PUMPBACK SYSTEM #1

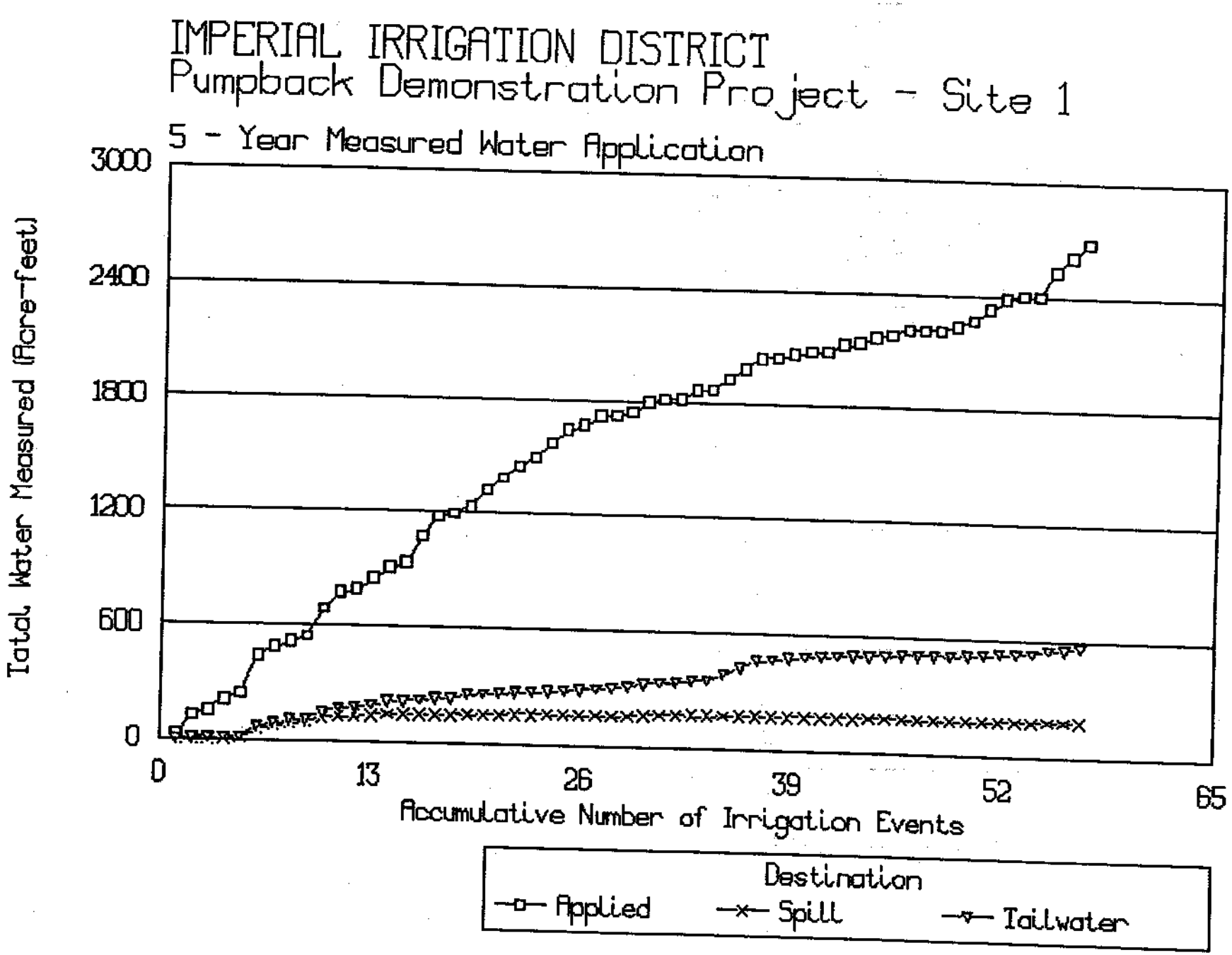
EVENT (1)	DATE (2)	CROP (3)
1	8/ 7/85	ALFALFA
2	8/20/85	ALFALFA
3	9/ 1/85	ALFALFA
4	11/ 1/85	ALFALFA
5	1/23/86	ALFALFA
1	5/ 1/86	ALFALFA
2	5/27/86	ALFALFA
3	6/18/86	ALFALFA
4	6/21/86	ALFALFA
5	7/ 7/86	ALFALFA
6	9/27/86	LETTUCE
7	10/20/86	LETTUCE
8	12/14/86	LETTUCE
9	12/29/86	LETTUCE
10	2/14/87	MELONS
11	5/ 8/87	MELONS
12	5/23/87	MELONS
13	5/27/87	MELONS
14	6/ 5/87	MELONS
15	6/14/87	MELONS
16	8/15/87	FLAT FLOOD
17	12/ 5/87	WHEAT
18	1/24/88	WHEAT
19	2/ 5/88	WHEAT
20	2/20/88	WHEAT
21	3/16/88	WHEAT
22	4/ 2/88	WHEAT
23	4/16/88	WHEAT
24	5/ 3/88	WHEAT
25	7/ 4/88	FLAT FLOOD
26	9/29/88	CARROTS & ONIONS
27	10/ 4/88	CARROTS & ONIONS
28	10/12/88	CARROTS & ONIONS
29	10/28/88	CARROTS & ONIONS
30	11/ 3/88	CARROTS & ONIONS
31	11/23/88	CARROTS & ONIONS
32	12/ 1/88	CARROTS & ONIONS
33	12/ 8/88	CARROTS & ONIONS
34	1/25/89	CARROTS & ONIONS
35	2/ 5/89	CARROTS & ONIONS
36	2/27/89	CARROTS & ONIONS
37	3/16/89	CARROTS & ONIONS
38	3/28/89	CARROTS & ONIONS
39	4/ 6/89	CARROTS & ONIONS
40	4/16/89	CARROTS & ONIONS

PUMPBACK SYSTEM #1

EVENT (1)	DATE (2)	CROP (3)	WATER QUANTITIES (ACRE FEET) DELIVERY (4)	SPILL (5)	RECYCLED TAILWATER (6)	TOTAL TAILWATER (7)	%TAILWATER SPILLED (8)	%DELIVERY SPILLED (9)	%DELIVERY TAILWATER (10)	NO RECORD (11)	COMMENTS (12)
1	8/ 7/85	ALFALFA	*41.2	*1.8		*1.8					
2	8/20/85	ALFALFA	*36.8	*1.6		*1.6					
3	9/ 1/85	ALFALFA	*29.2	*3.3		*3.3					
4	11/ 1/85	ALFALFA	*76.0								
5	1/23/86	ALFALFA	*61.2	*7.7		*7.7				NR	
1	5/ 1/86	ALFALFA	27.2	.2	2.2	2.4	8%	1%	9%		Pumpback Installed
2	5/27/86	ALFALFA	96.2	1.8	2.4	4.2	43%	2%	4%		
3	6/18/86	ALFALFA	28.0	.0	2.0	2.0	0%	0%	7%		
4	6/21/86	ALFALFA	58.2	.0	4.6	4.6	0%	0%	8%		
5	7/ 7/86	ALFALFA	30.0	1.1	.0	1.1	100%	4%	4%		
6	9/27/86	LETTUCE	199.6	55.4	.0	55.4	100%	28%	28%		
7	10/20/86	LETTUCE	42.4	12.0	.0	12.0	100%	28%	28%		
8	12/14/86	LETTUCE	28.2	14.7	.0	14.7	100%	52%	52%		
9	12/29/86	LETTUCE	33.2	6.2	.0	6.2	100%	19%	19%		
10	2/14/87	MELONS	144.2	26.6	13.3	39.9	67%	18%	28%		
11	5/ 8/87	MELONS	87.7	6.7	18.2	24.9	27%	8%	28%		
12	5/23/87	MELONS	14.1	1.5	2.5	4.0	38%	11%	28%		
13	5/27/87	MELONS	57.4	5.8	9.5	15.3	38%	10%	27%		
14	6/ 5/87	MELONS	59.0	7.3	9.0	16.3	45%	12%	28%		
15	6/14/87	MELONS	27.5	1.4	4.1	5.5	25%	5%	20%		
16	8/15/87	FLAT FLOOD	143.9	.0	6.7	6.7	0%	0%	5%		
17	12/ 5/87	WHEAT	107.8	.0	12.0	12.0	0%	0%	11%		
18	1/24/88	WHEAT	12.4	.5	1.1	1.6	31%	4%	13%		
19	2/ 5/88	WHEAT	40.8	2.6	17.2	19.8	13%	6%	49%		
20	2/20/88	WHEAT	88.1	2.3	3.4	5.7	40%	3%	6%		
21	3/16/88	WHEAT	62.3	.6	4.0	4.6	13%	1%	7%		
22	4/ 2/88	WHEAT	63.5	4.7	1.4	6.1	77%	7%	10%		
23	4/16/88	WHEAT	51.0	.3	3.6	3.9	8%	1%	8%		
24	5/ 3/88	WHEAT	76.7	1.2	5.3	6.5	18%	2%	8%		
25	7/ 4/88	FLAT FLOOD	66.0	.0	1.9	1.9	0%	0%	3%		
26	9/29/88	CARROTS & ONIONS	28.8	.0	8.8	8.8	0%	0%	31%		
27	10/ 4/88	CARROTS & ONIONS	48.7	.0	6.6	6.6	0%	0%	14%		
28	10/12/88	CARROTS & ONIONS	9.7	.0	8.3	8.3	0%	0%	86%		
29	10/28/88	CARROTS & ONIONS	17.3	.0	5.9	5.9	0%	0%	34%		
30	11/ 3/88	CARROTS & ONIONS	49.7	8.8	8.0	16.8	52%	18%	34%		
31	11/23/88	CARROTS & ONIONS	19.8	.1	6.3	6.4	2%	1%	32%		
32	12/ 1/88	CARROTS & ONIONS	3.3	.0	1.7	1.7	0%	0%	52%		
33	12/ 8/88	CARROTS & ONIONS	43.0	1.8	15.6	17.4	10%	4%	40%		
34	1/25/89	CARROTS & ONIONS	12.4	.5	1.1	1.6	31%	4%	13%		
35	2/ 5/89	CARROTS & ONIONS	49.9	2.6	29.8	32.4	8%	5%	65%		
36	2/27/89	CARROTS & ONIONS	60.0	2.7	34.4	37.1	7%	5%	62%		
37	3/16/89	CARROTS & ONIONS	57.8	.0	40.3	40.3	0%	0%	70%		
38	3/28/89	CARROTS & ONIONS	4.6	.0	4.8	4.8	0%	0%	104%		
39	4/ 6/89	CARROTS & ONIONS	18.5	1.5	9.6	11.1	14%	8%	60%		
40	4/16/89	CARROTS & ONIONS	13.1	.0	8.4	8.4	0%	0%	64%		

PUMPBACK SYSTEM #1

EVENT (1)	DATE (2)	CROP (3)	WATER QUANTITIES (ACRE FEET) DELIVERY (4)	SPILL (5)	RECYCLED TAILWATER (6)	TOTAL TAILWATER (7)	%TAILWATER SPILLED (8)	%DELIVERY SPILLED (9)	%DELIVERY TAILWATER (10)	NO RECORD (11)	COMMENTS (12)
41	4/24/89	CARROTS & ONIONS	6.8	.0	5.4	5.4	0%	0%	79%		
42	5/ 2/89	ONIONS & FLAT FLOOD	36.7	.4	4.3	4.7	9%	1%	13%		ONIONS & PRE-IRRIGATION
43	5/20/89	SUDAN GRASS	10.8	.0	1.6	1.6	0%	0%	15%		
44	5/26/89	SUDAN GRASS	33.2	.2	.5	.7	29%	1%	2%		
45	6/ 3/89	SUDAN GRASS	16.3	.0	2.5	2.5	0%	0%	15%		
46	6/ 7/89	SUDAN GRASS	29.0	.5	6.6	7.1	7%	2%	24%		
47	6/14/89	SUDAN GRASS	*11.2								
48	6/20/89	SUDAN GRASS	*44.9							NR	UNABLE TO DETERMINE RECYCLE TW
49	7/ 3/89	SUDAN GRASS	21.6	.7	1.5	2.2	32%	3%	10%		
50	7/11/89	SUDAN GRASS	36.0	.0	2.2	2.2	0%	0%	6%		
51	7/19/89	SUDAN GRASS	55.5	.0	6.4	6.4	0%	0%	12%		
52	8/ 1/89	SUDAN GRASS	57.0	3.1	6.7	9.8	32%	5%	17%		RECYCLED TW CALCULATED POWER
53	8/14/89	SUDAN GRASS	18.6	.0	3.2	3.2	0%	0%	17%		RECYCLED TW CALCULATED POWER
54	8/16/89	SUDAN GRASS	2.9	.0	2.4	2.4	0%	0%	83%		NO RECORD ON DELIVERY
55	10/21/89	ALFALFA	130.4	.7	17.8	18.5	4%	1%	14%		
56	12/12/89	ALFALFA	74.2	1.1	2.6	3.7	30%	1%	5%		
57	2/13/90	ALFALFA	70.5	.3	11.5	11.8	3%	0%	17%		
		TOTAL	2,681.5	177.9	389.2	567.1	31%	7%	21%		
		AVG	48.8	3.2	7.1	10.3					
		STD DEV	39.3	8.4	8.2	11.3					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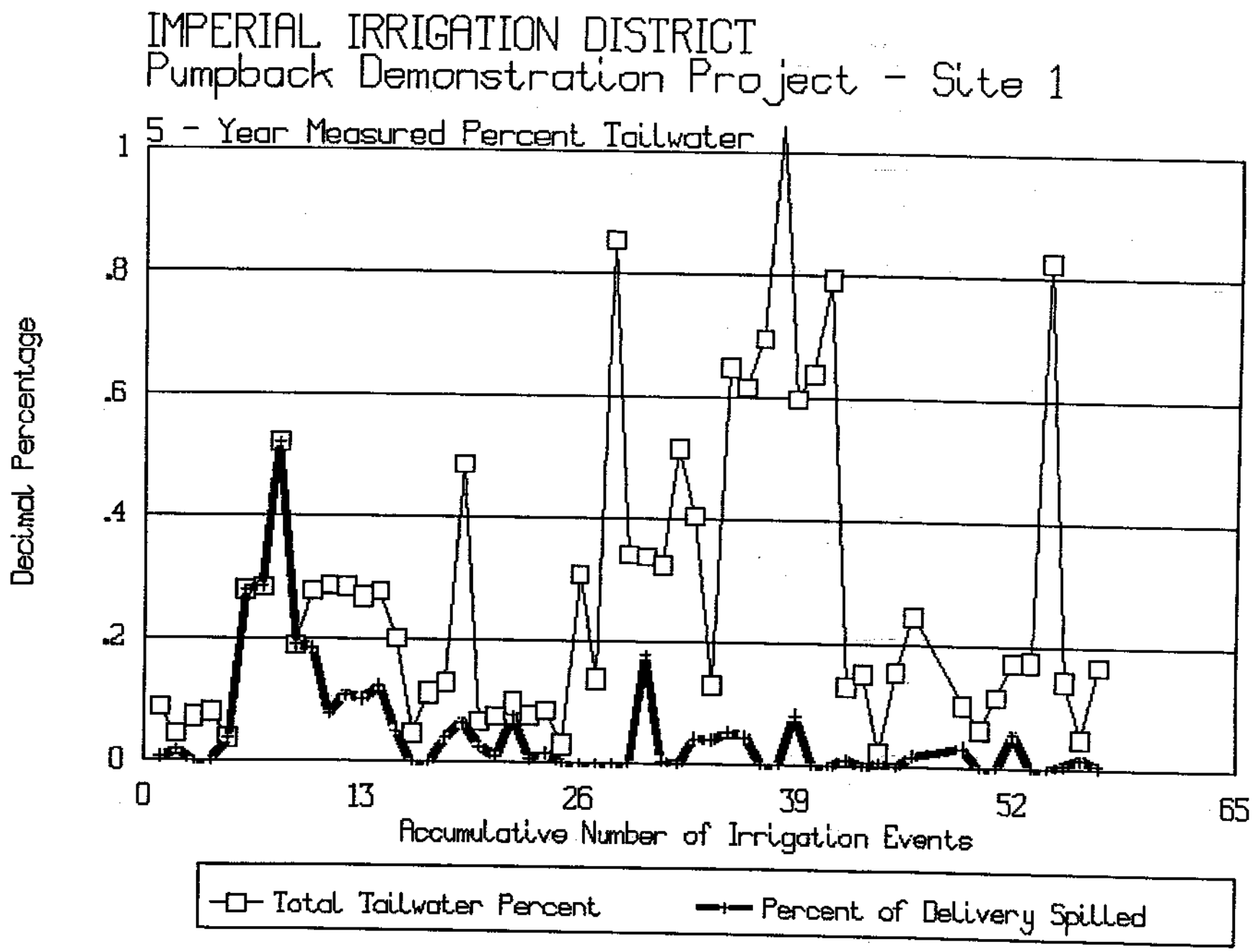
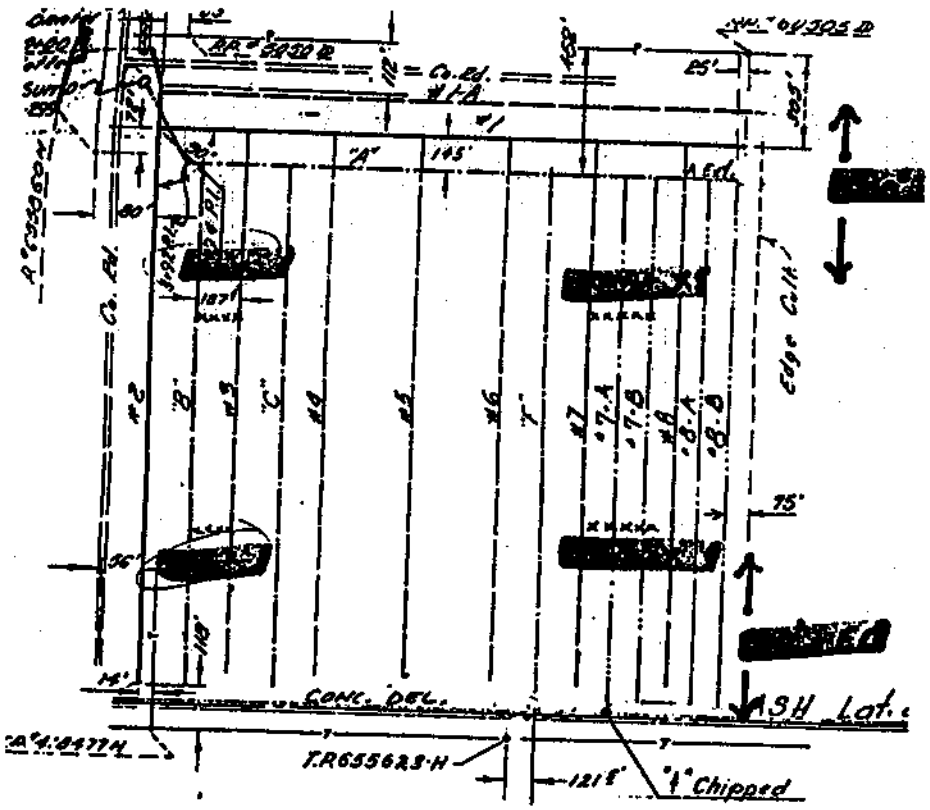
Pumpback Demonstration Project - Site 1
5 - Year Measured Water Application
Total Water Measured (Acre-feet)
3000
2400
1800
1200
600
0
0
13
26
39
52
65
Accumulative Number of Irrigation Events
Destination
Applied
Spill
Tailwater


IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 1
5 - Year Measured Percent Tailwater
Decimal Percentage
1
.8
.6
.4
.2
0
0
13
26
39
52
65
Accumulative Number of Irrigation Events
Total Tailwater Percent
Percent of Delivery Spilled

SOIL SALINITY



PUMPBACK SYSTEM #1

LOTS 1,2,4 AND 5 SEC. 16
T.16S.-R.15E.

