

EDWARDS UNDERGROUND WATER DISTRICT

1619 Tower Life Building
San Antonio, Texas

BULLETIN 4

CHEMICAL ANALYSES OF WATER FROM OBSERVATION WELLS IN THE EDWARDS AND ASSOCIATED LIMESTONES, SAN ANTONIO AREA, TEXAS, 1963

Compiled by
Sergio Garza, Hydraulic Engineer
United States Geological Survey

Prepared in cooperation with the Geological Survey,
United States Department of the Interior,
the Texas Water Commission, and
the City of San Antonio

JANUARY - 1964

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Ground water users in the San Antonio area have been concerned about possible encroachment of saline water into the fresh-water-bearing part of the Edwards and associated limestones as the head in the aquifer changes. As a result, the program to resample observation wells tapping the zone of transition between water of good quality and saline water in the Edwards and associated limestones was begun in 1959. Chemical analyses compiled through 1962 were published by the Edwards Underground Water District (Garza, 1962), and this report presents the chemical analyses compiled during 1963. The resampling program is part of a more extensive hydrologic investigation carried on by the U.S. Geological Survey in cooperation with the Edwards Underground Water District, the Texas Water Commission, and the city of San Antonio.

Chemical analyses of water from 100 wells are listed in this report. Most of the wells are sampled twice a year, but some of the wells are not in continuous use and it is not possible to sample them that frequently. About 80 wells are sampled twice a year; the remainder have been placed on standby to be resampled when the wells are in use.

The water samples are analyzed in the laboratory of the U.S. Geological Survey in Austin, Tex., for specific conductance, pH, chloride, sulfate, bicarbonate, and hardness. A more complete analysis has been made for one of the samples from each well, and these analyses are on file in the offices of the Geological Survey in Austin and San Antonio. Locations of wells and other data pertaining to the re-sampling program may be found in reports listed below.

REFERENCES

- Garza, Sergio, 1962, Recharge, discharge, and changes in ground-water storage in the Edwards and associated limestones, San Antonio area, Texas. A progress report on studies, 1955-59: Texas Water Commission Bull. 6201.
- Garza, Sergio, 1962, Chemical analyses of water from observation wells in the Edwards and associated limestones, San Antonio area, Texas: Edwards Underground Water District Bull. 1.

Chemical analyses of water from observation wells in the San Antonio area, Texas
(Analyses are in parts per million, except specific conductance and pH)

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature °F
<u>Kinney County</u>											
M-10	Wardlaw Bros.	750	Mar. 20, 1963	238	203	10		394	761	6.9	84
			Sept. 11, 1963	234	201	12		398	768	7.3	83
M-12	Wardlaw Bros.	1200	Mar. 20, 1963	182	1620	12		1840	2540	6.7	91
			Sept. 11, 1963	204	1640	13		1840	2570	6.4	89
M-14	F. Beidler	618	Mar. 19, 1963	262	95	13		284	617	7.2	81
			Sept. 11, 1963	268	93	13		284	624	7.0	78
N-5	Wardlaw Bros.	756	Mar. 19, 1963	264	93	15		268	621	7.0	82
			Sept. 10, 1963	260	94	15		274	626	7.3	80
U-15	W. Richards	1408	Mar. 19, 1963	180	1750	7.5		1920	2650	6.5	95
			Sept. 11, 1963	206	1780	11		1940	2670	6.3	94
V-7	Las Moras Springs	-	Mar. 14, 1963	238	7.2	9.5		220	433	7.0	74
V-29	R. Dodd	930	Mar. 20, 1963	210	554	9.2		735	1250	7.0	88
			Sept. 11, 1963	214	544	9.8		735	1240	6.6	86

Chemical analyses of water from observation wells in the San Antonio area-continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature °F
W-17	B. F. Orr	435	Sept. 10, 1963	392	42	116		182	1030	7.7	78
X-5	A. Harrison	514	Mar. 14, 1963	268	1250	28		1500	2240	6.7	79
Y-16	A. Schubach	285	Mar. 14, 1963	446	129	70		526	1100	6.4	79
			Sept. 10, 1963	440	130	74		510	1080	7.3	79
Y-17	A. Schubach	370	Mar. 14, 1963	380	51	66		338	867	7.5	75
			Sept. 10, 1963	386	60	70		338	893	7.4	78
<u>Uvalde County</u>											
1/2 G-6-2	F. Kirchgraber	1100	Mar. 14, 1963	428	21	35		376	786	6.8	74
H-4-34	J. Rosenow	593	Mar. 3, 1963	380	15	19		336	674	6.7	76
H-4-57	Knowlton Dairy	980	Mar. 19, 1963	314	44	121		430	952	6.9	76
H-4-64	F. Turner (H. Martin)	842	Mar. 13, 1963	552	112	105		380	1350	6.9	78
			Aug. 8, 1963	552	115	108		376	1300	7.0	78
H-4-95	S. G. Nelson	1113	Mar. 20, 1963	248	198	19		338	779	7.2	80
H-5-1	City of Uvalde	287	Feb. 20, 1963	280	24	28		276	582	6.9	--

