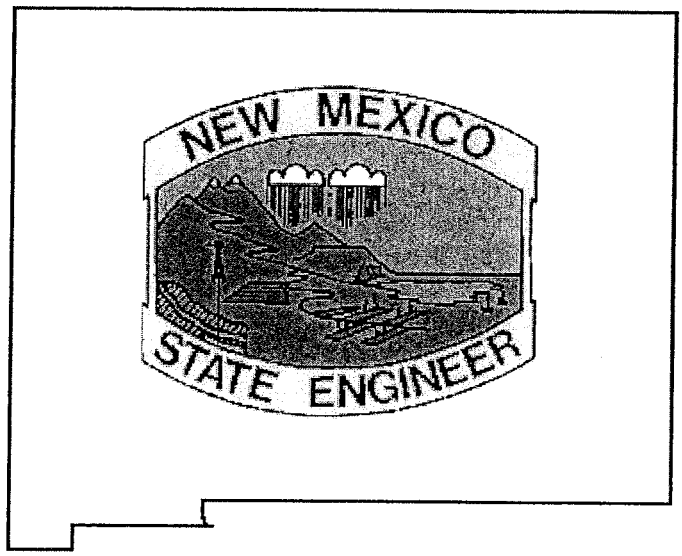
WATER RIGHTS ADMINISTRATIVE REVIEW & PERTINENT HYDROLOGIC DOCUMENTATION CONCERNING APPLICATIONS LRG-3283 THROUGH LRG-3296 FILED BY THE CITY OF LAS CRUCES FOR PERMIT TO APPROPRIATE THE UNDERGROUND WATERS OF THE SOUTHERN JORNADA DEL MUERTO SUB-BASIN OF THE LOWER RIO GRANDE UNDERGROUND WATER BASIN DOÑA ANA COUNTY, NEW MEXICO



By

Erek H. Fuchs
Water Resource Allocation Program
District IV, Las Cruces

New Mexico Office of the State Engineer

January 2002

MEMORANDUM
OFFICE OF THE STATE ENGINEER
DISTRICT 4
January 16, 2002

Files: LRG-3283, LRG-3284, LRG-3285, LRG-3286, LRG-3287, LRG-3288, LRG-3289, LRG-3290, LRG-3291, LRG-3292, LRG-3293, LRG-3294, LRG-3295 & LRG-3296

To: Calvin Chavez, District Supervisor

From: Erek H. Fuchs, Lower Rio Grande Basin Supervisor EHF

Subject: **Application for Permit to Appropriate**

Applicant: City of Las Cruces

Application
Applications LRG-3283 through LRG-3296 were filed November 24, 1981 by the City of Las Cruces to appropriate the shallow underground waters of the Jornada del Muerto sub-basin of the Lower Rio Grande basin, for a combined diversion of 14,000 acre-feet per annum from 14 proposed wells for municipal water supply purposes within the service area of the City of Las Cruces.

Well locations

Well No.	Sub.	Section	Township	Range
LRG-3283	NW¼NW¼SE¼	30	21 South	3 East
LRG-3284	NE¼NE¼SE¼	30	21 South	3 East
LRG-3285	NW¼NW¼SE¼	29	21 South	3 East
LRG-3286	SW¼SW¼SE¼	29	21 South	3 East
LRG-3287	SW¼SW¼NE¼	32	21 South	3 East
LRG-3288	SW¼SW¼NE¼	6	22 South	3 East
LRG-3289	SW¼SW¼SE¼	6	22 South	3 East
LRG-3290	NW¼NW¼SE¼	2	22 South	2 East
LRG-3291	NE¼NE¼NW¼	2	22 South	2 East
LRG-3292	NW¼NW¼SE¼	35	21 South	2 East
LRG-3293	NE¼NE¼SE¼	35	21 South	2 East
LRG-3294	SW¼SW¼NE¼	36	21 South	2 East
LRG-3295	SW¼SW¼SE¼	26	21 South	2 East
LRG-3296	SW¼SW¼NE¼	26	21 South	2 East

Place of use: Within the service area of the City of Las Cruces

Purpose of use: Municipal water supply

Quantity of water requested: 14,000 acre-feet per annum

DISCUSSION

Existing rights

The magnitude of new diversions sought under the subject applications make it incumbent upon this office to consider as a threshold matter, among other things, the extent of development of the City's existing water rights.

The City of Las Cruces has existing water rights claimed in the amount of 21,869 acre-feet per annum under OSE file number LRG-430, reflecting a pre-basin intent as of June 30, 1950 to supply groundwater for municipal purposes within the City's growing service area. While it is realized that the City has necessarily initiated use of groundwater for municipal purposes well before 1950, the rights that are the subject of file no. LRG-430 represent the primary source and claim on record with this office upon which the City of Las Cruces has historically depended for municipal purposes. The claim has been formally recognized through administrative permit and considered inchoate such that part, but not all of the rights claimed have been placed to beneficial use. Information extracted from the OSE WATERS (Water Administration Technical Engineering Resource System: http://164.64.214.10/awdProd/) database and summarized in Table 1 below reflects the chronology of OSE administrative records pertaining to file no. LRG-430.

Table 1. OSE WATERS database water right summary of file no. LRG-430.

New Mexico Office of the State Engineer
Water Right Summary

DB File Nbr: LRG 00430
Primary Purpose: MUN MUNICIPAL - CITY OR COUNTY SUPPLIED WATER
Primary Status: PMT Permit
Total Acres: 0
Total Diversion: 21869
Owner: CITY OF LAS CRUCES Contact: JORGE A. GARCIA

Documents on File

Doc	File/Act	Status 1 2 3	Trans_Desc	From/To	Acres	Diversion	Consumptive
SUPPL	11/07/2001	APP RCV PRC	LRG 00430 S 42	T	0	0	
CLW	11/13/2000	APP WDR PRC	LRG 00430-S-11	T	0	0	
CLW	11/13/2000	APP WDR PRC	LRG 00430-S-11	F	0	0	
SUPPL	12/04/1998	PMT ET PRC	LRG 00430-S-41	T	0	0	
SUPPL	12/04/1998	PMT ET PRC	LRG 00430-S-40	T	0	0	
SUPPL	08/18/1997	PMT ET PRC	LRG 00430-S-30	T	0	0	
SUPPL	08/18/1997	PMT ET PRC	LRG 00430-S-29	T	0	0	
CLW	07/25/1997	PMT ET PRC	LRG 00430-S-33	T	0	0	
CLW	07/25/1997	PMT ET PRC	LRG 00430-S-33	F	0	0	
CLW	12/11/1996	PMT ET PRC	LRG 00430-S-17	T	0	0	
CLW	12/11/1996	PMT ET PRC	LRG 00430-S-17	F	0	0	
REPAR	06/05/1996	PMT APR ABS	LRG 00430-S-23	T	0	0	
REPAR	06/05/1996	PMT APR ABS	LRG 00430-S-22	T	0	0	
REPAR	06/05/1996	PMT APR ABS	LRG 00430-S-14	T	0	0	
REPAR	06/05/1996	PMT APR ABS	LRG 00430-S-12	T	0	0	
REPAR	06/05/1996	PMT APR ABS	LRG 00430-S-11	T	0	0	
SUPPL	03/19/1996	PMT ET PRC	LRG 00430-S-39	T	0	0	
SUPPL	03/19/1996	PMT PCW PRC	LRG 00430-S-38	T	0	0	
CLW	08/24/1995	PMT PCW PRC	LRG 00430-S-9	T	0	0	
CLW	08/24/1995	PMT PCW PRC	LRG 00430-S-9	F	0	0	
SUPPL	05/18/1995	PMT PCW PRC	LRG 00430-S-36	T	0	0	

Table 1 continued.

