

TK/MG

2009 SEP 30 PM 1:22

Dr. Glenn Hoffman:

In your e-mail of 9/25 you requested a better copy of the maps and data showing the location of the New Jerusalem Drainage District and other tile drains noted in Attachment #2 of our submittal.

I have enclosed the following and hope they are helpful:

1. A street map of Western San Joaquin County with the approximate location of the New Jerusalem Drainage District outlined in Red along with an approximate location of the outfall to the river. All of the drainage water collected in the New Jerusalem Drainage District collector line system is discharged through this one outfall to the river.
2. To give you a better perspective as to the location of the district in relation to other land uses, I have enclosed a single page copy of the USGS 1:24,000 scale map of the area with the New Jerusalem Drainage District outlined in reddish-black along with an approximate location of the outfall to the river.
3. You also asked if we could place the approximate location of the New Jerusalem Drainage District on Figure 1.1 of your report. Based on the two maps above, I have put the approximate location on your Figure 1.1. The location is shown in black on the enclosed copy of Figure 1.1.
4. You asked to see a better copy of attachment # 2 of our submittal as the pdf version was difficult to read. I have copied the entire attachment so you have an easier to read copy (enclosed).
5. In addition I have enclosed the entire report entitled "*Quality of Agricultural Drainage Discharging to the San Joaquin River and Delta from the Western Portion of San Joaquin County, California, April 1986 to May 1988*" (cited as footnote #7 in our comments). Much of the data in our attachment #2 came from this report.
6. You asked for the location of the Tracy Boulevard Tile Drain Sump and the Grant Line Road Tile Drain Sump. Please refer to page 5 of the Report entitled "*Quality of Agricultural Drainage Discharging to the San Joaquin River and Delta from the Western Portion of San Joaquin County, California, April 1986 to May 1988*". The Tracy Boulevard Tile Drain Sump is shown as SJC002 on the map and the Grant Line Road Tile Drain Sump is shown as SJC003. Both are highlighted in yellow. The locations in relationship to the New Jerusalem Drainage District can be seen by focusing on the Tracy Defense Depot and the City of Tracy which are shown on the street map enclosed as #1 above and also shown on the map on page 5 of the report.
7. The location of the outfall for the New Jerusalem Drainage District tile drainage system is shown on page 4 of the enclosed report as site #SJC001 (also highlighted in yellow).

I hope this answers the questions you had. I have also sent a copy of this packet of information to Mark Gowdy at the State Water Resources Control Board. If you need any additional information, please do not hesitate to contact me.

Dennis Westcot

Mark  
This is the  
package I sent  
to Glenn Hoffman  
per his request  
Dennis Westcot

FOR ADJOINING AREA SEE ALAMEDA AND CONTRA COSTA COUNTIES MAP

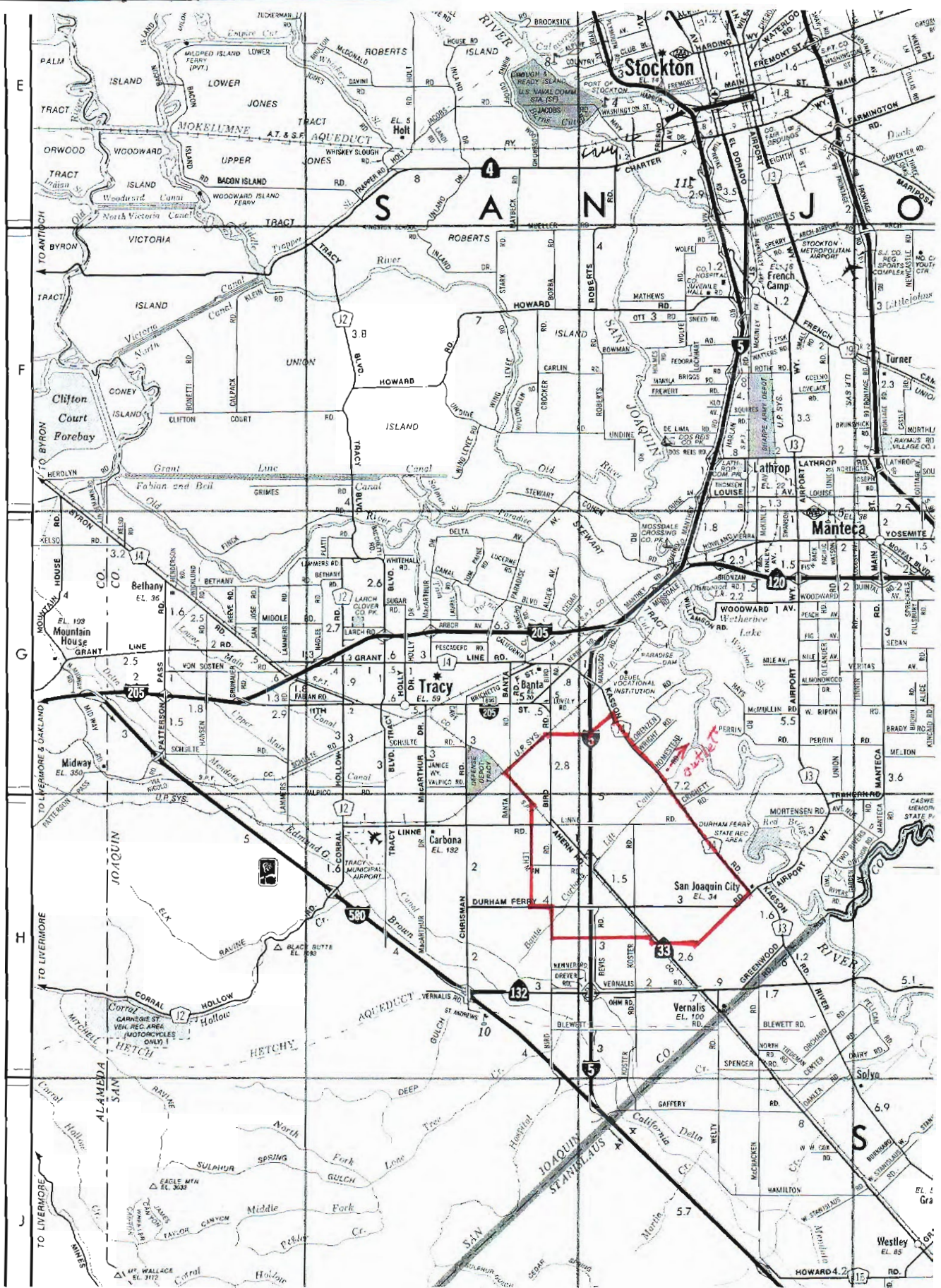
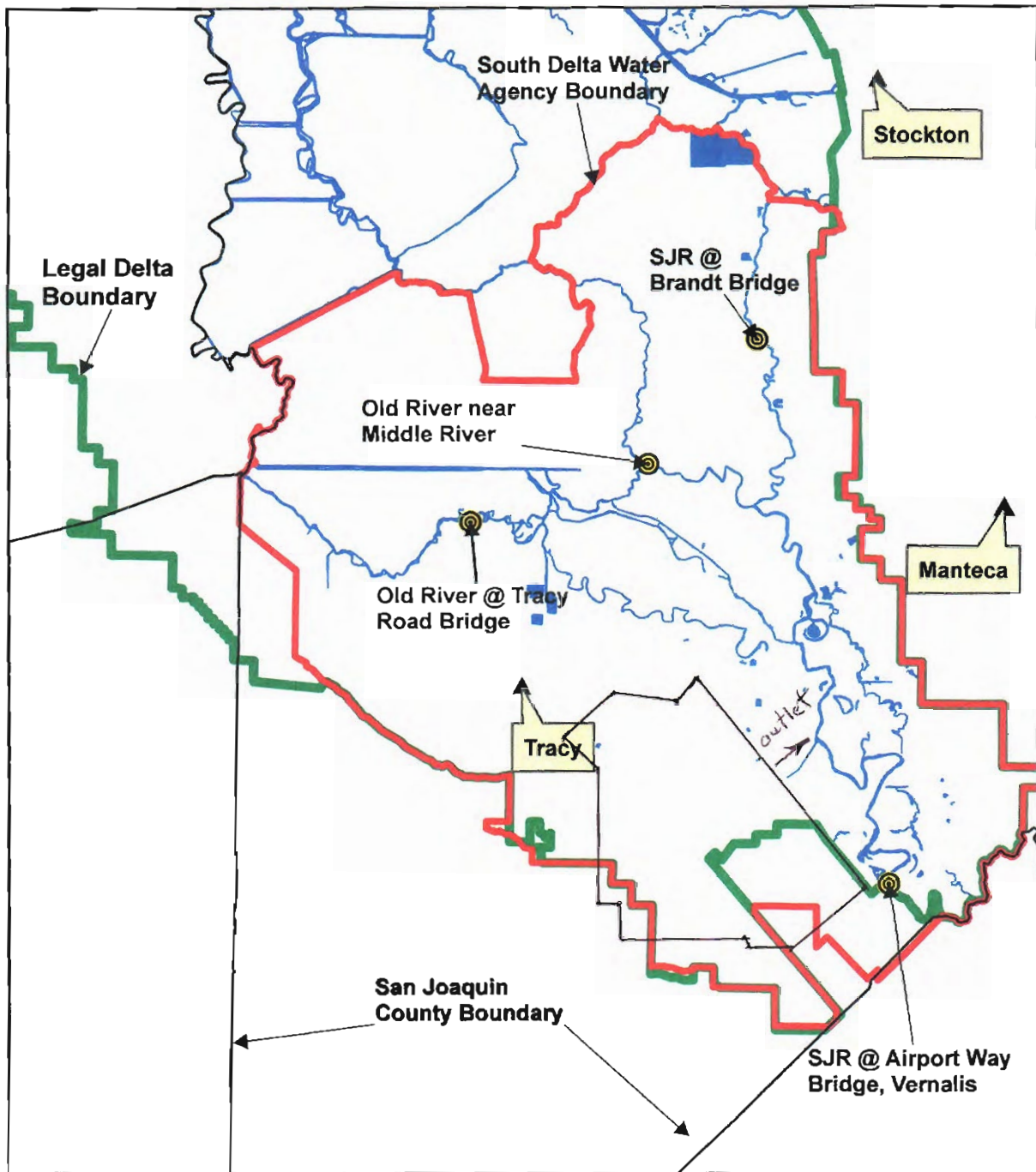




Figure 1.1. Map of southern Delta showing boundary of the South Delta Water Agency and salinity compliance stations.



0 1 2 3 4 5 Miles



LAW OFFICES OF

**SOUZA, COATS, MCINNIS & MEHLHAFF**

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██████████  
DENNIS L. HAY

June 10, 1992

Central Valley Regional  
Water Quality Control Board  
3443 Routier Road, Suite A  
Sacramento, CA 95827-3098

Re: New Jerusalem Drainage District: Information for  
Inland Surface Water Plan for California

Gentlemen:

I am the attorney for the captioned drainage district and the enclosed information is submitted in an attempt to comply with your too-numerous requirements for the Inland Surface Water Plan for California. Please know that the district is small and lacks funds to employ an engineer to draw the maps and gather the data necessary for full compliance with your demands. What follows is the best we can do on short notice.

The New Jerusalem Drainage District (NJDD) consists of 12,300 acres of agricultural land in the Vernalis area, southeast of Tracy. We enclose an area map with the district's location highlighted.

The district was organized in 1966 to construct and operate a subsurface tile collector-line system designed to eliminate a very high water table of poor quality that plagued the area. Thereafter NJDD installed about 30.8 miles of loosely-jointed concrete pipe, bedded in gravel and designed to collect subsurface percolation from surrounding lands. The pipe varies in size from 12 in. to 42 in. at the outfall. The system is not designed to collect surface drainage. Attached is Table 3A from the Watershed Workplan Report which lists the various collector lines that make up the system and states their lengths, sizes, etc. Also attached is a map of NJDD showing the location of the various lines.

In addition to the district's system there are several connecting, private on-farm subsurface systems. These are shown on the attached map. There are also a number of shallow drainage wells, some operated by the Banta-Carbona Irrigation District, that pump into the NJDD system. Time has not permitted us to locate and mark these wells on the map.

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CVRWQCB--2

All of the system--including the private drain lines and drainage wells--is manmade and no natural streams or water bodies of any kind are involved save for the San Joaquin River, into which our effluent flows.

The system was designed to discharge about 40 cfs into the river, but flows are not that high. A flow meter on the district's outfall pipe indicates flows of about 25 cfs during the irrigation season and about 10 cfs during the winter.

The system requires very little maintenance and the repairs themselves do not cause any water quality problems.

We think that--relatively speaking-- the quality of NJDD's river discharge is good, and certainly better than that coming from Mud and Salt sloughs and other points further south. But this is a matter on which the CVRWQCB staff has much better data than we, and you can judge the effluent quality for yourself.

The district will be happy to work with CVRWQCB to develop whatever additional information is required, but we lack the money to employ engineering assistance.





