P-W

Adamana Oil Company
SW/4-SE/4 Sec 4-Twp 14n-R 20E 9-2
Navajo, County No Permit

15

County Navajo

Area Snowflake

Lease No.

Well
Name Adamana Oil Company

Location SW SE Sec 4 Twp 14N Range 20E Footage

Elev 5865± Gr. KB Spud Date Complete 1952 Abandon Total Depth 3387

from USGS 7½' quad Blettop Hill per CE75

Contractor: Approx. Cost $

Drilled by Rotary
Cable Tool

Casing Size	Depth	Cement

Production Horizon

Initial Production D & A

REMARKS:

Moenkopi	surface
Coconino	60'
Supai	549'
base Supai	2848
Redwall	~~2848'~~ 3376? - very doubtful - ERK

Elec. Logs

Sample Log ✓
Sample Descript
Sample Set
Cores

Applic to Plub Plugging Record Completion Report

Water well - accepted by

Bond Co. & No.

Bond Am't $ Cancelled Date Organization Report

Filing Receipt dated Well Book Plat Book

Loc. Plat Dedication

PERMIT NO. None Date Issued

9-2

(From J. A. Frad. USGS - Farmington, N.M.)

Drilled approx

Stereo cut

Log of ADAMANA OIL CO. - Well No. 1. SW SE, Sec. 4-14N-20E, G&SRM, Patented land. Navajo Co., Arizona Holbrook Area.

From	To	Formation
1	60	Red shale
60	334	Hard cross-bedded sandstone
334	394	Yellow limestone
394	439	White shale
439	481	Buff sandstone
481	549	Buff and red sandstone - base Coconino 549
549		Water
549	611	Red sandstone
611	680	Red sandstone and shale
680	692	Hard lime
692	800	Red shale and gypsum
810	S	Set 8-1/4" casing
800	855	Shale, salt, and gypsum
855	865	Dark brown shale, and salt
865	1005	Reddish-brown shale
1005	1040	Brown shale
1040	1050	Blue lime
1050	1090	Brown shale, and salt
1090	1200	Blue shale and brown sandstone
1200	1740	Blue shale, and salt
1740	1750	Blue shale; strong oil showing
1750	1940	Lime
1940	1950	Shale; strong showing of oil and gas
1950	2028	Blue lime
2028	2040	Water sand, white
2040	2150	Brown shale, soft
2158		Set 5-5/8" casing
2150	2217	Blue-gray lime; thin shales
2217	2260	Brown sand; shale
2260	2300	Oil sand, dark brown
2300	2305	Brown shale
2305	2320	Buff water-sand; salt water
2320	2335	Rotten red lime or shale
2335	2375	Soft, brown shale
2375	2380	Sandy lime rock
2380		Set 4" casing
2380	2385	Hard, brown lime
2385	2425	Soft, brown shale with thin strips of hard, brown lime.
2425	2438	Dark, brown water-sand; water now absent
2438	2480	Dark, brown lime
2480	2492	Oil sand.
2492	2565	Dark, brown shale
2565	2610	Brown shale
2610	2618	Brown lime

Log of Adamana Oil Co. No. 1, contd.

From	To	Formation
2618	2668	Brown shale
2668	2725	Dark, brown shale
2725	2730	Fossil
2730	2848	Dark, brown shale, and fossil ← Base Supai 2848
2848	2865	Medium dark, soft, gray, lime
2865	2870	Black, hard, shale, and lime
2870	2878	Dark, hard, gray, lime
2878	2882	Dark, gray, shale
2882	2886	Brownish water-sand
2886	2890	Black lime
2890	2896	Brownish water-sand
2896	2898	Gray lime
2898		Set casing
2898	2902	Gray lime
2902	2906	Water-sand
2906	2974	Gray, black, shale
2974	2990	Gray lime
2990	3085	Dark shale, with thin streaks gray lime
3085	3185	Dolomite, very dark brown, with gray
3185	3275	Thin, gray lime, and gray shale
3275	3295	Brown, dry, sand
3295	3360	Thin, gray lime, and shale
3360	3365	Water-sand
3365	3371	Shale
3371	3374	Lime
3374	3376	Shale
3376	3378	Lime
3378	3387	Sandy lime
3387	# 3880 ?	Oil sand

Pennsylvanian to bottom of hole Deck

3387 - ~~(according to log obtained from~~ J. McConnell Hufford

(# delete) our records incomplete & original log not available. Unable to check log from 3387 - 3880 too much sand here.

T.D. 3387±

P1

No Permit

(From J.A. Frost. USGS - Farmington, N.M.

Drilled approx

Stenson Cuts

Log of ADAMANA OIL CO. - Well No. 1. SW SE, Sec. 4-14N-20E, G&SRM,

Patented land. Navajo Co., Arizona Holbrook Area.

From	To	Formation
1	60	Red shale
60	334	Hard cross-bedded sandstone
334	394	Yellow limestone
394	439	White shale
439	481	Buff sandstone
481	549	Buff and red sandstone - base Coconino 549
549		Water
549	611	Red sandstone
611	680	Red sandstone and shale
680	692	Hard lime
692	800	Red shale and gypsum
810	S	Set 8-1/4" casing
800	855	Shale, salt, and gypsum
855	865	Dark brown shale, and salt
865	1005	Reddish-brown shale
1005	1040	Brown shale
1040	1050	Blue lime
1050	1090	Brown shale, and salt
1090	1200	Blue shale and brown sandstone
1200	1740	Blue shale, and salt
1740	1750	Blue shale; strong oil showing
1750	1940	Lime
1940	1950	Shale; strong showing of oil and gas
1950	2028	Blue lime
2028	2040	Water sand, white
2040	2150	Brown shale, soft
2158		Set 5-5/8" casing
2150	2217	Blue-gray lime; thin shales
2217	2260	Brown sand; shale
2260	2300	Oil sand, dark brown
2300	2305	Brown shale
2305	2320	Buff water-sand; salt water
2320	2335	Rotten red lime or shale
2335	2375	Soft, brown shale
2375	2380	Sandy lime rock
2380		Set 4" casing
2380	2385	Hard, brown lime
2385	2425	Soft, brown shale with thin strips of hard, brown lime.
2425	2438	Dark, brown water-sand; water now absent
2438	2480	Dark, brown lime
2480	2492	Oil sand.
2492	2565	Dark, brown shale
2565	2610	Brown shale
2610	2618	Brown lime

Log of Adamana Oil Co. No. 1, contd.

From	To	Formation
2618	2668	Brown shale
2668	2725	Dark, brown shale
2725	2730	Fossil
2730	2848	Dark, brown shale, and fossil ← Base Supai 2848
2848	2865	Medium dark, soft, gray, lime
2865	2870	Black, hard, shale, and lime
2870	2878	Dark, hard, gray, lime
2878	2882	Dark, gray, shale
2882	2886	Brownish water-sand
2886	2890	Black lime
2890	2896	Brownish water-sand
2896	2898	Gray lime
2898		Set casing
2898	2902	Gray lime
2902	2906	Water-sand
2906	2974	Gray, black, shale
2974	2990	Gray lime
2990	3085	Dark shale, with thin streaks gray lime
3085	3185	Dolomite, very dark brown, with gray
3185	3275	Thin, gray lime, and gray shale
3275	3295	Brown, dry, sand
3295	3360	Thin, gray lime, and shale
3360	3365	Water-sand
3365	3371	Shale
3371	3374	Lime
3374	3376	Shale
3376	3378	Lime
3378	3387	Sandy lime
3387	# 3880 ?	Oil sand

Pennsylvanian to bottom of hole Dark

3387 - ~~(according to log obtained from~~ T. McConnell Hubbard

(# delete) our records incomplete & original log not available. Unable to check log from 3387-3880 too much sand here.

TD. 3387±

No Permit

From J.A. Frost. USGS - Farmington, N.M.

Drilled approx

Stereo Cuts

Log of ADAMANA OIL CO. - Well No. 1. SW SE, Sec. 4-14N-20E, G&SRM, Patented land. Navajo Co., Arizona Holbrook Area.

From	To	Formation
1	60	Red shale
60	334	Hard cross-bedded sandstone
334	394	Yellow limestone
394	439	White shale
439	481	Buff sandstone
481	549	Buff and red sandstone - base Coconino 549
549		Water
549	611	Red sandstone
611	680	Red sandstone and shale
680	692	Hard lime
692	800	Red shale and gypsum
810	S	Set 8-1/4" casing
800	855	Shale, salt, and gypsum
855	865	Dark brown shale, and salt
865	1005	Reddish-brown shale
1005	1040	Brown shale
1040	1050	Blue lime
1050	1090	Brown shale, and salt
1090	1200	Blue shale and brown sandstone
1200	1740	Blue shale, and salt
1740	1750	Blue shale; strong oil showing
1750	1940	Lime
1940	1950	Shale; strong showing of oil and gas
1950	2028	Blue lime
2028	2040	Water sand, white
2040	2150	Brown shale, soft
2158		Set 5-5/8" casing
2150	2217	Blue-gray lime; thin shales
2217	2260	Brown sand; shale
2260	2300	Oil sand, dark brown
2300	2305	Brown shale
2305	2320	Buff water-sand; salt water
2320	2335	Rotten red lime or shale
2335	2375	Soft, brown shale
2375	2380	Sandy lime rock
2380		Set 4" casing
2380	2385	Hard, brown lime
2385	2425	Soft, brown shale with thin strips of hard, brown lime.
2425	2438	Dark, brown water-sand; water now absent
2438	2480	Dark, brown lime
2480	2492	Oil sand.
2492	2565	Dark, brown shale
2565	2610	Brown shale
2610	2618	Brown lime

No Permit

Log of Adamana Oil Co. No. 1, contd.

From	To	Formation
2618	2668	Brown shale
2668	2725	Dark, brown shale
2725	2730	Fossil
2730	2848	Dark, brown shale, and fossil ← Base Supai 2848
2848	2865	Medium dark, soft, gray, lime
2865	2870	Black, hard, shale, and lime
2870	2878	Dark, hard, gray, lime
2878	2882	Dark, gray, shale
2882	2886	Brownish water-sand
2886	2890	Black lime
2890	2896	Brownish water-sand
2896	2898	Gray lime
2898		Set casing
2898	2902	Gray lime
2902	2906	Water-sand
2906	2974	Gray, black, shale
2974	2990	Gray lime
2990	3085	Dark shale, with thin streaks gray lime
3085	3185	Dolomite, very dark brown, with gray
3185	3275	Thin, gray lime, and gray shale
3275	3295	Brown, dry, sand
3295	3360	Thin, gray lime, and shale
3360	3365	Water-sand
3365	3371	Shale
3371	3374	Lime
3374	3376	Shale
3376	3378	Lime
3378	3387	Sandy lime
3387	# 3880 ?	Oil sand

Pennsylvanian to bottom of hole Dark

3387 - ~~(according to log obtained from~~ T. McConnell Holbrook

(# Ellite) our records incomplete to original log not available. Unable to check log for 3387-3880 too much sand here.

T.D. 3387½

P

No Permit

WELL NO. 1

Log of ADAMANA OIL CO. - SW SE, Sec. 4-14N-20E, G&SRM, Patented land, Navajo Co., Arizona Holbrook Area

PN 9-2

(From J. A. Frost, USGS - Farmington, N.M.)