SUPPL	04/24/1995	PMT PCW PRC	LRG 00430-S-37	T	0	0
SUPPL	04/03/1995	PMT PCW PRC	LRG 00430-S-35	T	0	0
REPAR	02/15/1995	PMT APR ABS	LRG 00430-S-5	T	0	0
SUPPL	01/25/1995	PMT PCW PRC	LRG 00430-S-34	T	0	0
CLW	11/23/1994	APP NFP PRC	LRG 00430-S-5	T	0	0
CLW	11/23/1994	APP NFP PRC	LRG 00430-S-5	F	0	0
SUPPL	03/17/1994	PMT ET PRC	LRG 00430-S-33	T	0	0
CLW	04/20/1992	PMT PCW PRC	LRG 00430-S-3	T	0	0
CLW	04/20/1992	PMT PCW PRC	LRG 00430-S-3	F	0	0
SUPPL	04/20/1992	PMT PCW PRC	LRG 00430-S-32	T	0	0
SUPPL	03/12/1992	PMT PCW PRC	LRG 00430-S-28	T	0	0
SUPPL	04/26/1991	PMT APR PRC	LRG 00430-S-26	T	0	20323
REPAR	05/11/1990	PMT LOG ABS	LRG 00430-S-11	T	0	0
CLW	02/22/1990	PMT PCW PRC	LRG 00430-S-2	T	0	0
CLW	02/22/1990	PMT PCW PRC	LRG 00430-S-2	F	0	0
SUPPL	02/22/1990	PMT PCW PRC	LRG 00430-S-31	T	0	0
EXPL	08/17/1989	PMT LOG ABS	LRG 00430-EXPL-2,3 &	T	0	0
REPAR	03/21/1989	PMT APR ABS	LRG 00430-S-11	T	0	0
REPAR	06/01/1988	PMT LOG ABS	LRG 00430-S-25	T	0	0
EXPL	06/01/1988	PMT LOG ABS	LRG 00430-EXPL	T	0	0
CLW	08/27/1987	APP WDR ABS	LRG 00430-S-2	T	0	0
CLW	08/27/1987	APP WDR ABS	LRG 00430-S-2	F	0	0
CLW	07/14/1987	APP PRO PRC	LRG 00430-S	T	0	0
CLW	07/14/1987	APP PRO PRC	LRG 00430-S	F	0	0
SUPPL	10/08/1986	APP WDR ABS	LRG 00430-S-30	T	0	0
REPAR	02/26/1986	PMT APR ABS	LRG 00430-S-2	T	0	0
SUPPL	11/26/1985	PMT PCW PRC	LRG 00430-S-27	T	0	0
CLW	03/16/1984	PMT PCW ABS	LRG 00430-S-4	T	0	1546
CLW	03/16/1984	PMT PCW ABS	LRG 00430-S-4	F	0	0
REPAR	02/16/1984	PMT LOG ABS	LRG 00430-S-13	T	0	0
REPAR	01/13/1984	PMT LOG ABS	LRG 00430-S-9	T	0	0
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-25-AMEND	T	0	966
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-24-AMEND	T	0	444
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-20-AMEND	T	0	580
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-19-AMEND	T	0	676
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-18-AMEND	T	0	1111
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-17-AMEND	T	0	1159
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-16-AMEND	T	0	1063
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-15-AMEND	T	0	1159
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-14-AMEND	T	0	1159
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-13-AMEND	T	0	869
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-12-AMEND	T	0	869
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-11-AMEND	T	0	821
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-10-AMEND	T	0	773
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-9-AMENDE	T	0	869
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-8-AMENDE	T	0	1159
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-7-AMENDE	T	0	927
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-6-AMENDE	T	0	966
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-5-AMENDE	T	0	1546
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-4-AMENDE	T	0	1546
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-3-AMENDE	T	0	966
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-2-AMENDE	T	0	1024
DCL	06/23/1983	DCL PRC ABS	LRG 00430-S-AMENDED	T	0	512
DCL	06/23/1983	DCL PRC ABS	LRG 00430-AMENDED	T	0	705
SUPPL	11/24/1981	APP PRO PRC	LRG 00430-S-23	T	0	0
SUPPL	11/24/1981	APP PRO PRC	LRG 00430 S 22	T	0	0
SUPPL	06/11/1981	APP PRO PRC	LRG 00430-S-21	T	0	0
DCL	04/06/1981	DCL PRC ABS	LRG 00430-X	T	0	145.18
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-20-AMEND	T	0	806.56
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-19-AMEND	T	0	1129.18
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-18-AMEND	T	0	1935.74
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-17-AMEND	T	0	1935.74
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-16-AMEND	T	0	1742.17
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-15-AMEND	T	0	1451.81
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-14-AMEND	T	0	1290.49
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-13-AMEND	T	0	1613.12
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-12-AMEND	T	0	1169.51
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-11-AMEND	T	0	1129.18
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-10-AMEND	T	0	1250.17
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-9-AMENDE	T	0	887.21
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-8-AMENDE	T	0	1935.74
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-7-AMENDE	T	0	1548.58
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-6-AMENDE	T	0	927.54
DCL	04/06/1981	DCL PRC ABS	LRG 00430-S-5-AMENDE	T	0	1451.81

Table 1 continued.

DCL	04/06/1981	DCL	PRC	ABS	LRG 00430-S-4-AMENDE	T	0	1451.81
DCL	04/06/1981	DCL	PRC	ABS	LRG 00430-S-3-AMENDE	T	0	1129.18
DCL	04/06/1981	DCL	PRC	ABS	LRG 00430-S-2-AMENDE	T	0	1774.43
DCL	04/06/1981	DCL	PRC	ABS	LRG 00430-S-AMENDED	T	0	645.25
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-AMENDED	T	0	1048.53
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430	T	0	0
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-5	T	0	871
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-25	T	20	60
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-20	T	0	532
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-19	T	0	1130
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-18	T	0	1162
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-17	T	0	1162
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-16	T	0	1640
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-15	T	0	916
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-14	T	0	775
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-12	T	0	702
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-13	T	0	968
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-11	T	0	678
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-10	T	0	750
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-9	T	0	533
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-8	T	0	1162
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-6	T	0	557
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-7	T	0	1031
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-4	T	0	871
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-3	T	0	1018
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S-2	T	0	1065
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430	T	0	360
DCL	10/27/1980	DCL	PRC	ABS	LRG 00430-S	T	0	387

The WATERS database entries agree with information contained on file, indicating that administrative actions of this office affecting the rights claimed under LRG-430 have been invoked only to repair, replace existing wells and drill new supplemental wells. No transfers of other water rights into the LRG-430 series have occurred for municipal purposes. Hydrographic Survey of the Lower Rio Grande (2000), subfile no. LRN-280110078(G) does identify file no. LRG-430 (see Attachment E, p. 9-862); however, the Survey has not as yet quantified this right in terms of an amount of water. Other rights identified for municipal purposes, though comparatively insignificant, are summarized in Table 2.