Very truly yours

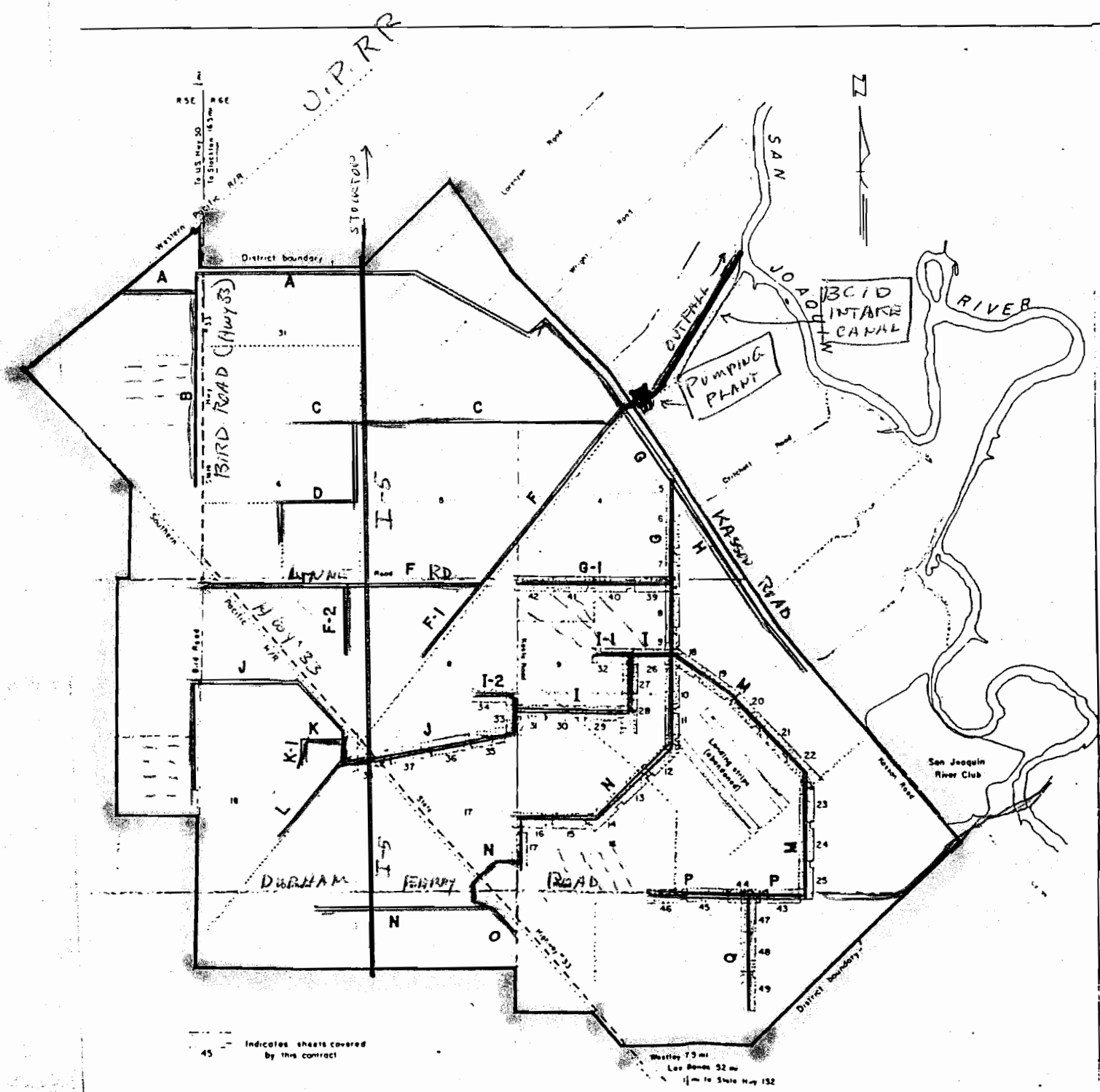
  
Walter J. McInnis

WJM:td

cc: Board of Directors



-  DISTRICT BOUNDARIES
-  OUTFALL LINE TO RIVER
-  DISTRICT Collector System
-  Private - or Farm - Systems

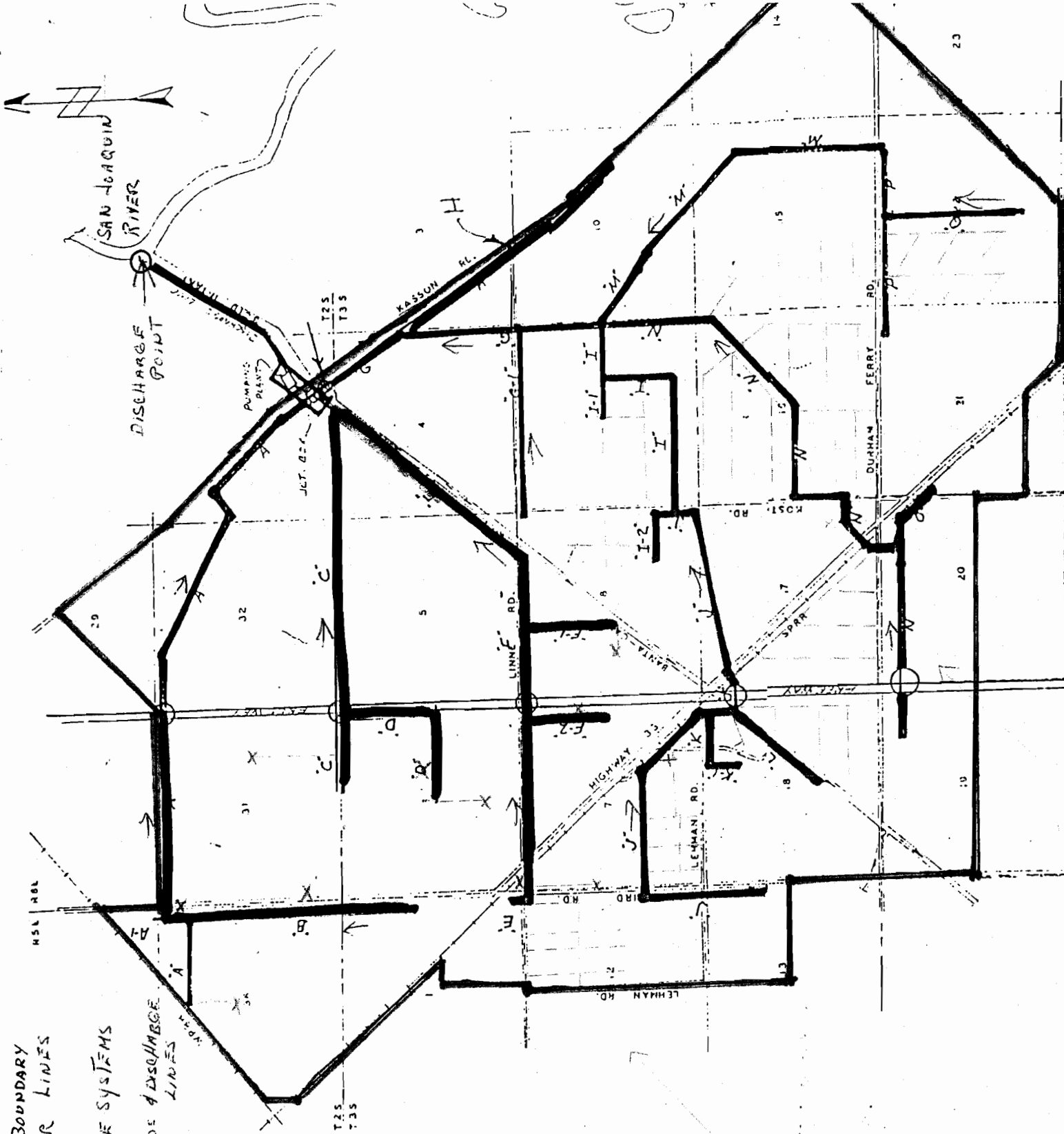


LOCATION MAP SHOWING ALL NJDD COLLECTOR LINES \*  
~~EXCEPT~~ PUMPING PLANT & DISCHARGE LINE  
 INCLUDING

DISTRICT BOUNDARY  
COLLECTOR LINES

ON FARM TIE SYSTEMS

SHALLOW PUMPS & DISCHARGE LINES



### New Jerusalem Drainage District Data - Page 4

- SOURCES:
- C.V.P.
- CALIFORNIA AQUADUCT
- POSITIONS: F:
- B.C. I.D.
- NEXT STANISLAUS I.D.
- HOSPITAL I.D.
- PLAINVIEW I.D.



## New Jerusalem Drainage District

### Various Water Quality Data in the Regional Board Files

Year	TDS (mg/L)	EC (dS/m) (calculated from TDS/0.64)
1977	1,666	2,603
1978	2,048	3,200
1979	1,920	3,000
1980	1,664	2,600
1982	1,408	2,200
1983	1,536	2,400
1984	1,280	2,000

12,000+ Acres Drained

Discharge (Design)	40 cfs
Actual Discharge	25-30 cfs (Irrigation Season) 10 cfs (Winter Season)
Discharges at Mile 63.4	(9.1 Miles downstream of Vernalis) (7.5 Miles Upstream of Mossdale)

Table 3. Water Quality Data for sites monitored in Western San Joaquin County.

Date	Temp deg F	pH	EC umhos/cm	Se ug/L	Mo	B	Cl	SO4	Ca	Mg	Na	K	Alk.	TDS	Hdhs	Cu	Cr	Ni	Pb	Zn	Hg	Total		
																						mg/L	ug/L	
SJC001 New Jerusalem Tile Drain																								
Latitude 37 42' 32", Longitude 121 17' 55". In NE 1/4, NE 1/4, NW 1/4, Sec. 34, T.2S, R.6E.																								
New Jerusalem Tile Drain at San Joaquin River.																								
08/11/86	66		2500		4	2.5	360	480						230		1	7	<5	<5	1				
10/23/86	67			<5	2.4	410	500						280		6	26	<5	<5	<1					
12/22/86	64	7.8	2200		<5	2.4	290	430					270		<1	25	<5	<5	<1					
04/07/87	66	7.5	2500	6.2	3.0	290																		
06/12/87	64		2350	4.9	2.8	444	560							96										
08/26/87	67	7.6		3.6	2.4	320	450							290										
02/19/88	61	7.0	2300	3.7	2.8	260	400							280										
03/30/88	63		2550	5.2	3.1	270	550																<.5	
04/22/88	64	7.2	2650	4.6	2.8	275	475																<.5	
05/25/88	66	6.5	2650	4.3	2.5	350	470							130										
SJC002 Tracy Boulevard Tile Drain Sump																								
Latitude 37 46' 47", Longitude 121 26' 15". In SE 1/4, NE 1/4, NE 1/4, Sec. 8, T.2S, R.5E.																								
1.1 mile north of Interstate 205, 150-200 feet west of Tracy Blvd.																								
04/22/86	60	6.9	2500		0.9	430	630	186	99	284	0.4		276	850	1800									
08/11/86	69		2800		28	1.2	440	460					260		2	<1	<5	<5	<5	1			<.5	
10/23/86	67			<5	1.6	270	700						300		<1	<1	<5	<5	<5	<1				
12/22/86	60	7.2	3100	16	0.8	400	320						350		<1	<1	<5	<5	<5	<1				
06/12/87	65		3050	3.2	1.1	615	580																	
08/26/87	71	7.5		2.3	1.0	270	320						184											
SJC003 Grant Line Road Tile Drain Sump																								
Latitude 37 45' 29", Longitude 121 30' 9". In NW 1/4, NW 1/4, SE 1/4, Sec. 14, T.2S, R.4E.																								
0.6 east of Hansen Rd., south of Grantline Rd.																								
08/12/86	67		2800		<5	2.9	490	370					280		1	<1	<5	<5	<5	<1				
10/23/86	68			<5	3.0	530	340						290		<1	<1	<5	<5	<5	<1				
12/22/86	64	7.6	2600		<5	3.0	420	210					270		<1	<1	<5	<5	<5	<1			<.5	
06/12/87	65		2700	2.7	2.8	541	335																<.5	
08/26/87	69	7.4		1.5	2.6	590	400						110										<.5	

Appendix A-1. Summary of constituent ranges for U.S. Bureau of Reclamation Water Quality Data. (U.S. Bureau of Reclamation, 1987; U.S. Bureau of Reclamation, 1989)

	EC umhos/cm	HCO3 mg/L	N mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO4 mg/L	B mg/L
SJC001 New Jerusalem Tile Drain										
Minimum	2100	280	1.0	40	42	280	1.0	270	221	0.78
Median	2770	354	9.8	159	69	330	2.1	420	540	2.8
Maximum	3720	466	98	193	83	389	3.0	3600	630	4.2
Data Count	42	6	22	10	10	10	10	16	11	33
SJC002 Tracy Boulevard Tile Drain Sump										
Minimum	2660	230	1.0	170	84	1	0.4	440	500	0.75
Median	3488	390	4.1	210	123	348	1.0	610	600	1.3
Maximum	3920	434	18	277	361	420	7.00	3600	720	3.5
Data Count	38	5	21	9	9	9	9	14	10	32
SJC003 Grant Line Road Tile Drain Sump										
Minimum	2690	208	8.2	64	60	281	1	525	320	0.64
Median	3000	346	12	85	62	421	1	560	331	3.0
Maximum	3580	364	44.5	156	68	455	2	625	348	3.9
Data Count	12	5	11	5	5	5	5	5	5	10

