CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
3550 N. Central Ave, 2nd floor
Phoenix, AZ, 85012
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

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November 8, 1963

S T A T E M E N T

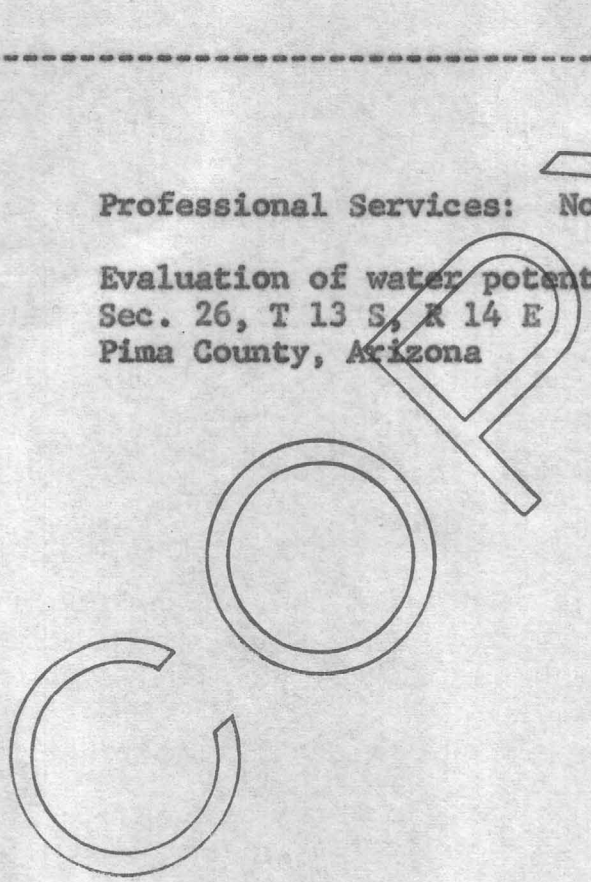
To: Mr. T. W. Keller
5240 E. River Road
Tucson, Arizona

Re:

Professional Services: November 5 thru 8, 1963

Evaluation of water potential
Sec. 26, T 13 S, R 14 E
Pima County, Arizona

$125.00



HEINRICHS GEOEXPLORATION COMPANY
MINERAL ENGINEERING CONSULTANTS AND CONTRACTORS
GEOPHYSICAL, GEOLOGICAL AND ECONOMIC APPRAISALS
TUCSON, ARIZONA, 85703

WALTER E. HEINRICHS, JR.
E. GROVER HEINRICHS

AREA CODE 602
PHONES: 622-4202, 623-6541
806-808 WEST GRANT ROAD
MAIL: P. O. BOX 5671

November 8, 1963

Mr. T. W. Keller
5240 E. River Road
Tucson, Arizona

Dear Mr. Keller:

Subsequent to your phone conversation with Mr. Walter E. Heinrichs, Jr., concerning water potential on your ranch in Sec. 26, T 13 S, R 14 E, Tucson, Arizona we have investigated it to the point of making the following conclusions and recommendations.

It should be possible to develop substantially more water on your property than is presently available from your two wells. This may be done in any or a combination of several ways.

a) Improve existing wells by cleaning, gravel packing and screening to keep permeable and allow more rapid infiltration of water and possibly deepening them.
b) Drill another well not too far away from your present well #1.
c) Install a 50,000 gallon storage tank on a high point near your barn for gravity pressure feed for irrigation and pump into it for longer periods at a lessened pumping rate.
d) Utilize geophysical methods on a two day trial basis to see if a basin or old stream channel exists on your property. The possibilities and values of this, for the purpose of selecting a new well site are discussed later.

We have visited the Agricultural Engineering Department of the University of Arizona and had discussions with Mr. Schwalen and examined and abstracted information from the logs of wells in your vicinity. Mr. Fred Pashley of the U. S. Geological Survey, Groundwater Department, was also visited. He has made special study of the rocks, formations and water of the general area which includes your property. During the morning of November 5, 1963 we visited you, viewed the ground and discussed matters. On November 7, 1963, the water levels in your two wells was measured.

