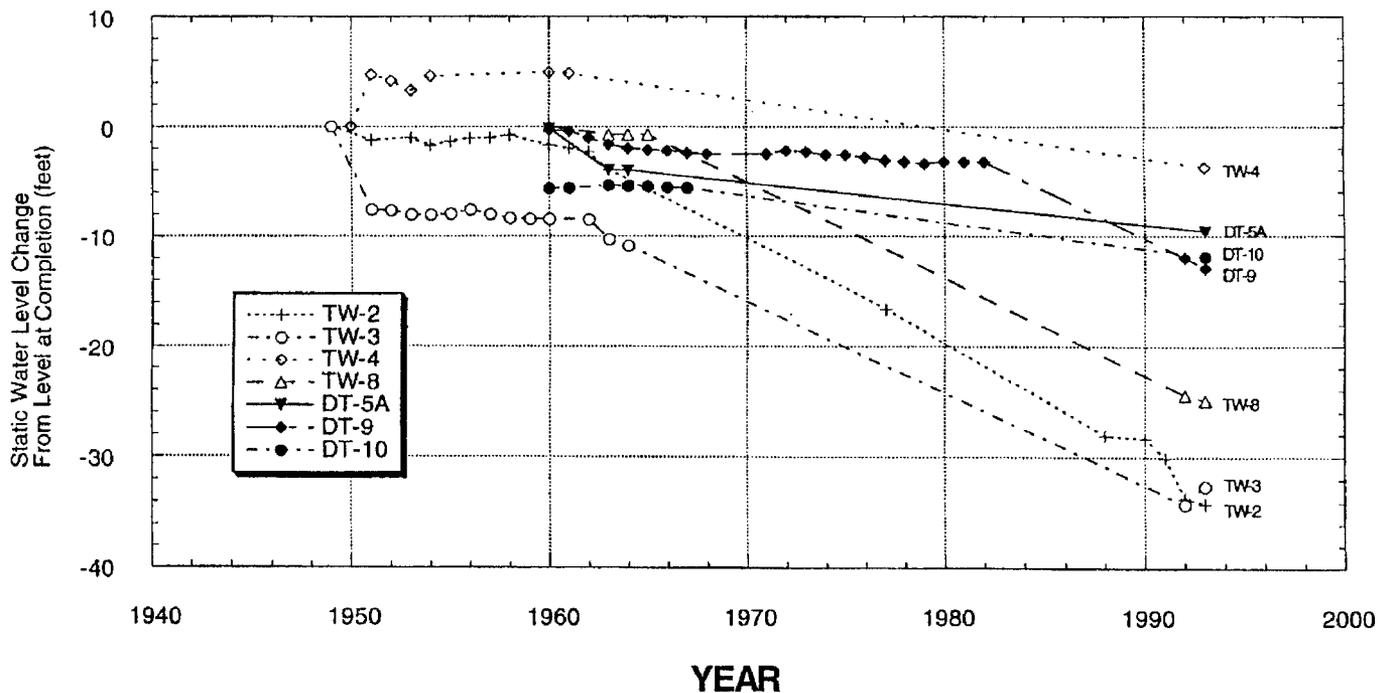


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Water Supply at
Los Alamos during 1993

Main Aquifer Test Wells



The four most recent reports in this series, unclassified, are LA-12276-PR, LA-12471-PR, LA-12770-PR, and LA-12926-PR.

Prepared by Belinda Gutierrez, Group ESH-20

Cover illustration: *The graph illustrates the changes in water levels observed in the test wells in the main aquifer of the Los Alamos area. These changes indicate declines of as much as 35 feet. Water level changes in pumping well fields are discussed in Section V of this report.*

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Progress Report

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*Water Supply at
Los Alamos during 1993*

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CONTENTS

FIGURES *vi*
TABLES..... *vi*
APPENDIX TABLES *vii*

ABSTRACT 1

I. INTRODUCTION 1

II. WELL FIELD CHARACTERISTICS..... 3
 A. Guaje Well Field..... 7
 B. Pajarito Well Field 9
 C. Otowi Well Field..... 10

**III. WATER CANYON GALLERY AND GUAJE AND
 LOS ALAMOS RESERVOIRS** 12

IV. QUALITY OF WATER..... 12

V. LONG-TERM WATER LEVEL TRENDS 12

VI. AQUIFER TEST AT SUPPLY WELL 0-4..... 17

**VII. PLUGGING OF LOS ALAMOS WELLS LA-1, LA-3,
 LA-4, AND LA-6**..... 21
 A. Well LA-1..... 21
 B. Well LA-3..... 22
 C. Well LA-4..... 22
 D. Well LA-6..... 22

VIII. SUMMARY 22

ACKNOWLEDGMENTS 22

REFERENCES..... 23

APPENDIX 25

WATER SUPPLY AT LOS ALAMOS
DURING 1993

FIGURES

1.	Locations of reservoirs, well fields, water supply wells, and gallery water supply.....	2
2.	Water production and usage from 1947 to 1993, and projected demands.	6
3.	Nonpumping water levels in wells in the Guaje Well Field.....	10
4.	Nonpumping water levels in wells in the Pajarito Well Field.	11
5.	Los Alamos Well Field.....	15
6.	Guaje Well Field.	15
7.	Pajarito Well Field.....	16
8.	Main Aquifer Test Wells.	16
9.	Generalized water level contours at Los Alamos, prepumping and 1993.....	18
10.	Pump test analysis at Well Otowi-4: a, discharge history in Otowi-4; and b, drawdown response in Test Well TW-3, located 413 ft away, from February 24 to March 18, 1993.....	19
11.	The Cooper-Jacob method analysis of drawdown data from Well Otowi-4.	20

TABLES

1.	Production of Potable Water from Wells and Gallery, 1947–1993	4
2.	Peak Demand Periods 1984–1993	5
3.	Well Production Characteristics for 1992 and 1993.....	7
4.	Average Pumping Rate and Specific Capacity, 1992 and 1993	8
5.	Average Water Levels for Nonpumping and Pumping Wells and Average Drawdown, 1992 and 1993	9
6.	Production from Water Canyon Gallery and Guaje and Los Alamos Reservoirs.....	13

WATER SUPPLY AT LOS ALAMOS
DURING 1993

APPENDIX TABLES

Well LA-1	27
Well LA-1B	28
Well LA-2	29
Well LA-3	30
Well LA-4	31
Well LA-5	32
Well LA-6	33
Well G-1	34
Well G-1A	35
Well G-2	36
Well G-3	37
Well G-4	38
Well G-5	39
Well G-6	40
Well PM-1	41
Well PM-2	42
Well PM-3	43
Well PM-4	44
Well PM-5	44
Well O-4	44
Water Canyon Gallery	45
Water Levels in Main Aquifer Test Wells	46

WATER SUPPLY AT LOS ALAMOS DURING 1993

by

W. D. Purtymun, A. K. Stoker, S. G. McLin, M. N. Maes, and T. A. Glasco

ABSTRACT

Municipal potable water supply during 1993 was about $1,457 \times 10^6$ gal. from wells in the Guaje, Pajarito, and Otowi Well Fields. The nonpotable water supply used for industry was about 6.4×10^6 gal. from the spring gallery in Water Canyon. Nonpotable water used for irrigation from Los Alamos Reservoir was about 0.5×10^6 gal.; thus, the total water usage in 1993 was about $1,464 \times 10^6$ gal. One of the two wells in the Otowi Well Field, Well O-4, was operational in 1993. It produced about 284×10^6 gal., or about 19% of the total production from the two well fields. Wells in the Los Alamos Field, on Pueblo land, were transferred to San Ildefonso Pueblo in 1992. With concurrence with the Pueblo, four of the wells were plugged in 1993.

I. INTRODUCTION

This report summarizes production and aquifer conditions for water wells in the Guaje, Pajarito, and Otowi Well Fields (Figure 1). These wells supplied all of the potable water used for municipal and some industrial purposes in Los Alamos County and the Los Alamos National Laboratory during 1993. The wells in the Los Alamos Well Field were transferred to San Ildefonso Pueblo in 1992. Four of the wells in the Los Alamos Well Field were plugged in 1993. One of the two new wells in the Otowi Well Field became operational in 1993. The spring gallery in Water Canyon supplied nonpotable water for industrial use, while surface water from the Los Alamos Reservoir was diverted for irrigation. In 1993 no water was used from the Guaje Reservoir. Due to the maintenance and operating cost of diverting water from the reservoirs, it is not economically feasible to continue their use for irrigation.

This report fulfills some of the requirements of the Los Alamos Groundwater Protection Management Program by documenting use of the groundwater for water supply and providing information on hydrologic characteristics of the main aquifer. This report is a joint effort between the Laboratory Water Quality and Hydrology Group and the Utilities Department of Johnson Controls World Services Inc. (JCI). The purpose of this report is to ensure a continuing historical record and to provide guidance for management of water resources in long-range planning for the water supply system. We have issued one summary report for the period of 1947 to 1971 and 22 annual reports that contain the results of our studies of these water supplies.¹⁻²³ An additional report summarized the hydrology of the main aquifer with reference to future development of groundwater supplies.²⁴ A report was issued in 1988 that examined the status of wells and future water supply.²⁵

JCI, the support contractor to the Laboratory and the Department of Energy (DOE) at Los Alamos, maintains and operates the water supply system. Water from the system is sold to the county for the communities of Los Alamos and White Rock and to the National Park Service for the water supply at Bandelier National Monument.

After the potable water is pumped from the wells into the distribution lines, it is lifted by booster pumps into reservoirs (tanks) for storage and distribution to the Laboratory and the community. The entire water supply is disinfected before being distributed to Los Alamos, White Rock, Bandelier National Monument,

WATER SUPPLY AT LOS ALAMOS
DURING 1993

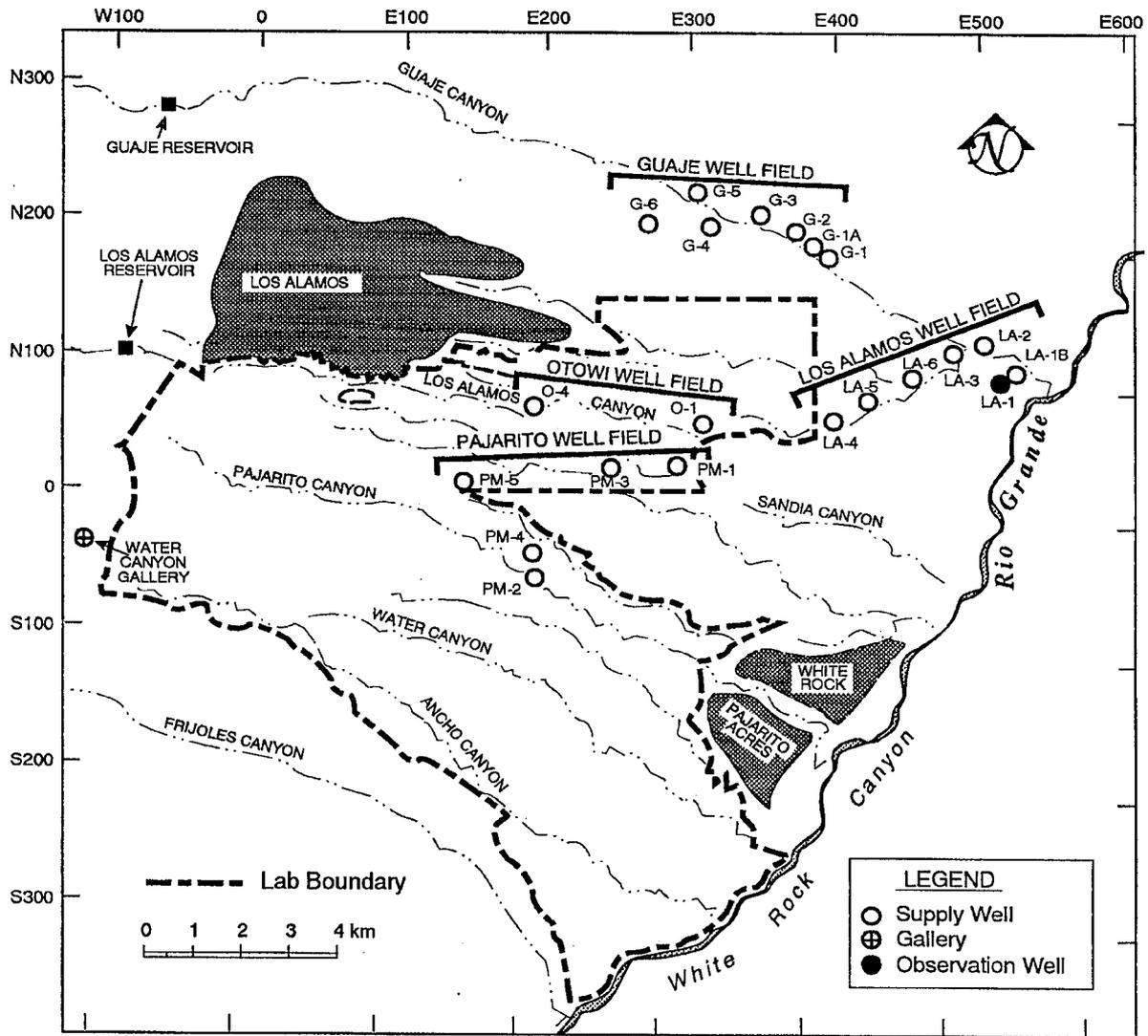


Figure 1. Locations of reservoirs, well fields, water supply wells, and gallery water supply. Letter designations on the figure indicate wells in the Guaje (G), Pajarito (PM), Los Alamos (LA), and Otowi (O) Well Fields.

and Laboratory areas (Figure 1). The nonpotable water used for industrial use at TA-16 flows by gravity from the gallery in Water Canyon to the steam plant. The transmission line from the gallery to the steam plant is separate from that of the potable supply.

JCI maintains a record of the hours of operation for each well along with records of daily and monthly water production. The monthly averages of nonpumping and pumping water levels are computed from air line pressure or transducer data recorded at each well. These data are used in calculating the pumping rates, drawdown, and other well field statistics that are included in this report. The Appendix contains annual pumping and production information for each water supply well for the period of record.

Water for the Laboratory, the communities of Los Alamos and White Rock, and Bandelier National Monument for 1993 was supplied from three well fields. Production was from nine wells, three of the seven wells in the Guaje Field, all of the five wells in the Pajarito Field, and one of the two wells in the Otowi Field. The well fields are located on the Pajarito Plateau and in Guaje Canyon (Figure 1). The wells are completed in the main aquifer of the Los Alamos area, the only aquifer capable of municipal and industrial water supply. The piezometric, or pressure, surface of the main aquifer ranges from near ground level (artesian) in the old well field in lower Los Alamos Canyon to about 760 ft along the eastern edge of the plateau to more than 1,200 ft near the center of the plateau at Well PM-5. Water in the aquifer moves eastward beneath the plateau to the Rio Grande, where some water is discharged into the river through seeps and springs.²⁴

The Water Canyon Gallery, which is located west of the Laboratory on the flanks of the Sierra de los Valles, discharges water from a small aquifer perched in the volcanic rocks (Figure 1). The two reservoirs, Guaje and Los Alamos, are located on the flanks of the Sierra de los Valles to the northwest and west of Los Alamos (Figure 1).

II. WELL FIELD CHARACTERISTICS

Production from the three well fields decreased about 72×10^6 gal., from $1,529 \times 10^6$ gal. in 1992 to about $1,457 \times 10^6$ gal. in 1993 (Table 1). The months of heaviest production in 1993 were June, July, and August. The production during these months was 546×10^6 gal., an increase of 35×10^6 gal. from a similar period of heavy production in 1992. The months of lightest production were February, March, and December with a production of 229×10^6 gal., a decrease of 31×10^6 gal. from a similar period in 1992.

The difference in demand between periods of heavy and light production (i.e., summer and winter demands) occurs mainly because of water usage for landscape irrigation. The water levels in the wells respond accordingly, with the highest water levels observed during months of least production and the lowest water levels occurring during months of greatest production. The growing season which requires irrigation occurs from April through September. About 64% (937×10^6 gal.) of the total water used ($1,457 \times 10^6$ gal.) occurred during this time. The annual and monthly variation in water usage cannot be correlated with annual or monthly precipitation.

The peak demand periods occur in the summer and for the past 10 years (1984–1993) have ranged from 6 to 34 days (Table 2). The average daily production has ranged from 6.5×10^6 gal. per day (gpd) to 9×10^6 gpd. The peak demand period for 1993 was for 18 days, June 25 through July 12, a total production of 146×10^6 gal. (Table 2). The demand period in 1993 was longer than that in 1992 and required about slightly less than 8.1×10^6 gpd compared with 8.2×10^6 gal. in 1992.

The production and use of water at the Laboratory and in the community increased from about 230×10^6 gal. in 1947 to $1,730 \times 10^6$ gal. in 1976. Water usage in 1977 declined to about $1,500 \times 10^6$ gal. and has ranged from about $1,450 \times 10^6$ gal. in 1979 to about $1,686 \times 10^6$ gal. in 1989 (Figure 2). The 1976 maximum has not been approached in recent years.