TD 3387
Have driller's ~~Sampl.~~ log.

From	To	Formation
1	60	Red Shale
60	334	Hard cross-bedded sandstone
334	394	Yellow limestone
394	439	White shale
439	481	Buff sandstone
481	549	Buff and red sandstone (base Coconino 549)
549		Water
549	611	Red sandstone
611	680	Red sandstone and shale
680	692	Hard lime
692	800	Red shale and gypsum
810	S	Set 8-1/4" casing
800	855	Shale, salt, and gypsum
855	865	Dark brown shale, and salt
865	1005	Reddish-brown shale
1005	1040	Brown shale
1040	1050	Blue lime
1050	1090	Brown shale, and salt
1090	1200	Blue shale and brown sandstone
1200	1740	Blue shale, and salt
1740	1750	Blue shale; strong oil showing Mancos (?)
1750	1940	Lime ~~Gaces~~ Greenhorn
1940	1950	Shale; strong showing of oil and gas
1950	2028	Blue lime
2028	2040	Water sand, white
2040	2150	Brown shale, soft
2158		Set 5-5/8" casing
2150	2217	Blue-gray lime; thin shales
2217	2260	Brown sand; shale
2260	2300	Oil sand, dark brown
2300	2305	Brown Shale
2305	2320	Buff water-sand; salt water
2320	2335	Rotten red lime or shale
2335	2375	Soft, brown shale
2375	2380	Sandy lime rock
2380		Set 4" casing
2380	2385	Hard, brown lime
2385	2425	Soft, brown shale with thin strips of hard, brown lime.
2425	2438	Dark, brown water-sand; water now absent
2438	2480	Dark, brown lime
2480	2492	Oil sand
2492	2565	Dark, brown shale
2565	2610	Brown shale
2610	2618	Brown lime
2618	2668	Brown Shale
2668	2725	Dark, brown shale
2725	2730	Fossil
2730	2848	Dark, brown shale, and fossil (Base Supai 2848)
2848	2865	Medium dark, soft, gray, lime
2865	2870	Black, hard, shale, and lime
2870	2878	Dark, hard, gray, lime
2878	2882	Dark, gray, shale
2882	2886	Brownish water-sand
2886	2890	Black lime
2890	2896	Brownish water-sand
2896	2898	Gray lime
2898		Set casing
2898	2902	Gray lime

Tops:
Moenkopi — Surface
Coconino — 60
Supai — 549
Redwall — 2848 - No Perk

?

No Permit

Log of Adamana Oil Co. No. 1, continued

From	To	Formation
2902	2906	Water-sand
2906	2974	Gray, black, shale
2974	2990	Gray lime
2990	3085	Dark shale, with thin streaks gray lime
3085	3185	Dolomite, very dark brown, with gray
3185	3275	Thin, gray lime, and gray shale
3275	3295	Brown, dry, sand
3295	3360	Thin, gray lime, and shale
3360	3365	Water-sand
3365	3371	Shale
3371	3374	Lime
3374	3376	Shale
3376	3378	Lime "Redwall Lime Top mississippi?"
3378	3387	Sandy lime
3387	(Total Depth)	Oil sand

PN 9-2

No Permit

WELL NO. 1

Log of ADAMANA OIL CO. - SW SE, Sec. 4-14N-20E, G&SRM, Patented land, Navajo Co., Arizona
Holbrook Area

PN G-2

(From J. A. Frost, USGS - Farmington, N.M.)

TD 3387
Have driller's ~~Sampl.~~ log.

From	To	Formation
1	60	Red Shale
60	334	Hard cross-bedded sandstone
334	394	Yellow limestone
394	439	White shale
439	481	Buff sandstone
481	549	Buff and red sandstone (base Coconino 549)
549		Water
549	611	Red sandstone
611	680	Red sandstone and shale
680	692	Hard lime
692	800	Red shale and gypsum
810	S	Set 8-1/4" casing
800	855	Shale, salt, and gypsum
855	865	Dark brown shale, and salt
865	1005	Reddish-brown shale
1005	1040	Brown shale
1040	1050	Blue lime
1050	1090	Brown shale, and salt
1090	1200	Blue shale and brown sandstone
1200	1740	Blue shale, and salt
1740	1750	Blue shale; strong oil showing Moenkopi (?)
1750	1940	Lime ~~Greenhorn~~ Greenhorn
1940	1950	Shale; strong showing of oil and gas
1950	2028	Blue lime
2028	2040	Water sand, white
2040	2150	Brown shale, soft
2158		Set 5-5/8" casing
2150	2217	Blue-gray lime; thin shales
2217	2260	Brown sand; shale
2260	2300	Oil sand, dark brown
2300	2305	Brown Shale
2305	2320	Buff water-sand; salt water
2320	2335	Rotten red lime or shale
2335	2375	Soft, brown shale
2375	2380	Sandy lime rock
2380		Set 4" casing
2380	2385	Hard, brown lime
2385	2425	Soft, brown shale with thin strips of hard, brown lime.
2425	2438	Dark, brown water-sand; water now absent
2438	2480	Dark, brown lime
2480	2492	Oil sand
2492	2565	Dark, brown shale
2565	2610	Brown shale
2610	2618	Brown lime
2618	2668	Brown Shale
2668	2725	Dark, brown shale
2725	2730	Fossil
2730	2848	Dark, brown shale, and fossil (Base Supai 2848)
2848	2865	Medium dark, soft, gray, lime
2865	2870	Black, hard, shale, and lime
2870	2878	Dark, hard, gray, lime
2878	2882	Dark, gray, shale
2882	2886	Brownish water-sand
2886	2890	Black lime
2890	2896	Brownish water-sand
2896	2898	Gray lime
2898		Set casing
2898	2902	Gray lime

Tops:
Moenkopi — Surface
Coconino — 60'
Supai — 549
Redwall — 2848 - No EHR

?

To Permit

Log of Adamana Oil Co. No. 1, continued

From	To	Formation
2902	2906	Water-sand
2906	2974	Gray, black, shale
2974	2990	Gray lime
2990	3085	Dark shale, with thin streaks gray lime
3085	3185	Dolomite, very dark brown, with gray
3185	3275	Thin, gray lime, and gray shale
3275	3295	Brown, dry, sand
3295	3360	Thin, gray lime, and shale
3360	3365	Water-sand
3365	3371	Shale
3371	3374	Lime
3374	3376	Shale
3376	3378	Lime Redwall lime Top mississippi?
3378	3387	Sandy lime
3387	(Total Depth)	Oil sand

PN 9-2

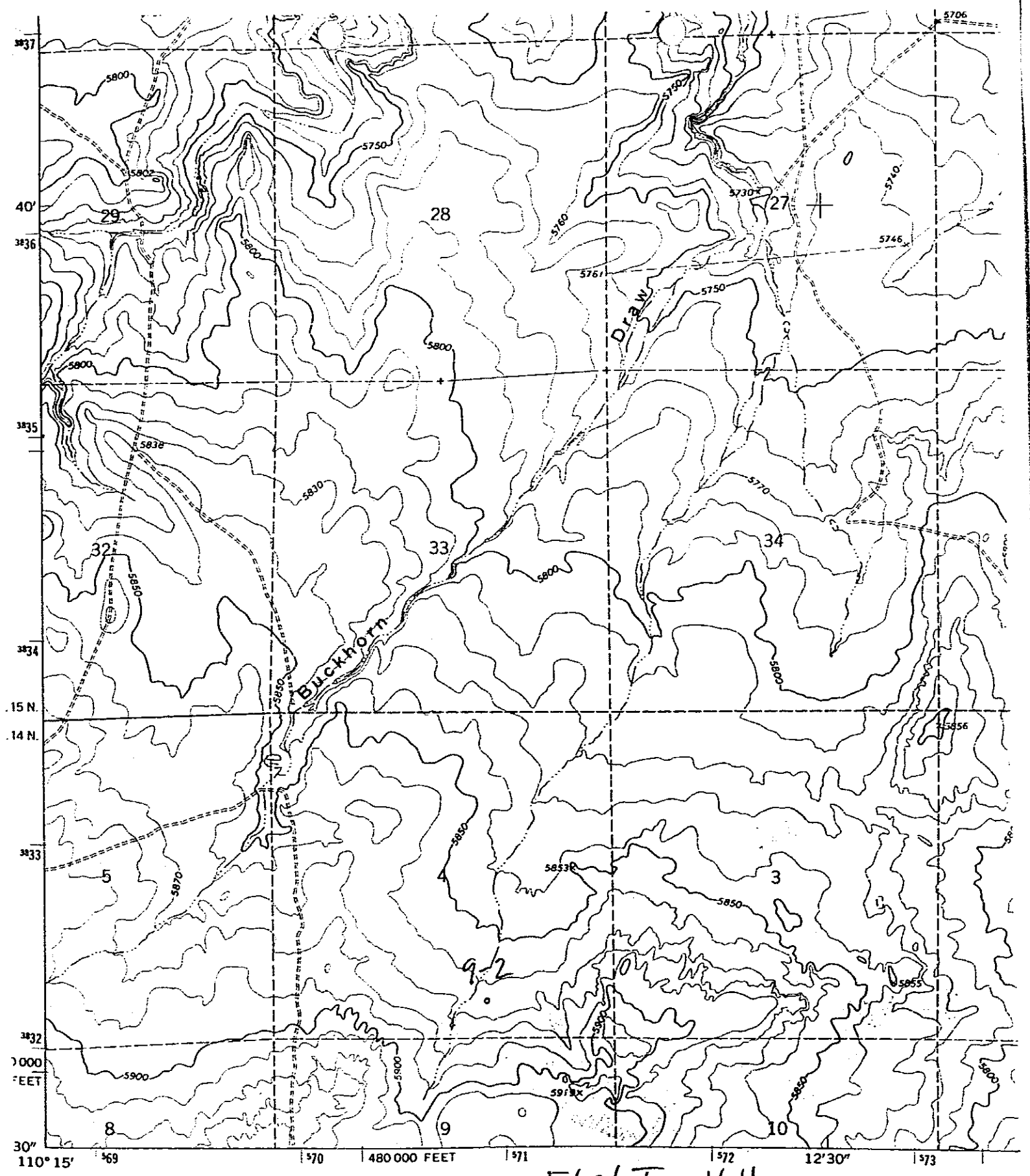
Na Dom 1

Information Tips from State Land Department Files

Adamson Oil Co #1

5 -	60.	Moenkopi
60 -	549	Coconino
549 -	2848	Supai
2848 -	3387	Penna. P- Mississippian Redwall
	TD 3387	

No Permit



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1968. Field checked 1970

Projection and 10,000-foot grid ticks: Arizona coordinate system, east zone (transverse Mercator)

