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HB1111 STUDY

**EFFECT OF ALLOWING THE WATERING OF DOMESTIC ANIMALS WITH
HOUSEHOLD USE ONLY WELLS**

Prepared for:

The 1990 Legislature

By:

**OFFICE OF THE STATE ENGINEER
DIVISION OF WATER RESOURCES
GROUND WATER SECTION**

November 30, 1990

SUMMARY

Section 37-92-602(3)(b)(II)(B), C.R.S. requires the State Engineer to conduct a study of the effects of 1988 House Bill 1111 for the period July 1, 1988 through July 1, 1990. House Bill 1111, approved on May 17, 1988, provides for the issuance of new well permits, normally limited to use for ordinary household purposes only in one dwelling, to include the watering of the user's non-commercial domestic animals. The bill also provided for the amendment of existing permits with the same limitations. This report presents the results of the study conducted by the Office of the State Engineer.

Information on the use of the new and amended wells for watering of animals was obtained by a survey of persons who amended permits or constructed wells under new permits issued during the study period. This information was then compiled into estimates of additional consumptive use of water resulting from allowing the watering of the user's non-commercial domestic animals. The results of the study indicate that 48% of persons having or desiring to construct wells, that would have been limited to ordinary household purposes only, desire to water domestic animals resulting in an additional annual consumptive use, per current and future well, of approximately 0.01 acre-foot per year per well.

STUDY

The records of the Division of Water Resources indicate that during the study period, July 1, 1988 to July 1, 1990, 367 holders of valid well permits issued prior to July 1, 1988, amended their "household use only" permit to allow the watering of the owner's (user's) non-commercial domestic animals pursuant to Section 37-92-602(3)(b)(II)(B), C.R.S. This equates to about 1.1% of these types of wells constructed between May 1972 and May 17, 1988. Approximately 32,700 household use wells were constructed statewide during that period. Subsequent to the passage of House Bill 1111, about 695 wells which allowed the watering of non-commercial domestic animals were constructed during the study period July 1, 1988 to July 1, 1990. These numbers are depicted in Figure 1.

Questionnaires were mailed to the 695 permit holders that constructed new wells during the study period and to the 367 permit holders of wells that amended their permits to allow the watering of non-commercial domestic animals. The questionnaire asked whether or not the well owner had animals, and, if so, the type and number of animals. Responses were received from 72% of the well owners polled, 296 or about 81% of the owners of amended pre-1988 permits and 464 or approximately 67% of the owners of new well permits issued during the study period. The numbers and types of animals varied greatly from birds to horses and exotic animals, but primarily horses. The number of respondents actually watering animals were 190 owners of amended Pre-1988 constructed wells, or 64%, and 224 wells constructed during the study period, or 48%.

The amount of water consumed by each type of animal was determined from Table 1 of the "Manual of Individual Water Supply Systems," a standard manual of water use published by the United States Environmental Protection Agency. This manual is used extensively by the water supply industry and water resources

consultants. Using the responses from the survey and water use values from the EPA manual, the additional consumptive use that could be ascribed to animal watering, for all wells for which responses were received, is 11.63 acre-feet per year. This value breaks down to 6.70 acre-feet per year reported as consumed from amended wells and 4.93 acre-feet reported as consumed from newly constructed wells. When these values are adjusted to include all the amended household use only (HUO) wells amended during the study period and all the new wells constructed during the study period, the values become 8.31 acre-feet per year and 7.38 acre-feet per year, respectively. Thus, the estimated total additional consumptive use becomes 15.69 acre-feet per year. The adjustments are based on an additional consumption of approximately 0.023 acre-feet per well per year by amended wells and 0.011 acre-feet per well per year by newly constructed wells. The number of wells and amounts of additional annual consumptive use for each water division and former irrigation district are shown in Table A and for each county in Table B.