Table 2. Other rights (non-LRG-430) owned by the City of Las Cruces.

File no.	Amount (acre-feet per annum)	File status	Hydro-Survey
LRG-517	774.0, not exercised, application pending to combine with LRG-430 et al., pending action on LRG-3283 et al.	Declared	???
LRG-389	up to 2,550.0 (limited to availability of offsets, none as yet acquired)	Permitted	Not quantified
LRG-3530	40.0	Permitted	???
LRG-399	up to 1,700 (currently limited to 326.5, as per availability of offsets, currently not excercised)	Permitted	???
LRG-2036	67.7	Permitted	67.7

Currently, the well field serving the municipal water utility by which the City exercises the LRG-430 right is comprised of 41 permitted, individual well locations, though the inherently dynamic operational requirements of the utility are such that not all of these wells are presently equipped and actually producing water. Metered diversions on record

with office, summarized in Table 3, indicate that the City is indeed approaching the upper limit of the permitted amount of 21,869 acre-feet per annum.

Table 3. Metered annual diversions on record for the City of Las Cruces, LRG-430 et. al.

Year	Diversion (acre-feet)	Comment
1989	18,662.12	
1990	16,904.62	
1991	15,725.76	
1992	16,653.74	
1993	17,483.24	
1994	18,667.72	
1995	19,070.68	
1996	19,043.81	
1997	17,881.77	Municipal conservation plan adopted
1998	17,581.32	
1999	17,409.49	
2000	20,897.05	Sonoma Ranch golf course constructed
2001	20,387.29	

The pattern of water use reflecting the exercise of the LRG-430 right is characterized by a generally increasing trend, marked with highs and lows of which may be the product of a host of variables typical of a municipal water utility, including obvious population growth, municipal expansion, climate, conservation measures, cultural practices and a multitude of other socio-economic factors beyond the scope of this review. The sudden increase in total diversions for the year 2000 does seem imposing and may to one degree or another reflect the additional water use associated with the Sonoma Ranch Golf and Country Club, but are not significantly greater than that reported at 19,070 acre-feet in 1995. Simple statistical (regression) analysis of this small data set (1989 through 2000) suggests that there is a 95.83% chance (P=0.05, R=0.24) of annual diversions at least as high as those reported for 2000 occurring in the future. The analysis yields the following predictive expression:

$$\text{Annual Diversion} = 186.51 \times \text{Year} - 353{,}995.33$$

Illustrated below in Figure 1, the expression predicts that the City will reach the full amount of the recognized claim of 21,869 acre-feet by year 2015.

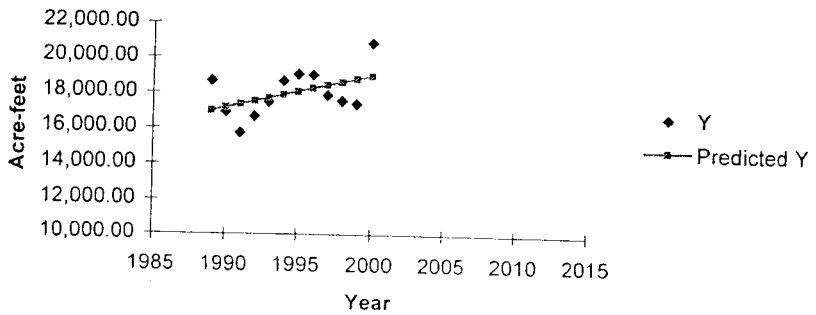


Figure 1. Actual vs. predicted exercise of LRG-430.

Year 2000 diversions reflect 96% development of the City's municipal claim under LRG-430. Coupled with readily identifiable population growth (approximately 20% increase from 1990 to 2000, U.S. Census, 2000) and municipal expansion in the area, it is plausible and statistically defensible to assume that the City may reach the full amount of the permitted, essentially perfected claim of 21,869 acre-feet well before year 2015, perhaps within the current year (2002). It may be concluded that development of the City's primary municipal claim to water has essentially reached fruition and that increasing operational demands of the City's water utility are such that an alternative or additional means of municipal water supply will be needed in the very near future. The City has been aware of this potential for some while and has/is pursuing various options, including the subject applications which were filed over 20 years ago.

Alternatives

Conservation

On October 7, 1996 the City of Las Cruces enacted two measures from the City's Water Conservation Plan: Ordinance no. 1578 which imposes restrictions on outdoor watering; and Resolution no. 97-132 creating a Water Conservation Ad Hoc Committee to identify solutions to better use and conserve City water. A product of the City's conservation efforts includes the development and imposition of an inclining-block rate system designed to assess higher fees for those choosing to use water beyond a particular threshold amount. The system is very similar to that developed and adopted in 1991 by the City of El Paso, TX. The inclining rates are associated primarily with residential, multi-unit and commercial services and are described in detail by the Las Cruces Water Resources Department at: http://www.las-cruces.org/Utilities/water/index.htm .

As documented in Findings of Fact and Order issued August 18, 1997 by the OSE concerning the approval of supplemental wells LRG-430-S-29 and LRG-430-S-30 (see file), the City's residential water use was approximately 140 gpcd (gallons per capita per day) in 1990. Assuming that 62,126 persons in Las Cruces in 1990 (U.S. Census, 1990) were receiving water service from the City, the Las Cruces overall (total, all uses) per capita water use as a community water system in 1990 would have been about 242 gpcd, of which approximately 58% (140 gpcd) would have been accounted for as residential uses at that time. According to Wilson (1996; p. 104), the City's overall per capita water use as a community water system was 243 gpcd in 1995 and includes, as defined by Wilson (1996, p. 10 at 3.2.1), the addition of water used for the irrigation of golf courses, playing fields, parks and water used to maintain the water level in ponds and lakes owned and operated by the City, to residential, commercial, and industrial uses. Wilson did not identify the extent of residential use as separate component in his report. Results of a study conducted in April 1995 by the Las Cruces Utilities Division (Needham, 1996; p.5,6) identified the City's overall per capita consumption in 1995 at 228 gpcd, though residential use likewise was not identified as a separate component in this study. More recently, according to the Las Cruces Public Utilities Department[1], the City's total production in 2001 was 255 gpcd, residential use averaged 135 gpcd and total sales were 211 gpcd. It is assumed that the residential use reported by the City is limited strictly to

[1] Data relayed by R. DeSimone, OSE HSB Las Cruces; personal communication with J. Garcia, Chief Utilities Engineer, Las Cruces Public Utilities, ph. 505-528-3511, Jan. 2002.

metered household data (excluding multi-unit and commercial service, parks, recreation, golf course, etc.), which accounts for a little over half (53%) of the City's total production in 2001. The disparity between sales and production suggests that unaccounted-for use in the City may be over 17%, or approximately 3,606 acre-feet for 2001. A water system is generally considered to be performing well if unaccounted-for water is only 10-15% of total withdrawals, though up to 20% may be considered reasonable (Moyer, 1985).