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature °F
H-5-72	B. Turner	350	Mar. 3, 1963	356	195	48		460	1010	6.8	75
H-5-163	U.S. Fish & Wildlife	600	Mar. 12, 1963	300	80	125		444	1010	6.6	76
			Aug. 22, 1963	296	102	128		450	1010	6.7	74
H-5-240	W. Painter	562	Apr. 1, 1963	262	432	99		680	1400	6.4	--
			Oct. 8, 1963	272	438	96		680	1400	7.1	--
H-6-25	B. Turner	1410	Mar. 12, 1963	356	888	425		896	3170	6.8	93
			Sept. 3, 1963	-	902	425		-	3140	-	92
H-6-74	C.S. Hunter	1075	Mar. 22, 1963	252	194	79		360	980	7.0	-
			Sept. 11, 1963	250	195	78		372	997	6.9	89
H-6-82	F. Kincaid	1524	Mar. 12, 1963	224	341	150		560	1390	6.7	87
			Aug. 22, 1963	224	344	148		570	1380	6.7	87
H-8-69	J. R. Farr	602	Mar. 12, 1963	236	325	270		580	1760	6.8	90
I-7-15	T. M. Woodley	2575	Mar. 12, 1963	220	117	31		312	663	6.7	100
			Sept. 22, 1963	222	120	31		312	647	7.0	99

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of Well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature °F
<u>Medina County</u>											
I-5-55	G. E. Farley	2000	Mar. 12, 1963	234	16	19		214	445	7.2	74
			Aug. 8, 1963	240	16	17		220	444	7.1	74
I-5-74	E. Hood	2260	Aug. 9, 1963	260	13	23		238	472	7.7	75
J-4-143	H. Kelso	2765	Aug. 7, 1963	236	36	25		224	489	7.0	94
<u>Atascosa County</u>											
3	C. W. Mask	2507	Mar. 3, 1963	208	154	67		334	807	7.3	--
			Aug. 14, 1963	224	74	34		266	571	7.2	90
5	City of Lytle	2379	Mar. 4, 1963	224	190	39		394	811	7.1	100
			Aug. 7, 1963	220	190	40		396	793	6.7	101

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of Well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25 C)	pH	Temperature °F
<u>Bexar County</u>											
155	Southern Henke Ice Co.	1300	Mar. 4, 1963	246	55	26		264	549	7.1	83
			Aug. 16, 1963	246	58	36		272	584	7.1	83
278	City of San Antonio	1108	Mar. 4, 1963	242	25	17		232	463	7.2	80
			Aug. 15, 1963	242	24	16		224	450	7.4	83
284	City of San Antonio	1582	Mar. 4, 1963	246	27	16		234	473	7.2	82
			Aug. 5, 1963	248	27	17		232	456	7.7	82
F-249	H. Hoffrichter	804	Mar. 29, 1963	242	273	322		514	1830	7.2	--
			Sept. 11, 1963	242	258	315		510	1810	7.2	76
G-7	Converse Water Co.	684	Mar. 21, 1963	240	39	23		244	513	7.0	81
			Sept. 27, 1963	240	38	23		244	518	6.8	80
G-33	A. H. Scott	750	Mar. 21, 1963	292	450	810		745	3620	7.0	--
			Aug. 19, 1963	284	462	800		750	3530	7.0	--
G-63	Kneupper Water Co.	576	Mar. 5, 1963	244	40	40		248	564	7.3	79
			Aug. 8, 1963	244	42	46		252	577	7.1	78

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature °F
I-125	R. Aelevoet	1285	Mar. 1, 1963	242	31	16		238	482	7.6	84
			Aug. 9, 1963	244	32	17		236	471	6.9	80
I-205	E. Persyn	1672	Mar. 24, 1963	224	392	190		638	1560	6.6	89
			Aug. 14, 1963	223	396	185		650	1530	7.4	89
I-206	Patio Foods, Inc.	1400	Mar. 1, 1963	244	37	18		244	488	7.3	84
			Aug. 15, 1963	244	37	18		244	483	7.2	82
J-40	E. Ackerman	900	Mar. 29, 1963	246	251	168		466	1320	7.3	--
			Aug. 19, 1963	246	279	188		495	1410	7.0	--
J-50	San Antonio Hot Wells	1878	Mar. 1, 1963	230	2000	940		2540	5470	6.6	104
			Aug. 16, 1963	284	1990	900		2560	5340	6.9	101
J-66	F. Ward	900	Mar. 29, 1963	250	113	137		326	1010	7.3	78
			Aug. 15, 1963	248	123	172		336	1120	7.0	76
J-75	V. E. Berry	1045	Mar. 5, 1963	264	1050	540		1440	3440	6.8	82
J-87	City of San Antonio	1185	Mar. 5, 1963	244	25	17		232	466	7.5	81
			Aug. 7, 1963	240	26	16		232	459	7.3	80