IMPERIAL IRRIGATION DISTRICT
AVERAGE SOIL SALINITY ACROSS SELECTED LOCATIONS - PUMPBACK SYSTEM #1

NORTHWEST - SITE 1

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	4.7	3.1	-34%	2.2	-29%
12	6.5	3.3	-49%	3.4	3%
24	9.0	4.2	-53%	4.6	10%
36	9.9	4.2	-58%	5.7	36%
48	9.5	4.6	-52%	5.3	15%
60	9.4	4.5	-52%	5.6	24%
AVG	8.2	4.0	-51%	4.5	12%

NORTHEAST - SITE 1

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	2.9	1.9	-34%	1.6	-16%
12	4.2	2.5	-40%	2.1	-16%
24	5.8	2.5	-57%	3.1	24%
36	6.6	3.7	-44%	4.6	24%
48	8.1	3.5	-57%	4.1	17%
60	7.5	4.1	-45%	5.4	32%
AVG	5.9	3.0	-48%	3.5	15%

SOUTHWEST - SITE 1

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	3.1	1.2	-61%	1.7	42%
12	3.5	1.2	-66%	2.1	75%
24	3.8	1.5	-61%	2.4	60%
36	3.7	2.4	-35%	4.9	104%
48	5.3	3.2	-40%	5.1	59%
60	5.8	3.3	-43%	5.7	73%
AVG	4.2	2.1	-49%	3.7	71%

SOUTHEAST - SITE 1

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	1.7	1.3	-24%	1.8	38%
12	1.7	1.4	-18%	1.9	36%
24	3.3	2.2	-33%	2.3	5%
36	4.3	3.2	-26%	4.1	28%
48	5.5	3.6	-35%	5.0	39%
60	4.1	3.2	-22%	4.6	44%
AVG	3.4	2.5	-28%	3.3	32%

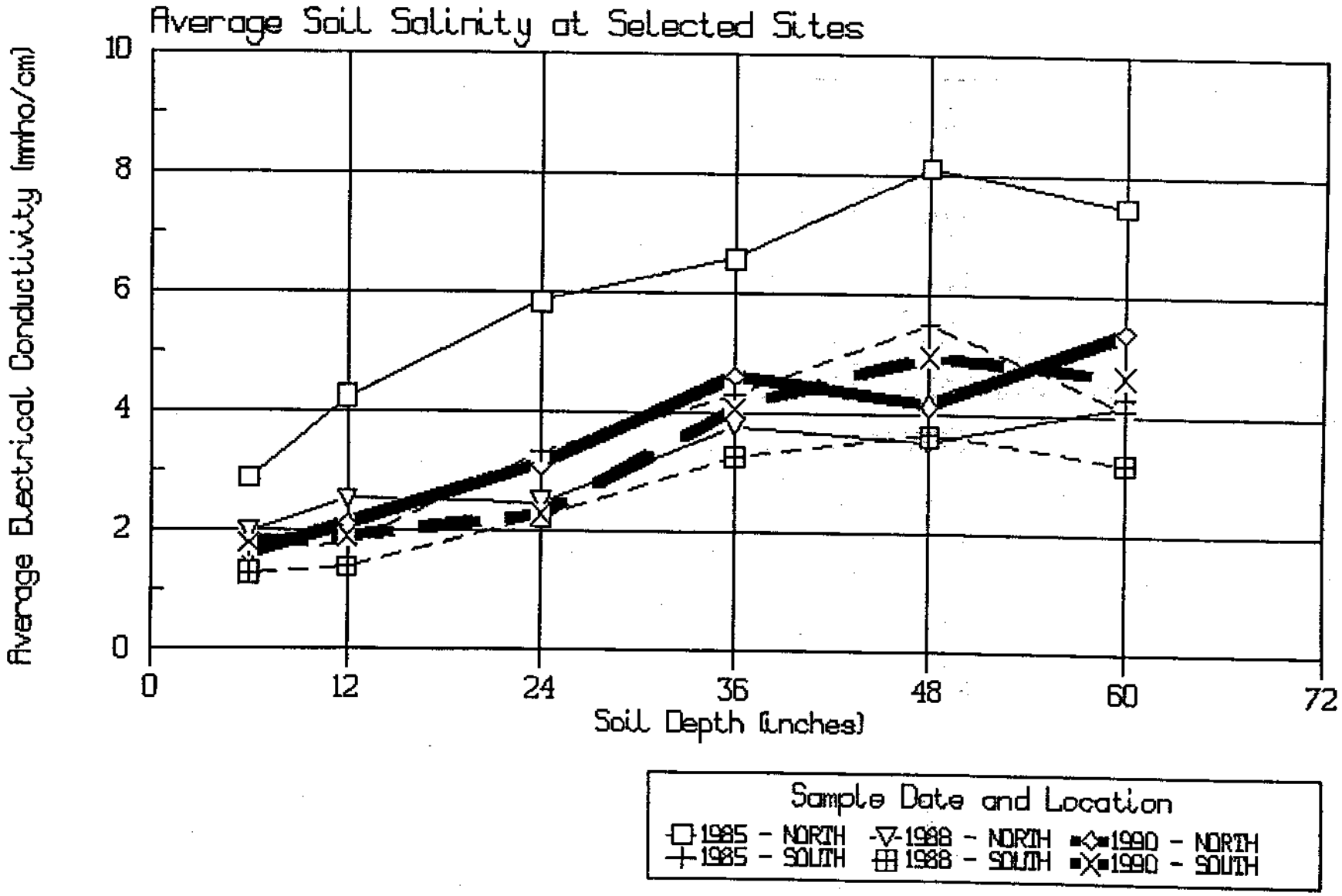
AVERAGE ELECTRICAL CONDUCTIVITY 1985 TO 1988 PERCENT INCREASE FOR SITE 1 = -46%
AVERAGE ELECTRICAL CONDUCTIVITY 1988 TO 1990 PERCENT INCREASE FOR SITE 1 = 28%
AVERAGE ELECTRICAL CONDUCTIVITY 1985 TO 1990 PERCENT INCREASE FOR SITE 1 = -31%

NOTE: NEGATIVE VALUES SIGNIFY DECREASES IN THE AVERAGE SOIL SALINITY.
ECe VALUES (MMHOS/CM) AVERAGED FROM SAMPLES OVER TILE DRAINS.

IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 1 EAST
SOIL SALINITY

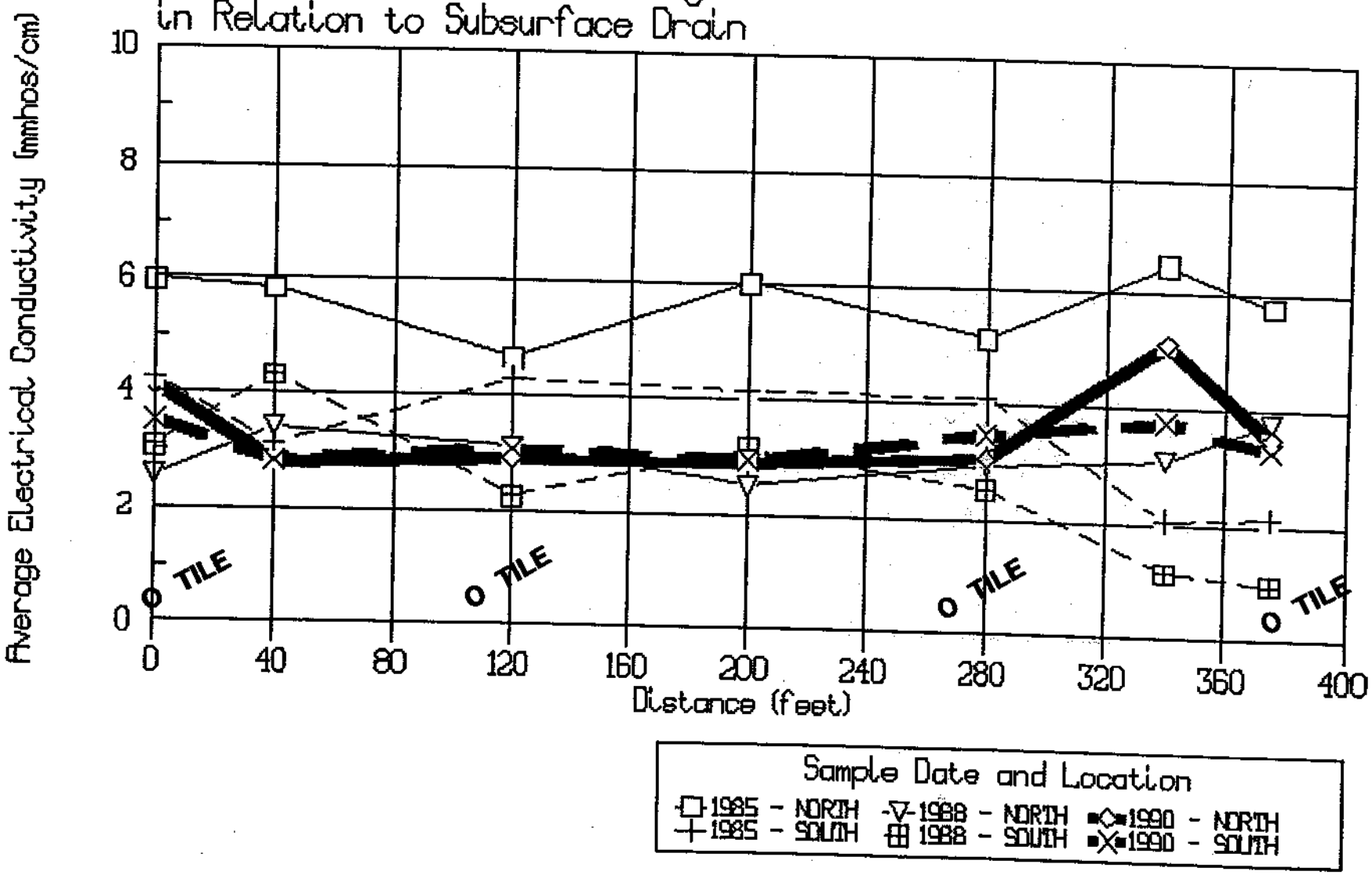
		DEPTH (in.)	DRAIN 7 DISTANCE (feet) 375	340	280	200	120	DRAIN 8 40	0	AVG EC (mmho/cm)
NORTH	1985	6	1.7	1.7	1.4	7.7		1.9	2.8	2.9
		12	6.4	3.3	3.7	2.8	6.1	4.5	2.8	4.2
		24	5.1	7.2	5.5	3.1			8.2	5.8
		36	7.0	8.2	4.9	6.8	3.2	7.1	8.7	6.6
		48	9.1	9.3	8.2	8.7		7.1	6.1	8.1
		60	5.4	9.3	7.2	7.1		8.6	7.2	7.5
		AVG EC	5.8	6.5	5.2	6.0	4.7	5.8	6.0	5.7
	1988	6	2.2	1.4	3.1	2.1	1.5	1.9	1.4	1.9
		12	4.7	1.6	3.7	1.9	3.0	1.3	1.4	2.5
		24	3.2	2.2	2.1	2.1	3.0	2.6	2.2	2.5
		36	4.2	5.7	2.2	2.2	2.8	5.2	3.9	3.7
		48	3.3	3.4	2.7	2.7	3.9	6.0	2.5	3.5
		60	5.0	4.4	3.9	3.9	4.3	3.6	3.9	4.1
		AVG EC	3.8	3.1	3.0	2.5	3.1	3.4	2.5	3.0
	1990	6	2.2	1.6	1.8	1.3	1.3	1.3	1.6	1.6
		12	2.4	1.6	2.1	1.9	1.9	3.4	1.4	2.1
		24	2.8	5.3	3.7	2.2	2.2	2.6	2.9	3.1
		36	4.0	6.1	3.9	4.1	4.1	3.8	6.2	4.6
		48	4.3	6.2	3.6	3.1	3.1	2.4	6.2	4.1
		60	5.3	9.9	3.2	4.8	4.8	3.2	6.4	5.4
		AVG EC	3.5	5.1	3.1	2.9	2.9	2.8	4.1	3.5
SOUTH	1985	6	1.7	1.6	1.3	1.4	1.3	2.3	2.3	1.7
		12	1.7	1.5	1.6	1.4	1.6	2.1	2.3	1.7
		24	1.5	1.6	6.5	2.5	6.1	1.4	3.7	3.3
		36	2.2	2.5	2.4	7.1		3.9	7.6	4.3
		48	2.6	2.5	5.1	8.1	8.2	4.9	6.9	5.5
		60	3.0	2.7	7.7	4.3		4.1	2.8	4.1
		AVG EC	2.1	2.1	4.1	4.1	4.3	3.1	4.3	3.4
	1988	6	.9	.8	1.0	1.3	1.5	2.6	.8	1.3
		12	.9	.9	1.6	1.4	1.5	2.4	1.0	1.4
		24	.9	1.0	1.3	3.4	1.8	4.6	2.5	2.2
		36	1.0	1.2	3.8	5.0	3.1	5.2	3.5	3.2
		48	1.1	1.5	4.1	4.2	2.9	6.0	5.6	3.6
		60	1.1	1.5	3.2	3.6	2.8	5.2	4.9	3.2
		AVG EC	1.0	1.2	2.5	3.1	2.2	4.3	3.1	2.5
	1990	6	1.6	2.0	1.6	1.4	1.3	1.9	2.6	1.8
		12	1.3	2.8	1.5	1.9	1.2	1.9	2.6	1.9
		24	2.8	2.7	1.7	1.4	2.3	2.0	2.9	2.3
		36	5.4	4.4	4.4	3.5	3.4	3.0	4.3	4.1
		48	5.0	4.9	7.0	4.3	4.6	4.2	4.7	5.0
		60	3.6	5.7	4.6	5.1	5.5	3.9	4.0	4.6
		AVG EC	3.3	3.8	3.5	2.9	3.1	2.8	3.5	3.3

IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 1 East



IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 1 East

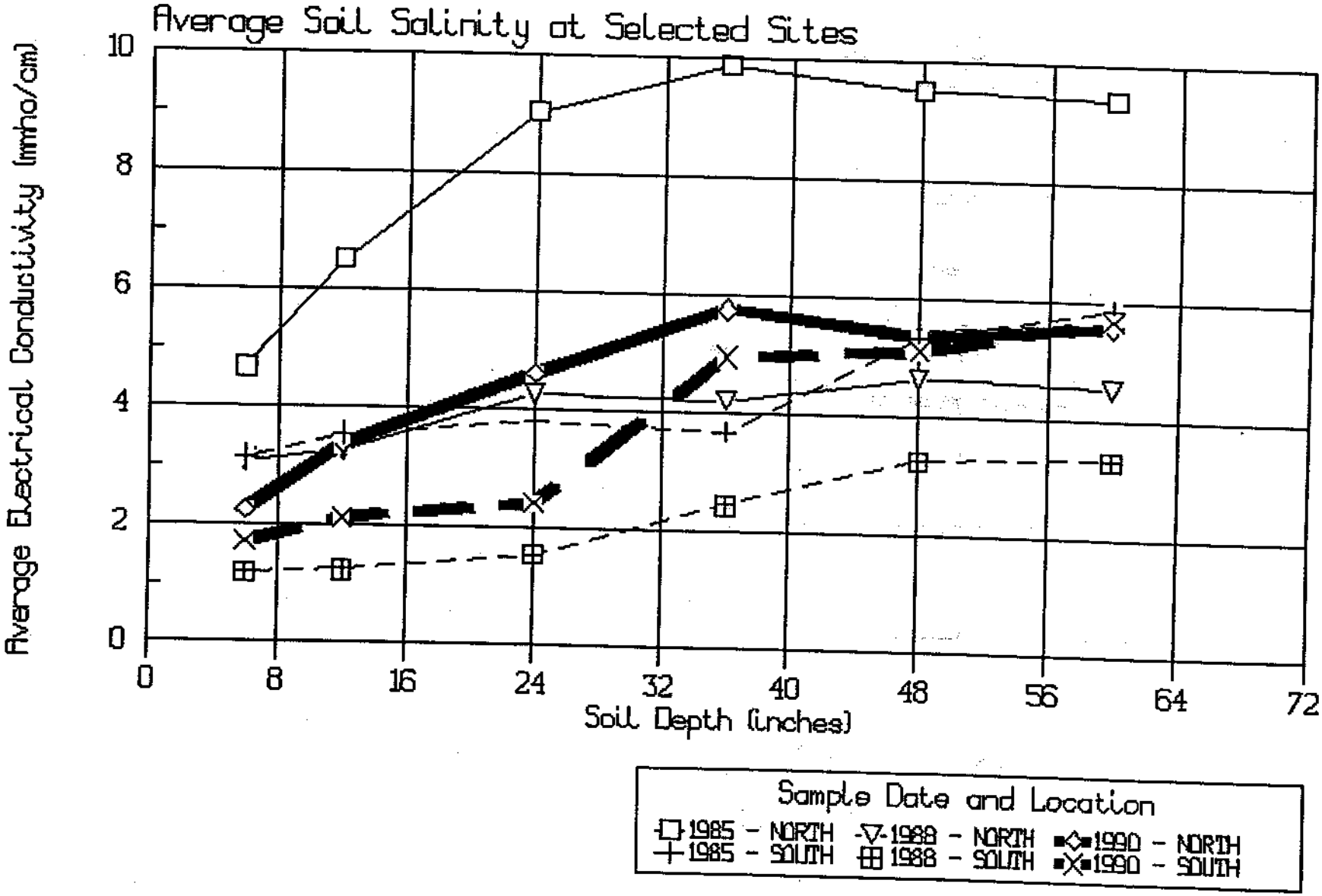
Average Soil Profile Salinity
in Relation to Subsurface Drain



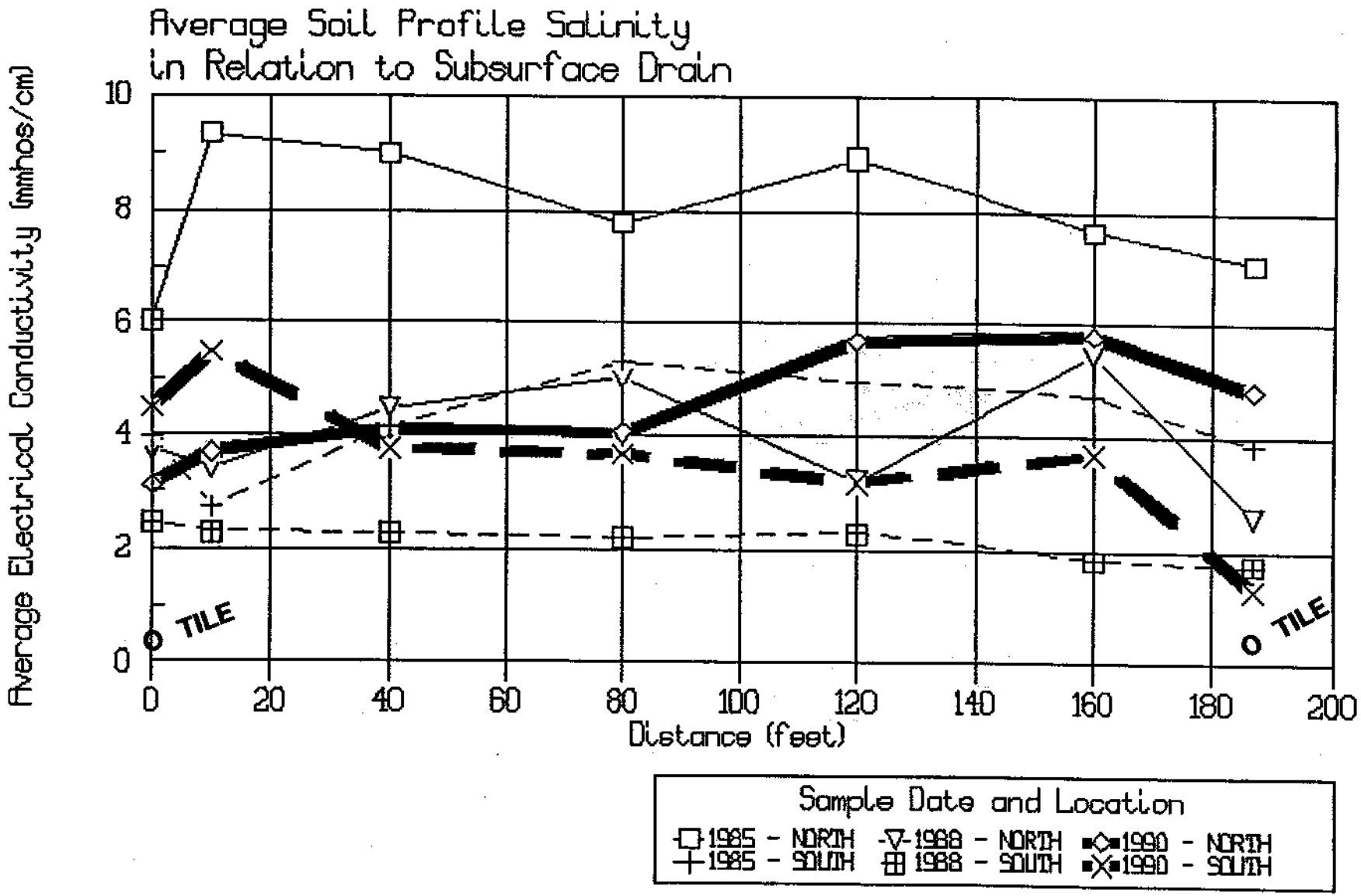
IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 1 WEST
SOIL SALINITY

		DEPTH (in.)	DRAIN B 0	10	40	80	120	160	DRAIN 3 187	AVG EC (mmho/cm)
			DISTANCE (feet)							
NORTH	1985	6	3.8	7.6	7.5	6.1	4.5	1.8	1.3	4.7
		12	5.2		10.0	7.6	7.6	4.6	3.9	6.5
		24		10.1	9.0	8.1	9.7	9.0	8.2	9.0
		36		10.1	9.0	9.1	11.3	11.0	8.7	9.9
		48			9.0	8.1	10.2	10.0	10.2	9.5
		60	9.1	9.6	9.5	7.6	10.2	9.5	10.2	9.4
		AVG EC	6.0	9.4	9.0	7.8	8.9	7.7	7.1	8.0
	1988	6	3.5	2.8	4.2	3.9	2.8	2.3	2.0	3.1
		12	3.0	2.8	4.6	3.9	2.8	3.7	2.1	3.3
		24	2.9	3.5	4.7	5.8	3.7	7.1	2.0	4.2
		36	3.1	3.7	4.3	5.2	4.0	5.2	3.8	4.2
		48	5.2	3.7	4.7	4.8	3.7	7.4	2.7	4.6
		60	4.5	3.9	4.4	6.5	2.2	7.0	3.0	4.5
		AVG EC	3.7	3.4	4.5	5.0	3.2	5.5	2.6	4.0
	1990	6	1.8	2.5	2.2	1.9	1.9	2.3	2.9	2.2
		12	2.1	2.1	2.2	2.5	4.9	6.2	3.5	3.4
		24	2.1	2.3	3.7	5.5	8.3	6.2	4.1	4.6
		36	5.1	5.3	5.1	5.0	7.2	5.4	7.0	5.7
		48	3.1	4.5	6.0	5.4	5.8	7.3	5.3	5.3
		60	4.4	5.4	5.5	4.0	6.1	7.4	6.1	5.6
		AVG EC	3.1	3.7	4.1	4.1	5.7	5.8	4.8	4.5
SOUTH	1985	6	1.6	1.3	2.0	3.0	3.4	8.7	1.9	3.1
		12	3.6	1.7	1.8	3.8	4.0	6.2	3.6	3.5
		24	4.7	1.9	3.3	3.8	4.9	3.8	4.2	3.8
		36	3.9	3.5	3.9	5.1		2.6	3.0	3.7
		48	3.8	3.6	6.3	8.1	6.5	3.5	5.4	5.3
		60	6.3	4.3	7.6	8.1	6.1	3.5	5.0	5.8
		AVG EC	4.0	2.7	4.2	5.3	5.0	4.7	3.9	4.2
	1988	6	1.2	1.1	1.2	1.3	1.0	1.0	1.3	1.2
		12	1.2	1.1	1.2	1.4	1.1	1.3	1.2	1.2
		24	2.4	1.6	1.6	1.5	1.5	1.1	1.1	1.5
		36	3.4	2.4	2.5	2.4	3.2	1.2	1.9	2.4
		48	3.8	4.0	3.3	3.0	3.2	3.0	2.4	3.2
		60	2.6	3.5	3.7	3.6	3.6	3.4	2.6	3.3
		AVG EC	2.4	2.3	2.3	2.2	2.3	1.8	1.8	2.1
	1990	6	2.6	1.8	1.3	1.5	2.1	1.5	1.1	1.7
		12	3.3	3.7	1.6	1.4	1.9	1.7	1.1	2.1
		24	2.8	5.3	1.9	1.9	1.9	2.0	1.0	2.4
		36	5.2	7.1	5.7	4.9	4.2	6.2	1.2	4.9
		48	6.4	7.5	6.3	6.2	3.4	4.5	1.3	5.1
		60	6.5	7.5	5.7	6.1	5.5	6.2	2.2	5.7
		AVG EC	4.5	5.5	3.8	3.7	3.2	3.7	1.3	3.6

IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 1 West



IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 1 West



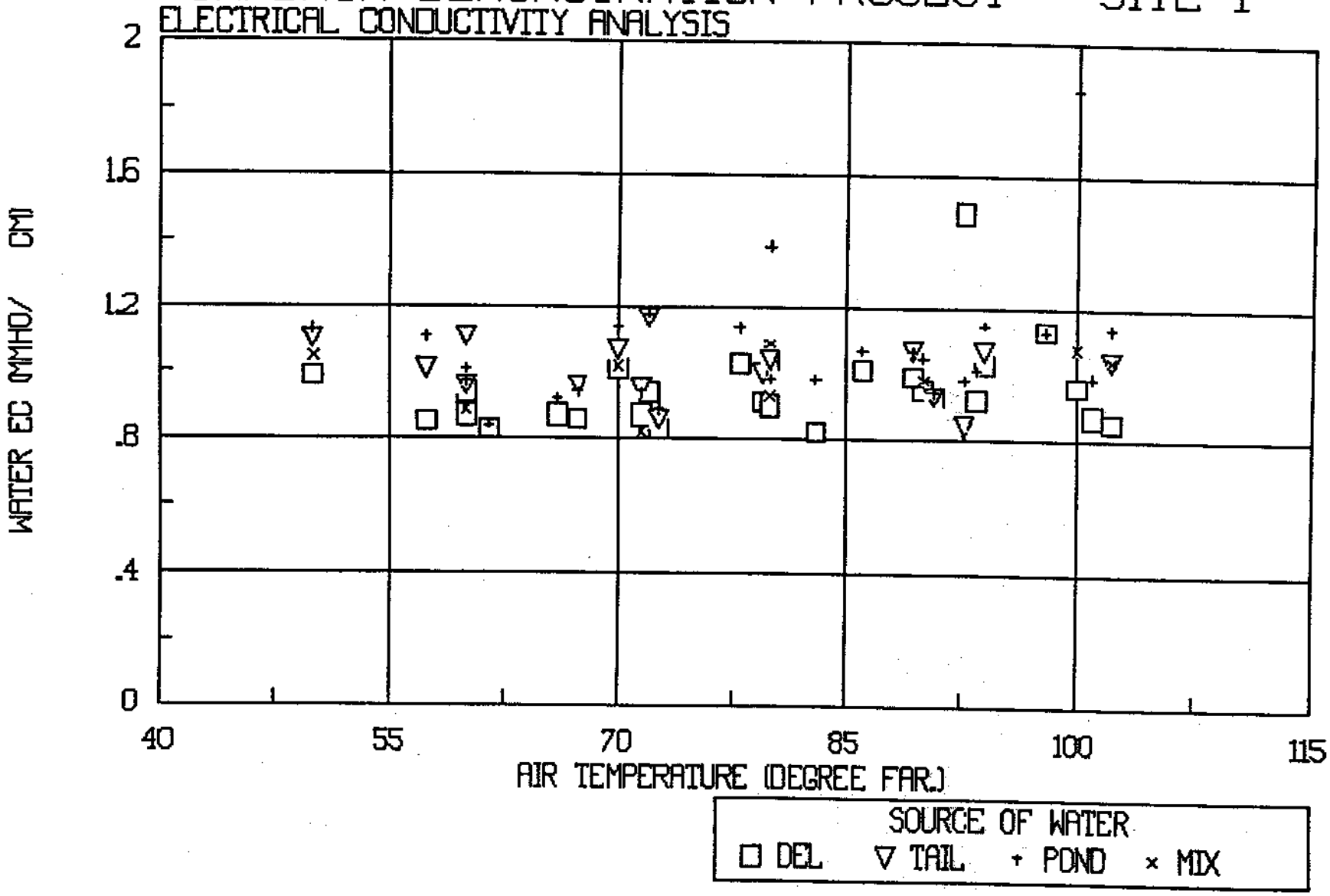
WATER SALINITY

PUMPBACK SYSTEM #1

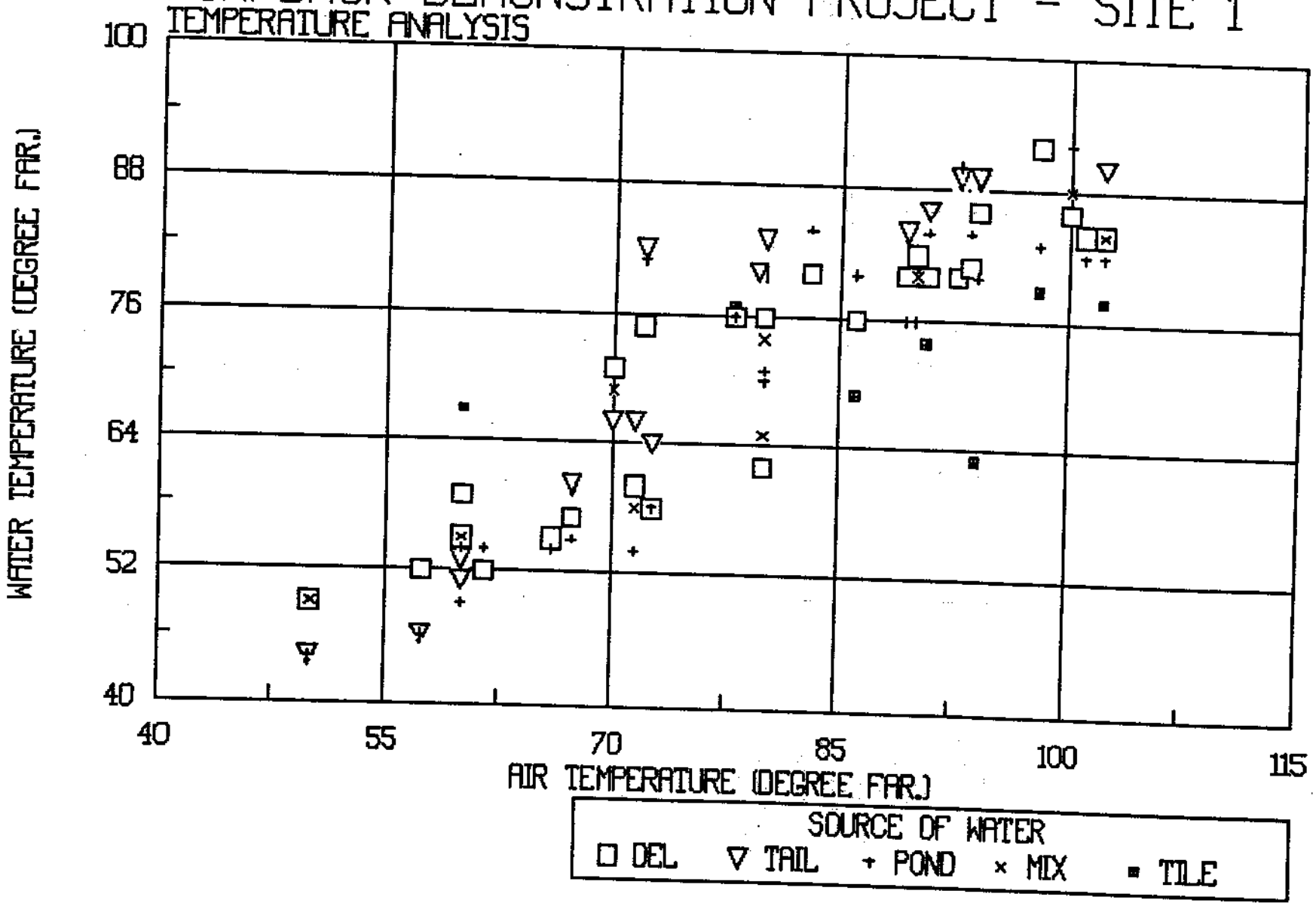
		AIR TEMPERATURE (DEGREES FAR.)						WATER TEMPERATURE (DEGREES FAR.)					CHANGE FROM DELIVERY TEMP (DEGREES FAR.)				WATER EC (MMHO/CM)					CHANGE FROM DELIVERY EC (MMHO/CM)			
DATE	TIME	DEL	TAIL	POND	MIX	TILE	AVG	DEL	TAIL	POND	MIX	TILE	TAIL	POND	MIX	TILE	DEL	TAIL	POND	MIX	TILE	TAIL	POND	MIX	TILE
8/21/85	305	80	79				80	80	80				0	*	*	*									
3/10/86	1110	72	72	72			72	75	82	81			7	6	*	*	.91	1.00				.09	*	*	*
4/25/86	1324	80	80	80	80		80	76	83	71	74		7	(5)	(2)	*	.94	1.17	1.18			.23	.24	*	*
4/30/86	1245	92	93	93			93	80	89	90			9	10	*	*	.90	1.04	.98	.93		.14	.08	.03	*
6/ 4/86	945	83		83			83	80		84			*	4	*	*	1.49	.84	.98			(.65)	(.51)	*	*
6/18/86	1240	101		101			101	84		82			*	(2)	*	*	.82		.98			*	.16	*	*
7/ 9/86	1020	94		93			94	81		84			*	3	*	*	.87		.99			*	.12	*	*
12/15/86	1245	67	67	68			67	57	60	55			3	(2)	*	*	.92		1.01			*	.09	*	*
12/17/86	1025	66		66			66	55		54			*	(1)	*	*	.86	.96	.94			.10	.08	*	*
12/30/86	1325	70	74	74			73	58	64	58			6	0	*	*	.87		.92			*	.05	*	*
1/14/87	1157	61		62			62	52		54			*	2	*	*	.83	.86	.89			.03	.06	*	*
2/17/87	1220	68	74	72	72		72	60	66	54	58		6	(6)	(2)	*	.83		.84			*	.01	*	*
2/18/87	920	60	60	60	60		60	55	51	49	55		(4)	(6)	0	*	.87	.95	.94	.82		.08	.07	(.05)	*
2/20/87	830	60	54	58			57	52	46	46			(6)	(6)	*	*	.87	.96	.97	.89		.09	.10	.02	*
5/12/87	1120	90		90	90		90	82		76	80		*	(6)	(2)	*	.85	1.01	1.11			.16	.26	*	*
6/16/87	1010	90	88	90			89	80	84	76			4	(4)	*	*	.95		1.05	.98		*	.10	.03	*
8/18/87	1300	100		102	98		100	86		92	88		*	6	2	*	.99	1.07	1.07			.08	.08	*	*
3/18/88	805	60	60	60		61	60	59	53	54		67	(6)	(5)	*	8	.96		1.86	1.08		*	.90	.12	*
5/25/88	952	86		86		86	86	76		80		69	*	4	*	(7)	.94	1.11	1.01		8.08	.17	.07	*	7.14
7/ 6/88	915	94	94	94		94	94	86	89	80		63	3	(6)	*	*	1.01		1.07		7.99	*	.06	*	6.98
10/ 4/88	1045	90	91	91		91	91	80	86	84		74	6	4	*	(6)	1.03	1.07	1.15		7.82	.04	.12	*	6.79
10/ 7/88	1435	102	103	102	102	103	102	84	90	82	84	78	6	(2)	0	(6)	.93	.93	.94		1.23		.01	*	.30
10/11/88	1255	98		98		98	98	92		83		79	*	(9)	*	(13)	.85	1.04	1.14	1.04	6.82	.19	.29	.19	5.97
10/19/88	1500	78		78		78	78	76		76		77	*	0	*	1	1.13		1.13		6.51	*		*	5.38
2/20/90	757	50	50	50	50		50	49	44	44	49		(5)	(5)	0	*	1		1		7.44	*	0	*	6
3/15/90	1227	80		80	80		80	62		70	65		*	8	3	*	.99	1.10	1.13	1.05		.11	.14	.06	*
5/16/90	818	70	70	70	70		70	71	66	64	69		(5)	(7)	(2)	*	1.04		1.39	1.09		*	.35	.05	*
	AVERAGES	79	76	80	78		79	71	71	70	69	72	2	(1)	0	(4)	1.01	1.07	1.14	1.02		.06	.13	.01	*
	STD DEV	14.6	14.9	14.9	16.1	13.1	15	12.7	15.9	14.5	12.8	5.7	5	5	2	7	.95	1.01	1.08	.99	6.56	.06	.12	.05	5.57
																	.13	.09	.19	.09	2.24	.19	.21	.06	2.22

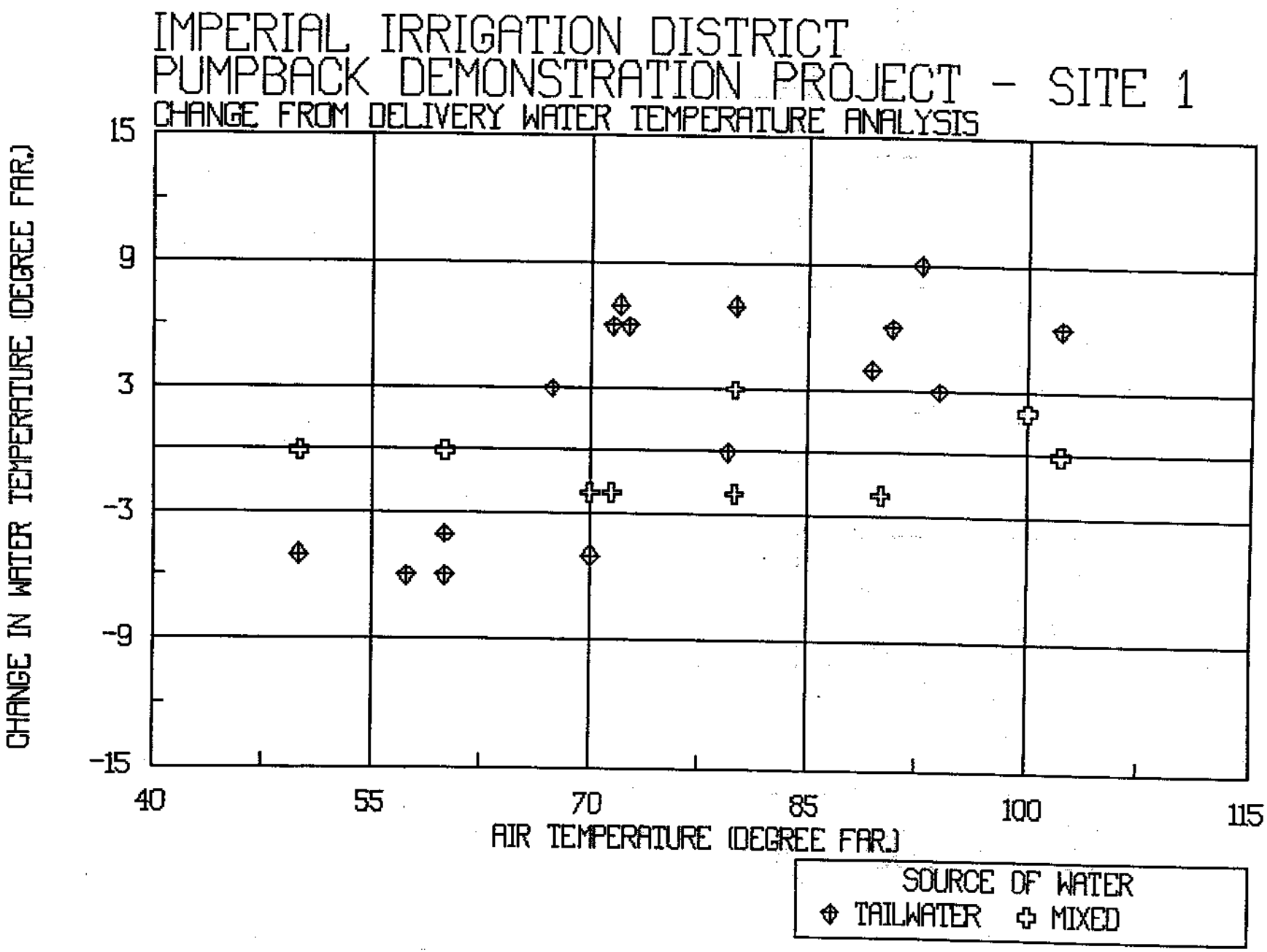
AVERAGE PERCENT INCREASE FROM DELIVERY EC 6% 13% 4%

IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 1

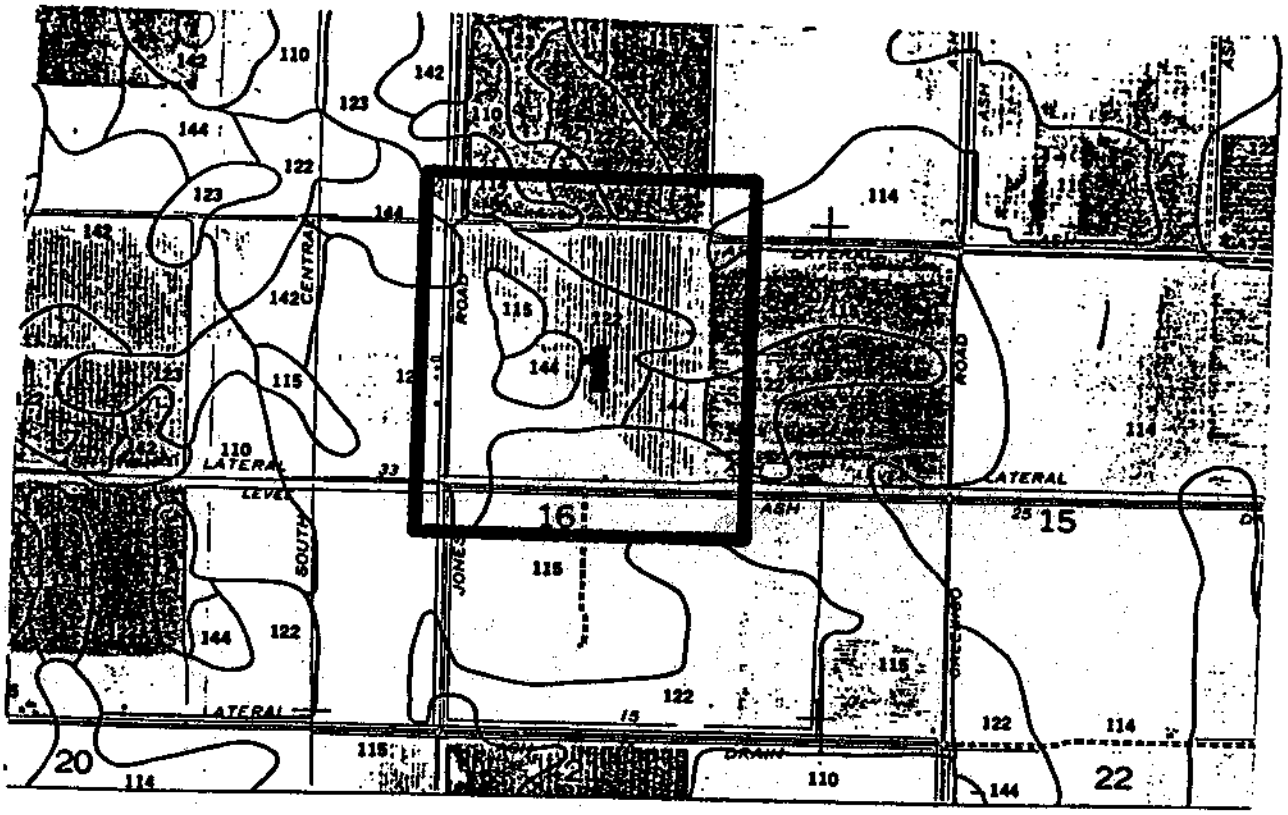


IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 1




IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 1
CHANGE FROM DELIVERY WATER TEMPERATURE ANALYSIS
CHANGE IN WATER TEMPERATURE (DEGREE FAR.)
15
9
3
-3
-9
-15
40
55
70
85
100
115
AIR TEMPERATURE (DEGREE FAR.)
SOURCE OF WATER
TAILWATER
MIXED