While it is realized that a host of variables including population growth, municipal expansion, climate, conservation measures, cultural practices and a multitude of other socio-economic factors beyond the scope of this review do influence municipal water use and that comparisons among municipalities can be complex and perhaps misleading, a glance at recent (2001) overall municipal water use in other southwestern cities as summarized in Table 4 suggests that Las Cruces may have room for improvement.

Table 4. 2001 overall municipal water use in several southwestern cities.

City	Usage (gallons per capita per day)
Santa Fe, NM	143
Tucson, AZ	158
El Paso, TX	155
Phoenix, AZ	228
Albuquerque, NM	204
Avg.	**178**

Source: City of Albuquerque Water Conservation Office:
http://www.cabq.gov/waterconservation/insert.html
El Paso Water Utilities:
http://www.epwu.org/
Arizona Department of Water Resources:
http://www.water.az.gov/

Las Cruces is under mandate as per conditions included in the 1997 Order concerning the approval of supplemental wells LRG-430-S-29 and LRG-430-S-30 to reduce residential per capita use by August 2004 to an amount equal to or below the southwestern states average; however, overall per capita use remains largely unaddressed and specific definitions and standards for documentation appear to be lacking. As required by the 1997 Order, the City submits to this office at the beginning of each year a water conservation report summarizing municipal water use for the previous year. Unfortunately, the conservation reports submitted have not documented overall per capita use and residential per capita use as required, but have simply reported gross monthly municipal diversions in gallons and acre-feet.

Again, while comparisons among municipal water utilities can be/are admittedly complex, it is interesting to consider that over 70% of the overall per capita use reported by the City of Albuquerque is actually residential use in this metropolitan area. This leaves approximately 61.2 gpcd to serve other uses (commercial, industrial, etc.), yet Albuquerque boasts a comparatively much greater population base, commercial and industrial center, and has managed to reduce overall per capita use by over 18% (from 250 to 204 gpcd) since 1995. Residential use as an individual component of water use

for the other cities listed in Table 4 was not found, but it was discovered that all cities reported various reductions of overall per capita use for at least the last five consecutive years. 2001 data reported by the City of Las Cruces suggests that 47% of total production or about 120 gpcd is used by Las Cruces to serve uses other than residential, yet Las Cruces does not host large-scale, extensive commercial and industrial manufacturing (i.e. compared to Albuquerque), but nevertheless appears to have experienced an increase in overall per capita use of about 12% (from 228 to 255 gpcd) since 1995. It is important to note that the population served by the Las Cruces water system does not include residents served by private and other public water systems within the City and that differences in reporting schemes (i.e. whether or not to include parks, golf course, recreation, etc. as part of residential use) may complicate municipal water use documentation. To this end, a clear and standardized means of documenting the City's municipal water use (residential and/or otherwise) needs to be developed and enforced.

Irrespective of decades of inchoacy and early speculative uncertainties concerning the development of the LRG-430 permitted claim, it is plausible to assume that the City of Las Cruces does have room to further pursue conservation measures and reduce municipal per capita water use. Such reduction, as has been required, should be pursued and enforced in a manner acceptable to the State Engineer. Reducing the overall per capita use reported for 2001 by 5% could result in conserved savings of about 12.75 gpcd, or about 1,060 acre-feet per annum assuming a population base of 74,267 persons in Las Cruces (U.S. Census, 2000). Assuming individual residential needs can be adequately met by about 0.5 acre-feet per residence per annum on average, these savings could account for potential service to an additional 2,120 residences or more within the confines of the existing LRG-430 permitted claim. "Saving" water under this hypothetical scenario is more accurately described as enhanced efficiency through conservation (i.e. more with less) and is consistent with the definition of conservation provided by Wilson (1999; p. 2 at 4). Prudent planning, however, must consider the reality of rapid population growth in the area. It is estimated that as many as 148,700 persons, over double current demand, will require municipal water service in Las Cruces by 2015 (WMP, 1995; p. 2-5).

Taken as a whole it appears that Las Cruces per capita water use is increasing while use in other neighboring southwestern cities is decreasing. It is not clear why this is or if continued attention to and further reductions of Las Cruces residential use alone (depending on how residential use is defined) will reverse this trend; however, continued attention to and reduction of residential use may be a good place to start and is consistent with conditions included in the 1997 OSE Order concerning the approval of supplemental wells LRG-430-S-29 and LRG-430-S-30. A reduction of per capita use, residential or otherwise would certainly compliment the traditional idea and statutory mandate of water conservation (i.e. NMSA 1978 §72-5-5.1, §72-12-3(E)) and would to some extent improve the longevity of the LRG-430 permitted claim to serve as the City's only municipal right to water. However, it is highly probable that continuing, rapid population growth and subsequent municipal expansion in the area will quickly account for waters otherwise conserved under the LRG-430 right. In the absence of municipal growth

restrictions of which the State Engineer has no jurisdiction, it is not plausible to assume that conservation of water alone will sustain the LRG-430 permitted claim as the City's only municipal right to water.

Reuse of treated sewage effluent

The City's wastewater treatment plant annually receives and treats about 50% of all waters diverted for municipal purposes under the LRG-430 right and discharges these treated waters directly into the Rio Grande. Once effluent actually reaches a watercourse or underground reservoir, the City has lost control over the water and cannot recapture it (NMSA 1978 § 72-5-27). Assuming 50% return of total diversions, year 2000 treated sewage effluent discharges amount to approximately 10,500 acre-feet of water. A quantity of this magnitude does merit the potential for reuse and quite possibly could extend the longevity of the LRG-430 permitted claim as the City's only municipal right to water, in addition to serving important water conservation and efficiency measures. However, as was decided by the Supreme Court of New Mexico in *Reynolds* v. *City of Roswell*, 99 N.M. 84, 654 P. 2d 537 (1982), the State Engineer has no jurisdiction over the discharge of treated sewage effluent except in instances where impairment to existing water rights is otherwise found to occur. The City is currently under no obligation from the OSE to discharge treated sewage effluent and actually may consume 100% of the diversions permitted under LRG-430.