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO	Specific conductance (micromhos at 25°C)	pH	Temperature OF
J-90	Holt Machinery	2179	Feb. 21, 1963	270	1940	920		2510	5460	6.6	105
			Aug. 7, 1963	268	1960	950		2520	5420	6.8	110
J-91	A. L. Wilson	800	Mar. 5, 1963	236	132	64		320	804	7.2	83
			Aug. 15, 1963	242	126	62		312	699	6.9	83
J-93	A. Brucks	775	Mar. 5, 1963	242	41	24		248	521	7.3	79
K-2	R. Schirmer	854	July 23, 1963	316	1880	1750		2340	7530	6.6	85
M-13	A. A. Seeligson	1800	Mar. 4, 1963	242	85	38		292	654	7.5	92
M-39	Constanzo Bros.	1949	Mar. 4, 1963	244	210	97		436	1020	7.1	90
M-44	R. Aelevoet	2226	Mar. 4, 1963	194	1750	810		2260	4760	6.8	104
			Aug. 7, 1963	240	1690	775		2240	4670	6.7	105
M-45	A. H. Grothues	2300	Mar. 11, 1963	232	113	50		322	722	6.6	92
			Aug. 14, 1963	230	200	88		412	961	6.7	95
M-47	K. L. Haggard	1950	Mar. 4, 1963	226	274	114		502	1170	6.8	95
			Aug. 14, 1963	226	246	112		480	1090	7.0	94
M-48	A. Ballard	2190	Mar. 1, 1963	232	302	136		536	1330	7.3	96

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature
M-48	A. Ballard	2190	Aug. 14, 1963	224	278	122		505	1170	6.8	95
N-4	O. R. Mitchell	1909	Mar. 1, 1963	240	24	16		232	466	7.0	84
N-5	O. R. Mitchell	1771	Mar. 1, 1963	246	29	18		236	473	7.3	82
N-6	C. Verstuyft	1532	Mar. 1, 1963	240	29	18		240	479	7.1	83
			Aug. 14, 1963	244	29	18		236	465	7.2	82
N-7	Paul Persyn	1830	Mar. 1, 1963	284	40	38		218	692	7.2	85
			Aug. 14, 1963	288	40	43		218	625	6.9	84
N-28	E. M. Baker	1742	Mar. 11, 1963	212	704	305		1020	2360	6.2	100
N-118	L. Knowlton	1856	Mar. 11, 1963	240	111	48		316	708	7.3	92
			Aug. 14, 1963	238	94	43		300	643	7.3	92
N-119	F. Vargas	1660	Mar. 1, 1963	238	908	440		1260	3030	6.8	88
			Aug. 14, 1963	218	916	440		1280	2920	7.0	86
N-120	Krueger Farm	1781	Mar. 11, 1963	236	29	18		234	474	7.0	80

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature
N-121	E. M. Baker	2274	Mar. 4, 1963	262	808	408		1160	2750	7.0	103
			Aug. 14, 1963	214	840	395		1150	2700	6.6	101
<u>Guadalupe County</u>											
D-18	C. L. Worthy	370	Mar. 13, 1963	242	87	58		304	724	7.0	--
			Aug. 8, 1963	240	93	58		296	698	6.9	76
D-56	City of Cibolo	506	Mar. 11, 1963	258	692	640		1010	3430	6.9	78
			Aug. 8, 1963	260	668	640		970	3220	7.2	79
D-67	W. Kramer	565	Mar. 11, 1963	256	418	380		705	2230	7.0	74
			Aug. 8, 1963	268	608	600		950	3070	7.1	75
<u>Comal County</u>											
F-75	U.S. Gypsum	209	Mar. 14, 1963	282	22	12		266	526	7.0	73
			Aug. 16, 1963	296	18	12		270	513	6.9	74