SCS SOIL BORINGS



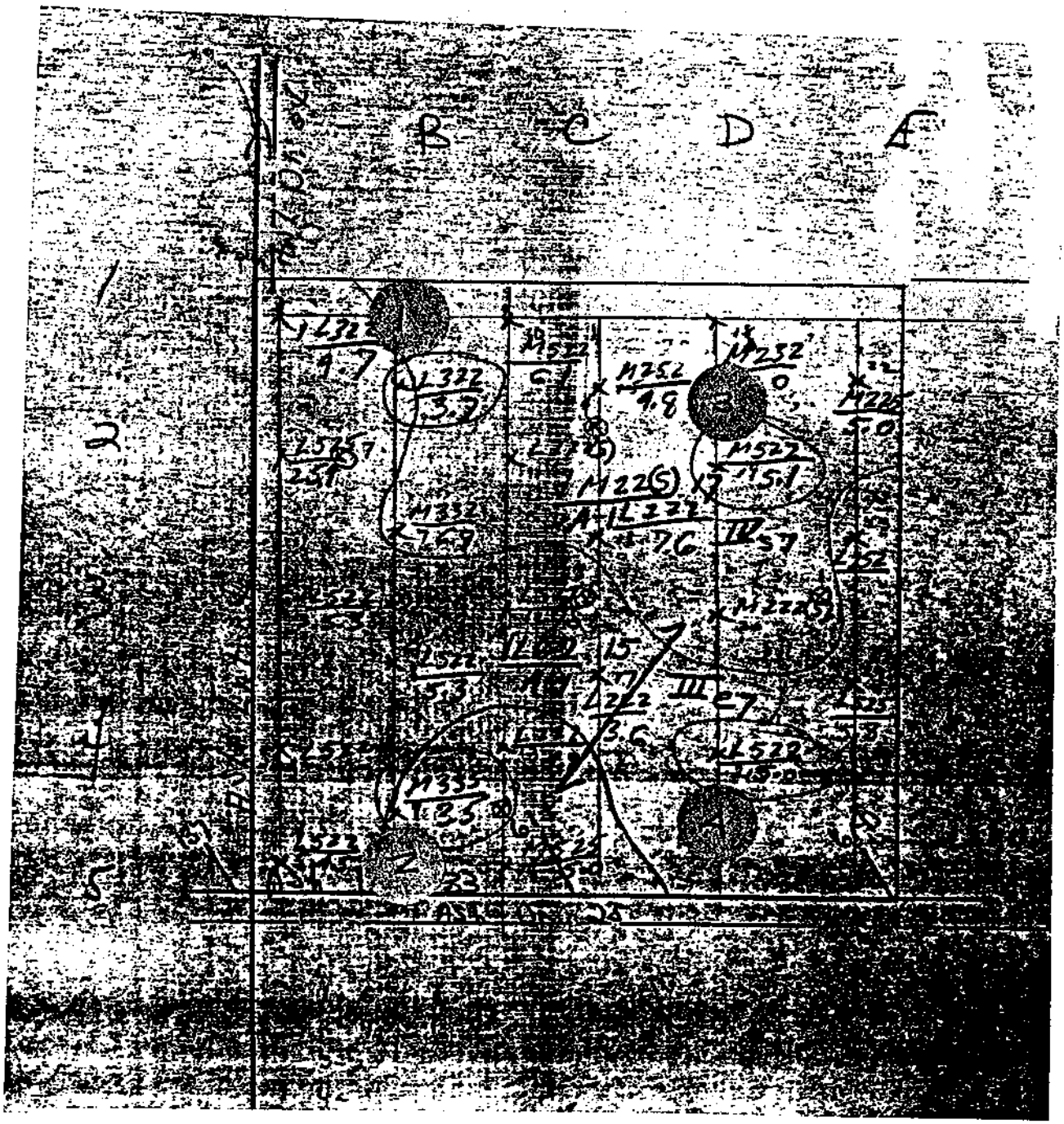
PUMPBACK SYSTEM # 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL LEGEND

SYMBOL	NAME
100	Antho loamy fine sand
101	Antho-Superstition complex
102	Badland
103	Carsitas gravelly sand, 0 to 5 percent slopes
104	Fluvaquents, saline
105	Glenbar clay loam
106	Glenbar clay loam, wet
107	Glenbar complex
108	Holtville loam
109	Holtville silty clay
110	Holtville silty clay, wet
111	Holtville-Imperial silty clay loams
112	Imperial silty clay
113	Imperial silty clay, saline
114	Imperial silty clay, wet
115	Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes
116	Imperial-Glenbar silty clay loams, 2 to 5 percent slopes
117	Indio loam
118	Indio loam, wet
119	Indio-Vint complex
120	Laveen loam
121	Meloland fine sand
122	Meloland very fine sandy loam, wet
123	Meloland and Holtville loams, wet
124	Niland gravelly sand
125	Niland gravelly sand, wet
126	Niland fine sand
127	Niland loamy fine sand
128	Niland-Imperial complex, wet
129	Pits
130	Rositas sand, 0 to 2 percent slopes
131	Rositas sand, 2 to 5 percent slopes
132	Rositas fine sand, 0 to 2 percent slopes
133	Rositas fine sand, 2 to 9 percent slopes
134	Rositas fine sand, 9 to 30 percent slopes
135	Rositas fine sand, wet, 0 to 2 percent slopes
136	Rositas loamy fine sand, 0 to 2 percent slopes
137	Rositas silt loam, 0 to 2 percent slopes
138	Rositas-Superstition loamy fine sand
139	Superstition loamy fine sand
140	Torriorthents-Rock outcrop complex, 5 to 60 percent slopes
141	Torriorthents and Orthids, 5 to 30 percent slopes
142	Vint loamy very fine sand, wet
143	Vint fine sandy loam
144	Vint and Indio very fine sandy loams, wet

SCS
BORINGS -
PUMPBACK #1



SOIL PROFILE CHART
FOR DRAINAGE INVESTIGATION
IMPERIAL IRRIGATION DISTRICT

PUMPBACK #1

1

ROPERTY _____ WEIGHTED AVERAGE PERMEABILITY _____ in./hr.

ORING NO. 6 LAND USE _____ CROP CONDITION _____

ECHNICIAN _____ DATE SURVEY 51 SYMBOL L 322-15

FIELD APPROXIMATIONS

IMP. IRRIG. DIST. DRAINAGE SYM.			SL		SLS		FS		MS		S		CS
STANDARD TEXTURE SYMBOLS	c sic sicl	cl scl sil	l	vfsl	fsl	sl	lvfs	ls	vfs	fs	s		cos
STANDARD PERMEABILITY SYM.	2	3	4		5				6		7		
PERMEABILITY inches per hour	.10	.25		1.0		2.0	2.5	3.0	4.0	5.0		6.0	7.0

W.S.

NOTE: When permeability rates exceed 7.0 in./hr., show estimated value at right margin.

7-0-15000-193

SOIL PROFILE CHART
FOR DRAINAGE INVESTIGATION
IMPERIAL IRRIGATION DISTRICT

PUMPBACK #1
#2

PROPERTY _____ WEIGHTED AVERAGE PERMEABILITY _____ in./hr.

BORING NO. 9 LAND USE _____ CROP CONDITION _____

TECHNICIAN _____ DATE SURVEY _____ SYMBOL M335

FIELD APPROXIMATIONS

IMP. IRRIG. DIST. DRAINAGE SYM.	I	S L L	SL			SLS			FS			MS				S			CS					
STANDARD TEXTURE SYMBOLS	c sic sicl	cl scl sil	l	vfsl		fsl		sl	lvfs		ls		vfs		fs	s			cos					
STANDARD PERMEABILITY SYM.	2	3	4				5					6					7							
PERMEABILITY inches per hour	.10	.25			1.0				2.0	2.5		3.0		4.0		5.0			6.0			7.0		

DEPTH IN FEET: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

W.S

NOTE: When permeability rates exceed 7.0 in./hr., show estimated value at right margin.

7-0-15000-193-L

SOIL PROFILE CHART
FOR DRAINAGE INVESTIGATION
IMPERIAL IRRIGATION DISTRICT

PUMPBACK #1
#3

PROPERTY ______ WEIGHTED AVERAGE PERMEABILITY ______ in./hr.

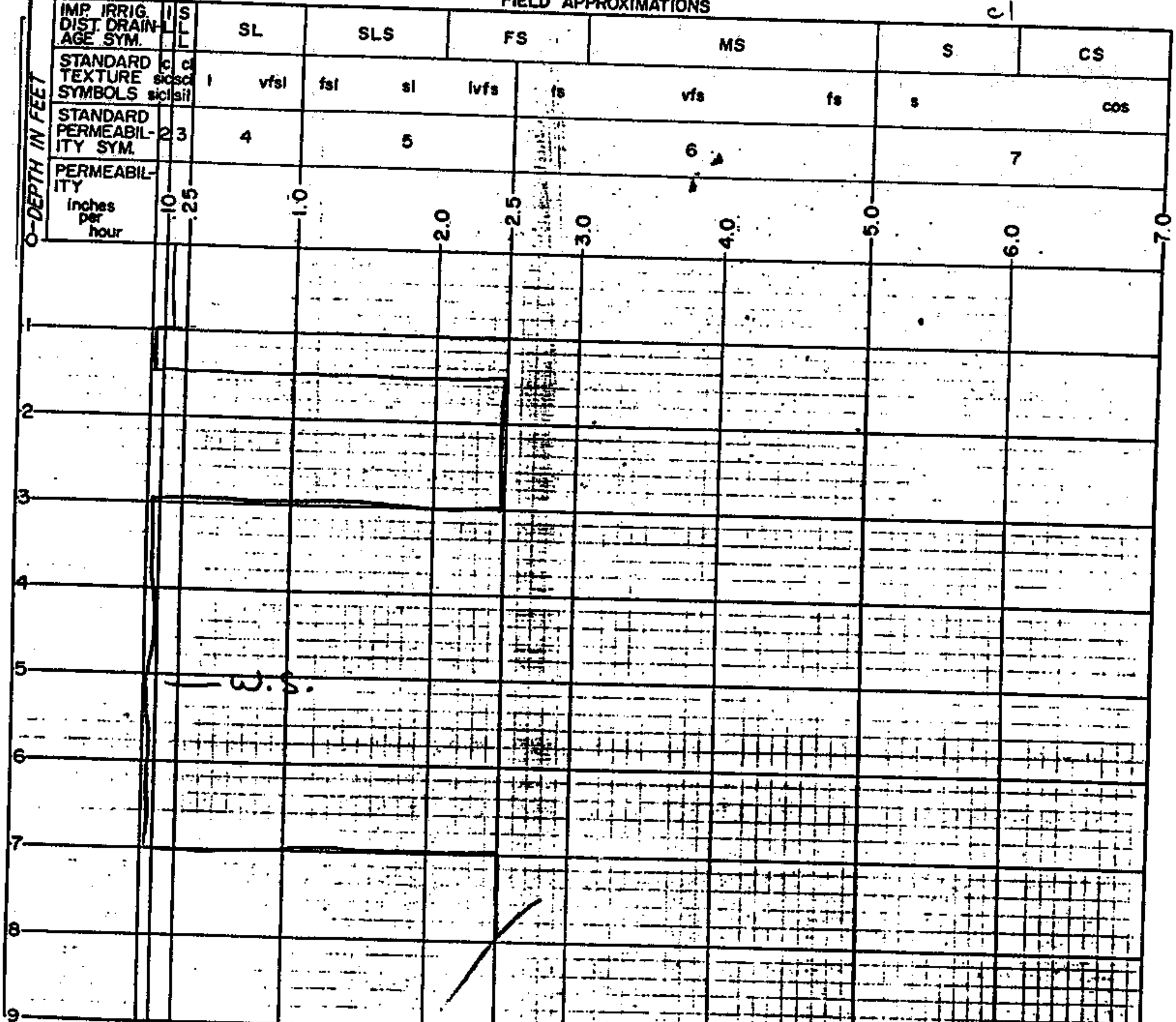
BORING NO. 19 LAND USE ______ CROP CONDITION ______

TECHNICIAN ______ DATE SURVEY ______ SYMBOL M 5 22

cl

FIELD APPROXIMATIONS

IMP. IRRIG. DIST. DRAINAGE SYM.	I L L	S L L	SL		SLS		FS		MS		S	CS
STANDARD TEXTURE SYMBOLS	c sic sicl	cl scl sil	l	vfsl	fsl	sl	lvfs	fs	vfs	fs	s	cos
STANDARD PERMEABILITY SYM.	2	3	4		5				6		7	
PERMEABILITY inches per hour	.10	.25	1.0		2.0		2.5	3.0	4.0	5.0	6.0	7.0



NOTE: When permeability rates exceed 7.0 in./hr., show estimated value at right margin.

M-1998

7-0-15000-193-L

SOIL PROFILE CHART
FOR DRAINAGE INVESTIGATION
IMPERIAL IRRIGATION DISTRICT

PUMPBACK #1
#4

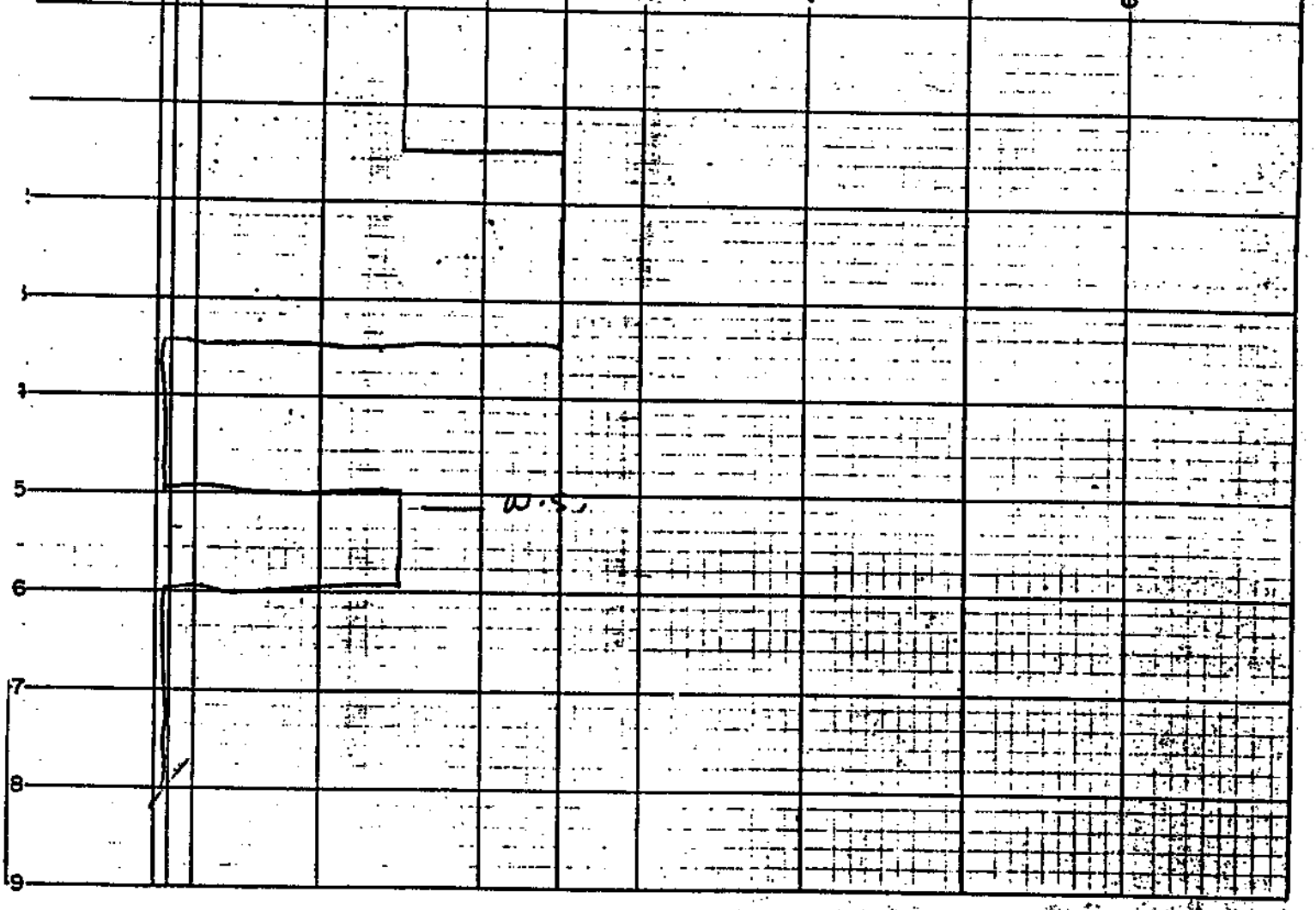
ROPERTY _____ WEIGHTED AVERAGE PERMEABILITY _____ in./hr.

ORING NO. 21 LAND USE _____ CROP CONDITION _____

ECHNICIAN _____ DATE SURVEY _____ SYMBOL 1572

FIELD APPROXIMATIONS

IMP. IRRIG. DIST. DRAINAGE SYM.	l	SL	SLS	FS	MS	S	CS
STANDARD TEXTURE SYMBOLS	c sic sicl	l vfsl fsl sl lvfs	ls vfs fs	s cos			
STANDARD PERMEABILITY SYM.	2 3	4	5	6	7		
PERMEABILITY inches per hour	.10 .25	1.0	2.0	2.5	3.0	4.0	5.0 6.0 7.0



NOTE: When permeability rates exceed 7.0 in./hr., show estimated value at right margin.

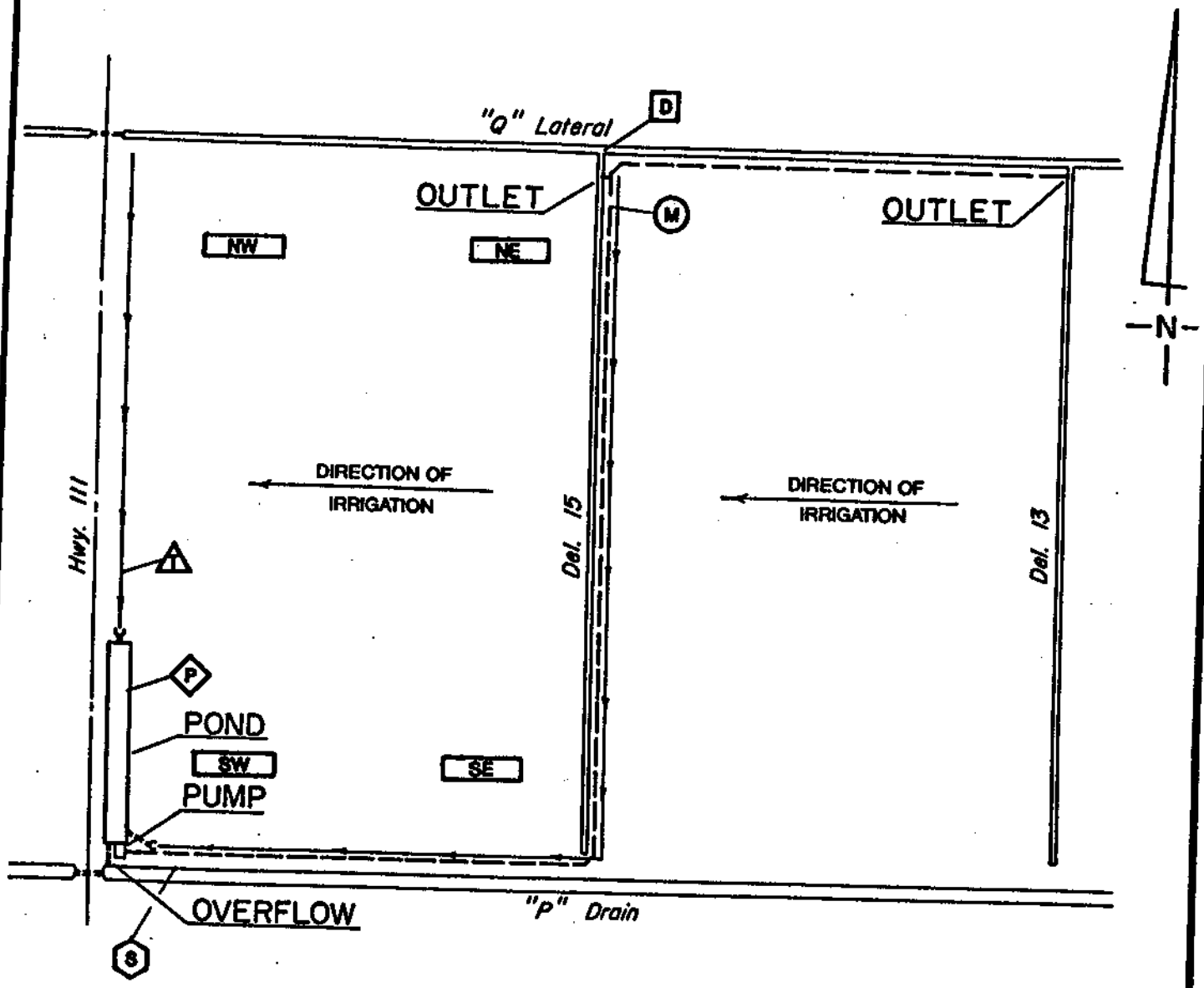
M-1228

7-0-15000-193-L

APPENDIX B

PUMPBACK SYSTEM #2

DWG. L-2882



LEGEND

- RETURN PIPELINE
- TAILWATER DITCH
- NW — SOIL SALINITY SAMPLE SITE
- D — DELIVERY WATER TEMPERATURE AND EC SAMPLE SITE
- T — TAILWATER TEMPERATURE AND EC SAMPLE SITE
- P — POND WATER TEMPERATURE AND EC SAMPLE SITE
- M — MIXED WATER TEMPERATURE AND EC SAMPLE SITE
- S — SPILL WATER TEMPERATURE AND EC SAMPLE SITE

Refer Dwg. 12F-6923

PUMPBACK SYSTEM #2

NE 1/4 SEC. 16 AND W1/2 W1/2 NW1/4 SEC.15
T.11S.-R.14E.

