

MEMORANDUM

To: 29-12898
29-7050
29-7613

Fr: Boyce Courier
Date: 6/29/01

Re: Diversion Rate Analysis

- 1) Proof of Ben use in 29-12898 from permit G-25476 indicates approx capacity of well in NW 1/4 of 17 is 850-900 GPM (1.9 - 2.0 g/s)
- 2) Grover Noble affidavit indicates 40 hp Fairbanks-Morse motor. Claim remarks assert this is original motor. (N well)
- 3) LaMond Bailey affidavit indicates 4 lines x 35 birds x 5/32" nozzles. (N system)
- 4) License exam 29-7613 indicates N well has 40 hp Fairbanks-Morse motor. Also indicates 4 x 33 birds x 5/32" @ 48-54 psi.

Diversion rate 6/29/01 2

5) USGS topo shows N well elevation ≈ 4428 feet, S well elevation ≈ 4426 ft.

6) Water Table elevation from map
" Eastern Iowa River bottom and flood plain
Major Groundwater Seepage
IDWR 1998 Shows 4400 ft
Contour through GS 34 E and
4350 ft contour through GS 32 E,
From this I interpolate GW
elevation ≈ 4375 ft, Static
WL $\approx (4428 - 4375) \approx 53$ ft

7) Theoretical calculation of N well @
40 hp, 75% pump efficiency, 10 ft
drawdown, 10 ft friction, 55 psi
discharge:

$$\begin{aligned} \text{GPM} &= \frac{\text{Water HP} \times 3960}{\text{T D H}} \\ &= \frac{(40) \times (.75) \times (3960)}{(53 + 10 + 10 + 55 \times 2.31)} \\ &= 595 \text{ GPM} \end{aligned}$$

- 5) Theoretical of N well at 50 psi,
1 ft draw down:

$$GPM = \frac{40 \times .75 \times 3960}{(53 + 10 + 50 \times 2.31)} = 670 \text{ gpm}$$

- 6) Theoretical based on nozzle chart:

$$4 \times 33 \times 5.15 \approx 681 \text{ gpm} \approx 1.52 \text{ gfs}$$

$$4 \times 33 \times 5.39 \approx 711 \text{ gpm} \approx 1.58 \text{ gfs}$$

- 7) Conclusion fr. North well: Nozzle chart calculation is likely the most reliable as it uses field-exam measurements consistent with affidavit describing original system. It is also consistent with theoretical #5. It is not consistent w/ Proof of Dam. Use estimates of Q but none of them assert a measurement was performed.

Recommend 1.58 gfs for dam. use claim
for 29-2613

- 8) South well: License examiner found 265 GPM @ South well, but figures into record as 265 GPM $\approx$ 0.59 gfs, but license was issued for 0.70 gfs. License exam 29-7050

Diversion Rate 6/23/0 4

29-7050 Good 0.66 gfs w/ Budget meter
but I believe nozzle count is possibly
more accurate.

Recommend 29-7050 @ 2.28 gfs as licensed

9) Combined limitation:

Based on license exam 29-7613, combined
capacity is 209 gfs. Limit 3 rights
in combination to 209 gfs.

Note that average ($79 + 35 = 114$)
justifies up to 2.28 gfs.

10) Unless Ground Water District Data are
significantly different this should
be a sound recommendation. Even
then, Exam was performed in 1984,
claim was filed in 1989. Exam is
probably a better representation of 1987
condition than is GWD data.

Dwight A. Carter

Table 1. Sprinkler discharge gpm (gallons per minute) for nozzle size (inches) and pressures (psi) (pounds per square inch).