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature
G-50	City of New Braunfels (Comal Springs)	-	Mar. 6, 1963	280	23	15		258	509	7.5	74
			Sept. 9, 1963	276	24	15		254	501	7.5	74
G-67	W. Sippel	502	Mar. 6, 1963	260	57	54		264	652	7.5	73
			Aug. 16, 1963	258	56	58		252	652	7.5	73
G-83	C. Hernandez	345	Mar. 7, 1963	292	165	85		405	1020	7.2	--
			Aug. 25, 1963	270	650	488		935	2920	7.2	--
G-84	H. C. Nelson	272	Mar. 6, 1963	380	200	157		545	1370	6.7	71
			Sept. 9, 1963	376	212	160		560	1400	7.0	74
G-85	O. Pape	170	Mar. 6, 1963	294	20	15		270	526	7.0	69
G-86	H. Soechting	168	Mar. 12, 1963	286	28	16		280	572	6.8	--
			Aug. 23, 1963	292	24	16		270	523	7.2	72
G-87	R. Soechting	160	Mar. 14, 1963	290	21	16		282	522	6.9	70
G-89	R. Hobson	160	Mar. 14, 1963	298	18	14		268	516	7.8	71
H-2	E. Kanz	450	Mar. 13, 1963	338	406	568		775	2850	7.5	74

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature
H-6	A. W. Feick	700	Mar. 5, 1963	274	54	53		270	665	6.9	73
			Aug. 22, 1963	258	59	54		264	622	7.1	78
H-7	R. Welsch	372	Mar. 8, 1963	290	37	20		272	566	7.0	71
H-20	W. Schaeffer	300	Mar. 5, 1963	290	18	22		256	549	7.4	72
			Aug. 16, 1963	284	17	28		252	527	7.1	74
H-23	O. Penshorn	428	Mar. 11, 1963	316	1990	630		2460	5230	7.2	--
H-43	H. Friesenhahn	400	Mar. 7, 1963	376	25	40		400	841	6.7	72
H-49	E. Feick	515	Mar. 5, 1963	426	498	620		935	3160	7.1	73
			Aug. 21, 1963	374	514	600		890	3100	7.0	--
H-52	P. Hansmann	380	Mar. 11, 1963	268	38	30		258	557	7.9	--
			Sept. 5, 1963	260	44	30		268	558	7.8	--

Hays County

E-70	H. K. Wilbern	450	Sept. 10, 1963	312	826	610		935	3780	-	71
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Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature
E-76	City of Buda	390	Mar. 1, 1963	318	29	12		302	560	7.2	71
			Sept. 10, 1963	326	29	12		302	571	7.1	72
E-79	C. M. Breeding	490	Mar. 5, 1963	280	692	342		920	2600	7.0	72
E-80	D. A. Dacy	492	Mar. 1, 1963	296	272	215		404	1590	7.6	--
			Sept. 10, 1963	304	262	218		400	1600	7.5	--
E-81	W. A. Word	520	Mar. 4, 1963	292	122	15		372	688	7.4	72
E-82	Tom Edwards	580	Mar. 8, 1963	356	158	53		416	1010	7.0	72
F-7	R. M. Turner	665	Mar. 1, 1963	288	301	195		372	1570	7.8	73
			Sept. 10, 1963	270	278	180		354	1480	7.5	74
F-22	A. H. Whitten	502	Mar. 5, 1963	296	342	322		424	2040	7.2	72
			Sept. 10, 1963	304	348	330		430	2100	7.2	75
H-19	City of Kyle	600	Sept. 9, 1963	284	131	16		358	696	7.5	75
H-25	Hillview Dairy	600	Mar. 4, 1963	242	526	640		745	3140	7.3	--
			Sept. 27, 1963	260	508	680		752	3240	7.0	--

Chemical analyses of water from observation wells in the San Antonio area--continued

Well	Owner	Depth of well (ft.)	Date of collection	Bicar- bonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃	Specific conductance (micromhos at 25°C)	pH	Temperature
H-50	L. Woods	141	Mar. 1, 1963	306	44	29		308	645	7.0	70
H-59	W. N. Goforth (Spring)	-	Mar. 1, 1963	-	25	20		-	-	-	70
			Sept. 9, 1963	238	30	25		236	510	7.2	75
H-66	A. B. Rogers Estate (San Marcos Springs)	-	Feb. 28, 1963	308	22	20		288	571	7.4	71
			Sept. 13, 1963	300	26	20		284	571	7.0	72
H-84	J. B. Netherland	250	Feb. 28, 1963	328	34	28		316	642	7.2	--
			Sept. 9, 1963	324	35	29		312	626	7.5	73
H-113	S. W. Texas State College	255	Feb. 28, 1963	304	34	28		298	603	7.0	72
K-1	W. N. Yates	360	Feb. 28, 1963	340	221	230		552	1550	7.4	70
K-5	E. Jackson	200	Feb. 28, 1963	340	299	250		648	1740	6.7	72
			Sept. 10, 1963	354	292	258		650	1790	7.0	74