PROJECTIONS

Using the responses to the survey and the well records of the Division of Water Resources, projections of the amount of water that could potentially be consumed by the watering of domestic animals is projected for a ten-year period in two-year increments. Assuming that 1% of the owners of in-house use wells constructed prior to May 17, 1988, will amend their permits every two years, 1635 permits will be amended (five 2-year periods X 327 wells per period). Using 0.023 acre-feet per well per year, about 229 acre-feet of additional water would be consumed during the ten years by amended wells. Based on current permit issue rates and well construction percentages, in ten years 5500 wells (1100 wells per two-year period X 5 periods) will be constructed which will allow the watering of animals. Using a value of 0.011 acre-feet per well per year of consumptive use, 666 acre-feet of additional water would be consumed by these type wells during the ten years. The total additional consumption by newly constructed and amended wells would be 895 acre-feet in the ten-year period with the additional consumptive use in the tenth year being 163 acre-feet.

RELATIONSHIPS

The relationship of the additional water diverted and consumed by these amended wells and wells newly constructed during the study period is compared to total diversions of water for Divisions 1, 2, and 4.

Division 1, the South Platte Drainage, has 60% of the newly constructed wells and 66% of the amended wells. Based on the survey results, the additional annual water consumed by the watering of non-commercial domestic animals in Division 1 is 9.85 acre-feet. By comparison, 3,833,678 acre-feet of water was diverted in Division 1 for all uses in 1989.

Division 2, the Arkansas River Drainage, has 18% of the newly constructed wells and 26% of the amended wells. The additional water consumed annually by the watering of non-commercial domestic animals in Division 2 is 3.48 acre-feet.

This compares to an average annual diversion of water for all uses in the Division of 1,678,758 acre-feet.

In Division 4, the Gunnison-Uncompaghre Drainages, newly constructed well equaled 4% of the wells surveyed, and amended wells equaled 1% of the surveyed wells. Total annual consumptive use of these wells is 0.4 acre-feet. By comparison, the 1989 annual irrigation diversions for Division 4 totaled 1,938,329 acre-feet.

Diversion totals for other Divisions were not available for comparison.

CONCLUSION

The study shows that, based on the number of wells newly constructed during the study period and on the number of previously constructed wells amended during the study period, the potential exists for the additional annual consumption of almost 16 acre-feet of water statewide. Approximately 1% of the wells eligible to be amended were amended, and about two-thirds of these amended wells currently water animals, resulting in an annual increase of 8.31 acre-feet of water being consumed statewide. Approximately one-half of the new wells constructed during the two-year study period actually were used to water animals with an annual increase of 7.38 acre-feet of water being consumed statewide. For the two water divisions in which most of these wells are located, Divisions 1 and 2, the increase in the amount of water consumed for the two-year study period, as compared to total water diverted, is less than 0.0002% of the total annual diversions for these divisions. After ten years the annual additional consumptive use would amount to 0.0024% of the total annual diversions for these Divisions.

