GENERAL OBSERVATIONS ON UNDERGROUND WATER IN NEW MEXICO

By

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I. Water Laws:

State Constitution

1. Confirmed existing right
2. Declared unappropriated water of natural streams to be public. Priority of appropriation shall give the better right.
3. Beneficial use shall be the basis, the measure and the limit of the right to the use of water. This is different to eastern states where riparian rights is the basic guide for use of water.

Ground Water Law

Legislative act of 1931 declares: The water of underground streams, channels, artesian basins, reservoirs, or lakes, having reasonable ascertainable boundaries, are hereby declared to be public waters and to belong to the public and to be subject to appropriation for beneficial use.

1949 law required drillers to be licensed.

1. Bond required
2. Licensed drillers in declared basins
3. Must have State Engineer's permit to drill.

1955 law

Cannot drill wells in New Mexico and take water across state line.
Office of State Engineer created in 1907.
Some conflict between surface and ground water laws.
The administrative, judicial and legislative decisions as regards water can materially effect the economy of an area.
Declared basins- State Engineer has authority to declare basins, once declared he has control over drilling.

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II. Increase Use of Ground Water

1. For Irrigation - - Table 1 shows that the acreage irrigated from wells increased about 200,000 acres from 1940 to 1950. By 1955 the irrigated land receiving water from wells had increased to about 66 percent of the total.

TABLE I

Acreage Irrigated by Source of Water for Various Years in New Mexico

	1955a	1950	1940	1930	1920
	acres	acres	acres	acres	acres
Flowing Wells	2,000[b]	19,120	23,262	27,693	36,586
Pumped Wells	574,000[c]	297,880[e]	97,304	37,295	24,291
Total Wells	576,000[c]	317,000[e]	120,566	64,988	60,877
% of Total Irrigated Land	66%	45%	21%	12%	11%
Streams and Other Sources	297,000[d]	383,000[e]	459,286	468,935	486,082
Total	873,000	700,000	579,852	533,923	546,959

Source: 1950 U. S. Census of Agriculture Irrigation of Agriculture Lands. Volume III - pt. 12.

a. Estimates by U.S. Geological Survey, Ground water Branch.
b. Estimated, primarily Roswell Basin, does not include wells which flow in the winter but are pumped in the summer.
c. Includes about 131,000 acres also furnished surface water.
d. Does not include about 131,000 acres also furnished ground water. Includes about 4,000 acres furnished sewage.
e. Includes approximately 34,000 acres also receiving surface water.

Increased number of pumps -- as indicated in Table 2, the number of irrigation pumps more than doubled from 1940 to 1950. For the five year period 1950 to 1955 the number of wells again almost doubled. There has also been substantial increases in the number of irrigation wells in specific oounties from 1950 to 1955. For example Dona Ana County reported only 46 pumps in 1950, compared with about 1200 in 1955. Curry County reported about 16 pumps in 1950 and by 1956 there is more than 400 in this county.

TABLE 2

A Comparison of Number of Pumps, Average Lift, and Additional Cost of Water for 1940 and 1950 and number of pumps 1955, by Counties in New Mexico

Area	Irrigation Pumps No.			Average Pumping Lift		Decrease 1940 to 1950	Additional** cost per acre-foot
	1940	1950	1955[a]	1940	1950		
State	1558	3942	7500b	46	70	-24	1.56
Bernalillo	3	32	*	*	43	--	
Catron	16	1	*	-42	--	--	
Chaves	597	943	1000	38	61	-23	1.50
Colfax	1	2	*	--	20	--	
Curry	*	16	400/	*	162	--	
DeBaca	*	4	*	*	47	--	
Dona Ana	7	46	1200	--	65	--	
Eddy	206	491	750	46	64	-18	1.17
Grant	29	51	70	35	73	-38	2.47
Guadalupe	--	--	9	--	--	--	
Hidalgo	17	74	160	38	82	-44	2.86
Lea	47	692	1000	55	70	-15	.98
Lincoln	3	52	*	63	60	/3	
Luna	204	413	570	68	93	-25	1.63
McKinley	--	1	*	--	85	--	
Mora	--	2	*	--	--	--	
Otero	4	38	100	112	108	/4	
Quay	12	55	65	74	66	/8	
Rio Arriba	1	6	*	--	15	--	
Roosevelt	330	772	1100	46	68	-22	1.43
Sandoval	1	2	*	--	40	--	
San Juan	1	20	*	*	50	--	
San Miguel	1	8	*	*	79	--	
Santa Fe	4	23	43	26	129	-103	6.70
Sierra	59	60	*	18	42	-24	1.56
Socorro	2	--	*	*	--	--	
Taos	2	3	17	*	225	--	
Torrance	5	104	200	68	85	-17	1.10
Union	3	9	40	*	80	--	
Valencia	--	22	35	--	127	--	

