

Table 1.--Rio Grande seepage investigation from Radium Springs, New Mexico, to El Paso, Texas, February 24-25, 2004

### EXPLANATION

REACH--The seepage investigation was conducted along a 62.4-mile reach from the Rio Grande below Leasburg Dam near Radium Springs, New Mexico, to the Rio Grande at El Paso, Texas (08364000). River miles are referenced upstream from the Rio Grande at El Paso, Texas, which is designated as river mile 1,249.9 (Hendricks, 1964).

WEATHER--Weather was favorable for the seepage investigation; no precipitation occurred. The mean daily temperature at Las Cruces, New Mexico was 8 degrees Celsius on February 24 and 25, 2004, with a low of 1 degrees Celsius on February 25 and a high of 14 degrees Celsius on February 25.

STREAMFLOW--The seepage investigation was conducted during the non-irrigation season at low flow during drought conditions. Intermittent streamflow occurred along 27.5 of 62.4 river miles, with dry conditions observed along several extensive reaches. Discharge measurements indicate a net seepage loss of 17.2 cubic feet per second, with side-channel inflows of 26.8 cubic feet per second. Indicated gains (+) and losses (-) throughout the reach are shown below. Tributary flow recorded as inflow is considered a contribution and not a gain; no outflow (diversions) occurred during the investigation. Channel gain or loss includes seepage to or from the streambed, evaporation from the water surface, and transpiration by vegetation along the channel banks. Evaporation from the water surface and transpiration by vegetation in February is considered negligible.

WATER QUALITY--Surface-water-quality samples were collected during the seepage investigation at four sites for chemical analyses to determine dissolved solids (salinity), and concentrations of major ions and selected nutrients. Results of the chemical analyses and field determinations are listed in table 2.

REMARKS--Recent drought conditions and decreasing reservoir storage resulted in a significant reduction in surface-water allocations during the previous 2003 irrigation season at 34 percent of full supply. Intermittent river flow occurred during the 2004 non-irrigation season, with drought conditions resulting in several dry reaches during the seepage investigation. Dry river conditions were observed at site 6A to site 9 (5.1 miles), site 10A to site 18 (15.6 miles), site 23A to site 24 (3.0 miles), and site 25A to site 30 (11.2 miles).

Discharge measurements were conducted at 11 mainstream sites and 8 inflow sites with specific conductance and water temperature measured at each site. Dry channel conditions were observed at 16 mainstream sites and 6 inflow sites. Individual discharge measurements were rated good (within 5 percent) throughout most of the stream reach. Individual discharge measurements were rated fair (within 8 percent) at site 2, site 19, and site 25, and rated poor (over 8 percent) at site 31 due to poor channel conditions. Accuracy of discharge measurements needs to be considered when evaluating indicated gains and losses.

°C, degrees Celsius;  $\mu\text{S}/\text{cm}$ , microsiemens per centimeter at 25 degrees Celsius;  $\text{ft}^3/\text{s}$ , cubic feet per second; --, no data or not applicable. Locations are in New Mexico unless otherwise indicated.

Table 1.--Rio Grande seepage investigation from Radium Springs, New Mexico, to El Paso, Texas, February 24-25, 2004--Continued

Site num-ber	River mile	Stream	Location	Time	Water temperature (°C)	Specific conductance (µS/cm)	Discharge, in ft <sup>3</sup> /s		
							Main stream	Inflow	Gain or loss
<u>February 24, 2004</u>									
1	1,312.3	Rio Grande	Below Leasburg Dam, Radium Springs Lat 32°28'41", long 106°55'10"	0835	7.0	2,230	2.12	--	--
2	1,310.2	Rio Grande	Near Leasburg Lat 32°27'21", long 106°54'08"	1010	9.0	2,110	2.52	--	+0.40
3	1,307.6	Selden Drain	Near Leasburg Lat 32°25'38", long 106°52'50"	1200	--	--	--	0	--
4	1,306.3	Rio Grande	Near Hill Lat 32°25'05", long 106°52'01"	1115	11.0	2,260	3.93	--	+1.41
5	1,302.7	Rio Grande	At Shalem Bridge near Doña Ana Lat 32°22'34", long 106°51'16"	1245	14.5	2,110	2.01	--	-1.92
6	1,301.2	Wasteway no. 5	Near Doña Ana Lat 32°22'14", long 106°50'14"	1235	--	--	--	0	--
6A	1,300.5	Rio Grande	Below Wasteway no. 5 Lat 32°21'38", long 106°50'18"	1420	--	--	0	--	-2.01
7	1,298.8	Rio Grande	Near Picacho Lat 32°20'18", long 106°50'09"	1300	--	--	0	--	--
8	1,295.6	Rio Grande	Below Picacho Bridge near Las Cruces Lat 32°17'45", long 106°49'25"	1236	--	--	0	--	--
9	1,295.4	Wastewater inflow	City of Las Cruces Lat 32°17'35", long 106°49'26"	1300	18.5	1,380	--	<sup>1</sup> 14.1	--
10	1,293.1	Rio Grande	At NM-359 Bridge near Mesilla Lat 32°15'49", long 106°49'29"	1415	16.0	1,370	7.85	--	-6.25
10A	1,292.2	Rio Grande	Below NM-359 Bridge near Mesilla Lat 32°14'59", long 106°49'01"	1345	--	--	0	--	-7.85
11	1,291.8	Picacho Drain	Above Mesilla Dam Lat 32°14'34", long 106°48'56"	1430	--	--	--	0	--
12	1,291.7	Rio Grande	Below Picacho Drain Lat 32°14'30", long 106°48'49"	1440	--	--	0	--	--
13	1,289.5	Rio Grande	Below Mesilla Dam Lat 32°13'17", long 106°47'15"	1400	--	--	0	--	--
14	1,287.3	Rio Grande	At NM-28 Bridge near San Pablo Lat 32°12'24", long 106°45'32"	1420	--	--	0	--	--
15	1,283.6	Santo Tomas River Drain	Near San Miguel Lat 32°10'16", long 106°43'11"	1510	--	--	--	0	--