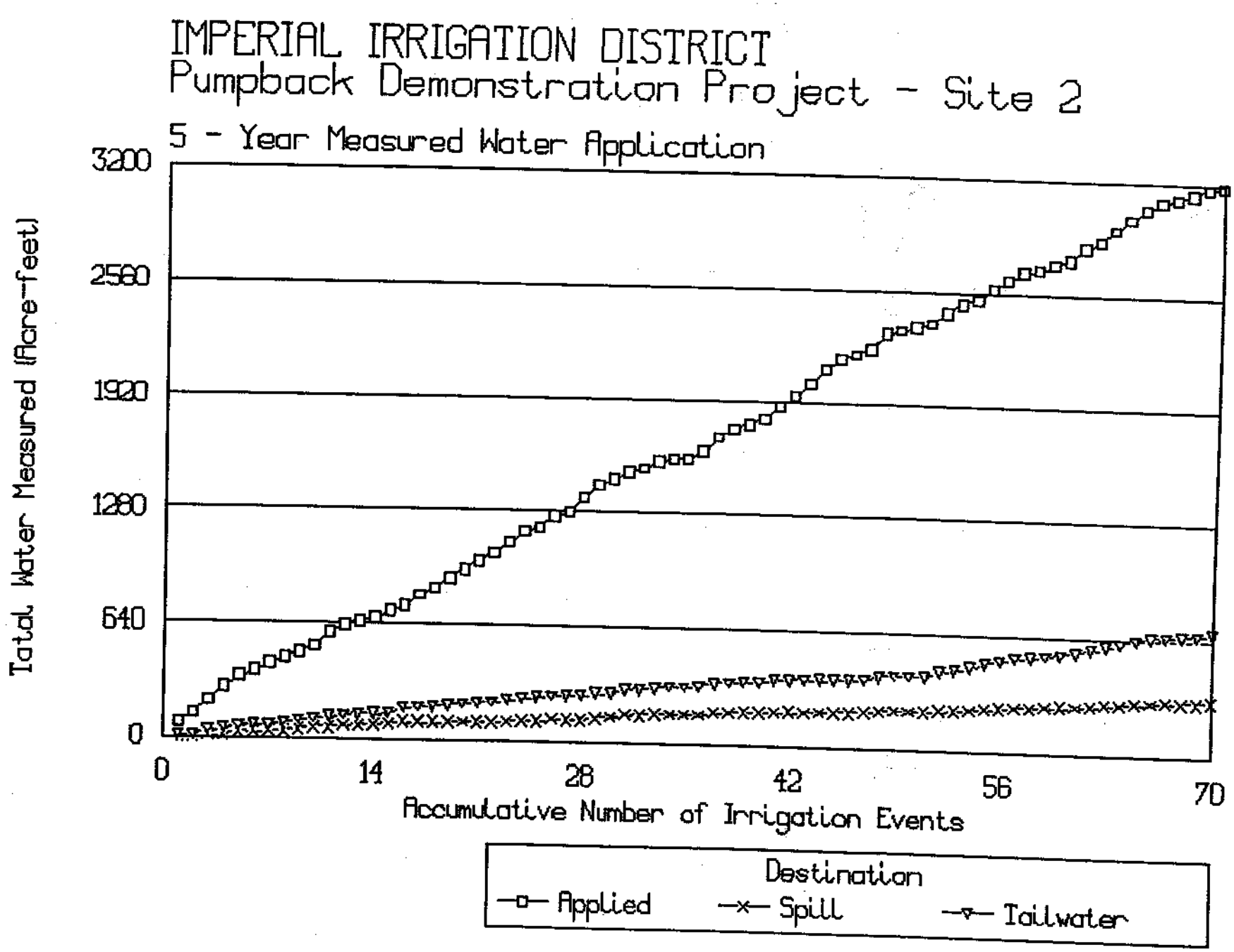
WATER DELIVERY/TAILWATER/SPILL

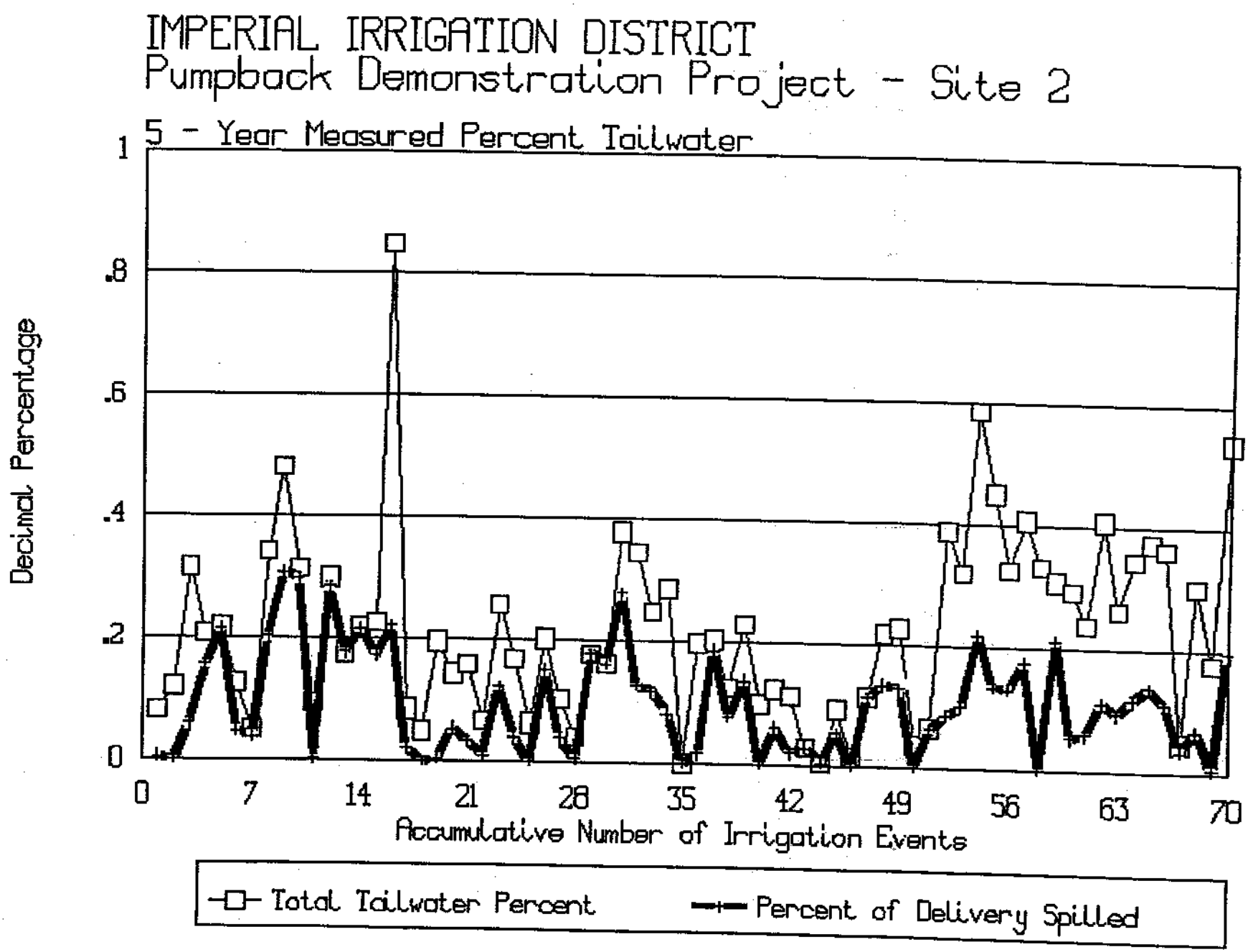
PUMPBACK SYSTEM #2

EVENT (1)	DATE (2)	CROP (3)	WATER QUANTITIES (ACRE FEET) DELIVERY (4)	SPILL (5)	RECYCLED TAILWATER (6)	TOTAL TAILWATER (7)	%TAILWATER SPILLED (8)	%DELIVERY SPILLED (9)	%DELIVERY TAILWATER (10)	NO RECORD (11)	COMMENTS (12)
1	3/ 4/86	ALFALFA	81.0	.4	6.2	6.6	6%	0%	8%		Pumpback Operational
2	3/21/86	ALFALFA	55.4	.0	6.6	6.6	0%	0%	12%		
3	4/16/86	ALFALFA	71.4	4.2	18.3	22.5	19%	6%	32%		
4	5/20/86	ALFALFA	75.2	11.7	3.7	15.4	76%	16%	20%		
5	6/ 7/86	ALFALFA	56.8	12.2	.0	12.2	100%	21%	21%		
6	6/18/86	ALFALFA	29.4	1.4	2.3	3.7	38%	5%	13%		
7	6/24/86	ALFALFA	41.2	1.6	.5	2.1	76%	4%	5%		
8	7/14/86	ALFALFA	36.4	7.3	5.1	12.4	59%	20%	34%		
9	7/21/86	ALFALFA	32.0	9.8	5.6	15.4	64%	31%	48%		
10	7/29/86	ALFALFA	32.2	9.5	.6	10.1	94%	30%	31%		
11	9/19/86	ALFALFA	79.2	.2	7.2	7.4	3%	0%	9%		
12	10/ 9/86	ALFALFA	42.4	12.0	.6	12.6	95%	28%	30%		
13	11/24/86	ALFALFA	20.0	3.5	.0	3.5	100%	18%	18%		
14	12/ 2/86	ALFALFA	20.0	4.3	.0	4.3	100%	22%	22%		
15	12/20/86	ALFALFA	35.6	6.1	1.9	8.0	76%	17%	22%		
16	1/12/87	ALFALFA	36.0	7.9	22.7	30.6	26%	22%	85%		
17	3/ 6/87	ALFALFA	60.7	1.4	3.7	5.1	27%	2%	8%		
18	3/18/87	ALFALFA	36.0	.0	1.8	1.8	0%	0%	5%		
19	4/16/87	ALFALFA	58.4	.3	11.0	11.3	3%	1%	19%		
20	4/30/87	ALFALFA	52.2	2.8	4.6	7.4	38%	5%	14%		
21	5/13/87	ALFALFA	50.7	1.7	6.2	7.9	22%	3%	16%		
22	5/27/87	ALFALFA	46.6	.4	2.7	3.1	13%	1%	7%		
23	6/ 6/87	ALFALFA	58.3	7.1	7.8	14.9	48%	12%	26%		
24	6/18/87	ALFALFA	62.1	2.5	7.9	10.4	24%	4%	17%		
25	6/30/87	ALFALFA	24.0	.0	1.5	1.5	0%	0%	6%		
26	7/10/87	ALFALFA	64.1	9.6	3.2	12.8	75%	15%	20%		
27	7/27/87	ALFALFA	19.8	.8	1.2	2.0	40%	4%	10%		
28	8/31/87	ALFALFA	89.8	.6	3.0	3.6	17%	1%	4%		
29	9/15/87	ALFALFA	68.0	12.0	.0	12.0	100%	18%	18%		
30	10/ 3/87	ALFALFA	37.3	6.0	.0	6.0	100%	16%	16%		
31	10/28/87	ALFALFA	41.4	11.4	4.2	15.6	73%	28%	38%		
32	11/12/87	ALFALFA	19.2	2.4	4.2	6.6	36%	13%	34%		
33	12/15/87	ALFALFA	38.1	4.4	5.0	9.4	47%	12%	25%		
34	1/12/88	ALFALFA	22.2	1.8	4.5	6.3	29%	8%	28%		
35	2/29/88	ALFALFA						0%	0%	NR	CHART NOT FOUND
36	3/ 1/88	ALFALFA	43.6	.7	7.8	8.5	8%	2%	19%		
37	3/19/88	ALFALFA & COTTON	81.0	15.0	1.4	16.4	91%	19%	20%		
38	4/11/88	ALFALFA & COTTON	49.9	3.8	2.4	6.2	61%	8%	12%		PUMP INOPERATIVE DURING IRRIG.
39	4/18/88	ALFALFA & COTTON	25.0	3.4	2.3	5.7	60%	14%	23%		RECYCLED TW FROM KW-HRS
40	4/29/88	ALFALFA & COTTON	35.9	.0	3.5	3.5	0%	0%	10%		RECYCLED TW FROM KW-HRS
41	5/17/88	ALFALFA & COTTON	68.3	4.2	4.2	8.4	50%	6%	12%		
42	6/ 1/88	ALFALFA & COTTON	61.7	1.2	5.6	6.8	18%	2%	11%		PUMP MALFUNCTION
43	6/17/88	ALFALFA & COTTON	74.6	2.2	.0	2.2	100%	3%	3%		RECYCLED TW CALCULATED POWER
44	7/ 2/88	ALFALFA & COTTON	79.1	.4	.0	.4	100%	1%	1%		
45	7/15/88	ALFALFA & COTTON	65.4	3.6	2.3	5.9	61%	6%	9%		PUMP MALFUNCTION PUMP MALFUNCTION

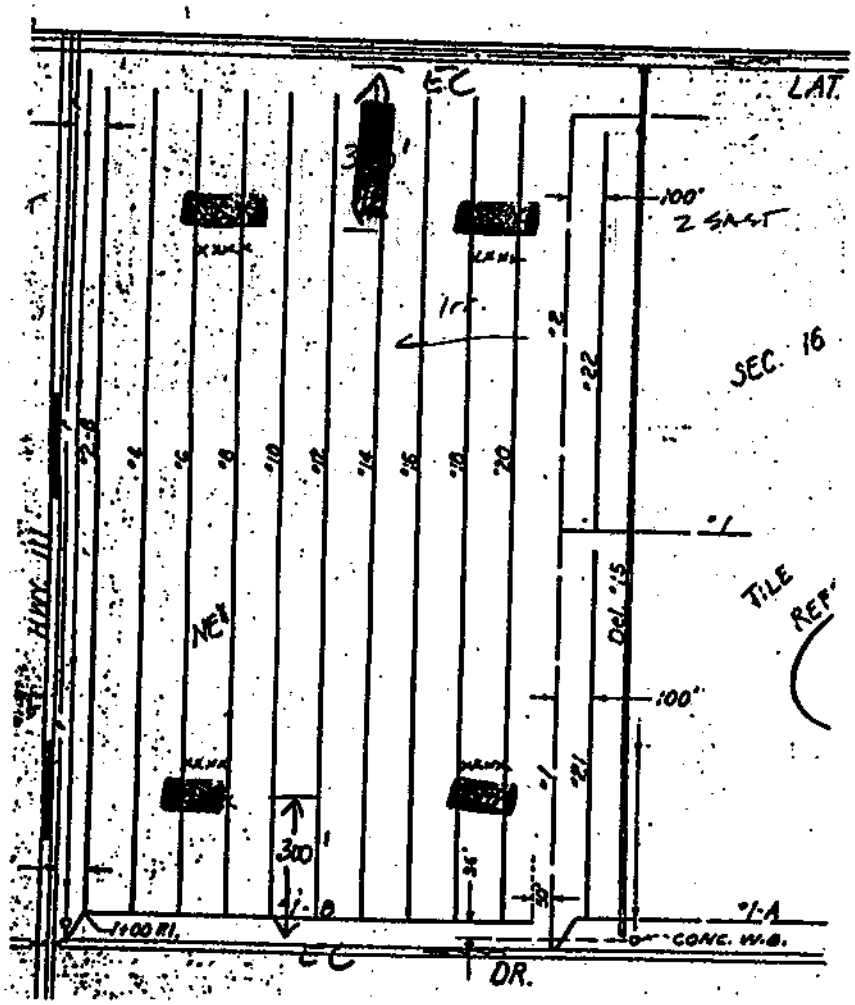
PUMPBACK SYSTEM #2

EVENT (1)	DATE (2)	CROP (3)	WATER QUANTITIES (ACRE FEET) DELIVERY (4)	SPILL (5)	RECYCLED TAILWATER (6)	TOTAL TAILWATER (7)	%TAILWATER SPILLED (8)	%DELIVERY SPILLED (9)	%DELIVERY TAILWATER (10)	NO RECORD (11)	COMMENTS (12)
46	7/28/88	COTTON	22.5	.0	.4	.4	0%	0%	2%		PUMP MALFUNCTION
47	8/ 9/88	ALFALFA & COTTON	32.8	3.7	.0	3.7	100%	11%	11%		
48	8/21/88	ALFALFA & COTTON	86.5	11.5	7.3	18.8	61%	13%	22%		
49	9/ 9/88	ALFALFA & COTTON	23.8	3.0	2.4	5.4	56%	13%	23%		
50	10/14/88	ALFALFA	21.4	.0	.8	.8	0%	0%	4%		
51	11/23/88	ALFALFA	18.8	1.2	.0	1.2	100%	6%	6%		PUMP MALFUNCTION
52	1/25/89	ALFALFA	65.4	5.6	19.8	25.4	22%	9%	39%		
53	2/20/89	ALFALFA	51.4	5.2	11.2	16.4	32%	10%	32%		
54	3/ 4/89	ALFALFA	25.7	5.6	9.5	15.1	37%	22%	59%		
55	3/26/89	ALFALFA & COTTON	58.7	7.8	18.6	26.4	30%	13%	45%		
56	4/14/89	ALFALFA & COTTON	50.0	6.5	9.7	16.2	40%	13%	32%		
57	4/30/89	ALFALFA	42.5	7.4	9.9	17.3	43%	17%	41%		
58	5/ 9/89	ALFALFA	19.9	.0	6.6	6.6	0%	0%	33%		RECYCLE TW ESTIMATED
59	5/22/89	ALFALFA & COTTON	30.7	6.5	2.9	9.4	69%	21%	31%		
60	6/ 2/89	ALFALFA & COTTON	28.4	1.5	6.8	8.3	18%	5%	29%		
61	6/13/89	ALFALFA & COTTON	64.6	3.8	11.5	15.3	25%	6%	24%		
62	6/23/89	ALFALFA & COTTON	44.0	4.9	13.0	17.9	27%	11%	41%		
63	7/ 7/89	ALFALFA, COTTON, & SUDAN GRASS	63.6	5.9	10.7	16.6	36%	9%	26%		
64	7/19/89	ALFALFA, COTTON, & SUDAN GRASS	60.8	7.0	13.9	20.9	33%	12%	34%		
65	7/31/89	ALFALFA, COTTON, & SUDAN GRASS	56.1	7.7	13.1	20.8	37%	14%	37%		
66	8/10/89	ALFALFA, COTTON, & SUDAN GRASS	45.6	5.0	11.5	16.5	30%	11%	36%		
67	8/27/89	ALFALFA	16.9	.6	.2	.8	75%	4%	5%		
68	9/ 2/89	SUDAN GRASS	29.2	2.0	6.8	8.8	23%	7%	30%		
69	9/17/89	ALFALFA & SUDAN GRASS	31.0	.2	5.2	5.4	4%	1%	17%		
70	10/ 3/89	ALFALFA	14.5	2.8	5.0	7.8	36%	19%	54%		
		TOTAL	3,182.4	297.2	380.1	677.3	44%	9%	21%		
		AVG	46.1	4.3	5.5	9.8					
		STD DEV	19.9	3.8	5.2	6.8					


IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 2
5 - Year Measured Water Application
Total Water Measured (Acre-feet)
3200
2560
1920
1280
640
0
0
14
28
42
56
70
Accumulative Number of Irrigation Events
Destination
Applied
Spill
Tailwater


IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 2
5 - Year Measured Percent Tailwater
Decimal Percentage
1
.8
.6
.4
.2
0
0
7
14
21
28
35
42
49
56
63
70
Accumulative Number of Irrigation Events
Total Tailwater Percent
Percent of Delivery Spilled

SOIL SALINITY



PUMPBACK SYSTEM #2

NE 1/4 SEC. 16 AND W1/2 W1/2 NW1/4 SEC.15
T.11S.-R.14E.

