Weiss Associates Environmental and Geologic Services

5500 Shellmound Street, Emeryville, CA 94608-2411 Fax: 510-547-5043 Phone: 510-547-5420

92 APR -3 PM 12:03

April 2, 1992

Ms. Juliette Shin
Alameda County Health Care Services
80 Swan Way
Room 200
Oakland, CA 94621

Re: Additional Pump Test Data
Chevron SS #9-0504
15900 Hesperian Blvd.
San Lorenzo, California
WA Job # 4-551-08

Dear Ms. Shin:

As you requested, Weiss Associates is providing the raw data used to plot the anticipated ground water pumping capture zone presented in our work plan dated March 4, 1992. Attached are the following:

- Tabulated drawdown and pumping rate data for both pump tests (well C-1 and well C-2),
- Semi-log plots for both tests plotting drawdown and pumping rate vs. time, and
- Pathlines and Traveltimes capture model plot.

Drawdown was corrected to account for phreatic (unconfined) aquifer conditions prior to plotting the semi-log graphs. Both tests were divided into phases based on changing flow rates. We calculated transmissivity for Phase 4 of the C-1 test and Phase 1 of the C-2 test by using the Cooper-Jacob straight line technique.

We used the formulas: $T = 35Q/\Delta s$

where T = transmissivity in ft^2/day, Δs = drawdown in ft over one log cycle of time (C-1 Phase 4 = 1.0 ft, C-2 Phase 1 = 0.25 ft), and Q = pumping rate in gallons per minute (gpm) (C-1 Phase 4 = 3.1 gpm, C-2 Phase 1 = 2.8 gpm).

and: $T = Kb$

where K = hydraulic conductivity in ft/day and b = saturated aquifer thickness (6.1 ft) to calculate K for each test.

We calculated a K of about 17.8 ft/day and 59.5 ft/day for the C-1 and C-2 tests, respectively. To model capture by pumping both wells simultaneously, we averaged the individual well K's for a value of about 39 ft/day). We conservatively estimated a long term pumping rate of 2 gpm and a ground water gradient of 0.004 ft/ft. We used these parameters to run the Pathlines and Traveltimes computer model. The computer plot was used to generate Figure 3 of the March 4, 1992 remediation work plan.

Once the ground water extraction system is installed and pumping begins, we will evaluate its effectiveness by monitoring water levels in all monitoring wells.

We trust that this data addresses your concerns. Please feel free to call if you have further questions or comments.

Sincerely,
Weiss Associates

Thomas R. Berry
Project Geologist

TRB:trb

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Attachments: Drawdown tables (C-1 and C-2 tests)
Drawdown/Pumping rate vs. Time plots
Pathlines and Traveltimes plot

cc: Nancy Vukelich, Chevron U.S.A. Products Company

Chevron Service Station #9-0504 15900 Hesperian Blvd., San Lorenzo, California

Pumping Test of Well C-1 on January 22, 1992

Analysis of Permeability and Transmissivity
STRAIGT-LINE METHOD OF OF COOPER-JACOB