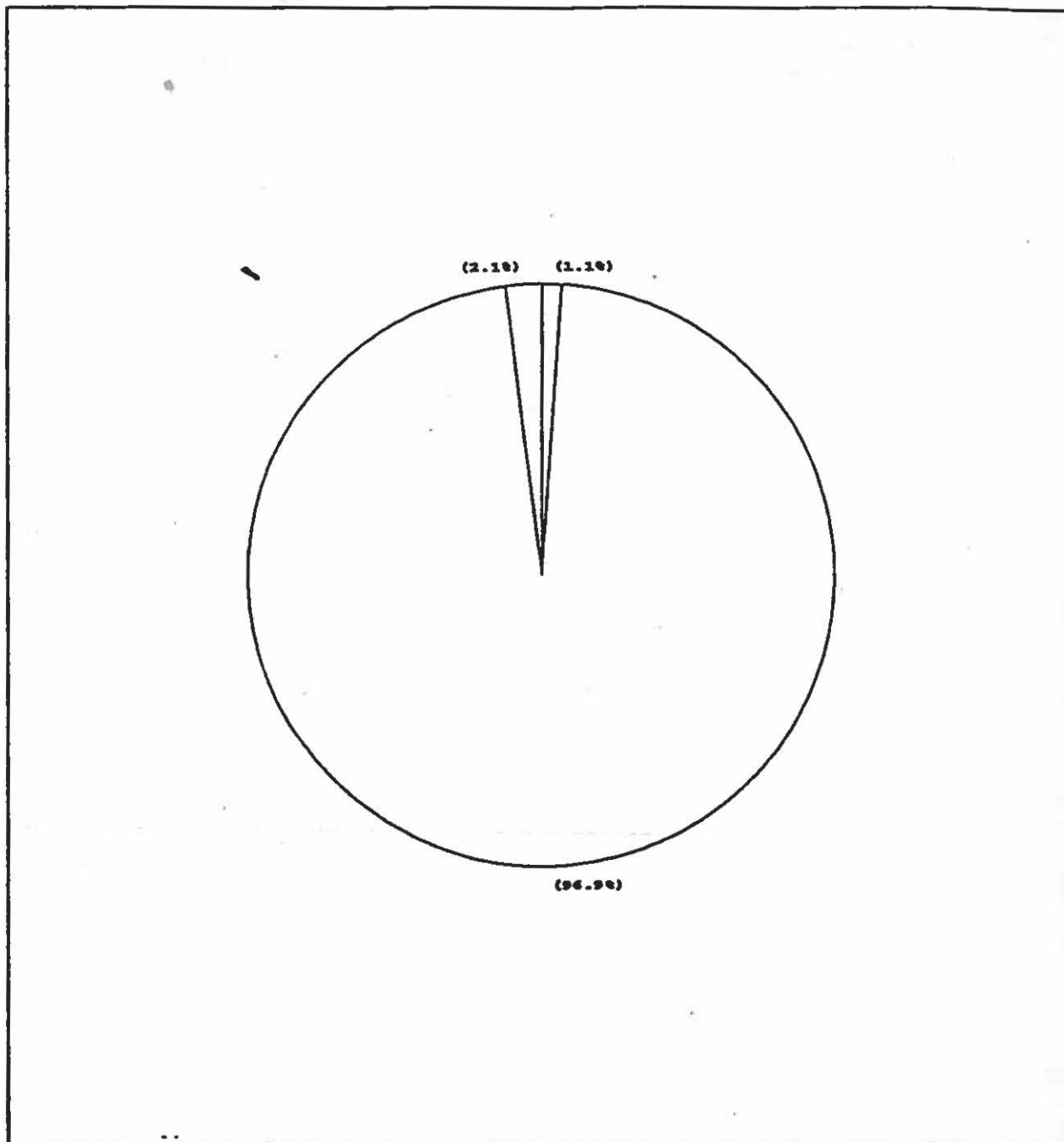


Figure 1 - DISTRIBUTION OF HOUSEHOLD USE ONLY WELLS SHOWING THE PERCENT ALLOWING THE WATERING OF THE USER'S NON-COMMERCIAL DOMESTIC ANIMALS