Informal indications are that the City is currently exploring the feasibility of sewage effluent reuse via U.S. Environmental Protection Agency grant monies, particularly for irrigation purposes at the recently constructed Sonoma Ranch Golf and Country Club. Unfortunately, indications are also that it may be many years before sewage effluent reuse is actually pursued. Reuse of treated sewage effluent is an activity that should probably be encouraged with the potential to improve the City's water use efficiency; however, it remains the discretion of the City to decide as much regarding feasibility, cost/benefit, etc.

Transfers

The acquisition and potential transfer of existing water rights into the LRG-430 series or otherwise is an alternative the City has and will most likely continue to explore. As part of the water rights acquisition strategy as set forth in the City's municipal code (§ 2-1342), the City will either acquire water rights (surface, ground, or both) by a conveyance of ownership, or collect a fee representative of water right market conditions, such an amount or fee to be reflective of the water meter size to be installed to measure the volume of water anticipated to be used in whatever new development may be in question.

Many ownership conveyances and/or fees have been charged on behalf of the City in recent years, but no actual transfers into the LRG-430 series for municipal purposes have as yet been sought. With few exceptions, most of the water rights the City has acquired thus far under the acquisition program are irrigation rights appurtenant to numerous small tracts (less than 2 acres) of land served principally if not exclusively by the surface waters of the Rio Grande within the Elephant Butte Irrigation District (EBID). Known as "flat-raters" and generally recognized as the product of decades of subdivision

fragmentation throughout the Mesilla Valley, these small tracts are significant when combined (approximately 4,200 acres taxed, 1999) and actually occupy the majority (51%) of the EBID member constituency. According to the Hydrographic Survey of the Lower Rio Grande (2000), the City had at the time of the Survey acquired ownership of approximately 11.6 acres of EBID "flat-rate" rights associated with 17 individual small tracts, though many of these particular tracts were not at the time nor had been irrigated for several years prior to the Survey. All Hydrographic Survey subfiles pertaining to the City of Las Cruces are attached (see Attachment E).

The recently formed Municipal Water Users Association and agreement between the EBID and City of Las Cruces adopted in the early summer of 2001 offers strong indication that the City will continue to purchase and/or lease water rights appurtenant to agricultural tracts, small or otherwise within the EBID and Las Cruces city limits for future transfer to municipal and industrial uses. Because there are precious few primary groundwater rights developed for irrigation purposes throughout the Mesilla Valley that are available for sale, lease and/or transfer to other uses, the predominantly senior, much more extensive surface water rights appurtenant to agricultural lands within the EBID are essentially the only waters potentially available for transfer. However, numerous institutional issues (i.e. questions of jurisdiction and permitting requirements), guaranteed protests and uncertain adjudication proceedings underway in the Lower Rio Grande as per *New Mexico ex rel. Office of the State Engineer v. Elephant Butte Irrigation District, et al.*, Case No. CV 96-888 (1996) will likely require extensive deliberation and/or litigation before such transfers are possible. It is not plausible to assume that transfers of water rights of this nature, with the ultimate goal of surface water treatment, can or will occur soon enough and in sufficient quantity to serve in addition to the LRG-430 permitted claim to meet the City's increasing and immediate municipal demand for water. Other water rights acquisition alternatives the City may pursue with potential for transfer may include negotiation for sale or perhaps condemnation of other privately owned and operated water utilities in the area, however, the State Engineer has no jurisdiction in business affairs or legal matters of this sort.

New appropriations

Much of the existing LRG-430 well field is clustered in an area near the overpass of Interstate 25 and Lohman Avenue, and near the overpass of Interstate 25 and Highway 70 in Las Cruces. The exercise of the City's right from these wells has historically drawn almost exclusively from the north-central extent of the underground waters of the Mesilla Bolson, an aquifer with a well-established and documented connection with the surface waters of the Rio Grande in the Mesilla Valley (Frenzel and Kaehler, 1992; Wilson and others, 1981). The interrelationship of the surface and groundwater system in this area necessitates conjunctive management of the water resource and is complicated by the fact that the surface waters of the Rio Grande are fully appropriated (Turney, 1999; p. 2 at A.1). This leaves very little if any opportunity to grant new groundwater appropriations in this area without incurring impairment to existing, senior surface water rights in the Mesilla Valley, principally those maintained within the EBID. As mentioned previously, there are precious few primary groundwater rights and even fewer non-EBID surface rights developed for irrigation purposes throughout the Mesilla Valley with an

established (pre-basin) hydrologic effect to the Rio Grande that are available for sale and transfer for offset purposes.

Four of the existing wells, LRG-430-S-26, LRG-430-S-28, LRG-430-S-29 and LRG-430-S-30 are located east of the City, in an area approximately 2 miles north of the intersection of Highway 70 and Hanger Lake Road on the East Mesa. Two of the existing well locations, LRG-430-S-26 and LRG-430-S-28, are synonymous with the locations of proposed new wells LRG-3289 and LRG-3288, respectively. These wells draw groundwaters from the southern extent of the Jornada del Muerto underground sub-basin, an aquifer generally considered to share a limited connection with the surface waters of the Rio Grande. The southern portion of this sub-basin, which is the source of groundwaters proposed for appropriation under the subject applications, is largely separated from the Mesilla Bolson by a subsurface igneous barrier (bedrock high) caused by a fault zone extending from the Dona Ana Mountains to Fillmore Pass (Rao and Hirsch, 1985). A generalized geohydrologic cross-section of this area, showing the relative location of the Jornada del Muerto sub-basin, is depicted in Figure 2.

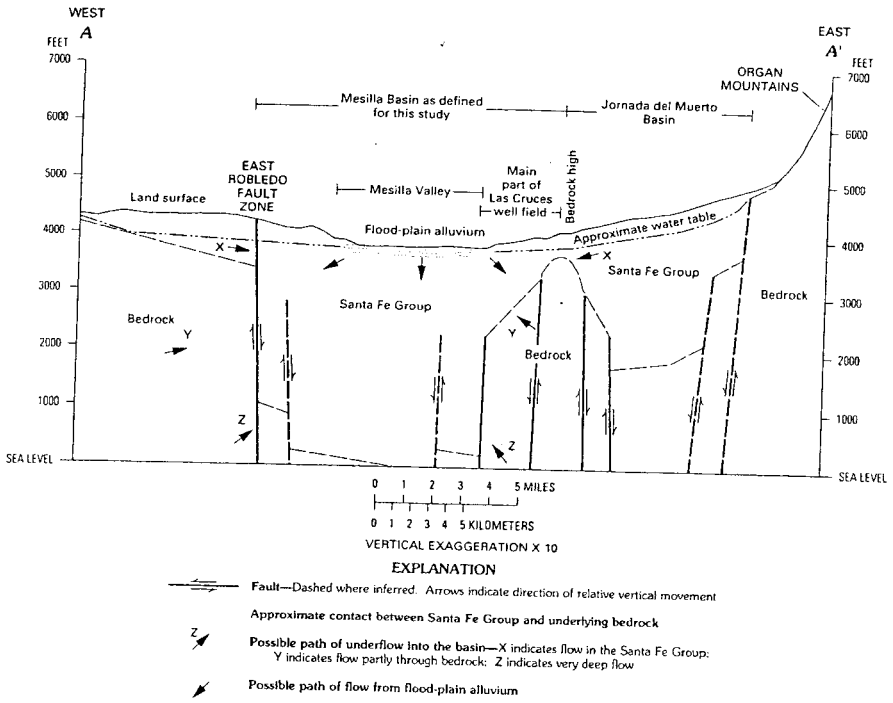


Figure 2. Generalized geohydrologic cross-section of the Mesilla basin. Adapted from Frenzel and Kaehler (1992; p. C-11).

