

File 5-3. Log in this folder

P-W

GILA OIL SYNDICATE #1, Graham Co. 5-3
SW/NE Sec 30-T5S-R24E

County Graham
Area _____
Lease No. _____

Well Name Gila Oil Syndicate #1
Location SW NE Sec 30 Twp 5S Range 24E Footage 2525 ft 1710 ft
Elev _____ Gr _____ KB Date 1928 Spud _____ Completed _____ Total 2680? - Ld. Dept.
Abandon 1931 Depth 2645 - U.S.G.S.
Approx. _____ Cost \$ _____ PP * 796-F

Contractor: _____
Casing Size _____ Depth _____ Cement _____
Drilled by Rotary _____ Cable Tool _____
Production Horizon _____
Initial Production _____ D&A

REMARKS It is very probable that this well is a deepening or re-entry of the Ashurst Oil Co. #1 - File No. 5-2.

Elec. Logs _____ Sample Log _____
Sample Descrip. X
Applic to Plug _____ Plugging Record _____ Completion Report _____ Sample Set _____
Cores _____

Water well - accepted by _____

Bond Co. & No. _____ Date _____
Bond Am't \$ _____ Cancelled _____ Organization Report _____
Filing Receipt _____ Dated _____ Well Book _____ Plat Book _____
Loc. Plat _____ Dedication _____

API # 02-009-05003

PERMIT NUMBER none Date Issued _____

#5-3

PLUGGING RECORD

Operator Gila Oil Syndicate		Address & Phone number Defunct	
Federal, State, or Indian Lease No. or lessor's name if fee lease Bellman Family Trust		Well No. 1	Field & Reservoir Wildcat well - Safford Basin
Location of Well SW, NE, sec 30, T. 5 S., R. 24 E.		Sec - Twp - Rge	County Graham
Application to drill this well was filed in name of N/A	Has this well ever produced oil or gas NO	Character of well at completion (initial production): Oil (bbls/day) 0 Gas (MCF/day) 0 Dry? Yes	
Date plugged 12/19/00	Total depth 2645	Amount well producing when plugged: Oil (bbls/day) 0 Gas (MCF/day) 0 Water (bbls/day) ~ 818	
Name of each formation containing oil or gas. Indicate which formation open to wellbore at time of plugging	Fluid content of each formation	Depth interval of each formation	Size, kind & depth of plugs used. Indicate zones squeeze cemented, giving amount of cement
			0-550' cement
			550 - 1800 cement
			1800 - 2400 cement
			(2400 - 2645 debris)

CASING RECORD

Size pipe	Put in well (ft.)	Pulled out (ft.)	Left in well (ft.)	Give depth and method of parting casing (shot, etc.)	Packers and shoes
24- inch	(?)	(?)			← (Original Ashurst well)
10- inch	1247	1247			← (Original Ashurst well)
16-inch	550	10	540	Perforated	
Was well filled with heavy drilling mud, according to regulations? No - filled with cement only				Indicate deepest formation containing fresh water	

NAME AND ADDRESSES OF ADJACENT LEASE OPERATORS OR OWNERS OF THE SURFACE

Name	Address	Direction from this well

In addition to other information required on this form, if this well was plugged back for use as a fresh water well, give all pertinent details of plugging operations to base of fresh water sand, perforated interval to fresh water sand, name and address of surface owner, and attach letter from surface owner authorizing completion of this well as a water well and agreeing to assume full liability for any subsequent plugging which might be required.

Use reverse side for additional detail. **See reverse**

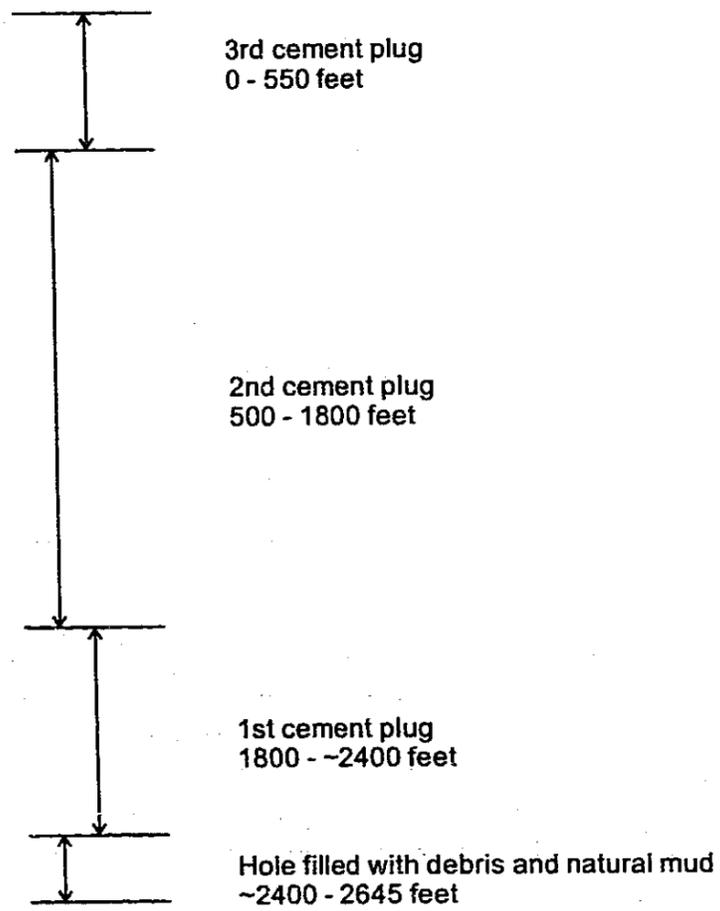
CERTIFICATE: I, the undersigned, under the penalty of perjury, state that I am the Contracts Manager of the Lang Exploratory Drilling (company) and that I am authorized by said company to make this report; and that this report was prepared under my supervision and direction and that the facts stated therein are true, correct and complete to the best of my knowledge.

Date Aug 12, 2001

Signature Randall May

Permit No. 5-2 & 5-3 Mail completed form to: Oil and Gas Program Administrator Arizona Geological Survey 416 W. Congress, #100 Tucson, AZ 85701	STATE OF ARIZONA OIL & GAS CONSERVATION COMMISSION Plugging Record File One Copy Form No. 10
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PLUGGING SCHEMATIC



APPLICATION TO PLUG AND ABANDON

FIELD Safford Basin

OPERATOR Gila Oil Syndicate ADDRESS & PHONE Defunct

LEASE NUMBER (Lessor's name if fee) Bellman Family Trust WELL NO. 1

LOCATION SW NE sec 30, T. 5 S., R. 24 E.

OGCC files 5-2/ & 5-3

TYPE OF WELL Dry TOTAL DEPTH 2645
(Oil, Gas, or Dry)

ALLOWABLE (If Assigned) NA

LAST PRODUCTION TEST OIL NA (Bbls.) WATER 10,000/day (Bbls.)
GAS _____ (MCF) DATE OF TEST 1928 (?)

PRODUCING HORIZON NA PRODUCING FROM _____ TO _____

1. COMPLETE CASING RECORD:

24" conductor casing to unknown depth
10" to 1247 feet
no record below 1247 feet

2. FULL DETAILS OF PROPOSED PLAN OF WORK:

Details of work plan will be developed as inspection of the well progresses.
Actual conditions of the well are unknown.
See attached Work Plan for expected methods and procedures.

DATE COMMENCING OPERATIONS October 1, 2000 2286 West 1500 South

NAME OF PERSON DOING WORK Lang Exploratory Drilling ADDRESS Salt Lake City, UT 84104

Signature *Randy Maye*

Title Contracts Manager

Address 2745 California Ave

Date Sept. 20, 2000 Salt Lake City, UT 84104

Mail two copies of completed form to:
Oil and Gas Program Administrator
Arizona Geological Survey
416 W. Congress #100
Tucson, AZ 85701

Date Approved 10-16-00

STATE OF ARIZONA
OIL & GAS CONSERVATION COMMISSION

By *SL Rainey*

STATE OF ARIZONA
OIL & GAS CONSERVATION COMMISSION
Application to Plug and Abandon
File Two copies

Form No. 9

Permit No. _____

Log of Gila Oil Syndicate's Well #1
near Ashurst, Graham County
SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec 30 T 5S R 24E

	Thick- ness (Feet)	Depth (Feet)	Remarks
Alluvium-----	50	50	Water.
Clay-----	380	430	
Sand-----	15	445	Flow of water.
White limestone-----	145	590	Salt water
Limy shale-----	30	620	
Gray sand-----	80	700	Flow of water
Limy shale-----	50	750	Salt water.
Blue shale-----	55	805	
Gravel-----	30	835	
Gray shale-----	200	1,035	
Brown shale-----	80	1,115	
Blue shale-----	20	1,135	
Brown shale-----	15	1,150	
Blue shale-----	15	1,165	
Brown shale-----	35	1,200	
Sandy shale-----	35	1,235	
Blue shale-----	20	1,255	
Brown shale-----	80	1,335	
Red shale-----	60	1,395	
Sandy shale-----	40	1,435	
Brown shale-----	80	1,515	
Brown sandstone-----	480	1,995	Flow of water
Gravel-----	10	2,005	
Dark-brown shale-----	70	2,075	
Black sand-----	10	2,085	
Brown shale-----	125	2,210	
Dark-brown sandstone-----	70	2,280	
Gray shale-----	15	2,295	
Red shale-----	110	2,405	
Dark-brown sandstone-----	80	2,485	
Limestone-----	80	2,565	
Sandy limestone-----	30	2,595	
Blue shale-----	50	2,645	Bottom of well

Wm. B. Smith

X

W.B.S.

Log of Gila Oil Syndicate's Well #1
 near Ashurst, Graham County
 SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec 30 T 5S R 24E

	Thick- ness (Feet)	Depth (Feet)	Remarks
Alluvium-----	50	50	Water.
Clay-----	380	430	
Sand-----	15	445	Flow of water.
White limestone-----	145	590	Salt water
Limy shale-----	30	620	
Gray sand-----	80	700	Flow of water
Limy shale-----	50	750	Salt water.
Blue shale-----	55	805	
Gravel-----	30	835	
Gray shale-----	200	1,035	
Brown shale-----	80	1,115	
Blue shale-----	20	1,135	
Brown shale-----	15	1,150	
Blue shale-----	15	1,165	
Brown shale-----	35	1,200	
Sandy shale-----	35	1,235	
Blue shale-----	20	1,255	
Brown shale-----	80	1,335	
Red shale-----	60	1,395	
Sandy shale-----	40	1,435	
Brown shale-----	80	1,515	
Brown sandstone-----	480	1,995	Flow of water
Gravel-----	10	2,005	
Dark-brown shale-----	70	2,075	
Black sand-----	10	2,085	
Brown shale-----	125	2,210	
Dark-brown sandstone-----	70	2,280	
Gray shale-----	15	2,295	
Red shale-----	110	2,405	
Dark-brown sandstone-----	80	2,485	
Limestone-----	80	2,565	
Sandy limestone-----	30	2,595	
Blue shale-----	50	2,645	Bottom of well

No Perm K

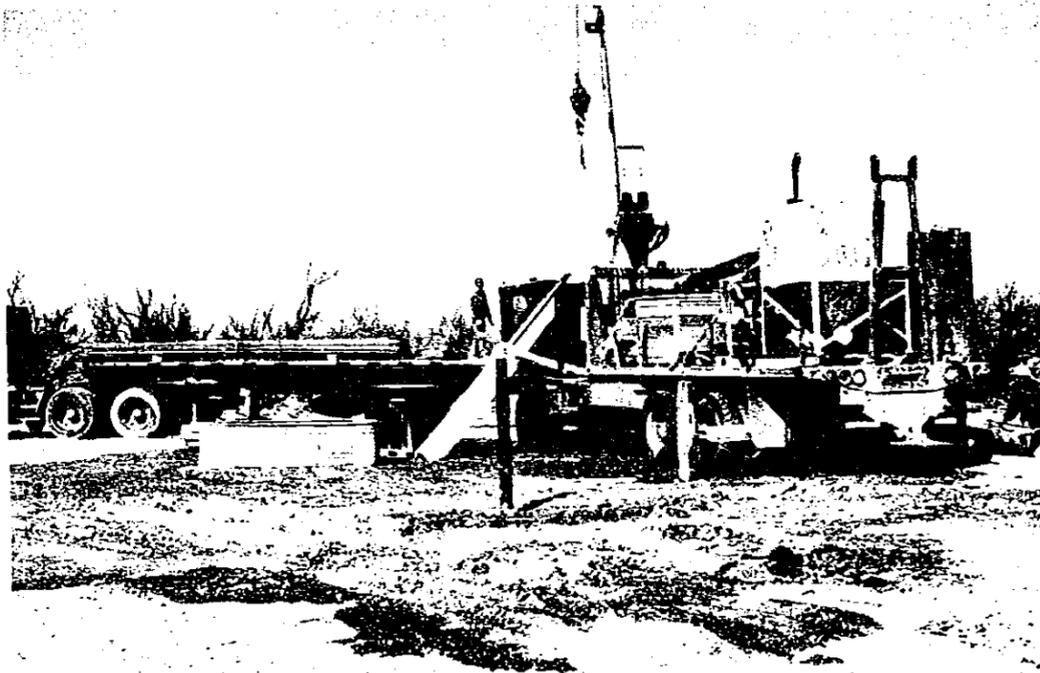
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Log of Oil and Gas Syndicate's well in the SW $\frac{1}{4}$ sec. 20, T. 5 S., R. 24 E.,
near Ashurst

	Thick- ness (Feet)	Depth (Feet)	Remarks
Alluvium-----	50	50	Water.
Clay-----	380	430	
Sand-----	15	445	Flow of water.
White limestone-----	145	590	Salt water.
Limy shale-----	30	620	
Gray sand-----	80	700	Flow of water.
Limy shale-----	50	750	Salt water.
Blue shale-----	55	805	
Gravel-----	30	835	
Gray shale-----	200	1,035	
Brown shale-----	80	1,115	
Blue shale-----	20	1,135	
Brown shale-----	15	1,150	
Blue shale-----	15	1,165	
Brown shale-----	35	1,200	
Sandy shale-----	35	1,235	
Blue shale-----	20	1,255	
Brown shale-----	80	1,335	
Red shale-----	60	1,395	
Sandy shale-----	40	1,435	
Brown shale-----	80	1,515	
Brown sandstone-----	480	1,995	Flow of water.
Gravel-----	10	2,005	
Dark-brown shale-----	70	2,075	
Black sand-----	10	2,085	
Brown shale-----	125	2,210	
Dark-brown sandstone-----	70	2,280	
Gray shale-----	15	2,295	
Red shale-----	110	2,405	
Dark-brown sandstone-----	80	2,485	
Limestone-----	80	2,565	
Sandy limestone-----	30	2,595	
Blue shale-----	50	2,645	Bottom of well.

The Permian



View northwest of Lang Exploratory Drilling rigging down behind abandoned well monument



View northwest of restored location and abandoned well monument

Gila Oil Syndicate #1 (File No. 5-3)
sw ne 30-5s-24e, Graham Co., Arizona
Abandoned before 1933, Plugged and photo taken December 2000



View South of pond kept full by artesian flow from well

Gila Oil Syndicate #1 (File No. 5-3)
sw ne 30-5s-24e, Graham Co., Arizona
Abandoned before 1933 Photo taken July 1998

Well is probably deepening of or same as Ashurst Oil #1 (5-2)



View South of artesian flow.
Water is 94° F, with TDS of 20,000 ppm



View South of pond kept full by artesian flow from well

Gila Oil Syndicate #1 (File No. 5-3)
sw ne 30-5s-24e, Graham Co., Arizona
Abandoned before 1933 Photo taken July 1998

2mestone

IN August Report of the Bear RY Springs Oil & Gas Company W

has at of im- et- ch- ug- on for. 7. st a rer. oss ven to cks the the re- fill ee- wall that im- s at o! is used City cords, mmer stroy- heth- ath- and stone's ming- e pool -main- esert; e and and it. tone's ave a ig-un- of old- f the Macla ted to thers. at for

SAN SIMON VALLEY—
 San Simon Well, on SE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 27; T. 13S., R. 30E., Torrence ranch 2 miles west of San Simon. Walter Tuttle, driller, has the deepest oil well, drilling in Arizona, 4230 feet, now in hard black sand (Lime) Good oil showings; 170 degree water at 4056 ft.; 6 $\frac{1}{4}$ in. casing hanging at 4035 ft. Will underream to 4160 ft. to shut off water and dry hole.
 Pinal Oil Co. Well No. 1 on Allen permit, SE $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 25; T. 10S., R. 28E., 17 miles north of Bowie. Sam Twentier, Field Supt. with crew of three has had a hard job to get two camps in shape to start active work. These two wells have been practically shut down for the past three years.
 Whitlock Oil Co. Well No. 1, on NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 36, T. 10S., R. 28E., State Land 17 miles north of Bowie. Pinal Oil Co. in return for loan of National No. 2 drilling machine and 30 h. p. Buffalo Gasoline engine, owned by Whitlock Oil Co., have repaired and put in good working order to pull 6 5-8 in. casing and plug Whitlock No. 1 Well back to 1500 ft. before moving the above equipment to Pinal No. 1 Well.
 Whitlock No. 2 Well, on NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 20; T. 10S., R. 29E., on Penford permit, still shut down at 521 ft.
 Finn No. 1 Well, 9 miles north of Bowie on SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 23, T. 11S., R. 28E., Reed permit, still negotiating with eastern capital to drill his permit.
 Ryan et al Well on SE $\frac{1}{4}$ NW $\frac{1}{4}$ Sec. 34, T. 14S., R. 30E., State Land 9 miles south of San Simon at 920 ft. Tentative option has been given a group of oil men, on the fifteen state land sections, held by R. J. Ryan and associates of Montebello, Calif. A "K" type Okell drilling machine is on location and the option calls for completion of the well.
SULPHUR SPRINGS VALLEY—
 Benedum-Trees, Arzberger No. 1 Well on NW $\frac{1}{4}$ SE $\frac{1}{4}$ Sec. 19; T. 15S., R. 26E., 14 miles SE of Willcox, 4000 ft. 3 $\frac{1}{4}$ in. casing unloaded by S. P. Ry, and delivered to well 10 in. set at 2343 ft. Depth 3140 ft in hard

brown shale with shells. Little water in hole. Two towers with crew of five. R. W. Hickman in charge, making very good progress, considering the many delays. John Pugh of the Two John Drilling Co., contractors, made a flying trip from Shreveport, La., Denver, Willcox, and back to headquarters.
 Geronimo Oil Co., No. 1, No. 2, and No. 3 Wells, in town of Willcox have shut down for the time being. Mr. I. R. Borck is in charge and expects a large heavy standard rig within 60 days. The splendid oil showings in their wells should warrant further explorations.
 S. V. Windle, Riggs No. 1 Well, N E $\frac{1}{4}$ Sec. 10, T. 17S., R. 28E., still waiting for equipment necessary to spud in.
 Western Water Works, of Alamo-gordo, N. M., was awarded the contract for drilling the state well for artesian water to irrigate 10,000 acres in the Stewart District. An appropriation of \$10,000.00 was allowed to do this drilling.
GILA VALLEY—
 Gila Oil Syndicate Well No. 1, SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 30, T. 5S., R. 24E., 7 miles NW of Pima, shut down at 2630 ft.
 Underwriters Syndicate Well No. 1 (Vaughn Oil Co.) 2 miles NW of Pima, on Mary Mack farm, NW $\frac{1}{4}$ N E $\frac{1}{4}$ Sec. 13, T. 6S., R. 24E., standing shut down at 3765 ft. Several deals pending to finish this well to completion.
SAN PEDRO VALLEY—
 Century Petroleum Co. Well No. 1 on Colrazier permit, NW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 17; T. 17S., R. 19E., 9 miles west of Benson, expecting to contract the deepening of this well, now shut down at 1550 ft.
 Understand interested people are looking over this prospect with view of starting drilling.
 San Pedro Oil Corp., No. 1 Well on Smith Bros. ranch 1 $\frac{1}{2}$ miles SE of Mammoth, shut down at 1400 ft.
CHINO VALLEY—
 Pinal Oil Co. Lantz No. 1 Well NE $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 3, T. 16N., R. 2W., 19 miles north of Prescott spudded

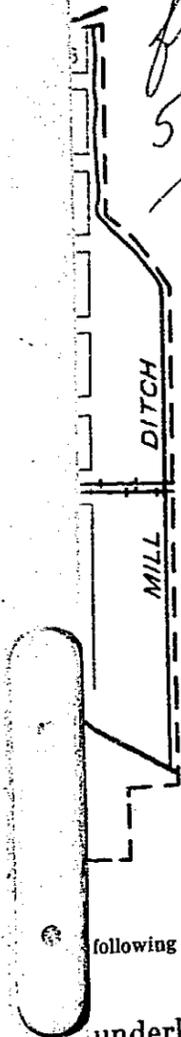
in August 16th. Now about 300 feet All casing on rack, all supplies purchased, work is progressing in fine shape, with a steam Star rig, under supervision of Fred Womack, Supt. A water well was drilled to 305 ft. and 350 bbls. a day artesian flow of good water was encountered there, making drilling water for that district a certainty.
 Yavapai Oil Development Co. Kissah No. 1 Well, Sec. 27; T. 18N., R. 2W., 29 miles north of Prescott, in charge of A. L. Kissah, who, I am told, has a number of Japanese clients interested in this development. Their No. 1 Well will be spudded in on the 30th, I hear.
 There is a possibility of a third well being drilled on the Pantteney Ranch. I hear that all arrangements have been made and the rig is being shipped in from Los Angeles.
 "Petroleum" a bulletin issued by the University of Arizona and prepared by Dr. G. M. Butler and J. E. Tenney is now ready for state distribution. The bulletin treats of the origin of petroleum, methods of concentration, favorable structures, hints to prospectors and tests for petroleum.
NEW COMPANIES INCORP.—
 Blue Ribbon Refinery Co., capital 100,000 shares, no normal par value. Incorporators, A. G. Hill, Robert U. Moore and R. H. Orkin.
 National Carbonic Ice Co., capital 1,000,000 shares, no par value. Incorporators, R. M. Malone, H. A. Kehler and C. A. Winder, all of San Francisco.
 Appointment of eight agents in Arizona was made yesterday by the Texas company, a foreign corporation, empowered to operate in Arizona. The agents are: Folsom Moore, Bisbee, Cochise Co.; Ed Matteson, Wenden, Yuma Co.; H. R. Sisk, Nogales, Santa Cruz Co.; J. Verne Pace, Safford, Graham Co.; L. F. Sweating, Clifton, Greenlee Co.; A. W. Sydnor, Globe, Gila Co.; Kirk Moore, Tucson, Pima Co.; Ned Creighton, Phoenix, Maricopa Co.
 BOB THOMAS,
 Business Agent Bear Springs Oil & Gas Co., Bowie, Arizona.

file 5-3

1937

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period of
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*file
5-3*



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Jack well,
drated five
530 feet.

GILA RIVER AND SAN SIMON CREEK, ARIZONA

213

USGS WSP 796-F, 1938

A well that was abandoned before 1933 was drilled to a depth of 2,645 feet near Ashurst, in sec. 30, T. 5 S., R. 24 E., about 2¼ miles southwest of Indian Hot Springs. It is reported to have yielded strong artesian flows at depths of 430, 620, 1,515, 2,075, 2,210, and 2,405 feet below the surface. The water of the deeper flows was highly mineralized and hot. The relation of the hot water encountered in this well to that of

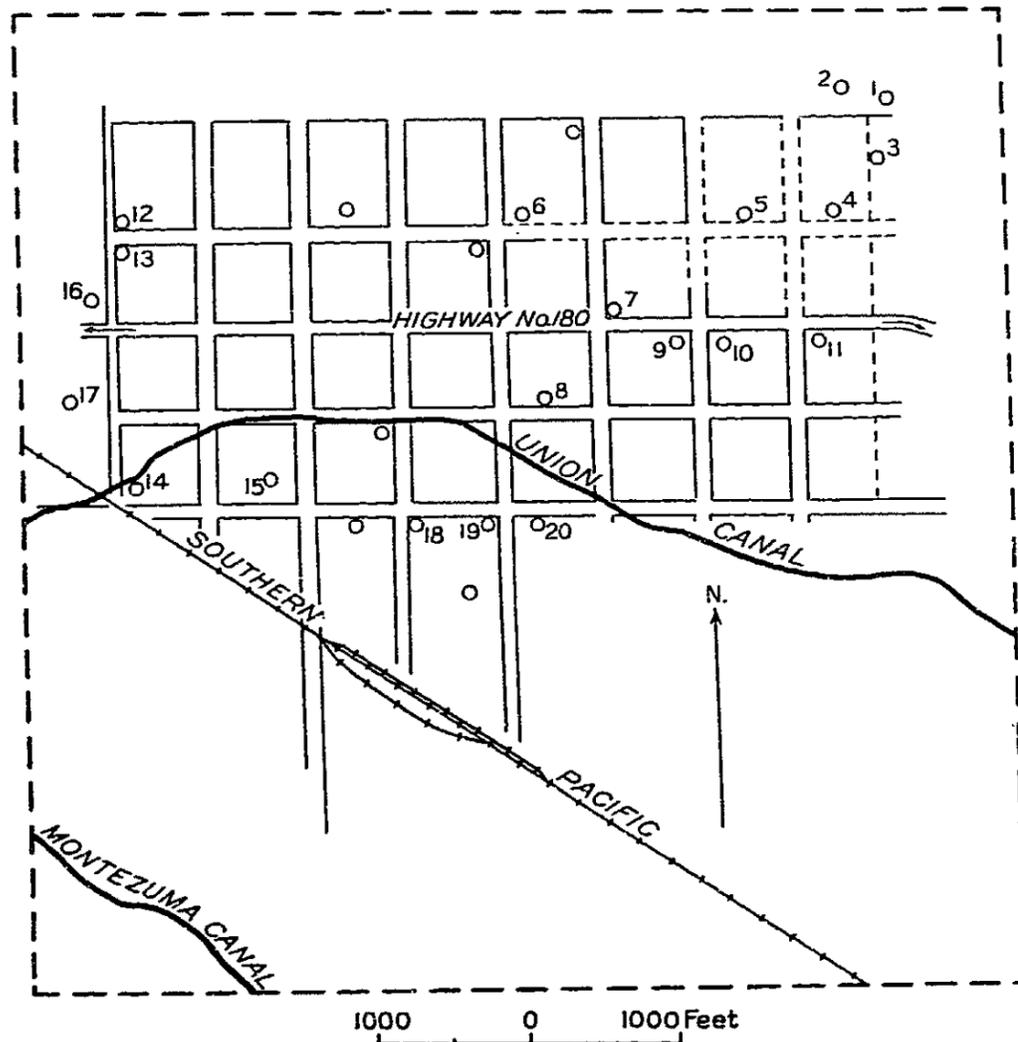


FIGURE 33.—Map of Thatcher, showing location of wells, 1934. (See wells 161-180, table following p. 222.)

Indian Hot Springs (pp. 216 and 217) is not known, but possibly the deep water-bearing beds are the same in both places. In February 1934 a well was being drilled by E. G. Rogers in the NE¼ sec. 5, T. 6 S., R. 24 E., in the expectation of striking artesian flows of hot water comparable with those obtained at Indian Hot Springs and the Mack

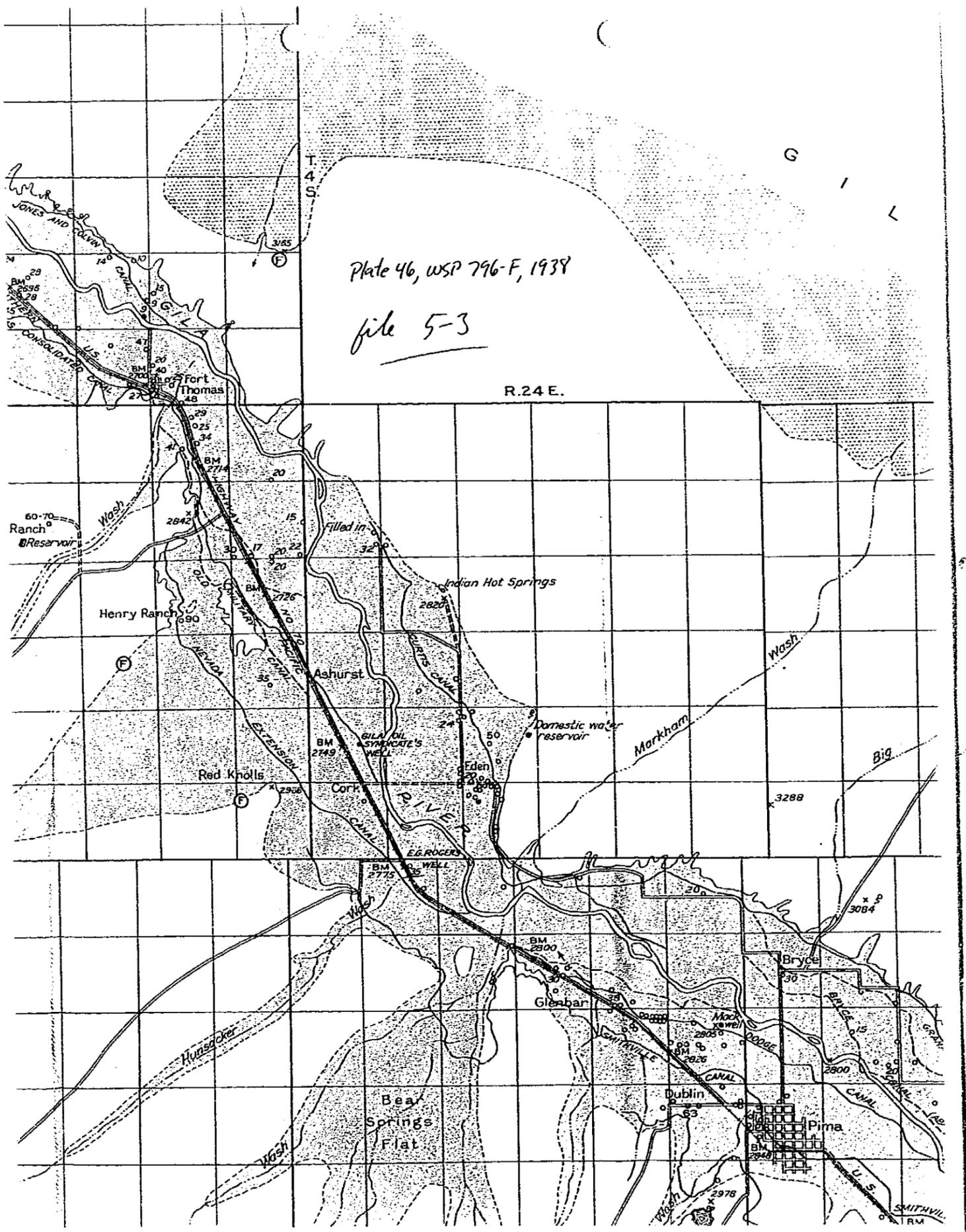
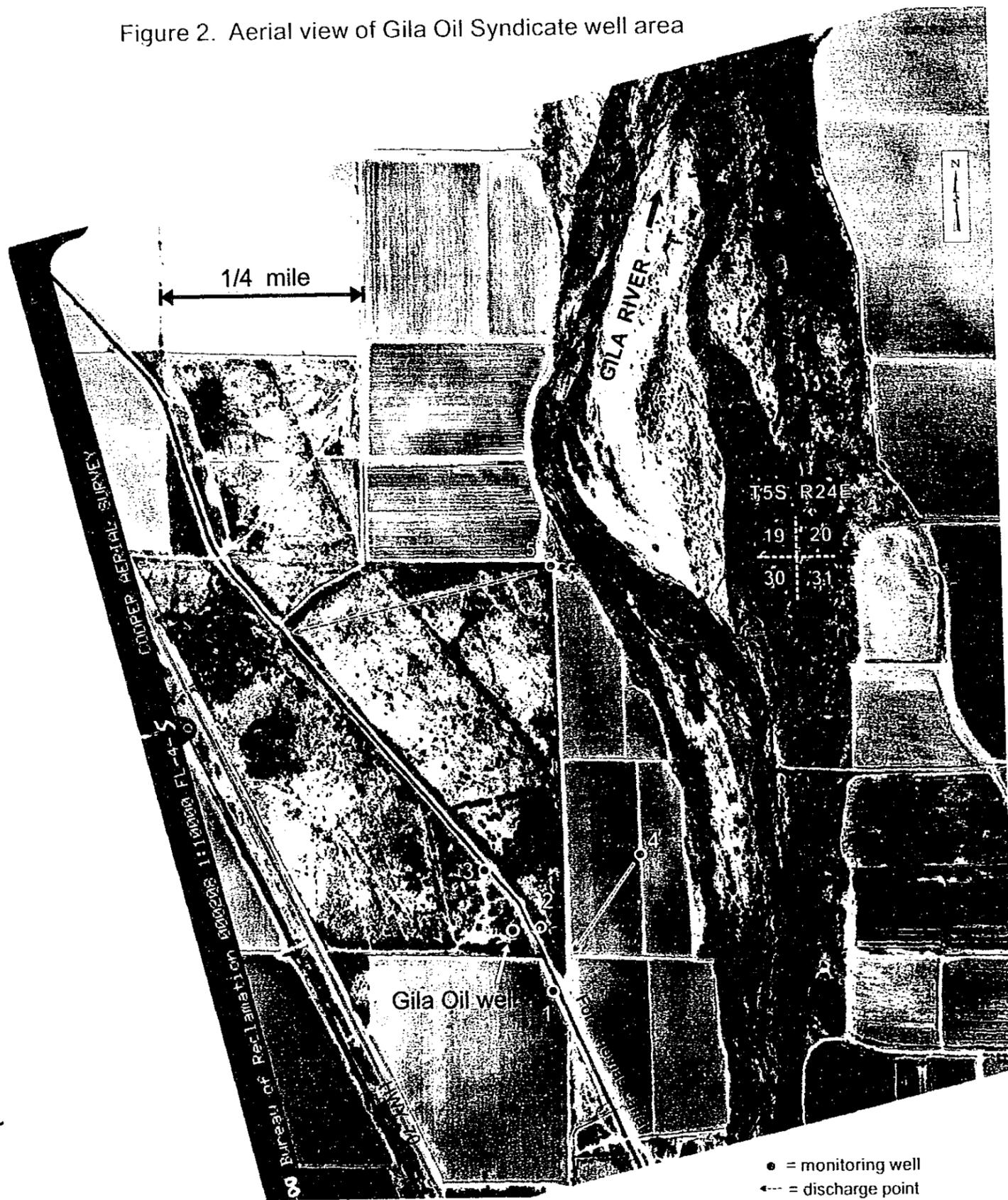
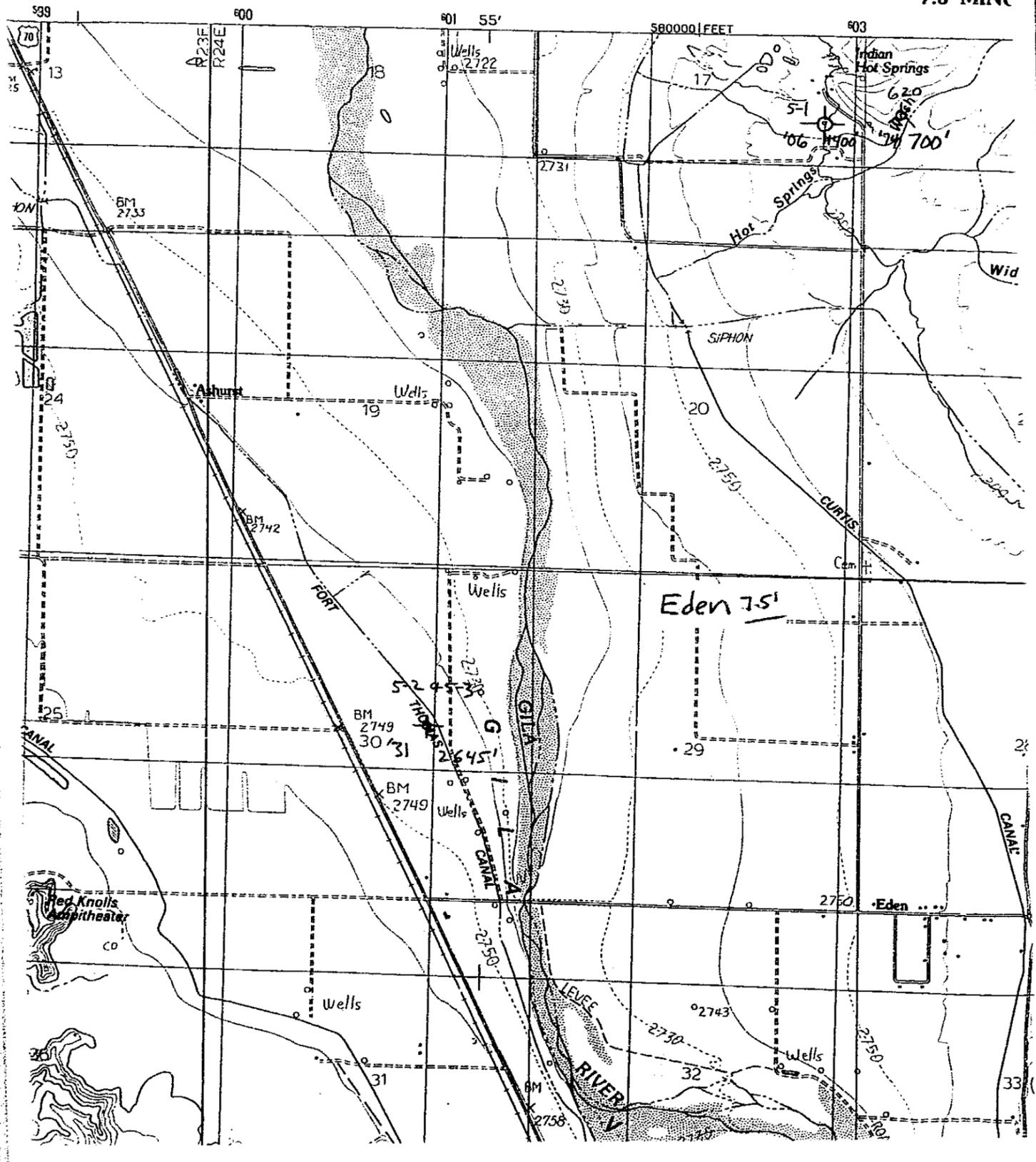


Figure 2. Aerial view of Gila Oil Syndicate well area



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7.5 MIN



**PLUGGING AND ABANDONMENT OF THE GILA OIL
SYNDICATE #1 WELL, SAFFORD BASIN, GRAHAM
COUNTY, ARIZONA:**

PLUGGING REPORT

by
Raymond C. Harris

Arizona Geological Survey

March 2001

Arizona Geological Survey
416 W. Congress, Suite #100, Tucson, Arizona 85701

The Arizona Water Protection Fund has partly funded this project through Grant number 99-086WPF. The views or findings presented in this report are the Grantees and do not necessarily represent those of the Water Protection Fund Commission or the Arizona Department of Water Resources.

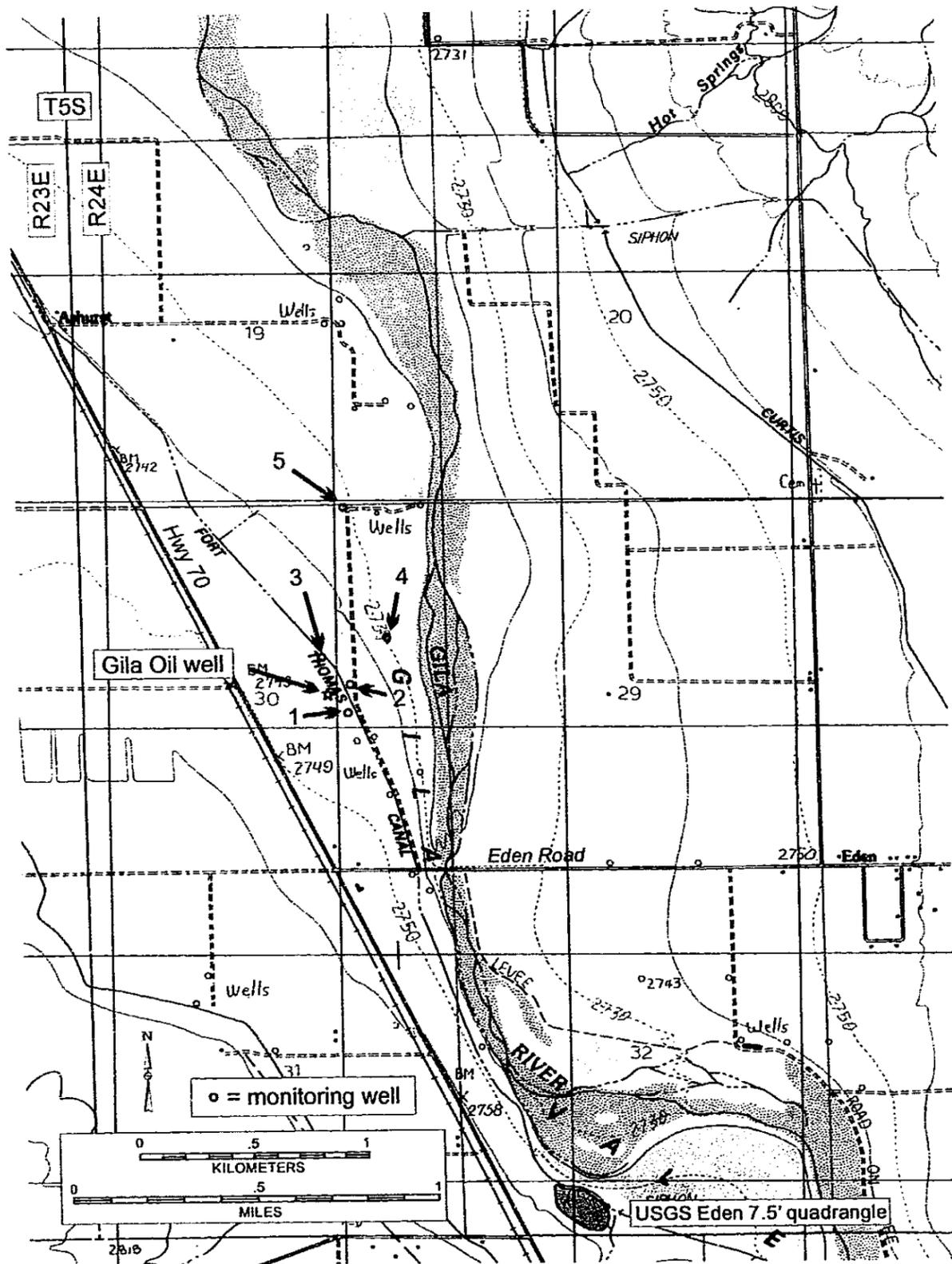
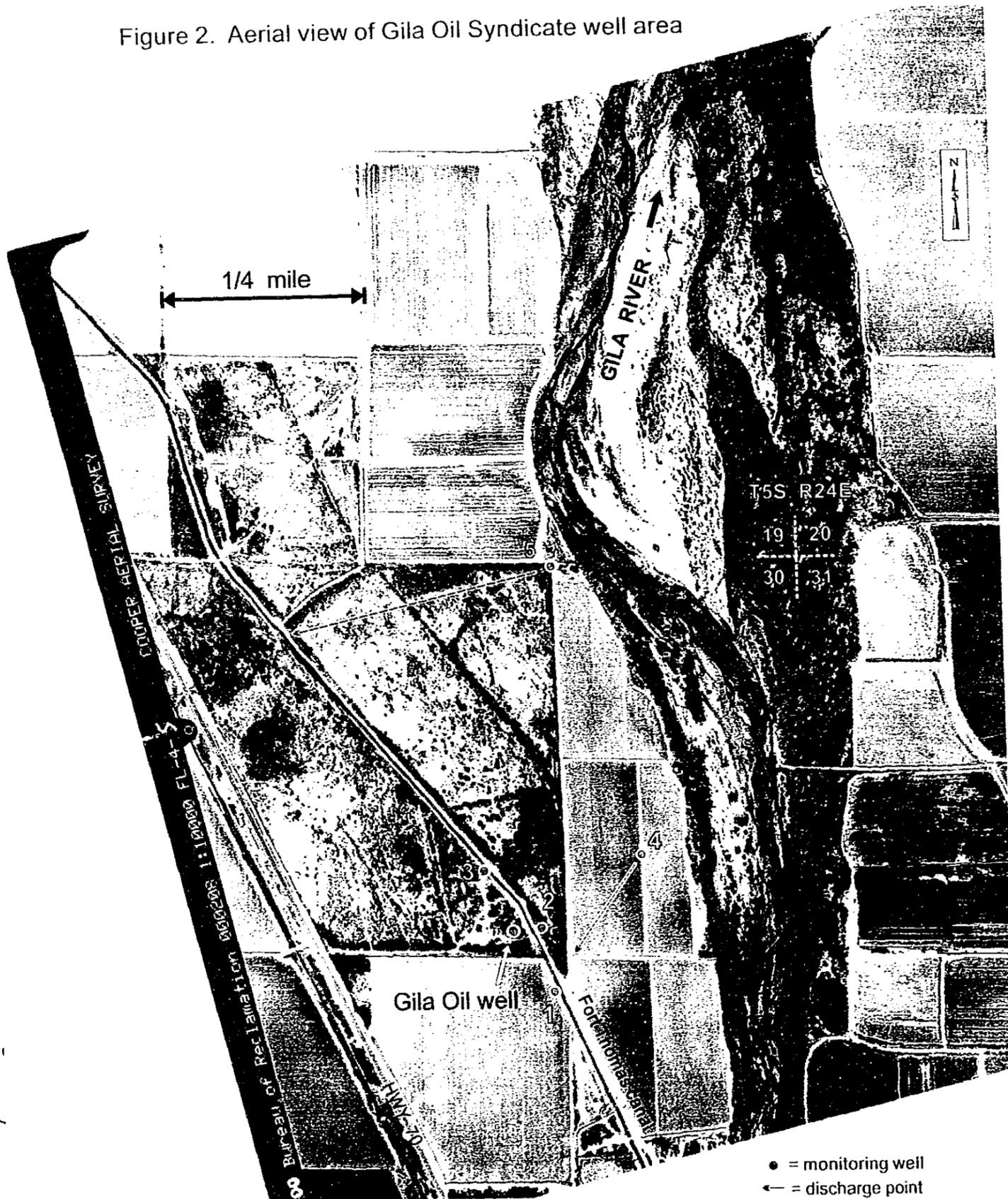


Figure 1. Gila Oil Syndicate well vicinity

Figure 2. Aerial view of Gila Oil Syndicate well area



BACKGROUND

The Safford Basin lies between the Pinaleno metamorphic core complex on the southwest and the volcanic Gila Mountains on the northeast. Detachment faulting during mid-Tertiary extension formed the core complex and the structural basin of the present Safford Valley. Seismic reflection profiling (Kruger, 1991; Kruger and others, 1995) has revealed the basin to be a half-graben, with the southwest side of the basin down-faulted along a secondary breakaway fault.

The Safford basin is a deep, sediment-filled structural trough containing abundant lacustrine (lake) and playa sediments, reflecting long periods of closed-basin conditions. Gravity models indicate that the Safford basin is up to 12,000 feet deep southeast of Safford and up to 9600 feet deep just south of San Simon (Oppenheimer and Sumner, 1980; 1981).

Sediments in the Safford basin were divided into an upper basin fill and lower basin fill by Harbour (1966). The boundary between the lower and upper basin fill was considered by Harbour to reflect a major climate change at the Pliocene-Pleistocene boundary. Recent work has revealed a more complex stratigraphy in the Safford-San Simon basin. Four basin-fill units have been recognized in the 111 Ranch sub-basin of the Safford-San Simon basin (Richter and others, 1983; Houser and others, 1985; Houser, 1990). These units consist of interfingering deposits of sand, gravel, silt and clay, with thick evaporite deposits in the center of the basin. The lateral and vertical changes in the basin-fill sediments reflect a combination of factors, including climate changes, different subsidence rates in different parts of the basins, changing sediment sources as erosion exposed older rocks, and inflow of water and sediment from outside the immediate basins.

Water quality issues have become increasingly important in the upper Gila River watershed. Largely forgotten until the past few years is the presence of numerous oil exploration wells drilled in the early 20th century in the Safford basin, some of which are open and flowing. These wells produce large quantities of hot, salty water that may affect the quality of groundwater in the region, and ultimately in the Gila River. These wells may represent a major human-caused source of salinity that has not been fully appreciated in salt-balance considerations.

The Safford basin has been the repeated target of oil exploration starting as early as 1905. Records indicate that at least 27 oil exploration and stratigraphic test wells were drilled in the basin from 1905 to 1997, not counting re-entries. To date, no oil or natural gas has been produced. At least 15 of these wells were abandoned before 1932.

In 1927, a group of investors from New York and New Jersey began work on an oil exploration well near Ashurst. The group, led by W.W. Todd, H.T. Proctor and M.C. Trumbull, was incorporated as the Ashurst Oil Company. After running out of money,

the group sold its interest in the well to another group of investors, and the project resumed under the name Gila Oil Syndicate.

By current standards, early oil wells in the Safford basin were improperly abandoned. Oil and Gas regulations in place since 1927 call for sealing abandoned wells to ensure that water from one aquifer cannot migrate into another aquifer through the well bore. A popular method of plugging wells prior to the 1940s was by stuffing a wooden plug into the wellhead. Some wells were abandoned by simply folding up the drill rig and driving away, leaving the hole open and flowing.

The importance of saline flowing wells in contributing TDS to shallow groundwater and to the Gila River has largely been overlooked. As pointed out by Schwennesen (1917), it is not just the waste of artesian water that matters. A well flowing at only 10 gpm produces 5,256,000 gallons, or 16.13 acre-feet, per year. In a well with that flow rate, each 1000 mg/l (ppm) of TDS translates to 1.36 tons per year of dissolved solids contributed to the groundwater or river.

In the Safford Valley, the problem posed by artesian wells, including abandoned oil wells, is that of contamination of shallow aquifers, and ultimately the Gila River, through transfer of saline waters from deeper aquifers. Stopping this communication among aquifers can be achieved by properly sealing saline artesian wells. By sealing artesian wells, the groundwater system is returned to a more natural condition.

Plugging and abandoning a well begins with assessing the condition of the hole and any casing. This usually involves surveying the hole with a down-hole video camera, or geophysical equipment. Material used in sealing, including cement grout and clay slurry, must be able to seal any voids between the borehole (annulus) and casing. If the space between the annulus and casing is not completely sealed, water can still migrate among various aquifers, and the abandonment will not be successful.

Depending on its condition, some or the entire casing may need to be removed or prepared before sealing. Short of complete removal, casing can be prepared with cutters to provide perforations so that sealant can penetrate the casing to seal the annular space.

Sealing is accomplished by injecting the sealant through a pipe, starting at the bottom of the hole. A number of sealant materials may be used, depending on conditions in the hole, depth, presence of salt beds, cost of materials, simplicity, and other factors. Materials include cement, either pure or with added compounds, thick bentonite clay slurry, and dry clay pellets that expand on wetting.

Enough material must be delivered through the pipe for each interval to completely fill the borehole. Calculation of the amount of material required to fill a hole of a given diameter is straightforward, but well bores are seldom uniform in diameter. Loose sand layers can cave in, during original drilling or upon re-entry for plugging. In the Safford basin, salt layers are common in the basin-fill sediments and small caverns can form

when water flows past the salt. An accounting must be made of the actual volume of the borehole, including caverns and caved intervals.

In the case of sealing deep wells in the Safford basin, the most important aspect is to properly seal not the aquifer intervals themselves, but the aquicludes that separate the water-bearing layers. Plugging the intervals between the aquifers prevents inter-aquifer communication.

A model for the proper plugging and abandonment of a saline artesian well is the Smithville Canal well, also known as the Mt. Graham Mineral Bath well (D-6-25-36cbb). That well produced 601 gpm of sodium chloride type water under artesian flow at 115°F (46°C). In 1997, the Smithville well was plugged and abandoned by the Smithville Canal Company with a grant from the Arizona Water Protection Fund.

CHRONOLOGY OF THE PLUGGING

Site preparation

Preliminary work consisted of clearing the area around the Gila well for construction of a drill pad. After years of surface flow, the well had created a large pond and swampy area. To drain the ponded water and allow for disposal of water during plugging operations, a plastic drainpipe was installed underground from the wellhead to the Fort Thomas canal. A layer of cobbles was placed several feet deep next to the well and up to a foot deep over the area of the drill pad to provide firm support for the equipment and to provide drainage in case of rain.

After leveling the layer of rock, a sand and gravel mixture was placed and smoothed to allow access to the site by vehicles. The road leading to the site was graded and sand-gravel material added over the original clayey base. A circular approach road was added to allow freight and cement trucks access to the drill pad without having to turn around.

Drill stem entry

Upon completion of the rig and site set up, the drill stem was lowered into the hole as a preliminary check for major obstructions. The drill stem progressed without any sign of obstruction to 2435 feet, where the hole was filled with debris including wood fragments and fiber, along with sediment that had collected at the bottom. When the open drill stem entered the debris, the flow of water ceased in the pipe, indicating that no water was coming up the hole from below 2435 feet.

The wood is the remains of at least one wooden plug used in an attempt to plug the hole, as mentioned in Knechtel (1938). Although the original depth of the hole was 2645 feet, the present depth is 2435 feet. No attempt was made to remove the debris, which acted as a natural plug, and 2435 was taken to be the depth of the well for plugging purposes.

It must be kept in mind that, at several hundred pounds per 20-foot length, the dual-walled drill stem weighed several tons after a few hundred feet. Only large obstructions would be detected by lowering the drill pipe, but this is a first step in clearing the hole. If obstructions had been encountered, an attempt to clear them would have been made, especially if there were indications that water was flowing past a partial obstruction.

It is important to clear obstructions if geophysics instruments are to be sent down the hole. The tests use small probes typically 3-6 feet in length and 2-3 inches in diameter. Because the instruments are relatively light and are suspended on wire cables, they can hang up easy going down. They also are much more expensive to replace than drill pipe.

Down-hole tests

Video

A video scan of the hole was attempted to assess the condition of the hole. After reaching the bottom of the hole with the drill string, the water issuing from the well and through the pipe was extremely turbid. At the time of the video scan, the well had been left flowing to clear for about a day and a half but the water was still cloudy with tan clay. The video was barely able to see the far wall of the 15½-inch casing when the probe was against one side. The side-view camera revealed that the casing was slightly corroded and/or coated with calcium deposits but was still essentially intact.

At a depth of 605 feet the video went black because of the extreme turbidity at that depth. The video was lowered repeatedly through the interval of ~590 to 610 feet with the same result and then to 620 feet with no further response and the test was terminated pending other tests to determine the condition of the hole. The down-hole camera instrument is very expensive and it was judged too risky to lower it further without being able to see potential obstructions approaching. Later runs with the caliper and temperature tools confirmed that the hole was in bad shape and that the camera probably would not have been able to penetrate some tight intervals.

Spinner Flow Test

A spinner flow logger was lowered into the hole to determine the flow rate of the well with depth in the hopes of seeing where possible aquifers were contributing water to the flow. The spinner was an optical rather than mechanical device and the instrument would not work below 605 feet due to extreme turbidity cutting off the light transmission that measures the spin rate of the propeller. The spinner test can only be used in open holes if the intent is to detect aquifers contributing water at different depths. The top 550 feet of the spinner test took place within the cased portion of the hole, so no information was gathered from that interval that was of use. Unfortunately, the instrument logged only 25 feet of open hole before extreme turbidity ended its use.

Caliper test

A caliper test was run to measure the size of the hole. This test is used to determine the condition of the hole and to calculate the volume of material needed to fill the hole. As

noted in the plot of the caliper runs, the hole below the 15 1/2 inch casing was in poor condition, and in many places the hole ranged from a few inches to more than the 18 inch range of the caliper over a distance of a few feet. The roughness of the hole precluded setting packers to isolate aquifers for discreet sampling.

In the intervals 930-1180 feet and 1580-1700, the hole was too tight for the caliper probe to penetrate without constantly hanging up. Several attempts were made to resume the logging by removing the caliper tool, adding 40-100 feet drill stem to get past the obstruction and re-lowering the caliper through the pipe. This time-consuming process had to be repeated several times before successful runs were made from 1180 to 1580 and 1700 feet to the bottom of the hole at 2435 feet.

Temperature test

A temperature probe was lowered into the hole to measure sudden changes in water temperature that could signal the presence of an aquifer. This test was in some respects a replacement for the video and spinner tests in terms of finding aquifers for possible sampling.

No change in temperature was noted above 665 feet. From the surface flow temperature of 96°F (35.4°C) a minor increase of ~2°F (~1°C) was noted at 665 feet. Other similar increases at 695-705, 715-720, and 740-745 feet brought the temperature up to 105°F (40.5°C). Knechtel (1938) reported aquifers at 590, 700, and 750 feet in a log, but mentions only one aquifer at 620 feet in his text description of the same well.

Several sudden shifts in temperature were noted. A sharp 4°F (2.2°C) shift occurred at 780 feet and another shift of 3-4°F took place at 888 feet. Both shifts coincided with the bottom of an interval of highly irregular and narrow hole diameter as measured by the caliper log. A sharp 5°F (2.8°C) increase was noted from 1020 to 1025 feet. The increase was preceded by an unexplained slight decrease in temperature.

Not all of the temperature increases coincided with the intervals of strong flow indicated in the well log or verbal description of the well in Knechtel (1938). It must be noted that Knechtel's well log on his page 204 disagrees with the narrative on his page 213 regarding the depth of the various aquifers. A log in the Oil and Gas Conservation Commission files for the 1247-foot Ashurst No. 1 well, which was reentered and deepened to become the Gila Oil Syndicate well, indicates water only at 620 feet. (Any aquifers above 550 feet would have been missed by the temperature log anyway, because this interval was cased.)

As with the caliper test, the temperature logging was plagued by obstructions or narrow intervals in the hole that prevented advancement of the temperature probe. The probe had to be removed several times for drill stem to be added to bridge obstructions. Four open-hole intervals were logged: 10-930, 1025-1080; 1160-1610; and 1700-2430 feet. Other intervals represent temperatures recorded as the probe was lowered within the drill stem. Water within the pipe can only enter at the lower end and so only aquifers at or below the

open end are represented. The pipe is also cold when inserted into the hole and thus cools the water flowing through it. Aquifers that may be of different temperatures but that are above the open end of the pipe do not mix with the water within the pipe. For these reasons the temperature recorded while the probe is within the pipe does not represent the actual in-hole temperature and should be disregarded.

The final temperature run was recorded through the entire depth of the hole, but above 1700 feet, the test was in the drill stem and this interval should be ignored. The surface temperature of the water flowing up the pipe at the beginning of the run was 130°F (54.4°C). A temperature of 153°F (67.2°C) was reached at the final depth of the test at a depth of 2330 feet. The cooling noted in the water above 1700 feet is largely due to conduction of heat through the cooler pipe and into the cooler surrounding sediments.

The deep water, coming in at about 2400 feet (?) was not reaching the surface until the drill stem had been lowered into the hole to about 1700 feet. This water was hotter but less saline and apparently was held in check by the heavier, saltier water coming in at ~600 feet.

Plugging and abandoning

The results of the down-hole tests were used to determine if any aquifers could be isolated with inflatable packers for sampling. Although the temperature log showed some probable aquifers, the hole around these intervals was too irregular to set packers. Water flowing up the drill stem from 2400 feet was sampled to represent the deepest aquifer. The Gila well surface flow had been sampled and measured during previous WPF projects so no additional sampling was needed.

Following completion of the down-hole tests, a 2-inch pipe was lowered to 2400 feet to begin cementing the hole. In this process, cement is pumped down the pipe and forced up the hole from the bottom. By keeping the end of the pipe submerged in the cement prevents the cement from freefalling and aids in forcing cement into the formation under its own weight.

After two trucks of cement had been pumped into the hole, filling about 500 feet, the cement underwent flash setting. The cement set more rapidly than expected probably because of the high temperature at the bottom of the hole, plus the normal heat of crystallization. Some mixing of the cement with saline water in the hole may also have contributed to the flash setting.

Because the lower end of the pipe was still submerged in the cement, it was frozen in place. In this situation, the pipe string has to be turned backwards to unscrew the pipe, hopefully close to the bottom, to rescue as much of the pipe as possible. When the pipe was unscrewed, it came apart such that 1520 feet remained in the hole, with only 880 feet retrieved. This length, plus the extra on hand was not enough to reach the top of the cement, which was at a depth of 1880 feet.

Additional pipe was ordered and after its arrival, the cementing resumed. Ten more trucks of cement were pumped into the hole. The plan was to bring the cement up to 500-550 feet, to just within the bottom of the casing. At that point, the casing would be perforated with a knife-wheel device to allow cement to penetrate between the casing and the hole, assuring a watertight seal that would prevent water from continuing to flow up the hole outside the casing.

Because the uncased hole was so irregular in diameter, it was impossible to accurately calculate the volume of the hole. As a result, the second round of cementing reached near the top of the hole instead of just to the bottom of the casing. The cement within the casing had to be reamed out so the casing could be perforated. After the excess cement was removed to 550 feet and the entire casing perforated, the final cement plug was brought to the surface.

During perforation of the casing, a strong flow of water was encountered at 430 feet, the depth noted for the first water encountered during drilling of the well in 1927. Several gallons of the water were collected by the drilling crew in the early morning hours. Unfortunately, when the new crew arrived in the morning, the samples were accidentally destroyed except for a half-liter bottle. This sample was sent to the University of Arizona for isotope analyses.

A permanent monument was installed in accordance with OGCC regulations marking the site of the well. Immediately upon setting the monument, demobilization of the drill rig and other equipment began. A semi truck was brought in, all of the equipment loaded, and the drill site vacated.

Site reclamation

Upon completion of the plugging operation all trash and refuse was collected and removed. The drainpipe was removed and the trench filled with native soil. Dirt that was bulldozed out of the way to make room for the rock pad was spread back over the site. The site was reclaimed to a normal and safe condition.

INTERPRETATION

A sample of water from the ~2400 foot aquifer was sent to labs for complete chemical and isotopic analyses. A sample from the 430-foot aquifer was large enough only for isotopic analyses. (This sample was from an interval where excess cement had been reamed out. In addition, the deteriorated casing was perforated. These disturbances probably would have seriously affected the major element chemistry of the sample anyway.) Analyses had already been done on the surface flow in previous WPF projects

so no additional sampling was done on the ~600-foot aquifer. Results of chemical and isotopic analyses are presented in Table 1.

Geothermal water is known to occur in several localities in the Safford basin (Stone and Witcher, 1982). Water discharging at the surface from the Gila Oil Syndicate well had a temperature of 95.7°F (35.4°C). This water was discovered during plugging to be coming from the 600-foot deep aquifer.

The hottest temperature recorded for thermal water in the Safford basin was the 138° F (58.9° C) water that discharged from the Underwriter's Syndicate Mary Mack oil exploration well at Pima (Stone and Witcher, 1982). It is likely that the temperature at the bottom of the Mary Mack well is higher than the discharge temperature because of mixing with shallower aquifers. No tests were done at the time the Mary Mack was drilled to determine aquifer discharge rates, artesian heads, or temperatures.

Water from ~2400 feet was lower in salinity (conductivity 9150 μ S; TDS~5500) and much hotter (153°F; 67.2°C) than water from 600 feet. None of this deeper water was reaching the surface because the water at 600 feet was denser due to both cooler temperature and much greater salinity. The saline 600-foot water acted as a barrier to the lower aquifers.

The bottom water has distinct isotopic differences from the upper water. The sulfur isotopic composition at 2400 feet is slightly different from 600 feet ($\delta^{34}\text{S} = 10.4$ vs. 11.3 ‰) but both are within the range of variation for the Safford basin and other continental evaporites (Harris, 1999).

The difference in chlorine isotopic composition is relatively large in the two aquifers, although both are within the range found in evaporites in Safford. One explanation for the difference is that it reflects primary differences in the composition of evaporites that formed at different times because of different relative contributions from the various sources of chlorine. Another factor could be that the thick clay units generate a semi-permeable membrane effect that is known to fractionate chlorine isotopes. Recent detailed isotopic sampling has revealed that membrane effects may be operating in outcrops around the valley, causing significant stratigraphic variations in Cl isotopic composition at the outcrop scale (Dr. Christopher Eastoe, University of Arizona unpublished data).

Oxygen and hydrogen isotopes are lighter (more negative) in the deeper aquifer and both aquifers have a signature of "old or cold" precipitation conditions. Water in the Gila Oil well aquifers is significantly lighter (more negative) than Gila River water, which generally has a $\delta^{18}\text{O}$ of -7.5 to -9.3 and δD of -60 to -68 (Harris, 1999, 2000; University of Arizona unpublished data).

The deeper groundwater was precipitated when the climate was cooler than at the time of infiltration of the shallower water, and water from both aquifers was precipitated at a

cooler temperature than precipitation today. Water from those depths may have precipitated during the last major ice age. Unpublished University of Arizona carbon-14 data for the Gila Oil well surface flow (600-foot aquifer) and an 810-foot deep artesian well at Geronimo indicates that deep artesian water in the valley is very old, possibly as old as the Pleistocene (>10,000 years).

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WORK PLAN

FOR

**ABANDONMENT OF GILA OIL SYNDICATE WELL #1
WPF 0245**

August 2000

The Arizona Water Protection Fund has funded this project. The views or findings presented in this report are the Grantees and do not necessarily represent those of the Water Protection Fund Commission or the Arizona Department of Water Resources.

INTRODUCTION

The Gila Oil Syndicate Well #1 is located in Graham County Arizona not far from the town of Ft. Thomas. It was originally known as the Ashurst Well. This well along with a whole series of wells was drilled in the early 1900's to explore for oil. It unfortunately did not find oil, but did intersect an artesian aquifer of salty water. Well #1 is the saltiest of all the known saline wells. Analysis of the water from the well shows total dissolved solids (TDS) to exceed 19,000 milligrams/liter. Driller's log notes suggest that the flow noted at the surface today is only a fraction of the total well discharge.

Once the drilling was completed, the drilled holes were left open and the artesian water flowed freely in many of the wells. Once this water rises past its confining layers and into the permeable alluvium near the discharge point, the salty water migrates down-gradient toward the Gila River in the alluvial aquifer. The flow of this water causes nearby shallow irrigation wells to have their water quality deteriorated and it eventually reaches the Gila River where its effect is also noticed.

The work planned for the closure of the Gila Syndicate Oil Well #1 is discussed in the following narrative.

SITE PREPARATION

In mid- August rock will start being hauled into the site and stockpiled in preparation for filling the flooded area around the well collar. There are currently several clusters of honeybee hives in close proximity to the well site. These hives will be moved for the safety of the workers. In late September, a trench will be dug from the flooded area to the Ft. Thomas canal bank so that the overflow and standing water from the well can be drained. Once the area is dry enough for access, the trees, which are non-native salt cedars, and the old power poles will be removed to provide a clear work area around the well head. The excess casing from the well will be removed to allow the rig to have entry to the hole. A diversion pipe will be set on the well to keep the water overflow from flooding the area again. The rock that has been hauled to the site will be placed around the well head to bring the ground to a level condition and provide a firm foundation for the drilling process.

Before abandonment can start, an 'Application To Abandon' must be submitted to the Arizona Oil and Gas Commission for approval. Once approval is obtained, the drilling company will be notified.

UPPER WELL CLEANING

At this point which should be early October, the drill rig will come in and set up over the well head. The rig will run drill tools down the hole to the first encounter of "wooden" material to determine the open depth. Removal of wood will start. The process of locating obstructions and their removal will continue until the depth of 1247 feet is reached. The rig will run appropriately sized clean out tools to the 1247 level to completely clean out the hole.

OBSERVATION/SAMPLING

At this point the rig will run a video camera down the hole to determine the condition of the well and the casing. If appropriate for the hole condition, a spinner log instrument will be run down the hole at this point to determine if there are any in-flowing aquifers in this interval. If there are aquifers, these will be sampled using the packer isolation or other appropriate method. Samples will be submitted for standard analyses to the appropriate lab.

LOWER WELL CLEANOUT

The rig will again enter the hole with clean out tools and attempt to clean the well from 1247 to 2645 feet.

OBSERVATION/SAMPLING

Another video inspection and spinner log of the well will be made once this part of the hole is cleaned out. Knowing the depths of in-flowing aquifers will allow the rig to place inflatable plugs and sample the water from these inflows.

WELL PLUGGING

After the well is cleaned out as much as possible, the old well casing will be perforated as determined from the video inspections to allow the grout to be completely placed on the outside of the casing. The rig will run a tremie line down the hole to the bottom of the well and grout will be pumped under pressure into the hole from the bottom up to the surface. The grout will be a mixture of cement and bentonite with other possible additives to be determined by the condition of the hole. It will be mixed according to ASTM STD as required in the Oil and Gas Commission Abandonment Regulations (see attached). Standard QA/QC will be used with one sample taken from each batch of cement. Appropriate tests will be done to calibrate the cement quality. The grout will be forced to the outside of the casing and will fill any cracks or voids between the outside of the casing and the solid rock side of the hole. As the grouting process continues, the tremie line is raised in the well and the inside of the casing is then also filled with grout. In this way a solid cement plug is placed in the borehole.

MONITOR WELL SAMPLING

During the time that the well is being cleaned out and readied for plugging, the other wells in the area of the Gila Well will be sampled to determine background levels of the constituents before the well is plugged. This data will be used to monitor the reaction of the groundwater in the area of the well as time passes and the effects of the plugging become evident.

SITE RECLAMATION

When the hole is plugged, the rig will leave and all trash and refuse will be collected and removed. All mud pits will be filled and drainpipes will be removed. The site will be reclaimed to a normal and safe condition.

DRILLING REPORT

The drilling contractor will submit daily shift reports and a detailed report explaining their findings during the clean out process and the results of the plugging process. This report along with photo documentation will be prepared for inclusion in the final report. A report of findings from the video observation and the spinner logging will also be received from the subcontractor.

DISTRICT WELL CLASSIFICATION

Since additional wells similar to the Gila Well exist in the valley, plans are being considered to plug more of these wells to help improve water quality in the river. Once the results of the sampling program have been received and interpreted, the committee will meet to discuss the process for ranking the other wells in the district. As part of this process the most negative sampling results will be evaluated against the monitor wells in order to determine a method of detection which can be used for other district wells. A proposed method for ranking will be developed and then taken to the current well owners and the public for input and suggestions. The actual ranking plan will not be developed until after public input, but will probably include issues such as water quality, distance from the river, natural attenuation, all current well uses, historical and present effects down gradient from wells, condition of well bore holes and casing, a sampling and data collection plan, identification and location of all wells, background research, and others. It is expected that a group of volunteers will be organized to collect data on as many wells as possible. This data will be evaluated by the group, with scientific input from the AZ Geological Survey and others, and used to rank the wells.

Arizona plugging forms

Subject: Arizona plugging forms
Date: Wed, 13 Sep 2000 11:53:51 -0700
From: Steve Rauzi <Rauzi_Steve@pop.state.az.us>
To: Randy Mayer <rmayer@boartlongyear.com>

Randy,

I have attached our Form 9, Application to Plug and Abandon, and Form 10, Plugging Record. A.A.C. R12-7-127 specifies the requirements for plugging oil and gas oles. Oil and gas rules may be viewed at: [http://www.sosaz.com/public_services/Title 12/12-07.htm](http://www.sosaz.com/public_services/Title_12/12-07.htm)

Let me know if there is anything else.

Steve

 Form09.pdf	Name: Form09.pdf Type: Acrobat (application/pdf) Encoding: base64
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 Form10.pdf	Name: Form10.pdf Type: Acrobat (application/pdf) Encoding: base64
--	--

Randy Mayer, Lang Exploratory Drilling, 801-973-6667
Will plug the Gila well with grant from wth protection Fund.
Asks about pluggins rules and forms.
He will advise Steve Eady that he has contacted me.
Steve Eady, Phelps Dodge, Safford wth advisory group.

Graham County Guardian and Gila Valley Farmer (Safford, Ariz.); reel commencing with April 1, 1927 (31st year, #7), continuing thru April 20, 1928:

May 13, 1927, p. 5: "Material for Ashurst Oil Well Arrives." Derrick is being constructed, etc. ⁵⁻³

April 29, 1927, p. 1: Material arrives for oil rig to be erected at Ashurst (i.e., in Section 30, T5S R24E).

July 15, 1927, p. 4: A carload of casing for the Pima and Ashurst oil wells is on the way and drilling should begin next week. Also,

July 29, 1927, p. 1: Ashurst oil well spudded in Thursday morning (i.e. July 28).

September 23, 1927, p. 1: Drilling operations at the Pima oil well are under way again, in two shifts; depth of over 60 ft. has been reached and 24" and 20" casing has been set. At the Ashurst well some changes are being made by Messrs. M.C. Trumbull and W.W. Todd of New York City, who are in charge. Carload of fuel oil has been unloaded and 24" casing has been set. Day and night shifts. Also, ⁵⁻⁵ ⁵⁻³

Ibid, p. 4: Eastern capitalists visited the Ashurst well. Active drilling resumed and 24" casing has been set; now drilling with a 22" bit. Visitors were pleased. ^{9/30/27}

At Ashurst in this county the Proctor and Trumbull well will resume drilling during the present month. ^{10/7/27}

Ibid, p. 8: Short article on the prospects for oil in the Gila Valley around Pima and Ashurst. Makes reference to the Trumbull Seismograph, and the highest Seismographic readings ever recorded by the Trumbull instrument. ^{11/25/27}

According to reports the well at Ashurst, being drilled by W.W. Todd and J.H. Leat, has reached a very interesting formation, showing both oil and gas indications. At the present time, it is said, they are now awaiting fuel oil and upon its arrival casing will be lowered, shutting off a small flow of water, and then drilling will be resumed. ^{4/20/28}

Mr. Leat arrived in Safford Wednesday from New York and is here on business in connection with the well. ^{p. 1}

May 25, 1928, p. 1: "Oil Showing Is Encountered at Ashurst" "Visitor Reports Oil Seen on Bit and In Slush Pit Last Monday" "Last Monday a very encouraging showing of oil was encountered at the oil well being drilled at Ashurst by Messrs. Leat and Todd of New York, according to visitors at the well.

It is said the oil could be seen on the bit and when the bailer was emptied into the slush pit quantities of oil appeared on top of the residue.

One of these visitors in commenting on the situation stated that the people of Graham county should be very much encouraged over the showing and appreciate the fact that outside money is being spent in the development of Arizona's natural resources. It is believed that the showing unmistakably points to a large pool of oil beneath Ashurst and every day gives more indications that the drill is drawing closer to an underground lake of oil.

Continuing he said 'ere long the people will awake to the fact that Arizona is being proclaimed one of the oil states of the union.'

The men in charge of the well have not proffered any information."

June 8, 1928, p. 1: "Directors Oppose Selling Oil Well Units In County"

"At a special meeting of the directors of the Chamber of Commerce last Tuesday night permission was denied the operators of the oil well being drilled in the Ashurst vicinity to dispose of interests in the proposition in Graham county."

August 16, 1929, p. 1: "Ashurst Oil Well To Be Completed By New Company"

"An interest in the Ashurst oil well by the Interocean Oil Company, which will complete the well, is the information given out yesterday by W.A. Leet, who arrived in Safford yesterday from California by way of Phoenix and Globe. W.W. Todd, who is interested with Mr. Leet in the well, is expected to arrive here today or tomorrow.

The Ashurst well was started about two years ago by Leet and Todd, New York oil men, and drilling was prosecuted to a depth of approximately 2,700 feet. Drilling was suspended nearly a year ago.

All water has been shut off at the Ashurst well, except that coming up between the casing, which it was deemed inexpedient to stop, and it is believed that the new drilling company will not have difficulties due to artesian water which has bothered other companies in the Bowie, Bear Springs and Willcox fields.

R.B. Vinmont, representative of the Interocean Oil Company, was recently at the well. He has expressed himself that the Bear Springs field represents an excellent field for oil exploration.

It is the intention of the company to make a thorough test for oil in the vicinity of Safford.

The company has three producing wells at Huntington Beach near Los Angeles, it is said.

Drilling is to be started by the company at once at the Ashurst well."

February 28, 1930, p. 2: "Drilling Operations At Ashurst Oil Well Will Be Resumed"

"Drilling operations at the Ashurst oil well between Pima and Ft. Thomas, will be resumed within the next 60 or 90 days, according to a statement made by W.W. Todd and E.H. Stone yesterday.

When drilling operations at the Ashurst well were temporarily discontinued several months ago following an expenditure of approximately \$64,000, the well had reached a depth of 2,700 feet.

Since that time Mr. Todd has succeeded in interesting the Arizona Pacific Exploration Co. of Los Angeles, in the Ashurst district, and the announcement is made that this company has acquired a substantial interest in the Ashurst well and surrounding territory.

Mr. Todd states that the entrance of the Arizona Pacific Exploration Co. into the Ashurst field insures this locality of a real test for oil and gas at an early date. This company is an oil producing company operating in the Colinga, Huntington Beach, and other oil fields of California, and has acquired a substantial interest in the Ashurst well."



Fife Symington
Governor

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Larry D. Fellows
Director and State Geologist

June 3, 1996

Mr. John P. Wilson
1109 Skyway
Las Cruces, New Mexico 88001-4016

file 5-3

Dear John:

Thank you for sending the several newspaper quotes on early drilling activity in San Simon Valley. I'm not familiar with the "oil affinity instrument" mentioned in the articles. A seismograph instrument measures and records the travel time of sound waves through the earth, sourced either by dynamite or vibroseis at the surface. The descriptions in the accounts do not make it entirely clear if the "Trumbull Seismograph" was a true seismograph instrument in this sense, or something else, like maybe a witching stick?!

You may find information on old drilling equipment by contacting a museum in a drilling town. The Oil Museum in Midland, Texas, has several of the old rigs rigged up, and it may be a good source. Maybe the museum in oil towns like Roswell or Farmington.

Finally, a copy of the section on the overthrust play in Arizona from *Oil and Gas in Arizona* by Nations, Brennan, and Ybarra is attached. This article gives a good overview of that play in Arizona.

Sincerely,

Steve

Steven L. Rauzi
Oil and Gas Program Administrator

Enclosure

Graham County Guardian and Gila Valley Farmer (Safford, Ariz.); reel commencing with April 1, 1927 (31st year, #7), continuing thru April 20, 1928:

May 13, 1927, p. 5: "Material for Ashurst Oil Well Arrives." Derrick is being constructed, etc. ⁵⁻³

April 29, 1927, p. 1: Material arrives for oil rig to be erected at Ashurst (i.e., in Section 30, T5S R24E).

July 15, 1927, p. 4: A carload of casing for the Pima and Ashurst oil wells is on the way and drilling should begin next week. Also,

July 29, 1927, p. 1: Ashurst oil well spudded in Thursday morning (i.e. July 28).

September 23, 1927, p. 1: Drilling operations at the Pima oil well are under way again, in two shifts; depth of over 60 ft. has been reached and 24" and 20" casing has been set. At the Ashurst well some changes are being made by Messrs. M.C. Trumbull and W.W. Todd of New York City, who are in charge. Carload of fuel oil has been unloaded and 24" casing has been set. Day and night shifts. Also, ⁵⁻⁵ ⁵⁻³

Ibid, p. 4: Eastern capitalists visited the Ashurst well. Active drilling resumed and 24" casing has been set; now drilling with a 22" bit. Visitors were pleased. ^{9/30/27}

At Ashurst in this county the Proctor and Trumbull well will resume drilling during the present month. ^{10/7/27}

Ibid, p. 8: Short article on the prospects for oil in the Gila Valley around Pima and Ashurst. Makes reference to the Trumbull Seismograph, and the highest Seismographic readings ever recorded by the Trumbull instrument. ^{11/25/27} ^{p. 1} *attached*

According to reports the well at Ashurst, being drilled by W.W. Todd and J.H. Leat, has reached a very interesting formation, showing both oil and gas indications. At the present time, it is said, they are now awaiting fuel oil and upon its arrival casing will be lowered, shutting off a small flow of water, and then drilling will be resumed. ^{4/20/28} ^{p. 1}

Mr. Leat arrived in Safford Wednesday from New York and is here on business in connection with the well.

May 25, 1928, p. 1: "Oil Showing Is Encountered at Ashurst" "Visitor Reports Oil Seen on Bit and In Slush Pit Last Monday" "Last Monday a very encouraging showing of oil was encountered at the oil well being drilled at Ashurst by Messrs. Leat and Todd of New York, according to visitors at the well.

It is said the oil could be seen on the bit and when the bailer was emptied into the slush pit quantities of oil appeared on top of the residue.

One of these visitors in commenting on the situation stated that the people of Graham county should be very much encouraged over the showing and appreciate the fact that outside money is being spent in the development of Arizona's natural resources. It is believed that the showing unmistakably points to a large pool of oil beneath Ashurst and every day gives more indications that the drill is drawing closer to an underground lake of oil.

Continuing he said 'ere long the people will awake to the fact that Arizona is being proclaimed one of the oil states of the union.'

The men in charge of the well have not proffered any information."

June 8, 1928, p. 1: "Directors Oppose Selling Oil Well Units In County"

"At a special meeting of the directors of the Chamber of Commerce last Tuesday night permission was denied the operators of the oil well being drilled in the Ashurst vicinity to dispose of interests in the proposition in Graham county."

August 16, 1929, p. 1: "Ashurst Oil Well To Be Completed By New Company"

"An interest in the Ashurst oil well by the Interocean Oil Company, which will complete the well, is the information given out yesterday by W.A. Leet, who arrived in Safford yesterday from California by way of Phoenix and Globe. W.W. Todd, who is interested with Mr. Leet in the well, is expected to arrive here today or tomorrow.

The Ashurst well was started about two years ago by Leet and Todd, New York oil men, and drilling was prosecuted to a depth of approximately 2,700 feet. Drilling was suspended nearly a year ago.

All water has been shut off at the Ashurst well, except that coming up between the casing, which it was deemed inexpedient to stop, and it is believed that the new drilling company will not have difficulties due to artesian water which has bothered other companies in the Bowie, Bear Springs and Willcox fields.

R.B. Vinmont, representative of the Interocean Oil Company, was recently at the well. He has expressed himself that the Bear Springs field represents an excellent field for oil exploration.

It is the intention of the company to make a thorough test for oil in the vicinity of Safford.

The company has three producing wells at Huntington Beach near Los Angeles, it is said.

Drilling is to be started by the company at once at the Ashurst well."

February 28, 1930, p. 2: "Drilling Operations At Ashurst Oil Well Will Be Resumed"

"Drilling operations at the Ashurst oil well between Pima and Ft. Thomas, will be resumed within the next 60 or 90 days, according to a statement made by W.W. Todd and E.H. Stone yesterday.

When drilling operations at the Ashurst well were temporarily discontinued several months ago following an expenditure of approximately \$64,000, the well had reached a depth of 2,700 feet.

Since that time Mr. Todd has succeeded in interesting the Arizona Pacific Exploration Co. of Los Angeles, in the Ashurst district, and the announcement is made that this company has acquired a substantial interest in the Ashurst well and surrounding territory.

Mr. Todd states that the entrance of the Arizona Pacific Exploration Co. into the Ashurst field insures this locality of a real test for oil and gas at an early date. This company is an oil producing company operating in the Colinga, Huntington Beach, and other oil fields of California, and has acquired a substantial interest in the Ashurst well."

visiting with Mr. and Mrs. Granville Pace, who are here from Cedar City, Utah. Mr. Pace is a brother of W. W. Pace. Those present were Mr. and Mrs. W. C. Pace, Mr. and Mrs. J. Verne Pace, Mr. and Mrs. D. C. Pace, and Mr. and Mrs. A. E. Jameson.

GLENBAR NOTES

(Lucette Hervert)
George Echols, who was recently married to Miss Beale Thompson, gave a wedding dance Thursday evening. A large crowd was present and everyone had a most enjoyable time.

Mrs. Rhla Curtis and daughter, Mrs. Lucy Western, arrived here from Artesia, California, Saturday evening, where they spent the winter. They intend to make their home here.

Anthony Christensen and wife were visitors from Eden Sunday afternoon. President H. L. Payne of the Layton ward and William Melville of the Pima ward were visitors and speakers at the church services here Sunday evening.

Ami Curtis, formerly of Glenbar, is lying in a hospital in Artesia, Cal., suffering an injured back. According to reports of the accident he was loading hay, and the wagon being wet and slippery he fell and struck his back on a timber. He is improving and expects to return home in September.

The Mutual Improvement Association of the Matthews ward held a very interesting meeting Sunday evening and a number of visitors from the different wards in the stake were in attendance and gave some very interesting talks. They were Chas. Clawson, W. T. Mendenhall, Miss Thelma Layton and Mr. Solomon of the Layton ward, Mr. and Mrs. Moroni Skinner of the Kinball ward, Mr. and Mrs. H. H. Oute of Pima, Mrs. Inez H. Lee, J. H. Mansum of the Thatcher ward.

Earl Long of Cottonwood Wash was a visitor at the home of Mr. and Mrs. H. L. Smith Monday afternoon.

Mrs. Ervin Herbert is visiting at the home of her mother, Mrs. Echols. E. Herbert of Geromino made a business trip to Glenbar Tuesday.

Miss Stella Bryce attended the dance at three Tuesday evening.

Clifford Hughes, a former resident of Thatcher has moved into the Dave Rogers' place at Glenbar.

ONE FARMER PROVES DAIRYING TO BE A PROFITABLE BUSINESS

That dairying is one of the best paying industries in the Gila valley is the belief expressed by C. L. Alfred Tuesday when he called at the Guardian office to renew his subscription to the paper. Mr. Alfred bases this belief on actual experience of many years in the business.

Ten years ago he purchased a 53-acre farm in the Artesian district and put a few dairy cows on it, going in debt for the farm and the cows both. Today, at the end of the ten years, he is not owing anyone, so far as he knows, the cows having paid out the debt on themselves and on the farm.

In addition to his herd of fine cows, Mr. Alfred raises chickens and hogs enough to supply his family and have some for the market.

The hay raised on the farm and fed to the dairy herd, Mr. Alfred figures, brings him \$5.00 a ton. The products from the herd brings him an income that is steady and does not fluctuate with the market as do cotton, hay, etc., and he therefore knows just what he will have to meet the expenses of his family and his farm each month.

Wm. A. Caraway left for his old home in Tucson Tuesday.

Wm. J. Vaughan, who is interested in the drilling of the oil well at Pima, returned to Safford the first of the week from a business trip to Phoenix. While in the capital city Mr. Vaughan told in an interview with newspaper reporters how he became interested in the oil proposition in Graham county, saying:

"The Gila basin," he said, "has been favorably noted by geologists as the possible seat of an oil basin for many years. In particular, Edward H. Hill of San Francisco, who more than any other man turned my attention to West Texas, called it to my attention six years ago. But it was not until the development of scientific oil detectors that I remembered his advice and came to look the country over for myself."

"There are two types of detectors. One reacts to the presence of oil and indicates volume. The other indicates only the depth at which oil may be struck. The first type may be described as an affinity instrument. It carries a reservoir of compound chemicals similar to those contained in petroleum. These chemicals are sympathetic to the vibrations sent out by electrons of the petroleum atoms and respond when the reservoir is suspended over a subterranean reservoir of oil. Amplifiers similar to those used in magnifying radio vibrations step up the sympathetic vibrations to the container until they can be mechanically indicated on a dial.

"Well, this affinity instrument was very strongly recommended to me by responsible, level-headed men who had tested it. I undertook tests of my own in the West Texas field. My inclination, I am free to confess, was in the direction of extreme skepticism. If there is anything an experienced oil man is ashamed to be associated with, it is a 'doodiebug' of any sort.

"But I got readings in proved country that I know intimately, and in dry country—known to be dry because I had tested it by sinking dry wells—readings. In all, I spent 15 months tracking down the experience of everybody who had tried the affinity detector and in the end I brought one to Artesia and went over the Gila basin. That was a little more than a year ago.

"Five miles west of my another New York syndicate headed by W. W. Todd, another responsible operator with ample backing, is also drilling on the strength of detector readings. I think you may say that the present quantity flow of eastern capital into Arizona drilling dates from the invention of the modern scientific detector.

"It takes money to drill a wildcat well, varying of course with the probable depth. Perhaps \$100,000 would be an average figure for what the Arizona wildcatter may expect to encounter in the way of difficulties.

"Our own well, wholly financed by New York City and Buffalo capital, was spudded in last August, but active drilling was not really begun before November 1. We are now down about 1,500 feet, and at 2,000 feet expect to get our 10-inch casing on a limestone bed which we expect to encounter at about that depth. We began with a 24-inch hole.

"At 1,300 feet we tapped a deposit of rock salt 15 feet thick, laid down in early geologic times when the sea covered Arizona. At present we are bringing up drill cuttings that under other tests, show the existence of oil, but we do not expect to get into production sands much above the level of the sea. That was our experience in West Texas and would take us down in this country, about 3,200 feet.

"I am inclined to regard the Gila basin as a possible oilfield or extension of the West Texas field, stretching across New Mexico. The state is surrounded by other oil-bearing states—New Mexico, where there are proved fields now in production, Texas, Utah, Colorado and California. The formations traversed by our drill much resemble those found in Colorado.

STATE SIFTINGS

TUCSON—Additional improvements cost—between \$150,000 and \$200,000 are to be made to the Santa R. Hotel and when the remodeling is completed the entire aspect of the big hostelry will be changed.

TOMBSTONE—Loss estimated between \$12,000 and \$15,000 resulted to business property here last week when fire destroyed several of the business houses in the heart of the town. The fire started when a gas tank in the Owl Cafe exploded while a leak was being mended by Joe Fredericks, 13. He was perhaps fatally burned and another, Robert Gilmore, was severely burned in attempting to save the boy.

MIAMI—Three Mexican mine laborers were crushed to death at the Inspiration Consolidated Copper Company plant when they were carried into workings of the mines on a conveyor belt on which they had gone to sleep.

TUCSON—One of the large Pickwick stage line buses was completely destroyed by fire which started from a heater. No one was injured and all baggage was saved.

AFTER CONDEMNING AUTOS FOR YEARS BUYS CHRYSLER 52

The Red Indian's trail, the pioneer's covered wagon, the stage coach, the railroad train and the steamboat, street cars, horseless carriages and their modern development, the fleet and beautiful automobile of today, even the aeroplane—all methods of transportation developed in the fast moving progress of the nineteenth and twentieth centuries have been watched with interest by Chaplain James King Gibson during the 82 years of his busy life. But until very recently the veteran national chaplain of the G. A. R. knew them only as spectator and passenger. Salesmen found him immune when they tried to induce him to buy.

Not until Walter P. Chrysler gave to the world an automobile so full of new beauty, smart handling, flashing speed and dependability that its appeal could not be resisted, did Dr. Gibson fall from grace. A few weeks ago he went into the showrooms of the Chrysler agency of Dayton, Ohio, and came out the owner of a Chrysler "52" coupe, the first car he has owned.

With only a few lessons he mastered the details of gear shift and steering, and he is now an enthusiastic Chrysler owner, driving through Dayton's city traffic with as much ease and certainty as any representative of young America.

Best Man: "Wan't it annoying the way that baby cried all during the ceremony?"
Maid of Honor: "It was dreadful. When I am married I shall have snatched on the invitations, 'No babies expected.'"

SHERIFF'S NOTICE OF SALE NO. 233

IN THE SUPERIOR COURT OF THE COUNTY OF GRAHAM, STATE OF ARIZONA.

M. E. O'Bryan, attorney-in-fact for the heirs of T. O'Bryan, deceased, plaintiff, versus Orville L. Larson and Orville L. Larson, administrator of the estate of Hazel Larson, deceased, defendant.

Under and by virtue of a special execution and judgment of foreclosure and sale granted out of the Superior Court of Graham County, Arizona, on the 23rd day of November, 1927,

All of lot 4 in Block 25 of Thatcher Township and bounded as follows, to-wit: Beginning at a point 92 rods North and 95 rods East of the Southwest corner of Section 2 Township 7 South of Range 25 East of Gila and Salt River Meridian in Graham County, Arizona; thence running East 16 rods; thence North 16 rods; thence West 16 rods; thence South 16 rods to the place of beginning, containing one and six-tenths (1 6/10) acres. Also one share of stock in Union Canal Company.

to-wit: together with all and singular the rights and appurtenances thereto in any wise belonging.
Public notice is hereby given that on Monday the 12th day of March, 1928, at 10:00 o'clock in the forenoon of said day at the court house door in the City of Safford, County of Graham, State of Arizona, I will, in obedience to the special execution, sell the above described real estate to satisfy said judgment, interest, costs and expenses of said sale, to the highest bidder for cash, lawful money of the United States of America.
Dated this 15th day of February, 1928.

H. M. TATE, Sheriff.
By SETH DOCKIE, Deputy.
First Publication: February 17, 1928
Last Publication: March 9, 1928



East via romantic New Orleans

—and southern and eastern point
Over this route travels the "Sunset Limited," famed round the world. It takes you swiftly and with the greatest comfort to New Orleans where connections are made to all principle cities of the east and south. On this train is a through standard sleeper to Jacksonville, Fla. and points enroute.

From New Orleans you can take a Southern Pacific steamer to New York and have this 100-hour ocean voyage with your meals and berth included at no extra fare.

Also the "Argonaut" daily over this route, carrying through sleepers to St. Louis, Memphis, Washington, D. C. and intermediate points.

Ask the agent for free illustrated folder describing the Sunset journey east.

Southern Pacific

GRAHAM COUNTY GUARDIAN AND GILA VALLEY FARMER (Safford, Ariz.), February 17, 1928, p. 6

"Eastern Man Tells How He
Became Attracted to Pima
As a Promising Oil Field"

Markets

LOCAL PRODUCE
Buying Prices on Poultry

Heavy Hens, lb	20c
Small Hens	15c
Roosters, lb	10c to 20c
Broilers, lb	25c
Friers, lb	25c

Retail Selling Prices

Bananas, lb	15c
Eggs, Doz.	30c
Beets, bunch	5c
Carrots, bunch	5c
Bell Peppers, lb	30c
Radishes, bunch	5c
Celery, bunch	20c and 25c
Lettuce, 2 heads	25c
Cabbage, lb	6c
Green Chilli, lb	25c
Fresh Tomatoes, 2 lbs	25c
Lemons, doz.	30c to 40c
Oranges	30c to 60c
Cooking onions, 3 lbs	25c
Onions, bunch	5c
Grapefruit, 2 for	25c
New Potatoes, 5 lbs	25c
Rhubarb, 2 lbs	25c
String Beans, lb	15c
Squash, lb	15c
Cucumbers, 2 lbs	25c
Cantaloupes, 2 lbs	25c
Watermelons, 2 lbs	25c
Okra	15c
Plums, 2 lbs	25c
Seedless grapes, 2 lbs	25c
Peaches, lb	15c

EGGS
Buying Prices

Brown extra	25c
White extra	25c
White medium	22c
White small	14c

SAFFORD

Eggs, brown per dozen	25c
White per dozen	22c

COTTON MARKET

COTTON SPOTS AND FUTURES
NEW YORK—The cotton market early selling on relatively easy cables was quiet but generally steady today, and a favorable weekly weather was absorbed on moderate setbacks, and prices later rallied on covering with same trade on commission house buying. October sold up from 17.75 to 17.85 and was holding around 17.81 in the mid-afternoon market, when active months were about 3 to 4 points new higher. Spots quiet, mid-afternoon close: January, 18.08; March, 18.25; May, 18.45; July, 17.46; October, 17.50; December, 18.02 to 18.03.

CATTLE MARKET

KANSAS CITY
CATTLE—7,000; calves 1,000; beef steers and yearlings opening slow, steady to weak; she stock mostly steady; bulls strong; vealers steady to 50c higher; stockers and feeders slow, weak; choice medium weight steers held above \$13; good to choice lightweight steers \$11.35; good medium weight wintered Kansas grassers \$12.10; common Kansas grazed Texas grassers \$7.65-7.85; practical veal top \$12.50; two loads Kansas grassers on country accounts averaging 1,100 lbs. \$10.50.

LOS ANGELES
CATTLE—Small supply cleaned up readily at strong prices; medium 1045 lb. steers \$8.50; few she stock 5.00-6.00; calves 50, steady; vealers 10.00 to 12.00.

Geologist Reports On Oil Indications As Found In Graham Co.

The following report of Claude Palmer, the geologist, who checked the Trumbull instrument in the proven oil fields from Florida to Graham county and who also mapped the two structures now being drilled with eastern money, is very interesting to the people of Graham county, showing why these men believe there is oil in this valley. We are indebted to H. T. Proctor of Safford, who loaned these two structures for this copy of the report, which we are printing below.

February 23, 1917.
W. W. Todd, 12 Pearl St., New York City.
Dear Sir:—
In compliance with your request, I am pleased to submit to you a report of my findings and impression of the K. C. Trumbull oil affinity instrument or machine. Also my opinion of the Arizona structure owned by Messrs. Leet, Trumbull, Proctor and others, and on which you were contemplating the purchase of an interest for the purpose of helping defray the expenses for drilling a test well to test the properties for oil or gas.

Of course, as you accompanied Messrs. Leet, Trumbull and myself throughout the trip from Florida to the Spindle Top fields of Beaumont, Texas, and then from there to El Paso, Texas, and later to Graham county, Arizona, and observed my work of comparing and testing the accuracy of the several localities, it will not be necessary to make an extended report. Therefore, suffice to say that I selected the Beaumont oil field as the place for the first test because this locality was unusual to the extent that it had produced more oil of high grade paraffine base from shallow sand wells than any other one spot of like size in the world (the old Spindle Top field) and had eventually become stripped of all oil excepting a very few wells yet producing a small amount, and in addition the new Spindle Top field lately being developed from sands of from 3,000 to 5,000 feet deep, and lies less than a quarter of a mile from the edge of the old field, and which fields are divided by the effects of the tremendous salt core, which was instrumental in causing the uplift.

This situation made an ideal locality to test the instrument on and off light oil of limited amount, the dry streak including salt core, and on and off heavy oil of large volume. While I had previously been biased in mind to a certain extent, against Mr. Trumbull's machine or instrument, and had considered it the same as many other "doodle-bug" contraptions that I had checked against geology heretofore and found lacking, I was surprised and dumfounded upon witnessing the action of this machine

which made the structural features of the lower formation hard to determine.

Upon reaching the Gila valley in Graham county, Arizona, I was pleased to note the feature of an uplift arising through an extensive syncline lying between two mountain ranges crossing a valley of about twenty miles wide.

My conclusions, after a thorough examination of the structure, which lies from 12 to 16 miles northwest of the town of Safford, which you are expecting to be interested in, is that you have a closed structure, worthy of a test for oil or gas, provided the well is drilled to a depth of at least 3,500 feet, in order to test both sands, if necessary. The outline of this structure is very discernible and it appears to be one of several along a major Anticline. I was very well pleased with the action of Mr. Trumbull's instrument or machine upon this structure. We commenced testing with the machine at the same place as we did on the edge of Florida structure. After checking around the edge of the structure, we checked two cross-sections across the apex of the structure (see sketch).

It registered upon two productive sands in the apex of the structure, while it registered on but one sand around the edge of the structure. The instrument registered perfectly according to structural geology. The pleasant surprise was the exceptionally large readings that the machine registered upon the apex of the structure at the localities mapped out by me for the first test well to be drilled. In fact, it averaged from 700 to 1,500 readings around the apex, both locations, and was the highest readings that were recorded on the trip. In fact, they were more than double the average readings from the new Spindle Top field, where we took tests beside wells making from 2,000 to 2,500 barrels per day, settled production.

Therefore, my conclusions are that the machine or instrument does register faster to petrolierous matter that it does not register or is not influenced by other minerals or formations, content that it does register increased or decreased production in the sands from place to place, according to porosity of sands, that it registers accurately, according to structural geology, even though it is influenced to higher readings on account of either hydrostatic or gas pressure.

The machine will not tell the depth to any sand, will not tell the character of the oil, will not determine the gathering ground of the area surrounding the field, will not determine the hydrostatic pressure or syphon conditions to be encountered. However, all this can be determined by competent geologists, while the machine or instrument does record conditions that no geologist can determine. Therefore, I believe, if this instrument is used in conjunction with geological knowledge, that the combination will create a revelation in the history of the oil industry.

Respectfully submitted,
(Signed) CLAUDE F. PALMER,
Geologist.

GRAHAM COUNTY GUARDIAN AND GILA VALLEY FARMER

Log of Gila Oil Syndicate's Well #1
 near Ashurst, Graham County, Arizona
 SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec 30 T 5 S R 24 E

	Thickness Feet	Depth Feet	Remarks
Alluvium	50	50	Water
Clay	380	430	
Sand	15	445	Flow of water
White limestone	145	590	Salt water
Limy shale	30	620	
Gray sand	80	700	Flow of water
Limy shale	50	750	Salt water
Blue shale	55	805	
Gravel	30	835	
Gray shale	200	1,035	
Brown shale	80	1,115	
Blue shale	20	1,135	
Brown shale	15	1,150	
Blue shale	15	1,165	
Brown shale	35	1,200	
Sandy shale	35	1,235	
Blue shale	20	1,255	
Brown shale	80	1,335	
Red shale	60	1,395	
Sandy shale	40	1,435	
Brown shale	80	1,515	
Brown sandstone	480	1,995	Flow of water
Gravel	10	2,005	
Dark brown shale	70	2,075	
Black sand	10	2,085	
Brown shale	125	2,210	
Dark brown sandstone	70	2,280	
Gray shale	15	2,295	
Red shale	110	2,405	
Dark brown sandstone	80	2,485	
Limestone	80	2,565	
Sandy limestone	30	2,595	
Blue shale	50	2,645	Bottom of well

Log of Gila Oil Syndicate's Well #1
 near Ashurst, Graham County, Arizona
 SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec 30 T 5 S R 24 E

	Thickness Feet	Depth Feet	Remarks
Alluvium	50	50	Water
Clay	380	430	
Sand	15	445	Flow of water
White limestone	145	590	Salt water
Limy shale	30	620	
Gray sand	80	700	Flow of water
Limy shale	50	750	Salt water
Blue shale	55	805	
Gravel	30	835	
Gray shale	200	1,035	
Brown shale	80	1,115	
Blue shale	20	1,135	
Brown shale	15	1,150	
Blue shale	15	1,165	
Brown shale	35	1,200	
Sandy shale	35	1,235	
Blue shale	20	1,255	
Brown shale	80	1,335	
Red shale	60	1,395	
Sandy shale	40	1,435	
Brown shale	80	1,515	
Brown sandstone	480	1,995	Flow of water
Gravel	10	2,005	
Dark brown shale	70	2,075	
Black sand	10	2,085	
Brown shale	125	2,210	
Dark brown sandstone	70	2,280	
Gray shale	15	2,295	
Red shale	110	2,405	
Dark brown sandstone	80	2,485	
Limestone	80	2,565	
Sandy limestone	30	2,595	
Blue shale	50	2,645	Bottom of well