PRELIMINARY FIELD DATA

C-1

Clock Time	Elapsed Time	Depht to Water	negative Drawdown	corr. Drawdown	Pumping Rate	Elapsed Time
	[min]	[ft]	[ft]	[ft]	[gpm]	[sec]
09:58:00	-65.37	12.66			0	-3922
10:48:00	-15.37	12.64	0		0	-922
11:03:22	0.00	12.64	0		0.35	0
11:04:00	0.63	12.79	-0.15	-0.15	0.35	38
11:05:01	1.65	12.85	-0.21	-0.21	0.35	99
11:06:00	2.63	12.9	-0.26	-0.25	0.35	158
11:07:00	3.63	12.92	-0.28	-0.27	0.35	218
11:07:46	4.40	12.92	-0.28	-0.27	0.35	264
11:07:18	3.93	12.92	-0.28	-0.27	0.35	236
11:10:20	6.97	12.92	-0.28	-0.27	0.35	418
11:11:05	7.72	12.92	-0.28	-0.27	0.35	463
11:12:42	9.33	12.92	-0.28	-0.27	0.35	560
11:13:00	9.63	12.92	-0.28	-0.27	0.9	578
11:13:40	10.30	13.44	-0.8	-0.75	0.9	618
11:14:24	11.03	13.5	-0.86	-0.80	0.9	662
11:14:50	11.47	13.55	-0.91	-0.84	0.9	688
11:15:35	12.22	13.58	-0.94	-0.87	0.9	733
11:16:35	13.22	13.6	-0.96	-0.88	0.9	793
11:17:30	14.13	13.62	-0.98	-0.90	0.9	848
11:18:37	15.25	13.63	-0.99	-0.91	0.9	915
11:19:04	15.70	13.64	-1	-0.92	0.9	942
11:20:00	16.63	13.67	-1.03	-0.94	0.9	998
11:21:50	18.47	13.7	-1.06	-0.97	0.9	1108
11:22:00	18.63	13.72	-1.08	-0.98	1.2	1118
11:22:30	19.13	13.9	-1.26	-1.13	1.2	1148
11:24:10	20.80	13.9	-1.26	-1.13	1.2	1248
11:24:30	21.13	13.91	-1.27	-1.14	2.2	1268
11:25:10	21.80	14.04	-1.4	-1.24	2.2	1308
11:25:57	22.58	14.15	-1.51	-1.32	2.2	1355
11:26:33	23.18	14.24	-1.6	-1.39	2.2	1391
11:27:02	23.67	14.32	-1.68	-1.45	2.2	1420
11:28:15	24.88	14.33	-1.69	-1.46	2.2	1493
11:29:00	25.63	14.33	-1.69	-1.46	2.2	1538
11:30:45	27.38	14.35	-1.71	-1.47	2.2	1643
11:31:50	28.47	14.36	-1.72	-1.48	2.2	1708
11:39:50	36.47	14.39	-1.75	-1.50	2.2	2188
11:40:30	37.13	14.4	-1.76	-1.51	3	2228
11:41:44	38.37	14.84	-2.2	-1.80	3	2302
11:41:38	38.27	15.01	-2.37	-1.91	3	2296
11:42:13	38.85	15.19	-2.55	-2.02	3	2331

11:42:55	39.55	15.42	-2.78	-2.15	3	2373
11:43:40	40.30	15.65	-3.01	-2.27	3	2418
11:44:13	40.85	15.73	-3.09	-2.31	3	2451
11:44:55	41.55	15.88	-3.24	-2.38	3	2493
11:46:00	42.63	15.51	-2.87	-2.19	3.1	2558
11:49:56	46.57	15.58	-2.94	-2.23	3.1	2794
11:50:41	47.32	15.62	-2.98	-2.25	3.1	2839
11:51:22	48.00	15.64	-3	-2.26	3.1	2880
11:53:30	50.13	15.68	-3.04	-2.28	3.1	3008
11:54:20	50.97	15.69	-3.05	-2.29	3.1	3058
11:55:40	52.30	15.7	-3.06	-2.29	3.1	3138
11:56:47	53.42	15.71	-3.07	-2.30	3.1	3205
11:57:44	54.37	15.77	-3.13	-2.33	3.1	3262
11:59:50	56.47	15.73	-3.09	-2.31	3.1	3388
12:00:30	57.13	15.74	-3.1	-2.31	3.1	3428
12:02:30	59.13	15.74	-3.1	-2.31	3.1	3548
12:03:20	59.97	15.74	-3.1	-2.31	3.1	3598
12:19:20	75.97	15.92	-3.28	-2.40	3.1	4558
12:35:00	91.63	16.18	-3.54	-2.51	3.1	5498
12:58:00	114.63	16.04	-3.4	-2.45	3.1	6878
13:14:00	130.63	16.58	-3.94	-2.67	3.1	7838
13:36:00	152.63	16.69	-4.05	-2.71	3.1	9158
13:48:00	164.63	16.82	-4.18	-2.75	3.1	9878
14:07:00	183.63	17.04	-4.4	-2.81	3.1	11018
14:24:00	200.63	17.04	-4.4	-2.81	3.1	12038
14:43:50	220.47	17.04	-4.4	-2.81	3.1	13228
14:44:00	220.63	17.04	-4.4	-2.81	0	13238
14:47:00	223.63	15.47	-2.83	-2.17	0	13418
14:48:00	224.63	14.62	-1.98	-1.66	0	13478
14:49:00	225.63	13.65	-1.01	-0.93	0	13538
14:53:00	229.63	13.06	-0.42	-0.41	0	13778
14:55:00	231.63	13.02	-0.38	-0.37	0	13898
15:11:00	247.63	12.86	-0.22	-0.22	0	14858
15:22:00	258.63	12.82	-0.18	-0.18	0	15518
15:37:00	273.63	12.8	-0.16	-0.16	0	16418
16:27:00	323.63	12.75	-0.11	-0.11	0	19418
						0
16:52:00	348.63	12.8			C2 = on	
17:54:00	410.63	12.82			C2 = on	