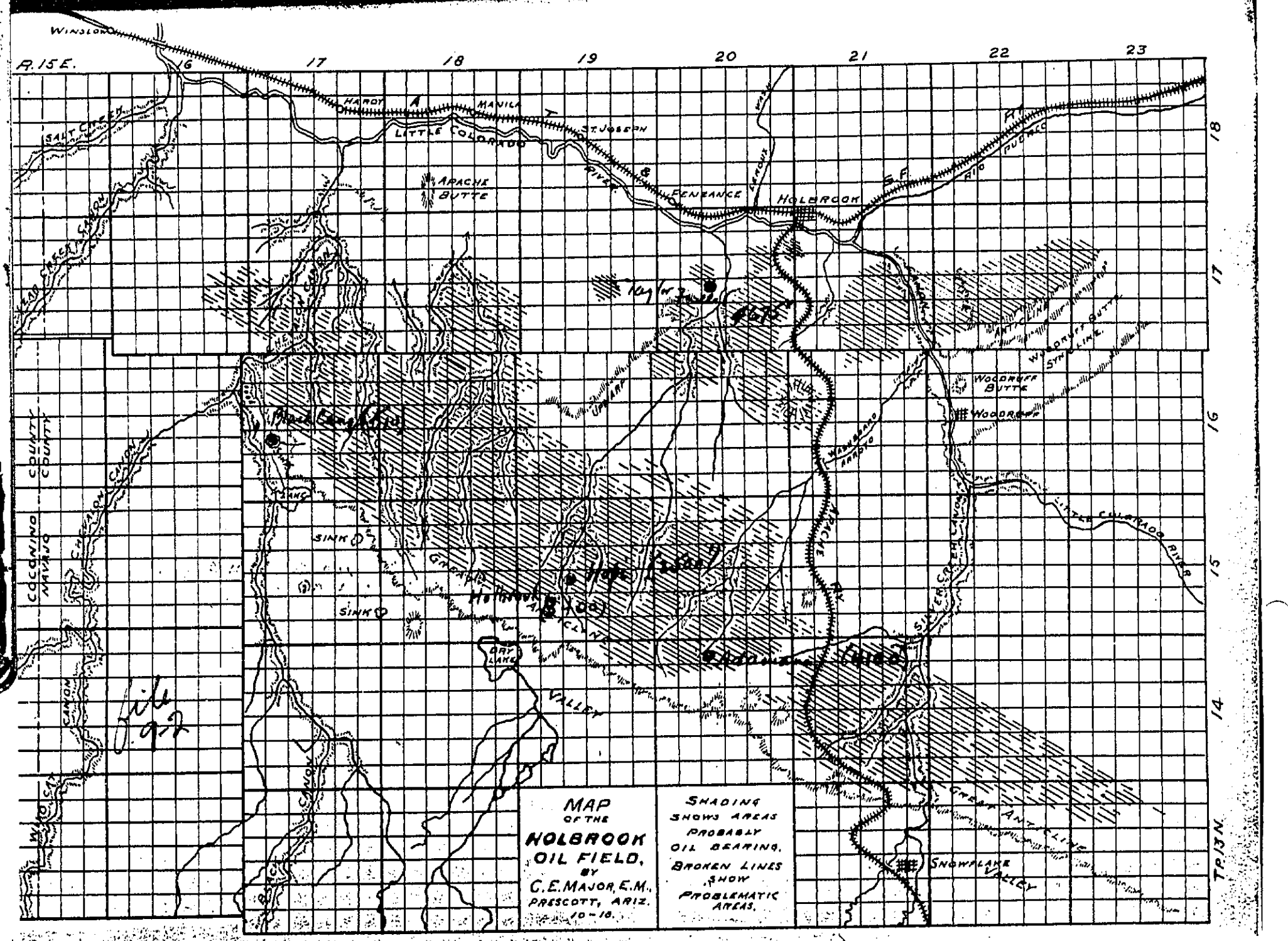
Flat Top Hill

GN MN

0°28' 8 MILS

13½° 240 MILS

1 1000 1


MAP
OF THE
HOLBROOK
OIL FIELD,
BY
C.E. MAJOR, E.M.,
PRESCOTT, ARIZ.
10-16.
SHADING
SHOWS AREAS
PROBABLY
OIL BEARING.
BROKEN LINES
SHOW
PROBLEMATIC
AREAS.
R. 15 E.
16
17
18
19
20
21
22
23
18
17
16
15
14
T. 13 N.
WINSLOW
HARDY
MANILA
ST JOSEPH
LITTLE COLORADO
RIVER
APACHE
BUTTE
FENEANCE
HOLBROOK
S.F.
RIO
PUERCO
SALT CREEK
WOODRUFF BUTTE
WOODRUFF
WOODRUFF BUTTE
SYNCLINE
ANTICLINE
LITTLE COLORADO RIVER
SILVER SPRING CANYON
SINK
SINK
DRY LAKE
VALLEY
CANYON
CANYON
CANYON
CREEK ANTICLINE
SNOWFLAKE
VALLEY
COCONINO
COUNTY
MOHAVE
COUNTY
File 92

Petroleum

Geology and Oil Prospects

of

Holbrook District

Arizona

by

Harry R. Johnson
Union Oil Building
Los Angeles.

August 18, 1919

file 92

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Introduction

In view of activity toward oil development near Holbrook, Arizona, which, in addition to arousing intense local interest, is now commanding the attention of outside operators, a review of the conditions found there will be presented, including present development, status of lands, and the indications and possibilities regarding oil.

Location and Topography

The town of Holbrook, about 900 population, is situated on the Santa Fe Railroad, 60 miles from the eastern border of the State. Two banks, several wholesale and retail merchandise establishments, two newspapers and half a dozen hotels make it headquarters of the ranching and Indian reservation interests, and lately, for oil development work in that section. It is on the Ocean-to Ocean Highway, and dirt roads into the surrounding country are fairly well kept up. Winslow, Arizona, 33 miles west of Holbrook (population 2000) may also be considered within the oil development area.

The Little Colorado River flows intermittently thru both Holbrook and Winslow, the wells 300 feet deep and reservoirs formed by damming creeks form the water supplies of the towns. A sparse growth of scrub timber, found on the hills south of Holbrook, is a source of fuel for drilling, and coal is brought in from New Mexico. The elevation of Holbrook is 5,080 ft; that of Winslow is 4,850 ft.

Topography

The Holbrook district is situated on the plateau province of Arizona, at the south border of the Navajo County which extends with little variation in topography north 175 miles into Utah. The surface is cut by occasional deep canons, due to the swift torrential streams. As a rule, the region is a prairie country, with scattered buttes, the remnants of lava flows or erosional features. To some extent the topography conforms with the bedding, comprising a gently rolling surface that follows the barely perceptible bend of the hard sandstone strat beneath. The plateau country, from the Utah border to 90 miles south of Holbrook, maintains an elevation between 4800 and 6000 feet throughout.

Maps and Photography

The accompanying composite map will serve to indicate the geographic, topographic and geologic conditions of this district. The stratigraphy is based on Herbert E. Gregory's U.S.G.S. Professional Paper, 93, long accepted as a standard on the geology of the Navajo County. The structural geology, as mapped, is the result of the writer's investigations made in a general way only, and not detailed. The accompanying photographs show the general appearance of the country, and the position from which each was taken is indicated on the map.

Development and Operations to Date

The Aztec Land and Cattle Company have been in possession for a number of years, of nearly a million acres of land in this district, formerly owned by the Santa Fe Railroad. A portion of this land has recently been leased by the Hopi Oil Company of Holbrook, and in October of 1918, a well was started on their property in Sec. 21, T. 15 N., R. 19 E., at the end of July 1919, a depth of 2050 ft. had been reached with no showing except a slight color at about 425 ft. (This showing appears in the oil wells drilled so far and in water wells, and will be commented on later.) The Wind River Oil Co., of Wyoming is drilling their well for the Hopi Oil Company on a participating interest basis.

The Holbrook Oil Company, with close to 60,000 acres of patented and leased land, is drilling a well on Sec. 23, T. 15 N., R. 18 E., now 100 ft. and waiting for tools.

The Adamana Oil & Land Company, with 40,000 acres, has reached a depth of 1060 ft. on Sec. 4. T. 14 N., R 20 E., drilling.

The Black Canyon Oil Company (McCloskey interests of Holbrook) with 50,000 acres has drilled to 500 ft. with a core drill on Sec. 20, T. 16 N., R. 17 E., seventeen miles southerly from Winslow.

The Apache Oil & Development Company has a location in Sec. 7, T. 16 N., R. 21 E;-the Holbrook Oil Co. a location in Sec. 22. T. 17 N. R. 21 E; the Lone Star Oil Co. a location in Sec. 6, T. 19 N., R. 23 E;-the Zuni Oil Co. a location in Sec. 6, T.19 N., R. 24 E.

Other Arizona companies organied to secure leases include the Winslow Oil Co., Chevlon Oil Co., Home Oil Co., Klatawa Oil Co., Holbrook Investment Co., Winslow Mutual Oil Association, and Shamrock Oil & Development Co., all of whom contemplate putting down rigs eventuallyaand are at present offering leases or shares on the market in any size blocks. The land is thoroughly taken up to the extent of some 1100 square miles.

Geologist representing the Carter Oil Co., Commonwealth Oil Co., Allen Oil Co (of Oklahoma) Union Oil Co., of California, Standard Oil Co. of California and Sinclair Oil Co., have visited the district in the past, it is reported.

Results Obtained by Drilling

The progress of the Hopi Oil Co., well in Sec. 21-15-19 is being watched with interest by all parties concerned in the Holbrook field. The depth of the oil bearing horizon (if one should exist) is purely speculative, inasmuch as ther is no criterion in the way of drilled wellsto guide the prospectors. At a depth of 2050ft. the Hopi drill has passed the horizon that carried oil in the San Juan Oil field, 160 miles to the north, where wells of

small production (5 to 15 bbls. per day) were secured at depths ranging from 300 to 750 ft. The Hopi well is drilling with standard tools in an open hole, encountering alternate sandstone and lime, with very little shale. At 1950 ft. very little water had been encountered, tho at 2025 ft. the drill penetrated a "saturated water sand." This is considered significant from the standpoint that it indicates the possible presence of sufficient underground water to assist in the accumulation of oil, a point which will be touched upon later in this report.

The other drilling wells in the locality have not reached sufficient depth to add to the knowledge of underground conditions. However, the Adamana in Sec.4-14-20 encountered a 50 ft. bed of impure salt at a depth of 650 ft., which was not noted in the Hopi well. Similar salt deposits were noted in water wells near Winslow and elsewhere.

With the test wells now drilling, a rea fifty miles long and some fifteen miles wide will be proven up, provided the wells are carried to sufficient depth. The broad form of folding found in this territory does not sharply segregate the district into likely and unlikely territory as in California or Wyoming fields, though the anticlines and synclines are sufficiently well developed as to make each a separate drilling possibility.

Geology and Structure

The Navajo Country of Arizona comprises a well recognized geographical and geological unit. It includes a gently rolling plateau area that extends roughly from the Utah border south thru Arizona 190 miles or 50 miles south of the Santa Fe Railroad and Holbrook; and from the Colorado and Little Colorado Rivers on the west to the Continental Divide (approximating Gallup, New Mexico) on the east. The general elevation of the surface of this plateau is between 4800 and 6000 ft.

Throughout this plateau the sedimentary strata (of Mesozoic and Paleozoic age) extend without perceptible break and with little warping except at the boundaries of the region. The slight warping on a broad scale, has placed the bed in the form of a geo-syncline extending southerly from the San Juan River (and oil fields) in Utah to Holbrook, though making a long general slope upward to and south of Holbrook. Along a line situated fifteen miles south of Holbrook this upward slope terminates and the beds bend over in an anticlinal fold that is barely perceptible, and assume a dip toward the south. The gentle folding is on such a large scale that many smaller anticlinal and synclinal folds are encountered as one traverses the district. Thus the "great anticline" or "Holbrook structure," as the major anticlinal (or doming) fold has come to be known, is the location selected for prospecting by the Holbrook interests. The minor folds take the form of partly-closing domes on the flanks of the major structure, or anticlines and synclines whose trend has apparently little conformance with the trend of the major anticlinal axis. The location of many of the minor folds, both anticlinal and synclinal, have been selected by the various operators as suitable

locations for drilling, which accounts for the wide dispersion of test wells in the district.