The summation of our evaluation to date is as follows:

1. We do not believe you are getting the maximum yield from the existing wells' potential due to lack of proper completion at the time they were drilled.

2. There is a good chance that the best aquifer on the property may be between the south boundary and the bluffs or hills to the north. This is suggested by the facts that (a) at the times the two wells were drilled, static water level for No. 1 was much higher than for No. 2. (b) No. 1 is a better producer than No. 2 even though much smaller diameter. (c) Your comment of rise in level being directly related to Sabino Creek discharge. (d) Being directly down stream from the junction of Tanque Verde Wash with Rillito Creek. (e) Personal observation that the possibility of an old meander north of the present creek area looks favorable. (f) On November 7, water stood in Well No. 2 at 34 ft. from the top of the casing, or about 30 ft. below ground level. In well No. 1 it was 37 ft. below the top of the casing or approximately 25 ft. below ground level in the adjacent fields--a differential of about 5 ft. higher in Well No. 1.

These add up to the possibility of a somewhat impervious dam existing between the underground runoff of Tanque Verde and that of Rillito with, on your property, the Tanque Verde having water nearer the surface and in more recoverable quantity. Your No. 1 well may be tapping the Tanque Verde source and your No. 2 the Rillito source of supply.

The above may be somewhat checked by two methods:

1. Measure, several different times, the depth to static water in both wells after a period of non-pumping, for example, in the early mornings after nights or even more extended periods of recovery. The longer period of recovery the better. If there is considerable discrepancy between the two, and especially if the level is much higher in Well No. 1, then they are likely separate water courses.

2. Take an uncontaminated sample of water from each and have it analyzed. If there is little variance, the sources may or may not be different. If there is considerable difference in contained salts and minerals, the sources are different.

Examination of the logs of several wells and talks with Mr. Pashley brings out that there are definitely two and possibly three water horizons in your vicinity. The following table shows these for three sections:

	Section 25	Section 26	Section 27
Zone "A"	20' - 40'	25' - 60'	40' - 60'
Zone "B"	80' - 100'	100' - 120'	110' - 120'
Zone "C"	(?)	150' - 180'	

Your No. 1 well would penetrate Zones "A" and "B" but Well #2 only "A".

Among things that can be done to help the present wells are surge blocking and cleaning, the use of chemicals and possibly cutting more perforations in the casing. Surging properly done, will create a natural gravel pack outside the casing by drawing sand and silt into the well which is then cleaned out. A good person to contact about such services or for more drilling, etc. is Mr. A. L. "Cotton" Boring, 1915 S. Wilson Avenue. Phone MAin 3-8989 or MAin 4-1897.

If it appears or happens that from one manner or another you are unable to improve your yield, a large storage tank that can be filled during periods of otherwise non-pumping could be utilized to furnish a reservoir of higher yield replenishing the lower yield.

The possible applications of geophysics are restricted because of immediate geology and cultural features that might cause effects overriding and masking the natural ones desired. Electrical methods such as resistivity, would be restricted because of the fences, pumps, casing, pipes, power lines, etc. Shallow refraction seismic would work well on mapping strong changes in rock type such as bedrock versus overlying alluvium. Here where the change would only be between valley fill over Pantano Formation the contrast may or may not be so great.

Resistivity, if successful, will map the interface at which water occurs. Seismic will map points of change in configuration of the subsurface. None of the geophysical methods will tell anything directly about the exact quantity or quality of water available.

Two days of field work would be required to test your ground by the best applicable methods. However, we cannot be absolutely certain that the data will give the answers required. Two days of field work with following office time for calculations, evaluations and interpretation would cost $500.00.

If any of the above is not clear to you, please feel free to call or visit us for further discussion and clarification.

The sketch we borrowed from you is enclosed along with our billing for this evaluation.

Respectfully,

HEINRICHS GEOEXPLORATION CO.