The change that occurred in the long-term use pattern is partly attributable to a decline in per capita use by Los Alamos County. The per capita use has declined to about 50×10^3 gal. per year since 1980, after

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Table 1. Production of Potable Water from Wells and Gallery, 1947–1993 (in millions of gallons)

Year	Los Alamos Field	Guaje Field	Pajarito Field	Otowi Field	Water Canyon Gallery	Production Total
1947	147	0	0	—	84	231
1948	264	0	0	—	97	361
1949	302	0	0	—	92	394
1950	547	3	0	—	54	604
1951	702	68	0	—	39	809
1952	448	350	0	—	48	846
1953	444	372	0	—	39	855
1954	380	374	0	—	40	794
1955	407	375	0	—	33	815
1956	437	506	0	—	23	966
1957	350	378	0	—	40	768
1958	372	395	0	—	60	827
1959	391	478	0	—	54	923
1960	530	533	0	—	48	1,111
1961	546	624	0	—	54	1,224
1962	577	597	0	—	67	1,241
1963	539	654	0	—	51	1,244
1964	627	665	0	—	45	1,337
1965	447	571	99	—	72	1,189
1966	450	613	127	—	82	1,272
1967	373	464	481	—	56	1,374
1968	345	474	584	—	65	1,468
1969	331	435	569	—	80	1,415
1970	360	423	595	—	65	1,443
1971	412	484	657	—	37	1,590
1972	380	467	662	—	40	1,549
1973	406	475	685	—	49	1,615
1974	369	453	802	—	35	1,659
1975	356	431	749	—	42	1,578
1976	343	531	817	—	41	1,732
1977	345	515	614	—	57	1,531
1978	302	444	690	—	45	1,481
1979	289	456	662	—	44	1,451
1980	339	485	743	—	32	1,599
1981	336	469	701	—	45	1,551
1982	317	422	773	—	46	1,558
1983	221	338	904	—	38	1,501
1984	326	460	780	—	34	1,600
1985	290	456	841	—	37	1,624
1986	179	460	858	—	28	1,525
1987	217	485	892	—	34	1,628
1988	158	477	824	—	— ^a	1,459
1989	219	506	961	—	— ^a	1,686
1990	187	532	923	—	— ^a	1,642
1991	125	502	820	—	— ^a	1,447
1992	13	472	1,044	—	— ^a	1,529
1993	—	298	876	284	— ^a	1,458
Total	16,445	19,970	20,733	284	2,129	59,561

^aWater Canyon Gallery is no longer a potable water supply (see nonpotable production, Table 6).

Table 2. Peak Demand Periods 1984-1993

	Demand Period									
	June 8- June 18 1984	June 29- July 16 1985	July 28- August 10 1986	July 2- July 17 1987	June 18- June 26 1988	June 18- July 11 1989	May 31- July 3 1990	June 24- June 29 1991	July 1- July 9 1992	June 25- July 12 1993
No. of days	11	18	14	16	9	24	34	6	9	18
Total production (gal.)	81×10^6	138×10^6	91×10^6	134×10^6	63×10^6	216×10^6	297×10^6	45.8×10^6	73.9×10^6	145×10^6
Average daily production (gal.)	7.4×10^6	7.7×10^6	6.5×10^6	8.4×10^6	7.0×10^6	9.0×10^6	8.7×10^6	7.6×10^6	8.2×10^6	8.1×10^6
No. of days										
> 10×10^6 gal.	—	—	—	—	—	4	8	—	—	—
> 9×10^6 gal.	—	3	—	4	—	9	13	—	2	2
> 8×10^6 gal.	2	4	2	7	2	10	3	4	3	12
> 7×10^6 gal.	6	9	2	4	3	0	4	—	4	2
< 7×10^6 gal.	3	2	10	1	4	1	6	2	—	2

WATER SUPPLY AT LOS ALAMOS
DURING 1993

WATER SUPPLY AT LOS ALAMOS
DURING 1993

reaching a peak of about 74×10^3 gal. per year in 1974. Some of this decline may be related to the cost of water, which increased by a factor of about 10 in the last 20 years. Laboratory use has been nearly constant at about 500×10^6 per year since the late 1970s.²³

A projection of the total use is plotted along with actual production (Figure 2). The projection is the extrapolation of a least-squares line based on the actual production during the 15-year period 1979 through 1993. The trend line shows a slight decline of about 1.5×10^6 gal. per year.

Annual production is plotted for the Los Alamos, Guaje, Pajarito, and Otowi Well Fields to show a comparison of the distribution of production (Figure 2). The production from any individual well field peaks as another well field is brought on line. The production from the Los Alamos Well Field peaked in 1951 as the Guaje Well Field became operational. Similarly, the production from the Guaje Well Field peaked in 1964 as the Pajarito Well Field was phased into use. The last year of municipal supply from the Los Alamos Well Field occurred in 1991. As a result, the loss of production from the Los Alamos Field was made up by increased production from the Pajarito Well Field. With the first year of operation of the Otowi Well Field in 1993, production from the Pajarito Well Field may have peaked in 1992. The expansion of well fields is necessary as older wells deteriorate with age and the production decreases. New wells must be added to the system to keep up with demand.

The present yield reflects the distribution of production with the addition of the high yield well in the Otowi Well Field; about 20% from the Guaje Well Field, about 60% from the Pajarito Field, and about 19% from the Otowi Well Field. In 1992 the percentage of production was 29% from the Guaje Well Field and 71% from the Pajarito Well Field (Table 3).

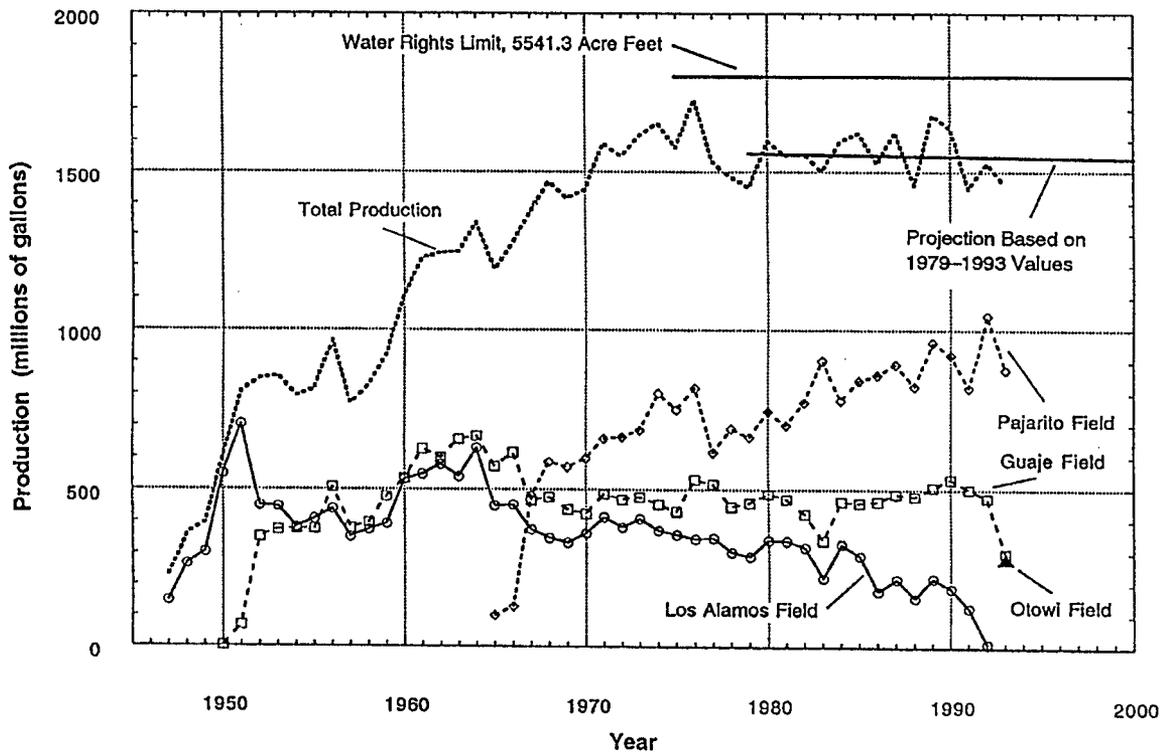


Figure 2. Water production and usage from 1947 to 1993, and projected demands.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Table 3. Well Production Characteristics for 1992 and 1993

	Production				Total Production	
	Amount (10 ⁶ gal.)		Well Field (%)		Production (%)	
	1992	1993	1992	1993	1992	1993
Guaje Field						
Well G-1	12.00	0.03	3	<1	<1	<1
Well G-1A	134.10	108.20	28	36	9	7
Well G-2	129.00	97.10	27	33	8	7
Well G-3	—	—	—	—	—	—
Well G-4	12.00	—	3	—	<1	—
Well G-5	114.40	92.20	24	31	7	6
Well G-6	70.20	—	15	—	5	—
Subtotal	471.70	297.50	100	100	29	20
Pajarito Field						
Well PM-1	92.70	63.90	9	7	6	5
Well PM-2	277.70	267.80	27	31	18	18
Well PM-3	307.40	168.50	29	19	20	12
Well PM-4	158.30	249.70	15	29	10	16
Well PM-5	208.40	126.00	20	14	14	9
Subtotal	1,044.50	875.90	100	100	71	60
Otowi Field						
Well O-4	0	283.80	—	100	—	19
Subtotal	0	283.80	—	—	—	—
Total Potable	1,529.60	1,457.23	—	—	100	99
Water Canyon Gallery	0.12	6.40	—	—	<0.1	<0.1
Guaje Reservoir	—	0.50	—	—	—	—
Los Alamos Reservoir	—	—	—	—	—	—
Total Nonpotable	0.12	6.90	—	—	<0.01	<0.01
Total Production from Permitted Sources	1,529.70 ^a	1,464.13	—	—	100	100

^aIncludes 13.4 million gal. nonpotable usage for road construction from Well LA-2.

A. Guaje Well Field

The Guaje Well Field consists of seven wells ranging in depths from 1,500 to 2,000 ft. Wells G-1, -2, -3, -4, and -5 were completed in 1950. Well G-1A was completed in 1954, and Well G-6 was placed in service in 1964. Almost all of the 1993 production came from three of the wells: G-1A, G-2, and G-5. Attempted rehabilitation of Well G-3 in 1986 damaged their casings beyond repair and the well was taken out of production. During 1993 there was little, if any, production from Wells G-1, G-4, and G-6. The yield of the wells had declined due to deterioration of their casings to a point where it was not considered economically feasible to pump them. Though the wells were not pumped, water level data were collected for the year. There is no water level recorder on Well G-3; thus, there has been no water level data collected from the well since 1986.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

The production from the Guaje Well Field decreased about 147×10^6 gal., from 472×10^6 gal. in 1992 to 278×10^6 gal. in 1993. The well field contributed about 20% of the total production in 1993 (Table 3).

The combined pumping rate declined about 629 gpm, from 1,912 gpm in 1992 to 1,283 gpm in 1993. The decline represents the pumping rate of the three wells (G-1, G-4, and G-6) that were not pumped during the year. The pumping rate of the three pumped wells (G-1A, G-2, and G-5) was 1,283 gpm, similar to that for the same wells in 1992 (Table 4). There was no significant change in the specific capacities of the three pumped wells in 1993 as compared with the previous year (Table 4).

The average nonpumping water levels in both the pumped wells and the wells that were not pumped were slightly higher in 1993 than in 1992 (Table 5). In the pumped wells, the water level rose an average of about 3 ft, while in the other three wells the water levels rose an average of about 11 ft. The higher water levels are due to the decline in pumpage from the field in 1993 compared with the previous year. These water changes are normal and indicate some recovery (Figure 3).

Table 4. Average Pumping Rate and Specific Capacity, 1992 and 1993

	Average Pumping Rate (gpm)		Average Specific Capacity (gpm per ft of drawdown)	
	1992	1993	1992	1993
<i>Guaje Field</i>				
Well G-1	186	—	1.2	—
Well G-1A	478	467	13.3	13.7
Well G-2	424	418	13.7	13.5
Well G-3	—	—	—	—
Well G-4	179	—	1.1	—
Well G-5	376	398	9.9	10.8
Well G-6	268	—	3.3	—
Subtotal	1,911	1,283	7.1 ^a	12.7 ^a
<i>Pajarito Field</i>				
Well PM-1	617	591	25.7	28.1
Well PM-2	1,328	1,305	19.2	18.9
Well PM-3	1,419	1,391	59.1	53.5
Well PM-4	1,278	1,295	31.2	—
Well PM-5	1,233	1,229	12.7	12.6
Subtotal	5,875	5,811	29.6 ^a	28.3 ^a
<i>Otowi Field</i>				
Well O-4	—	1,603	—	60.5
Subtotal	—	1,603	—	60.5
Total	7,786	8,697	—	—

^aAverage specific capacity.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

**Table 5. Average Water Levels for Nonpumping and Pumping Wells
and Average Drawdown, 1992 and 1993**

	Average Depth to Water				Average Drawdown	
	Nonpumping (ft)		Pumping (ft)		(ft)	
	1992	1993	1992	1993	1992	1993
Los Alamos Field						
Well LA-2	—	—	—	—	—	—
Average per field	—	—	—	—	—	—
Guaje Field						
Well G-1	283	280	439	—	156	—
Well G-1A	325	321	361	355	36	34
Well G-2	370	368	401	399	31	31
Well G-3	—	—	—	—	—	—
Well G-4	387	374	544	—	157	—
Well G-5	470	466	508	503	38	37
Well G-6	591	575	673	—	82	—
Average per field	404	397	487	419	83	34
Pajarito Field						
Well PM-1	756	758	780	779	24	21
Well PM-2	860	855	929	924	69	69
Well PM-3	770	771	794	797	24	26
Well PM-4	1,084	—	1,125	—	41	—
Well PM-5	1,248	1,224	1,345	1,321	97	97
Average per field	944	902	955	904	51	53
Otowi Field						
Well O-4	—	861	—	889	—	28
Average per field	—	861	—	889	—	28

B. Pajarito Well Field

The Pajarito Well Field consists of five wells. The wells were completed over a 17-year period, from 1965 through 1982, and range in depths from 2,300 to 3,100 ft. Because they are located on the Pajarito Plateau, the depths to water range from about 750 ft at Well PM-1 to more than 1,200 ft at Well PM-5. During 1993 the following wells were down for repairs: Well PM-3 from September through December; Well PM-4 from January through July; and Well PM-5 from January through March. Due to a malfunction of the recorder, no water level data were collected from Well PM-4 for the entire year.

The production from the Pajarito Well Field in 1993 was about 876×10^6 gal., a decrease of 168×10^6 gal. from the $1,044 \times 10^6$ gal. produced in 1992 (Table 3). The field contributed about 60% of the total 1993 production. The production from Wells PM-2, -3, and -4 represented about 46% of the total water produced at Los Alamos in 1993 (Table 3).

The average pumping rates of the Pajarito wells ranged from 591 to 1,391 gpm (Table 4). Four of the wells (PM-2, -3, -4, and -5) are high-yield wells with pumping rates over 1,000 gpm (Table 4). The pumping rates from the individual wells varied slightly from 1992 to 1993, with a decrease of about 64 gpm from 5,875 gpm in 1992 to 5,811 gpm in 1993.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

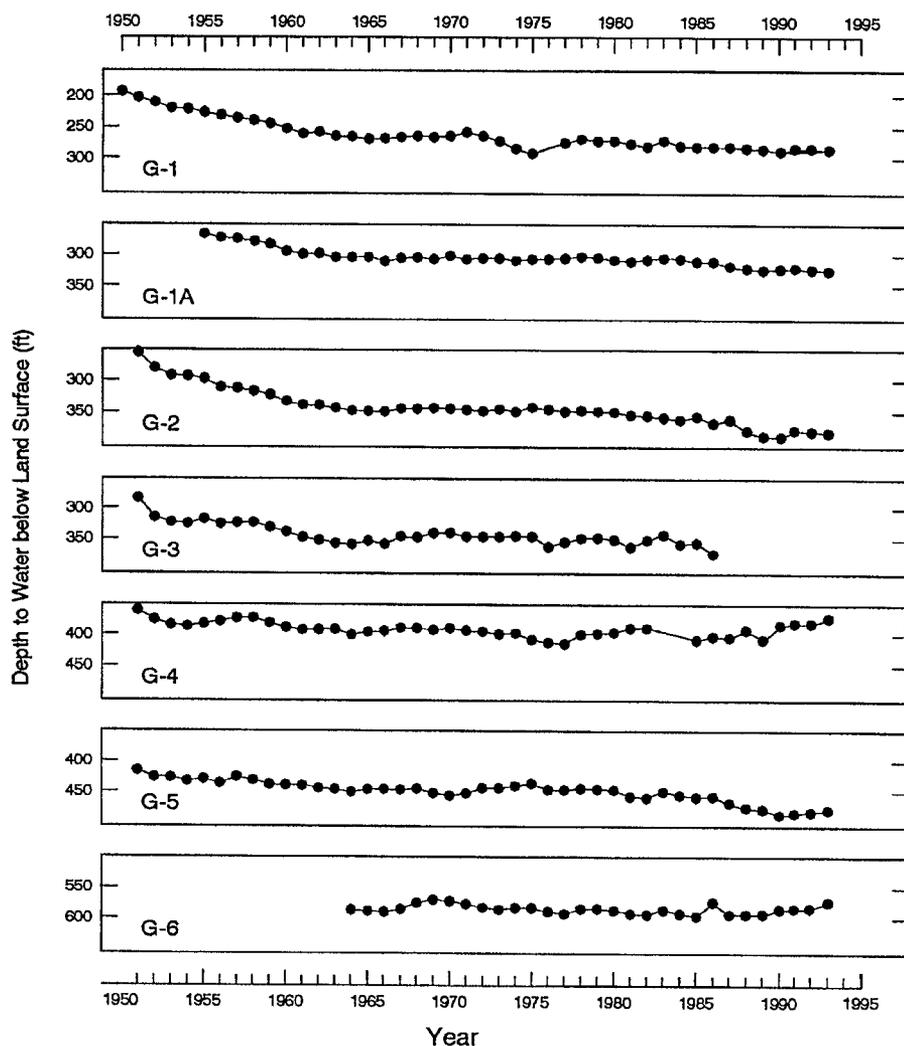


Figure 3. Nonpumping water levels in wells in the Guaje Well Field.