	Ag ug/L	As ug/L	Cd ug/L	Cr ug/L	Cu ug/L	Fe ug/L	Hg ug/L	Mn ug/L	Mo ug/L	Ni ug/L	Pb ug/L	Se ug/L	Zn ug/L
SJC001 New Jerusalem Tile Drain													
Minimum	<1	<1	<1	2.2	<1	3.0	<0.1	<10	<1	<1	<1	<1	<10
Median	<1	<1	<1	3.6	3	160	0.1	<10	2	9	<1	5	<10
Maximum	<1	2	2	4.6	5	670	0.3	30	7	33	7	8	20
Data Count	20	18	20	22	24	21	22	21	24	24	19	25	23
SJC002 Tracy Boulevard Tile Drain Sump													
Minimum	<1	2	<1	<1	<1	<10	<0.1	50	4	<1	<1	<1	<10
Median	<1	3	<1	3	2	30	<0.1	95	12	8	2	3	<10
Maximum	1	4	1	9	6	210	0.1	460	24	31	7	5	40
Data Count	17	18	19	21	23	20	19	20	23	23	18	24	20

Date	Time	EC umhos/cm	Ca	Mg	Na	K	Cl	SO4	B	Ag	As	Cd	Cr	Cu	Fe	Hg	Mn	Mo	Ni	Pb	Se	Zn
SJC001 New Jerusalem Tile Drain (continued)																						
08/09/85		2810					400	500	2.8	<1	2	<1	29	1	<30	0.1	<10	1	7	<1	2	<10
09/13/85		2840	180	78	330	1.9	400	630	3.0	<1	1	<1	46	3	80	0.2	<10	4	3	<1	5	<10
10/11/85		2240							2.6				37	2	0.2			1	6		4	
11/08/85		2230							2.4				40	2	<0.1			1	1		4	
12/06/85		2100	9.5	120	51	280	1.4	270	420	<1	<1	<1	34	<1	36	0.2	14	2	9	<1	4	<10
01/10/86		2250								<1	<1	<1	43	<1	<60	<0.1	<10	1	<1	<1	3	<10
05/09/86		2940	180	69	330	1.9	370	550	2.5					<4				<4	<5		5	<10
08/08/86		2850	160	68	310	2.2	380	500	3.0												4	<10

SJC002 Tracy Boulevard Tile Drain Sump

09/23/82	1220	3350	0	3.6	277	127	361	1	700	678	1.3												
11/22/82	1115	3480	0	1.4	251	361	1	700	696	1.3													
12/14/82	0840	3690		5.8																			
01/21/83	0805	3510	230	1	227	130	348	5	710	610	0.78												
02/22/83	1150	3800		10																			
03/28/83	1005	3720		18																			
04/18/83	1005	3496	424	10.7	175	123	397	1	700	590	1.2												
05/16/83	0920	3650		9							1.1												
06/13/83	0850	3140		5.3							1.4												
07/18/83	0950	3680		4.8							1.5												
08/15/83	0855	3470	434	6.4	191	123	420	1	613	532	2.1												
09/12/83	1000	3430		3.6							3.5												
10/17/83	0910	3660		3.3							1.5												
01/23/84		3330		3.7								561											
03/12/84		3600																					
05/21/84		3560		4.1																			
06/18/84		3220		6																			
07/23/84		2810		7.4																			
08/20/84		3450		4.1																			
09/24/84		3620																					
10/18/84		3540		2.3																			
11/12/84		3390		1.6																			

Date	Time	EC umhos/cm	HCO <sub>3</sub>	CO <sub>3</sub>	N	Ca	Mg	Na	K	Cl	SO <sub>4</sub>	B	Ag	As	Cd	Cr	Cu	Fe	Hg	Mn	Mo	Ni	Pb	Se	Zn		
													.....ug/L.....														
SJC001 New Jerusalem Tile Drain																											
08/19/82	1330	2440	466	0	12.5	40	42	360	2	440	221	3.5															
09/23/82	1100	2670	348	0	9.8	176	78	290	3	440	564	3															
11/22/82	1150	2400	326	0	9.6	157	62	306	3	340	540																
12/14/82	0940	2730			9.8																						
01/21/83	0850	2990	280		19.5	144	68	385	3	420	605	0.78															
02/22/83	1315	2910			5.3																						
03/28/83	1115	3720			10																						
04/18/83	1130	2980	360		10.4	128	71	380	3	500	513	2.8															
05/16/83	1100	2960			1							3.2															
06/13/83	1025	3180			7.5							4.1															
07/18/83	1050	3060			9.8							2.6															
08/15/83	1050	3190	372		24.2	193	83	389	1	450	542	4.2															
09/12/83	1120	2680			9.6							3.7															
10/17/83	1100	2600			9.4							2.9															
01/23/84		2420			8.8					340																	
03/12/84		2620											2.5	<1	<1	44	4	670	<0.1	30	2	6	<1	4	10		
04/02/84		2500											2.3	<1	<1	43	5	180	<0.1	<10	2	11	2	5	10		
04/23/84		2840											2.8	<1	<1	36	3	180	<0.1	10	2	6	<1	5	20		
05/21/84		2930			14.3					3600			2.9	<1	2	24	3	190	<0.1	20	3	23	2	4	<10		
06/18/84		3050			10								2.8	<1	<1	36	4	270	<0.1	20	2	<1	<1	<1	<10		
07/23/84		3010			11					460			2.8	<1	<1	33	<20	160	<0.1	16	<1	17	6	6	<5		
08/20/84		2820			10					420			2.7	<1	1	22	<20	190	0.1	14	<1	33	5	4	5		
09/24/84		2670											2.9	<1	<1	28	1	120		10	2	<1	1	4	<10		
10/09/84		2960			98					430			3.0	<1	<1	45	3	220	0.2	<10	7	30	2	5	<10		
11/12/84		2300			8.6								2.4	<1	<1	38	3	80	0.1	<10	1	11	1	4	<10		
12/10/84		2300											2.4	<1	<1	31	3	130	0.1	<10	5	18	<1	5	<10		
02/14/85		2240											2.4	<1	<1	30	2	30	<0.1	<10	<1	12	<1	5	<10		
03/14/85		2250											2.4	<1	<1	30	2	40	0.2	<10	2	10	<1	6	10		
04/11/85		2650											3.0	<1	2	45	3	190	0.2	<10	<1	12	7	5	20		
05/09/85		2810											2.6	<1	1	36	2	430	0.3	10	3	23	<1	8	<10		
06/06/85		2880											2.9	<1	2	30	3	90	0.3	<10	3	9	4	5	20		
07/12/85		2820											3.0	<1	2	37	3	400	0.2	<10	2	5	5	5	20		

# Surface Water Ambient Monitoring Program Data for New Jerusalem Drainage District from the Central Valley Regional Board Files

Site Code	Date	Time	Temp (C)	Temp (F)	Field EC (umhos)	Lab EC (umhos)	pH	Dissolved Oxygen (mg/L)	Boron (mg/L)	Se (ug/L)	TSS (mg/L)	Turbidity (ntu)	TOC (mg/L)	Total Coli MPN	E. Coli MPN
<b>Water Year 2001</b>															
SJC001	10/24/2000	12:45 PM	20		2380	2390	7.6		2.3		<6		<1		
SJC001	11/28/2000	1:42 PM	16.5		2390	2390	7.9		2.4		<6		<1		
SJC001	12/27/2000	12:00 PM	16.7		2550	2600	7.9		2.7		<5		<1		
SJC001	1/23/2001	11:45 AM	16.1		2480	2430	7.8		2.5		<5		1.5		
SJC001	2/20/2001	12:05 PM	16		2600	2610	8		2.7		<5.5		<1		
SJC001	3/27/2001	12:21 PM	18.6		2760	2830	7.5		2.6		<5		NA		
SJC001	4/24/2001	2:00 PM	20.7		2420	2450	7.4		2.3		12		3.2		
SJC001	5/29/2001	12:55 PM	19.9		2540	2560	7.2		2.3		<5		3.1		
SJC001	6/26/2001	1:39 PM	18		2580		7.3	10.3			33		7.8		
SJC001	7/24/2001	11:08 AM	18.9		2740		7.4	9.4					4.8		
SJC001	8/28/2001	9:55 AM	19.1		2340		7.4	10.6	2.2		<6		21		
SJC001	9/25/2001	11:47 AM	19.2		2230		7.6	10.8	2.2		NA		21		
<b>Water Year 2002</b>															
SJC001	10/23/2001	11:23 AM	19.5		2440		7.9	9.7	2.6				20		
SJC001	11/27/2001	11:15 AM	19		1340		8	9.2	2.5						
SJC001	12/26/2001	1:12 PM	13.6		2670		8.2	NA	2.8						
SJC001	1/29/2002	10:41 AM	17.3		2790		8.1	11.2	2.8						
SJC001	2/26/2002	10:41 AM	17.5		2590		8	9.3					NA		
SJC001	3/26/2002	12:20 PM	15		1730		7.9	10.1	1.6				2.1		
SJC001	4/23/2002	1:12 PM	17.1		2570		7.5	10.1	2.5				NA		
SJC001	5/28/2002	11:10 AM	17.7		2390		7.5	11.8	2.3				<1.0		
SJC001	6/18/2002	11:18 AM	17.9		2560		7.4	9.1	2.5				2.1		
SJC001	7/31/2002	9:20 AM	18.5		2560		7.6	8.9			2.4		>2419.6	4	
SJC001	8/27/2002	NA	20.3		2370	2400	NA	NA					1.7		
SJC001	9/24/2002	11:41 AM	19.3		2430		7.6	10.1	2.4				2.2		
<b>Water Year 2003</b>															
SJC001	10/15/2002	8:40 AM	19.2		2280		7.6	9.2				0.2		548	8
SJC001	10/29/2002	1:15 PM	19.2		2290		7.7	9.2	2.2	3.4		0.2	1.5		
SJC001	11/19/2002	11:01 AM	19		2260		7.7	9.8	2.2				1.4		
SJC001	12/17/2002	10:14 AM	18		2060		7.9	9.5				290			
SJC001	1/15/2003	NA	NA		NA		NA	NA				NA		NA	NA
SJC001	1/28/2003	10:30 AM	NA		NA		NA	NA				NA			
SJC001	3/25/2003	10:15 AM	17.4		2300		7.7	10.9	2.3			2.6	1.8		
SJC001	4/22/2003	10:45 AM	17.2		2660		7.6	11.7	2.8			13.9	2.6	1986	9
SJC001	5/27/2003	11:29 AM	17.4		2510		7.1	9.6	2.7			38.3	NA		
SJC001	6/24/2003	9:34 AM	17.8		2280		7.4	10.3	2.2			35.5	NA		
SJC001	7/29/2003	9:35 AM	18.8		2410		7.4	8.3				2.5		1986	4
SJC001	8/26/2003	11:01 AM	19.1		2550		7.5	9.7				0.7		>2419.6	15
SJC001	9/23/2003	10:42 AM	19.4		2440		7.7	10.2				0.9		1120	16
<b>Water Year 2004</b>															
SJC001	10/28/2003	12:27 PM	19.6		2250		7.9	11.2				5.7		236	1
SJC001	11/18/2003	11:52 AM	19.4		2320		8.3	12.6				6.6		548	<1
SJC001	1/28/2004	NA	NA		NA		NA	NA				NA		NA	NA
SJC001	2/24/2004	10:55 AM	15.6		2240		8.1	10.3				NA		135	<1
SJC001	5/26/2004	10:55 AM	NA		NA		NA	NA				NA		NA	NA
SJC001	6/23/2004	9:47 AM	18.2		2530		7.5	11.9				NA		>2419.6	6
SJC001	7/28/2004	10:27 AM	19.4		2190		7.4	11				NA		>2419.6	18
SJC001	8/25/2004	10:38 AM	19.2		2510		7.4	9.9				NA		>2419.6	2
SJC001	9/29/2004	10:43 AM	19.4		2240		7.3	11.2				NA		1986	4
<b>Water Year 2005</b>															
SJC001	10/27/2004	10:43 AM	NA		NA		NA	NA				NA		NA	NA
SJC001	11/22/2004	11:24 AM	11		2540		8.1	10.1					<0.20	365	6
SJC001	12/28/2004	10:10 AM	NA		NA		NA	NA				NA		NA	NA
SJC001	1/26/2005	10:25 AM	17.5		2650		8	9.1					<0.20	222	<1
SJC001	2/23/2005	9:53 AM	17.4		2620		7.8	10.1					<0.20	52	1
SJC001	3/29/2005	11:00 AM	NA		NA		NA	NA					NA	NA	NA
SJC001	3/31/2005	12:49 PM	17.1		2550		7.5	10.6					2.2	548	5
SJC001	4/26/2005	10:50 AM	17.2		2770		7.4	11.3					NA	>2419.6	12
SJC001	5/24/2005	10:05 AM	17.4		2550		7.2	9.2					NA	>2419.6	15
SJC001	6/28/2005	10:12 AM	17.9		2450		7.3	9.7					1.9	>2419.6	3
SJC001	7/26/2005	10:08 AM	18.6		2320		7.3	9.3					NA	>2419.6	22
SJC001	8/23/2005	10:14 AM	19.1		2340		7.2	9.1					2.2	2420	1
SJC001	9/27/2005	10:59 AM	19.1		2290		7.4	14.6					2.4	>2419.6	27
<b>Water Year 2006</b>															
SJC001	10/25/2005	10:17 AM	19.2		2220		7.8	9.9					1.9	>2419.6	4
SJC001	11/29/2005	9:26 AM	18.6		2190		7.3	9.2					1.0	517	4

# Surface Water Ambient Monitoring Program Data for New Jerusalem Drainage District from the Central Valley Regional Board Files