psi	Nozzle Size (in)										
	3/32	7/64	1/8	9/64	5/32	11/64	3/16	13/64	7/32	15/64	1/4
20	1.17	1.60	2.09	2.65	3.26	3.92	4.69	5.51	6.37	7.32	8.34
25	1.31	1.78	2.34	2.96	3.64	4.38	5.25	6.16	7.13	8.19	9.32
30	1.44	1.95	2.56	3.26	4.01	4.83	5.75	6.80	7.86	8.97	10.21
35	1.55	2.11	2.77	3.50	4.31	5.18	6.21	7.30	8.43	9.69	11.03
40	1.66	2.26	2.96	3.74	4.61	5.54	6.64	7.80	9.02	10.35	11.79
45	1.76	2.39	3.13	3.99	4.91	5.91	7.03	8.30	9.60	10.99	12.50
50	1.85	2.52	3.30	4.18	5.15	6.19	7.41	8.71	10.10	11.58	13.18
55	1.94	2.64	3.46	4.37	5.39	6.48	7.77	9.12	10.50	12.15	13.82
60	2.03	2.76	3.62	4.50	5.65	6.80	8.12	9.56	11.05	12.68	14.44
65	2.11	2.88	3.77	4.76	5.87	7.06	8.45	9.92	11.45	13.21	15.03
70	2.19	2.99	3.91	4.96	6.10	7.34	8.78	10.32	11.95	13.70	15.59
75	2.27	3.09	4.05	5.12	6.30	7.58	9.08	10.66	12.32	14.19	16.14
80	2.35	3.19	4.18	5.29	6.52	7.84	9.39	11.02	12.74	14.64	16.67
85	2.42	3.29	4.31	5.45	6.71	8.07	9.67	11.35	13.11	15.10	17.18
90	2.49	3.38	4.43	5.61	6.91	8.31	9.95	11.69	13.51	15.53	17.68
100	2.62	3.57	4.67	5.91	7.29	8.76	10.50	12.32	14.23	16.37	18.64
110	2.75	3.74	4.89	6.19	7.63	9.24	11.00	12.90	14.97	17.17	19.55
120	2.87	3.91	5.10	6.46	7.97	9.65	11.48	13.47	15.63	17.93	20.42
130	2.99	4.07	5.31	6.72	8.30	10.04	11.95	14.02	16.27	18.66	21.25

Note: Figures given are approximate maximum discharge rates for given nozzle size and pressure.

Table 2. Average gross application rate (in/hr).

Spacing (ft)	Gallons per minute from each sprinkler									
	1	2	3	4	5	6	7	8	9	10
20 x 20	0.24	0.48	0.72	0.96	1.20	1.44	1.70	1.93	2.16	2.40
20 x 30	.16	.32	.48	.64	0.80	0.96	1.12	1.28	1.43	1.60
20 x 40	.12	.24	.36	.48	.60	.72	0.84	0.96	1.08	1.20
30 x 30	.11	.21	.32	.43	.54	.64	.75	.86	0.96	1.07
30 x 40	.08	.16	.24	.32	.40	.48	.56	.64	.72	0.80
30 x 50	.06	.13	.19	.25	.32	.38	.45	.51	.58	.64
40 x 40	.06	.12	.18	.24	.30	.36	.42	.48	.54	.60
40 x 50	.05	.10	.14	.19	.24	.29	.34	.38	.43	.48
40 x 60	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40

Table 3. Net applied depth (in) at 70% efficiency.

Set time (hrs)	Application										
	0.10	0.12	0.14	0.16	0.18	0.20					
1	.07	.08	.10	.11	.13	.14	.17	.20	.22	.25	.28
2	.14	.17	.20	.22	.25	.28	.34	.39	.45	.50	.63
3	.21	.25	.29	.34	.38	.42	.50	.59	.67	0.76	0.95
4	.28	.34	.39	.45	.50	.56	.67	.78	0.90	1.01	1.26
5	.35	.42	.49	.56	.63	.70	0.84	0.98	1.12	1.26	1.58
6	.42	.50	.59	.67	.76	.84	1.01	1.18	1.34	1.51	1.89
7	.49	.59	.69	.78	0.88	0.98	1.18	1.37	1.57	1.76	2.21
8	.56	.67	.79	0.90	1.01	1.12	1.34	1.57	1.79	2.02	2.52
9	.63	.76	.88	1.01	1.13	1.26	1.51	1.76	2.02	2.27	2.84
10	.70	0.84	0.98	1.12	1.26	1.40	1.68	1.96	2.24	2.52	3.15
12	0.84	1.01	1.18	1.34	1.51	1.68	2.02	2.35	2.69	3.02	3.78
18	1.26	1.51	1.76	2.02	2.27	2.52	3.02	3.53	4.03	4.54	5.67
24	1.68	2.02	2.35	2.69	3.02	3.36	4.03	4.70	5.38	6.05	7.56
36	2.52	3.02	3.53	4.03	4.54	5.04	6.05	7.06	8.06	9.07	11.34
48	3.36	4.03	4.70	5.38	6.05	6.72	8.06	9.41	10.75	12.10	15.12