The specific capacities of the four wells in 1993 ranged from 12.6 to 53.5 gpm per ft of drawdown. There was no significant change in the specific capacities of the wells from 1992 to 1993, though there was some slight variation in the specific capacities of individual wells (Table 4).

The water levels in these wells fluctuated as would be expected from the amount of pumpage (Figure 4). The average nonpumping water levels in the field were slightly higher in 1993 compared with the 1992 average water levels (Table 5). These higher levels were due to the reduced production in 1993 when compared with the production in 1992.

C. Otowi Well Field

The Otowi Well Field consists of two wells that were completed in 1990. Well O-1 was completed at a depth of 2,497 ft, with a static water level of the main aquifer at a depth of about 695 ft. Well O-4 was

WATER SUPPLY AT LOS ALAMOS
DURING 1993

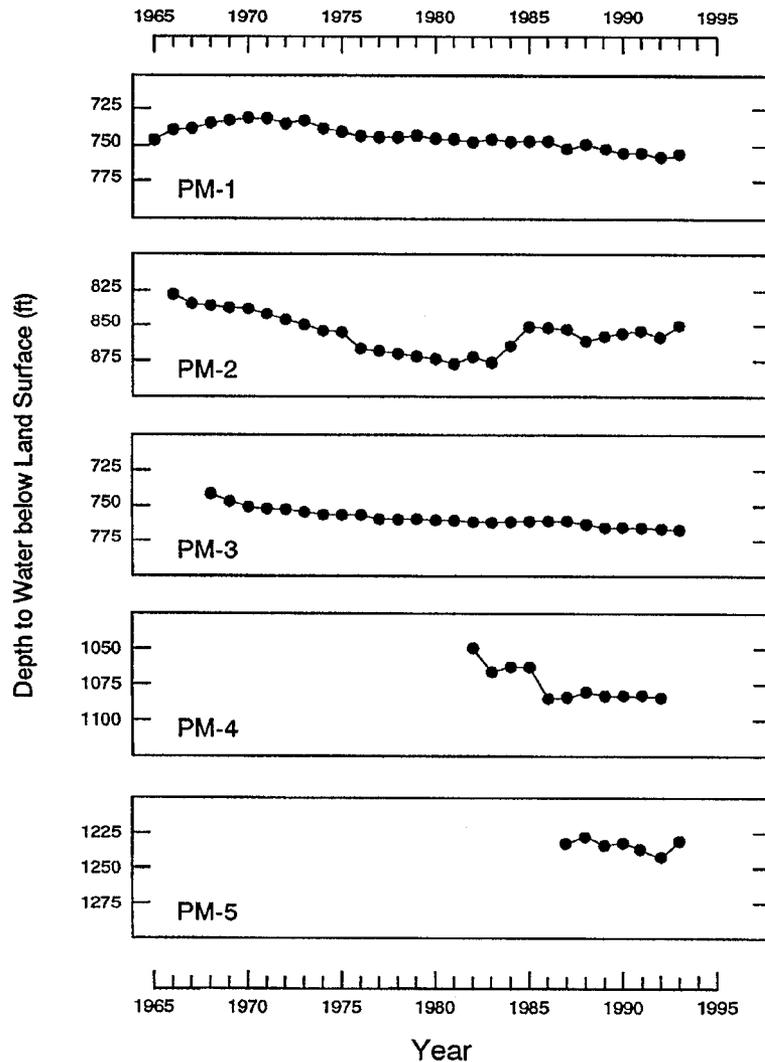


Figure 4. Nonpumping water levels in wells in the Pajarito Well Field.

completed at a depth of 2,585 ft, with a static water level at 790 ft. Well O-1 was not operational in 1993. Well O-4 became operational in February. Water level data collection was started in July.

The production from Otowi Well Field in 1993 was from Well O-4. The well produced about 284×10^6 gal. or about 19% of the total amount of water pumped during 1993 (Table 3). The well is a high-yield well with a pumping rate of about 1,574 gpm. The specific capacity for the period of record was 60.5 gpm per ft of drawdown (Table 4). The pumping rate and specific capacity are higher than those of any of the high-yield wells in the Pajarito Well Field.

During 1993 at Well O-4 the average nonpumping level was 861 ft, with a pumping level of 885 ft and with a drawdown of 28 ft (Table 5).

III. WATER CANYON GALLERY AND GUAJE AND LOS ALAMOS RESERVOIRS

Water Canyon Gallery was a source of potable water from the early days of the Manhattan Project until 1989 (Table 1). Rapid recharge to the gallery causes heavy sediment loads to enter the potable system. In 1989, to keep the sediments out of the potable system, the use of the gallery was ended. The water from the gallery is used as nonpotable supply at the steam plant.

The spring gallery in Water Canyon is dug about 30 ft into the Bandelier Tuff. The gallery, or tunnel, is framed with timbers and sheet metal to keep the walls and overhead from collapsing. The floor of the gallery is constructed, so as to form a basin to collect the spring flow. About 1 mile of water line connects the gallery to the power plant at TA-16 (S-Site). The water line is not part of the potable system.

The water occurs in the fractures of a welded tuff, which is underlain by a nonwelded tuff (the fractures in the welded tuff contain the water, which is perched on the nonwelded tuff). The gallery furnished only a small amount of water, about 64×10^6 gal., to the power plant during 1993 (Tables 3 and 6). The total discharge from the gallery was not utilized at the steam plant. The excess discharge was released to the environment. The annual use, potable and nonpotable, during the period 1947-1993 is shown in the Table 6.

Water from Guaje and Los Alamos Reservoirs was used for municipal and industrial water supply at Los Alamos during the early days of the Manhattan Project. Use of the reservoirs for potable water supply was discontinued in 1959 because of intermittent periods of turbidity caused by storm runoff and because of difficulties in maintaining bacteriological levels below limits allowed for a municipal supply.

The water from the reservoirs is available for irrigation of lawns and shrubs in the community and Laboratory. Parts of the water lines are above ground and are subject to freezing; thus, water use from the reservoirs is limited to the period from late spring to early fall. During 1993 only a small amount of water, 0.5×10^6 gal., was diverted from Los Alamos Reservoir for irrigation. No water was used from Guaje Reservoir. The age of the distribution system and need for rehabilitation along with operation cost may cause the Laboratory to abandon the irrigation system as it is not economically feasible to operate. The production from the Guaje and Los Alamos Reservoirs for the period of record is shown on Table 6.

IV. QUALITY OF WATER

The Laboratory conducts two separate programs to monitor the quality of groundwater in the area and to meet regulatory requirements. The first program, under the Laboratory's long-term environmental surveillance program, includes monitoring the quality of water from the supply wells, the gallery in Water Canyon, and reservoirs in Guaje and Los Alamos Canyons.

The second program monitors the quality of water in the Laboratory and county distribution systems to ensure compliance with the Safe Drinking Water Act (SDWA). During 1993, all water collected under the SDWA program at Los Alamos was in compliance with the regulations. The results of both programs will be documented in the report "Environmental Surveillance at Los Alamos during 1993."²⁶

Complete chemical and radiochemical analyses and interpretation of data related to the chemical quality in individual wells in the Los Alamos, Guaje, Pajarito, and Otowi Well Fields, Water Canyon Gallery, and Guaje and Los Alamos Reservoirs were presented in "Water Supply at Los Alamos during 1991."²²

V. LONG-TERM WATER LEVEL TRENDS

Water levels have been measured in wells in the main aquifer since the late 1940s when the first exploratory wells were drilled by the U.S. Geological Survey. These data have been documented in various reports over the years. This section compiles all the available water level data for the main aquifer and summarizes the changes in graphic form.

The annual summary data on each water supply well has been documented since 1971 in this series of water supply reports. There is one table for each of the wells used as a water supply well at Los Alamos in

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Table 6. Production from Water Canyon Gallery and Guaje and Los Alamos Reservoirs^a

Year	Water Canyon Gallery (10 ⁶ gal.)	Guaje Reservoir ^b (10 ⁶ gal.)	Los Alamos Reservoir (10 ⁶ gal.)
<i>Municipal Water-Supply Production</i>			
1947		87.8	21.7
1948		119.8	21.9
1949		116.1	14.7
1950		79.9	20.6
1951		41.0	10.5
1952		131.0	33.6
1953		58.0	14.8
1954		66.0	16.9
1955		71.0	18.1
1956		24.0	4.8
1957		213.0	54.8
1958		193.0	49.4
<i>Nonpotable Production</i>			
1972		5.8	—
1973		9.7	—
1974		4.9	—
1975		5.3	—
1976		4.4	—
1977		4.1	—
1978		2.8	—
1979		3.7	1.3
1980		4.7	2.3
1981		2.7	2.1
1982		3.4	2.8
1983		3.4	1.4
1984		3.0	1.3
1985		2.8	0.9
1986		2.4	1.5
1987		2.8	3.2
1988		2.4	1.4
1989		4.6	3.3
1990	9.30	2.2	4.6
1991	12.00	1.5	2.4
1992	0.12	—	—
1993	6.40	—	0.5

^aGuaje and Los Alamos Reservoir municipal supply 1947–1959; irrigation 1972–1990. Water Canyon Gallery municipal supply 1947–1989; industrial supply 1990 (see Table 1 and Appendix).

^bProduction from Guaje Reservoir for 1951–1958 is estimated.

the Appendix: Annual Statistics on Aquifer Characteristics. Each table includes annual average information on the water produced and both nonpumping and pumping water levels. Notes on each table have been added for the first time in this report to indicate information about the water level at time of completion of the well.

Because all the wells in the Los Alamos Field have either been abandoned and plugged (see Section VII) or turned over to San Ildefonso Pueblo, this year's report will be the final documentation for those water supply wells. It is anticipated that some future measurement of water levels will be possible in the remaining Los Alamos Field wells (LA-1B, LA-2, and LA-5) under cooperative agreements between the Pueblo, the Bureau of Indian Affairs, and the Department of Energy.

One additional table has been added to the Appendix this year that summarizes the data for the test wells reaching the main aquifer. The table is Water Levels in Main Aquifer Test Wells (page 46). The table includes completion information, static water levels, and changes in water levels in main aquifer test wells, which show the calculated change in water level as compared with the level at time of completion.

The test well water level data were compiled from the original records in the files of the Water Quality and Hydrology Group. Some of the data in the table represent averages when more than one measurement was made during a given year. During 1993, a program was underway to equip each test well with a transducer and automatic data recording capability. The data in the table for 1993 represent the final reading of water level recorded during 1993. In future years it is anticipated that the automated data collection will permit presentation of data on shorter term fluctuations in water levels throughout the year.

A summary of the water level changes since the late 1940s is presented in several graphs. Data for three water supply well fields are presented for the Los Alamos (Figure 5), Guaje (Figure 6), and Pajarito (Figure 7) Well Fields. No graph was made for the Otowi Field as only 1 year of data is available for the single well, Otowi-4 (see Appendix tables). Trends in the main aquifer test wells are depicted in a separate graph (Figure 8).

The levels in the Los Alamos Well Field (Figure 5) generally ranged from about 40 to 140 ft below initial levels until 1990, when the field was taken out of production. Since then levels have trended back toward initial conditions. The easternmost wells, which were artesian at completion, have regained most of their levels; LA-1B has again become artesian.

The levels in the Guaje Well Field (Figure 6) have ranged from almost no decline to about 120 ft of decline since 1950. In this field the westernmost wells show the least decline overall, and they have recovered significantly in recent years with somewhat lower production. Wells G-4 and G-6 recovered significantly in 1993 when they were not pumped.

The wells in the Pajarito Well Field (Figure 7) have always been the best producers, with generally much higher specific capacities. As expected, they show the least decline in water levels; since 1990, about 20 to 40 ft.

The test wells penetrating to the main aquifer show declines ranging from less than 10 to about 35 ft over the 45-year period of record (Figure 8). They fall into geographic groups. The westernmost well, TW-4, shows less than 10 ft of change. The southernmost group of wells, DT-5A, DT-9, and DT-10, all located near TA-49, show a decline of about 10 to 15 ft since 1960. The one well in the central part of the plateau, TW-8, shows a decline of about 25 ft, within the range of declines shown by the Pajarito Field supply wells. The north-central wells, TW-2 and TW-3, both show about 35 ft of decline over the 45-year period of record.

One test well, TW-1, showed an apparent increase in water level after many years of no measurements (see Appendix tables) and was not depicted on the graph. The anomalous behavior of this well is not understood and is under investigation. Some preliminary tests to determine a possible reason for its behavior are discussed in the two most recently published Environmental Surveillance Reports for Los Alamos.^{27,28} There is some indication of communication with the surface as reflected by low level tritium measurements.²⁸

WATER SUPPLY AT LOS ALAMOS
DURING 1993

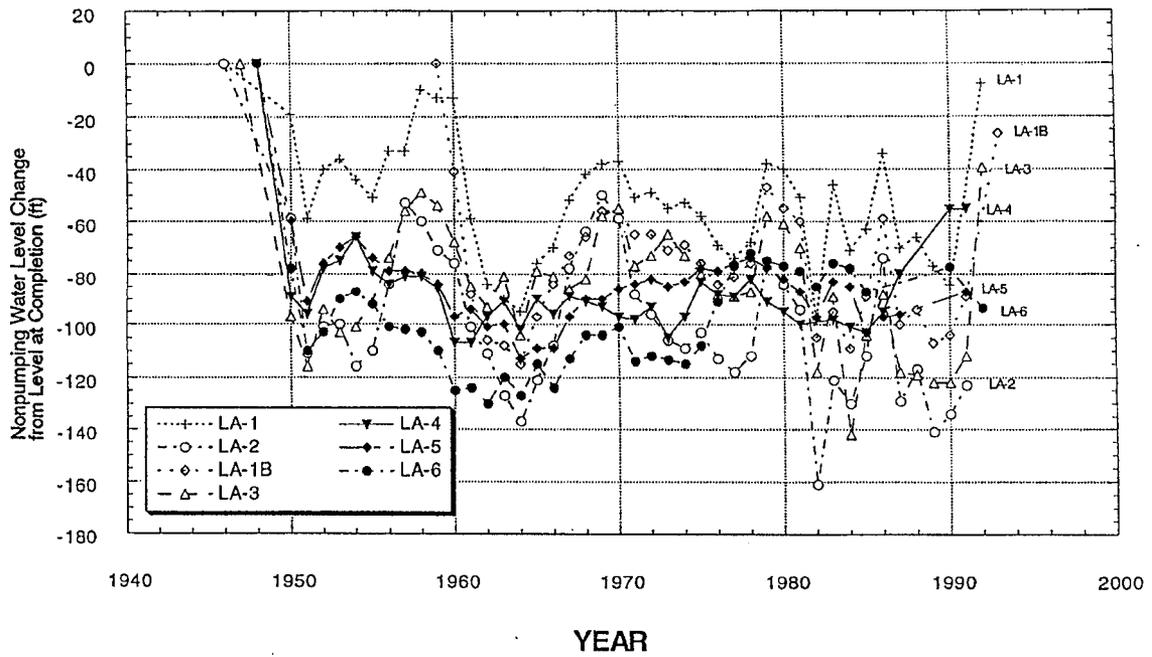


Figure 5. Los Alamos Well Field.

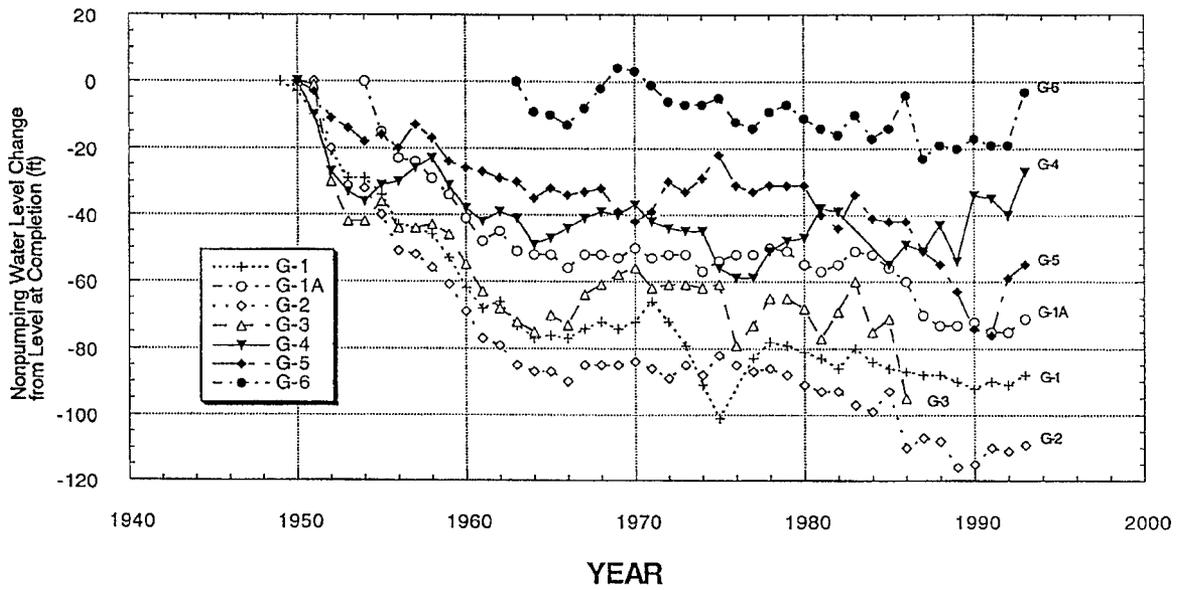


Figure 6. Guaje Well Field.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

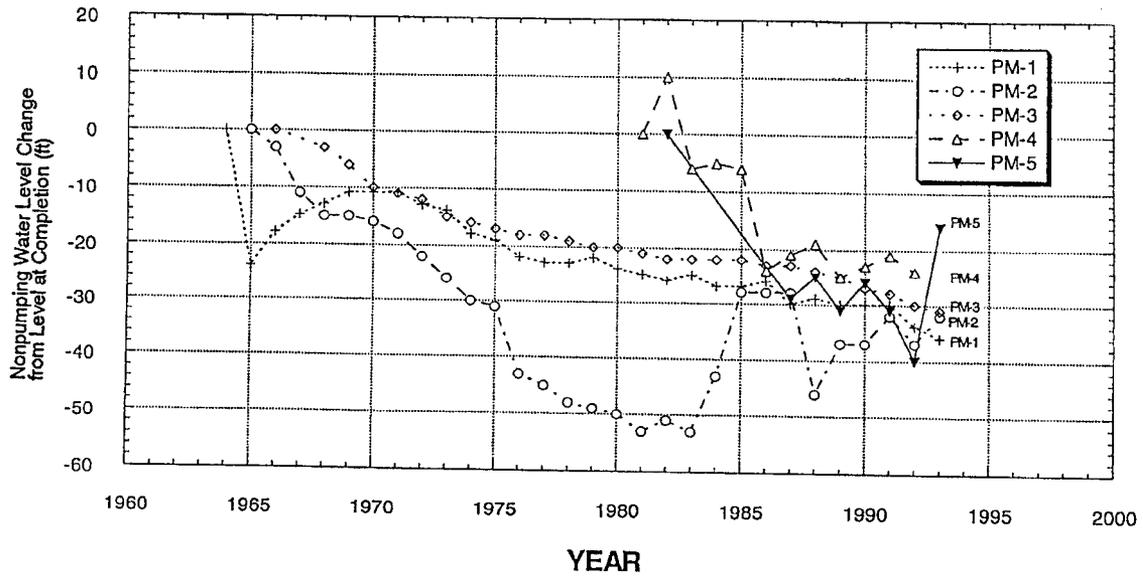


Figure 7. Pajarito Well Field.

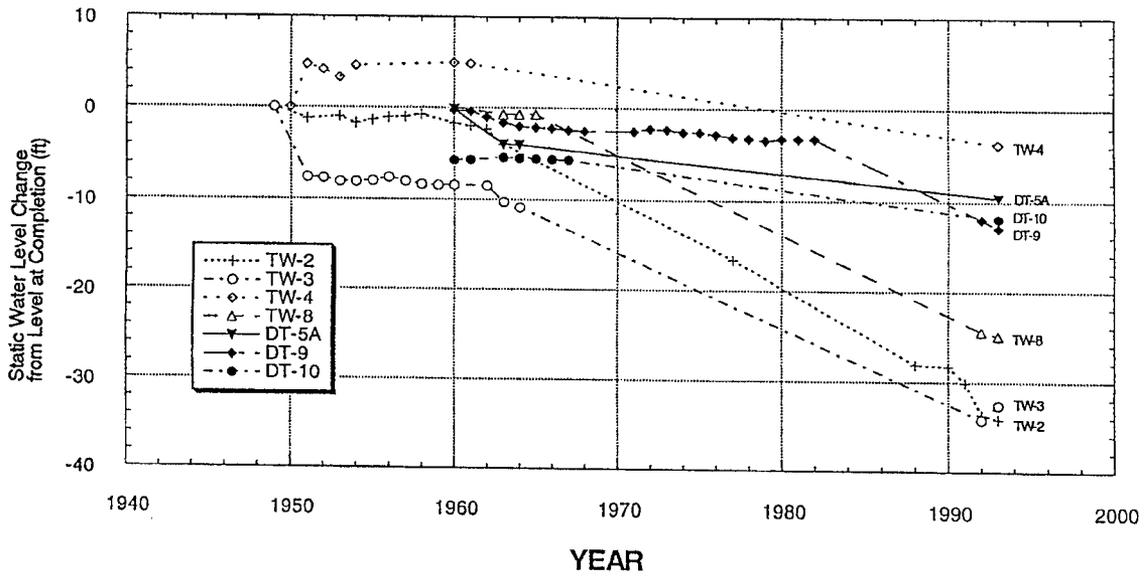


Figure 8. Main aquifer test wells.

Another interpretation of the changes in water levels is presented as a map in Figure 9. This map of generalized water level contours provides a simplified indication of how the water levels have changed in a geographic context. The map depicts contours for "prepumping conditions" based on the initial water levels measured in each well when drilled; and for "1993 conditions" based on the measured static or nonpumping water levels at the end of 1993. This map must be viewed with some understanding of its limitations; it is not a true potentiometric contour map.

A potentiometric contour map is normally a presentation of the piezometric surface of a uniform aquifer or hydrologic unit at some point in time. This is not practicable for Los Alamos at present because of the need to cover the area by using data from both test wells and producing water supply wells. Test wells penetrate and therefore permit measuring water levels in only the top (10 to 100 ft) of the uppermost water-bearing layers. The producing supply wells penetrate much thicker groups (hundreds to more than 1,000 ft) of water-bearing layers in several hydrologically different formations. This deeper penetration results in water levels that "average" the water pressures in all the layers. The nonpumping water levels also reflect some influence of recent pumping in the producing wells and have not fully recovered static levels. Additionally, the "prepumping contours" are based on data collected at different times, as the various wells were drilled. However, such data are the closest approximation we have to "undisturbed" conditions.

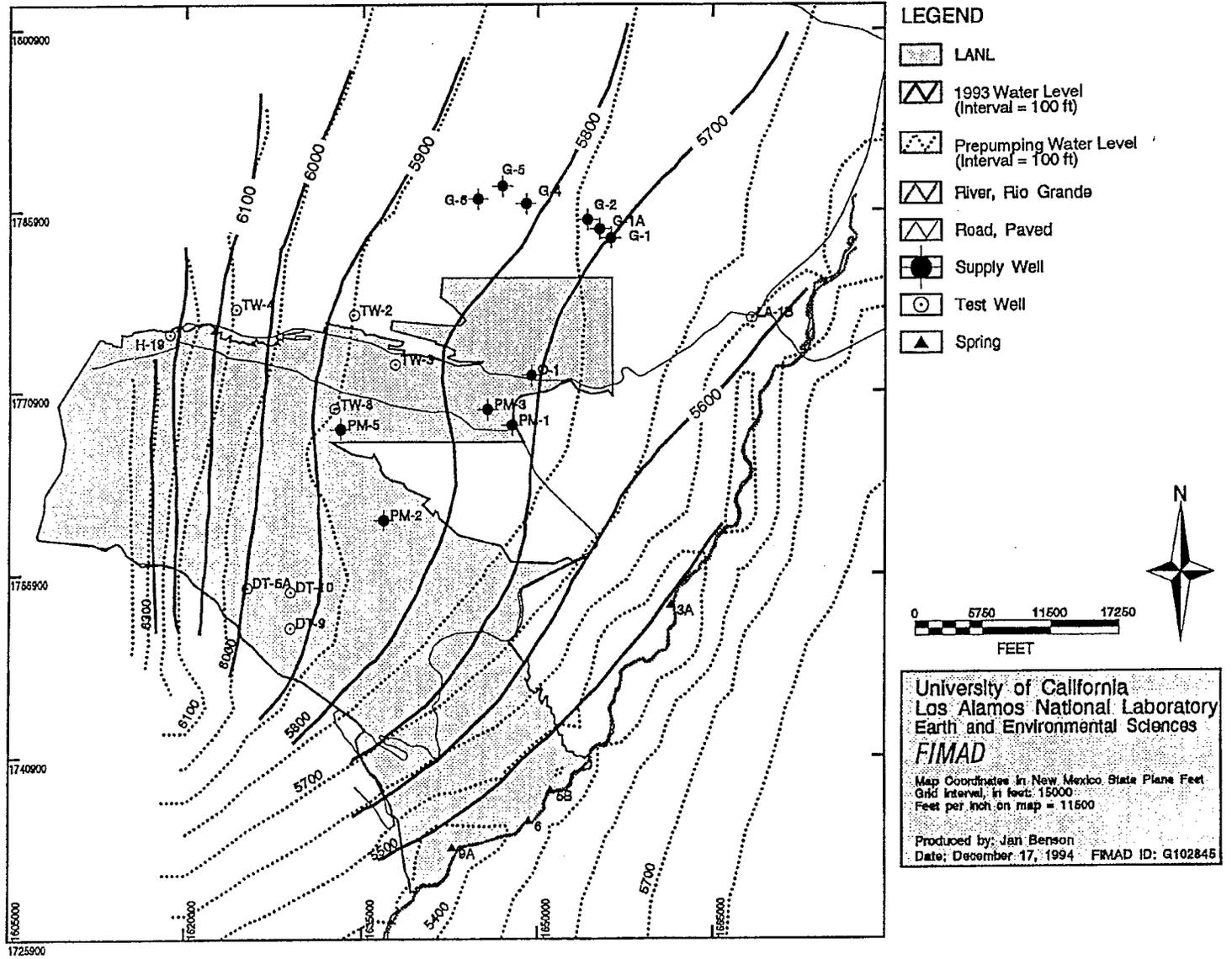
Given these limitations, the map in Figure 9 permits a quick visualization of the relative changes in different parts of the Los Alamos area. The largest changes, at about 100 ft, occurred in the vicinity of the Guaje and Los Alamos Well Fields. Intermediate changes, at about 30 ft, have occurred in the central portion generally influenced by the higher yielding Pajarito and Otowi Well Fields. The smallest changes, at about 10 ft, occurred to the west and south where no wells are pumped, and adjacent to the Rio Grande where the artesian conditions have resulted in nearly complete recovery in the easternmost wells of the Los Alamos Field. A possible generalization is that the overall pumping of water is greater than the recharge or movement of water into the area, apparently from the west. The importance of these declines may be partly based on comparison with the thickness of the aquifer. The maximum declines of about 100 ft, in the Guaje and Los Alamos Fields, are less than 1% of the several-thousand-ft interval of saturated formations underlying the Pajarito Plateau.

VI. AQUIFER TEST AT SUPPLY WELL O-4

A 22-day pump test was conducted in the municipal water supply well Otowi-4 (O-4) from February 24 to March 18, 1993. The pumping rate during this test averaged 1,660 gal. per minute (gpm), and fluctuated less than 2% (i.e., 30 gpm) as seen in Figure 10a. The total volume of water extracted during this test was 52.48 million gal. in 22.042 days. At frequent intervals throughout the pump test, water production rates in well Otowi-4 were measured with a totalizer-type in-line flow meter and stop watch. Total flows were averaged over 5- to 10-minute intervals to establish flow rates.

Drawdown histories were recorded in O-4, and Test Well 3 (TW-3, located 413 ft east of Otowi-4) with automatic recording pressure transducers at 60-minute intervals. Drawdown data (s) from wells TW-3 and O-4 are plotted in Figures 10b and 11, respectively. A diurnal barometric pressure effect is apparent in each figure and is represented by small amplitude repeating "bumps" that are superimposed onto the drawdown trends of each well.

The plots in Figures 10b and 11 both suggest that the main aquifer surrounding O-4 behaved like a leaky confined aquifer during the test. The bend in the curve for O-4 (Figure 11) clearly suggests that the spreading cone of depression emanating from O-4 encountered a recharge effect after about 5.5 days of constant pumping. This aquifer response is plausible because O-4 is screened in the highly stratified sediments within the formations of the Santa Fe Group.²⁰ These sediments consist of mixed conglomerates and gravels with some basalts, sandstones, siltstones, and clays. Well O-4 probably derives most of its water yield from numerous interbedded permeable layers within these Santa Fe sediments, resulting in vertical seepage into these major production zones from less permeable adjacent layers. Supporting



WATER SUPPLY AT LOS ALAMOS DURING 1993

Figure 9. Generalized water level contours at Los Alamos, prepumping and 1993.

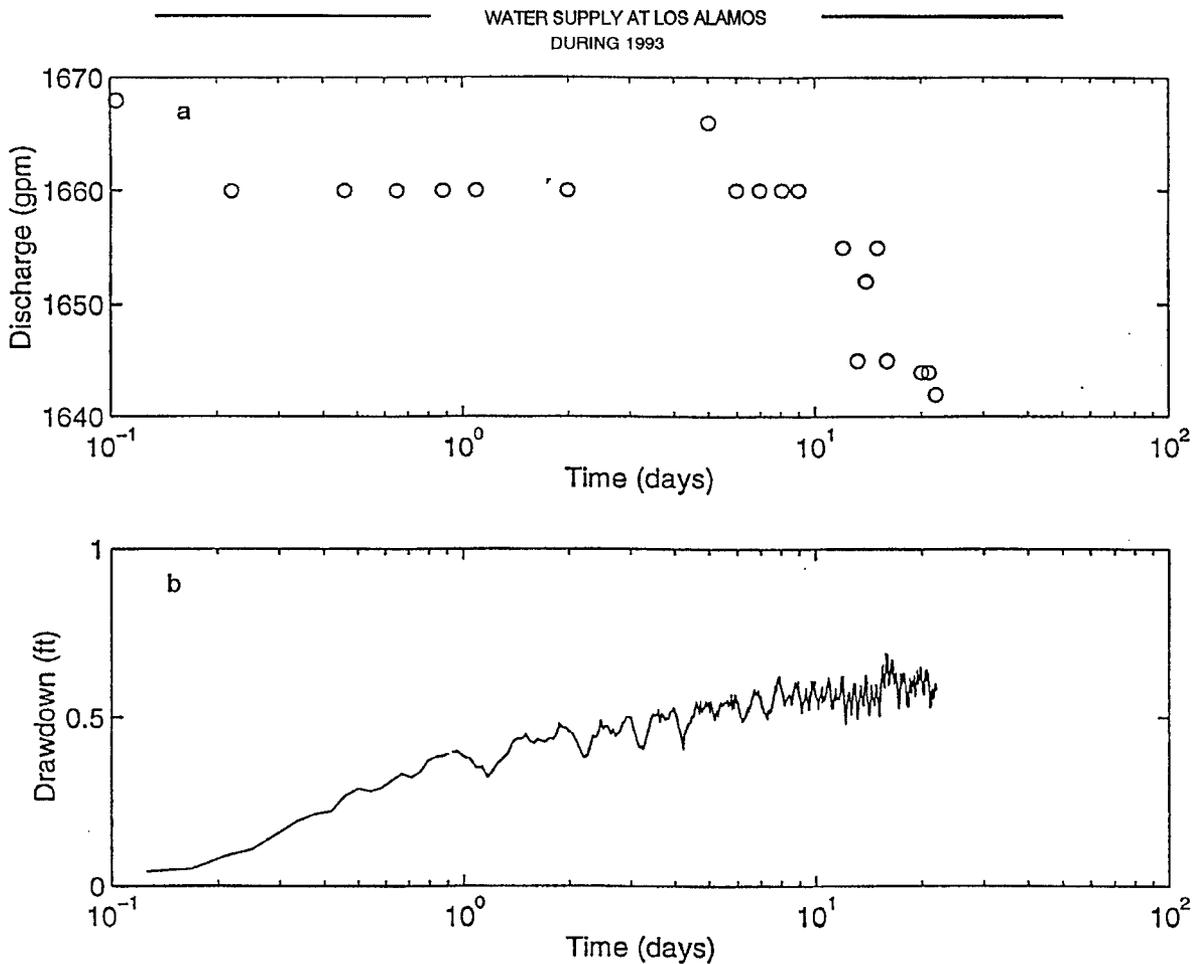


Figure 10. Pump test analysis at Well Otowi-4: a, discharge history in Otowi-4; and b, drawdown response in Test Well TW-3, located 413 ft away, from February 24 to March 18, 1993.

evidence for this interpretation is provided by the negligible drawdown in Well TW-3 (Figure 10b), which is completed several hundred feet above the O-4 screened interval as shown in Table 7.

Municipal water supply wells PM-3 (located some 6,029 ft southeast of O-4), and PM-5 (located some 6,714 ft southwest of O-4) remained off during this test and were also used as observation wells; however, no recordable drawdown data were obtained at either of these two wells in response to pumpage at O-4. Because these two supply wells were screened over intervals similar to O-4 (see Table 7), their lack of observable drawdown response is fairly conclusive evidence that the cone of depression did not extend to those distances. In addition, no recordable drawdown was observed in either test well TW-2, located to the northwest, or in test well TW-8, located to the southwest. However, these two test wells are also screened over intervals several hundred feet higher than O-4 (Table 7).

The standard Cooper-Jacob procedure was used to compute hydrologic parameters of transmissivity (T) and storage coefficient (S).²⁹ The observed drawdown (s) from Otowi-4 is plotted against time (t) on semilogarithmic paper, as shown in Figure 11. The best-fitting straight line is drawn through the data

WATER SUPPLY AT LOS ALAMOS
DURING 1993

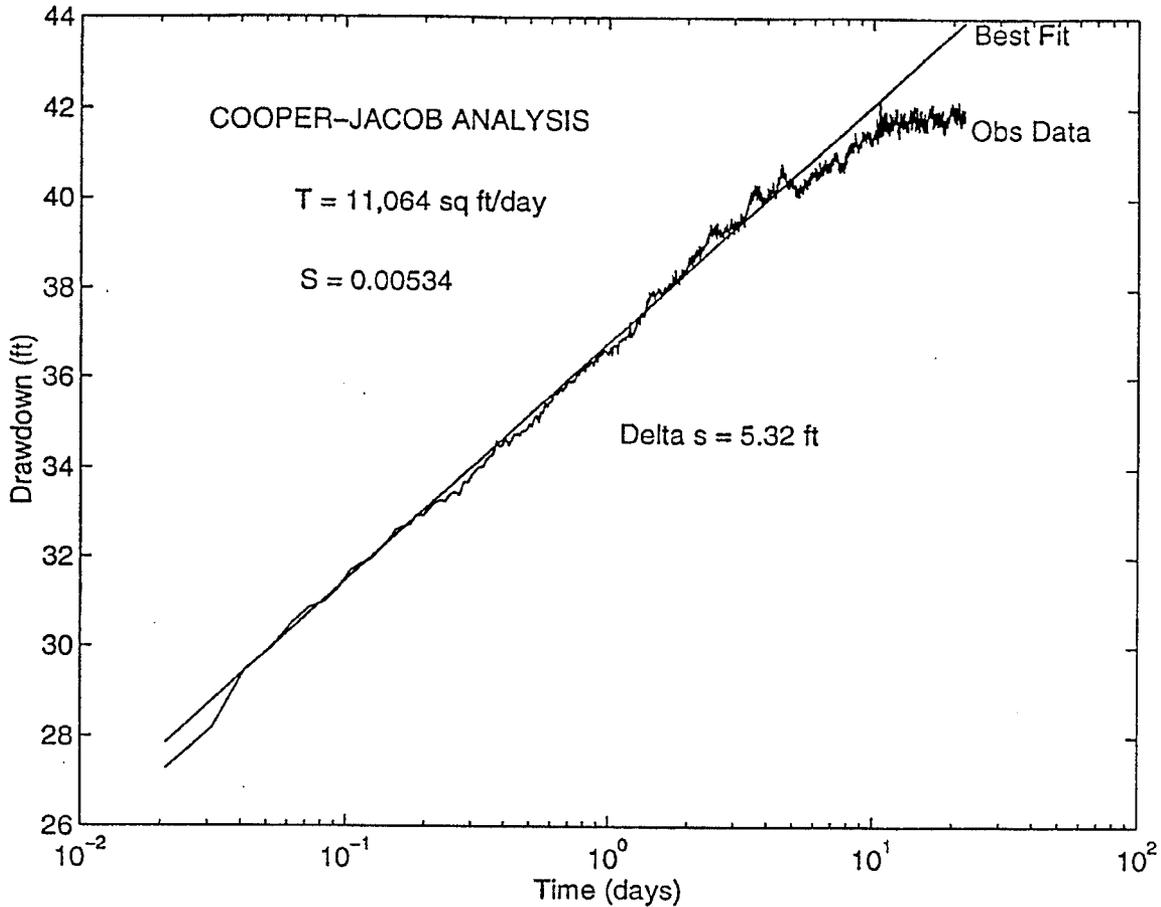


Figure 11. The Cooper-Jacob method analysis of drawdown data from Well Otowi-4. The computed T and S values are 11,064 square ft per day, and 0.00534, respectively. Note that a recharge effect became important after about 5.5 days of pumpage.

Table 7. Static Water Levels on February 24, 1993, and Screened Intervals in Selected Observation Wells.

Well	Radial Distance ^a	Water Level ^a	Screened Interval ^a
Otowi-4 ^b	0.75	5,761	5,512-4,042
TW-3	413.00	5,817	5,790-5,780
TW-2	5,380.00	5,855	5,880-5,824
TW-8	5,929.00	5,886	5,925-5,813
PM-5 ^c	6,714.00	5,861	5,656-4,024
PM-3 ^c	6,029.00	5,875	5,636-4,360

^aAll units are in feet; water levels and screened intervals are relative to mean sea level.

^bOtowi-4 was the pumping well for the test described in this report.

^cMunicipal water supply well remained off from January through March 1993.

points, giving more weight to the early-time data points (i.e., for $t < 5.5$ days) before the recharge effect begins to affect the linear relationship between s and $\log(t)$. The slope (Δs) of this best-fitting line is measured over one log cycle, and t_0 is estimated where this best-fit line intersects the drawdown axis at $s = 0$. T and S are then computed from

$$T = 2.303*Q/(4*\pi*\Delta s) \quad \text{and} \quad S = 2.25*T*t_0/r^2$$

Note that r represents the radial distance from the pumping well to the observation well where s and t are recorded. In this test, drawdown was measured inside a 2-in. steel gage line located outside the Otowi-4 well casing and connected to the production casing below the pump impellers at the 1,114-ft depth. Here the screen and gravel pack are in close hydraulic communication and have an outside diameter of 18 in. Hence r was set equal to 0.75 ft. From Figure 2 we see that $\Delta s = 5.32$ ft, and $t_0 = 1.21e-07$ days. Thus $T = 11,064$ sq ft/day, and $S = 0.00534$. These values compare reasonably with those previously reported ($T = 8,362$ sq ft/day and $S = 0.00193$) for a much shorter step-drawdown test conducted in 1990 at O-4.²⁰ While the test results reported here are more representative of actual conditions in the main aquifer than were earlier T and S values, it should be noted that the drawdown values were still recorded in the production well, and these results are not as desirable as those from a test with a fully penetrating observation well. In particular, the value of S is difficult to determine because the well radius may be affected by gravel pack permeability and well losses.

The drawdown data from TW-3, shown in Figure 10b, was not analyzed quantitatively because this well is completed to a total depth of 815 ft below the surface, with only the bottom 10 ft screened. The top of the screen in O-4 starts at 1,115 ft below the surface and continues down to 2,574 ft below the surface.²⁰ Hence the screened intervals in O-4 and TW-3 do not overlap. Table 1 clearly illustrates this point.

VII. PLUGGING OF LOS ALAMOS WELLS LA-1, LA-3, LA-4, AND LA-6

The plugging operations were carried out in accordance to a set of specifications that were approved by the State Engineer. The specifications were written by Glenn Hammock, a consulting engineer. The depth of the wells were determined prior to the plugging operations. The depths determined were always less than the completed depths as the wells in the field tend to fill with sand while being pumped and in some cases the casings may have parted, allowing the gravel packs to fill the holes. In each of the four wells, the volume of cement exceeded the volume of the wells to be plugged. This indicates that some of the neat cement slurry moved into the gravel pack through the casing slots.

The wells were plugged from the bottom to the land surface. A tremmie pipe was set near the bottom of the holes and a slurry of neat cement was pumped into the hole through the tremmie pipe. As the holes were filled with the slurry, a section of the tremmie pipe was removed and pumping continued. The operation continued until cement extended to the surface.

A. Well LA-1

Well LA-1 was drilled in 1946 and cased to a depth of 870 ft with 12-in.-diameter casing. There were 805 ft of slots between 60 and 805 ft. The well was gravel packed. Prior to plugging, the well was sounded at a depth of 180 ft. The well was plugged from 180 ft to land surface with about 20.8 cu yd of neat cement. The top 5 ft of the casing and conductor pipe was removed and the annular space was grouted with neat cement.

The 12-in.-diameter casing to a depth of 180 ft would require 5.2 cu yd of cement. About 20.8 cu yd of cement were used, an excess of 15.6 cu yd. During the plugging operation it was noted that the cement plug moved, as if the hole were bridged at the measurement. The excess cement, while filling the hole, probably moved out into the gravel pack. The job was completed August 18, 1993.

B. Well LA-3

Well LA-3 was drilled in 1947 and cased to a depth of 870 ft with 12-in.-diameter casing. There were 760 ft of slotted casing and screens between a depth of 105 and 865 ft. The well was gravel packed. Prior to plugging, the well was sounded at a depth of 753 ft. The well was plugged from 753 ft to land surface with 31.0 cu yd of neat cement. The top 5 ft of the casing and conductor pipe were removed and the annular space grouted with neat cement.

The 12-in.-diameter casing extending to a depth of 753 ft would require 21.8 cu yd of cement. About 31.0 cu yd were used, an excess of 9.2 cu yd. The excess probably moved out into the gravel pack. The job was completed on August 18, 1993.

C. Well LA-4

Well LA-4 was drilled in 1948 and was cased to a depth of 1,965 ft. The casing diameter was 12-in. from land surface to 754 ft, then reduced to a 10-in. diameter from 754 to 1,965 ft. There were 305 ft of slotted casing between 754 ft to 1,964 ft. The well was gravel packed. Prior to plugging, the well was sounded at a depth of 778 ft. The well was plugged from 778 ft to land surface with 33.0 cu yd of sand cement. The top 5 ft of the casing and conductor pipe were removed and the annular space grouted with neat cement.

The 12-in.-diameter casing to 754 ft and 10-in.-diameter casing from 754 to 778 ft would require 22.4 cu ft of cement. About 33.0 cu yd were used, an excess of 10.6 cu yd. During well rehabilitation in 1987, a video log of the well indicated that the casing was parted at or near the reduction of the 12-in.-diameter casing to 10-in.-diameter casing at 754 ft. The excess cement moved out into the well bore or gravel pack at the casing break or casing slots. The job was completed on August 30, 1993.

D. Well LA-6

Well LA-6 was drilled in 1948 and was cased to a depth of 1,790 ft. The casing diameter was 12-in. from land surface to 597 ft and then reduced to a 10-in. diameter from 597 to 1,790 ft. There were 400 ft of slotted casing between 420 ft to 1,778 ft. The well was gravel packed. The well depth in 1977 was about 1,200 ft. It was sounded prior to being plugged at a depth of 1,200 ft. The well was plugged from 1,200 ft to land surface with 22.5 cu yd of sand cement and 13.02 cu yd of neat cement. The top 5 ft of the casing and conductor pipe were removed and the annular space grouted with neat cement.

The 12-in.-diameter casing to a depth of 597 ft and the 10-in.-diameter casing from 597 to 1,200 ft would require 29.5 cu yd of cement. The well was plugged with 35.5 cu yd of neat cement and sand, an excess of 6.0 cu yd. The excess probably moved out into the gravel pack. The job was completed on August 30, 1993.

VIII. SUMMARY

Operations of wells and well fields in 1993 were satisfactory. Water level trends in the wells were as expected under the current amount of annual pumpage. Future operations of the wells and water supply system should be continued as in the past. The pumps on Wells G-1, G-4, and G-6 should be tested during the year. The three wells have a potential of 600 gpm, which in an emergency, with the loss of one or two high-yield wells during peak demand periods in the summer, would be necessary to maintain the required fire protection level in storage tanks. Water level monitoring of the three wells should be continued. Efforts should be made to install water level monitoring equipment on Well G-3 and to repair the equipment on Well PM-4. Continued collection of data from wells and well fields is necessary to evaluate present and future wells and well field operations.

ACKNOWLEDGMENTS

Statistics on well production were collected by personnel from Johnson Control World Services Inc. and were compiled for this report by the Laboratory's Water Quality and Hydrology Group.

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Appendix

Annual Statistics on Aquifer Characteristics

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well LA-1

Year	Pumping Time (h)	Production (10 ⁶ gal.)	Pumping Rate (gpm)	Water Level (Nonpumping) (ft)
1947	3,468	54.0	259.5	—
1948	2,988	34.7	193.6	—
1949	1,361	26.7	327.0	—
1950	563	10.5	310.8	19.0
1951	1,215	14.6	200.3	59.0
1952	286	3.4	198.1	40.0
1953	0	0.0	0.0	36.0
1954	0	0.0	0.0	44.0
1955	690	9.7	234.3	51.0
1956	39	0.0	0.0	33.0
1957	0	0.0	0.0	33.0
1958	0	0.0	0.0	10.0
1959	0	0.0	0.0	13.0
1960	0	0.0	0.0	13.0
1961	0	0.0	0.0	59.0
1962	0	0.0	0.0	84.0
1963	0	0.0	0.0	90.0
1964	0	0.0	0.0	95.0
1965	0	0.0	0.0	76.0
1966	0	0.0	0.0	70.0
1967	0	0.0	0.0	52.0
1968	0	0.0	0.0	42.0
1969	0	0.0	0.0	38.0
1970	0	0.0	0.0	37.0
1971	0	0.0	0.0	51.0
1972	0	0.0	0.0	49.0
1973	0	0.0	0.0	55.0
1974	0	0.0	0.0	53.0
1975	0	0.0	0.0	58.0
1976	0	0.0	0.0	69.0
1977	0	0.0	0.0	74.0
1978	0	0.0	0.0	68.0
1979	0	0.0	0.0	38.0
1980	0	0.0	0.0	40.0
1981	0	0.0	0.0	51.0
1982	0	0.0	0.0	98.0
1983	0	0.0	0.0	46.0
1984	0	0.0	0.0	71.0
1985	0	0.0	0.0	63.0
1986	0	0.0	0.0	34.0
1987	0	0.0	0.0	70.0
1988	0	0.0	0.0	66.0
1989	0	0.0	0.0	77.0
1990	0	0.0	0.0	84.0

NOTE: Well was completed November 1946; initial water level: flowing; surface elevation 5,624 ft. Air line and recorder were removed in 1990; water level on March 12, 1992 was 7.61 ft below top of brass valve. Facility was demolished in 1990 and the well was plugged in 1993.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well LA-1B

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1960	415	36.3	1,457.8	7.0	111.0	104.0	14.0
1961	3,727	124.7	557.6	54.0	154.0	100.0	5.6
1962	3,936	129.1	546.7	72.0	169.0	97.0	5.6
1963	3,649	117.4	536.2	74.0	170.0	96.0	5.6
1964	4,174	130.3	520.3	81.0	183.0	102.0	5.1
1965	3,007	97.9	542.6	63.0	170.0	107.0	5.1
1966	2,589	83.9	540.1	50.0	169.0	119.0	4.5
1967	2,519	84.9	561.7	39.0	153.0	114.0	4.9
1968	2,183	74.0	565.0	32.0	147.0	115.0	4.9
1969	2,244	75.7	562.2	22.0	142.0	120.0	4.7
1970	2,369	79.7	560.7	22.0	143.0	121.0	4.6
1971	2,633	89.1	564.0	31.0	162.0	131.0	4.3
1972	2,215	75.3	566.6	31.0	163.0	132.0	4.3
1973	2,628	87.2	553.0	37.0	170.0	133.0	4.2
1974	2,282	73.9	539.7	35.0	161.0	126.0	4.3
1975	2,308	74.4	537.3	42.0	168.0	126.0	4.3
1976	2,521	79.6	526.2	50.0	176.0	126.0	4.2
1977	2,782	84.2	504.4	47.0	167.0	120.0	4.2
1978	2,306	75.6	546.3	42.0	162.0	120.0	4.6
1979	1,354	45.9	564.6	13.0	134.0	121.0	4.7
1980	1,955	62.9	536.3	21.0	146.0	125.0	4.3
1981	2,299	73.9	537.7	26.0	144.0	118.0	4.5
1982	3,707	108.1	486.0	71.0	180.0	109.0	4.5
1983	407	12.1	495.0	61.0	160.0	99.0	5.0
1984	2,673	96.9	604.0	75.0	201.0	126.0	4.8
1985	1,919	68.5	595.0	55.0	179.0	124.0	4.8
1986	1,598	54.9	573.0	25.0	144.0	119.0	4.8
1987	2,753	97.3	589.0	66.0	187.0	121.0	4.9
1988	2,187	75.4	574.0	60.0	192.0	132.0	4.4
1989	2,864	97.8	569.0	73.0	197.0	124.0	4.6
1990	2,072	68.6	552.0	70.0	196.0	126.0	4.4
1991	1,488	50.4	565.0	55.0	180.0	125.0	4.5

NOTE: Well was completed March 1960; initial water level: +34 ft artesian pressure; surface elevation 5,622 ft. Well was out of service in 1992; the well and pump were transferred to San Ildefonso Pueblo in 1992. The water level in 1993 was +7.5 ft artesian pressure.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well LA-2

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1947	963	27.6	477.7	—	—	—	—
1948	3,659	59.3	270.1	—	—	—	—
1949	1,654	41.8	421.2	—	—	—	—
1950	614	15.6	423.5	59.0	285.0	226.0	1.9
1951	2,415	57.7	398.2	111.0	305.0	194.0	2.1
1952	1,980	46.3	389.7	101.0	300.0	199.0	2.0
1953	2,201	47.2	357.4	100.0	301.0	201.0	1.8
1954	2,601	56.8	364.0	116.0	—	—	—
1955	2,223	49.4	370.4	110.0	—	—	—
1956	1,805	44.2	408.1	84.0	—	—	—
1957	1,066	29.6	462.8	53.0	277.0	224.0	2.1
1958	1,166	31.1	444.5	60.0	270.0	210.0	2.1
1959	1,599	40.7	424.2	71.0	303.0	232.0	1.8
1960	2,169	51.6	396.5	76.0	305.0	229.0	1.7
1961	2,149	44.4	344.3	101.0	313.0	212.0	1.6
1962	1,823	35.7	326.4	111.0	314.0	203.0	1.6
1963	1,999	40.7	339.3	127.0	332.0	205.0	1.7
1964	1,924	34.2	296.3	137.0	347.0	210.0	1.4
1965	1,911	39.8	347.1	121.0	330.0	209.0	1.7
1966	1,070	21.4	333.3	108.0	340.0	232.0	1.4
1967	238	4.9	343.1	78.0	304.0	226.0	1.5
1968	502	11.3	375.2	64.0	305.0	241.0	1.6
1969	155	3.8	408.6	50.0	297.0	247.0	1.7
1970	341	7.2	351.9	59.0	310.0	251.0	1.4
1971	1,787	31.8	296.6	88.0	318.0	230.0	1.3
1972	2,189	39.3	299.2	96.0	322.0	226.0	1.3
1973	2,625	46.7	296.5	106.0	334.0	228.0	1.3
1974	2,033	36.8	301.7	109.0	325.0	216.0	1.4
1975	2,310	40.2	290.0	103.0	320.0	217.0	1.3
1976	2,488	39.9	267.3	113.0	322.0	209.0	1.3
1977	2,775	42.5	255.3	118.0	314.0	196.0	1.3
1978	2,299	39.5	286.4	112.0	338.0	226.0	1.3
1979	1,353	26.2	323.0	75.0	316.0	241.0	1.3
1980	1,960	33.8	287.4	84.0	318.0	234.0	1.2
1981	1,991	34.4	300.0	94.0	336.0	242.0	1.2
1982	3,174	51.2	269.0	161.0	348.0	187.0	1.4
1983	2,752	54.5	330.0	121.0	321.0	200.0	1.6
1984	2,753	53.7	325.0	130.0	323.0	193.0	1.7
1985	2,027	37.1	305.0	112.0	291.0	179.0	1.7
1986	1,289	24.1	312.0	74.0	252.0	178.0	1.8
1987	2,619	39.6	252.0	129.0	319.0	190.0	1.3
1988	1,936	33.0	284.0	117.0	296.0	179.0	1.6
1989	2,647	43.2	272.0	141.0	329.0	188.0	1.4
1990	2,399	40.3	280.0	134.0	330.0	196.0	1.4
1991	1,705	32.7	320.0	123.0	333.0	210.0	1.5
1992	—	13.4	—	—	—	—	—
1993	—	3.6	—	—	—	—	—

NOTE: Well was completed December 1946; initial water level: flowing; surface elevation 5,651 ft. In 1992 the well was out of service to supply water to Los Alamos; 1992 production was for road construction; the well and pump were transferred to San Ildefonso Pueblo in 1992.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well LA-3

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1947	1,476	64.9	732.8	—	—	—	—
1948	3,647	82.5	377.0	—	—	—	—
1949	1,505	41.7	461.8	—	—	—	—
1950	2,793	57.8	344.9	97.0	231.0	134.0	2.6
1951	3,554	66.9	313.7	116.0	233.0	117.0	2.7
1952	2,514	58.6	388.5	94.0	218.0	124.0	3.1
1953	3,104	69.7	374.2	103.0	229.0	126.0	3.0
1954	2,595	57.3	368.0	101.0	225.0	124.0	3.0
1955	2,195	48.7	369.8	91.0	226.0	135.0	2.7
1956	1,849	42.1	379.5	74.0	222.0	148.0	2.6
1957	1,080	26.1	402.8	56.0	219.0	163.0	2.5
1958	1,612	33.6	347.4	49.0	225.0	176.0	2.0
1959	1,821	35.0	320.3	54.0	231.0	177.0	1.8
1960	2,174	38.4	294.4	68.0	230.0	162.0	1.8
1961	1,939	34.7	298.3	85.0	189.0	104.0	2.9
1962	2,361	45.4	320.5	93.0	192.0	99.0	3.2
1963	2,128	42.5	332.9	81.0	197.0	116.0	2.9
1964	2,574	50.4	326.3	104.0	217.0	113.0	2.9
1965	1,961	43.3	368.9	79.0	220.0	141.0	2.6
1966	2,236	46.1	343.6	81.0	219.0	138.0	2.5
1967	2,274	47.4	347.4	86.0	218.0	132.0	2.6
1968	2,127	42.7	334.6	82.0	251.0	169.0	2.0
1969	2,072	40.1	322.6	58.0	246.0	188.0	1.7
1970	2,303	44.0	318.4	55.0	241.0	186.0	1.7
1971	2,556	45.4	296.0	77.0	250.0	173.0	1.7
1972	2,205	39.7	300.1	73.0	251.0	178.0	1.7
1973	977	20.3	346.3	65.0	248.0	183.0	1.9
1974	2,291	43.5	316.5	73.0	244.0	171.0	1.9
1975	2,306	43.3	313.0	80.0	253.0	173.0	1.8
1976	2,474	42.3	285.0	88.0	260.0	172.0	1.7
1977	2,779	47.3	283.7	89.0	248.0	159.0	1.8
1978	2,308	42.4	306.4	87.0	250.0	163.0	1.9
1979	1,343	28.1	348.1	58.0	243.0	185.0	1.9
1980	1,952	35.1	299.9	61.0	237.0	176.0	1.7
1981	2,297	41.5	301.1	70.0	240.0	170.0	1.8
1982	3,691	54.9	247.0	118.0	246.0	128.0	1.9
1983	949	14.7	258.0	89.0	203.0	129.0	2.0
1984	838	16.6	329.0	142.0	301.0	159.0	2.0
1985	2,078	41.9	336.0	104.0	280.0	176.0	1.9
1986	1,328	26.9	338.0	88.0	255.0	167.0	2.0
1987	2,710	50.9	313.0	118.0	289.0	171.0	1.8
1988	2,130	40.1	313.0	119.0	272.0	153.0	2.0
1989	2,808	51.9	308.0	122.0	298.0	176.0	1.8
1990	2,461	44.6	302.0	122.0	295.0	173.0	1.8
1991	1,398	23.4	278.0	112.0	284.0	172.0	1.6

NOTE: Well was completed May 1947; initial water level: flowing; surface elevation 5,672 ft. Air line and recorder were removed in late 1991; water level on March 12, 1992 was 39.55 ft below brass valve. Well was out of service in 1992; the facility was demolished in 1992; well was transferred to San Ildefonso in 1992 and was plugged in 1993.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well LA-4

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1948	1,570	42.7	453.3	—	—	—	—
1949	940	37.5	664.9	—	—	—	—
1950	4,350	164.9	631.8	278.0	353.0	75.0	8.4
1951	4,909	173.6	589.4	285.0	357.0	72.0	8.2
1952	3,429	119.6	581.3	267.0	339.0	72.0	8.1
1953	3,034	109.1	599.3	264.0	335.0	71.0	8.4
1954	2,133	78.2	611.0	255.0	329.0	74.0	8.3
1955	2,647	94.5	595.0	268.0	341.0	73.0	8.2
1956	3,402	120.0	588.9	273.0	346.0	73.0	8.1
1957	2,844	105.4	617.7	270.0	345.0	75.0	8.2
1958	2,973	110.3	618.3	270.0	342.0	72.0	8.6
1959	3,084	113.5	613.4	275.0	346.0	71.0	8.6
1960	4,084	145.6	594.2	296.0	365.0	69.0	8.6
1961	3,687	129.7	586.3	296.0	365.0	69.0	8.5
1962	3,688	129.3	584.3	286.0	359.0	73.0	8.0
1963	3,718	130.5	585.0	280.0	351.0	71.0	8.2
1964	4,500	155.0	574.1	291.0	361.0	70.0	8.2
1965	3,110	111.4	597.0	279.0	349.0	70.0	8.5
1966	3,279	115.6	587.6	285.0	356.0	71.0	8.3
1967	2,127	77.1	604.1	278.0	350.0	72.0	8.4
1968	2,276	81.7	598.3	280.0	351.0	71.0	8.4
1969	1,694	61.8	608.0	282.0	358.0	76.0	8.0
1970	2,333	83.5	596.5	286.0	363.0	77.0	7.7
1971	2,519	89.0	588.9	287.0	373.0	86.0	6.8
1972	2,322	82.6	592.9	282.0	367.0	85.0	7.0
1973	2,616	92.4	588.7	294.0	377.0	83.0	7.1
1974	2,306	82.2	594.1	286.0	367.0	81.0	7.3
1975	2,319	82.3	591.5	272.0	355.0	83.0	7.1
1976	2,802	98.2	584.1	277.0	373.0	96.0	6.1
1977	2,741	96.4	586.2	278.0	374.0	96.0	6.1
1978	2,248	80.1	594.2	271.0	368.0	97.0	6.1
1979	2,964	104.6	587.9	280.0	376.0	96.0	6.1
1980	3,322	115.3	578.5	284.0	385.0	101.0	5.7
1981	2,573	89.4	579.1	289.0	393.0	104.0	5.6
1982	0	0	0	—	—	—	—
1983	1,840	61.5	577.0	287.0	392.0	105.0	5.3
1984	2,695	87.1	539.0	290.0	383.0	93.0	5.8
1985	2,667	86.4	540.0	292.0	378.0	86.0	6.3
1986	1,172	38.8	552.0	284.0	377.0	93.0	5.9
1987	38	1.6	—	269.0	357.0	88.0	—

NOTE: Well was completed August 1948; initial water level 189 ft; surface elevation 5,975 ft. Well was out of service in 1988. Air line and recorder were removed in 1990. Water level was 244.4 ft on June 22, 1990, and 244.2 ft on March 11, 1991; both measurements were below top of brass valve. Facilities demolished in 1992 and well was transferred to San Ildefonso Pueblo in 1992.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well LA-5

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1948	1,171	40.4	575.0	—	—	—	—
1949	1,763	58.5	553.0	—	—	—	—
1950	4,052	130.1	535.1	131.0	254.0	123.0	4.4
1951	6,004	187.4	520.2	162.0	272.0	110.0	4.7
1952	3,425	109.6	533.3	147.0	259.0	112.0	4.8
1953	3,278	103.9	528.3	141.0	257.0	116.0	4.6
1954	2,546	80.1	524.4	137.0	259.0	122.0	4.3
1955	3,158	97.3	513.5	145.0	267.0	122.0	4.2
1956	3,476	104.5	501.1	150.0	276.0	126.0	4.0
1957	2,868	86.0	499.8	150.0	277.0	127.0	3.9
1958	3,009	89.9	498.0	151.0	277.0	126.0	4.0
1959	3,088	93.5	504.6	155.0	280.0	125.0	4.0
1960	4,088	119.1	485.6	168.0	288.0	120.0	4.0
1961	3,534	100.3	473.0	165.0	288.0	123.0	3.8
1962	3,735	107.7	480.6	172.0	—	—	—
1963	3,726	105.0	469.7	171.0	—	—	—
1964	4,236	118.8	467.4	184.0	—	—	—
1965	1,740	50.5	483.7	180.0	—	—	—
1966	2,817	79.3	469.2	180.0	—	—	—
1967	2,533	73.7	484.9	168.0	—	—	—
1968	2,233	63.3	472.5	161.0	300.0	139.0	3.4
1969	2,402	68.5	475.3	161.0	298.0	137.0	3.5
1970	2,353	66.1	468.2	157.0	300.0	143.0	3.3
1971	2,659	74.4	466.3	155.0	302.0	147.0	3.2
1972	2,301	64.4	466.5	153.0	304.0	151.0	3.1
1973	2,476	68.3	459.7	156.0	308.0	152.0	3.0
1974	1,903	52.5	459.8	154.0	306.0	152.0	3.0
1975	2,318	63.9	459.4	149.0	309.0	160.0	2.9
1976	2,799	77.6	462.1	150.0	310.0	160.0	2.9
1977	2,665	74.8	467.8	147.0	303.0	156.0	3.0
1978	2,274	64.9	475.8	145.0	299.0	154.0	3.1
1979	2,964	84.0	472.4	149.0	301.0	152.0	3.1
1980	3,316	92.2	463.6	153.0	300.0	147.0	3.2
1981	3,523	96.5	456.5	158.0	304.0	146.0	3.1
1982	3,654	102.3	467.0	168.0	299.0	136.0	3.4
1983	2,842	78.1	458.0	154.0	295.0	141.0	3.2
1984	2,889	72.1	416.0	156.0	281.0	125.0	3.1
1985	2,153	55.8	432.0	174.0	308.0	134.0	3.2
1986	1,376	34.6	419.0	168.0	310.0	142.0	2.9
1987	1,148	27.9	405.0	167.0	314.0	147.0	2.8
1988	351	9.9	406.0	—	—	—	—
1989	1,074	26.5	411.0	—	—	—	—
1990	1,388	33.3	400.0	—	—	—	—
1991	783	18.5	394	—	—	—	—

NOTE: Well was completed September 1948; initial water level 71 ft; surface elevation 5,840 ft. Air line and recorder were removed in late 1991; water level on December 4, 1991 (TV log), was 158 ft below top of pump base (5,856.5 ft). Well was out of service in 1992; well and pump were transferred to San Ildefonso Pueblo in 1992.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well LA-6

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1948	116	4.9	704.0	—	—	—	—
1949	2,451	95.8	651.4	—	—	—	—
1950	4,490	167.9	623.2	83.0	136.0	53.0	11.8
1951	5 882	201.6	571.2	115.0	160.0	45.0	12.7
1952	3,168	110.3	580.3	108.0	151.0	43.0	13.5
1953	3,177	113.8	597.0	95.0	139.0	44.0	13.6
1954	2,894	107.1	616.8	92.0	135.0	43.0	14.3
1955	2,911	108.0	618.3	97.0	140.0	43.0	14.4
1956	3,438	125.8	609.9	106.0	149.0	43.0	14.2
1957	2,833	102.4	602.4	107.0	152.0	45.0	13.4
1958	2,957	106.9	602.5	108.0	131.0	43.0	14.0
1959	3,096	108.3	583.0	115.0	158.0	43.0	13.6
1960	4,084	138.6	565.6	130.0	172.0	42.0	13.5
1961	3,284	112.5	571.0	129.0	171.0	42.0	13.6
1962	3,886	129.4	555.0	135.0	175.0	40.0	13.9
1963	2,953	102.9	580.8	125.0	171.0	46.0	12.6
1964	4,244	138.3	543.1	132.0	172.0	40.0	13.6
1965	3,145	103.8	550.1	120.0	160.0	40.0	13.8
1966	3,173	104.0	546.3	129.0	169.0	40.0	13.7
1967	2,511	85.4	566.8	118.0	158.0	40.0	14.2
1968	2,111	71.6	565.3	109.0	150.0	41.0	13.8
1969	2,402	81.6	566.2	109.0	151.0	42.0	13.5
1970	2,337	79.1	564.1	106.0	149.0	43.0	13.1
1971	2,472	82.5	556.2	119.0	160.0	41.0	13.6
1972	2,317	79.2	569.7	117.0	155.0	38.0	15.0
1973	2,638	90.6	572.4	118.4	155.0	37.0	15.5
1974	2,337	79.8	569.1	120.0	156.0	36.0	15.8
1975	1,571	51.9	550.6	113.0	151.0	38.0	14.5
1976	175	5.1	485.7	96.0	—	—	—
1977	—	—	—	82.0	—	—	—
1978	33	1.1	572.7	77.0	142.0	65.0	8.8
1979	6	0.2	555.6	80.0	146.0	66.0	8.4
1980	4	0.1	520.8	82.0	142.0	60.0	8.7
1981	2.3	0.08	579.8	84.0	141.0	57.0	10.2
1982	—	—	—	90.0	—	—	—
1983	—	—	—	81.0	—	—	—
1984	—	—	—	83.0	—	—	—
1985	—	—	—	92.0	—	—	—
1986	—	—	—	—	—	—	—
1987	—	<0.1	—	—	—	—	—
1988	—	<0.1	—	—	—	—	—
1989	—	<0.1	—	—	—	—	—
1990	—	—	—	—	—	—	—

NOTE: Well was completed December 1948; initial water level 5 ft; surface elevation 5,770 ft. Air line and recorder were removed in 1990; water level on May 5, 1990 was -82.5 ft below land surface datum (5,770 ft); on March 11, 1992 it was 98.35 ft below brass valve. Well was out of service in 1977 but has been pumped since that time for quality-of-water samples. The pump was removed in 1990; the facility was demolished in 1991; the well was transferred to San Ildefonso Pueblo in 1992 and plugged in 1993.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well G-1

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1950	0	2.80	0.0	195.0	—	—	—
1951	1,168	37.70	538.0	202.0	309.0	107.0	5.0
1952	2,476	75.50	508.2	213.0	295.0	82.0	6.2
1953	3,275	97.30	495.2	221.0	292.0	71.0	7.0
1954	2,616	77.80	495.7	221.0	290.0	69.0	7.2
1955	2,406	70.50	448.4	226.0	295.0	69.0	7.1
1956	2,958	83.20	468.8	235.0	303.0	68.0	6.9
1957	2,098	55.90	444.1	236.0	307.0	71.0	6.3
1958	2,460	68.10	461.4	238.0	308.0	70.0	6.6
1959	2,952	82.40	465.2	245.0	314.0	69.0	6.7
1960	3,564	96.00	448.9	254.0	325.0	71.0	6.3
1961	4,236	112.40	442.2	260.0	333.0	73.0	6.1
1962	3,431	93.60	454.7	258.0	342.0	84.0	5.4
1963	4,519	114.90	423.8	265.0	348.0	83.0	5.1
1964	4,374	113.80	433.6	269.0	352.0	83.0	5.2
1965	3,530	90.70	428.2	268.0	352.0	84.0	5.1
1966	4,074	102.60	419.7	269.0	363.0	94.0	4.5
1967	2,615	69.90	445.5	266.0	362.0	96.0	4.6
1968	2,996	78.90	438.9	264.0	366.0	102.0	4.3
1969	2,657	68.30	428.4	266.0	376.0	110.0	3.9
1970	2,712	64.70	397.6	264.0	377.0	113.0	3.5
1971	2,908	67.90	389.2	258.0	378.0	120.0	3.2
1972	2,865	66.10	384.5	264.0	389.0	125.0	3.1
1973	2,997	67.50	375.4	271.0	403.0	132.0	2.8
1974	2,767	62.30	375.3	283.0	412.0	129.0	2.9
1975	2,467	55.70	376.3	293.0	411.0	118.0	3.2
1976	2,962	65.10	366.3	—	—	—	—
1977	2,734	57.90	353.0	275.0	426.0	151.0	2.3
1978	2,656	56.00	351.4	270.0	419.0	149.0	2.4
1979	2,998	61.70	342.9	271.0	422.0	151.0	2.3
1980	3,459	68.30	329.0	273.0	428.0	155.0	2.1
1981	4,427	81.60	307.2	275.0	444.0	169.0	1.8
1982	3,678	69.00	313.0	278.0	443.0	165.0	1.9
1983	2,871	52.20	303.0	272.0	443.0	171.0	1.8
1984	3,804	62.80	275.0	276.0	448.0	172.0	1.5
1985	3,004	48.30	268.0	278.0	450.0	172.0	1.6
1986	2,027	30.30	249.0	279.0	450.0	171.0	1.5
1987	2,070	29.20	235.0	280.0	451.0	171.0	1.4
1988	395	5.40	227.0	280.0	445.0	165.0	1.4
1989	2,010	26.90	223.0	282.0	451.0	169.0	1.3
1990	2,121	30.80	242.0	284.0	454.0	170.0	1.4
1991	1,730	20.90	201.0	282.0	451.0	169.0	1.2
1992	1,077	12.00	186.0	283.0	439.0	156.0	1.2
1993	2.5	0.03	200.0	280.0	—	—	—

NOTE: Well was completed July 1950; initial water level 192 ft; surface elevation 5,973 ft.

WATER SUPPLY AT LOS ALAMOS

DURING 1993

Well G-1A

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1954	108	4.6	709.0	—	—	—	—
1955	1,531	53.0	577.0	265.0	316.0	51.0	11.3
1956	3,130	107.7	573.5	273.0	323.0	50.0	11.5
1957	2,470	87.0	587.0	274.0	327.0	53.0	11.1
1958	2,670	92.5	577.4	279.0	331.0	52.0	11.1
1959	2,965	102.7	577.3	284.0	333.0	49.0	11.8
1960	3,641	122.8	562.1	291.0	342.0	51.0	11.0
1961	4,297	147.3	571.3	298.0	350.0	52.0	11.0
1962	3,972	136.1	571.1	295.0	344.0	49.0	11.7
1963	4,525	149.7	551.4	301.0	350.0	49.0	11.3
1964	3,852	129.3	559.4	302.0	353.0	51.0	11.0
1965	3,505	116.5	554.0	302.0	353.0	51.0	10.9
1966	3,964	133.4	560.9	306.0	355.0	49.0	11.4
1967	2,720	91.3	559.4	302.0	351.0	49.0	11.4
1968	3,089	103.2	556.8	302.0	352.0	50.0	11.1
1969	2,695	90.7	560.9	303.0	356.0	53.0	10.6
1970	2,772	92.5	556.2	300.0	357.0	57.0	9.8
1971	3,313	111.8	562.4	303.0	361.0	58.0	9.7
1972	2,879	94.0	544.2	302.0	361.0	59.0	9.2
1973	2,760	87.9	530.8	302.0	362.0	60.0	8.8
1974	2,974	92.7	519.5	307.0	355.0	48.0	10.8
1975	2,740	85.3	518.9	304.0	351.0	47.0	11.0
1976	2,983	91.6	511.8	302.0	350.0	48.0	10.7
1977	2,942	88.7	502.5	302.0	350.0	48.0	10.5
1978	2,631	77.9	493.5	300.0	345.0	45.0	11.0
1979	2,974	88.0	493.9	301.0	345.0	44.0	11.0
1980	3,480	103.2	494.4	305.0	345.0	40.0	12.4
1981	4,212	131.2	519.1	307.0	347.0	40.0	13.0
1982	3,618	109.7	505.0	305.0	347.0	42.0	12.0
1983	2,901	86.7	498.0	301.0	336.0	35.0	14.2
1984	3,789	113.9	501.0	302.0	345.0	43.0	11.7
1985	4,430	128.4	483.0	306.0	348.0	42.0	11.5
1986	4,644	130.4	468.0	310.0	351.0	41.0	11.4
1987	4,468	122.5	457.0	320.0	362.0	42.0	10.9
1988	5,016	133.5	443.0	323.0	364.0	41.0	10.8
1989	4,663	131.5	470.0	323.0	359.0	36.0	13.1
1990	4,860	145.5	499.0	322.0	362.0	40.0	12.5
1991	5,120	150.2	489.0	325.0	361.0	36.0	13.6
1992	4,676	134.1	478.0	325.0	361.0	36.0	13.3
1993	3,862	108.2	467.0	321.0	355.0	34.0	13.7

NOTE: Well was completed December 1954; initial water level 250 ft; surface elevation 6,014 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well G-2

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1951	123	3.9	528.5	259.0	—	—	—
1952	2,372	78.3	550.2	279.0	327.0	48.0	11.5
1953	3,254	105.6	540.9	290.0	334.0	44.0	12.3
1954	2,682	86.3	536.3	291.0	335.0	44.0	12.2
1955	2,487	78.8	528.1	299.0	345.0	46.0	11.5
1956	3,109	95.8	513.6	310.0	357.0	47.0	10.9
1957	2,458	76.1	516.0	311.0	360.0	49.0	10.5
1958	2,707	80.1	493.2	315.0	361.0	46.0	10.7
1959	2,938	84.6	479.9	320.0	363.0	43.0	11.2
1960	3,535	96.6	455.4	328.0	370.0	42.0	10.8
1961	3,982	105.3	440.7	336.0	375.0	39.0	11.3
1962	4,076	99.8	408.1	338.0	374.0	36.0	11.3
1963	4,563	105.7	386.1	344.0	379.0	35.0	11.0
1964	4,541	105.3	386.5	346.0	380.0	34.0	11.4
1965	3,535	82.6	389.4	346.0	381.0	35.0	11.1
1966	3,994	94.7	395.2	349.0	383.0	34.0	11.6
1967	2,743	67.6	410.7	344.0	379.0	35.0	11.7
1968	2,732	66.5	405.7	344.0	379.0	35.0	11.6
1969	2,679	68.6	426.8	344.0	381.0	37.0	11.5
1970	2,431	62.8	430.5	343.0	381.0	38.0	11.3
1971	3,420	87.4	425.9	345.0	384.0	39.0	10.9
1972	2,887	73.4	423.7	348.0	388.0	40.0	10.6
1973	2,816	72.4	428.5	344.0	385.0	41.0	10.5
1974	3,056	82.0	447.2	347.0	390.0	43.0	10.4
1975	2,724	74.5	455.8	341.0	384.0	43.0	10.6
1976	2,990	81.1	452.1	344.0	388.0	44.0	10.3
1977	2,981	80.4	449.5	346.0	388.0	42.0	10.7
1978	2,562	71.6	451.9	345.0	386.0	41.0	11.0
1979	2,975	80.0	448.0	347.0	388.0	41.0	11.0
1980	3,478	92.4	443.0	350.0	389.0	39.0	11.4
1981	1,432	38.3	445.8	352.0	390.0	38.0	11.7
1982	2,833	25.7	476.0	352.0	399.0	47.0	10.1
1983	624	16.5	441.0	356.0	399.0	43.0	10.3
1984	2,018	43.7	361.0	358.0	385.0	27.0	13.4
1985	4,339	96.6	371.0	352.0	381.0	29.0	12.8
1986	4,769	109.3	382.0	369.0	395.0	26.0	14.7
1987	4,526	109.7	404.0	366.0	399.0	33.0	12.2
1988	4,836	132.8	457.0	367.0	400.0	33.0	13.9
1989	4,820	133.9	463.0	375.0	408.0	33.0	14.0
1990	5,060	134.5	443.0	374.0	407.0	33.0	13.4
1991	4,792	123.3	428.0	369.0	401.0	32.0	13.4
1992	5,075	129.0	424.0	370.0	401.0	31.0	13.7
1993	3,871	97.1	418.0	368.0	399.0	31.0	13.5

NOTE: Well was completed August 1951; initial water level 259 ft; surface elevation 6,056 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well G-3

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1951	192	7.3	633.7	281.0	—	—	—
1952	2,379	65.4	458.2	310.0	358.0	48.0	9.5
1953	3,192	76.4	398.9	322.0	360.0	38.0	10.5
1954	2,675	66.1	411.8	322.0	370.0	48.0	8.6
1955	2,369	69.4	488.3	316.0	368.0	52.0	9.4
1956	3,149	87.9	465.2	324.0	380.0	56.0	8.3
1957	2,517	70.2	464.8	324.0	385.0	61.0	7.6
1958	2,562	69.5	452.1	323.0	386.0	63.0	7.2
1959	2,931	74.6	424.2	326.0	395.0	69.0	6.1
1960	3,591	82.5	382.9	335.0	407.0	72.0	5.3
1961	3,612	79.9	368.7	343.0	414.0	71.0	5.2
1962	4,057	83.7	343.9	348.0	418.0	70.0	4.9
1963	4,555	86.7	317.2	352.0	422.0	70.0	4.5
1964	4,487	78.6	292.0	355.0	424.0	69.0	4.2
1965	3,498	65.6	312.6	350.0	419.0	69.0	4.5
1966	3,991	73.7	307.8	353.0	420.0	67.0	4.6
1967	2,752	52.9	320.4	344.0	418.0	74.0	4.3
1968	3,086	56.5	305.1	341.0	418.0	77.0	4.0
1969	2,672	50.8	316.9	338.0	417.0	79.0	4.0
1970	2,736	55.4	337.5	336.0	419.0	83.0	4.1
1971	3,337	64.2	320.6	342.0	423.0	81.0	4.0
1972	2,838	50.9	298.9	341.0	421.0	80.0	3.7
1973	2,843	47.3	277.3	341.0	418.0	77.0	3.6
1974	3,006	49.3	273.3	342.0	424.0	82.0	3.3
1975	2,632	43.1	272.9	341.0	428.0	87.0	3.1
1976	2,971	82.6	463.4	359.0	447.0	88.0	5.3
1977	2,961	78.9	444.1	353.0	448.0	95.0	4.7
1978	2,590	66.4	427.5	345.0	443.0	98.0	4.4
1979	3,014	69.0	381.0	345.0	450.0	105.0	3.6
1980	3,448	61.8	298.6	348.0	453.0	105.0	2.8
1981	4,315	66.6	257.2	357.0	467.0	110.0	2.3
1982	3,550	51.0	239.0	349.0	459.0	110.0	2.2
1983	2,183	31.3	239.0	340.0	463.0	123.0	1.9
1984	1,211	19.0	267.0	355.0	475.0	120.0	2.2
1985	1,587	22.1	232.0	351.0	470.0	119.0	2.0
1986	2,266	26.7	196.0	375.0	492.0	117.0	1.7
1987	—	<0.1	—	—	—	—	—
1988	—	3.4	—	—	—	—	—
1989	—	<0.1	—	—	—	—	—
1990	—	—	—	—	—	—	—
1991	—	—	—	—	—	—	—

NOTE: Well was completed July 1951; initial water level 280 ft; surface elevation 6,139 ft. Well was out of service in 1989 due to pumpage of excessive sand.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well G-4

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1951	—	12.5	—	357.0	477.0	120.0	—
1952	2,401	56.9	395.0	374.0	474.0	100.0	3.9
1953	2,677	55.2	343.7	380.0	472.0	92.0	3.7
1954	2,256	58.8	434.4	383.0	526.0	143.0	3.0
1955	1,172	22.7	322.8	378.0	481.0	103.0	3.1
1956	1,800	33.9	313.9	377.0	491.0	114.0	2.8
1957	1,324	24.2	304.6	373.0	498.0	125.0	2.4
1958	1,970	35.9	303.7	370.0	490.0	120.0	2.5
1959	1,819	31.6	289.5	378.0	494.0	116.0	2.5
1960	2,457	37.0	251.0	385.0	509.0	124.0	2.0
1961	2,787	45.0	269.1	389.0	512.0	123.0	2.2
1962	2,738	41.7	253.8	386.0	505.0	119.0	2.1
1963	3,519	46.4	219.8	388.0	504.0	116.0	1.9
1964	3,561	42.9	200.8	396.0	499.0	103.0	1.9
1965	2,100	23.8	188.9	394.0	492.0	98.0	1.9
1966	2,219	33.6	252.4	391.0	498.0	107.0	2.4
1967	2,690	44.8	277.6	388.0	509.0	121.0	2.3
1968	2,083	31.4	251.2	386.0	509.0	123.0	2.0
1969	1,309	17.4	221.5	387.0	505.0	118.0	1.9
1970	606	7.7	211.8	384.0	504.0	120.0	1.8
1971	1,640	21.0	213.4	389.0	503.0	114.0	1.9
1972	2,840	33.3	195.4	391.0	507.0	116.0	1.7
1973	3,006	37.2	206.3	392.0	521.0	129.0	1.6
1974	2,672	34.3	213.9	392.0	519.0	127.0	1.7
1975	1,977	41.0	345.6	403.0	559.0	156.0	2.2
1976	2,859	57.8	336.9	406.0	571.0	165.0	2.0
1977	2,954	62.4	352.1	406.0	589.0	183.0	1.9
1978	2,607	49.5	316.5	398.0	589.0	191.0	1.7
1979	2,974	52.9	296.4	395.0	586.0	191.0	1.6
1980	2,235	35.6	265.7	394.0	580.0	186.0	1.4
1981	432	8.2	316.4	385.0	573.0	188.0	1.7
1982	3,657	65.2	297.0	386.0	578.0	192.0	1.5
1983	2,604	42.2	270.0	—	—	—	—
1984	3,766	49.7	220.0	—	—	—	—
1985	1,747	21.7	207.0	402.0	572.0	170.0	1.2
1986	2,678	33.9	211.0	396.0	574.0	178.0	1.2
1987	2,011	25.1	208.0	398.0	573.0	175.0	1.2
1988	301	4.1	227.0	390.0	545.0	155.0	1.4
1989	1,739	21.6	207.0	401.0	562.0	161.0	1.3
1990	1,539	16.8	182.0	381.0	564.0	183.0	1.0
1991	1,254	13.7	181.0	382.0	559.0	177.0	1.0
1992	1,116	12.0	179.0	387.0	544.0	157.0	1.1
1993	—	—	—	374.0	—	—	—

NOTE: Well was completed May 1951; initial water level 347 ft; surface elevation 6,229 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well G-5

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1951	—	6.7	—	414.0	—	—	—
1952	2,579	73.8	476.9	422.0	480.0	58.0	8.2
1953	1,433	37.8	439.6	425.0	467.0	42.0	10.5
1954	2,617	80.9	515.2	429.0	473.0	44.0	11.7
1955	2,529	80.4	529.9	427.0	472.0	45.0	11.8
1956	3,052	97.0	529.7	431.0	478.0	47.0	11.3
1957	2,385	64.1	447.9	424.0	466.0	42.0	10.7
1958	1,523	49.1	537.3	428.0	477.0	49.0	11.0
1959	2,917	101.7	581.1	435.0	495.0	60.0	9.7
1960	2,828	98.0	577.6	437.0	501.0	64.0	9.0
1961	3,908	134.0	571.5	438.0	507.0	69.0	8.3
1962	4,186	142.0	565.4	440.0	511.0	71.0	8.0
1963	4,528	151.0	555.8	441.0	513.0	72.0	7.7
1964	4,532	150.4	553.1	446.0	516.0	70.0	7.9
1965	3,520	117.1	554.5	443.0	516.0	73.0	7.6
1966	2,555	83.2	542.7	445.0	520.0	75.0	7.2
1967	2,405	80.0	554.4	444.0	519.0	75.0	7.4
1968	2,513	81.2	538.5	443.0	517.0	74.0	7.3
1969	2,649	83.3	524.1	450.0	520.0	70.0	7.5
1970	2,771	88.9	534.7	453.0	521.0	68.0	7.9
1971	2,657	88.3	553.9	450.0	521.0	71.0	7.8
1972	2,902	92.4	530.7	441.0	514.0	73.0	7.3
1973	3,003	97.5	541.1	444.0	515.0	71.0	7.6
1974	2,054	69.0	559.9	440.0	513.0	73.0	7.7
1975	2,266	74.7	549.4	433.0	500.0	67.0	8.2
1976	2,955	95.0	535.8	442.0	504.0	62.0	8.6
1977	2,836	92.1	541.3	444.0	504.0	60.0	9.0
1978	2,608	84.2	538.4	442.0	502.0	60.0	9.0
1979	2,766	86.5	521.5	442.0	502.0	60.0	8.7
1980	2,896	89.0	512.4	442.0	502.0	60.0	8.5
1981	2,124	66.7	523.4	451.0	528.0	77.0	6.8
1982	1,219	38.2	522.0	455.0	510.0	55.0	9.5
1983	2,904	73.2	420.0	445.0	492.0	47.0	8.9
1984	3,838	115.4	501.0	452.0	507.0	55.0	9.4
1985	2,193	67.9	516.0	453.0	509.0	56.0	9.2
1986	2,219	52.5	394.0	453.0	494.0	41.0	9.6
1987	5,732	116.7	379.0	462.0	504.0	42.0	9.0
1988	4,841	115.3	396.0	466.0	507.0	41.0	9.7
1989	4,715	110.9	392.0	474.0	514.0	40.0	9.8
1990	5,094	119.2	390.0	485.0	526.0	41.0	9.5
1991	4,981	113.0	378.0	487.0	534.0	47.0	8.0
1992	5,006	114.4	376.0	470.0	508.0	38.0	9.9
1993	3,859	92.2	398.0	466.0	503.0	37.0	10.8

NOTE: Well was completed May 1951; initial water level 411 ft; surface elevation 6,306 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well G-6