Pumping Test of well C-1
on January 22, 1992

SS# 9-0504 Chevron

PRELIMINARY FIELD DATA

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Chevron Service Station #9-0504 15900 Hesperian Blvd., San Lorenzo, California

Pumping Test of Well C-2 on January 22, 1992

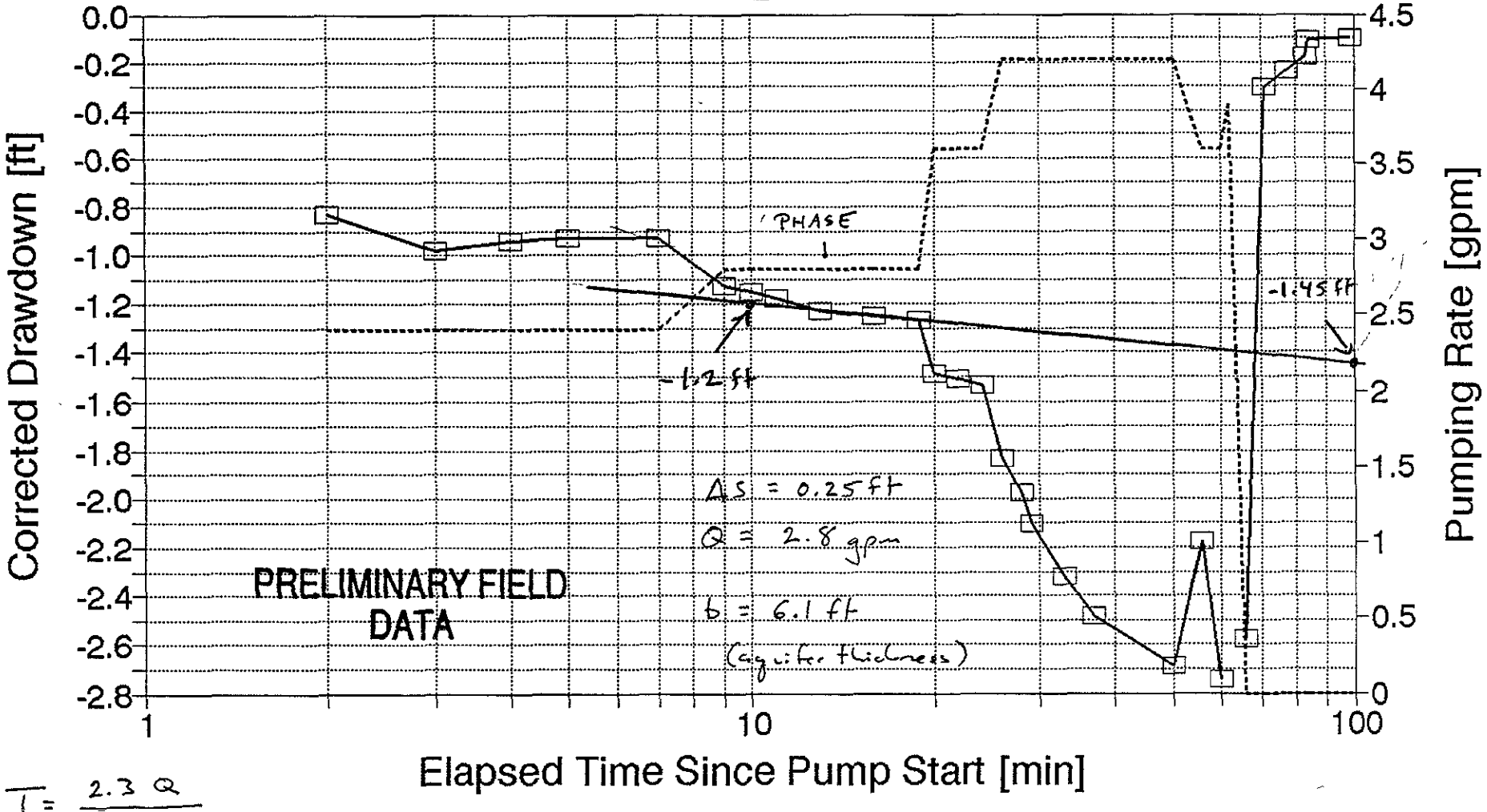
Analysis of Permeability and Transmissivity
STRAIGT-LINE METHOD OF OF COOPER-JACOB