J. W. Marlatt

J. W. Marlatt
Geologist

Wm. W. Carey

Wm. W. Carey
Geophysicist

JWM/WWC: jh

Enclosures.

Sec. 25 T13S R14E

J. A. White. Loc. NW 1/4 of Sec.
Cor. N. Stone & Pastime Park Rd.
Drilled 6" O.D. Casing
Perforations second strata only.
Drilled by CWP (R. Boyle) March 1937
0'-20' top soil
20'-30' sand
30'-35' sand & clay
35'-41' sand & water -38'
41'-81' clay-sand
81'-98' sand - little clay
98-100' clay-sand

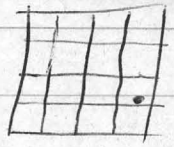
Sec. 25 SE SW G. C. Willet 123 W. Ft. Lowell.
drilled. Casing 86'8"
by CWP (W. Adkins) 11/10-17/36
0'-30' pit
30'-85' red sand & clay
85'-107' white sand - some clay
water at 85' when drilled.

Sec. 25 SW1/4 SW1/4
Frank W. Jordan Tucson
Dug - by self Concrete 8' dia by 22'
Total depth 21'
W. L. from 9' in low season to 3'-4'

Sec. 25 SE SW George Amos (windmill)
drilled. Parkhill rig. Huck driller Dec. 1947
111' of 12" casing Perfor. 6 3/8" x 5' ga ft.
0'-10'
10'-35' brown caliche
35'-60' Hard brown caliche
60'-71' caliche
71'-79' hard sand
79'-83' hard sand
83'-100' Hard sand coarse
100'-111' clay & sand
111'-123' caliche & sand
123'-141' " " "
141-160' " " "
W.L. 20' from surface when drilled
450 gpm pump swabs air in 1.5 minutes

Sec. 25 SE SW George Amos #2
Drilled. K.I. Jordan Casing 0'-38'-10"
38'-100'-8"
0-8' sandy top soil
8'-38' Sand gravel & water
38'-42' Boulders
42'-78' Clay & gravel - No water
78-84' Gravel water
84'-100' yellow clay
W.L. at 12' when drilled.

Sec. 26 Drilled for Dean Short by McDaniel

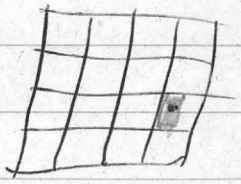


~~East~~ of River Rd., near Swan Rd.

May 29, 1959

0-12' silty soil
12'-25' Tight clay-soil
25'-60' clean sand & water
60-70' Muddy sand & water
70'-100' Tight conglomerate
casing 8" I.D. to 73' Perforated.
Static w.l. 16'

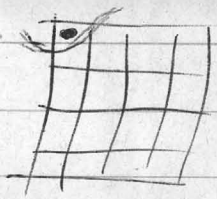
Sec 26 drilled for Stephens Pump Co. by McDaniel



Keller on River Rd.
20 May 1960

0-22' Black soil
22'-27' clean gravel - water
27'-65' Black muddy sand - water
65'-120' Rocky conglomerate - tight
120'-125' white gravel & clay - tight
125'-150' Rocky conglomerate - tight
casing 10" I.D. Perforated
Static water level 22'.

Sec. 26 for Anthony J. Visconti by McDaniel
6 May 1960



0'-6' Sandy top soil
6'-85' Cemented gravel
85'-97' Clay & gravel
97'-105' Muddy sand & gravel - water
105'-110' Hard conglomerate
110'-180' Muddy conglomerate - water
180'-202' Cemented sand & gravel
Casing 202' of 8" I.D. Perforated
Static water level 76'.

Sec. 26 SW/4 SW/4 SW/4 for Lewis W. Douglas 4755 E. Ft. Lowell Rd. by McDaniel
July 29, 1958
0'-4' soil
4'-25' Dirty gravel
25'-130' Clean gravel, water at 45'
130'-134' Tight rocky conglomerate
134'-180' Clean gravel & water
180'-190' Tight rocky conglomerate
Casing 190' of 16" OD perforated
Static water level 24'.