IMPERIAL IRRIGATION DISTRICT
AVERAGE SOIL SALINITY ACROSS SELECTED LOCATIONS - PUMPBACK SYSTEM #2

NORTHWEST - SITE 2

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	9.8	4.8	-51%	3.7	-23%
12	11.7	4.3	-63%	4.9	14%
24	13.3	7.7	-42%	7.1	-8%
36	13.2	7.9	-40%	8.1	3%
48	10.7	7.5	-30%	8.8	17%
60	9.3	7.2	-23%	9.7	35%
AVG	11.3	6.6	-42%	7.1	7%

NORTHEAST - SITE 2

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	2.5	1.1	-56%	2.4	118%
12	2.4	1.4	-42%	2.5	79%
24	3.0	2.6	-13%	3.2	23%
36	4.6	3.2	-30%	3.2	0%
48	3.2	2.9	-9%	3.8	31%
60	2.4	2.4	0%	3.5	46%
AVG	3.0	2.3	-25%	3.1	37%

SOUTHWEST - SITE 2

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	13.4	6.6	-51%	12.3	86%
12	13.8	10.7	-22%	13.0	21%
24	13.3	11.8	-11%	13.8	17%
36	12.1	11.1	-8%	12.9	16%
48	11.5	11.9	3%	13.2	11%
60	11.6	11.3	-3%	12.7	12%
AVG	12.6	10.6	-16%	13.0	23%

SOUTHEAST - SITE 2

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	7.4	4.4	-41%	10.6	141%
12	9.9	8.4	-15%	11.1	32%
24	8.7	9.4	8%	11.1	18%
36	8.7	8.6	-1%	11.7	36%
48	7.3	8.1	11%	11.9	47%
60	7.1	8.5	20%	12.2	44%
AVG	8.2	7.9	-3%	11.4	45%

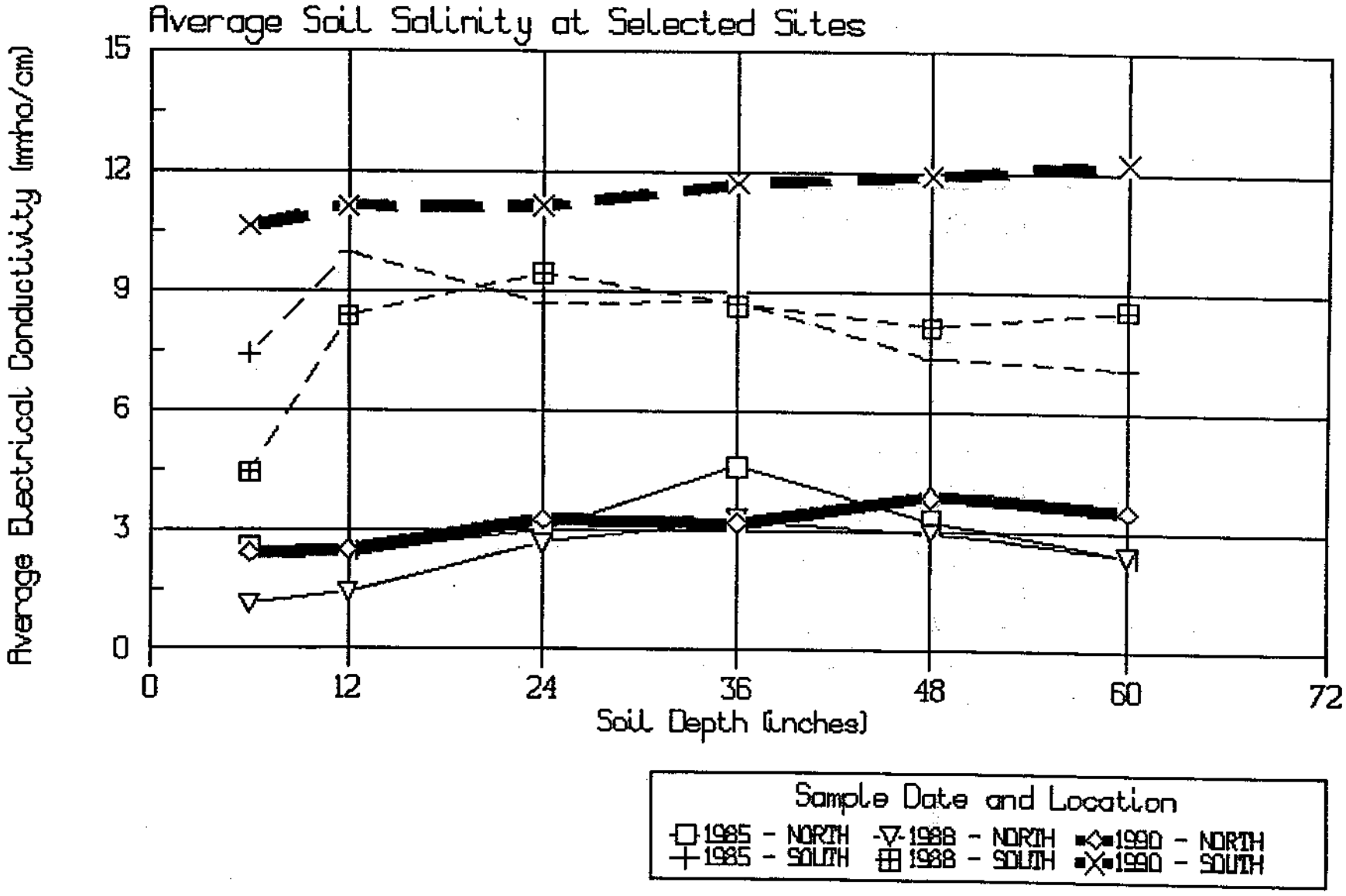
AVERAGE ELECTRICAL CONDUCTIVITY 1985 TO 1988 PERCENT INCREASE FOR SITE 2 = -22%
AVERAGE ELECTRICAL CONDUCTIVITY 1988 TO 1990 PERCENT INCREASE FOR SITE 2 = 27%
AVERAGE ELECTRICAL CONDUCTIVITY 1985 TO 1990 PERCENT INCREASE FOR SITE 2 = -2%

NOTE: NEGATIVE VALUES SIGNIFY DECREASES IN THE AVERAGE SOIL SALINITY.
ECe VALUES (MMHOS/CM) AVERAGED FROM SAMPLES OVER TILE DRAINS.

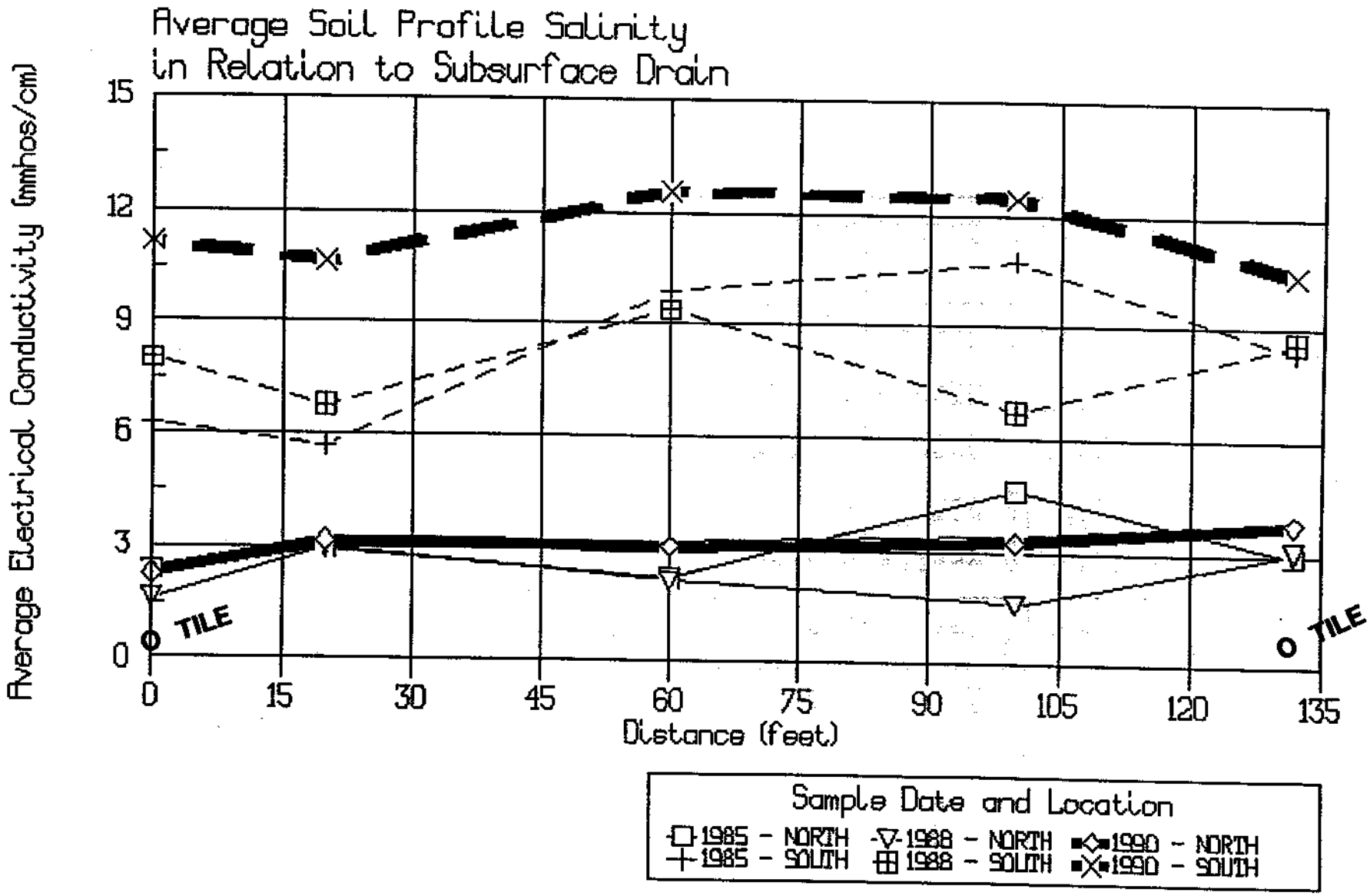
IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 2 EAST
SOIL SALINITY

		DEPTH (in.)	DRAIN 18 132	DRAIN 20 100	60	20	0	AVG EC (mmho/cm)
NORTH	1985	6	2.4	2.9	2.7	3.0	1.6	2.5
		12	1.7	4.4	1.8	2.4	1.8	2.4
		24	2.1	6.7	1.1	2.2	2.9	3.0
		36	3.7	7.3	3.1	5.3	3.5	4.6
		48	4.7	4.2	2.2	2.5	2.6	3.2
		60	3.1	2.2	2.4	2.3	1.8	2.4
		AVG EC	3.0	4.6	2.2	3.0	2.4	3.0
	1988	6	1.3	.8	1.2	1.2	1.0	1.1
		12	1.7	.9	1.3	1.7	1.4	1.4
		24	4.2	1.1	1.6	4.3	1.8	2.6
		36	4.9	1.7	3.6	4.1	1.9	3.2
		48	4.0	2.7	3.0	3.2	1.7	2.9
		60	2.1	2.3	2.2	3.2	1.9	2.4
		AVG EC	3.0	1.6	2.2	3.0	1.6	2.3
	1990	6	2.6	2.4	2.7	2.2	2.1	2.4
		12	2.7	2.9	2.3	2.5	1.9	2.5
		24	4.8	3.4	3.0	2.8	2.1	3.2
		36	3.9	4.1	3.1	2.7	2.0	3.2
		48	5.4	3.9	3.4	3.6	2.9	3.8
		60	3.3	2.7	3.9	5.1	2.5	3.5
		AVG EC	3.8	3.2	3.1	3.2	2.3	3.1
SOUTH	1985	6	8.0	11.7	6.2	5.1	6.0	7.4
		12	10.7	13.9	11.7	6.4	6.7	9.9
		24	8.6	11.7	11.7	7.0	4.5	8.7
		36	8.6	10.7	10.1	7.5	6.8	8.7
		48	8.6	8.0	10.7	3.8	5.6	7.3
		60	5.6	8.5	9.1	4.3	8.0	7.1
		AVG EC	8.4	10.8	9.9	5.7	6.3	8.2
	1988	6	5.2	6.0	4.2	2.2	4.5	4.4
		12	7.6	7.5	9.7	7.6	9.4	8.4
		24	11.1	9.0	7.6	10.0	9.3	9.4
		36	10.1	4.8	11.2	8.0	9.1	8.6
		48	9.1	4.6	11.1	7.5	8.3	8.1
		60	8.8	8.3	12.6	5.4	7.6	8.5
		AVG EC	8.6	6.7	9.4	6.8	8.0	7.9
	1990	6	9.6	10.9	10.5	10.2	11.7	10.6
		12	10.7	14.1	12.4	7.9	10.4	11.1
		24	10.0	12.2	12.8	9.8	10.8	11.1
		36	11.9	13.2	12.1	9.5	11.7	11.7
		48	11.7	12.2	14.7	9.4	11.5	11.9
		60	8.6	12.0	12.9	17.0	10.6	12.2
		AVG EC	10.4	12.4	12.6	10.6	11.1	11.4

IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 2 East



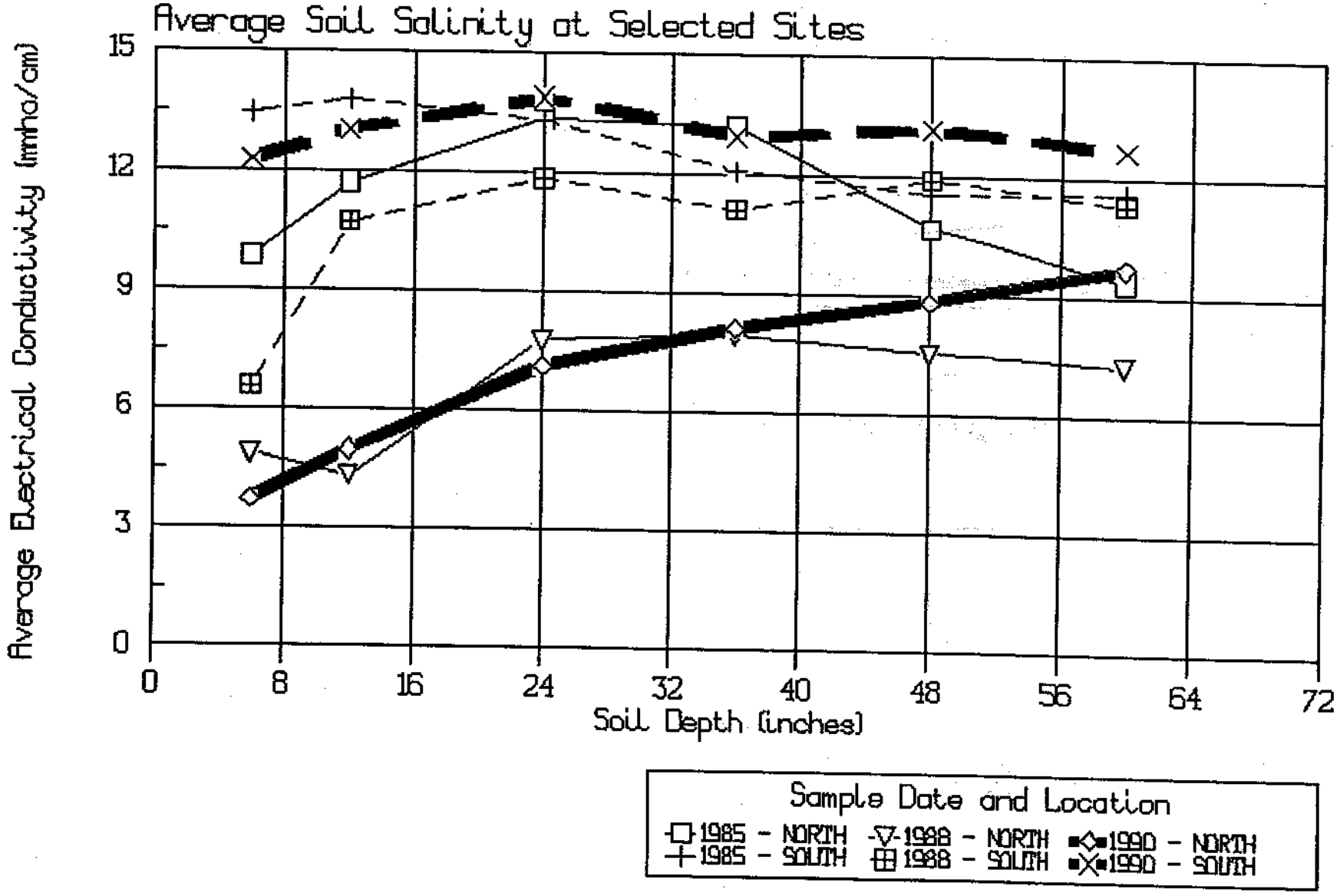
IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 2 East



IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 2 WEST
SOIL SALINITY

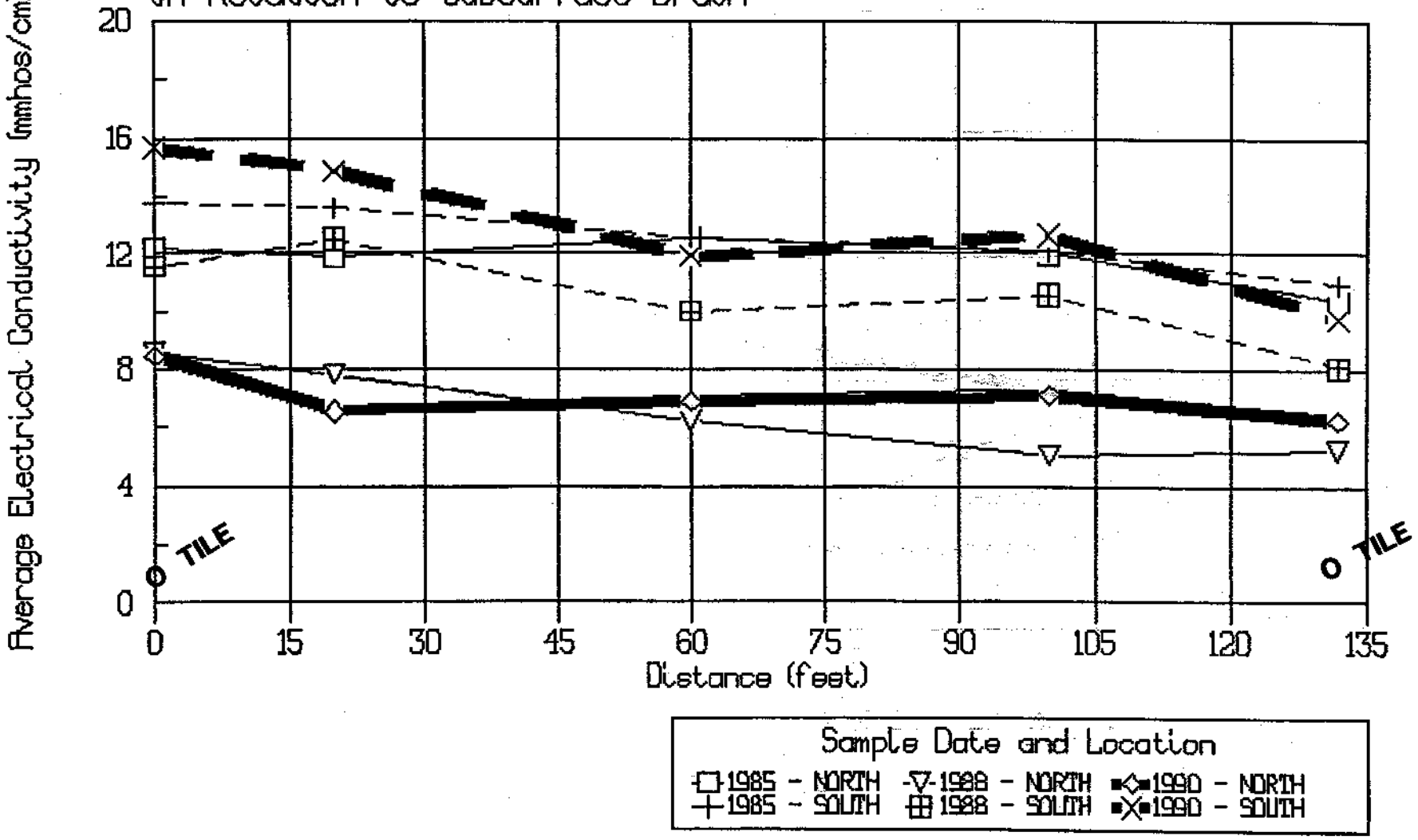
		DEPTH (in.)	DRAIN 6 0	20	DRAIN 8 60	100	132	AVG EC (mmho/cm)
NORTH	1985	6	8.6	8.6	9.1	9.7	6.5	9.8
		12	11.1	11.1	12.1	10.2	11.2	11.7
		24	15.1	12.1	12.1	12.2	9.7	13.3
		36	16.1	14.2	15.2	14.2	12.2	13.2
		48	11.1	13.2	13.2	13.2	9.2	10.7
		60	7.6	9.1	10.1	10.2	9.7	9.3
		AVG EC	12.2	11.9	12.5	12.0	10.4	11.8
	1988	6	5.0	7.8	4.6	2.2	4.5	4.8
		12	7.8	4.7	3.5	2.8	2.6	4.3
		24	9.2	6.3	8.8	6.9	7.4	7.7
		36	10.7	8.2	7.2	6.8	6.7	7.9
		48	10.3	10.0	6.5	5.5	5.1	7.5
		60	8.1	10.0	6.8	6.2	5.0	7.2
		AVG EC	8.5	7.8	6.2	5.1	5.2	6.6
	1990	6	4.3	3.4	4.2	3.4	3.2	3.7
		12	8.0	6.3	4.2	4.3	1.9	4.9
		24	9.4	5.9	7.5	6.5	6.2	7.1
		36	9.4	7.0	8.3	8.7	7.1	8.1
		48	8.4	8.3	7.7	10.3	9.3	8.8
		60	11.1	8.4	9.6	9.6	9.7	9.7
		AVG EC	8.4	6.6	6.9	7.1	6.2	7.1
SOUTH	1985	6	13.9	16.1	13.0	15.2	8.9	13.4
		12	12.9	16.1	15.2	13.0	11.6	13.8
		24	13.9	15.0	13.0	12.0	12.6	13.3
		36	12.9	12.9	12.0	12.0	10.5	12.1
		48	13.9	11.8	12.0	9.8	10.1	11.5
		60	15.0	9.7	10.3	10.9	12.1	11.6
		AVG EC	13.8	13.6	12.6	12.2	11.0	12.6
	1988	6	6.7	9.9	4.2	9.1	2.8	6.6
		12	14.0	11.4	12.7	6.1	9.4	10.7
		24	12.0	13.4	13.5	11.4	8.8	11.8
		36	9.7	11.6	11.6	11.0	11.5	11.1
		48	14.1	13.2	9.3	15.1	7.8	11.9
		60	12.9	15.5	8.9	10.8	8.3	11.3
		AVG EC	11.6	12.5	10.0	10.6	8.1	10.6
	1990	6	17.8	11.0	11.8	13.8	6.9	12.3
		12	16.7	16.0	14.5	10.7	7.1	13.0
		24	16.7	15.8	15.5	11.1	10.1	13.8
		36	14.7	15.5	9.0	14.1	11.3	12.9
		48	16.4	16.2	10.6	11.1	11.5	13.2
		60	11.7	14.5	10.1	15.1	11.9	12.7
		AVG EC	15.7	14.8	11.9	12.7	9.8	13.0

IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 2 West



IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 2 West

Average Soil Profile Salinity
in Relation to Subsurface Drain



WATER SALINITY

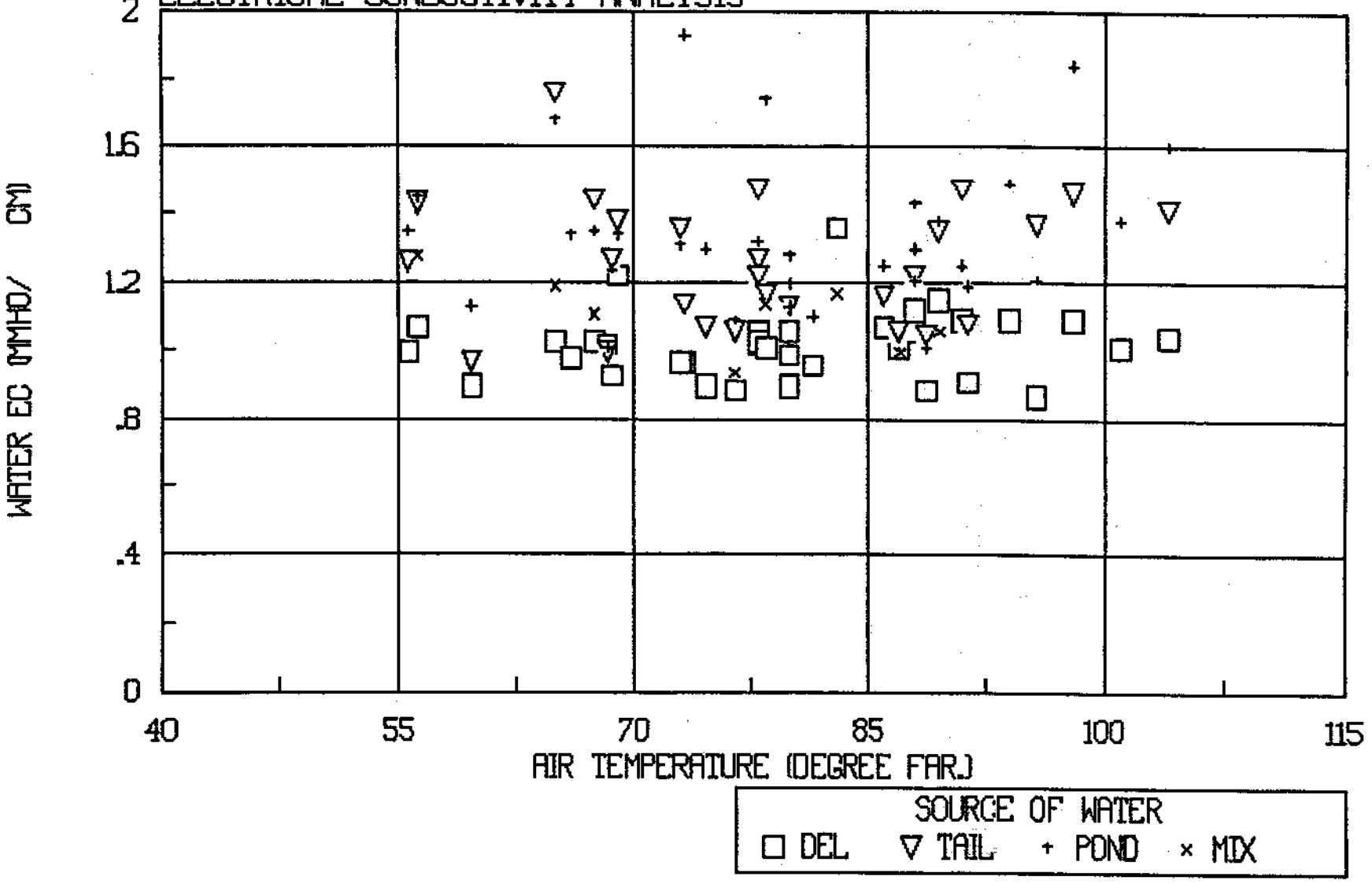
PUMPBACK SYSTEM #2

		AIR TEMPERATURE (DEGREES FAR.)						WATER TEMPERATURE (DEGREES FAR.)					CHANGE FROM DELIVERY TEMP (DEGREES FAR.)				WATER EC (MMHO/CM)					CHANGE FROM DELIVERY EC (MMHO/CM)			
DATE	TIME	DEL	TAIL	POND	MIX	TILE	AVG	DEL	TAIL	POND	MIX	TILE	TAIL	POND	MIX	TILE	DEL	TAIL	POND	MIX	TILE	TAIL	POND	MIX	TILE
1/ 3/86	1245	78	78				78	61	72				11	*	*	*	1.06	1.27				.21	*	*	*
1/ 4/86	835	63	57	59			60	57	53	53			(4)	(4)	*	*	.90	.97	1.13			.07	.23	*	*
3/ 7/86	935	78	78				78	68	65				(3)	*	*	*	1.02	1.22				.20	*	*	*
4/16/86	1020	72	74	74			73	66	72	64			6	(2)	*	*	.97	1.14	1.93			.17	.96	*	*
4/30/86	1420	84			82		83	78			74		*	*	(4)	*	1.36			1.17		*	*	(.19)	*
5/23/86	1445	95	96	96			96	85	96	73			11	(12)	*	*	.87	1.37	1.21			.50	.34	*	*
6/ 9/86	1105	90	92	92			91	84	94	80			10	(4)	*	*	.91	1.08	1.19			.17	.28	*	*
6/25/86	817	82		81			82	80		80			*	0	*	*	.96		1.10			*	.14	*	*
7/15/86	826	80	80	80			80	79	79	80			0	1	*	*	.90	1.13	1.13			.23	.23	*	*
7/22/86	752	76	77	76	77		77	78	77	76	78		(1)	(2)	0	*	.89	1.06	1.09	.94		.17	.20	.05	*
7/30/86	1015	90	88	88			89	84	88	80			4	(4)	*	*	.89	1.05	1.01			.16	.12	*	*
9/21/86	1020	76	74	74			75	70	62	66			(8)	(4)	*	*	.90	1.07	1.30			.17	.40	*	*
11/25/86	1035	69	69	69			69	60	64	56			4	(4)	*	*	1.22	1.38	1.34			.16	.12	*	*
1/13/87	1215	65	65	65	65		65	50	58	51	52		8	1	2	*	1.03	1.76	1.68	1.19		.73	.65	.16	*
1/14/87	1305	70	70	66			69	54	58	56			4	2	*	*	.93	1.27	1.24			.34	.31	*	*
3/ 9/87	1310	76	80	78			78	66	72	64			6	(2)	*	*	1.03	1.47	1.32			.44	.29	*	*
3/24/87	940	67	68	67	68	68	68	60	67	58	60	64	7	(2)	0	4	1.03	1.44	1.35	1.11	5.41	.41	.32	.08	4.38
3/25/87	1235	80		80			80	66		65			*	(1)	*	*	1.06		1.28			*	.22	*	*
5/27/87	1220	78	80	78	78		79	74	84	68	74		10	(6)	0	*	1.01	1.17	1.74	1.14		.16	.73	.13	*
7/13/87	800	82		78			80	82		86			*	4	*	*	.99		1.20			*	.21	*	*
7/14/87	845	86	86	90	86		87	82	80	78	80		(2)	(4)	(2)	*	1.01	1.06	1.00	1.00		.05	(.01)	(.01)	*
9/ 2/87	1315	104	104	104			104	90	102	102			12	12	*	*	1.04	1.41	1.60			.37	.56	*	*
12/16/87	1255	50	63	58	54		56	66	66	66	66		0	0	0	*	1.07	1.43	1.45	1.28		.36	.38	.21	*
1/13/88	857	54	54	59			56	50	44	41			(6)	(9)	*	*	1.00	1.26	1.35			.26	.35	*	*
3/22/88	850	68	68	69		68	68	65	64	60		65	(1)	(5)	*	0	1.02	1.00	1.01		7.53	(.02)	(.01)	*	6.51
4/11/88	905	73	73	73		73	73	67	65	63		67	(2)	(4)	*	0	.97	1.36	1.31		8.20	.39	.34	*	7.23
4/19/88	900	66		66		67	66	69		70		69	*	1	*	.0	.98		1.34		8.38	*	.36	*	7.40
5/17/88	1330	88		88		88	88	84		83		70	*	(1)	*	(14)	1.07		1.43		8.30	*	.36	*	7.23
5/19/88	1250	94		94		94	94	82		88		72	*	6	*	(10)	1.09		1.49		6.20	*	.40	*	5.11
5/20/88	1030	88		88		88	88	79		74		70	*	(5)	*	(9)	1.12		1.30		10.14	*	.18	*	9.02
5/25/88	1418	101		101		101	101	86		86		72	*	0	*	(14)	1.01		1.38		14.26	*	.37	*	13.25
6/ 2/88	940	89	90	90	89	90	90	77	82	79	79	72	5	2	2	(5)	1.15	1.35	1.38	1.06	9.27	.20	.23	(.09)	8.12
6/21/88	935	88	88	88		88	88	83	82	78		74	(1)	(5)	*	(9)	1.06	1.22	1.21		7.72	.16	.15	*	6.66
7/ 5/88	905	91	91	91		91	91	84	82	82		77	(2)	(2)	*	(7)	1.09	1.47	1.25		7.93	.38	.16	*	6.84
7/19/88	920	86	86	86		87	86	83	85	83		75	2	0	*	(8)	1.07	1.16	1.25		7.16	.09	.18	*	6.09
8/25/88	1045	98	98	98			98	84	98	92			14	8	*	*	1.09	1.46	1.84			.37	.75	*	*
AVERAGES		80	79	80	75	84	80	73	74	72	70	71	3	(1)	0	(6)	1.02	1.26	1.33	1.11	8.38	.26	.32	.04	7.32
STD DEV		12.3	12.2	12.4	11.0	11.0	12.0	11.0	14.1	13.1	9.5	3.8	6	5	2	6	.10	.18	.22	.10	2.14	.16	.21	.13	2.14

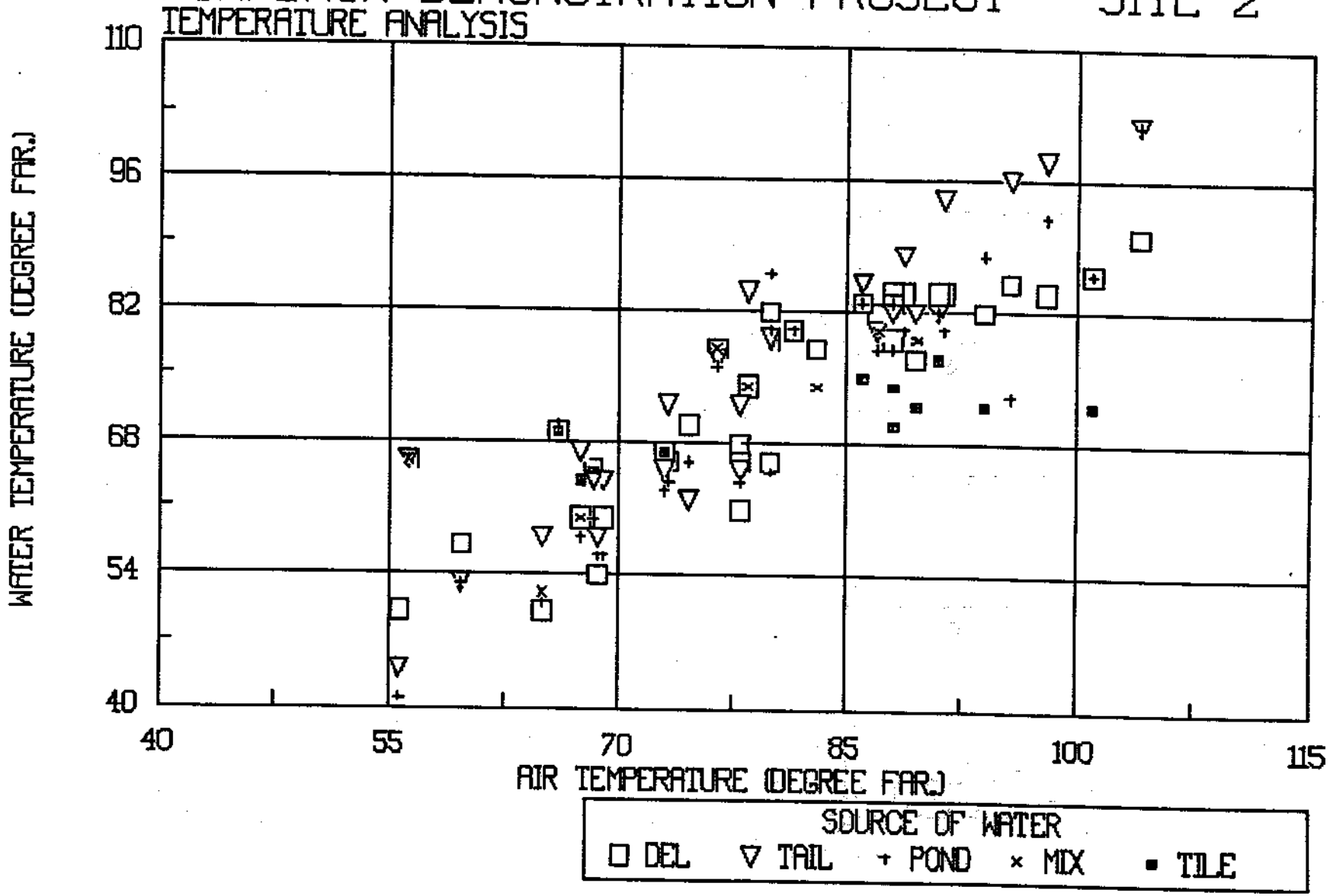
AVERAGE PERCENT INCREASE FROM DELIVERY EC 23% 30% 9%

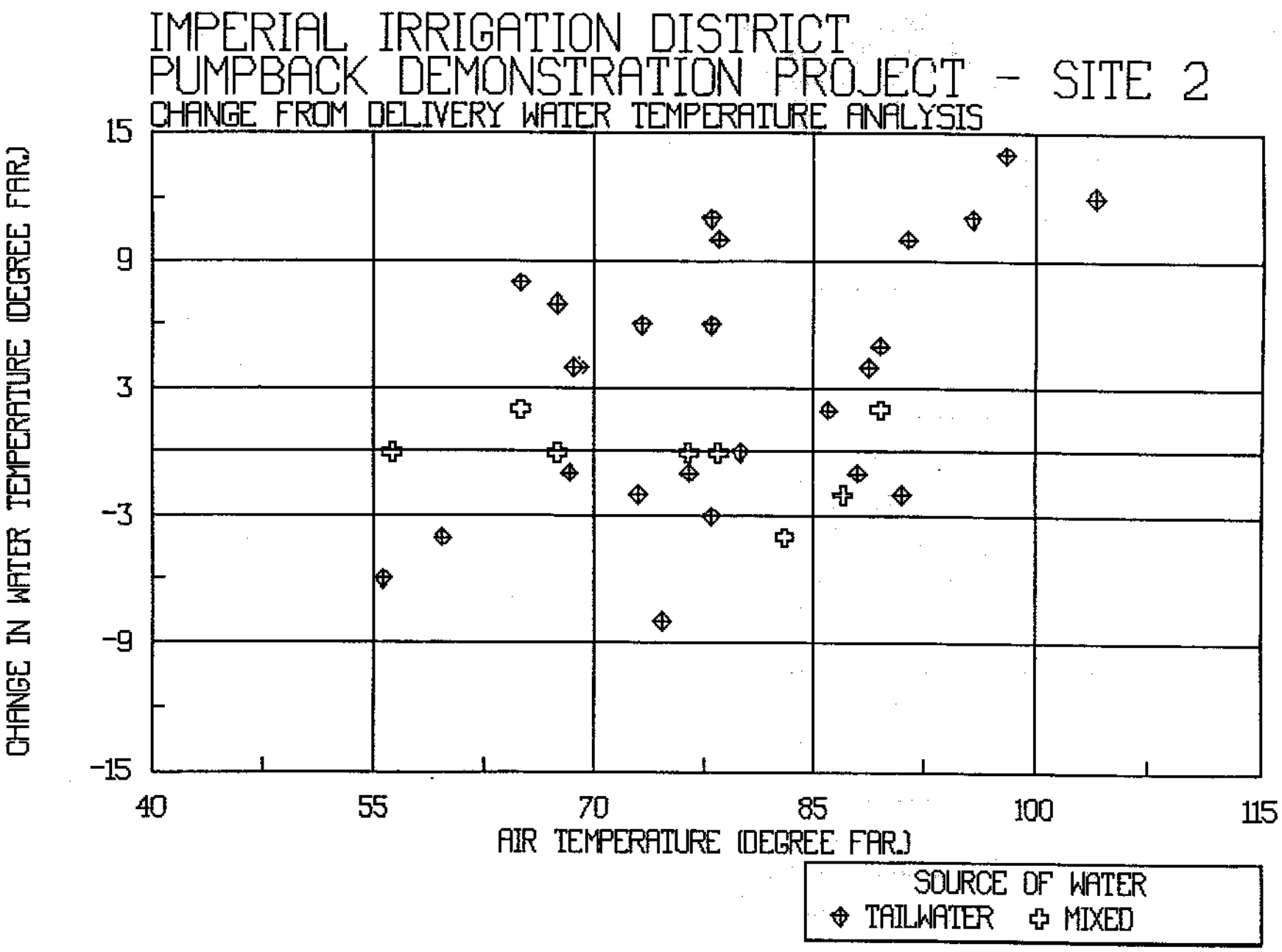
IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 2

ELECTRICAL CONDUCTIVITY ANALYSIS

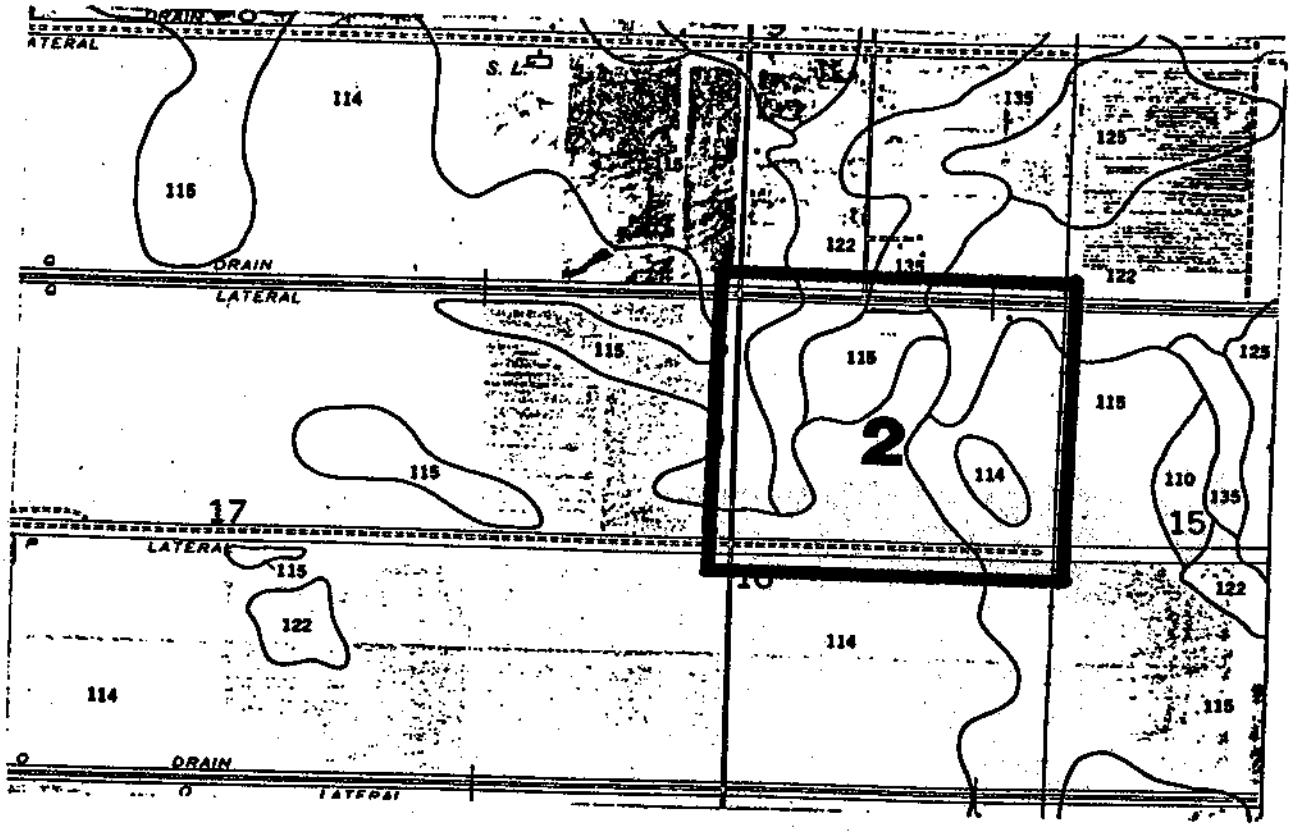


IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 2




IMPERIAL IRRIGATION DISTRICT
PUMPBACK DEMONSTRATION PROJECT - SITE 2
CHANGE FROM DELIVERY WATER TEMPERATURE ANALYSIS
CHANGE IN WATER TEMPERATURE (DEGREE FAR.)
15
9
3
-3
-9
-15
40
55
70
85
100
115
AIR TEMPERATURE (DEGREE FAR.)
SOURCE OF WATER
TAILWATER
MIXED