Table 1.--Rio Grande seepage investigation from Radium Springs, New Mexico, to El Paso, Texas, February 24-25, 2004--Continued

Site num- ber	River mile	Stream	Location	Time	Water temper- ature (°C)	Specific conduct- ance (µS/cm)	Discharge, in ft <sup>3</sup> /s		
							Main stream	Inflow	Gain or loss
16	1,282.7	Rio Grande	At NM-228 Bridge near San Miguel Lat 32°09'43", long 106°42'58"	1515	--	--	0	--	--
17	1,277.8	Rio Grande	At NM-227 Bridge near Vado Lat 32°06'48", long 106°40'05"	1530	--	--	0	--	--
<u>February 25, 2004</u>									
17	1,277.8	Rio Grande	At NM-227 Bridge near Vado Lat 32°06'48", long 106°40'05"	0800	--	--	0	--	--
18	1,276.6	Del Rio Drain	Near Vado Lat 32°06'09", long 106°39'27"	0945	8.0	1,330	--	0.16	--
19	1,273.8	Rio Grande	At NM-226 Bridge near Berino Lat 32°03'56", long 106°39'45"	0955	6.5	1,580	0.46	--	+0.30
20	1,271.6	La Mesa Drain	Near Chamberino Lat 32°02'15", long 106°39'23"	0930	--	--	--	0	--
21	1,271.5	Rio Grande	Below La Mesa Drain near Chamberino Lat 32°02'12", long 106°39'18"	1015	11.0	1,860	0.11	--	-0.35
22	1,268.5	Rio Grande	At NM-225 Bridge near Anthony Lat 31°59'58", long 106°38'07"	1040	16.5	2,410	0.02	--	-0.09
23	1,268.5	Pipe inflow	At NM-225 Bridge near Anthony Lat 31°59'58", long 106°38'07"	1110	14.0	1,780	--	0.19	--
23A	1,268.4	Rio Grande	Below NM-225 Bridge near Anthony Lat 31°59'51", long 106°38'04"	--	--	--	0	--	-0.21
24	1,265.4	East Drain	Near Vinton, Tex. Lat 31°58'09", long 106°36'17"	1030	12.0	1,920	--	2.01	--
25	1,264.7	Rio Grande	At Vinton Bridge near Vinton, Tex. Lat 31°57'33", long 106°36'16"	1120	11.0	1,860	1.38	--	-0.63
25A	1,262.2	Rio Grande	Above TX-259 Bridge, Cañutillo, Tex. Lat 31°55'23", long 106°36'08"	--	--	--	0	--	-1.38
26	1,261.6	Rio Grande	At TX-259 Bridge, Cañutillo, Tex. Lat 31°54'54", long 106°36'06"	1145	--	--	0	--	--
27	1,259.3	Rio Grande	At Borderland Bridge near Borderland, Tex. Lat 31°53'09", long 106°35'55"	1200	--	--	0	--	--
28	1,256.2	Rio Grande	At TX-260 Bridge near Santa Teresa Lat 31°50'46", long 106°36'18"	1215	--	--	0	--	--

Table 1.--Rio Grande seepage investigation from Radium Springs, New Mexico, to El Paso, Texas, February 24-25, 2004--Concluded

Site num- ber	River mile	Stream	Location	Time	Water temper- ature (°C)	Specific conduct- ance (µS/cm)	Discharge, in ft <sup>3</sup> /s		
							Main stream	Inflow	Gain or loss
February 25, 2004									
29	1,252.8	Rio Grande	Near Sunland Park Lat 31°48'24", long 106°34'57"	1200	--	--	0	--	--
30	1,251.0	Wastewater inflow	Sunland Plant, City of Sunland Park Lat 31°47'55", long 106°33'25"	1530	20.5	2,040	--	<sup>1</sup> 2.79	--
31	1,250.9	Rio Grande	At Sunland Park Bridge, Sunland Park Lat 31°47'56", long 106°33'16"	1315	21.5	2,040	1.96	--	-0.83
32	1,250.3	Montoya Drain	Near Sunland Park Lat 31°48'10", long 106°32'47"	1425	17.0	4,810	--	6.68	--
32A	1,250.2	El Paso Electric Discharge Inlet	Near Sunland Park Lat 31°48'12", long 106°32'44"	1500	16.5	3,340	--	<sup>1</sup> 0.90	--
33	1,250.1	Keystone Reservoir Inlet	Near El Paso, Tex. Lat 31°48'18", long 106°32'39"	1425	--	--	--	0	--
33A	1,250.0	Side-channel Inlet	Above Courchesne Bridge Near El Paso, Tex. Lat 31°48'13", long 106°32'28"	1515	15.5	4,290	--	0.01	--
34	1,249.9	Rio Grande	At Courchesne Bridge, El Paso, Tex. Lat 31°48'09", long 106°32'26"	1545	16.5	4,270	9.75	--	+2.16

<sup>1</sup>/ Reported discharge