Site Code	Date	Chloride (mg/L)	Sulfate (mg/L)	Hardness (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	TDS (mg/L)	Carbonate (mg/L)	Bicarbonate (mg/L)	Total Alkalinity (mg/L)	Sodium (mg/L)
<b>Water Year 2001</b>											
SJC001	10/24/2000	280	420	610	150	60	1600	<1	380	310	290
SJC001	11/28/2000	310	420	640	150	62	1600	<1	370	300	320
SJC001	12/27/2000	320	500	660	160	65	1700	<1	370	300	320
SJC001	1/23/2001	280	420	630	150	61	1600	<1	370	300	310
SJC001	2/20/2001	310	520	670	160	67	1700	<1	360	300	320
SJC001	3/27/2001	360	520	740	180	71	NA	<1	380	310	330
SJC001	4/24/2001	280	610	640	150	61	1600	<1	320	270	280
SJC001	5/29/2001	290	500	660	160	63	1700	<1	300	300	310
SJC001	8/28/2001	280	410	360	51	56	1600	<1	380	310	290
SJC001	9/25/2001	280	410	590	140	60	NA	<1	350	280	280
<b>Water Year 2002</b>											
SJC001	10/23/2001	300	490	620	150	61	NA	<1	380	310	320
SJC001	11/27/2001	290	450	610	150	60	1600	<1	370	300	310
SJC001	12/26/2001	310	570	660	160	62	1800	<1	360	300	310
SJC001	1/29/2002	350	590	730	180	71	1900	<1	370	300	330
SJC001	3/26/2002	220	320	450	110	5	1100	<1.0	260	210	210
SJC001	4/23/2002	300	540	720	180	69	1700	<1.0	340	280	320
SJC001	5/28/2002	340	470	610	150	58	NA	<1.0	350	290	310
SJC001	6/18/2002	330	470	720	170	69	NA	<1.0	360	NA	340
SJC001	9/24/2002	340	400	660	150	67	NA	<1.0	370	310	310
<b>Water Year 2003</b>											
SJC001	10/29/2002	310	360	590	140	57	1500	<1.0	370	310	280
SJC001	11/19/2002	320	430	580	140	57	1500	<1.0	360	300	280
SJC001	3/25/2003	300	390	590	140	58					
SJC001	4/22/2003	350	510	720	170	72					
SJC001	5/27/2003	310	480	680	160	66					
SJC001	6/24/2003	310	430	600	140	58					
<b>Water Year 2004-2006</b>											
No data collected											

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## INTRODUCTION

The Agricultural Unit of the Central Valley Regional Water Quality Control Board (Regional Board) initiated a water quality monitoring program in April 1986 to evaluate the effects of subsurface agricultural drainage water discharges from Western San Joaquin County on the Western Delta Sloughs and the San Joaquin River water quality. The study area is agricultural land located on the western side of the San Joaquin River within western San Joaquin County. The purpose of this monitoring program was to compile a data base for selected inorganic constituents found in the agricultural drains that are discharging into the Delta and San Joaquin River. This data base will be used in the development and evaluation of the need for an agricultural drainage reduction program.

The majority of the subsurface agricultural drainage pollutant load is discharged to the San Joaquin River via Mud Slough (north) and Salt Slough in Merced County (James et al., 1988a and 1988b, Westcot et al., 1989a and Chilcott et al., 1989). The impact of these discharges, however, is highly modified by numerous surface discharges downstream of these two sloughs. The importance of these downstream discharges is manifested by the finding that the majority of the San Joaquin River from Salt Slough and Mud Slough (north) inflows downstream to Vernalis in many months of the year is made up entirely of agricultural return flows.

The San Joaquin River is thus highly modified by the time it reaches the Delta. The river is further modified in the Delta by localized extractions and discharges. The main influences on the San Joaquin River flow in the Delta are the U.S. Bureau of Reclamation and State Water Project extraction pumps located near Tracy. The majority of the river flow returns to these pumps. The quality of the San Joaquin River is also influenced by localized subsurface drainage water discharges upstream and downstream of the project extraction pumps. Little information is available on the quality and magnitude of these localized discharges.

The most significant discharges occur from the western side of the San Joaquin River in both San Joaquin County and Contra Costa County. A previous report detailed the characteristics of drainage water entering from the eastern portion of Contra Costa County (Westcot et al., 1989c). The objective of this study is to characterize the discharges known to enter the San Joaquin River from the western portion of San Joaquin County. The goal is to develop a data base that can be used in assessing beneficial use impairment and to determine whether there is a need for regulatory actions.

## STUDY AREA

The study area consists of the western portion of San Joaquin County that drains into the San Joaquin River and Delta waterways (Figure 1). Drainage discharges occur throughout the southern uplands section of the South Delta Area (Department of Water Resources, 1987) and many of these discharges find their way to the lower section of the San Joaquin River which extends from approximately the Delta-Mendota Canal Intake near the Contra Costa County line south to Greenwood Road near the Stanislaus County line. Major portions of the irrigated land within this area have subsurface drainage systems.

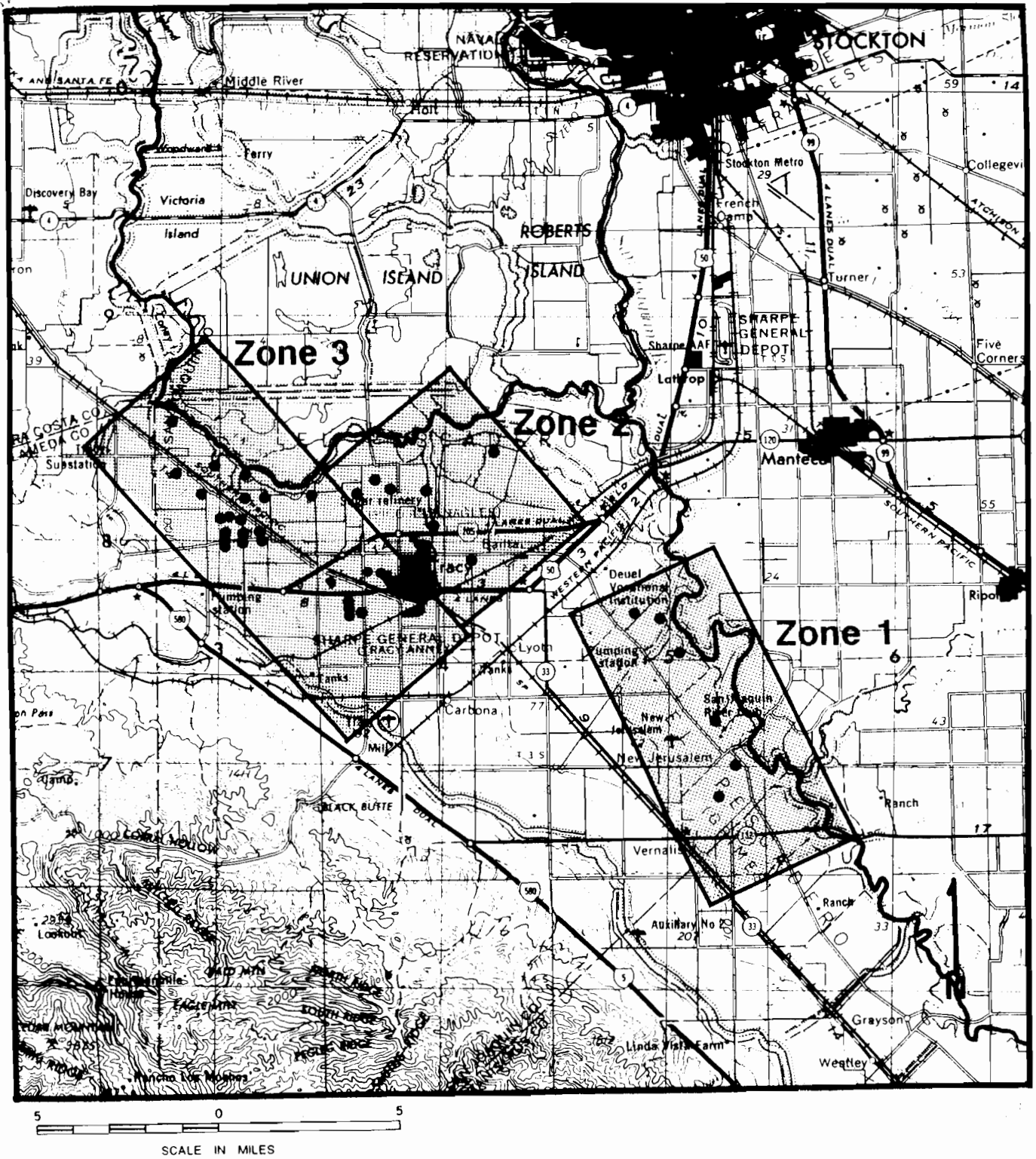


Figure 1. Zone Location Map of Drainage Monitoring Sites That Flow Into The San Joaquin River and Delta From Western San Joaquin County.

The study area was divided into three zones determined by localized water distribution and management influences. Zone 1 is influenced by the New Jerusalem Drainage District and discharges directly to the San Joaquin River upstream of the Mossdale Bridge at Interstate 5 Highway. Zone 2 is influenced by the Delta sloughs while Zone 3 is influenced by the west side Coast Range streams. Both Zones 2 and 3 discharge to Old River Channel in the Delta.

Monitoring sites and their locations are listed in Table 1 and shown on Figures 2 and 3. Water quality monitoring was conducted on all of these sites.

**Table 1. Drainage flow monitoring sites in Western San Joaquin County**

Zone 1. Southern Sites	Zone 3. Northwestern Sites
SJC001 New Jerusalem Tile Drain	SJC003 Grant Line Road Tile Drain Sump
* SJC028 Crichtett Road Drain	SJC004 Bethany/Lammers Tile Drain
SJC029 Wright Road Collector Drain	SJC005 Patterson Pass Road Tile Drain
* SJC030 Yasui Surface Drain	SJC006 Moitoso Tile Drain
SJC031 Yasui (Fisk) Ranch Tile Drain	SJC007 Krohn Road Drain
* SJC042 San Joaquin River Club	SJC008 Pimentel Tile Drain
	SJC010 Westside Irrigation District Main Drain
	SJC013 Costa Brothers East Tile Drain
	SJC014 Costa Brothers West Tile Drain
	SJC015 Castro Tile Drain
	SJC016 Earp Tile Drain
	SJC017 Freeman Tile Drain
	SJC018 Costa Tile Drain
	SJC019 Moitoso and Castro Tile Drain
	SJC022 City of Tracy Tile Drain
	* SJC032 Kelso Road Drain
	SJC033 Mountain House Creek
	* SJC034 Westside Irrigation District Disch. Pump
	* SJC035 Naglee/Burk Pump # 6
	SJC036 Kelso Road/Byron Hwy Tile Drain Sump
	SJC037 Spirow Nicholaw Tile Drain
	SJC038 JM Laurence Jr. East Tile Drain
	SJC039 JM Laurence Jr. West Tile Drain
	SJC040 Sequeira Tile Drain
	SJC041 Reeve Road Tile Drain

\* Sites with tailwater drainage, not used in statistical calculations.

## METHODS

The study was initiated in April 1986 and periodic sampling was conducted through the end of May 1988. The frequency of sample collection for this monitoring program varied but generally grab samples were collected monthly during the irrigation season. Additional samples were taken at selected times during the nonirrigation season. This sampling frequency was supplemented by sampling at selected sites by other agencies (Appendix A).

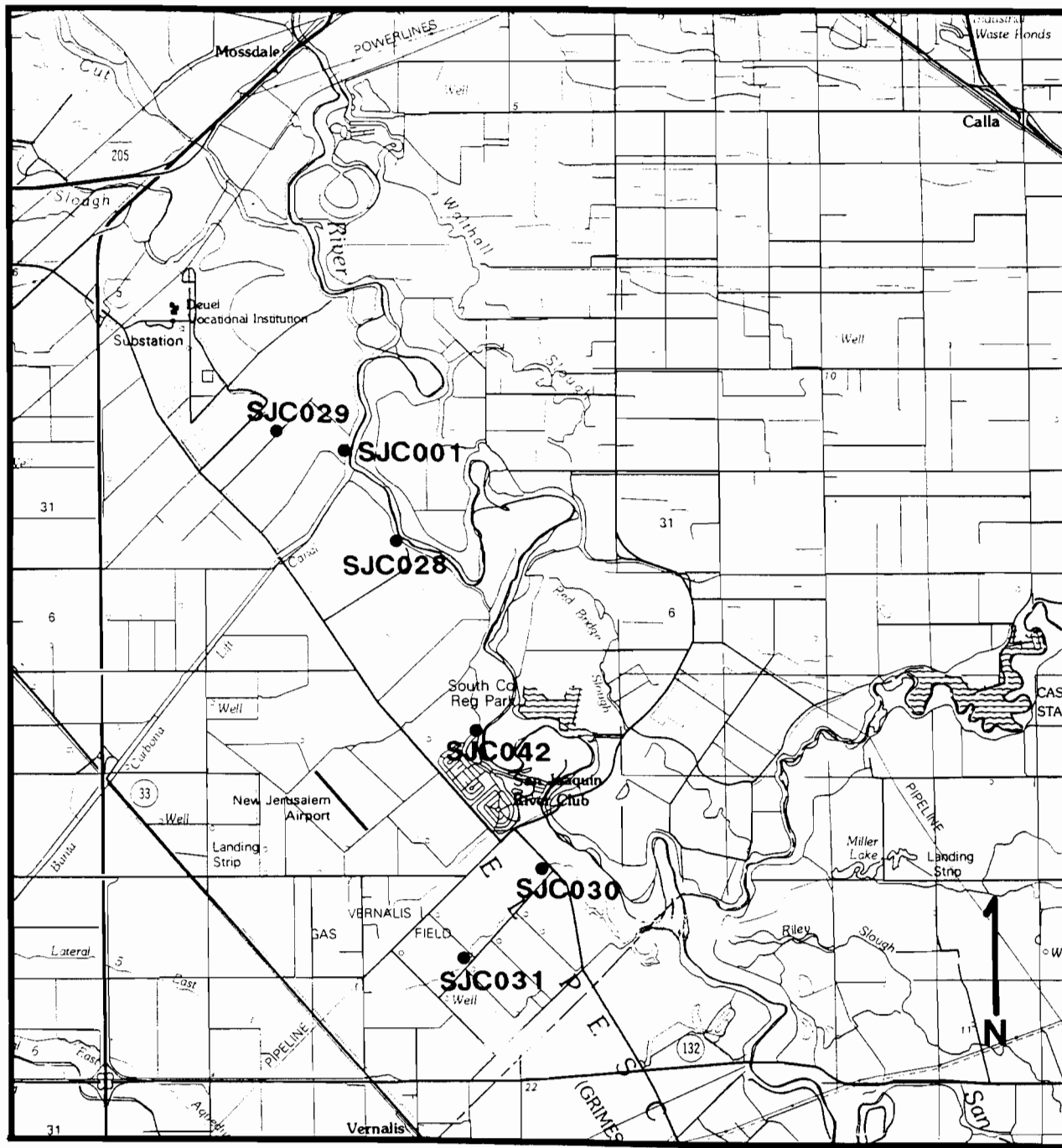


Figure 2. Location Map of Zone 1 Monitoring Sites.