The geohydrology of the Jornada del Muerto sub-basin is further described and location reference figures are provided in attached Hydrology Report no. 01-6 (Johnson, 2001; p. 4, 16-20), (see Attachment A).

The geohydrologic characteristics of the Jornada del Muerto sub-basin (SJB) are such that it is a "mined" basin (groundwater depleted from storage is not replenished). Although limitations on the availability and subsequent effects of well pumping on the

recoverable freshwater thickness of the SJB and other mined basins are inevitable, new appropriations of groundwater in this area are possible and may present the only viable alternative available to the City of Las Cruces to develop water rights in addition to the LRG-430 permitted claim in a sufficient quantity to meet the City's increasing and immediate municipal demand for water.

Hydrologic evaluations and results

City of Las Cruces

On behalf of the City, John Shomaker and Associates, Inc. (JSAI) developed a finite-difference numerical groundwater flow MODFLOW model of the SJB (JSAI, 1996; 2000). A detailed review of the JSAI model and recommendation that the model be used as a technical tool in the SJB is documented in Hydrology Report no. 01-6 (Johnson, 2001), (Attachment A). Other preliminary modeling considerations and exchanges with this office included administrative direction regarding the amount and extent of existing rights and applications filed prior to the City's in the SJB to be used as model inputs for simulating background stresses. Early tabulations from this office indicated that total permitted, declared, and applied for rights existing prior to the City's applications in the SJB could be as high as 22,328.75 acre-feet per annum. A much closer review based in part on recent field investigations, other relevant information and without pre-judging prior applications, revealed that 10,794.45 acre-feet per annum is actually a more accurate estimate of potential background stresses to be simulated for modeling purposes. This total is inclusive of 150.0 acre-feet per annum associated with LRG-935 (Jornada Water Co.), which was originally, though errantly omitted from early tabulations. The OSE file numbers and respective owners that comprise this total, exclusive of LRG-935, are included in attached memorandum dated July 23, 2001 from M.S. Johnson (Johnson, 2001[a]; Table 3), (see Attachment B).

The initial JSAI modeling efforts on behalf of the City in support of the requested total diversion of 14,000 acre-feet per annum assumed total background stresses (pre-City application potential diversions) in the amount of 10,724.5 acre-feet per annum, reflecting consensus rates available to JSAI at the time the model runs were conducted. Major highlights of the JSAI modeling results, taken directly from the September 2000 report from JSAI to the City (JSAI, 2000; p. iii), are as follows:

- Whether the applications are approved or not, many existing wells would require deepening by 2039 because of the concentration of pumping by other appropriators (and not including Las Cruces' existing rights) in a small area a few miles west of Organ.
- About 26 wells, for which water level information is available, will have less than a 20-ft water column by the end of 2039 due to the exercise of existing rights. The additional effect if Las Cruces' applications are approved will lead to eight more such wells at the end of 2039.
- Deepening of wells to restore the ability to pump is available to appropriators in most areas, but in the area of heavy concentration of existing and assumed future pumping just west of Organ, by appropriators other than Las Cruces, drawdown at the end of 40 years is predicted to leave little saturated thickness. The quality of the water that will remain is not known, but it is likely to be

poor. These effects are the inevitable consequences of continued pumping from a mined basin, and are within the administrative guidelines proposed by Las Cruces (Wilson, 1996).

- The effect of approving the pending applications, in terms of decrease of natural groundwater discharge from the basin and consequent increase in calculated depletion of the flow of the Rio Grande, would be about 133 acre-feet per year by the end of 2039. Because of the discharge to the river of treated wastewater derived from pumping of the applied-for wells, however, the net effect of approval of the applications will be augmentation of flow in the Rio Grande of about 3,771 acre-feet per year for 2039. The discharge of effluent would offset depletion due to exercise of other Las Cruces water rights.

The JSAI proposal acknowledges the limited availability of freshwater (total dissolved solids less than 1,000 milligrams per liter) and uncertain future within 40 years of many existing wells in the SJB under existing rights alone, but appears to rationalize that approval of the City's applications, while worsening this situation somewhat, is acceptable in lieu of a mined basin. The proposal appears to rely heavily on the criteria offered by Wilson (1996) for administration in the SJB, of which no limits are placed on water level declines. The calculated river depletion of 133 acre-feet by the end of 2039 is quite small relative to the diversions modeled and will be easily offset by effluent returns. The small depletion is consistent with the documented minor connection of the SJB with the surface waters of the Rio Grande.

The proposal identifies the potential benefit to the river via the discharge of effluent (at the expense of the SJB) but does not consider the merits of increased water use efficiency and conservation otherwise available through effluent reuse. Indeed, discharge of effluent may offset river depletions due to exercise of other Las Cruces water rights or pending applications for other new appropriations, in which case the State Engineer's jurisdiction over the effluent (or that part/volume reflecting the offset amount in question) is warranted in lieu of obvious impairment considerations. While it is realized that population growth is inevitable and that effluent reuse is not without considerable expense, it should be noted that a policy of reliance upon or encouraged production of municipal effluent (i.e. a greater number and more frequent flushing of toilets, etc.) as the basis for creating offsets to secure more and greater groundwater diversions may very well be contradictory to public welfare and conservation of water in the state.

OSE

In the interests of maximizing potential new appropriations under the subject applications, the City initially, informally indicated that previously permitted diversions in the SJB totaling 6,396 acre-feet per annum associated with existing wells LRG-430-S-26, S-28, S-29 and S-30 would be removed from the SJB, and would be exercised from other existing LRG-430 series supplemental wells in the Mesilla Valley within the constraints of other existing permit conditions. Two of the existing well locations, LRG-430-S-26 and S-28, are synonymous with the locations of proposed new wells LRG-3289 and LRG-3288, respectively. It was agreed that these two existing wells would be

included for modeling purposes as LRG-3289 and LRG-3288 and that all of the previously permitted diversions under LRG-430 in the SJB would be removed. Based on this understanding and at the request of this office, the Hydrology Bureau of the OSE conducted a hydrologic evaluation of the subject applications. The results of this evaluation are described in attached memorandum dated July 23, 2001 from M.S. Johnson (Johnson, 2001[a]), (see Attachment B).