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1964	1,912	45.0	392.3	581.0	659.0	78.0	5.0
1965	3,200	74.9	390.1	582.0	660.0	78.0	5.0
1966	3,931	92.2	390.9	585.0	658.0	73.0	5.4
1967	2,454	57.8	392.6	580.0	653.0	73.0	5.4
1968	2,597	56.2	360.7	574.0	647.0	73.0	4.9
1969	2,698	55.6	343.5	568.0	636.0	68.0	5.1
1970	2,765	51.0	307.4	569.0	634.0	65.0	4.7
1971	2,932	42.8	243.3	573.0	629.0	56.0	4.3
1972	2,516	57.0	377.6	578.0	670.0	92.0	4.1
1973	2,991	65.3	363.9	579.0	667.0	88.0	4.1
1974	2,950	63.8	360.5	579.0	665.0	86.0	4.2
1975	2,717	56.7	347.8	577.0	659.0	82.0	4.2
1976	2,966	57.8	324.8	584.0	662.0	78.0	4.2
1977	2,954	54.4	306.9	586.0	659.0	73.0	4.2
1978	2,218	38.4	288.9	581.0	645.0	64.0	4.5
1979	1,030	18.2	295.1	579.0	645.0	66.0	4.8
1980	1,789	34.5	321.5	583.0	670.0	87.0	3.7
1981	4,302	76.5	296.4	586.0	673.0	87.0	3.4
1982	3,763	63.6	281.0	588.0	669.0	81.0	3.5
1983	1,960	35.4	301.0	582.0	668.0	86.0	3.5
1984	3,010	55.3	306.0	589.0	666.0	77.0	3.9
1985	3,980	71.4	299.0	586.0	664.0	78.0	3.8
1986	4,420	76.7	293.0	576.0	654.0	78.0	3.8
1987	5,100	81.4	266.0	595.0	671.0	76.0	3.5
1988	5,121	82.1	267.0	591.0	669.0	78.0	3.4
1989	5,000	81.6	272.0	592.0	669.0	77.0	3.5
1990	5,202	84.9	272.0	589.0	670.0	81.0	3.4
1991	5,063	81.2	267.0	591.0	674.0	83.0	3.2
1992	4,382	70.2	268.0	591.0	673.0	82.0	3.3
1993	—	—	—	575.0	—	—	—

NOTE: Well was completed March 1964; initial water level 572 ft; surface elevation 6,422 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well PM-1

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1965	2,754	99.2	600.3	746.0	786.0	40.0	15.0
1966	3,086	108.0	583.3	740.0	779.0	39.0	15.0
1967	2,870	111.0	644.6	737.0	781.0	44.0	14.6
1968	1,846	68.1	614.8	735.0	769.0	34.0	18.1
1969	951	34.4	602.9	733.0	766.0	33.0	18.3
1970	1,781	66.2	619.5	733.0	769.0	36.0	17.2
1971	2,728	101.0	617.1	733.0	766.0	33.0	18.7
1972	2,415	84.9	585.9	735.0	762.0	27.0	21.7
1973	1,688	46.5	459.1	736.0	755.0	19.0	24.2
1974	2,649	96.3	605.9	740.0	768.0	28.0	21.6
1975	2,567	94.8	615.5	741.0	766.0	25.0	24.6
1976	2,933	106.8	606.9	744.0	767.0	23.0	26.4
1977	2,969	105.4	591.7	745.0	767.0	22.0	26.9
1978	2,544	90.6	593.3	745.0	767.0	22.0	27.0
1979	2,350	83.4	591.5	744.0	766.0	22.0	26.9
1980	2,786	98.5	588.6	746.0	769.0	23.0	25.7
1981	2,789	98.5	588.6	747.0	769.0	22.0	26.8
1982	2,820	99.6	589.0	748.0	770.0	22.0	26.8
1983	2,464	86.5	585.0	747.0	769.0	22.0	26.6
1984	2,667	92.8	580.0	749.0	772.0	23.0	25.6
1985	2,760	95.4	576.0	749.0	770.0	21.0	27.4
1986	2,130	73.9	578.0	748.0	770.0	22.0	26.3
1987	2,912	102.4	586.0	752.0	773.0	21.0	27.9
1988	2,758	98.0	592.0	751.0	775.0	24.0	24.7
1989	3,014	104.9	580.0	752.0	774.0	22.0	26.4
1990	2,620	88.2	561.0	752.0	772.0	20.0	28.0
1991	2,600	88.6	568.0	752.0	774.0	22.0	25.8
1992	2,503	92.7	617.0	756.0	780.0	24.0	25.7
1993	1,802	63.9	591.0	758.0	779.0	21.0	28.1

NOTE: Well was completed March 1965; initial water level 722.1 ft; surface elevation 6,520 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well PM-2

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1966	221	18.9	1,425.3	826.0	889.0	63.0	22.6
1967	4,336	370.0	1,422.2	834.0	888.0	54.0	26.3
1968	3,865	328.2	1,415.3	838.0	889.0	51.0	27.8
1969	3,304	279.9	1,411.9	838.0	890.0	52.0	27.2
1970	3,529	300.6	1,419.7	839.0	893.0	54.0	26.3
1971	4,035	339.5	1,402.3	841.0	898.0	57.0	24.6
1972	4,611	385.3	1,392.7	845.0	902.0	57.0	24.4
1973	4,571	380.6	1,387.7	849.0	907.0	58.0	23.9
1974	5,443	450.9	1,380.7	853.0	912.0	59.0	23.4
1975	4,644	385.3	1,382.8	854.0	913.0	59.0	23.4
1976	5,382	442.0	1,368.8	866.0	924.0	58.0	23.6
1977	3,306	272.8	1,375.3	868.0	924.0	56.0	24.6
1978	4,743	388.4	1,364.9	871.0	928.0	57.0	23.9
1979	4,671	381.8	1,262.2	872.0	924.0	52.0	26.2
1980	5,023	409.6	1,359.2	873.0	931.0	58.0	23.4
1981	4,551	370.1	1,355.4	876.0	934.0	58.0	23.4
1982	4,319	359.3	1,386.0	874.0	934.0	60.0	23.1
1983	1,922	157.9	1,369.0	876.0	935.0	59.0	23.2
1984	996	81.6	1,365.0	866.0	930.0	64.0	21.7
1985	1,749	143.3	1,365.0	851.0	916.0	65.0	21.0
1986	1,036	84.4	1,359.0	851.0	915.0	64.0	21.2
1987	351	28.3	1,340.0	851.0	907.0	56.0	23.9
1988	1,843	146.8	1,328.0	869.0	931.0	62.0	21.4
1989	1,639	130.0	1,322.0	860.0	920.0	60.0	22.0
1990	3,164	250.4	1,319.0	860.0	928.0	68.0	19.4
1991	2,141	170.7	1,329.0	855.0	918.0	63.0	21.1
1992	3,486	277.7	1,328.0	860.0	929.0	69.0	19.2
1993	3,420	267.8	1,305.0	855.0	924.0	69.0	18.9

NOTE: Well was completed July 1965; initial water level 823 ft; surface elevation 6,715 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well PM-3

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1968	2,327	187.4	1,342.2	743.0	771.0	28.0	47.9
1969	3,241	254.7	1,309.8	746.0	772.0	26.0	50.4
1970	2,905	227.8	1,306.9	750.0	774.0	24.0	54.5
1971	2,774	216.3	1,299.6	751.0	774.0	23.0	56.5
1972	2,445	192.1	1,309.5	752.0	775.0	23.0	56.9
1973	3,256	257.8	1,319.6	755.0	778.0	23.0	57.4
1974	3,241	255.3	1,312.9	756.0	779.0	23.0	57.1
1975	3,421	269.3	1,312.0	757.0	780.0	23.0	57.0
1976	3,171	268.3	1,410.2	758.0	784.0	26.0	54.2
1977	2,792	235.5	1,405.8	758.0	784.0	26.0	54.1
1978	2,516	211.0	1,397.6	759.0	784.0	25.0	55.9
1979	2,359	197.2	1,393.0	760.0	784.0	24.0	58.0
1980	2,796	234.4	1,397.2	760.0	785.0	25.0	55.9
1981	2,784	232.4	1,391.3	761.0	786.0	25.0	55.6
1982	2,831	238.1	1,402.0	762.0	785.0	23.0	60.9
1983	2,496	207.6	1,386.0	762.0	785.0	23.0	60.3
1984	3,317	275.6	1,385.0	762.0	787.0	25.0	55.4
1985	2,643	221.2	1,395.0	762.0	784.0	22.0	63.4
1986	2,920	244.8	1,397.0	763.0	787.0	24.0	58.2
1987	2,984	250.2	1,397.0	763.0	788.0	25.0	55.9
1988	2,766	232.0	1,397.0	764.0	788.0	24.0	58.2
1989	2,656	221.0	1,386.0	765.0	791.0	26.0	53.3
1990	2,949	244.6	1,382.0	767.0	790.0	23.0	60.0
1991	2,752	229.5	1,385.0	768.0	791.0	23.0	60.2
1992	3,610	307.4	1,419.0	770.0	794.0	24.0	59.1
1993	2,018	168.5	1,391.0	771.0	797.0	26.0	53.5

NOTE: Well was completed November 1966; initial water level 740 ft; surface elevation 6,640 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Well PM-4

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1982	869	76.2	1,460	1,050	1,091	41	35.6
1983	5,267	452.5	1,432	1,066	1,101	35	40.9
1984	4,059	325.8	1,338	1,065	1,104	39	34.3
1985	4,759	379.2	1,328	1,066	1,101	35	37.9
1986	3,925	307.4	1,305	1,084	1,119	35	37.3
1987	5,071	392.2	1,289	1,081	1,117	36	35.8
1988	2,435	218.7	1,313	1,079	1,117	38	34.6
1989	5,387	418.9	1,296	1,085	1,122	37	35.0
1990	2,827	219.3	1,293	1,083	1,123	40	32.3
1991	2,832	219.5	1,292	1,081	1,123	42	30.8
1992	2,064	158.3	1,278	1,084	1,125	41	31.2
1993	3,901	249.7	1,295	—	—	—	—

NOTE: Well was completed August 1981; initial water level 1,060 ft; surface elevation 6,920 ft.

Well PM-5

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1985	—	2.0	—	—	—	—	—
1986	2,047	147.3	1,199	—	—	—	—
1987	1,620	118.6	1,220	1,237	1,345	108	11.3
1988	1,754	128.6	1,221	1,233	1,345	112	10.9
1989	1,184	86.2	1,213	1,239	1,352	113	10.7
1990	1,611	121.0	1,252	1,234	1,347	113	11.1
1991	1,497	112.1	1,248	1,239	1,346	107	11.7
1992	2,823	208.4	1,233	1,248	1,345	97	12.7
1993	1,709	126.0	1,229	1,224	1,321	97	12.6

NOTE: Well was completed September 1982; initial water level 1,208 ft; surface elevation 7,095 ft.

Well O-4

Year	Pump Time (h)	Production (10 ⁶ gal.)	Pump Rate (gpm)	Water Level		Drawdown (ft)	Specific Capacity (gpm/ft)
				Nonpumping (ft)	Pumping (ft)		
1993	2,942	283.8	1,603	861	889	28	57.3

NOTE: Well was completed March 1990; initial water level 780 ft; surface elevation 6,627 ft.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Water Canyon Gallery

Year	Time (h)	Production (10 ⁶ gal.)	Discharge Rate (gpm)
1947	8,760	84.00	159.8
1948	8,784	97.00	184.0
1949	8,760	92.00	175.0
1950	8,760	54.00	102.7
1951	8,760	39.00	74.2
1952	8,784	48.00	91.1
1953	8,760	39.00	74.2
1954	8,760	40.00	76.1
1955	8,760	33.00	62.8
1956	8,784	23.00	43.6
1957	8,760	40.00	76.1
1958	8,760	60.00	114.2
1959	8,760	54.00	102.7
1960	8,784	48.00	91.1
1961	8,760	54.00	102.7
1962	8,760	67.00	127.5
1963	8,760	51.00	97.0
1964	8,784	45.00	85.4
1965	8,760	72.00	137.0
1966	8,760	82.00	156.0
1967	8,760	56.00	106.5
1968	8,784	65.00	123.3
1969	8,760	80.00	152.2
1970	8,760	65.00	123.7
1971	8,760	37.00	70.4
1972	8,784	40.00	75.9
1973	8,760	49.00	93.2
1974	8,760	35.00	66.6
1975	8,760	42.00	79.9
1976	8,784	41.00	77.8
1977	8,760	57.00	108.4
1978	8,760	45.00	86.2
1979	8,760	44.00	83.7
1980	8,784	32.00	60.7
1981	8,760	45.50	86.6
1982	8,760	45.90	94.9
1983	8,760	38.20	72.7
1984	8,784	34.00	65.4
1985	8,760	36.60	69.6
1986	8,760	28.20	53.6
1987	8,760	34.20	65.1
1988	8,784	34.50	65.5
1989	8,760	23.00	43.8
1990	8,760	9.30 ^a	—
1991	—	12.00 ^a	—
1992	—	0.12 ^a	—
1993	—	6.4	—

^aIndustrial use, the rest released as Water Canyon surface drainage.

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Water Levels in Main Aquifer Test Wells

Well	TW-1	TW-2	TW-3	TW-4	TW-8	DT-5A	DT-9	DT-10
Completion Information								
Surface (ft)	6,369.19	6,647.63	6,595.31	7,244.56	6,877.62	7,143.86	6,936.71	7,019.92
Elevation (ft)								
Initial	584.90	758.90	743.30	1,170.80	968.00	1,173.00	1,003.00	1,085
Water Levels								
Date	1/1950	11/1949	11/1949	3/1950	12/1960	12/1959	2/1960	3/1960
Well	TW-1	TW-2	TW-3	TW-4	TW-8	DT-5A	DT-9	DT-10

Static Water Levels (ft below surface)

Year	TW-1	TW-2	TW-3	TW-4	TW-8	DT-5A	DT-9	DT-10
1949		758.9	743.3					
1950	584.9			1,170.8				
1951	592.31	760.09	750.87	1,166.08				
1952	591.38		750.98	1,166.62				
1953	591.2	759.91	751.37	1,167.51				
1954	591.81	760.6	751.36	1,166.2				
1955		760.25	751.27					
1956	592	759.93	750.87					
1957	593.1	759.88	751.33					
1958	593.82	759.68	751.68					
1959	593.92		751.77					
1960	593.36	760.53	751.75	1,165.86	968	1,173.16	1,003.29	1,090.65
1961	591.8	760.85		1,165.93			1,003.4	1,090.58
1962	589.96	761.19	751.8				1,004	
1963	588.26	762.85	753.62		968.72	1,176.92	1,004.6	1,090.34
1964	587.85		754.21		968.7	1,176.98	1,005	1,090.4
1965	588.38				968.7		1,005.1	1,090.47
1966							1,005.2	1,090.57
1967							1,005.4	1,090.59
1968							1,005.5	
1969								
1970								
1971							1,005.5	
1972							1,005.2	
1973							1,005.3	
1974							1,005.6	
1975							1,005.6	
1976							1,005.8	
1977		775.5					1,006.1	
1978							1,006.2	
1979							1,006.4	
1980							1,006.2	
1981							1,006.2	
1982							1,006.2	
1983							1,006.2	
1984								
1985								
1986								
1987								
1988		787						

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Water Levels in Main Aquifer Test Wells (Cont.)

Well	TW-1	TW-2	TW-3	TW-4	TW-8	DT-5A	DT-9	DT-10
Decline from Initial Level (ft)								
Year								
1989								
1990	508.37	787.2	772.0					
1991	507	789						
1992	536.5	792.52	777.5		992.45		1,015.01	
1993	546.77	793.04	775.92	1,174.52	992.9	1,182.58	1,015.96	1,096.92
1945								
1946								
1947								
1948								
1949		0.00	0.00					
1950	0.00			0.00				
1951	-7.41	-1.19	-7.57	4.72				
1952	-6.48		-7.68	4.18				
1953	-6.30	-1.01	-8.07	3.29				
1954	-6.91	-1.70	-8.06	4.60				
1955		-1.35	-7.97					
1956	-7.10	-1.03	-7.57					
1957	-8.20	-0.98	-8.03					
1958	-8.92	-0.78	-8.38					
1959	-9.02		-8.47					
1960	-8.46	-1.63	-8.45	4.94	0.00	-0.16	-0.29	-5.65
1961	-6.90	-1.95		4.87			-0.40	-5.58
1962	-5.06	-2.29	-8.50				-1.00	
1963	-3.36	-3.95	-10.32		-0.72	-3.92	-1.60	-5.34
1964	-2.95		-10.91		-0.70	-3.98	-2.00	-5.40
1965	-3.48				-0.70		-2.10	-5.47
1966							-2.20	-5.57
1967							-2.40	-5.59
1968							-2.50	
1969								
1970								
1971							-2.50	
1972							-2.20	
1973							-2.30	
1974							-2.60	
1975							-2.60	
1976							-2.80	
1977		-16.60					-3.10	
1978							-3.20	
1979							-3.40	
1980							-3.20	
1981							-3.20	
1982							-3.20	
1983								
1984								
1985								
1986								
1987								
1988		-28.10						

WATER SUPPLY AT LOS ALAMOS
DURING 1993

Water Levels in Main Aquifer Test Wells (Cont.)

Well	TW-1	TW-2	TW-3	TW-4	TW-8	DT-5A	DT-9	DT-10
1989								
1990	76.53		-28.30					
1991	77.90	-30.10						
1992	48.40	-33.62	-34.20		-24.45		-12.01	
1993	38.13	-34.14	-32.62	-3.72	-24.90	-9.58	-12.96	-11.92