The San Juan oil field, with its known oil measures, has been used by geologists as a criterion at Holbrook, as far as possible, though, as mentioned previously, the measures containing oil at San Juan have been pierced by the drill at Holbrook, and have proved unproductive. The geologic section at Holbrook may be given as follows:

Era	Period	Series	Group	Formation	Thickness (Estimated)	Description
Mesozoic	Triassic			Chinle	1000 Plus	Gray, purplish shale.
				Shinarump	5-20	Heavy conglomerate
				De Chelly	0-20	Red sandstone
		Permian		Hoenkopie	100-300	Red shale and standstone
				Kaibab	0-80	Limestone
Paleozoic	Carboniferous		Aubrey			
		Pennsylvanian		Coconino	300	Gray & white cross-bedded standstone
				Supai	1500	Sandstones & limestones (oil bearing at San Juan)
		Mississippian		Redwall	500 (?)	Limestone
	Cambrian		Tonto		900 plus (?)	Shales and sandstones
Proterazoic	Pre-Cambrian			Unkerchuar	5000 plus (?)	Shales, sandstones, quartzite, limestone
						Granites, gneschists.

The surface rock in the vicinity of Holbrook is the Moenkopie. Toward Winslow the Moenkopie is entirely eroded away, exposing the Kaibab Limestone, which is there only 8 ft. in thickness. The Coconino sandstone is exposed in the walls of Chevlon and Clear Creek Canons, southeast of Winslow. There the walls stand 100 ft. above the waters which have been dammed up to form reservoirs.

Thus the wells drilled thus far penetrate a lower portion of the Moenkopie; may or may not encounter the Kaibab limestone, according to their location (as the Kaibab does not underlie all this region;) and pass into the Supai Lower Pennsylvanian, the thickness of which is unkown here, but judging from distant outcrops, will probably be upwards of 1500 ft. This formation is oil bearing in the San Juan oil field (known there as the Goodridge sands of the Aubrey group.) The lower portion of the Supai is the objective of the drillers at Holbrook. The well of the Hopi Company as has been mentioned previously, has passed the upper members of the Supai and at 2050 ft. (August 1,1919) should have reached the lowermost members, and has not yet encountered the oil. The well will be carried down into the Redwall lime if necessary, it is understood.

Beneath the Redwall limestone there is encountered in other parts of Arizona (Grand Canon section) a tremendous thickness of Cambrian and Pre-Cambrian sedimentarics that lie on the primitive granites and schists, the thickness, or even presence of which beneath the Holbrook area is unkown, and their possibilities as a source of petroleum is highly improbable.

As regards lava flows in this vicinity, remnants of basaltic flow rock are still to be found at no great distance, notably at Woodruff Butte, 10 miles southeast of Holbrook, where a resistant basaltic cap rests on the chinle shales. Other basaltic remnants occur in large masses 25 miles north of Holbrook. Twin Buttes, 18 miles north of Holbrook, are of intrusive origin.

The plateau region in general has been the scene of intrusive action thru-out Triassic, Tertiary and even recent ages, the region 75 miles southeast of Holbrook (near Springerville) and 40 miles west of Winslow (San Francisco Mountain volcanic field) being notable examples of fresh volcanic activity, with unusually perfect cinder cones and lava flows. The particular region about Holbrook and Winslow, however, has not been subjected to volcanic action (though the general detrimental effect of neighboring intrusive activity on the accumulation of petroleum should not be overlooked.)

Faulting does not occur to any perceptible extent in the Holbrook area. The maximum dips encountered are 3 10/2 on the flanks of the smaller folds; the general dip of the beds toward the north on the north portion of the major anticline is 10/2, and the same toward the south.

Emphasis must be placed here upon the importance of under-

ground water as a factor influencing the accumulation of petroleum. A sufficient supply of underground waters, constituting a hydrostatic head, will tend to accumulate the oil in porous beds under an impervious shale or limestone cap in the top or apex of the anticlines and domes, due to the higher specific gravity of the water. Lack of water will allow the oil to settle in the synclines. In most oil fields the oil is found in the anticlines, where it is impounded by waters bearing it up from beneath. At the San Juan Oil Field, however, the oil is recovered from the synclines due to the absence of a hydrostatic head of water. In this case, the deep-cut canyons of the San Juan River and its tributaries have apparently drained the oil bearing strata of water, leaving the oil to settle in a general way in the synclines.

At Holbrook the feature of deep-cut canons is not encountered; but it is possible in this region, where there is no higher land within forty miles, and where the stratification (level, resistant, compact beds) is conducive to quick run-off of surface waters, and where a general condition of aridity exists, that there may be the lack of underground waters necessary to the anticlinal accumulation of oil.

On this hypothesis the location of the Adamana Oil Co. well, Sec. 4-14-20, has been made on a syncline. In this connection also the logging of a "saturated water sand" in the Hopi Co. Well, Sec. 21-15-19, at 2025 ft. is significant, as mentioned previously, in that it gives an indication as to what may be expected of water conditions, and is considered in a favorable light by those who have selected anticlinal locations for their prospect rigs. The relative value of anticlinal locations for the accumulation of oil could only be determined by the drill, should oil be discovered in this section. The anticlinal position would be preferred by the writer if guided by choice of location alone.

Surface Indications of Oil

As pointed out previously, the San Juan oil field, 160 miles north of Holbrook, is the most closely related point of oil production; and the oil measures there do extend south to Holbrook and are within reach of the drill there but have so far proven barren. Drilling commenced at San Juan in 1910, the wells being small producers of high grade oil.

The Seven Lakes oil field, 60 miles north of Gallup, New Mexico, 125 miles northeast of Holbrook, supports a number of 5 to 20 barrel wells. The oil is high grade, with reported high gasoline and lubricating stock contents, and the field, like the San Juan field, tho far from transportation, is at present being exploited for further development. The oil horizon at Seven Lakes is evidently the Dakota sandstone, a Cretaceous member and much higher stratigraphically than the Holbrook area.

An oil seep is reliably reported to the writer to be found in Canyon de Chelly, 95 miles northeast of Holbrook (half way to San Juan) and another in Cibicu Canon, 106 miles south of Holbrook.

The writer personally visited an oil seep, or group of seeps on Clear Creek, 7 miles southeast of Winslow. The seeps occur at the edge of the water in a reservoir formed by damming the steep walled gorge of Clear Creek, and can be reached only by boat (or, as in the writer's case by swimming.) A thin stream of brown oil exudes with water from crevices in the Coconino sandstone and spreads upon the surface of the reservoir. It is believed that this oil occurs at the base of the Coconino sandstone and is floated out by the waters of the reservoir, penetrating the surrounding strata. Considerable gas, with unmistakable petrolific odor, bubbles thru the water. There is no evidence of faulting that would allow this oil to reach the surface here from great depths.

A similar seep is reported in the gorge of Chevlon Fork, also dammed up, 13 miles southeast of Winslow and 21 miles west of Holbrook.

In connection with these seeps on Clear Creek and Chevlon Fork are indications of oil in the form of colors and globules, with some gas, creditably reported and known for some years, to be found in various water wells drilled to depths of 300 to 500 ft. near Holbrook. Further, as mentioned previously in this report, the Hopi well reported a showing of colors and gas at 425 ft, which corresponds with the horizon of the Coconino sandstone. Hence the Coconino standstone seems to be a member that contains oil in very small quantities, though has evidently been explored thoroughly without having proved productive.

Conclusions Concerning Possibilities

The foregoing more or less detailed description of the geological and structural features of the Holbrook district will serve to indicate that if oil were present in the deep-lying sediments of the Navajo Country, the Holbrook major anticline, as well as a number of the minor folds accompanying it, would offer some promise of accumulation. However, the fact that the sand measures above the Cambrian have been prospected without results, especially the Pennsylvanian series (Coconino sandstone) that showed some surface indications of oil at shallow depth; the nature of the sedimentary rocks, lacking in carbonaceous or diatomaceous shales throughout; the questionable presence of underground hydrostatic pressure; the adverse conditions created by (geologically) recent igneous activity in the general region; the knowledge that such oil is produced in New Mexico and Utah is derived from horizons above those in which Holbrook interest are now drilling, and that the Mississippian beds where exposed in this region are known to have shown no evidences of petroleum; together with the fact that all the wells in the New Mexico and Utah fields have scarcely produced oil in commercial quantities, makes the Holbrook area, in the writer's opinion, an unpromising one, where the possibility of securing petroleum is extremely unlikely.

The section of country fifty miles east of Holbrook presents a better appearance for the accumulation of petroleum than that at

Holbrook. Anticlinal structures of more pronounced folding are evident, and the area is more worthy of prospecting. However conditions that govern the accumulation of oil at Holbrook will apply also to this region. The land in the vicinity of Houck on the Santa Fe Railroad, has not been located for oil possibilities and should any oil be encountered in the drilling activities near Holbrook, this territory should command the attention of operators.

Los Angeles, California.
August 18,1919.