Sec. 26 Ctr. of NW/4 NW/4 for I. E. Huffman by Bennenfield
Casing 6" O.D. to 120' perforated lower 18'. Jan. 6, 1930
0-14 unconsolidated
14-105 Cemented conglomerate
105-120 Sandy clay, some water
120-175 "Sandstone" did not cave, white. 175 - crevice
175-180 "Sandstone" Bit stuck. Big flow of water

W.L. 75'

Sec. 26 SW¼ for J. Knox Corbett by Evans

Caisson – & drilled Aug. 1921

Casing 8" or 10"

Caisson to 25' or 26' and struck cemented hardpan

25'–100' Sand & gravel cemented

100'–102' Loose gravel

102'–141' "Hard" and "soft" – the "soft" caves

141'–180'+ Solid rock. Sample is Catalina gneiss. Broken by drill. Probably cemented gravel & boulders.

W.L. at 15' In 1921 discharge about 300 gpm

Sec 26 NE SE for H. H. Hall by Anderson May 28, 1956

0'–38' conglomerate

38'–65' Water bearing

65'–78' conglomerate

78'–145' Soft spots, water

145–170' Hard conglomerate

170'–190' Broken formation

190'–220' Very tight hard form.

W.L. at 38'

Stevens Ave off River Rd.

Sec 26 for Keller by McDaniel May 19, 1961

0'–15' Sandy soil

15'–42' Dirty sand & gravel

42'–70' Sand & gravel – water

70'–89' conglomerate

Casing 93' 3" of 20" I.D. perforated

Static water level 34'.

Sec. 26 NW SW for John Bender by CWP
East Swan Rd. March 1958

0'-9' silt
9'-25' sand - little clay
25'-40' sand & gravel
40'-150' cemented gravel
150'-180' " boulders
180'-235' " sand

W.L. at 5' cased & perforated.

Sec. 27 near gravel pit for John Bender Water Co by CWP
Aug 25, 1957 Cased & perforated

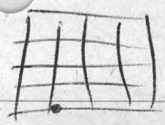
0'-6' Sand & gravel
6'-40' sand, gravel, little clay
40'-60' sand, gravel, water 60'
60-75' red clay & sand
75'-95' loose sand & gravel
95'-180' cement boulders & sand
180'-224' red sticky clay

W.L. at 32'

Sec. 27 for John Bender by CWP 3/4/58
cased & perforated

0-9' silt
9'-25' sand with little clay
25'-40' sand and gravel
40'-150' cemented sand
150'-180' " boulders
180'-235 " sand

W.L. at 9'.

Sec. 27  for Anderson by Pistor

Drilled & cased 10" to 194' July 1941

0-4 Sandy soil
4-25 Granite, little clay
25-35 Small boulders
35-38 Sand
38-85 Gravel & clay
85-120 Boulders & clay W.L. at 30'
120-166 Packed sand.
166-170 Gravel & clay
170-194 " "

Sec. 27 SE SW NE  for A.W. Anderson by Forsythe

cased July 1951

0-12 Black silt
12-30 Sandy red mud
30-60 Rocky sand & gravel - water
60-110 Sandy red clay conq Streaks of water
110-120 Loose sandy conq Water
120-150 Sandy brown conq.
150-160 Sandy gray conq. streaks of water
160-175 Cemented conq.
175-205 Hard brown conq. W.L. at 33' 6"

Many more in Sec. 27

Sect. 26 Water Level

No.	Date Logged	TD	Level Below Surface	Remarks
1	5-63		28.72	down 2 ft over 62 measurements 2450.02 to 2421.31
2	5-63	100	7.95	2440.18 to 2432.23 down 2.80 feet
3	4-63	100	9.28	
4	5-63		21.50	2441.50 to 2432.2~ down 3.33 ft. down 1 ft of 62
	anon Domestic			
5	(Smith windmill) 5-63	160	10.40	2439.92 - 2429.5~ varies ± 2 feet
6.	(Courtright Stable) 5-63 (just typical well)	16	8.33	2441.35 - 2433.02 varies ± 2 feet