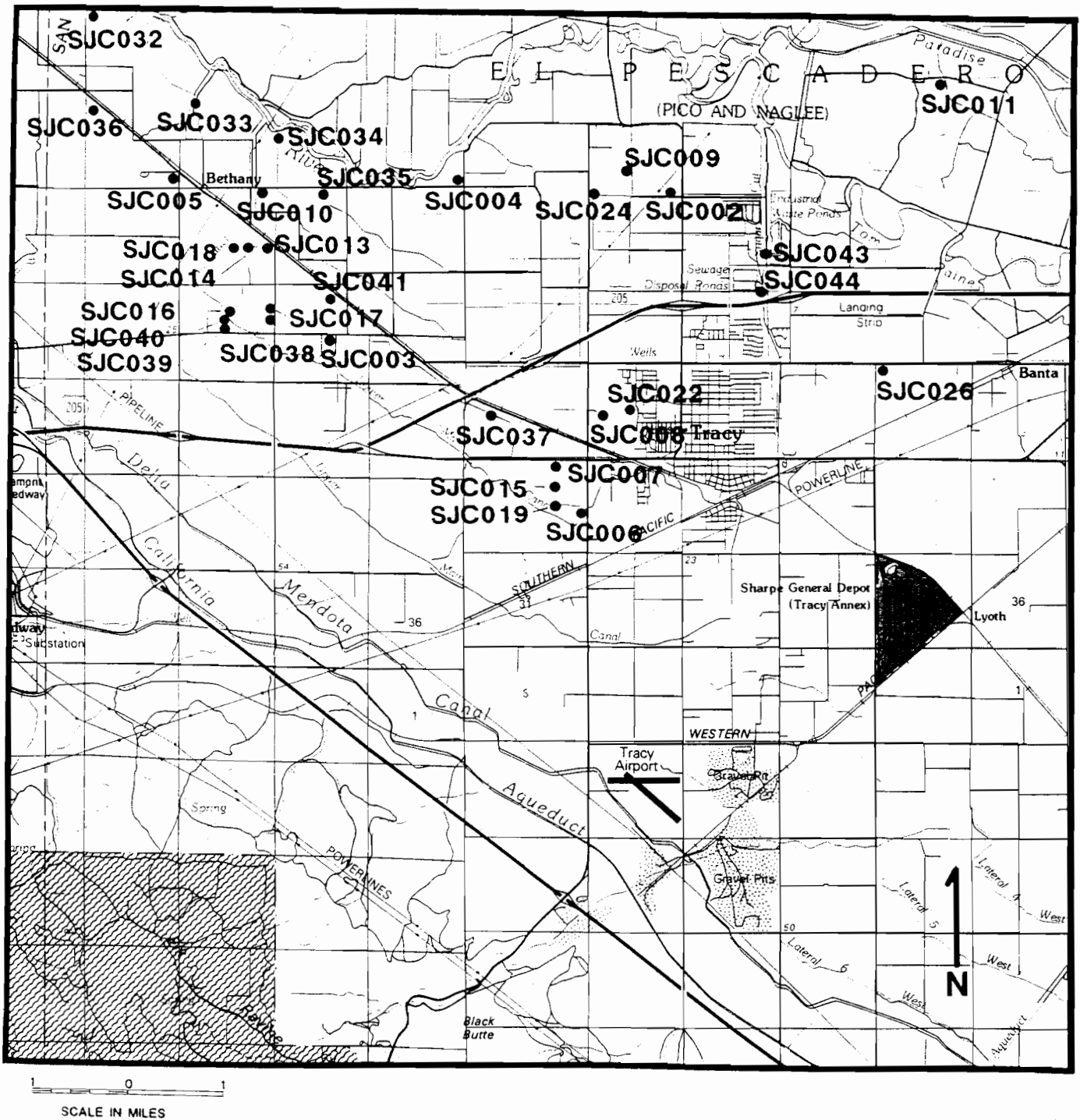


Figure 3. Location Map of Zones 2 and 3 Monitoring Sites.

All samples were analyzed for total recoverable selenium, boron, chloride, sulfate, total alkalinity and electrical conductivity (EC). Selected sites during 1986 were tested for total recoverable copper, chromium, lead, mercury, molybdenum, nickel, and zinc. Water temperature, pH, EC and sample time were recorded in the field at each site. All samples were collected in polyethylene bottles. All sample bottles were washed and acid rinsed in the laboratory prior to use and rinsed three times with water to be sampled prior to sample collection. Selenium and other trace element samples were preserved by lowering the pH to less than 2 using ultra-pure nitric acid fixation techniques. All samples were kept on ice until preservation or submittal to the laboratory for analysis.

A quality control and quality assurance program was conducted utilizing spike and duplicate samples in the laboratory. Blind replicate samples were collected at 10 percent of the sites and 50 percent of the blind replicates were spiked for laboratory quality assurance. All reported results fall within the quality assurance tolerance guidelines.

## RESULTS

Concentrations of the measured constituents varied between discharge sites, time of year, and between years. Median values for selected constituents are listed in Table 2. Water quality for the individual sites and sampling dates are given in Table 3. The median salinity (EC) was 2,500  $\mu\text{mhos/cm}$  for Zone 1, 2,600  $\mu\text{mhos/cm}$  for Zone 2, and 2,300  $\mu\text{mhos/cm}$  for Zone 3. This compares with a median EC of 6,100  $\mu\text{mhos/cm}$  for drains coming from the Panoche Fan area (Chilcott et al., 1988). The median boron concentration was highest in Zone 3 (3.0 mg/L) and lowest in Zone 2 (1.5 mg/L). These compare with a median of 7.9 mg/l from subsurface drains in the Panoche Fan area (Chilcott et al., 1988). The overall median boron concentrations (2.5 mg/L) are approximately equal to those reported in the Contra Costa County area (2.8 mg/L) (Chilcott et al., 1988 and Westcot et al., 1989c) but are higher than drains in the western Stanislaus County area (1.5 mg/L) (Westcot et al., 1989). Boron has been known to cause crop toxicity problems in this area and even though subsurface drains have been in operation for over 20 years, boron concentrations continue to be high. The median chloride concentrations for Zones 1, 2, and 3 were 350 mg/L, 360 mg/L, and 390 mg/L respectively and with an overall median concentration of 380 mg/l for all zones. This compares to a median concentration of 2400 mg/l for drains coming from the Panoche Fan area (Chilcott et al., 1988) and 270 mg/L for the western Stanislaus County (Westcot et al., 1989). The median sulfate concentrations for Zones 1, 2, and 3 were 480 mg/L, 352 mg/L, 320 mg/L respectively and with an overall median concentration of 360 mg/L for all zones. This compares to the significantly higher median concentration of 2336 mg/L for drains coming from the Panoche Fan area (Chilcott et al., 1988) and is similar to the median value of 340 mg/L for the western Stanislaus County (Westcot et al., 1989).

Selenium concentrations from the monitored sites are low. Median selenium concentrations for Zones 1, 2, and 3 were 4.6, 1.6, and 2.1  $\mu\text{g/L}$  respectively and with an average median concentration of 2.3  $\mu\text{g/L}$  for the entire study area. Although total recoverable selenium varied from 0.4 to 13.5  $\mu\text{g/L}$ , the

concentrations did not vary seasonally. The 4.6  $\mu\text{g/L}$  found in Zone 1 compares well with the median concentration of 5  $\mu\text{g/L}$  found by the U.S. Bureau of Reclamation for the New Jerusalem Tile Drain (SJC001) (U.S.B.R., 1987, U.S.B.R., 1989) This site represents drainage from approximately 11,000 acres of land in Zone 1. The median concentration for the Panoche Fan area was 120  $\mu\text{g/L}$  and 2  $\mu\text{g/L}$  for western Stanislaus County (Chilcott et al., 1988). Concentrations of other trace elements (Mo, Cr, Cu, Ni, Pb, and Zn) are also low and continue to follow the general pattern suggested by Chilcott et al., 1988. Seasonal variability was not notable.

Table 2. Summary of selected constituent ranges for drainage monitoring sites that flow into the San Joaquin River and Delta from Western San Joaquin County.

		EC	B	Cl	SO <sub>4</sub>	Ca	Mg	Na	K	Total		
		umhos/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	Alkalinity	Hardness	TDS
										mg/L	mg/L	mg/L
Zone 1	Minimum	1730	1.2	190	200					96		
	Median	2500	2.8	350	480					280		
	Maximum	9400	15	1720	300					450		
	Data Count	15	19	19	17					13		
Zone 2	Minimum	1500	0.2	200	150	186	99	284	0.4	76	850	1800
	Median	2800	1.5	360	352	280	198	474	0.9	290	1500	2800
	Maximum	6850	5.1	1430	1250	445	282	561	2.0	520	240	4200
	Data Count	27	38	38	34	3	3	3	3	27	3	3
Zone 3	Minimum	410	0.4	43	31	28	16	89	1.0	72	120	440
	Median	2550	3.0	390	320	79	44	310	2.2	300	293	1275
	Maximum	4000	9.4	1100	110	129	68	351	9.0	510	590	1500
	Data Count	80	110	110	96	4	4	4	4	76	4	4
Total of all Zones	Minimum	410	0.2	43	31	28	16	89	0.4	72	120	440
	Median	2600	2.5	380	360	129	68	350	1.4	290	590	1500
	Maximum	9400	15	1720	3000	445	282	561	9.0	520	2400	4200
	Data Count	122	167	167	147	7	7	7	7	116	7	7

		Se	Mo	Cu	Cr	Ni	Pb	Zn	Hg
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Zone 1	Minimum	2.0	<5	<1	<1	<5	<5	<1	<0.5
	Median	4.6	17	1	5	<5	<5	<1	<0.5
	Maximum	13.5	35	6	26	<5	<5	1	<0.5
	Data Count	13	6	6	6	6	6	6	5
Zone 2	Minimum	0.4	<5	<1	<1	<5	<5	<1	<0.5
	Median	1.6	6	<1	<1	<5	<5	<1	<0.5
	Maximum	3.5	82	61	14	15	<5	74	1
	Data Count	17	18	18	18	18	18	18	22
Zone 3	Minimum	0.5	<5	<1	<1	<1	<1	<1	<0.5
	Median	2.1	<5	<1	<1	<5	<5	<1	<0.5
	Maximum	6.3	30	70	12	32	21	70	1
	Data Count	52	56	56	56	56	56	56	39
Total of all Zones	Minimum	0.4	<5	<1	<1	<5	<5	<1	<0.5
	Median	2.3	<5	<1	<1	<5	<5	<1	<0.5
	Maximum	13.5	82	70	26	32	21	74	1
	Data Count	82	80	80	80	80	80	80	66

The median concentration of selenium in Zone 1 (4.6  $\mu\text{g/L}$ ) warrants further periodic monitoring as the U.S. Environmental Protection Agency criterion for the protection of freshwater aquatic life is 5  $\mu\text{g/L}$ .



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Table 3. Water Quality Data for sites monitored in Western San Joaquin County.