* Not Available

** Based on a cost of 6.5¢ per acre foot, per foot of lift. Source: 1950 U. S. Census of Agriculture, Irrigation of Agri. Lands, V. III - Pt. 12 / U.S.G.S.

a. Estimates by U.S.G.S. Ground Water Branch and Stephens.

b. County figures do not add up to the 7,500 state total. The additional pumps are in counties where estimates were not made.

2. Domestic use - The increased domestic use of ground water in Albuquerque is a good example of the general trend in the state. Table 3 shows that in 1947 the City of Albuquerque used about 9,000 acre-feet, by 1954 this had increased to about 27,000 acre-feet. The principal source of this water is deep wells. In 1954 the average daily use of water per person averaged 159 gallons in Albuquerque.

TABLE 3

Use of water by the City of Albuquerque 1947 and 1954

Year	No. Wells	Bil. of gal. used	Ac/ft
1947	17	2.9	8,891
1954	54	8.7	26,761

Source: Albuquerque Progress, Vol. XXII, No. 6, Albuquerque National Bank, June 1955, p-1

3. Industrial use - as industry in our state increases it demands and gets additional water. Ground water is the principal source of this water.

III. Location of Irrigated land in New Mexico

Table 4 shows the location of irrigated land in the state by counties and by source of water. It is indicated that for the entire state about 70 percent of the irrigated land receives part of all of the water from wells.

TABLE 4

Irrigated Acreage in State by Source of Water and by Counties, 1955

County	Irrigated Acreage			
	Wells	Surface stream	Combination surface & well	Total
Bernalillo	---	1,700	24,000	25,700
Catron	---	2,200	---	2,200
Chaves	90,100	4,000	---	94,100
Colfax	---	23,000	---	23,000
Curry	63,000	---	---	63,000
DeBaca	---	4,300	---	4,300
Dona Ana	4,900	5,500	80,000	90,400
Eddy	43,000	6,500	20,000	69,500
Grant	---	7,500	1,900	9,400
Guadalupe	250	3,100	---	3,350
Harding	---	100	---	100
Hidalgo	12,600	---	5,000	17,600
Lea	85,000	---	---	85,000
Lincoln	350	1,200	4,700	6,250
Luna	30,000	---	1,000	31,000
McKinley	---	3,500	---	3,500
Mora	---	15,000	---	15,000
Otero	5,500	2,500	1,000	9,000
Quay	3,500	36,520	---	40,020
Rio Arriba	---	34,000	---	34,000
Roosevelt	50,000	---	---	50,000
Sandoval	---	10,000	5,000	15,000
San Juan	---	42,900	---	42,900
San Miguel	---	15,000	---	15,000
Santa Fe	3,000	8,000	---	11,000
Sierra	1,000	4,200	---	5,200
Socorro	---	2,200	13,000	15,200
Taos	2,100	33,000	---	35,100
Torrance	20,000	100	---	20,100
Union	4,370	1,000	---	5,370
Valencia	4,500	5,500	22,000	32,000
State	423,170	272,520	177,600	873,290

Source: Estimated by Stephens based on report by C. B. Thompson, State Waters, New Mexico Interstate Stream Commission, Santa Fe, New Mexico, June 1953 and estimates by U.S.G.S. Ground Water Branch.