Subsequent correspondence (see Attachment C; letter dated October 31, 2001 from JSAI) and discussions with the City revealed the need to find a way of continuing use of existing wells LRG-430-S-29 and S-30 in concert with action on the subject applications. Realizing that these existing wells represent a significant capital investment on behalf of the City, it was decided that Hydrology Bureau re-evaluate the applications by including continued pumping of wells LRG-430-S-29 and S-30 at the previously permitted schedule ultimately totaling 3,300 acre-feet per annum from these two wells. Permitted diversions associated with existing wells LRG-430-S-26 and S-28, however, totaling 3,096 acre-feet per annum were assumed removed. The results of this re-evaluation are described in attached memorandum dated November 27, 2001 from M.S. Johnson (Johnson, 2001[b]), (see Attachment D). A summary of these results, including pertinent conclusions drawn from the July 23, 2001 memorandum and borrowing heavily from the text therein, is as follows:

- Recommended guidelines for the SJB, based on guidelines for other similar basins, include considering one-half of the total freshwater thickness to be recoverable, reserving one-half of the recoverable freshwater thickness for use after the 40-year period from 2000 to 2039, and limiting well depths to less than 50 percent of the freshwater zone thickness. A groundwater flow model developed for the City was found to be the most appropriate model for estimating hydrologic effects. Any model cell with a water-level decline rate exceeding 3.5 feet per year (ft/yr) should be considered critical. No new appropriations should be allowed in critical cells, and additional declines on such cells from proposed uses should not exceed 0.1 ft/yr.
- At the proposed total depths of 1,500 feet, wells LRG-3283 through 3296 may penetrate more than 50 percent of the estimated freshwater thickness at these locations, and may too deep to avoid water quality degradation. Depth-specific sampling should be carried out during drilling, and holes plugged back to a depth of 50 percent of the freshwater zone if necessary.
- Assuming 60 percent production time, an average yield of about 1,033 gallons per minute (gpm) each at proposed wells LRG-3283 through 3296 would be required. While eight of the proposed wells should be capable of obtaining such yields, wells LRG-3290, 3291, 3292, 3293, 3295 and 3296 would be located in an area with estimated potential yields of only 10 to 100 gpm. All the wells should retain sufficient water columns after 40 years, even if completed at depths penetrating only 50 percent of the freshwater thickness.
- A total of 10,200 acre-feet per annum (ac-ft/yr) pumped at 12 of the 14 proposed locations was achieved using a procedure based on reasonable assumptions about well yields and the City's preferred order for placing wells in service, as evaluated against the recommended water-level decline criteria

and assuming no future City supplemental pumping occurs under permits LRG-430-S-26 and LRG-430-S-28. This included seven wells at 1000 ac-ft/yr each (3290 through 3296), two wells at 800 ac-ft/yr each (3288 and 3289), two wells at 450 ac-ft/yr each (3284 and 3285), and one well at 700 ac-ft/yr (3283). No pumping at proposed locations LRG-3286 and 3287 was possible without causing incremental water-level declines greater than 0.1 ft/yr in the critical cell in which these proposed wells were to be located.

- Forty-year drawdowns of 14 to almost 440 feet resulting from existing rights plus City pumping at 10,200 ac-ft/yr may exceed 70 percent of the water column at 16 wells, eight of these due to existing rights alone. Of the nine wells predicted to go completely dry within 40 years, six would be dewatered by existing rights alone. Sufficient freshwater thickness should remain after 40 years to allow attempts to regain supply by deepening the affected wells.
- Surface water depletions resulting from City pumping at 10,200 ac-ft/yr are estimated to be 100 ac-ft/yr after 40 years, and 644 ac-ft/yr after 100 years.

It may be concluded that 10,200 acre-feet per annum, or about 73% of the total new appropriation sought by the City, can be supplied by the SJB as evaluated against the recommended water-level decline criteria, the assumed background stresses and no future City supplemental pumping under permits LRG-430-S-26 and LRG-430-S-28 in the SJB.

At least eight wells of other ownership in the SJB for which water column information is available may suffer drawdowns of 70% or greater in 40 years as a result of the City's diversion of 10,200 acre-feet per annum (Johnson, 2001[a]; Table 8). However, as was decided in *City of Roswell* v. *Berry*, 80 N.M. 110, 452 P.2d 179 (1969), lowering of wells as a result of appropriation of water does not necessarily constitute impairment. None of the drawdown effects on these wells resulting from the effects of existing rights plus the City's exercise of 10,200 acre-feet per annum will exceed the recommended water-level decline limitation rate of 3.5 ft/yr. Therefore, sufficient freshwater thickness should remain after 40 years to allow attempts to regain supply by deepening the affected wells, or perhaps by other means negotiated between the City and the owners of the affected wells.

Assuming 50% return of treated wastewater under the new diversions, the discharge of effluent generated by these diversions will easily offset depletions to the Rio Grande stream system resulting from the City ultimately pumping at 10,200 ac-ft/yr.

40-Year Water Development Plan

Pursuant to NMSA 1978 §72-1-9, the City does have on file with this office a 40-Year Water Development Plan that is maintained in concert with the City's Water and Wastewater Master Plan (WMP). The most recent (June 1995) update to this plan estimates that about 35,145 acre-feet of water per annum, assuming 211 gpcd, will be needed to serve the City by the year 2015 (WMP, 1995; p. 3). This suggests an increase of approximately 60% beyond current (2000) diversions, although the population requiring water service is expected to more than double in this same time frame. The methodology used and assumptions made in the estimate appear to be reasonable, though

it is quite possible that per capita use can be reduced somewhat. The addition of 10,200 acre-feet per annum of new appropriations from the SJB to the existing rights under LRG-430 amounts to 32,069 acre-feet per annum, or about 91% of the projected demand by year 2015. The City's WMP supports a reasonable need for and use of at least an additional 10,200 acre-feet per annum within 40 years.

Notice of publication
Notice for subject applications was published on December 7, 14 and 21, 1981. Affidavit of Publication was received on January 6, 1982.

Protest
The applications were protested by ten protestants as follows: Jornada Water Users Association, El Paso Water Utilities Public Service Board, C.R. Hayslett, Dewey D. & Jan L. Lachey, Earl H. Barksdale, Mrs. Charles Henry Ferguson, W.K. Miller, Donald L. Hoihjelle, Foo Lan and Lawrence J. Girault. The protestants were sent a letter dated November 4, 1998 from this office seeking direction/interest in continued pursuit of the protests. C.R. Hayslett was the only protestant to answer the letter, but withdrew his protest by letter filed with this office on June 9, 1999.

CONCLUSION

It is recommended that Applications LRG-3286 and LRG-3287 for Permit to Appropriate be denied for the reason that no pumping at the proposed locations is possible without causing incremental water-level declines greater than 0.1 ft/yr in the critical cell in which these wells are to be located.