Date	Temp deg F	pH	EC umhos/cm	Se	Mo	B	Cl	SO4	Ca	Mg	Na	K	ALK.	Hdms	TDS	Cu	Cr	Ni	Pb	Zn	Hg	Total				
																						.....ug/L.....	.....mg/L.....			
<b>SJC001 New Jerusalem Tile Drain</b>																										
Latitude 37 42' 32", Longitude 121 17' 55". In NE 1/4, NE 1/4, NW 1/4, Sec. 34, T.2S, R.6E.																										
New Jerusalem Tile Drain at San Joaquin River.																										
08/11/86	66		2500		4	2.5	360	480								230						1	7	<5	<5	1
10/23/86	67				<5	2.4	410	500								280						6	26	<5	<5	<1
12/22/86	64	7.8	2200		<5	2.4	290	430								270						<1	25	<5	<5	<1
04/07/87	66	7.5	2500	6.2		3.0	290																			
06/12/87	64		2350	4.9		2.8	444	560								96										
08/26/87	67	7.6		3.6		2.4	320	450								290										
02/19/88	61	7.0	2300	3.7		2.8	260	400								280										
03/30/88	63		2550	5.2		3.1	270	550																		
04/22/88	64	7.2	2650	4.6		2.8	275	475																		
05/25/88	66	6.5	2650	4.3		2.5	350	470								130										
<b>SJC002 Tracy Boulevard Tile Drain Sump</b>																										
Latitude 37 46' 47", Longitude 121 26' 15". In SE 1/4, NE 1/4, NE 1/4, Sec. 8, T.2S, R.5E.																										
1.1 mile north of Interstate 205, 150-200 feet west of Tracy Blvd.																										
04/22/86	60	6.9	2500			0.9	430	630	186	99	284	0.4				276	850	1800								
08/11/86	69		2800		28	1.2	440	460								260						2	<1	<5	<5	1
10/23/86	67				<5	1.6	270	700								300						<1	<1	<5	<5	<1
12/22/86	60	7.2	3100		16	0.8	400	320								350						<1	<1	<5	<5	<1
06/12/87	65		3050	3.2		1.1	615	580																		
08/26/87	71	7.5		2.3		1.0	270	320								184										
<b>SJC003 Grant Line Road Tile Drain Sump</b>																										
Latitude 37 45' 29", Longitude 121 30' 9". In NW 1/4, NW 1/4, SE 1/4, Sec. 14, T.2S, R.4E.																										
0.6 east of Hansen Rd., south of Grantline Rd.																										
08/12/86	67		2800		<5	2.9	490	370								280										
10/23/86	68				<5	3.0	530	340								290						<1	<1	<5	<5	<1
12/22/86	64	7.6	2600		<5	3.0	420	210								270						<1	<1	<5	<5	<1
06/12/87	65		2700	2.7		2.8	541	335																		
08/26/87	69	7.4		1.5		2.6	590	400								110										

Table 3. Water Quality Data for sites monitored in Western San Joaquin County. (continued)

Date	Temp deg F	pH	EC umhos/cm	Se ug/L	Mo ug/L	B	Cl	SO4	Ca	Mg	Na	K	Total ALK.	Hdns	TDS	Cu	Cr	Ni	Pb	Zn	Hg
<b>SJC004 Bethany-Lammers Road Tile Drain</b>																					
Latitude 37 46' 53", Longitude 121 28' 34". In SE 1/4, SE 1/4, Sec. 1, T.2S, R.4E.																					
West of Lammers Rd., 100-200 feet north of Bethany Rd.																					
04/22/86	59	7.9	2200			0.6	390	400	129	68	270	3.0	280	590	1500	2	<1	5	<5	<1	<.5
08/12/86	67		2100	30	0.7	320	280						310								
06/12/87	64		1950	1.2	0.6	298	230														
08/26/87	68	7.0		1.2	0.7	380	360						190								
<b>SJC005 Patterson Pass Road Tile Drain</b>																					
Latitude 37 46' 57", Longitude 121 31' 54". In NW 1/4, SE 1/4, Sec. 4, T.2S, R.4E.																					
Northwest corner of intersection at Byron Hwy. and Patterson Pass Rd.																					
04/22/86	60	7.4	2200		3.5	295	215	81	44	350	1.4	388	355	1350	7	3	20	<5	31	<.5	
08/12/86	67		1400	<5	2.3	200	130						290								
10/30/86	69		2200	<5	4.7	320	200						400			<1	<1	<5	<1	<.5	
12/23/86	63	7.8	2200	<5	4.2	220	120						380			<1	<1	<5	<1	<.5	
04/07/87	62	7.5	2700	3.6	3.6	320															
06/17/87	64		2300	2.8	3.8	340	225														
08/26/87	67	7.5		5.2	4.6	500	360						242								
<b>SJC006 Moitoso Tile Drain</b>																					
Latitude 37 44' 00", Longitude 121 27' 17". In SE 1/4, NE 1/4, Sec. 30, T.2S, R.5E.																					
West of Corral Hollow Rd., 0.5 mile south of Fabian Rd.																					
08/11/86	73		1600	<5	1.4	240	210						240			1	<1	<5	<5	<1	<.5
10/23/86	68			<5	1.2	1050	840						310			<1	<1	<5	<5	<1	<.5
12/22/86	64	7.7	1700	<5	1.2	230	170						300			<1	10	<5	<5	<1	<.5
06/12/87	74		1550	2.1	1.7	230	208														
08/26/87	71	7.4		0.8	1.4	250	230						138								

Table 3. Water Quality Data for sites monitored in Western San Joaquin County.

(continued)

Date	Temp deg F	pH	EC umhos/cm	Se ...ug/L....	Mo	B	Cl	SO4	Ca	Mg	Na	K	Total Alk.	Hdhs	TDS	Cu	Cr	Ni .....ug/L.....	Pb	Zn	Hg
SJC007 Krohn Road Tile Drain																					
Latitude 37 44'22", Longitude 121 27'05". In N 1/2, NE 1/4, Sec. 30, T.2S, R.5E. 0.4 mile west of intersection of Fabian Rd. and Corral Hollow Rd.																					
08/11/86	66		2500	<5	2.3	380	320						260			1	<1	<5	<5	<1	
10/23/86	68			<5	1.4	240	210						320			<1	<1	<5	<5	<1	
12/22/86	65	7.6	1900	<5	1.4	260	200						310			<1	12	<5	<5	<1	<.5
04/07/87	64	7.5	2150	1.5	1.6	340															<.5
06/17/87	62		1850	1.4	1.4	287	210														<.5
SJC008 Pimentel Tile Drain																					
Latitude 37 44'50", Longitude 121 27'00". In SW 1/4, NW 1/4, Sec. 20, T.2S, R.5E. 0.5 mile north of Fabian Rd., 500 feet east of Corral Hollow Rd.																					
08/11/86	68		2200	<5	1.8	320	270						320			1	<1	<5	<5	<1	
06/12/87	66		2150	2.4	1.7	376	268														
08/26/87	69	6.7		1.7	1.9	300	280						120								<.5
SJC009 Lammers-Corral Hollow Road Tile Drain Sump																					
Latitude 37 47'05", Longitude 121 26'45". In SE 1/4, SE 1/4, SW 1/4, Sec 5, T.2S, R.5E. 0.4 mile south of Lammers Rd., 0.45 mile east of Corral Hollow Rd.																					
04/22/86	59	6.8	4500		0.8	880	710	280	198	474	0.9		350	1500	2800						
08/11/86	65		4500	82	1.0	780	780						430			1	<1	<5	<5	1	
10/23/86	66			24	1.0	770	560						410			61	<1	<5	<5	<1	
12/22/86	58	7.2	3900	16	1.0	350	260						400			<1	<1	<5	<5	<1	<.5
06/12/87	63		4600	1.6	0.9	960	870														<.5
08/26/87	67	7.5		2.3	1.1	860	910						130								<.5

Table 3. Water Quality Data for sites monitored in Western San Joaquin County. (continued)

Date	Temp deg F	pH	EC umhos/cm	Se	Mo	B	Cl	SO4	Ca	Mg	Na	K	Alk.	Hdms	TDS	Cu	Cr	Ni	Pb	Zn	Hg	Total		
																						ug/L	mg/L	
SJC010 Westside Irrigation District Main Drain																								
Latitude 37 46'48", Longitude 121 30'55". In NW 1/4, NE 1/4, NE 1/4, Sec. 10, T.2S, R.5E.																								
South of Bethany Rd. at Wicklund Rd.																								
04/22/86	67	8.0	2000			2.0	280	310	101	48	232	3.1	198	440	1200									
08/13/86	66		2100		<5	2.6	310	330					230			5	3	8	<5	15				
10/30/86	60		2600		<5	3.3	400	430					300			<1	<1	6	<5	11	<.5			
12/23/86	57	7.9	2800		<5	3.3	320	370					310			<1	14	7	<5	17				
04/07/87	74	8.2	2250			2.9		350																
06/17/87	64		2250			2.3		357																
08/26/87	77	7.8				2.5		401					219										<.5	
SJC011 Delta Avenue Tile Drain																								
Latitude 37 47'52", Longitude 121 23'10". In NW 1/4, NW 1/4, NE 1/4, Sec. 2, T.2S, R.5E.																								
South of Delta Ave., 0.25 mile east of Tom Paine Ave.																								
10/23/86	64				<5	0.3	340	150					130											
12/22/86	62	6.6	1500		<5	0.2	350	150					110											
04/07/87	62	6.7	1700			0.5		350																
06/12/87	65		2700			2.6		691																
08/26/87	65	6.8				0.4		320					76											
SJC013 Costa Brothers East Tile Drain																								
Latitude 37 46'18", Longitude 121 30'47". In NW1/4, NW 1/4, SE 1/4, Sec. 10, T.2S, R.4E.																								
50 yards west of Byron Rd. and Hansen Rd. intersection.																								
08/12/86	68		4000		<5	6.2	690	990					390			5	2	8	<5	2				
SJC014 Costa Brothers West Tile Drain																								
Latitude 37 46'18", Longitude 121 31'04". In NE 1/4, NW 1/4, SE 1/4, Sec. 10, T.2S., R.4E.																								
Approximately 0.3 mile west of Byron Rd. and Hansen Rd. intersection.																								
08/12/86	66		3900		<5	5.3	610	880					400											
10/30/86	63		3400		<5	3.9	520	550					510											
04/07/87	64	7.4	3500			2.3		510																
06/17/87	62		3550			3.0		715																
08/26/87	68	7.3				3.1		710					110											

Table 3. Water Quality Data for sites monitored in Western San Joaquin County.

(continued)

Date	Temp deg F	pH	EC umhos/cm	Se ug/L	Mo	B	Cl	SO4	Ca	Mg	Na	K	Alk.	TDS	Cu	Cr	Ni	Pb	Zn	Hg	Total	
				.....ug/L									.....mg/L								.....ug/L	
SJC015 Castro Tile Drain																						
Latitude 37 44'05", Longitude 121 27'30". In SW 1/4, NE 1/4, Sec. 30, T.2S, R.5E.																						
South of Interstate 205 and 0.35 mile west of Corral Hollow Rd.																						
10/23/86	66			<5	2.4	860	76						300		<1	<1	<5	<5	<1			
12/23/86	62	7.8	2400		2.4	250	230						280		<1	<1	<5	<5	<1			
04/07/87	66	7.6	2400	2.9			380															
06/12/87	66		2300	3.1	2.3	445	325															<.5
08/26/87	66	7.0		2.7	2.2	380	350						120									
SJC016 Earp Tile Drain																						
Latitude 37 45'39", Longitude 121 31'17". In SE 1/4, NW1/4, Sec. 15, T.2S, R.5E.																						
0.2 mile north of Grantline Rd., 0.5 mile east of Hansen Rd.																						
08/12/86	66		2800		3.0	430	410						472		3	<1	6	<5	<1			
10/23/86	65			<5	2.8	260	390						420		<1	<1	7.4	<5	10			<.5
12/22/86	62	7.4	2900		3.1	320	250						410		<1	11	<5	<5	15			<.5
04/07/87	64	7.2	3050	1.0	2.9	510																
06/17/87	64		2800	0.5	2.9	437	405															
08/26/87	67	7.2		1.8	2.5	400	380						140									
SJC017 Freeman Tile Drain																						
Latitude 37 45'43", Longitude 121 30'44". In SE 1/4, SE 1/4, NE 1/4, Sec 15, T.2S, R.4E.																						
West of Hansen Rd., 0.25 mile north of Grantline Rd.																						
08/12/86	68		3400		5.5	710	660						360		2	<1	<5	<5	1			
10/23/86	66			<5	5.9	730	1100						360		<1	<1	<5	<5	<1			<.5
12/22/86	61	7.4	3600		5.4	380	420						310		<1	11	<5	<5	<1			<.5
04/07/87	64	7.2	3800	3.6	4.7	370																
06/17/87	64		3800	3.5	5.4	677	675															
08/26/87	68	7.2		3.9	5.0	700	760						120									<.5

(continued)

Table 3. Water Quality Data for sites monitored in Western San Joaquin County.

Date	Temp deg F	pH	EC	Se umhos/cm	Mo	B	Cl	SO4	Ca	Mg	Na	K	ALK.	TDS	CU	Cr	Ni	Pb	Zn	Hg	Total	
																					mg/L	ug/L
SJC018 Costa Tile Drain																						
Latitude 37 46'18", Longitude 121 31'15". In NW 1/4, NW 1/4, Sec. 10, T.2S, R.4E.																						
At intersection of Byron Rd. and Hansen Rd, 0.5 mile west along collector drain.																						
08/12/86	69		3500	<5	4.1	660	500						340	1	2	5	<5	1	<.5			
10/30/86	63		3200	<5	4.3	540	410						360	<1	<1	3	<5	<1	<.5			
12/23/86	58	8.0	3200	<5	4.4	520	460						370	<1	<1	<5	<5	<1	<.5			
04/07/87	64	7.8	3250	1.0	3.8	560																
06/17/87	62		3800	5.5	4.6	760	515															
08/26/87	74	7.4		6.3	4.4	810	580						110									
SJC019 Moitoso and Castro Tile Drain																						
Latitude 37 43'58", Longitude 121 21'30". In SW 1/4, NE 1/4, Sec. 30, T.2S, R.5E.																						
3/8 mile west of Corral Hollow Rd. where drain turns in.																						
08/11/86	70		2000	<5	1.8	270	210						320	1	<1	<5	<5	<1	<.5			
10/23/86	66			<5	1.6	1100	910						340	<1	<1	<5	<5	<1	<.5			
12/22/86	61	7.6	1900	<5	1.7	250	200						350	<1	10	<5	<5	<1	<.5			
04/07/87	66	7.4	1900	0.5	1.6	260																
06/12/87	65		2150	0.7	2.0	368	268															
08/26/87	68	7.2		0.8	1.8	300	260						180									
SJC022 City of Tracy Tile Drain																						
In SE 1/4, NW 1/4, Sec. 20, T.2S, R.5E.																						
0.5 mile north of Fabian Rd. at end of dirt road.																						
08/11/86	74		2100	<5	1.3	270	220						280	1	<1	<5	<5	6				
10/23/86	70			<5	1.4	270	220						350	70	<1	<5	<5	10				
12/22/86	57	7.6	730	<5	0.6	90	83						140	12	7	8	21	70				
04/07/87	66	7.6	1950	1.1	1.4	300																
06/12/87	68		1900	1.0	1.4	395	201															
08/26/87	72	7.2		0.7	1.5	290	240						130									

Table 3. Water Quality Data for sites monitored in Western San Joaquin County. (continued)

Date	Temp deg F	pH	EC umhos/cm	Se ug/L	Mo	B	Cl	SO4	Ca	Mg	Na	K	Total Alk.	Hdms	TDS	Cu	Cr	Ni ug/L	Pb	Zn	Hg
SJC024 Corral Hollow-Betany Road Tile Drain Sump																					
Latitude 37 46'48", Longitude 121 27'07". In SW 1/4, NW 1/4, NW 1/4, Sec. 8, T.2S, R.5E.																					
East side of Corral Hollow Rd., 0.75 mile south of Lammers Rd.																					
04/22/86	60	6.7	6200		1.4	1400	1200	445	282	561	2.0	370	2400	4200	1	<1	15	<5	1		<.5
08/11/86	68		5900	16	1.6	1300	1100					410			3	<1	9	<5	3		
10/30/86	64		6100	16	1.9	1200	1000					520									
04/07/87	62	6.9	6850	1.0	2.0	1430															<.5
06/12/87	63		5750	1.0	1.6	1422	1250														<.5
08/26/87	68	6.9		0.8	1.5	1400	1200					87									<.5
SJC026 Chrisman Road Tile Drain																					
Latitude 37 45'16", Longitude 121 23'50". In NW 1/4, NW 1/4, NW 1/4, Sec. 23, T.2S, R.5E.																					
At intersection of Grantline Rd. and Chrisman Rd.																					
08/11/86	66		2000	8	2.6	300	300					290			2	1	<5	<5	<1		<.5
10/23/86	68			<5	2.4	330	320					290			<1	<1	<5	<5	<1		<.5
12/22/86	62	7.4	2100	<5	2.4	330	300					290			8	12	<5	<5	<1		<.5
06/12/87	64		2000	1.7	2.5	401	320														<.5
08/26/87	66	7.5		1.5	2.3	330	310					120									<.5
SJC028 Critchett Road Drain																					
Latitude 37 42'53", Longitude 121 17'20". In SE 1/4, NE 1/4, Sec. 34, T.2S, R.6E.																					
At end of Critchett Rd., 1.25 mile from Kasson Rd.																					
08/11/86	72		3100	<5	3.8	290	1100					290			3	<1	5	<5	10		<.5
10/23/86	59			<5	2.9	450	800					280			<1	<1	7.0	<5	18		
04/07/87	60	7.0	2000	2.1	1.7	180															
06/12/87	73		2900	1.7	3.0	305	831														
08/26/87	68	8.5		1.5	1.4	190	400					212									



Table 3. Water Quality Data for sites monitored in Western San Joaquin County.

(continued)

Date	Temp deg F	pH	EC umhos/cm	Se ug/L	Mo	B	Cl	SO4	Ca	Mg	Na	K	Alk.	Hdms	TDS	Cu	Cr	Ni	Pb	Zn	Hg	Total		
																						mg/L	ug/L	
SJC029 Wright Road Collector Drain																								
Latitude 37 43'50", Longitude 121 18'38". In SE 1/4, NE 1/4, SE 1/4, Sec. 28, T.2S, R.6E.																								
On Wright Rd., 0.75 mile northeast of Kasson Rd.																								
08/11/86	69		9400	35	15.0	1600	3000							400	2	<1	<5	<5	<5	1	<.5			
10/23/86	65		1200	33	11.0	1500	2200							450	<1	<1	<5	<5	<5	<1	<.5			
12/22/86	62	7.4	8100	30	10.0	630	1000							430	<1	2	<5	<5	<5	<1	<.5			
04/07/87	61	6.9	9350	12.5	8.7	1610																		
06/12/87	64		8450	13.5	10.4	1720	2333																	
08/26/87	67	7.5		13.2	8.8	1200	2100							155										
SJC030 Yasui Ranch Surface Drain																								
Latitude 37 40'08", Longitude 121 15'18". In NW 1/4, SE 1/4, SW 1/4, Sec. 13, T.3S, R.6E.																								
0.5 mile south of Pipeline Rd., west of Kasson Rd.																								
10/23/86	58			<5	1.4	290	270							210	<1	<1	<5	<5	<5	12	<.5			
12/22/86	47	6.7	1700	<5	1.1	260	210							200	<1	11	<5	<5	<5	<1	<.5			
04/07/87	57	6.5	1750	3.2	1.3	255															<.5			
06/12/87	72		1500	1.7	1.2	322	203														<.5			
SJC031 Yasui (Fisk) Ranch Tile Drain																								
Latitude 37 39'26", Longitude 121 16'39". In SW 1/4, NW 1/4, SE 1/4, Sec. 23, T.3S, R.6E.																								
0.5 mile south of Pipeline Rd., off dirt road, 1.3 mile east of Kasson Rd.																								
02/19/88	60	7.2	1730	2.0	1.2	220	200							280										
04/22/88	65	7.6	1750	2.4	1.2	190	210																	
05/25/88	62	7.3	1800	2.5	1.2	250	230							102										

Table 3. Water Quality Data for sites monitored in Western San Joaquin County. (continued)

Date	Temp deg F	pH	EC umhos/cm	Se ug/L	Mo	B	Cl	SO4	Ca	Mg	Na	K	Alk.	Hdms	TDS	Cu	Cr	Ni	Pb	Zn	Hg	Total		
																						mg/L	ug/L	
SJC032 Kelso Road Drain																								
Latitude 37 48'46", Longitude 121 32'55". In NW 1/4, SW 1/4, Sec. 28, T.1S, R.4E.																								
Kelso Rd. at Old River.																								
04/22/86	70	7.8	1400	<5	2.7	190	210	41	24	209	4.7	150	190	790	8.4	2.2	7.5	<5	<5	13.0	<.5			
08/12/86	74		3500	<5	9.0	370	270					290			2	<1	<5	<5	<5	2	<.5			
10/30/86	61		4100	<5	11.0	790	540					408			<1	<1	3	<5	<5	<1				
12/23/86	53	8.0	4100	<5	10.0	600	500					440			<1	8	<5	<5	<5	2				
04/07/87	72	8.4	4350	3.1	11.0	790																		
06/17/87	63		4400	2.5	10.4	881	645														<.5			
08/26/87	86	8.7		1.7	7.6	700	460					341									<.5			
SJC033 Mountain House Creek																								
Latitude 47 30'05", Longitude 121 31'39". In NW 1/4, NW 1/4, Sec. 4, T.2S, R.4E.																								
Mountain House Creek at Henderson Rd.																								
04/22/86	68	7.8	730	<5	1.0	76	87	28	16	89	9.3	100	120	440	17.0	5.5	32.0	<5	<5	28.0				
08/13/86	70		410	<5	0.5	43	31					72			5	2	5	<5	<5	10				
10/30/86	63		2900	<5	8.4	450	360					434			<1	<1	5	<5	<5	50				
12/23/86	56	8.2	3100	<5	9.4	380	280					350			<1	<1	<5	<5	<5	<1	<.5			
04/07/87	78	8.8	3250	2.6	8.5	780															<.5			
06/17/87	68		900	2.2	0.6	318	210														<.5			
08/26/87	77	7.6		1.8	0.4	130	98					100									<.5			
SJC034 Westside Irrigation District Discharge Pump on Old River																								
Latitude 37 47'20", Longitude 121 30'46". In SW 1/4, NW 1/4, Sec. 2, T.2S, R.4E.																								
0.25 mile east of Wickland Rd., 200 feet south of Old River.																								
08/13/86	70		3900	17	3.5	630	1100					230			3	<1	6	<5	<5	4				
10/30/86	61		5900	<5	6.9	900	1200					180			<1	<1	7	<5	<5	<1	<.5			
12/23/86	56	7.1	5400	<5	9.3	300	660					310			<1	3	<5	<5	<5	<1	<.5			
04/07/87	74	8.3	2350	3.2	9.4	660																		
06/17/87	63		4200	6.4	4.0	620	1140																	
08/26/87	73	7.2		3.8	2.5	550	980					140												

Table 3. Water Quality Data for sites monitored in Western San Joaquin County.

(continued)

Date	Temp deg F	pH	EC umhos/cm	Se	Mo	B	Cl	SO4	Ca	Mg	Na	K	Total Alk.	Hdms	TDS	Cu	Cr	Ni	Pb	Zn	Hg
SJC035 Naglee - Burk Pump #6																					
Latitude 37 46'50", Longitude 121 30'12". In NE 1/4, NE 1/4, NW 1/4, Sec. 11, T.2S., R.4E.																					
South side of Bethany Rd, 3/4 mile east of Wickland Rd.																					
04/22/86	68	7.6	2700	17	2.2	420	650	137	87	350	9.3	220	680	1900	6.1	4.1	14.0	<5	11.0	<.5	
08/13/86	67	2300	9	2.7	310	550	200	390	300	<1	14	5	<5	13	<.5						
10/30/86	60	4800	40	5.8	760	1100	300	<1	14	5	<5	12	<.5								
12/23/86	51	7.0	4500	<5	5.9	300	460	218	2.7	1.7	320	430	218								
04/07/87	68	8.5	5050	4.4	4.8	520	2150	3.1	2.0	303	460	430	218								
06/17/87	64	2150	3.1	2.0	303	460	430	218													
08/26/87	77	7.6	2.7	1.7	320	430	218														
SJC036 Kelso Road-Byron HWY Tile Drain Sump																					
Latitude 37 47'32", Longitude 121 32'43". SE 1/4, NW 1/4, NW 1/4, Sec. 4, T.2S., R.4E.																					
South side of Byron Hwy, 0.2 mile east of Kelso Rd.																					
04/22/86	61	7.3	2100	<5	4.1	290	220	76	43	351	1.3	376	230	1200	7.4	4.7	7.0	<5	9.4	<.5	
08/12/86	66	1500	<5	3.3	220	130	290	420	390	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
10/30/86	69	2100	<5	5.1	300	160	390	276	4.8	3.0	185	270	276								
12/23/86	60	7.6	2100	<5	4.8	190	110	185	4.5	3.03	185	270									
04/07/87	64	7.3	2050	1.4	4.4	250	2150	1.7	4.5	303	185	270									
06/17/87	64	2150	1.7	4.5	303	185	270														
08/26/87	67	7.5	3.0	4.8	390	270	276														
SJC037 Spirow Nicholaw Tile Drain																					
Latitude 37 44'48", Longitude 121 20'15". In NE 1/4, NW 1/4, SW 1/4, Sec. 19, T.2S., R.4E.																					
100 yards south of Byron Hwy, 1/4 mile east of Lammers Ferry Rd.																					
08/11/86	66	3100	<5	3.4	500	560	240	270	280	1	<1	<5	<5	1	<1	<1	<1	<5	<5	<1	<1
10/23/86	66	3100	<5	3.7	540	580	270	280	280	<1	<1	<5	<5	<1	<1	<1	<1	<5	<5	<1	<1
12/22/86	62	7.4	3100	<5	3.9	310	390	540	580	<1	<1	<5	<5	<1	<1	<1	<1	<5	<5	<1	<1
04/07/87	65	7.4	3200	4.4	3.6	520	3000	3.7	3.5	487	540	86	86								
06/12/87	64	3000	3.7	3.5	487	540	86	86													
08/26/87	66	7.0	3.9	3.4	500	540	86	86													

(continued)

Table 3. Water Quality Data for sites monitored in Western San Joaquin County.