1.1% = 367 PERMITS AMENDED PER HB1111

2.1% = 695 WELLS CONSTRUCTED
(5/17/88 TO 6/30/90) CONDITIONS ALLOW
WATERING OF DOMESTIC ANIMALS

96.9% = 31,661 PERMITS THAT HAVE NOT BEEN
AMENDED PER HB1111

TOTAL GRAPH = 32,723 CONSTRUCTED WELLS

TABLE A. WELLS & CONSUMPTIVE USE BY DIVISION & DISTRICT

	HUO WELLS CONST. PRE 5-17-1988	HUO WELLS CONST. 5-17-88 TO 6-30-90	CONSUMPTIVE USE IN ACRE FEET	AMENDED PERMITS PER HB1111	CONSUMPTIVE USE IN ACRE FEET
DIVISION 1					
SOUTH PLATTE					
WATER DISTRICT					
1	185	5	0.05	6	0.14
2	356	12	0.13	1	0.02
3	987	26	0.28	2	0.05
4	1140	30	0.32	5	0.11
5	935	23	0.24	1	0.02
6	2202	62	0.66	1	0.02
7	1902	18	0.19	19	0.43
8	1787	63	0.67	46	1.04
23	2634	42	0.45	47	1.06
9	3734	73	0.78	46	1.04
48	5	0	0.00	0	0.00
49	0	0	0.00	0	0.00
65	0	0	0.00	0	0.00
64	141	6	0.06	0	0.00
76	0	0	0.00	0	0.00
80	2945	54	0.57	67	1.52
TOTAL	18953	414	4.40	241	5.45
DIVISION 2					
ARKANSAS					
WATER DISTRICT					
10	999	24	0.25	31	0.70
11	1531	21	0.22	38	0.86
12	1884	47	0.50	13	0.29
13	576	13	0.14	12	0.27
14	144	2	0.02	1	0.02
15	330	5	0.05	1	0.02
16	36	2	0.02	0	0.00
17	48	2	0.02	0	0.00
18	17	1	0.01	0	0.00
19	120	6	0.06	0	0.00
66	8	0	0.00	0	0.00
67	26	0	0.00	0	0.00
79	15	0	0.00	0	0.00
TOTAL	5734	123	1.31	96	2.17

TABLE A.

	HUD WELLS CONST. PRE 5-17-1988	HUD WELLS CONST. 5-17-88 TO 6-30-90	CONSUMPTIVE USE IN ACRE FEET	AMENDED PERMITS PER HB1111	CONSUMPTIVE USE IN ACRE FEET
DIVISION 3					
RIO GRANDE					
WATER DISTRICT					
20	753	9	0.10	2	0.05
21	36	1	0.01	0	0.00
22	139	6	0.06	0	0.00
24	41	1	0.01	0	0.00
25	56	3	0.03	0	0.00
26	14	1	0.01	1	0.02
27	11	0	0.00	0	0.00
35	115	0	0.00	0	0.00
TOTAL	1165	21	0.22	3	0.07
DIVISION 4					
GUNNISON					
WATER DISTRICT					
28	217	4	0.04	0	0.00
40	180	3	0.03	4	0.09
41	72	1	0.01	0	0.00
42	9	2	0.02	0	0.00
59	484	8	0.08	0	0.00
60	174	1	0.01	0	0.00
61	0	0	0.00	0	0.00
62	151	7	0.07	0	0.00
63	4	0	0.00	0	0.00
68	84	3	0.03	0	0.00
73	2	0	0.00	0	0.00
TOTAL	1377	29	0.31	4	0.09
DIVISION 5					
COLORADO					
WATER DISTRICT					
36	1025	16	0.17	1	0.02
37	65	5	0.05	0	0.00
38	597	32	0.34	10	0.23
39	152	6	0.06	4	0.09
45	113	6	0.06	1	0.02
50	183	1	0.01	0	0.00
51	1577	20	0.21	0	0.00
52	7	0	0.00	0	0.00
53	29	2	0.02	0	0.00
70	9	0	0.00	0	0.00
72	52	3	0.03	0	0.00
TOTAL	3809	91	0.97	16	0.36

TABLE A.

	HUO WELLS CONST. PRE 5-17-1988	HUO WELLS CONST. 5-17-88 TO 6-30-90	CONSUMPTIVE USE IN ACRE FEET	AMENDED PERMITS PER HB1111	CONSUMPTIVE USE IN ACRE FEET
DIVISION 6					
YAMPA & WHITE					
WATER DISTRICT					
47	88	4	0.04	0	0.00
43	32	1	0.01	1	0.02
44	56	0	0.00	0	0.00
54	9	0	0.00	0	0.00
55	2	0	0.00	0	0.00
56	1	0	0.00	0	0.00
57	5	0	0.00	0	0.00
58	154	1	0.01	0	0.00
TOTAL	347	6	0.06	1	0.02
DIVISION 7					
SAN JUAN & DOLORES					
WATER DISTRICT					
29	205	1	0.01	0	0.00
30	422	4	0.04	2	0.05
31	374	4	0.04	0	0.00
32	42	0	0.00	0	0.00
33	41	0	0.00	1	0.02
34	30	0	0.00	0	0.00
46	6	0	0.00	0	0.00
69	11	0	0.00	0	0.00
78	144	1	0.01	2	0.05
71	58	1	0.01	1	0.02
77	5	0	0.00	0	0.00
TOTAL	1338	11	0.12	6	0.14
TOTAL ALL	32723	695	7.38	367	8.31

