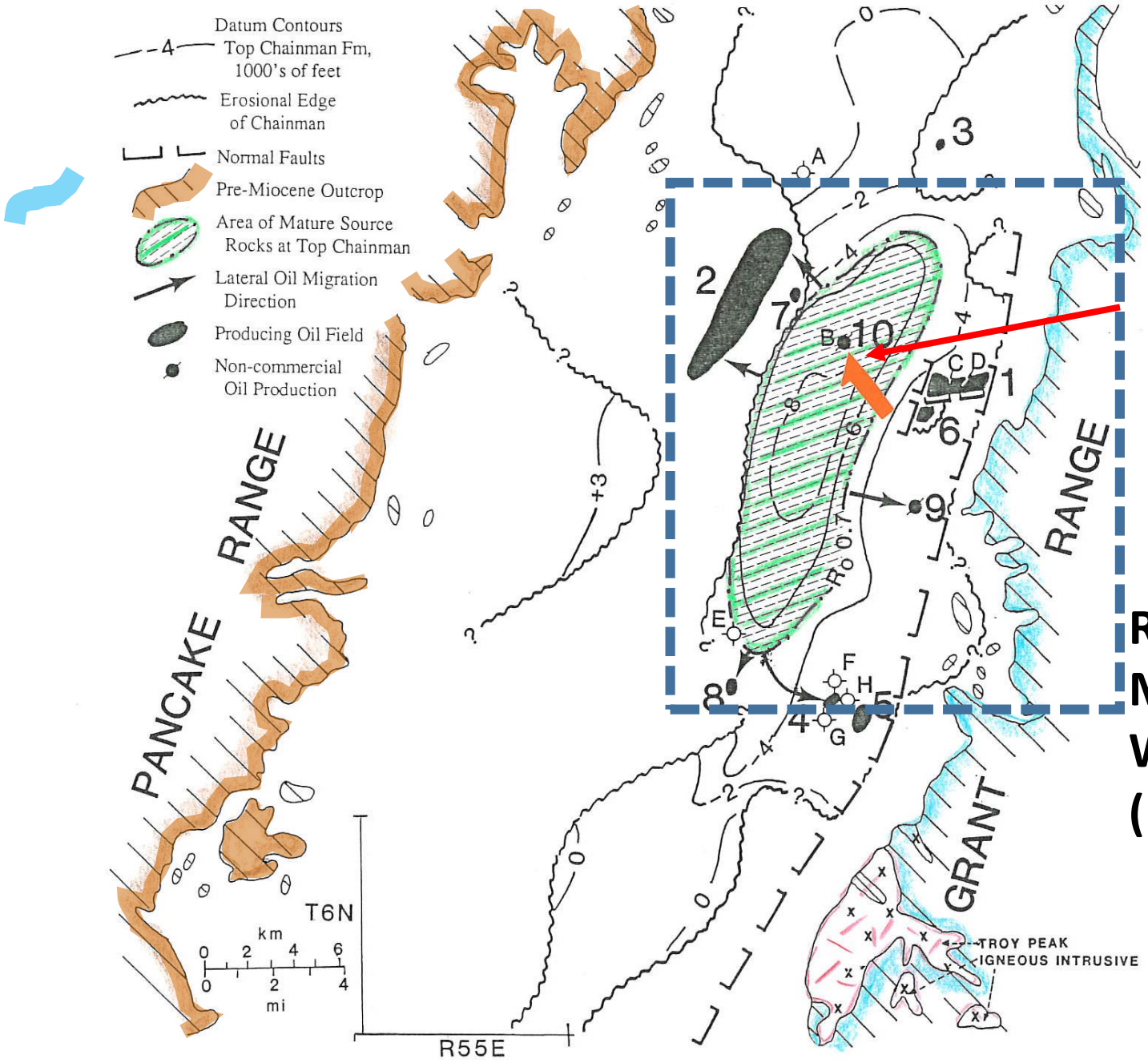
Grant Canyon True Scale Cross Section A-A’



(Johnson, 1994)

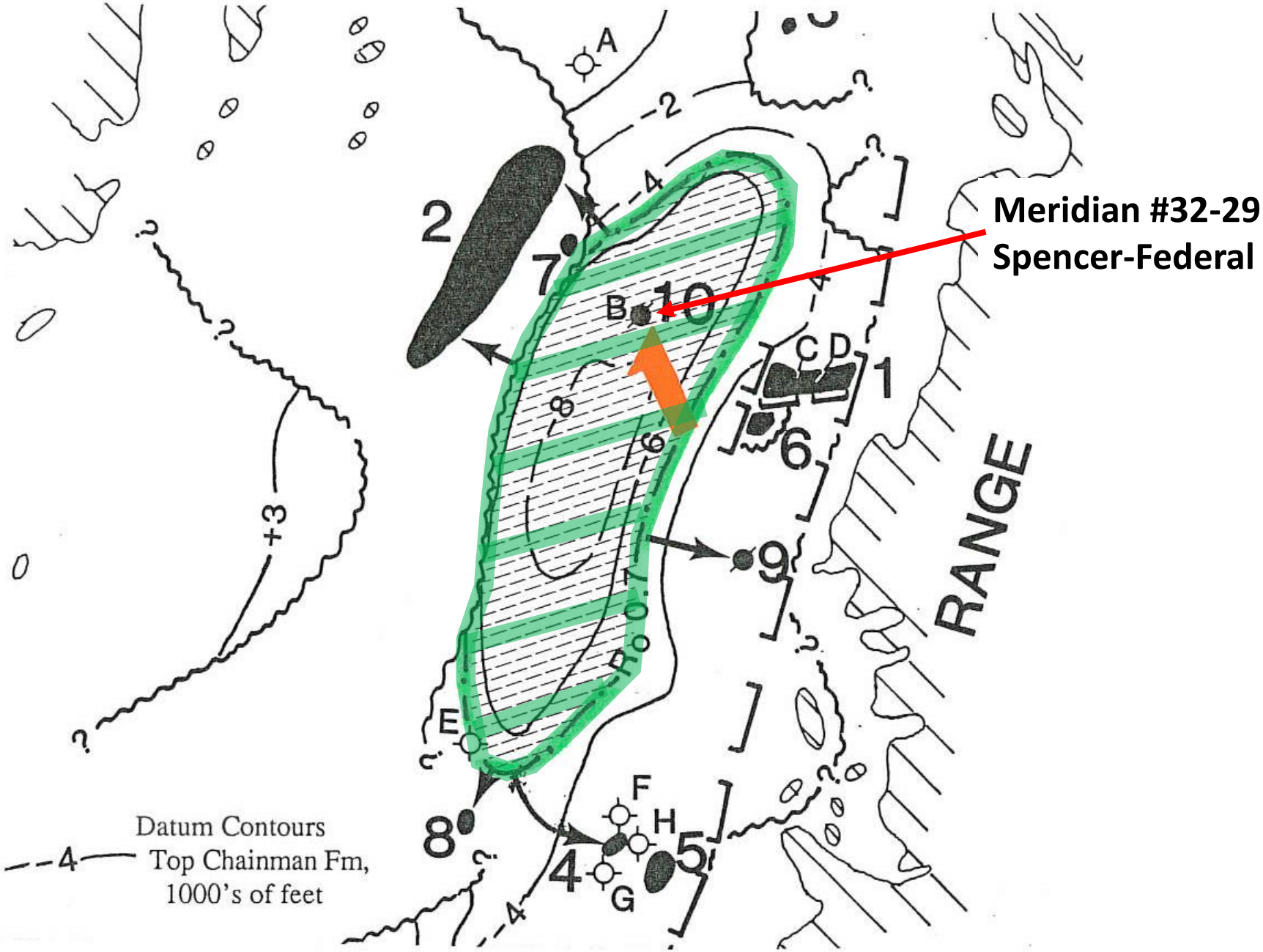
Grant Canyon – Comparison of Neutron-Density Logs GC#3 & GC#4



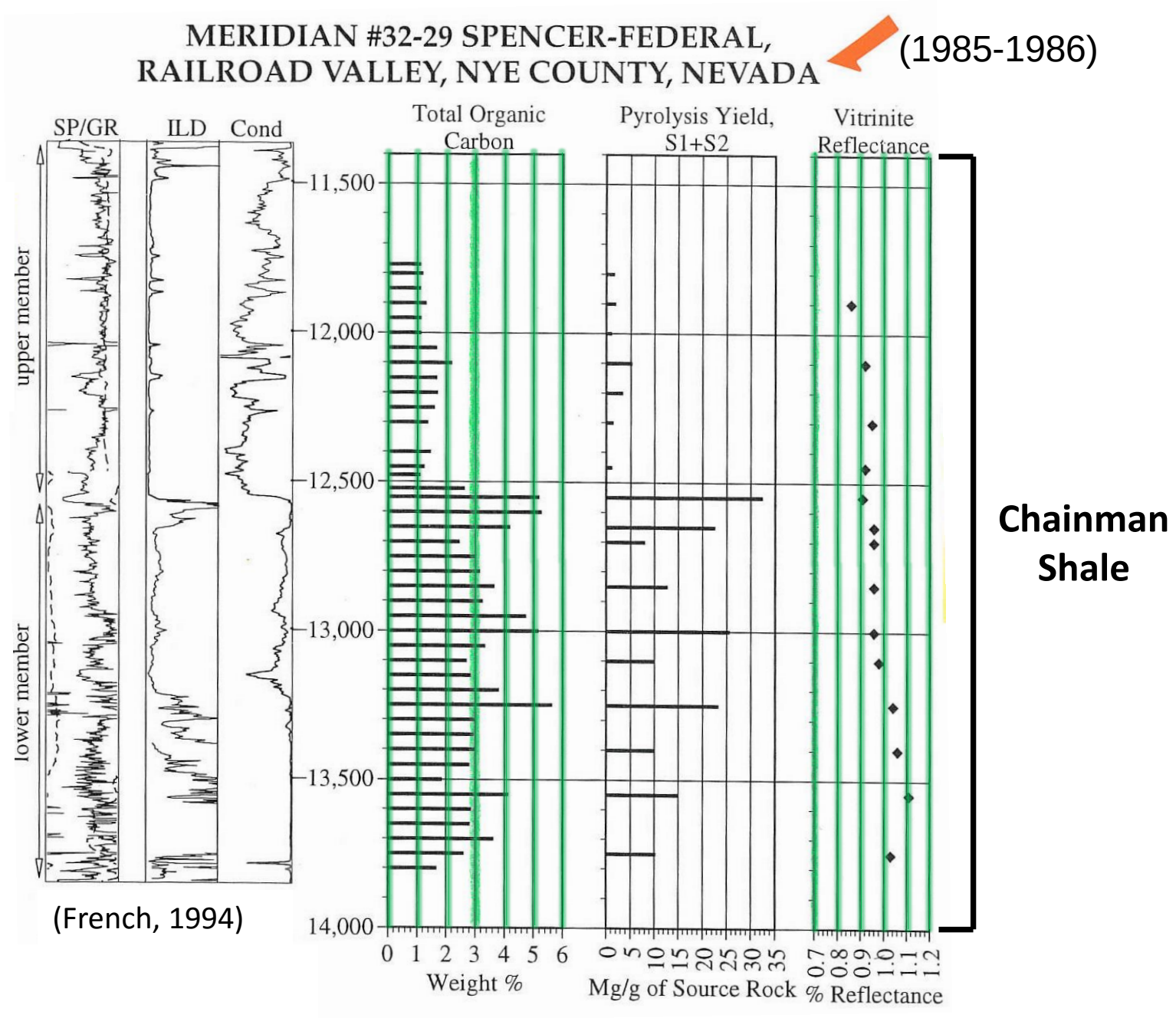


Meridian #32-29 Spencer-Federal

RRV "Cooking Pot" Area of Mature Chainman Source Rocks With Vitrinite Reflectance (Ro)>0.7 (Meissner, 1995)


Meridian #32-29
Spencer-Federal
RANGE
Datum Contours
Top Chainman Fm,
1000's of feet
A
B
C
D
E
F
G
H
2
7
10
1
6
9
8
4
5
-2
-4
-6
-8
-10
+3

Source-Rock Quality and Maturity of Chainman Shale



CONCLUSIONS (Part I)

- ✓ **Main Characteristics of RRV**
  - **Large valley (cooking pot)**
  - **Mature source rocks (Mch & Tsp)**
  - **Good top seals**
    - **Base valley-fill sediments**
    - **Oligocene ash flows**
  - **Numerous trap types**
    - **Truncation**
    - **Fault block**
    - **Structural (slide block)**
    - **Basin-centered(?)**
  - **Thick oil columns-reservoirs**
  - **Good average cum/well**

CONCLUSIONS (Part II)

- ✓ **To date, RRV is the most oil-productive basin-valley in Nevada: cum 47,000,000 BO**
- ✓ **Prospects remain to be drilled & discovered (conventional and unconventional)**
- ✓ **When prospecting--don't forget the 3D seismic—enhances your Nevada gambler's odds**