It is also recommended that Applications LRG-3283, LRG-3284, LRG-3285, LRG-3288, LRG-3289, LRG-3290, LRG-3291, LRG-3292, LRG-3293, LRG-3294, LRG-3295 and LRG-3296 for Permit to Appropriate be approved or partially approved, subject to the following conditions:

1) These applications are approved as follows:
Permit Numbers:
LRG-3283, LRG-3284, LRG-3285, LRG-3288, LRG-3289, LRG-3290, LRG-3291, LRG-3292, LRG-3293, LRG-3294, LRG-3295 and LRG-3296

Priority: November 24, 1981

Source: Shallow underground waters of the Southern Jornada del Muerto sub-basin of the Lower Rio Grande basin

Points of diversion:

Well No.	Sub.	Section	Township	Range
LRG-3283	NW¼NW¼SE¼	30	21 South	3 East
LRG-3284	NE¼NE¼SE¼	30	21 South	3 East
LRG-3285	NW¼NW¼SE¼	29	21 South	3 East

LRG-3288	SW¼SW¼NE¼	6	22 South	3 East
LRG-3289	SW¼SW¼SE¼	6	22 South	3 East
LRG-3290	NW¼NW¼SE¼	2	22 South	2 East
LRG-3291	NE¼NE¼NW¼	2	22 South	2 East
LRG-3292	NW¼NW¼SE¼	35	21 South	2 East
LRG-3293	NE¼NE¼SE¼	35	21 South	2 East
LRG-3294	SW¼SW¼NE¼	36	21 South	2 East
LRG-3295	SW¼SW¼SE¼	26	21 South	2 East
LRG-3296	SW¼SW¼NE¼	26	21 South	2 East

Purpose of Use: Municipal

Place of Use: Within the service area of the City of Las Cruces

Amount of Water: The maximum diversion from each individual well under these permits shall not exceed the following amounts for a total combined diversion of 10,200 acre-feet per annum:

Well No.	Amount (acre-feet per annum)
LRG-3283	700
LRG-3284	450
LRG-3285	450
LRG-3288	800
LRG-3289	800
LRG-3290	1,000
LRG-3291	1,000
LRG-3292	1,000
LRG-3293	1,000
LRG-3294	1,000
LRG-3295	1,000
LRG-3296	1,000

2) No water shall be diverted under these permits until existing permits LRG-430-S-26 and LRG-430-S-28, totaling 3,096 acre-feet per annum, are withdrawn.

3) These permits shall not be exercised to the detriment of valid existing water rights, shall not be contrary to conservation of water within the state, and shall not be detrimental to the public welfare of the state of New Mexico.

4) Prior to the drilling of wells under these permits, the permittee shall submit to the District IV Office of the State Engineer in Las Cruces an acknowledged statement executed by the owner of the land upon which the wells are to be drilled that the permittee has permission to occupy such portion of the owner's land as is necessary to drill and operate the wells.

5) Any wells encountering Total Dissolved Solids (TDS) of 1,000 milligrams per liter or greater during drilling shall be plugged back to at least half the thickness of the freshwater zone to protect water quality.

6) The potential for discharge of treated sewage effluent by the permittee's wastewater treatment facility into the Rio Grande generated by the exercise of rights under these permits is herein recognized and shall be maintained, in the absence of water rights otherwise acquired for offset purposes, to satisfy offsets in the amount of 644 acre-feet per annum reflecting the calculated maximum 100-year effect to the Rio Grande. The 644 acre-feet per annum represents the calculated maximum 100-year effect of ultimately pumping 10,200 acre-feet per annum, not all of which is needed immediately for offset purposes, but shall be maintained in accordance with the following schedule:

Time after start of pumping (years)	Offset required (acre-feet per annum)
1	0.0
5	0.3
10	2.8
20	18
30	50
40	100
100	644

These permits expire on February 28, 2102 unless additional effluent discharges are committed or rights to water are acquired to meet anticipated depletions to the Rio Grande greater than 644 acre-feet per annum.

7) The State Engineer retains jurisdiction over these permits to oversee the provisions of nos. 3 and 6 above, and may reevaluate the amount of water approved under these permits in no. 1 above in the event that background stresses currently assumed are later found to be less, subject to administrative criteria or additional considerations that may exist at such time.

8) The permittee shall utilize the highest and best technology available and economically feasible for the intended use to ensure conservation of water to the maximum extent practical.

9) The permittee shall submit on or before January 1 of each year, a written report acceptable to the State Engineer on water conservation efforts, overall per capita use and residential per capita use calculations and any changes to the water conservation plan all of which illustrate the effectiveness of the water conservation efforts of the permitee. Within 3 years of approval of these permits, the permittee shall reduce residential per capita use to the amount equal to the southwestern states average.

10) Prior to diversion of water under these permits, the permittee shall install a well monitoring system in the Southern Jornada del Muerto sub-basin, of a type and location(s) acceptable to the State Engineer. Monitored water level measurements shall be taken and reported at a frequency acceptable to the State Engineer.

11) Wells numbered LRG-3283, LRG-3284, LRG-3285, LRG-3288, LRG-3289, LRG-3290, LRG-3291, LRG-3292, LRG-3293, LRG-3294, LRG-3295 and LRG-3296 shall each be equipped with totalizing meters installed before the first branch of the discharge line from each well. The discharge of treated sewage effluent into the Rio Grande generated by diversions from these wells shall also be metered. The type of meters, manner of installation and meter locations must be acceptable to the State Engineer. The permittee shall provide the State Engineer in writing with the make, model, serial number, date of installation and initial meter readings prior to the appropriation of water.

12) Written records of the amount of water diverted from wells numbered LRG-3283, LRG-3284, LRG-3285, LRG-3288, LRG-3289, LRG-3290, LRG-3291, LRG-3292, LRG-3293, LRG-3294, LRG-3295 and LRG-3296 and subsequent discharge of treated sewage effluent into the Rio Grande generated by diversions from these wells shall be submitted to the District IV Office of the State Engineer in Las Cruces on or before the 10th day of each month for the preceding calendar month.

13) A Well Record shall be submitted to the District IV Office of the State Engineer in Las Cruces within ten (10) days following the drilling of wells numbered LRG-3283, LRG-3284, LRG-3285, LRG-3289 (existing well, previously numbered LRG-430-S-26), LRG-3290, LRG-3291, LRG-3292, LRG-3293, LRG-3294, LRG-3295 and LRG-3296 under these permits.

A Well Record for existing well LRG-3288 (previously numbered LRG-430-S-28) has been filed. A Well Record has not been filed and is required prior to any diversions from existing well LRG-3289 (previously numbered LRG-430-S-26).

14) Proof of Completion of Well for wells numbered LRG-3283, LRG-3284, LRG-3285, LRG-3288, LRG-3289, LRG-3290, LRG-3291, LRG-3292, LRG-3293, LRG-3294, LRG-3295 and LRG-3296 shall be filed with the District IV Office of the State Engineer in Las Cruces on or before February 28, 2004.

15) Proof of Application of Water to Beneficial Use shall be filed with the District IV Office of the State Engineer in Las Cruces on or before February 28, 2006.

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