Date	Temp deg F	pH	EC umhos/cm	Se ug/L	Mo	B	Cl	SO4	Ca	Mg	Na	K	ALK.	Hdhs	TDS	Cu	Cr	Ni	Pb	Zn	Hg	Total		
																						mg/L	ug/L	
SJC038 JM Lawrence Jr. East Tile Drain																								
Latitude 37 45'40", Longitude 121 30'44". In NW 1/4, SE 1/4, NE 1/4, Sec. 15, T.2S., R.4E.																								
West side of Hansen Rd. 1/4 mile north of Grant Line Rd.																								
08/12/86	67		3400	<5	3.2	650	450							390		1	<1	8	<5	1				
10/23/86	66			<5	3.1	780	480							410		<1	<1	<5	<5	<1				
12/22/86	61	7.6	3600	<5	3.1	520	320							410		<1	<1	<5	<5	<1				
04/07/87	64	7.4	3700	1.4	2.8	370																		
06/17/87	65		3500	1.7	3.1	703	470																	
08/26/87	69	7.5		1.5	2.9	610	490							187										
SJC039 JM Lawrence Jr. West Tile Drain																								
Latitude 37 45'32", Longitude 121 31'17". In SW 1/4, SW 1/4, NE 1/4, Sec. 15, T.2S., R.4E.																								
50 yards north of Grant Line Rd, 0.5 mile west of Hansen Rd.																								
08/12/86	67		2300	7	2.3	410	230							370		1	<1	<5	<5	<1				
10/23/86	65			<5	2.3	520	250							350		<1	<1	<5	<5	<1				
12/22/86	62	7.5	2500	<5	2.4	270	190							380		<1	<1	<5	<5	<1				
04/07/87	64	7.2	2600	1.9	2.2	400																		
06/17/87	64		2300	2.2	2.3	376	210																	
08/26/87	68	7.3		2.0	2.1	390	280							188										
SJC040 Sequeria Tile Drain																								
Latitude 37 45'37", Longitude 121 31'17". In SW 1/4, NW 1/4, Sec. 15, T.2S., R.4E.																								
North side of Grant Line Rd, half way between Hansen Rd and Patterson Rd.																								
08/12/86	73		3500	<5	3.8	660	520							460		2	<1	12	<5	<1				
10/23/86	69			<5	3.5	680	450							460		<1	<1	9.0	<5	<1				
12/22/86	62	7.5	3700	<5	3.6	420	280							430		<1	<1	7	<5	<1				
06/17/87	65		3500	0.9	3.2	620	475																	



Appendix A-1.

Summary of constituent ranges for U.S. Bureau of Reclamation Water Quality Data.  
(U.S. Bureau of Reclamation, 1987; U.S. Bureau of Reclamation, 1989)

	EC umhos/cm	HCO3 mg/L	N mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	Cl mg/L	SO4 mg/L	B mg/L
SJC001 New Jerusalem Tile Drain										
Minimum	2100	280	1.0	40	42	280	1.0	270	221	0.78
Median	2770	354	9.8	159	69	330	2.1	420	540	2.8
Maximum	3720	466	98	193	83	389	3.0	3600	630	4.2
Data Count	42	6	22	10	10	10	10	16	11	33
SJC002 Tracy Boulevard Tile Drain Sump										
Minimum	2660	230	1.0	170	84	1	0.4	440	500	0.75
Median	3488	390	4.1	210	123	348	1.0	610	600	1.3
Maximum	3920	434	18	277	361	420	700	3600	720	3.5
Data Count	38	5	21	9	9	9	9	14	10	32
SJC003 Grant Line Road Tile Drain Sump										
Minimum	2690	208	8.2	64	60	281	1	525	320	0.64
Median	3000	346	12	85	62	421	1	560	331	3.0
Maximum	3580	364	44.5	156	68	455	2	625	348	3.9
Data Count	12	5	11	5	5	5	5	5	5	10

	Ag ug/L	As ug/L	Cd ug/L	Cr ug/L	Cu ug/L	Fe ug/L	Hg ug/L	Mn ug/L	Mo ug/L	Ni ug/L	Pb ug/L	Se ug/L	Zn ug/L
SJC001 New Jerusalem Tile Drain													
Minimum	<1	<1	<1	22	<1	30	<0.1	<10	<1	<1	<1	<1	<10
Median	<1	<1	<1	36	3	160	0.1	<10	2	9	<1	5	<10
Maximum	<1	2	2	46	5	670	0.3	30	7	33	7	8	20
Data Count	20	18	20	22	24	21	22	21	24	24	19	25	23
SJC002 Tracy Boulevard Tile Drain Sump													
Minimum	<1	2	<1	<1	<1	<10	<0.1	50	4	<1	<1	<1	<10
Median	<1	3	<1	3	2	30	<0.1	9.5	12	8	2	3	<10
Maximum	1	4	1	9	6	210	0.1	460	24	31	7	5	40
Data Count	17	18	19	21	23	20	19	20	23	23	18	24	20

Appendix A-2. U.S. Bureau of Reclamation Water Quality Data for Selected Monitoring Sites. (U.S. Bureau of Reclamation, 1987; U.S. Bureau of Reclamation, 1989)

Date	Time	EC umhos/cm	CO <sub>3</sub>	N	Ca	Mg	Na	K	Cl	SO <sub>4</sub>	B	Ag	As	Cd	Cr	Cu	Fe	Hg	Mn	Mo	Ni	Pb	Se	Zn		
SJC001 New Jerusalem Tile Drain																										
08/19/82	1330	2440	466	0	12.5	40	42	360	2	440	221	3.5														
09/23/82	1100	2670	348	0	9.8	176	78	290	3	440	564	3														
11/22/82	1150	2400	326	0	9.6	157	62	306	3	340	540															
12/14/82	0940	2730		9.8																						
01/21/83	0850	2990	280	19.5	144	68	385	3	420	605	0.78															
02/22/83	1315	2910		5.3																						
03/28/83	1115	3720		10																						
04/18/83	1130	2980	360	10.4	128	71	380	3	500	513	2.8															
05/16/83	1100	2960		1							3.2															
06/13/83	1025	3180		7.5							4.1															
07/18/83	1050	3060		9.8							2.6															
08/15/83	1050	3190	372	24.2	193	83	389	1	450	542	4.2															
09/12/83	1120	2680		9.6							3.7															
10/17/83	1100	2600		9.4							2.9															
01/23/84		2420		8.8					340																	
03/12/84		2620									2.5	<1	<1	<1	44	4	670	<0.1	30	2	6	<1	4	10		
04/02/84		2500									2.3	<1	<1	<1	43	5	180	<0.1	<10	2	11	2	5	10		
04/23/84		2840									2.8	<1	<1	<1	36	3	180	<0.1	10	2	6	<1	5	20		
05/21/84		2930		14.3					3600		2.9	<1	<1	2	24	3	190	<0.1	20	3	23	2	4	<10		
06/18/84		3050		10							2.8	<1	<1	<1	36	4	270	<0.1	20	2	<1	<1	<1	<10		
07/23/84		3010		11					460		2.8	<1	<1	<1	33	<20	160	<0.1	16	<1	17	6	6	<5		
08/20/84		2820		10					420		2.7	<1	1	<1	22	<20	190	0.1	14	<1	33	5	4	5		
09/24/84		2670							430		2.9	<1	<1	<1	28	1	120		10	2	<1	1	4	<10		
10/09/84		2960		98							3.0	<1	<1	<1	45	3	220	0.2	<10	7	30	2	5	<10		
11/12/84		2300		8.6							2.4	<1	<1	<1	38	3	80	0.1	<10	1	11	1	4	<10		
12/10/84		2300									2.4	<1	<1	<1	31	3	130	0.1	<10	5	18	<1	5	<10		
02/14/85		2240									2.4	<1	<1	<1	30	2	30	<0.1	<10	<1	12	<1	5	<10		
03/14/85		2250									2.4	<1	<1	<1	30	2	40	0.2	<10	2	10	<1	6	10		
04/11/85		2650									3.0	<1	<1	2	45	3	190	0.2	<10	<1	12	7	5	20		
05/09/85		2810									2.6	<1	<1	1	36	2	430	0.3	10	3	23	<1	8	<10		
06/06/85		2880									2.9	<1	2	2	30	3	90	0.3	<10	3	9	4	5	20		
07/12/85		2820									3.0	<1		37	3	400	0.2	<10	2	5	5	5	10			

Appendix A-2. U.S. Bureau of Reclamation Water Quality Data for Selected Monitoring Sites.

(U.S. Bureau of Reclamation, 1987; U.S. Bureau of Reclamation, 1989)

Date	Time	EC	HCO <sub>3</sub>	CO <sub>3</sub>	N	Ca	Mg	Na	K	Cl	SO <sub>4</sub>	B	Ag	As	Cd	Cr	Cu	Fe	Hg	Mn	Mo	Ni	Pb	Se	Zn		
		umhos/cm	mg/L										ug/L														
SUC001 New Jerusalem Tile Drain (continued)																											
08/09/85		2810				400	500	2.8	<1	2	<1	29	1	<30	0.1	<10	1	<1	7	<1	2	<10					
09/13/85		2840			180	78	330	1.9	330	400	630	3.0	<1	1	<1	46	3	80	0.2	<10	4	3	<1	5	<10		
10/11/85		2240						2.6								37	2	0.2			1	6		4			
11/08/85		2230						2.4								40	2	<0.1			1	1		4			
12/06/85		2100			9.5	120	51	280	1.4	270	420		<1	<1	34	<1	36	0.2	14	2	9	<1	4	<10			
01/10/86		2250											<1	<1	43	<1	<60	<0.1	<10	1	<1	<5	3	<10			
05/09/86		2940				180	69	330	1.9	370	550	2.5					<4				<4	5	5	<10			
08/08/86		2850				160	68	310	2.2	380	500	3.0										4	4	<10			

SUC002 Tracy Boulevard Tile Drain Sump

09/23/82	1220	3350	390	0	3.6	277	127	361	1	700	678	1.3														
11/22/82	1115	3480	380	0	1.4	251	361	1	700		696	1.3														
12/14/82	0840	3690			5.8																					
01/21/83	0805	3510	230		1	227	130	348	5	710	610	0.78														
02/22/83	1150	3800			10																					
03/28/83	1005	3720			18																					
04/18/83	1005	3496	424		10.7	175	123	397	1	700	590	1.2														
05/16/83	0920	3650			9																					
06/13/83	0850	3140			5.3																					
07/18/83	0950	3680			4.8																					
08/15/83	0855	3470	434		6.4	191	123	420	1	613	532	2.1														
09/12/83	1000	3430			3.6																					
10/17/83	0910	3660			3.3																					
01/23/84		3330			3.7					561																
03/12/84		3600											<1	2	<1	3	3	30	<0.1	120	14	<1	2	5	<10	
05/21/84		3560			4.1					3600			<1	2	1	<2	4	20	<0.1	90	24	11	2	2		
06/18/84		3220			6								<1	2	<1	3	3	40	<0.1	110	15	1	1	<1	30	
07/23/84		2810			7.4					460			<1	3	<1	<1	<20	<30	<0.1	53	12	12	<1	3	<5	
08/20/84		3450			4.1					600			<1	3	<1	<1	<20	68	<0.1	120	4	28	1	2	8	
09/24/84		3620											<1	2	<1	8	<1	60	0.1	50	12	12	<1	2	<10	
10/18/84		3540			2.3					610			<1	3	<1	2	4	20	<0.1	100	12	31	3	2	<10	
11/12/84		3390			1.6								<1	3	<1	3	1	<10	<0.1	110	12	5	<1	2	10	



Appendix A-2. U.S. Bureau of Reclamation Water Quality Data for Selected Monitoring Sites. (U.S. Bureau of Reclamation, 1987; U.S. Bureau of Reclamation, 1989)

Date	Time	EC umhos/cm	HC03	CO3	N	Ca	Mg	Na	K	Cl	SO4	B	Ag	As	Cd	Cr	Cu	Fe	Hg	Mn	Mo	Ni	Pb	Se	Zn	
SJC002 Tracy Boulevard Tile Drain Sump (continued)																										
12/10/84		3500										1.4	<1	3	<1	2	5	30	<0.1	90	16	26	<1	2	<10	
01/14/85		2870										0.75	<1	3	<1	2	3	80	<0.1	260	24	5	3	5	<10	
02/14/85		3510										1.1	1	2	<1	3	3	40	<0.1	400	9	11	2	4		
03/14/85		3690										1.2	<1	2	<1	3	5	30	<0.1	110	11	12	7	4	<10	
04/11/85		3310										1.2	<1	2	<1	2	5	210	<0.1	390	6	9	2	3	10	
05/09/85		3920										1.2	<1	2	1	2	6	80	<0.1	460	5	7	<1	1	<10	
06/06/85		2660										1.2	<1	3	<1	1	4	140	0.1	50	13	24	2	5	40	
07/12/85		3040								450	500	1.4	<1	4	<1	8	2	30	0.1	90	12	2	3	20		
08/09/85		2820								520	600	1.4	<1	4	<1	7	1	<30	0.1	50	6	8	1	2	10	
09/13/85		3090				200	94	320	0.5	600	600	1.4		4	<1	6	2	120	0.1	80	8	8	<1	3	<10	
10/07/85		3580										1.6				6	2				8	8		2		
11/04/85		3570										1.7				9	2				11	4		3		
12/06/85		3410			2.2	240	120	400	0.5	660	720		<1		<1	4	2	<30	0.1	80	12	6	2	2	<10	
01/09/86		3690												3	<1		1	<60		75	15	6	3	<10		
05/09/86		3470				210	110	330	0.4	540	550	1.0					<4				15	5		3	<10	
08/08/86		2960				170	84	300	0.5	440	500	1.3									15	5		3	<10	

SJC003 Grant Line Road Tile Drain Sump

09/23/82	1310	2710	350	0	11.8	156	62	281	2	560	348	3.2													
11/22/82	1050	2970	342	0	11.8	129	60	421	1	620	331	3													
12/14/82	0905	3010			10.6																				
01/21/83	0825	3350	208		8.2	85	68	435	1	625	333	0.64													
02/22/83	1200	3580			12.5																				
04/18/83	1025	2690	364		12	70	60	361	1	525	320	2.6													
05/16/83	0950	3270			17							2.9													
06/13/83	0905	2990			8.5							3.3													
07/18/83	0920	3030			14.3							2.2													
08/15/83	0900	2960	346		44.5	64	62	455	1	545	323	3.9													
09/12/83	1016	2860										3.8													
10/17/83	0940	3010			12.9							2.8													