NOTE: HUO = HOUSEHOLD USE ONLY

TABLE B. WELLS & CONSUMPTIVE USE BY COUNTY

COUNTY	HUO WELLS CONST. PRE 5-17-1988	HUO WELLS CONST. 5-17-89 TO 6-30-90	CONSUMPTIVE USE IN ACRE FEET	AMENDED PERMITS PER HB 1111	CONSUMPTIVE USE USE IN ACRE FEET
ADAMS	195	5	0.05	0	0.00
ALAMOSA	146	3	0.03	0	0.00
ARAPAHOE	69	4	0.04	0	0.00
ARCHULETA	360	2	0.02	1	0.02
BACA	2	0	0.00	0	0.00
BENT	21	0	0.00	0	0.00
BOULDER	2401	71	0.75	1	0.02
CHAFFEE	1154	14	0.15	36	0.81
CHEYENNE	2	1	0.01	0	0.00
CLEAR CREEK	1300	17	0.18	17	0.38
CONEJOS	173	7	0.07	0	0.00
COSTILLA	144	1	0.01	0	0.00
CROWLEY	11	0	0.00	0	0.00
CUSTER	780	16	0.17	12	0.27
DELTA	147	1	0.01	0	0.00
DENVER	2	0	0.00	0	0.00
DOLORES	9	0	0.00	0	0.00
DOUGLAS	503	33	0.35	8	0.18
EAGLE	121	8	0.08	2	0.05
ELBERT	87	7	0.07	1	0.02
EL PASO	874	24	0.25	42	0.95
FREMONT	1046	25	0.27	9	0.20
GARFIELD	419	21	0.22	11	0.25
GILPIN	895	16	0.17	1	0.02
GRAND	1777	20	0.21	0	0.00
GUNNISON	820	17	0.18	4	0.09
HINSDALE	218	5	0.05	0	0.00
HUERFANO	48	2	0.02	0	0.00
JACKSON	89	4	0.04	0	0.00
JEFFERSON	6036	120	1.27	100	2.26
KIOWA	2	2	0.02	0	0.00
KIT CARSON	9	0	0.00	0	0.00
LAKE	383	7	0.07	3	0.07
LA PLATA	834	8	0.08	3	0.07
LARIMER	2074	53	0.56	7	0.16
LAS ANIMAS	140	7	0.07	0	0.00
LINCOLN	9	0	0.00	0	0.00
LOGAN	125	3	0.03	0	0.00
MESA	69	4	0.04	0	0.00
MINERAL	197	3	0.03	0	0.00
MOFFAT	62	0	0.00	0	0.00
MONTEZUMA	127	1	0.01	1	0.02
MONTROSE	101	1	0.01	0	0.00
MORGAN	54	0	0.00	0	-0.00
OTERO	21	2	0.02	0	0.00
OURAY	82	3	0.03	0	0.00
PARK	3696	61	0.65	74	1.67
PHILLIPS	0	0	0.00	0	0.00
PITKIN	360	17	0.18	3	0.07
PROWERS	7	0	0.00	0	0.00
PUEBLO	361	3	0.03	2	0.05
RIO BLANCO	32	1	0.01	1	0.02
RIO GRANDE	308	4	0.04	2	0.05
ROUTT	163	1	0.01	0	0.00
SAGUACHE	105	7	0.07	1	0.02
SAN JUAN	4	0	0.00	0	0.00
SAN MIGUEL	157	2	0.02	0	0.00
SEDGWICK	11	1	0.01	0	0.00
SUMMIT	1015	16	0.17	1	0.02
TELLER	2106	40	0.42	24	0.54
WASHINGTON	6	1	0.01	0	0.00
WELD	236	3	0.03	0	0.00
YUMA	18	0	0.00	0	0.00
TOTAL	32723	695	7.38	367	8.31