C-2

Clock Time	Elapsed Time	Depht to Water	negative Drawdown	corr. Drawdown	Pumping Rate	Elapsed Time
	[min]	[ft]	[ft]	[ft]	[gpm]	[sec]
						0
16:25:00	-3.00	12.64	0		0	-180
16:27:50	-0.17	12.64	0		0	
16:28:00	0.00	12.64	0		2.4	0
16:30:00	2.00	13.54	-0.9	-0.83	2.4	120
16:31:00	3.00	13.71	-1.07	-0.98	2.4	180
16:32:00	4.00	13.67	-1.03	-0.94	2.4	240
16:33:00	5.00	13.65	-1.01	-0.93	2.4	300
16:35:00	7.00	13.65	-1.01	-0.93	2.4	420
16:37:00	9.00	13.9	-1.26	-1.13	2.8	540
16:38:00	10.00	13.93	-1.29	-1.15	2.8	600
16:39:00	11.00	13.96	-1.32	-1.18	2.8	660
16:41:00	13.00	14.03	-1.39	-1.23	2.8	780
16:44:00	16.00	14.05	-1.41	-1.25	2.8	960
16:47:00	19.00	14.08	-1.44	-1.27	2.8	1140
16:48:00	20.00	14.37	-1.73	-1.48	3.6	1200
16:50:00	22.00	14.4	-1.76	-1.51	3.6	1320
16:52:00	24.00	14.44	-1.8	-1.53	3.6	1440
16:54:00	26.00	14.89	-2.25	-1.84	4.2	1560
16:56:00	28.00	15.12	-2.48	-1.98	4.2	1680
16:57:00	29.00	15.34	-2.7	-2.10	4.2	1740
17:01:00	33.00	15.76	-3.12	-2.32	4.2	1980
17:05:00	37.00	16.11	-3.47	-2.48	4.2	2220
17:18:00	50.00	16.64	-4	-2.69	4.2	3000
17:24:00	56.00	15.47	-2.83	-2.17	3.6	3360
17:28:00	60.00	16.82	-4.18	-2.75	3.6	3600
17:30:00	62.00				3.9	3720
17:34:00	66.00	16.34	-3.7	-2.58	0	3960
17:39:00	71.00	12.95	-0.31	-0.30	0	4260
17:45:00	77.00	12.88	-0.24	-0.24	0	4620
17:51:00	83.00	12.82	-0.18	-0.18	0	4980
17:52:00	84.00	12.75	-0.11	-0.11	0	5040
18:07:00	99.00	12.74	-0.1	-0.10	0	

PRELIMINARY FIELD DATA

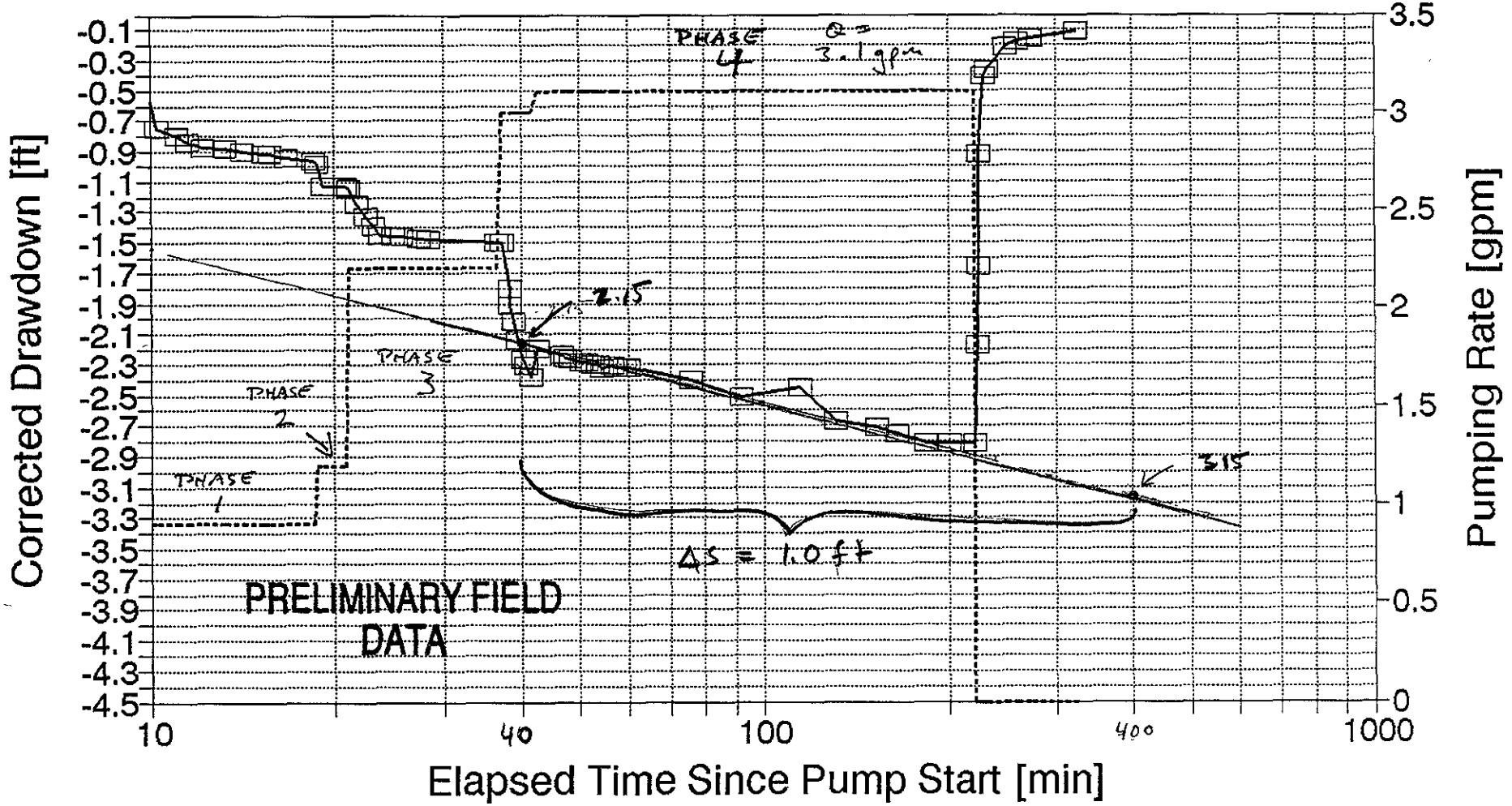
Chevron Service Station #9-0504 S.L.
Pumping Test of Well C-2 on January 22, 1992



$T = \frac{2.3\,Q}{4\pi\,\Delta S}$

$K = T/b$

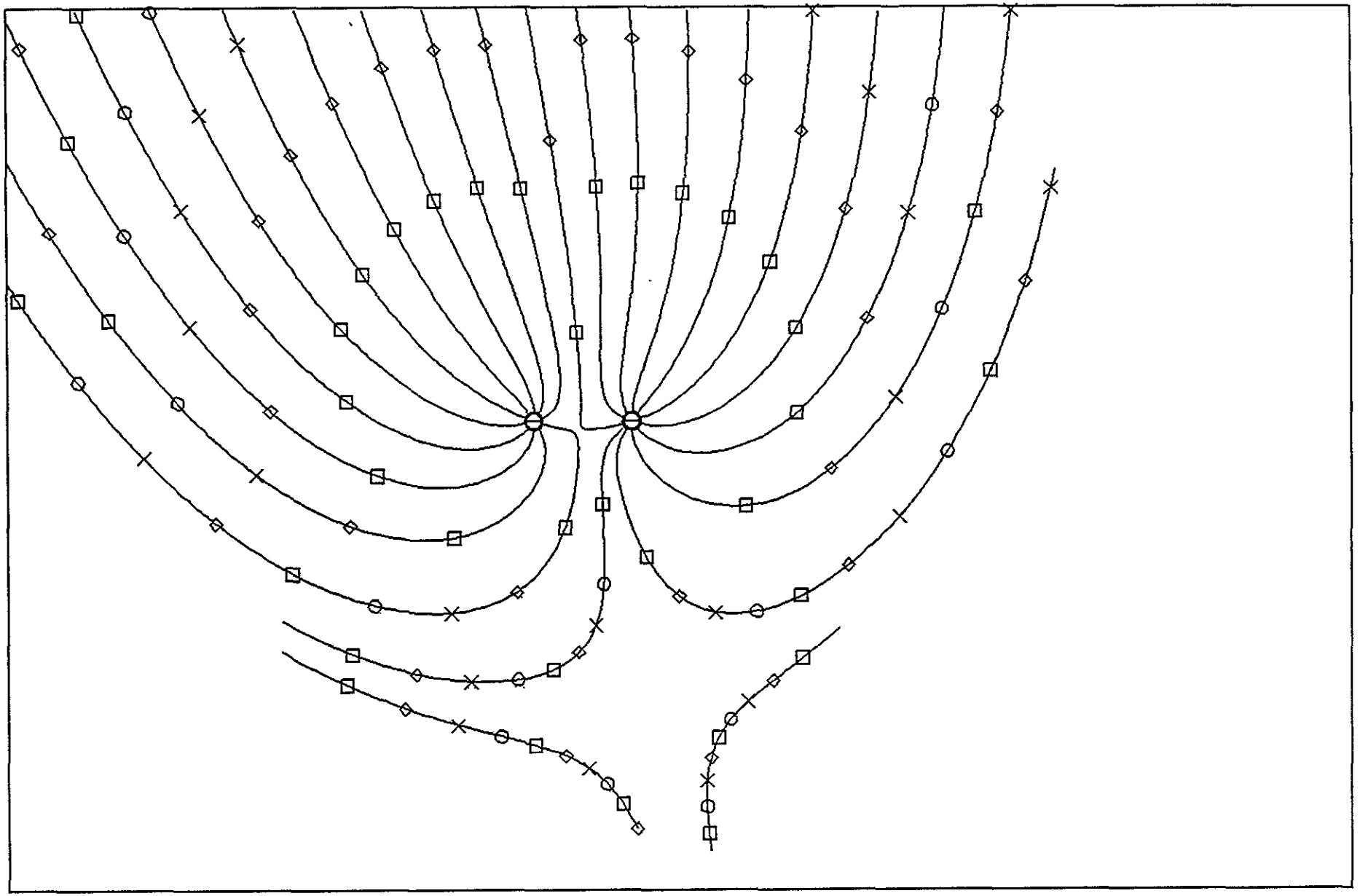
Chevron Service Station #9-0504 S.L.
Pumping Test of Well C-1 on January 22, 1992



$\Delta S = 1.0$

$T = \frac{2.3\,Q}{4\pi\,\Delta S}$

$T = kb$



PATHLINES AND TRAVELTIMES: Chevron Station #9-0504, San Lorenzo SCALE = 1:728

Parameters:

kf = .00014 m/s, H = 1.86 m, nf = .15, i = .004, alpha = 283

Pumping both Wells at 2 gpm 30 days between markers