Claim 29-12588

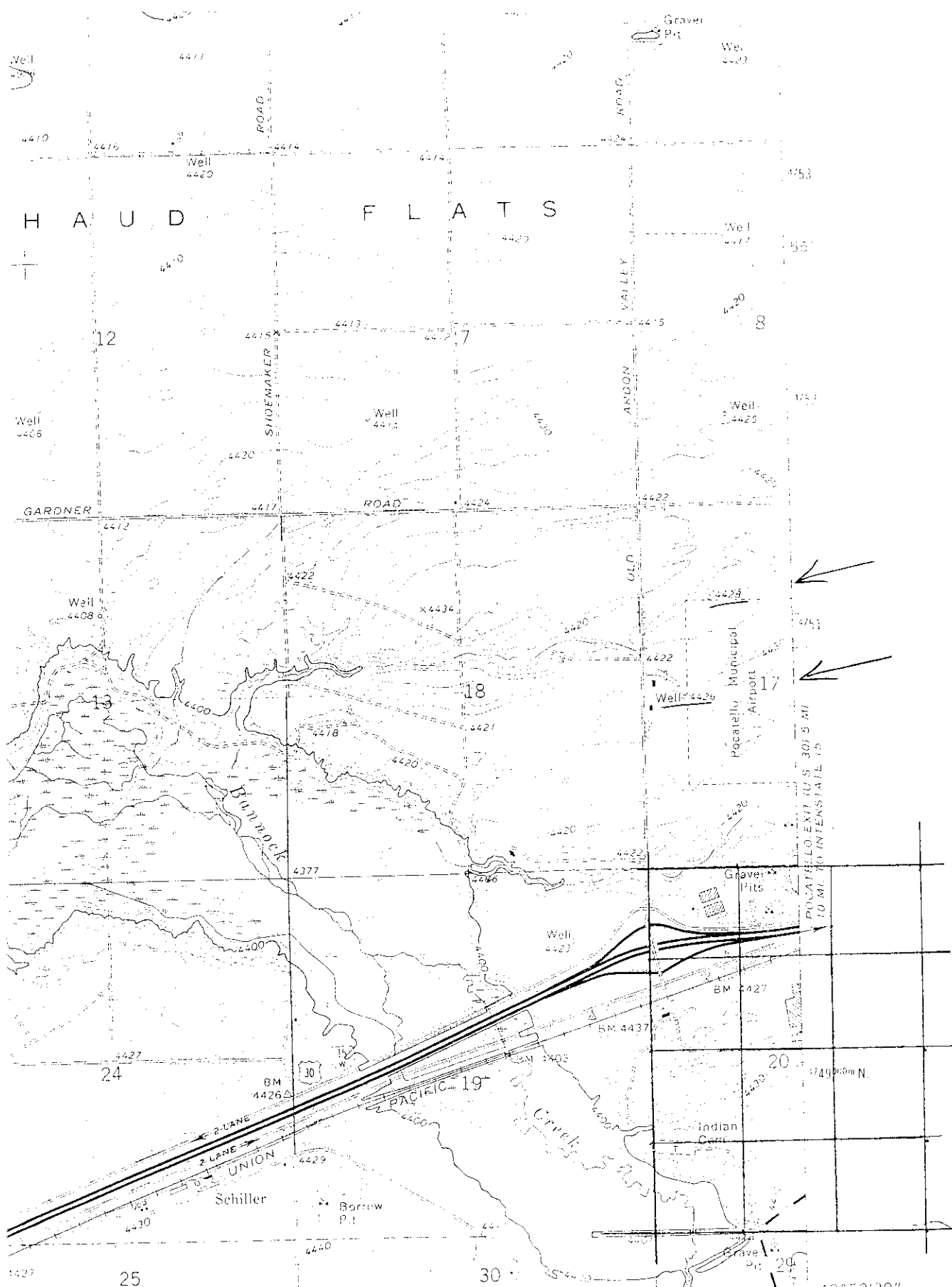
Doc Source Dorrell C. Laven, U.S.

1991 Workshop Handout

Date 6/29/91 Sig. JCC

Table 4. Adjustment factor to use with values in table 3 for other than 70% efficiency.

Efficiency	Multiply by	Efficiency	Multiply by
55	0.79	75	1.07
60	0.86	80	1.14
65	0.93	85	1.21



40' 64
1:62,500

R. 32 E. R. 33 E.

ROAD CLASSIFICATION

Primary highway hard surface	Light duty road, hard or improved surface
Secondary highway, improved surface	Improved road

42°52'30"

117°34'30"

16/000m E.

3489 1 SE

(MICHAUD CREEK)