Sect 27

1.	(Pump at 86 feet) 4-63	200+	49.90	2400.44 to 2350.51
2.	Bender #1 4-63	375'	68.15	2411.57 to 2343.42 down 2 feet from 62
3	Anderson (domestic & irrigation) 4-63		76.25	2414.60 to 2338.36 varies - 1 foot
4	Hazzard 4-63	160'	48.72	2410.96 to 2362.2~ varies ± 4 feet

Water Levels

Sec 26

1 - TD 200'

8-63 80.15

Sect.	Number	TD	Date	Level ft below surface	Remarks
26	1	200'	8-63	80.15	(little fluctuation) ±2ft

Top 2467.46 1st water level 2387.31

26	2	?	5-63	16.80	fluctuation 10 feet ±5'

(2430.55 (top of casing) to 2414.75 water level)

26	3		4-63	11.13	fluctuating 3 feet

2434.84 Top 2423.71 water level

26	4	220	4-63	34.63	down 6 feet since 63 & 62

2438.02 Top to 2403.39 level

26	5	235	4-63	16.46	down 8.88 over last year

2415.28 Top to 2398.82 level

26	(Irrigation well) 6	190'	4-63	34.71	down 8.75' over 12-62 data

2418.35 to 2383.64

26	7	41'	4-63	17.59	down 6 feet over previous data

2426.30 to 2408.71

27 cont'd

No.	Date	TD	Level Below Surface	Remarks
5	(irrigation Dug & Drilled) 5-63	240	22.58	2410.31 to 2387.73 down 10 feet.
6	(Broad) 4-63	100	27.52	2399.81 - 2372.29 down 7 feet
7.	Bernins (Housewell) 4-63	162	61.55	2430.17 - 2368.62 varies 1 foot
8	Detweiler 4-63	114	62.22	2414.27 - 2352.05 down 10 feet over 62
9.	Dickerson 4-63	28	16.53	down 7 feet 2406.85 - 2390.82
10.	Davidson Sch. (irrigation purposes) 8-63	105	72.50	2405.08 - 2332.58
11	Peterson 3-63		68.41	2405.07 - 2336.66 varies 12 feet
12.	Bingham 4-63	100	75.87	2413.23 - 2337.36 down 10 feet
13	Haskell		average 30.00	2418.92 Top

Sec 35

No	Level
1	88.80
2	76.55
3	3500 average
4	56.66
5	64.80
6	104.67
7	110.35
8	108.03
9	62.66
10	50.20
11	30.20
12	48.78

10/30/63

~~Golf~~ Texas Afternoon

This week

or Next week

Ba 6-7929

T.W. Tite Wad Keller

" " Ranch

I day $125-150.00 plus

extras.

50 Days. 7/23/63

Reffered by: Chas. McGuire 20 Acres

Rillito – Pantano & Tanque Verde

N. of Med. Center.

30"-casing

Fancy Cattle.

100' to bedrock

400' " " nearby.

"Title Wad"

Ted. W. X Keller.

5240 E. River

EAst-6-7929

old:-
Stevens Dairy Farm.

John Bender 400' to B.R.

40' ~~cistern~~, nearby.
cistern

(W?) E 1/2 W 1/4 of

SE 1/4 Sec 26

T 13 S, R 14E

Sabino Canyon Snow recharge.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TUCSON NORTH QUADRANGLE
ARIZONA—PIMA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 MT. LEMMON 15' QUADRANGLE

(CORTARO 1:62 500) (MT. LEMMON 1:62 500)

111°00' 32°22'30" 501 000m.E. FLORENCE 53 MI. ORACLE JUNCTION 11 MI. R. 13 E. 57'30" R. 14 E. (MT. LEMMON 1:62 500) 55' 820 000 FEET 110°52'30" 32°22'30"