SW SE 4 | NAVAJO Co

T. 14N | R. 20E | Hammons Oil & Gas | COMPANY

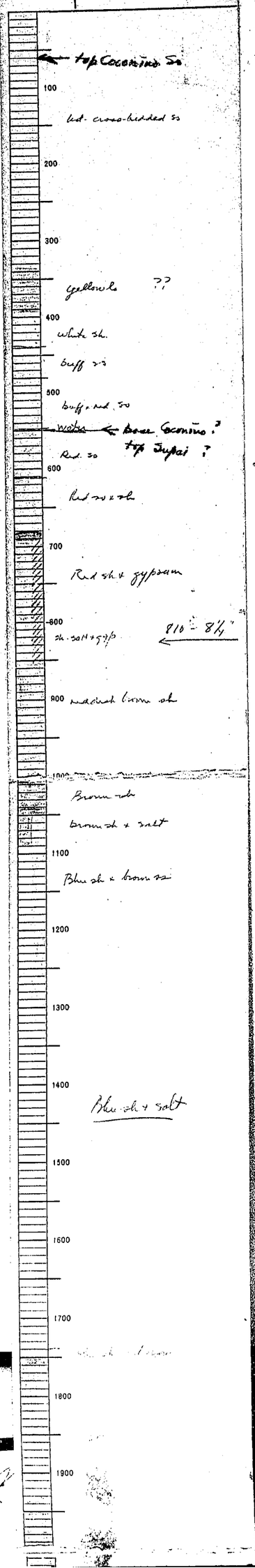
NO. 1

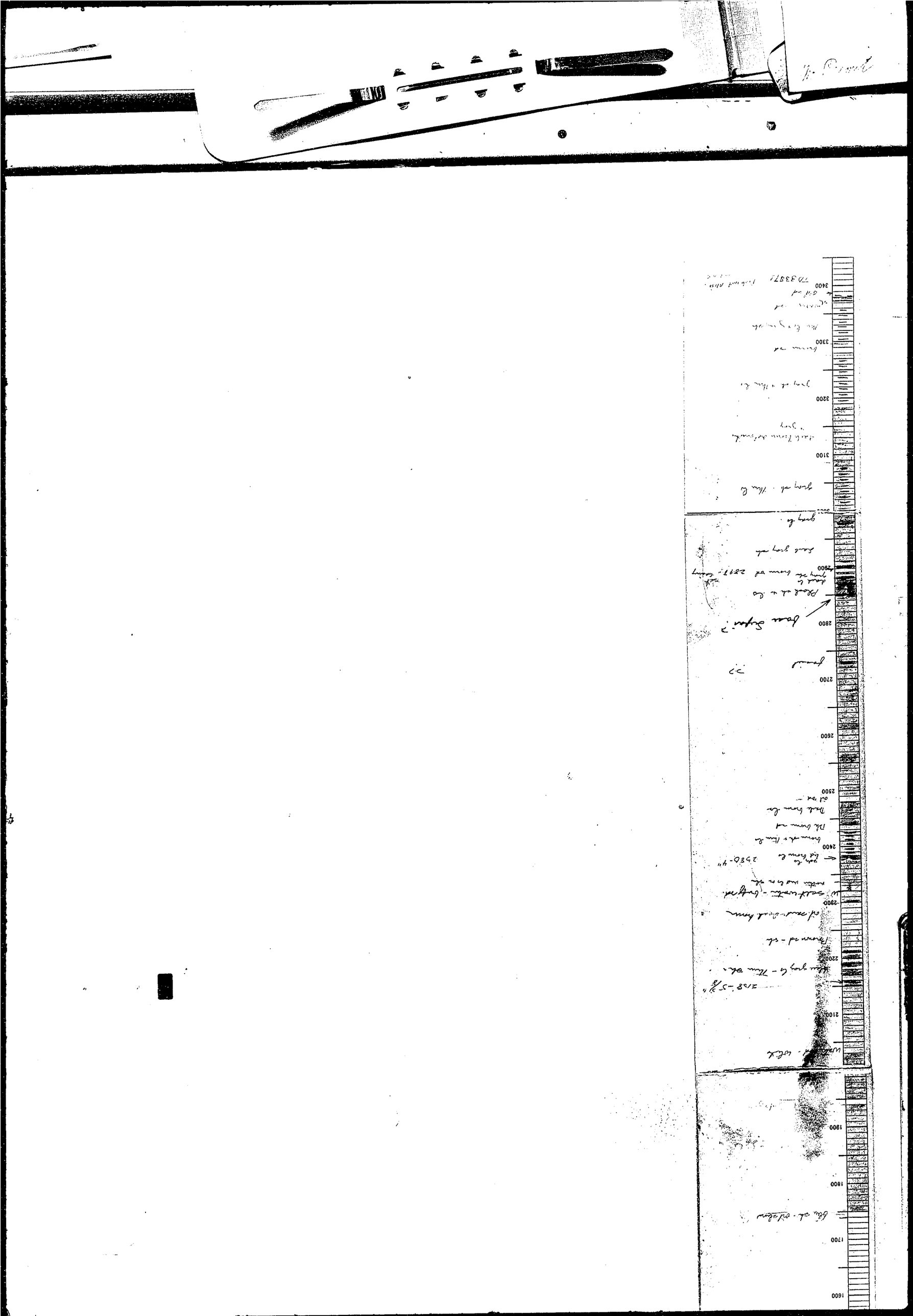
COMMENCED 19

COMPLETED 19

ELEVATION

REMARKS:





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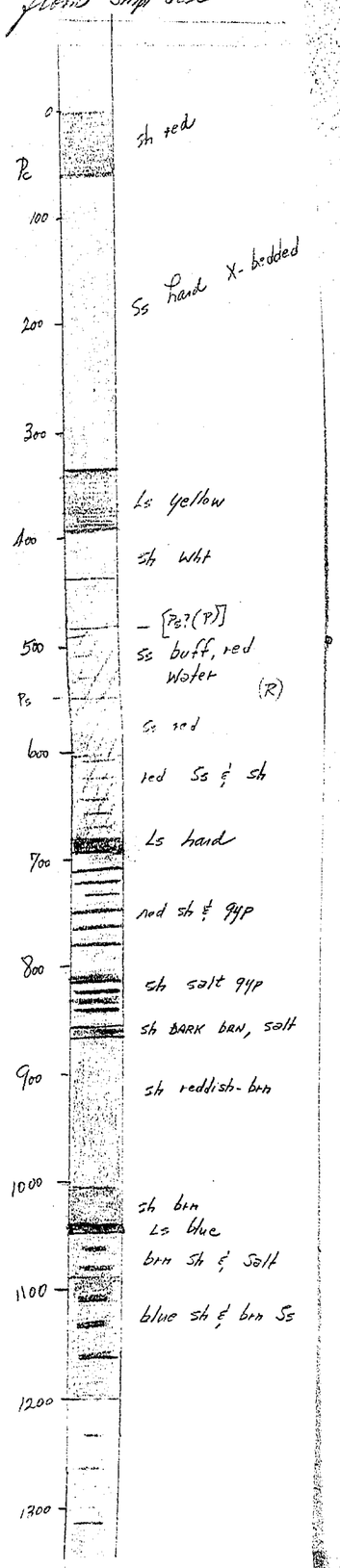

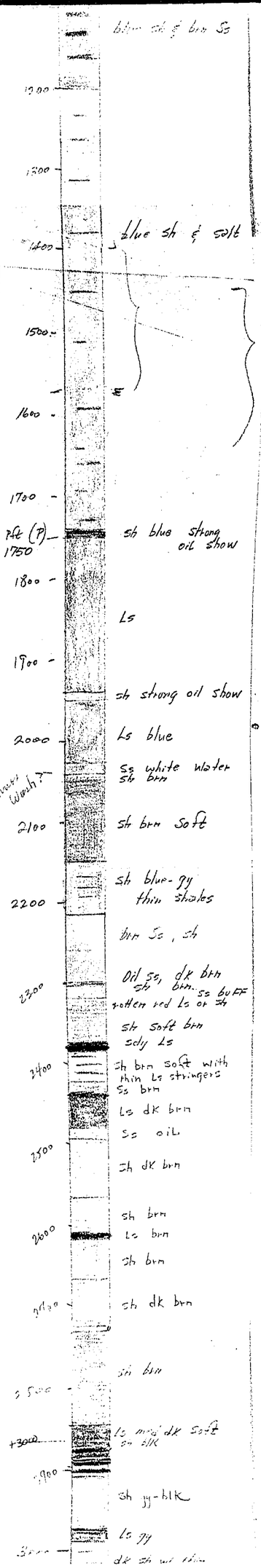
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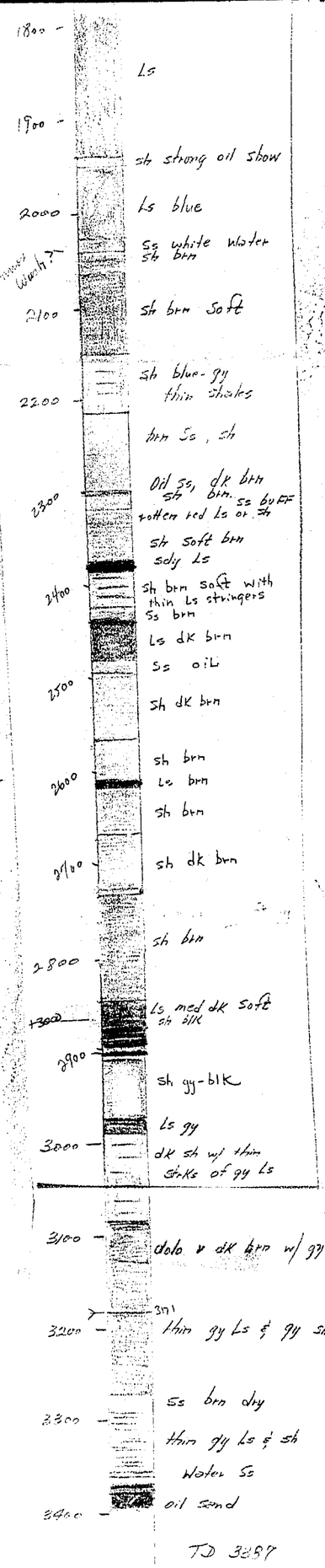
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ADAMANA OIL CO. SW SE, Sec. 4-14N-20E, G&SRM, Navajo County, Arizona, Patented land, Holbrook area.
Well No. 1
(From J. A. Frost, USGS - Farmington, N. M.)

From	To	Formation
1	60	Red shale
60	334	Hard cross-bedded sandstone
334	394	Yellow limestone
394	439	White shale
439	481	Buff sandstone
481	549	Buff and red sandstone (base Coconino 549)
549		Water
549	611	Red sandstone
611	680	Red sandstone and shale
680	692	Hard lime
692	800	Red shale and gypsum
810		Set 8¼" casing
800	855	Shale, salt, & gypsum
855	865	Dark brown shale, and salt
865	1005	Reddish-brown shale
1005	1040	Brown shale
1040	1050	Blue lime
1050	1090	Brown shale, and salt
1090	1200	Blue shale and brown sandstone
1200	1740	Blue shale, and salt
1740	1750	Blue shale; strong oil showing
1750	1940	Lime
1940	1950	Shale; strong showing of oil and gas
1950	2028	Blue lime
2028	2040	Water sand, white
2040	2150	Brown shale, soft
2158		Set 5-5/8" casing
2150	2217	Blue-gray lime; thin shales
2217	2260	Brown sand; shale
2260	2300	Oil sand, dark brown
2300	2305	Brown shale
2305	2320	Buff water-sand; salt water
2320	2335	Rotten red lime or shale
2335	2375	Soft, brown shale
2375	2380	Sandy lime rock
2380		Set 4" casing
2380	2385	Hard, brown lime
2385	2425	Soft, brown shale with thin strips of hard, brown lime.
2425	2438	Dark, brown water-sand; water now absent
2438	2480	Dark, brown lime
2480	2492	Oil sand
2492	2565	Dark, brown shale
2565	2610	Brown shale
2610	2618	Brown lime
2618	2668	Brown shale
2668	2725	Dark, brown shale
2725	2730	Fossil
2730	2848	Dark, brown shale, and fossil (Base Supai 2848)
2848	2865	Medium dark, soft, gray, lime
2865	2870	Black, hard, shale, and lime
2870	2878	Dark, hard, gray, lime
2878	2882	Dark, gray, shale
2882	2886	Brownish water-sand
2886	2890	Black lime
2890	2896	Brownish water-sand
2896	2898	Gray lime
2898		Set casing
2898	2902	Gray lime

ADAMANA OIL CO. NO. 1 NAVAJO COUNTY

From	To	Formation
2902	2906	Water-sand
2906	2974	Gray, black, shale
2974	2990	Gray lime
2990	3085	Dark shale, with thin streaks gray lime
3085	3185	Dolomite, very dark brown, with gray
3185	3275	Thin, gray lime, and gray shale
3275	3295	Brown, dry, sand
3295	3360	Thin, gray lime, and shale
3360	3365	Water-sand
3365	3371	Shale
3371	3374	Lime
3374	3376	Shale
3376	3378	Lime
3378	3387	Sandy lime
3387	(Total Depth)	Oil sand

ADAMANA OIL CO. SW SE, Sec. 4-14N-20E, G&SRM, Navajo County, Arizona, Patented land, Holbrook area.
Well No. 1
(From J. A. Frost, USGS - Farmington, N. M.)

From	To	Formation
1	60	Red shale
60	334	Hard cross-bedded sandstone
334	394	Yellow limestone
394	439	White shale
439	481	Buff sandstone
481	549	Buff and red sandstone (base Coconino 549)
549		Water
549	611	Red sandstone
611	680	Red sandstone and shale
680	692	Hard lime
692	800	Red shale and gypsum
810		Set 8¼" casing
800	855	Shale, salt, & gypsum
855	865	Dark brown shale, and salt
865	1005	Reddish-brown shale
1005	1040	Brown shale
1040	1050	Blue lime
1050	1090	Brown shale, and salt
1090	1200	Blue shale and brown sandstone
1200	1740	Blue shale, and salt
1740	1750	Blue shale; strong oil showing
1750	1940	Lime
1940	1950	Shale; strong showing of oil and gas
1950	2028	Blue lime
2028	2040	Water sand, white
2040	2150	Brown shale, soft
2158		Set 5-5/8" casing
2150	2217	Blue-gray lime; thin shales
2217	2260	Brown sand; shale
2260	2300	Oil sand, dark brown
2300	2305	Brown shale
2305	2320	Buff water-sand; salt water
2320	2335	Rotten red lime or shale
2335	2375	Soft, brown shale
2375	2380	Sandy lime rock
2380		Set 4" casing
2380	2385	Hard, brown lime
2385	2425	Soft, brown shale with thin strips of hard, brown lime.
2425	2438	Dark, brown water-sand; water now absent
2438	2480	Dark, brown lime
2480	2492	Oil sand
2492	2565	Dark, brown shale
2565	2610	Brown shale
2610	2618	Brown lime
2618	2668	Brown shale
2668	2725	Dark, brown shale
2725	2730	Fossil
2730	2848	Dark, brown shale, and fossil (Base Supai 2848)
2848	2865	Medium dark, soft, gray, lime
2865	2870	Black, hard, shale, and lime
2870	2878	Dark, hard, gray, lime
2878	2882	Dark, gray, shale
2882	2886	Brownish water-sand
2886	2890	Black lime
2890	2896	Brownish water-sand
2896	2898	Gray lime
2898		Set casing
2898	2902	Gray lime

ADAMANA OIL CO. NO. 1 NAVAJO COUNTY

From	To	Formation
2902	2906	Water-sand
2906	2974	Gray, black, shale
2974	2990	Gray lime
2990	3085	Dark shale, with thin streaks gray lime
3085	3185	Dolomite, very dark brown, with gray
3185	3275	Thin, gray lime, and gray shale
3275	3295	Brown, dry, sand
3295	3360	Thin, gray lime, and shale
3360	3365	Water-sand
3365	3371	Shale
3371	3374	Lime
3374	3376	Shale
3376	3378	Lime
3378	3387	Sandy lime
3387	(Total Depth)	Oil sand

LOG OF ADAMANA WELL No. 1

April 25, 1924

- 0 -

#617
OGCC 9-2

Formation	Character	Feet	to	Feet
Moqui	Red Shale	0	"	60
	Hard cross-bedded Sandstone	60	"	334
	Yellow Sandstone	334	"	394
	White Shale	394	"	439
Coconino	Buff Sandstone	439	"	481
	Buff and red Sandstone	481	"	549
	Water	549	"	
	Red Sandstone	549	"	611
	Red Sandstone and Shale	611	"	680
	Hard Lime	680	"	692
	Red Shale and Gypsum	692	"	800
	8-1/4-inch Casing	810		
	Shale, Salt and Gypsum	800	"	855
	Dark brown Shale and Salt	855	"	865
	Reddish brown Shale	865	"	1005
	Brown Shale	1005	"	1040
	Blue Lime	1040	"	1050
Upper Supai	Brown Shale and Salt	1050	"	1090
	Blue Shale and brown Sandstone	1090	"	1200
	Blue Shale and Salt	1200	"	1740
	Blue Shale, strong oil showing	1740	"	1750
	Lime	1750	"	1940
	Shale, strong showing of oil and gas	1940	"	1950
	Blue Lime	1950	"	2028
	Water Sand (white)	2028	"	2040
	Soft brown Shale	2040	"	2150
	5-5/8-inch Casing	2150		
	Blue-gray Lime, thin Shales	2150	"	2217
	Brown Sand Shale	2217	"	2260
	Oil Sand, dark brown	2260	"	2300
	Brown Shale	2300	"	2305
	Buff Water Sand, salt water	2305	"	2320
	Rotten red Lime or Shale	2320	"	2335
	Soft brown Shale	2335	"	2375
	Sandy Lime Rock	2375	"	2390
	4-inch Casing	2390		
Lower Supai	Hard brown Lime	2390	"	2395
	Soft brown Shale with thin strips of hard brown lime-	2395	"	2425
	Dark brown Water Sand (water now absent)	2425	"	2450
	Dark brown Lime	2450	"	2490
	Oil Sand	2490	"	2492
	Dark brown Shale	2492	"	2565
	Brown Shale	2565	"	2610
	Brown Lime	2610	"	2618
	Brown Shale	2618	"	2668
	Dark brown Shale	2668	"	2725
	Fossil	2725	"	2730
	Dark brown Shale and Fossil	2730	"	2848
	Medium dark, soft gray Lime	2848	"	2865
	Black, hard Shale and Lime	2865	"	2870
	Dark, hard gray Lime	2870	"	2878
	Dark gray Sqhle	2878	"	2882
	Brownish Water Sand	2882	"	2890
	Black Lime	2890	"	2890
	Brownish Water Sand	2890	"	2896
	Gray Lime	2896	"	2898
	Setting Casing	2898		
	Gray Lime	2898	"	2902
Upper Redwall or Middle Goodrich	Water Sand	2902	"	2906
	Gray-black Shale	2906	"	2974
	Setting Casing - hard gray-black Lime	2979		
	Gray Lime	2974	"	2980
	Dark Shale with thin streaks of dark Lime	2980	"	3086
	Dolomite, very dark brownish gray	3086	"	3106
	Thin gray Lime and gray Shales	3106	"	3275
	Brown Sand (dry)	3275	"	3295
	Thin gray Lime and Shales	3295	"	3360
	Water Sand	3360	"	3365
	Shale	3365	"	3371
	Lime	3371	"	3374
	Shale	3374	"	3376
	Lime Shell	3376	"	3378
	Sandy Lime	3378	"	3380

Middle Pennsylvanian

LOG OF ADAHANA WELL No. 1

April 26, 1924

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#617
OGCC 9-2

Formation	Character	Feet	to	Feet
Kaibab	Red Shale	0	"	60
	Hard cross-bedded Sandstone	60	"	334
	Yellow Sandstone	334	"	394
	White Shale	394	"	439
Coconino	Buff Sandstone	439	"	461
	Buff and red Sandstone	461	"	549
	Water	549	"	
	Red Sandstone	549	"	611
	Red Sandstone and Shale	611	"	680
	Hard Lime	680	"	692
	Red Shale and Gypsum	692	"	810
	8-1/4-inch Casing	810		
	Shale, Salt and Gypsum	800	"	855
	Dark brown Shale and Salt	855	"	865
	Reddish brown Shale	865	"	1005
	Brown Shale	1005	"	1040
	Blue Lime	1040	"	1050
Upper Supai	Brown Shale and Salt	1050	"	1090
	Blue Shale and brown Sandstone	1090	"	1200
	Blue Shale and Salt	1200	"	1740
	Blue Shale, strong oil showing	1740	"	1750
	Lime	1750	"	1940
	Shale, strong showing of oil and gas	1940	"	1950
	Blue Lime	1950	"	2028
	Water Sand (white)	2028	"	2040
	Soft brownShale	2040	"	2150
	5-5/8-inch Casing	2150		
	Blue-gray Lime, thin Shales	2150	"	2217
	Brown Sand Shale	2217	"	2260
	Oil Sand, dark brown	2260	"	2300
	Brown Shale	2300	"	2305
	Buff Water Sand, salt water	2305	"	2320
	Rotten red Lime or Shale	2320	"	2335
	Soft brown Shale	2335	"	2375
	Sandy Lime Rock	2375	"	2380
	4-inch Casing	2380		
Lower Supai	Hard brown Lime	2380	"	2395
	Soft brown Shale with thin strips of hard brown lime-	2395	"	2425
	Dark brown Water Sand (water now absent)	2425	"	2450
	Dark brown Lime	2450	"	2480
	Oil Sand	2480	"	2492
	Dark brown Shale	2492	"	2565
	Brown Shale	2565	"	2610
	Brown Lime	2610	"	2618
	Brown Shale	2618	"	2663
	Dark brown Shale	2663	"	2725
	Fossil	2725	"	2730
	Dark brown Shale and Fossil	2730	"	2848
	Medium dark, soft gray Lime	2848	"	2865
	Black, hard Shale and Lime	2865	"	2870
	Dark, hard gray Lime	2870	"	2878
	Dark gray Shale	2878	"	2882
	Brownish Water Sand	2882	"	2890
	Black Lime	2890	"	2890
	Brownish Water Sand	2890	"	2896
	Gray Lime	2896	"	2900
	Setting Casing	2900		
	Gray Lime	2900	"	2902
Upper Redwall	Water Sand	2902	"	2906
	Gray-black Shale	2906	"	2974
	Setting Casing - hard gray-black Lime	2979		
	Gray Lime	2974	"	2980
or	Dark Shale with thin streaks of dark Lime	2980	"	3005
	Dolomite, very dark brownish gray	3005	"	3105
Middle Goodrich	Thin gray Lime and gray Shales	3105	"	3275
	Brown Sand (dry)	3275	"	3295
	Thin gray Lime and Shales	3295	"	3360
	Water Sand	3360	"	3365
	Shale	3365	"	3371
	Lime	3371	"	3374
	Shale	3374	"	3378
	Lime Shell	3378	"	3379
	Sandy Lime	3379	"	3380

Middle Pennsylvanian

SW SE Sec. 4 T14N R20E Navajo Co. 9-2
Adamana Oil Co.

0	60	ss
60	335	hd cross bedded ss - top Coconino ss
335	395	yellow ls
395	440	white sh
440	480	buff ss
480	550	buff and red ss
550		water base Coconino top supar
550	610	red ss
610	680	red ss and sh
680	690	ls
690	855	red sh and gypsum
855	1040	reddish brown sh
1040	1050	ls
1050	1100	brown sh and salt
110	1200	blue sh and brown ss
1200	1740	blue sh and salt
1740	1750	blue sh oil shows
1750	1940	ls
1940	1950	sh show oil and gas
1950	2030	ls
2030	2040	water sand white
2040	2150	brown sh
2150	2215	blue gray ls - thin sh
2215	2260	brown sd - sh
2260	2320	oil sand - dark brown
2320	2335	salt water buff sd
2335	2375	brown sh
2375	2425	brown sh and ls
2425	2480	dark brown ls
2480	2490	oil sd
2490	2850	brown sh - fossil at 2730
2850	2900	black sh and dark ls
2900	2970	dark gray sh
2970	2990	gray ls
2990	3085	gray sh and thin ls
3085	3185	dark brown dolomite & gray
3185	3275	gray sh & thin ls
3275	3295	brown sd
3295	3360	thin ls & gray sh
3360	3365	water sand
3365	3385	sh & oil sand

PARTIAL LIST OF WELLS DRILLED IN ARIZONA

APACHE COUNTY

1. Hogback Oil Company No. 1. Sec. 24, T. 23N. R. 30E.
   340' from W. line, 300' from N. line of NW¼NW¼ Sec. 24.
   Drilling commenced November 15, 1926.
   Drilling completed May 7, 1927.
   Total Depth 1510', in gray granite.
   No shows recorded.
   Log on file and plotted.
   Located on upthrown fault block South end of Defiance Uplift.

2. U. S. Indian Service Water Well, at junction of roads, South of Window Rock and 2 miles East of St. Michaels.
   T. D. 1795. Surface dips 15-25° E., in Chinlee Fm.
   Hole bottomed in Cutler Formation. No shows oil or gas.
   Log on file.
   E. flank Defiance Uplift.

3. Zuni Oil Company No. 1 Sec. 6, T. 19N., R. 24E.
   T. D. @ 1000 feet. Start in Chinlee, bottomed in lower Chinle.
   No shows oil and gas on our records.
   No log on file.
   Located on NE flank of so-called Carrizo Anticline.

COCHISE COUNTY

1. Arnberger No. 1 SE¼ Sec. 19, T. 15 S., R. 26 E.
   Commenced drilling April 3, 1931.
   Completed drilling October 28, 1931.
   T. D. 3298'.
   No shows recorded on log.
   Temperature at 3225-35' 110° F.
   Log on file and plotted.

2. Bowie Oil Leasing Syndicate No. 1. SE¼NW¼ Sec. 16, T. 13 S., R. 28 E.
   Commenced * * * * * * * *
   Completed drilling February 1, 1925.
   T. D. 4110'.
   Shows:

1925-35	sso
2100-2300	sdy sh, sso
2670-2700	sdy sh, sso & g
2950-62	sd, sso & g
3580	sh, sso & g

   3815-3852-4110 shows oil when tested with chloroform also H_2S.
   Log on file and plotted.

9-2

3. Funk Benevolent Corp., No. 1 Fee. SE¼NE¼ Sec. 27, T. 13 S., R. 30 E.

Commenced drilling 1929
Completed - - still drilling Oct. 5, 1938
Depth to date 6440'
Temperature at 2430' - 165°
Temperature at 6400' - 274°.
Shows of oil and gas numerous, beginning at 1730' and occurring at frequent intervals to bottom.
Hole full of water; operators attempting shut-off and swab test.
No correlation of formations available but suggestion is offered that the conglomerate in lower 500' of hole may be basal Cretaceous.
Log on file at 6400'.

4. Southern Pacific Railroad Water Well, Willcox.

1928-30
T. D. 650'.
Produced light oil, kerosene and gasoline; pumper sold 2,800 gallons to local ranchers at 10¢ a gallon.
Well not used since 1930.
Log on file and plotted.

MARICOPA COUNTY

1. Camelback No. 1 NE¼NW¼ Sec. 30, T. 2 N., R. 4 E.

Drilled 1907.
T. D. 2818'.
Shows numerous between 618' and 2400'.
Log on file and plotted.
Located on flank of Camelback Uplift.

2. Tannehill No. 1, Beardsley. SW¼NE¼ Sec. 25, T. 4 N., R. 2 W.

T. D. 3350'
Shows:

2540	Light oil
3280	Black shale saturated with oil, some gas.

Log on file.

NAVAJO COUNTY

1. Adawana Oil and Land Company No. 1.

Sec. 4, T. 14 N., R. 20 E.

T. D. 3387'.
Shows:

1740-50	sh, oil
1940-50	sh, oil and gas
2250-2300	sd, oil
2480-2495	sd, oil
3380-(?)	sdy, ls, oil

Hole lost after fishing for tools. Never tested bottom show.
Log on file.
Located 2 miles N. of Richards Lake-Snowflake fault and 2 miles E. of anticline.

2. Black Canyon No. 1 Sec. 20, T. 16 N., R. 17 E.
T. D. 510'. ?
Core drill rig, took 7' cores of Coconino sandstone, which lie on ground near rig.
No shows on record.
No log on file.
Surface - Coconino Ss.
Located N. of Richards Lake-Snowflake fault on N. flank of anticline.

3. Great Basin Oil Company No. 1. Fuller (E. S. Taylor). Sec. 21, T. 17 N., R. 20 E.
T. D. 4675'.
Shows:
1925-35 sd, salt water, gas.
3590-96 ls, oil
3685-3870 arkosic sd, oil on tools, water.
Correlations vague, but bottom hole may be Cambrian.
Log on file and plotted.
Supposedly located on structure by Dorsey Hager, but proved to be off structure.

4. Holbrook Oil Company No. 1. Sec. 23, T. 15 N., R. 18 E.
T. D. 2400' in 1922.
Deepened as Jerome-Navajo Drilling Company to 3775' in 1925.
Show gas?
No log on file.
Located on structure? Doubtful

5. Hopi Oil Company No. 1. Sec. 21, T. 15 N., R. 19 E.
T. D. 2500'
No log on file.

YAVAPAI COUNTY

1. Arizona-Verde Oil Company. NW¼NW¼ Sec. 14, T. 13 N., R. 5 E.
T. D. 1625'.
Bottomed in igneous rock.
Correlation: 0-250'; Redwall ls ?
Log on file

2. Arizona-Verde Oil Company. NW¼NW¼ Sec. 9, T. 13 N., R. 5 E.
T. D. 1225'.
Bottomed in igneous rock.
Log on file.

3. Chino Valley Oil and Mining Company No. 1. Sec. 27, T. 18 N., R. 2 W.

Drilled 1913
T. D. 1600' SSO.
No log on file.
Surface: Redwall ls.
Located on NW trending anticline in Redwall ls.

YUMA COUNTY

1. J. H. Loftus No. 1 (Stowell) NW¼ Sec. 4, T. 8 S., R. 13 W.

Commenced
Completed
T. D. 2360'.
Temperatures:

2405-45	110°
2500	120°
2545	140°

Shows: Black mud at 2545-50', methane gas.
Log on file and plotted. No correlations.

9-2

REGISTERED GEOLOGIST
CERTIFICATE NO. 6949
GENE C CARPENTER
Date Signed
ARIZONA U.S.A.

Aztec Land and Cattle Company, Limited
T.W. Cabeen, Vice President
Albuquerque National Bank Building
P.O. Box 873
Albuquerque, New Mexico

March 26, 1949

Mr. R. S. Chapman
San Carlos Hotel
Phoenix, Arizona

Dear Mr. Chapman:

Your favor of 25th inst. I leave tomorrow for northeast Arizona and will be there until Thursday, 31st inst.

The now blind man living in Holbrook who worked on the Adamana well is Frank Felsch. I saw a bottle of the oil from that well a number of years ago. My understanding is that the well had oil and gas shows in upper horizons but that the free oil and gas that would ignite and broke through the water by heads, were from the 3385 horizon. Above company at that time was controlled and operated by the Santa Fe. I have now the old records and according to them a geologist for CONO, another Santa Fe subsidiary, confirmed the presence of the oil and gas.

Ben R. Hunt, supervisor, Navajo County, also worked on the Adamana well. I don't think there is any question but that they had some oil and gas; I don't believe the Santa Fe would kid themselves.

I will ascertain from the County Records who now has record title to NW¼ Sec.4. 14N 20E, and advise you. [illegible] McNeill held it up to the time of his death.

The geologist who did the work on which the Holbrook Exploration Co. leases are based, is Mark W. Baden, Winfield, Kansas, formerly district geologist for Benedum-Trees, as well as Cities Service, and he is all right. His geology was checked by Union Oil Co. while they were drilling the two test wells in that area, and that is all right. Indicated location of a test well is center of SW¼SW¼ Sec.8-14-20E.

Shaw originally geologized the Carrizo dome, and Argo took leases on the state lands thereon, and still hold a section or so, I think.

With regards and best wishes, I am
Sincerely,

s T.W. Cabeen

C
O
P
Y

9-2

9-2

Adamana Oil Company. Well No. 1. Located in SW¼ SW¼ Section 4, T. 14 N., R. 20 E. Drilled to depth of 4,100 feet and operations suspended. A good oil showing was reported. A log was not available. The company proposes to resume operations and test for production.

Area visited April 21, 1928.

* * * * * * * * * * *

Mulbrook Test. Well is located in the NE¼ Section 23, T. 15 N., R. 18 E., G. & S. R. M. Drilled to depth of approximately 3,400 feet. No log or information available at this time.

* * * * * * * * * * *

Sunshine Oil Company. Well No. 1. NW¼ SW¼ Section 13 T. 20 N., R. 12½ E., G. & S. R. M. Drilling commenced in Fall of 1926. Drilled to depth of approximately 350 feet and suspended operations. The company is reorganizing and will probably resume operations in the near future. Well visited April 24, 1928.

* * * * * * * * * * *

Logs which are lacking in this report will probably be obtainable later. The photographs attached were furnished by Mr. Bob Thomas, of Globe, Arizona, and pertain to wells in this report.

Reported by

R. E. Canfield,
Assistant Petroleum Engineer.

~~lime & sand~~ ~~sand~~ ~~gray~~ ~~brn~~ ~~[illegible]~~ 9-Z

Copy of a signed statement made by Ray F. Durfee, Driller of the Adamana Oil Well No. A, Holbrook, Arizona: *Included in Geol. Rpt by Martin W. Baden, 1-8-42 to Arizona Pet. Corp re Holbrook Area*

"Mr. W. A. Rutter,
Holbrook, Arizona.

This is the statement of the actual facts regarding log of Adamana Well: I have a true record of sands and depths, but have misplaced them so these depths will be approximate.

I started work sometime in January, 1922, the hole was near 2200 feet deep with a string of 5-5/8", 10½ pound casing set and collapsed at 1700 feet. I removed the casing all but 7 lengths, about 142 feet, which was side tracked, and 4 inch pipe set at near 2300 feet, and accomplished a complete water shut off. Another water was encountered a few feet below casing, drilled through that showed all indications of being a true oil sand, in fact it made considerable gas through 2400 feet of water, continued until it was cased off a little below 2400 feet. The gas was inflamable. I ignited it myself and it burned very freely until it was snuffed out. I drilled the hole to a little below 2600 feet then was away for a little over a year, when I went back, I don't remember the depth of the hole, but I think about 3100. The four inch casing was set at near 2900 feet. I carried the four inch, and made another water shut off at near 3200 feet. Another water was encountered at below 3200 feet, and I was drilling in about 2400 feet of water when the oil sand was struck at about 3385 feet. The bit only penetrated the sand not to exceed 18 inches, came out loaded with a heavy residue. I shut down and went to town to notify the management, Mr. Warren and Senator Taylor of the Great Basin Oil Company, and others were invited out, the bailer was run a few times, and each time brought out a small amount of very high grade of oil. The very words Mr. Warren (who was manager for the Great Basin Oil Company) used were: "Don't drill any farther until you shut off the water, you have got what you were looking for."

The attempt was made and every body knows how it was handled and the outcome. I was working there again later, after the casing was parted, and the hole bridged over at near 2400 feet. I drilled through bridge, and the gas pressure that had accumulated below, blew oil and water to near the top of the hole. I personally bottled some of the oil, and heard reliable information that it blew oil and water above the floor.

THIS IS A VERY CONSERVATIVE STATEMENT OF FACTS.

Respectfully yours,

(signed) Ray F. Durfee "

RALPH E. HERRON, PRESIDENT WILL A. PETERS, VICE-PRESIDENT E. FORD KNOWLES, SECRETARY-TREASURER

Bear Springs Oil and Gas Company

INCORPORATED UNDER LAWS OF ARIZONA
CAPITAL, $500,000.00

BOB THOMAS, BUSINESS AGENT

OGCC=9-2

Bowie, Arizona, Oct 8th 1931

UNIVERSITY OF ARIZONA
AGRICULTURAL EXPERIMENT STATION
IRRIGATION DEPT. DATE

Mr. H.C. Schwalen,
Tucson.
Ariz.

Dear Mr. Schwalen:

I am enclosing log of Adamana Oil Well, I think I gave you a short form this log with others the U.S.G.S. at Taft, Calif. sent me.

The party that mailed me this log wants the following logs, Have you them if so will you send me 2 copies of each. (list attached.)

I think Dorsey Hager, Petroleum Geologist & Engineer and Author of Practical Oil Geology & Oil Field Practice, he also made a report on the Holbrook field & if you wrote him, he might send you the reports as well logs as per attached list. I think Mr Hager's address is Seattle Wa

Thanking you, I am,
Yours truly, Bob Thomas

Log of Hole

#617

UNIVERSITY OF ARIZONA
AGRICULTURAL EXPERIMENT STATION
IRRIGATION DEPT. DATE
H. C. Schuster

ADAMANA OIL AND LAND CO.
Sec. 4-14N-20E
Navajo Co. Ariz.

0-
60 red shale
334 hard cross bedded sandstone
394 yellow limestone
459 white shale
481 buff sandstone
549 buff and red sandstone
569 water
611 red sandstone
650 red sandstone
692 hard lime
800 red shale
810 8 inch casing
855 shale, salt and gypsum
865 dark brown shale and salt
1005 reddish brown shale
1040 brown shale
1050 blue limestone
1080 brown shale and salt
1200 blue shale and brown sandstone
1740 blue shale and salt
1750 blue shale, strong oil showing
1940 lime
1950 shale, strong showing oil
2025 blue lime
2040 water sand- soft water
2150 brown shale
2155 5 5/8 casing
2217 blue gray lime, thin shale
2260 brown sand shale
2300 oil sand, drk green
2305 brown shale
2320 buff water sand, salt water
2355 rotten red lime and shale
2375 soft brown shale
2380 sandy lime rock
2390 4 inch casing
2395 hard brown lime
2424 soft brn shale, thin strips brn lime
2438 dark brn water sand, water now absent
2480 dark brown lime
2482 oil sand
2545 dark brown shale
2610 brown shale
2618 born lime
2665 brown shale
2725 dark brown shale
2730 fossil
2845 dark brown shale and fossil
2855 medium dark soft gray lime
2870 black hard shale and lime
2878 dark hard gray lime
2882 dark gray shale
2886 brownish water sand
2890 black lime
2896-2906 brownish water sand
2898 gray lime (setting casing)
2902 gray lime
2906 water sand
2974 gray-black shale
2990 gray lime
3085 drk shale with thin streaks gray lime
3125 dolomite, very dark brown with gray
3275 thin gray lime and gray shale
3325 brown sand - dry
3360 thin gray lime and shale
3365 water sand
3371 shale
3374 lime
3376 shale
3378 lime
3387 sandy lime
3390 oil sand.

TD Plugged

Bob Herman
Log Collection

OGC 9-2

9-2

RECORD OF ADAMANA BORE HOLE, SEC. 4, T. 14, R. 20, SOUTHWEST OF HOLBROOK, ARIZONA

Feet	Material	Formation
0– 60	Red shale	Moenkopi
60– 80	Limestone, yellow, very sandy	Kaibab
80– 394	Sandstone, yellow	Coconino
394– 439	Shale, white	
439– 549	Sandstone, mostly buff, some reddish	
549– 680	Sandstone, white	
680– 692	"Limestone", hard	Supai
692– 855	Red shale, some gypsum and salt	
855–1040	Shale, brown	
1040–1050	Lime, blue	
1050–1090	Shale, brown, and salt	
1090–1745	Shale, blue and brown, salt	
1745–1950	Limestone, blue	Redwall
1950–2040	Sandstone and salt	
2040–2150	Shale, brown	
2150–2345	Limestone, some shale	

This record was to the end of January, 1921. A year later the depth was 350 feet greater, and soft, brown beds were being penetrated. In February, 1923, the depth was about 3,000 feet and the material was black shale. The Supai formation appears to be about 1,065 feet thick in this hole, but there is some uncertainty as to its lower limit.

RECORD OF HOPI BORING, IN SEC. 21, T. 15 N., R. 19 E., SOUTHWEST OF HOLBROOK, ARIZONA

Feet	Material	Formation
0– 465	Sandstone, hard, cross-bedded, gray to buff	Coconino
465– 625	Sandstone, red	Supai
629– 697	Limestone, sandy, red	
697– 710	Sandstone, gray	
710–1075	Shale, etc., red	
1075–1200	Sandy shale, black	
1200-1725	Sandstone, red, with salt beds, (limestone, 1550–1590 feet)	
1725–1788	Limestone, very hard, black on blue	Redwall
1788–1875	Sandstone	
1875–2175	Red sandstone with salt in upper half	
2175–2355	Limestone, red, sandy, hard	
2355–2400	Sandstone, buff	
2400–2420	Sandy limestone and sandstone, red	

Another record gives red sand and shale 2196 to 2235 feet, lime and shale, 2235 to 2505 feet, and white "lime," 2505 to 2520 feet. Possibly the base of the Supai was at 1725 feet, but red material occurs in underlying strata.

Early in 1925 the Taylor-Fuller boring penetrated arkosic sandstone 3685-3870 feet, limestone 3870-3994 and red and brown hard sandstone 3994-4112 feet, possibly strata of the Apache group which outcrop on Canyon Creek 60 miles southwest.

Arizona Bureau of Mines Bulletin 119, 1925

The Holbrook boring (No. 1) about three miles west of the Hopi hole is reported to have entered red shale at 511 feet, which continued to 935 feet, interrupted by limestone from 680 to 692 feet and by gypsum at intervals from 692 to 865 feet and some salt from 855 to 935 feet. Apparently there are local salt basins in Permian and Pennsylvanian strata in this region.

The westernmost bore hole, which is at the Black Canyon claim in Section 20, T. 16, R. 17, was sunk 476 feet with diamond drill. The cores were nearly all light colored sandstone (Coconino). Some layers were found to contain considerable calcium carbonate and a few thin layers of shale were penetrated. The mesa at this place is capped by the thin Kaibab limestone, the upper part very sandy. A boring for water at Winslow had reached a depth of 965 feet late in 1924 all in Coconino sandstone below 100 feet. The overlying Kaibab was thin.

The thinning of the Kaibab limestone in the plateau south of Holbrook is an interesting feature which has been described in considerable detail on a previous page. It results in the disappearance of the formation at Holbrook, although its thin edge is well characterized a short distance south of that place and near Winslow and Snowflake. It is absent in the basin northeast of Holbrook and in the Defiance uplift where the Moenkopi formation, and to the northward the Shinarump conglomerate, lies on the Coconino sandstone.

As shown in Plate 52, the dome of the Holbrook region trends northwest and finally flattens out in the monocline southeast of Winslow. It is broad and flat to the southeast along the Little Colorado River, which cuts a canyon across it, mostly with walls of Coconino sandstone, from near Snowflake to Holbrook. Woodruff Butte consists of Moenkopi, Chinle, and Shinarump beds in a shallow basin, capped by basalt (See Pl. 60a.) Possibly the vent from which this latter rock came is in the butte. Just east of Taylor there is a small local dome in which the Coconino sandstone is revealed overlain by yellow sandy Kaibab limestone only a few feet thick.

The Sinks are on the south slope of the large dome, about 10 miles northwest of Snowflake. There are 30 or 40 of them, ranging from a few yards to 100 yards in diameter, in an area about a mile in length, and all near or on the steep dip to the south. Most of them expose sandstone of Coconino aspect (see Pl. 60b), overlain by Kaibab limestone, here 20 or 30 feet thick. Undoubtedly this sandstone is underlain by a limestone member which has been removed in places by solution in underground waters passing into the valley of Dry Lake to the southward.

This latter valley is a syncline filled with Moenkopi formation, as shown in the cross section (Fig. 28), which extends nearly to Chevlon Canyon. In the center of the basin, southwest of the Sinks, are two buttes capped by Shinarump conglomerate.

The Moenkopi extends far up the slopes south of Dry Lake Valley, and on an irregular surface of this formation and in places overlapping on to the Kaibab limestone, is the cap of Upper Cretaceous strata which

May 15, 1924.

OGCC 9-2

Mr. R. S. Teeple,
Adamana Oil & Land Co.,
Holbrook, Ariz.

Dear Sir:

I wish to acknowledge receipt of your letter dated May 6, in which you enclosed your check for $3.00 in payment for the analysis made on petroliferous material sent to me some time ago by you, and to thank you for this remittance. We received the sample of sand that you sent to us and examined it with much interest.

I wish to thank you for the log of your well that you were kind enough to send to us, and wish to assure you that we shall be greatly interested in learning of any developments that you may be kind enough to report to us.

Assuring you that we shall always be glad to serve you in any way in our power, and with kindest personal regards, I am

Very sincerely,

G.W. Butler-L

Dean and Director.

ING DIRECTOR

A. M. MACDUFFEE, PRESIDENT

R. S. TEEPLE, SEC'Y-TREAS.

ADAMANA OIL AND LAND COMPANY

HOLBROOK, ARIZONA

May 6, 1924

(17)

OGCC 9-2

University of Arizona
Tucson, Arizona

Gentlemen:

We are handing you check for $3.00 in payment of your charge for making the analysis of petroleum material, and wish to thank you for your attention to the matter.

The sample sent you was not introduced into the hole, but the same kind of material is still coming up with the bailer. We now have a column of 2800 feet of salt water, and are engaged in the process of making a shut-off. We drilled into about three feet of sandy or rotten lime which seemed to be more or less lively, and are now on top of a loose, fine sand, a sample of which we are mailing you under separate cover. We believe this oil to be the heavier material left on top of the sand after the lighter fluids have been forced back. This sand is heaving to some extent, that is, after the bailer has been pulled, it, to a certain degree, releases the water pressure, and there is a preceptible heave or uplift of the sand at the bottom.

For your information, we are handing you a copy of our log. We, apparently, are still in the Upper Redwall, but may be about at the contact of the Upper and Lower Redwall. Any information with which you can furnish us will be much appreciated, and if you desire to ask any questions, please go ahead.

Practical oil men here declare that this showing in the Adamana Well has proven the Holbrook Oil Field.

Yours very truly

ADAMANA OIL AND LAND COMPANY

R S Teeple

Secretary

RST MC
Encl.