IV. Declared Basins

1. Roswell Artesian Basin
   a. Declared August 12, 1931
   b. Artesian basin closed at this time.(1931)
   c. Shallow water basin closed 1937
   d. Water table dropped from 38 feet in 1940 to 61 feet 1950 or 23 feet.
   e. This would be an additional cost of 23 x 6.5¢= $1.50 per acre foot.
   f. Dropped 10 feet around Hagerman from 1953 to 1954

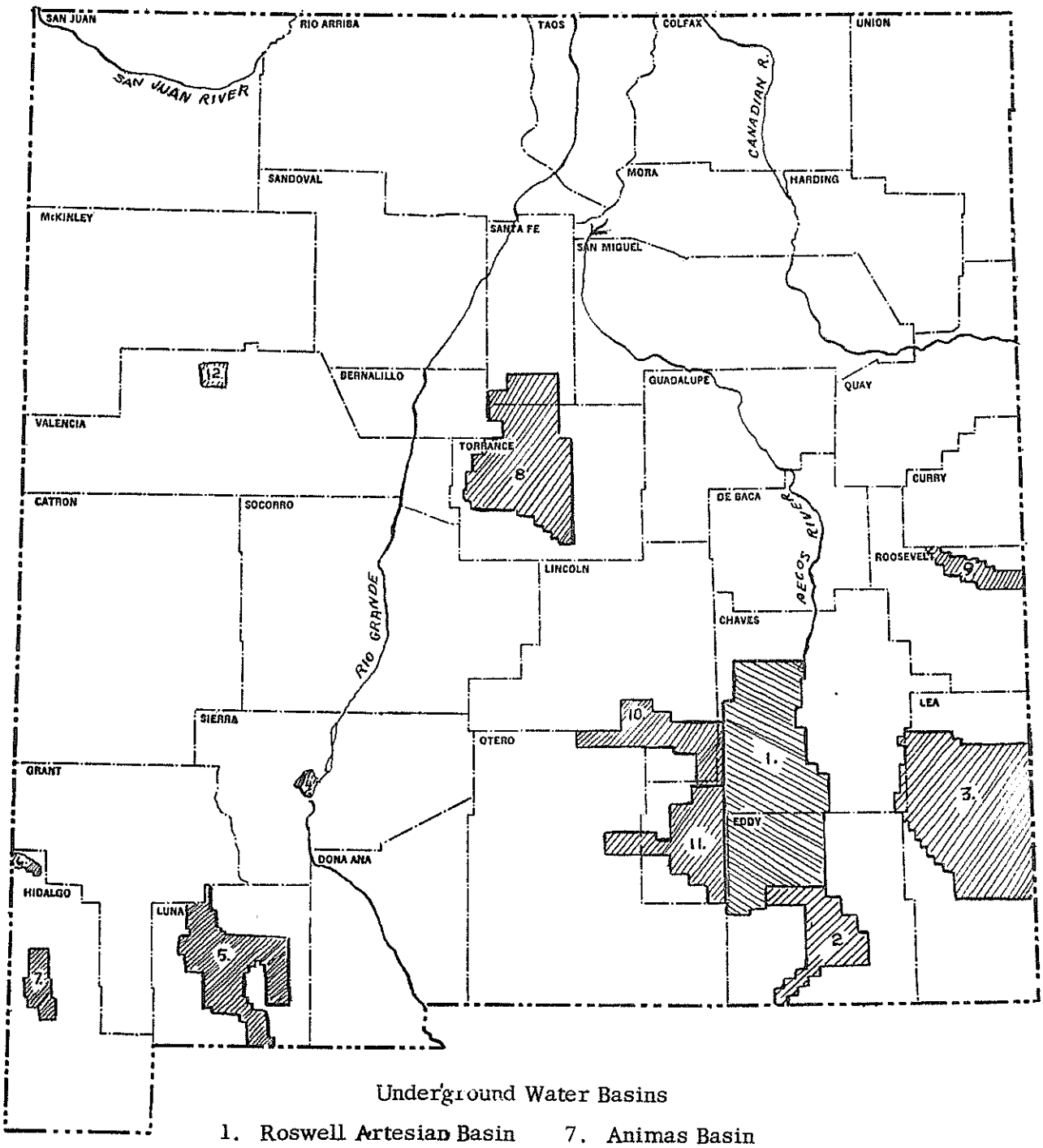
2. Carlsbad Basin
   a. Declared basin October 16, 1947
   b. Open to filing of application for ground water for supplemental use of lands with existing surface water rights.
   c. Water table dropped from 46 feet in 1940 to 64 feet in 1950 or 18 feet.
   d. An increased cost of $1.17 per acre-foot.
   e. South of Loving dropped 6 feet from 1953 to 1954 Just south of Carlsbad dropped 6 feet for this same period.