CORTARO 6.5 MI. 3581 000m.N. 500 000 FEET

CALLE CONCORDIA · CAMINO CORONADO · CAMINO DE ANZA · Park · WT · LA CANADA DRIVE · MAGEE ROAD · PASO DEL NORTE · INA ROAD · CHULA VISTA RD · LOS ALTOS RD · ORANGE GROVE RD · ATALAYA ROAD · RUDISILL RD · LAS LOMITAS RD · CRESTA LOMA DRIVE · COASTER · ROLLER · GERONIMO DRIVE · WETMORE ROAD · ROGER ROAD · PRINCE ROAD · FAIRVIEW AVENUE · FLOWING WELLS ROAD · ORACLE ROAD · LIMBERLOST DRIVE · EAST PRINCE ROAD · EAST FT LOWELL ROAD · W FT LOWELL RD · EVERGREEN CEMETERY · HOLY HOPE CEMETERY · EAST GLENN STREET · EAST GRANT ROAD · WEST GRANT ROAD · SOUTHERN PACIFIC · CASA GRANDE 64 MI. JAYNES 3.6 MI. · 6.7 MI. TO U.S. 80 & 89 · CITY HALL 2.3 MI. · 790 000 FEET

Arizona Desert School · Landing Strip · Water Tank · Tunnel · Prospect · Shaft · Spring · Pontatoc Mine · Finger Rock · Mt. Kimball · Pusch Peak (VABM 5361) · Pusch Ridge · Wash · Pima · Valley View · BM 2510 · BM 2305 · BM 2304 · Gaging Sta · Gravel Pit · Reservoir · RILLITO · RILLITO PARK AND RACE TRACK · CREEK · Wetmore School · Flowing Wells High Sch · Prince Sch · Amphitheater Jr HS · Amphitheater High School · Academy of the Sacred Heart · Fire Sta · Helen Keeling School · Salpointe High School · Drive-in Theater · Park · Substation · Power Plant · Gravel Pits · Gravel Pit Cemetery · University of Arizona Farm · Tucson General Hospital · Catalina Foothills School · Tucson Community School · Cragin Sch · Catalina Fire Sta · La Madera Park · Fenster School · Conner Park · BM 2398 · Davidson School · Catalina Jr High Sch · Radio Towers KCNA · Valley School For Girls · Tank · Water Tank · Reservoirs · Polo Field · Reservoir (Aband'd) · TUCSON MEDICAL CENTER · Keller Prop. · TUCSON · (TUCSON)

CORONADO NATIONAL FOREST · PUSCH PEAK · FINGER ROCK CANYON · SABINO CANYON · SUNRISE DRIVE · SUNRISE VIEW · SKYLINE DRIVE · CATALINA HIGHWAY

(CORTARO 1:62 500) (SABINO CANYON) (SAN XAVIER MISSION) 1:62 500 (TUCSON EAST)

T. 12 S. T. 13 S. 20' 17'30" 460 000 FEET 32°15' 111°00' 790 000 FEET R. 13 E. 57'30" R. 14 E. (TUCSON) 55' 511 000m.E. 110°52'30" 32°15' 3569 000m.N. T 13 S. R 14 E.

INTERIOR-GEOLOGICAL SURVEY, WASHINGTON, D. C.—1959—NS
M R 4949

Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and USCE

Topography from aerial photographs by Kelsh plotter and by planetable surveys 1957. Aerial photographs taken 1954

Polyconic projection. 1927 North American datum
10,000-foot grid based on Arizona coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Unchecked elevations are shown in brown

SCALE 1:24000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DASHED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

13½° TRUE NORTH MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 1957

ARIZONA
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Heavy-duty · Light-duty
Medium-duty · Unimproved dirt
U. S. Route · State Route

TUCSON NORTH, ARIZ.
SW/4 MT. LEMMON 15' QUADRANGLE
N3215—W11052.5/7.5

1957

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER 2, COLORADO OR WASHINGTON 25, D. C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST