Table 1.--Rio Grande seepage investigation from Radium Springs, New Mexico, to El Paso, Texas, February 23 and March 4, 2005

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--Above average winter precipitation occurred with frequent isolated thunderstorms in January through March, 2005. Weather was favorable for the seepage investigation on February 23 along most of the upstream reach from Radium Springs to Vado, New Mexico. Heavy overnight rain occurred with significant precipitation on February 24. Weather was favorable for the seepage investigation along the downstream reach from Vado, New Mexico to El Paso, Texas on March 4.

STREAMFLOW--The seepage investigation was conducted during the non-irrigation season at low flow. Intermittent streamflow occurred along 43.6 of 62.4 river miles, with dry conditions observed along two extensive reaches. Discharge measurements indicate a net seepage loss of 40.3 cubic feet per second, with side-channel inflows of 38.9 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 2004 irrigation season at 36 percent of full supply. Intermittent river flow occurred during the 2005 non-irrigation season, with two dry reaches during the seepage investigation. Dry river conditions were observed at site 14A to site 16A (6.5 miles) and site 25D to site 30 (12.3 miles).

Discharge measurements were conducted at 16 mainstream sites and 14 inflow sites with specific conductance and water temperature measured at each site. Dry channel conditions were observed at 8 mainstream sites and 5 inflow sites. Individual discharge measurements were rated good (within 5 percent) throughout most of the stream reach. The discharge measurement at site 8 was effected by precipitation from an isolated thunderstorm and was rated poor due to unsteady stage during the measurement. Individual discharge measurements were rated fair (within 8 percent) at site 10 and rated poor (over 8 percent) at site 24 due to poor channel conditions. Accuracy of discharge measurements needs to be considered when evaluating indicated gains and losses.

°C, degrees Celsius; µS/cm, microsiemens per centimeter at 25 degrees Celsius; ft^3/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 23 and March 4, 2005--Continued

Site number	River mile	Stream	Location	Time	Water temperature (°C)	Specific conductance (µS/cm)	Discharge, in ft³/s: Main stream	Discharge, in ft³/s: Inflow	Discharge, in ft³/s: Gain or loss
			February 23, 2005						
1	1,312.3	Rio Grande	Below Leasburg Dam, Radium Springs Lat 32°28'41", long 106°55'10"	0955	14.5	1,340	14.9	--	--
2	1,310.2	Rio Grande	Near Leasburg Lat 32°27'21", long 106°54'08"	--	--	--	--	--	--
3	1,307.6	Selden Drain	Near Leasburg Lat 32°25'38", long 106°52'50"	0850	--	--	--	0	--
4	1,306.3	Rio Grande	Near Hill Lat 32°25'05", long 106°52'01"	1130	14.5	1,570	16.4	--	+1.5
5	1,302.7	Rio Grande	At Shalem Bridge near Doña Ana Lat 32°22'34", long 106°51'16"	1250	16.5	1,520	14.0	--	-2.4
6	1,301.2	Wasteway No. 5	Near Doña Ana Lat 32°22'14", long 106°50'14"	0815	--	--	--	0	--
7	1,298.8	Rio Grande	Near Picacho Lat 32°20'18", long 106°50'09"	1415	16.0	1,390	13.7	--	-0.3
8	1,295.6	Rio Grande	Below Picacho Bridge near Las Cruces Lat 32°17'45", long 106°49'25"	1540	15.0	1,160	8.99	--	-4.7
9	1,295.4	Wastewater Inflow	City of Las Cruces Lat 32°17'35", long 106°49'26"	1300	21.0	1,300	--	[1]/14.9	--
10	1,293.1	Rio Grande	At NM-359 Bridge near Mesilla Lat 32°15'49", long 106°49'29"	1550	20.5	1,270	17.6	--	-6.3
11	1,291.8	Picacho Drain	Above Mesilla Dam Lat 32°14'34", long 106°48'56"	1415	--	--	--	0	--
12	1,291.7	Rio Grande	Below Picacho Drain Lat 32°14'30", long 106°48'49"	0900	12.0	1,340	4.85	--	-12.8
13	1,289.5	Rio Grande	Below Mesilla Dam Lat 32°13'17", long 106°47'15"	1025	13.5	1,300	3.01	--	-1.84
14	1,287.3	Rio Grande	At NM-28 Bridge near San Pablo Lat 32°12'24", long 106°45'32"	1155	19.0	1,210	1.21	--	-1.80
14A	1,284.8	Rio Grande	Below NM-28 Bridge near San Miguel Lat 32°11'12", long 106°43'48"	1700	--	--	0	--	-1.21
15	1,283.6	Santo Tomas River Drain	Near San Miguel Lat 32°10'16", long 106°43'11"	1445	--	--	--	0	--

Table 1.--Rio Grande seepage investigation from Radium Springs, New Mexico, to El Paso, Texas, February 23 and March 4, 2005--Continued

Site number	River mile	Stream	Location	Time	Water temperature (°C)	Specific conductance (µS/cm)	Discharge, in ft³/s: Main stream	Discharge, in ft³/s: Inflow	Discharge, in ft³/s: Gain or loss
16	1,282.7	Rio Grande	At NM-228 Bridge near San Miguel Lat 32°09'43", long 106°42'58"	1330	--	--	0	--	--
16A	1,278.3	Rio Grande	Above NM-227 Bridge near Vado Lat 32°07'06", long 106°40'29"	1545	--	--	0	--	--
17	1,277.8	Rio Grande	At NM-227 Bridge near Vado Lat 32°06'48", long 106°40'05"	1430	20.5	1,070	[2]0.06	--	+0.06
			March 4, 2005						
17	1,277.8	Rio Grande	At NM-227 Bridge near Vado Lat 32°06'48", long 106°40'05"	0930	15.0	1,290	[2]0.07	--	--
18	1,276.6	Del Rio Drain	Near Vado Lat 32°06'09", long 106°39'27"	1030	11.0	1,360	--	2.84	--
19	1,273.8	Rio Grande	At NM-226 Bridge near Berino Lat 32°03'56", long 106°39'45"	1145	17.0	1,310	3.60	--	+0.69
20	1,271.6	La Mesa Drain	Near Chamberino Lat 32°02'15", long 106°39'23"	1310	--	--	--	0	--
21	1,271.5	Rio Grande	Below La Mesa Drain near Chamberino Lat 32°02'12", long 106°39'18"	1420	22.0	1,340	4.07	--	+0.47
22	1,268.5	Rio Grande	At NM-225 Bridge near Anthony Lat 31°59'58", long 106°38'07"	1620	21.0	1,300	3.65	--	-0.42
23	1,268.5	Pipe Inflow	At NM-225 Bridge near Anthony Lat 31°59'58", long 106°38'07"	1525	15.0	1,590	--	[2]0.04	--
24	1,265.4	East Drain	Near Vinton, Tex. Lat 31°58'09", long 106°36'17"	0830	10.0	1,980	--	0.91	--
24A	1,265.9	Temporary Well Inflow	Above Vinton Bridge, near Vinton, Tex. Lat 31°58'32", long 106°36'50"	0755	18.0	1,940	--	[1,3]1.69	--
25	1,264.7	Rio Grande	At Vinton Bridge near Vinton, Tex. Lat 31°57'33", long 106°36'16"	1010	18.0	1,680	2.48	--	-3.81
25A	1,264.7	Temporary Well Inflow	At Vinton Bridge near Vinton, Tex. Lat 31°57'32", long 106°36'16"	0825	19.5	1,470	--	[1,3]1.54	--
25B	1,264.2	Temporary Well Inflow	Below Vinton Bridge near Vinton, Tex. Lat 31°57'06", long 106°36'18"	0905	19.5	1,310	--	[1,3]2.76	--
25C	1,263.9	Temporary Well Inflow	Below Vinton Bridge near Vinton, Tex. Lat 31°56'52", long 106°36'17"	0915	19.5	1,280	--	[1,3]0.99	--

Table 1.--Rio Grande seepage investigation from Radium Springs, New Mexico, to El Paso, Texas, February 23 and March 4, 2005--Continued

Site number	River mile	Stream	Location	Time	Water temperature (°C)	Specific conductance (µS/cm)	Discharge, in ft³/s		
							Main stream	Inflow	Gain or loss
25D	1,263.3	Rio Grande	Below Vinton Bridge near Vinton, Tex. Lat 31°56'19", long 106°36'16"	1420	--	--	0	--	-7.77
25E	1,262.2	Temporary Well Inflow	Above TX-259 Bridge near Cañutillo, Tex. Lat 31°55'27", long 106°36'10"	0850	18.5	1,430	--	[1,3]0.56	--
26	1,261.6	Rio Grande	At TX-259 Bridge, Cañutillo, Tex. Lat 31°54'54", long 106°36'18"	1100	--	--	0	--	-0.56
27	1,259.3	Rio Grande	At Borderland Bridge near Borderland, Tex. Lat 31°53'09", long 106°35'55"	1110	--	--	0	--	--
28	1,256.2	Rio Grande	At TX-260 Bridge near Santa Teresa Lat 31°50'46", long 106°36'18	1125	--	--	0	--	--
29	1,252.8	Rio Grande	Near Sunland Park Lat 31°48'24", long 106°34'57"	1145	--	--	0	--	--
30	1,251.0	Wastewater Inflow	Sunland Plant, City of Sunland Park Lat 31°47'55", long 106°33'25"	1139	19.0	2,120	--	[1]2.40	--
31	1,250.9	Rio Grande	At Sunland Park Bridge, Sunland Park Lat 31°47'56", long 106°33'16"	1500	21.5	2,120	2.23	--	-0.17
32	1,250.3	Montoya Drain	Near Sunland Park Lat 31°48'10", long 106°32'47"	1335	17.5	4,000	--	9.59	--
32A	1,250.2	El Paso Electric Discharge Inlet	Near Sunland Park Lat 31°48'12", long 106°32'44"	1135	17.0	2,540	--	[1] 0.61	--
33	1,250.1	Keystone Reservoir Inlet	Near El Paso, Tex. Lat 31°48'18", long 106°32'39"	1600	17.5	2,380	--	[2]0.06	--
33A	1,250.0	Side-channel Inlet	Above Courchesne Bridge Near El Paso, Tex. Lat 31°48'13", long 106°32'28"	1625	18.0	4,730	--	[2] 0.04	--
34	1,249.9	Rio Grande	At Courchesne Bridge, El Paso, Tex. Lat 31°48'09", long 106°32'26"	1710	19.5	3,780	13.6	--	+1.1

[1] Reported discharge

[2] Parshall Flume

[3] Temporary well inflow from shallow wells completed in the flood-plain alluvium within 500 feet of the Rio Grande. Wells were pumped for the purpose of dewatering at a pipeline construction site.