3. Lea County Basin
   a. Declared August 21, 1931
   b. Closed December 29, 1948
   c. Reopened on a township basis 1953
   d. Water table dropped from 55 feet in 1940 to 70 feet in 1950 or 15 feet
   e. An increased cost of about $1.00 per acre-foot
   f. Dropped as much as 8 feet in some areas from 1953 to 1954

4. Hot Springs Artesian Basin
   a. Declared April 15, 1935
   b. Closed to mineral (hot) water July 1, 1937 Various portions reopened in 1947 and 1950
   c. Closed to fresh (cold) water August 26, 1947

5. Mimbres Basin
   a. Declared July 29, 1931, extended in 1942
   b. Closed April 20, 1945
   c. Reopened part of it April 26, 1950
   d. Water table lowered from 68' in 1940 to 93' in 1950 or 25'
   e. An increased cost of about $1.62 per acre-foot
   f. Lowered 4' to 5' in some areas from 1953 to 1954

DECLARED UNDERGROUND WATER BASINS *



Underground Water Basins

1. Roswell Artesian Basin
2. Carlsbad Basin
3. Lea County Basin
4. Hot Springs Basin
5. Mimbres Basin
6. Virden Valley Basin
7. Animas Basin
8. Estancia Basin
9. Portales Basin
10. Hondo Basin
11. Penasco Basin
12. Bluewater Basin

*Source: office of State Engineer

6. Virden Valley Basin
   a. Declared December 5, 1938
   b. Still open to filing

7. Animas Basin
   a. Declared May 5, 1948
   b. Closed June 14, 1948
   c. Dropped from 38' in 1940 to 82' in 1950 or 44'
   d. A cost increase of about $2.86 per acre-foot
   e. In concentrated pumping area dropped 7' from 1953 to 1954

8. Estancia Basin
   a. Declared January 31, 1950
   b. Still open to filing
   c. Water table dropped from 68' in 1940 to 85' in 1950 or 17'
   d. A cost increase of about $1.10 per acre-foot

9. Portales Basin
   a. Declared May 1, 1950
   b. Open to filing
   c. Water table dropped from 46' in 1940 to 68' in 1950 or 22'
   d. A cost increase of about $1.43 per acre-foot
   e. Dropped 6' - 8' from 1953 to 1954

10. Hondo Basin

11. Penasco Basin

12. Grants-Bluewater Basin

V. Other Ground Water Areas

1. Quay County - House Area
2. Curry County - Clovis Area
3. Hidalgo County - East of Animas - Playas
4. Taos County - Sunshine Valley
5. Sierra and Dona Ana Counties - Rincon and Mesilla Valleys
6. Sandoval, Bernalillo, Valencia, and Socorro Counties - Middle Rio Grande Valley
7. Grant County - Upper Gila River Valley
8. Grant and Luna Counties - Upper Mimbres Valley
9. Otero County - Tularosa Valley

VI. Summary

New Mexico with the possible exception of the Middle Rio Grande Valley has no known extensive ground water areas in which the available supply is sufficient to meet ultimate demand.

At present in the major pump areas the draft exceeds the recharge.

What are the economic limits on depth of pumping?

Relationship of costs and returns:

1. Cost

    a. Technology of pump, motor and fuel
    b. Prices paid

2. Returns

    a. Crops that can be grown, yields, etc.
    b. Prices received.