SCS SOIL BORINGS



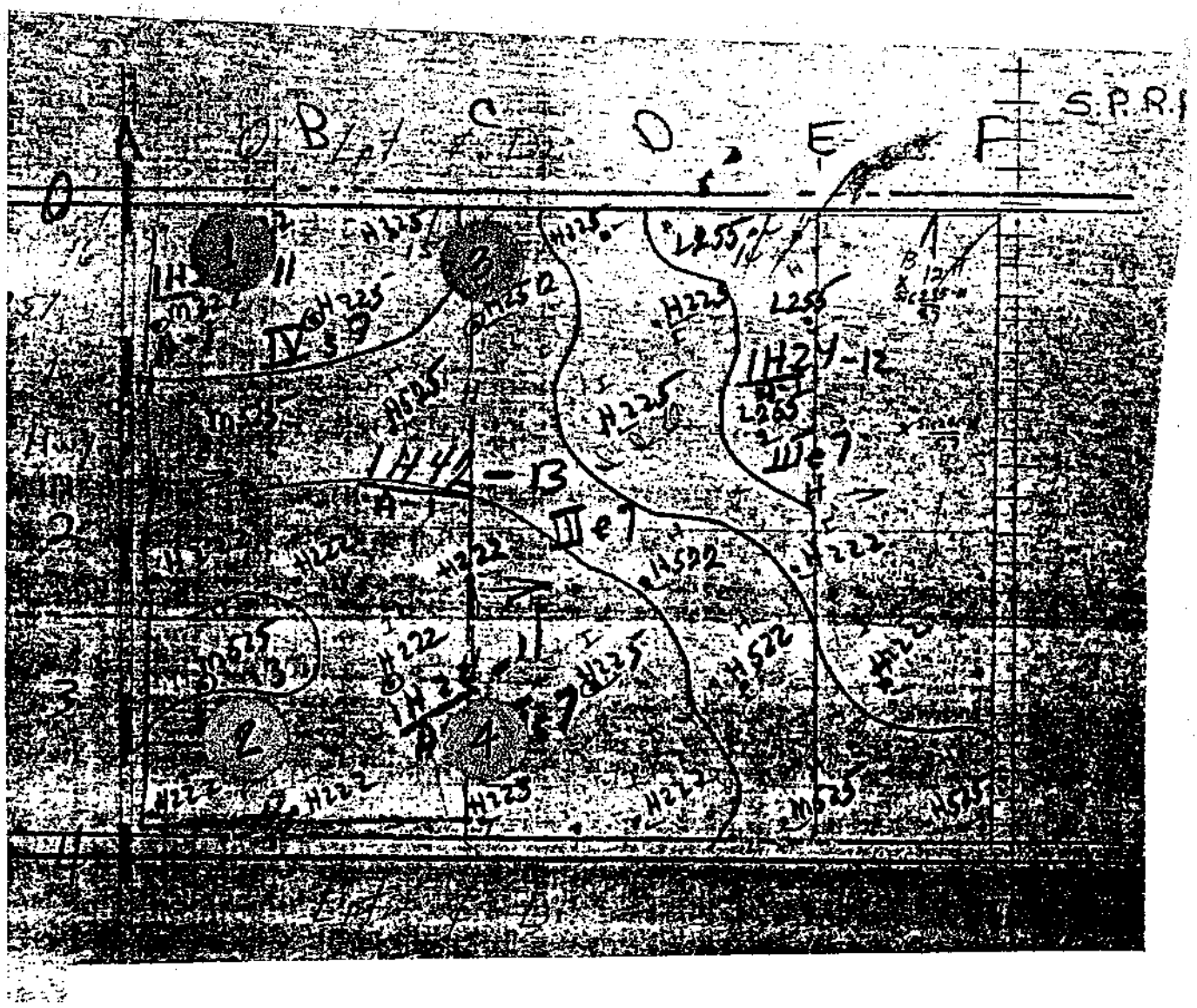
PUMPBACK SYSTEM # 2

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL LEGEND

SYMBOL	NAME
100	Antho loamy fine sand
101	Antho-Superstition complex
102	Badland
103	Carsitas gravelly sand, 0 to 5 percent slopes
104	Fluvaquents, saline
105	Glenbar clay loam
106	Glenbar clay loam, wet
107	Glenbar complex
108	Holtville loam
109	Holtville silty clay
110	Holtville silty clay, wet
111	Holtville-Imperial silty clay loams
112	Imperial silty clay
113	Imperial silty clay, saline
114	Imperial silty clay, wet
115	Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes
116	Imperial-Glenbar silty clay loams, 2 to 5 percent slopes
117	Indio loam
118	Indio loam, wet
119	Indio-Vint complex
120	Laveen loam
121	Meloland fine sand
122	Meloland very fine sandy loam, wet
123	Meloland and Holtville loams, wet
124	Niland gravelly sand
125	Niland gravelly sand, wet
126	Niland fine sand
127	Niland loamy fine sand
128	Niland-Imperial complex, wet
129	Pits
130	Rositas sand, 0 to 2 percent slopes
131	Rositas sand, 2 to 5 percent slopes
132	Rositas fine sand, 0 to 2 percent slopes
133	Rositas fine sand, 2 to 9 percent slopes
134	Rositas fine sand, 9 to 30 percent slopes
135	Rositas fine sand, wet, 0 to 2 percent slopes
136	Rositas loamy fine sand, 0 to 2 percent slopes
137	Rositas silt loam, 0 to 2 percent slopes
138	Rositas-Superstition loamy fine sand
139	Superstition loamy fine sand
140	Torriorthents-Rock outcrop complex, 5 to 60 percent slopes
141	Torriorthents and Orthids, 5 to 30 percent slopes
142	Vint loamy very fine sand, wet
143	Vint fine sandy loam
144	Vint and Indio very fine sandy loams, wet

SCS
BORINGS-
PUMPBACK #2



SOIL PROFILE CHART
FOR DRAINAGE INVESTIGATION
IMPERIAL IRRIGATION DISTRICT

PUMPBACK #2
#1

PROPERTY _____ WEIGHTED AVERAGE PERMEABILITY _____ in./hr.

BORING NO. AX-1-0-3/1 LAND USE _____ CROP CONDITION _____

TECHNICIAN _____ DATE SURVEY _____ SYMBOL M322-1P

HS 2

FIELD APPROXIMATIONS

IMP. IRRIG. DIST. DRAINAGE SYM.	I L	S L L	SL	SLS	FS	MS	S	CS				
STANDARD TEXTURE SYMBOLS	c sic sicl	cl scl sil	l	vfsl	fsl	sl	lvfs	ls	vfs	fs	s	cos
STANDARD PERMEABILITY SYM.	2	3	4	5	6	7						
PERMEABILITY inches per hour	.10	.25	1.0	2.0	2.5	3.0	4.0	5.0	6.0	7.0		

0-DEPTH IN FEET

FS

SiC

SC

SiCL

SiC

1 2 3 4 5 6 7 8 9

NOTE: When permeability rates exceed 7.0 in./hr., show estimated value at right margin.

M-1228

7-0-15000-193-L

SOIL PROFILE CHART
FOR DRAINAGE INVESTIGATION
IMPERIAL IRRIGATION DISTRICT

PUMPBACK #2
#2

PROPERTY ______ WEIGHTED AVERAGE PERMEABILITY ______ in./hr.

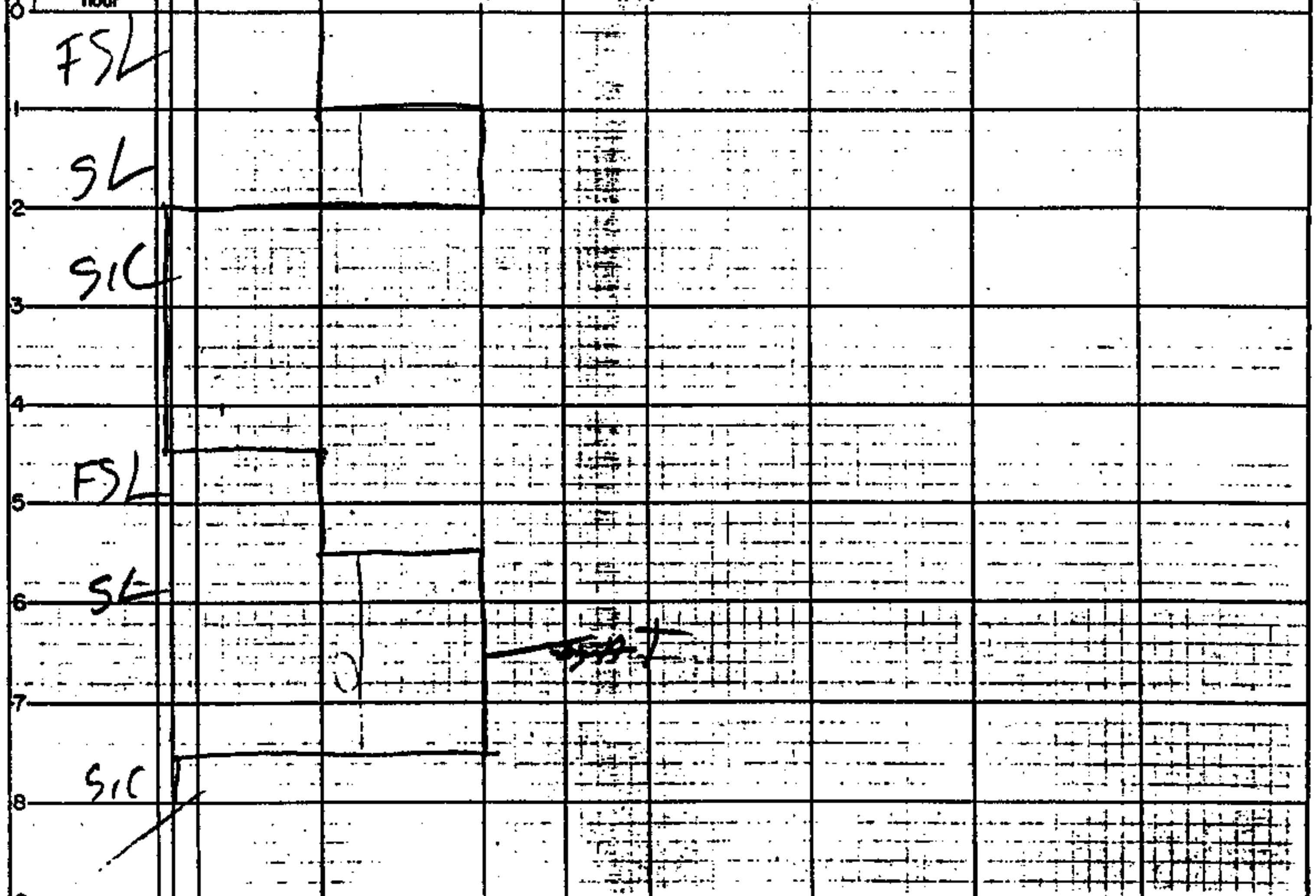
BORING NO. A½- 3 LAND USE ______ CROP CONDITION ______

TECHNICIAN ______ DATE SURVEY ______ SYMBOL M 52 5-17 fsl

FIELD APPROXIMATIONS

IMP. IRRIG. DIST. DRAINAGE SYM.	ILL	SLL	SL		SLS		FS	MS		S	CS	
STANDARD TEXTURE SYMBOLS	c sic sicl	cl scl sil	l	vfsl	fsl	sl	lvfs	ls	vfs	fs	s	cos
STANDARD PERMEABILITY SYM.	2	3	4		5				6		7	
PERMEABILITY inches per hour	.10	.25	1.0		2.0	2.5		3.0	4.0	5.0	6.0	7.0

DEPTH IN FEET



NOTE: When permeability rates exceed 7.0 in./hr., show estimated value at right margin.

M-1228

7-0-15000-193-L

SOIL PROFILE CHART
FOR DRAINAGE INVESTIGATION
IMPERIAL IRRIGATION DISTRICT

PUMPBACK #2
#3

PROPERTY _____ WEIGHTED AVERAGE PERMEABILITY _____ in./hr.

BORING NO. C-03/1 LAND USE _____ CROP CONDITION _____

TECHNICIAN _____ DATE SURVEY _____ SYMBOL H252-11

FIELD APPROXIMATIONS

IMP. IRRIG. DIST. DRAINAGE SYM.	I L	S L	SL	SLS	FS	MS			S	CS		
STANDARD TEXTURE SYMBOLS	c sic sicl	cl scl sil	l	vfsl	fsl	sl	lvfs	ls	vfs	fs	s	cos
STANDARD PERMEABILITY SYM.	2	3	4		5			6			7	
PERMEABILITY inches per hour	.10	.25		1.0		2.0	2.5	3.0	4.0	5.0	6.0	7.0

0-DEPTH IN FEET

1 SiC
2
3
4 SL
5
6 SiC
7 SL
8 SL
9

NOTE: When permeability rates exceed 7.0 in./hr., show estimated value at right margin.

M-1228

7-0-15000-193

SOIL PROFILE CHART
FOR DRAINAGE INVESTIGATION
IMPERIAL IRRIGATION DISTRICT

PUMPBACK #2
#4

PROPERTY _____ WEIGHTED AVERAGE PERMEABILITY _____ in./hr.

BORING NO. BK-3 LAND USE _____ CROP CONDITION _____

TECHNICIAN _____ DATE SURVEY _____ SYMBOL H 222-4

FIELD APPROXIMATIONS

IMP. IRRIG. DIST. DRAINAGE SYM.	I	S	SL			SLS			FS			MS					S			CS			
STANDARD TEXTURE SYMBOLS	c sic	cl scl sil	l	vfsl		fsl		sl	lvfs		ls		vfs		fs		s			cos			
STANDARD PERMEABILITY SYM.	2	3	4					5					6						7				
PERMEABILITY inches per hour	.10	.25			1.0				2.0	2.5		3.0		4.0			5.0			6.0			7.0

DEPTH IN FEET: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

SiC

SiC

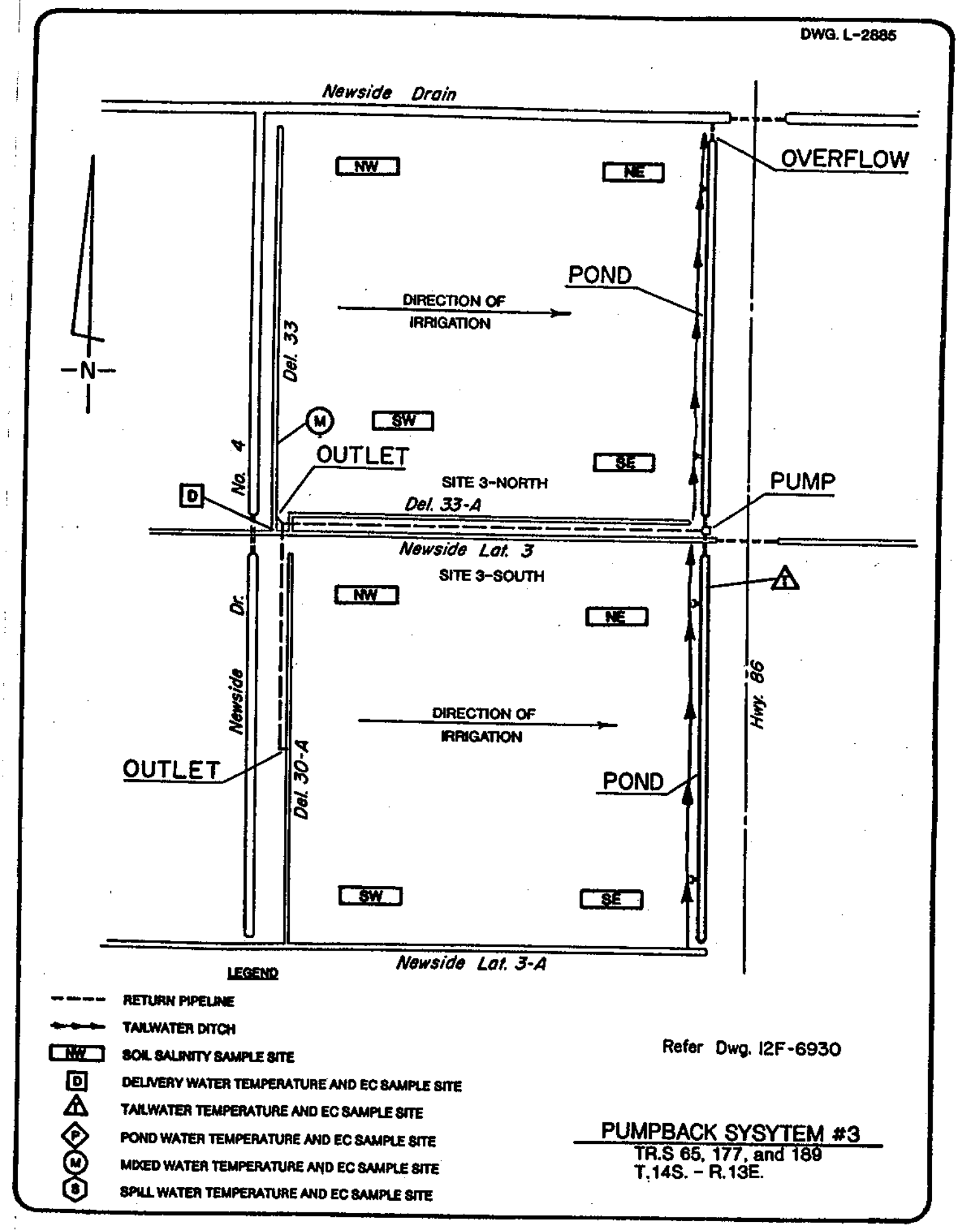
NOTE: When permeability rates exceed 7.0 in./hr., show estimated value at right margin.

M-1226

7-0-15000-193-1

APPENDIX C

PUMPBACK SYSTEM #3


DWG. L-2885
Newside Drain
OVERFLOW
NW
NE
POND
DIRECTION OF
IRRIGATION
Del. 33
N
M
SW
OUTLET
No. 4
SE
SITE 3-NORTH
PUMP
D
Del. 33-A
Newside Lat. 3
SITE 3-SOUTH
NW
NE
Dr.
Newside
Hwy. 86
DIRECTION OF
IRRIGATION
OUTLET
Del. 30-A
POND
SW
SE
Newside Lat. 3-A
LEGEND
RETURN PIPELINE
TAILWATER DITCH
NW SOIL SALINITY SAMPLE SITE
D DELIVERY WATER TEMPERATURE AND EC SAMPLE SITE
TAILWATER TEMPERATURE AND EC SAMPLE SITE
P POND WATER TEMPERATURE AND EC SAMPLE SITE
M MIXED WATER TEMPERATURE AND EC SAMPLE SITE
S SPILL WATER TEMPERATURE AND EC SAMPLE SITE
Refer Dwg. I2F-6930
PUMPBACK SYSYTEM #3
TR.S 65, 177, and 189
T.14S. - R.13E.

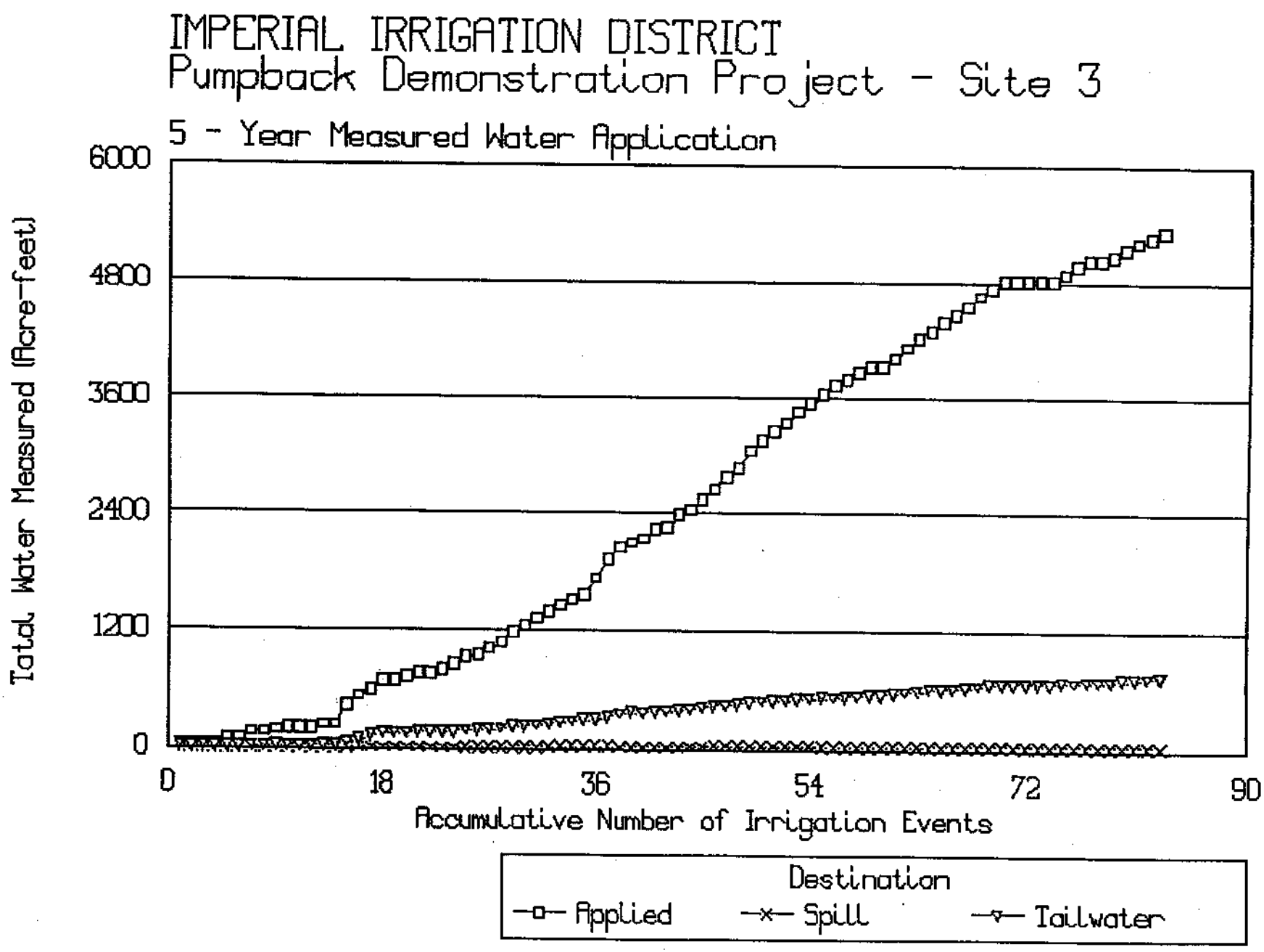
WATER DELIVERY/TAILWATER/SPILL

PUMPBACK SYSTEM #3

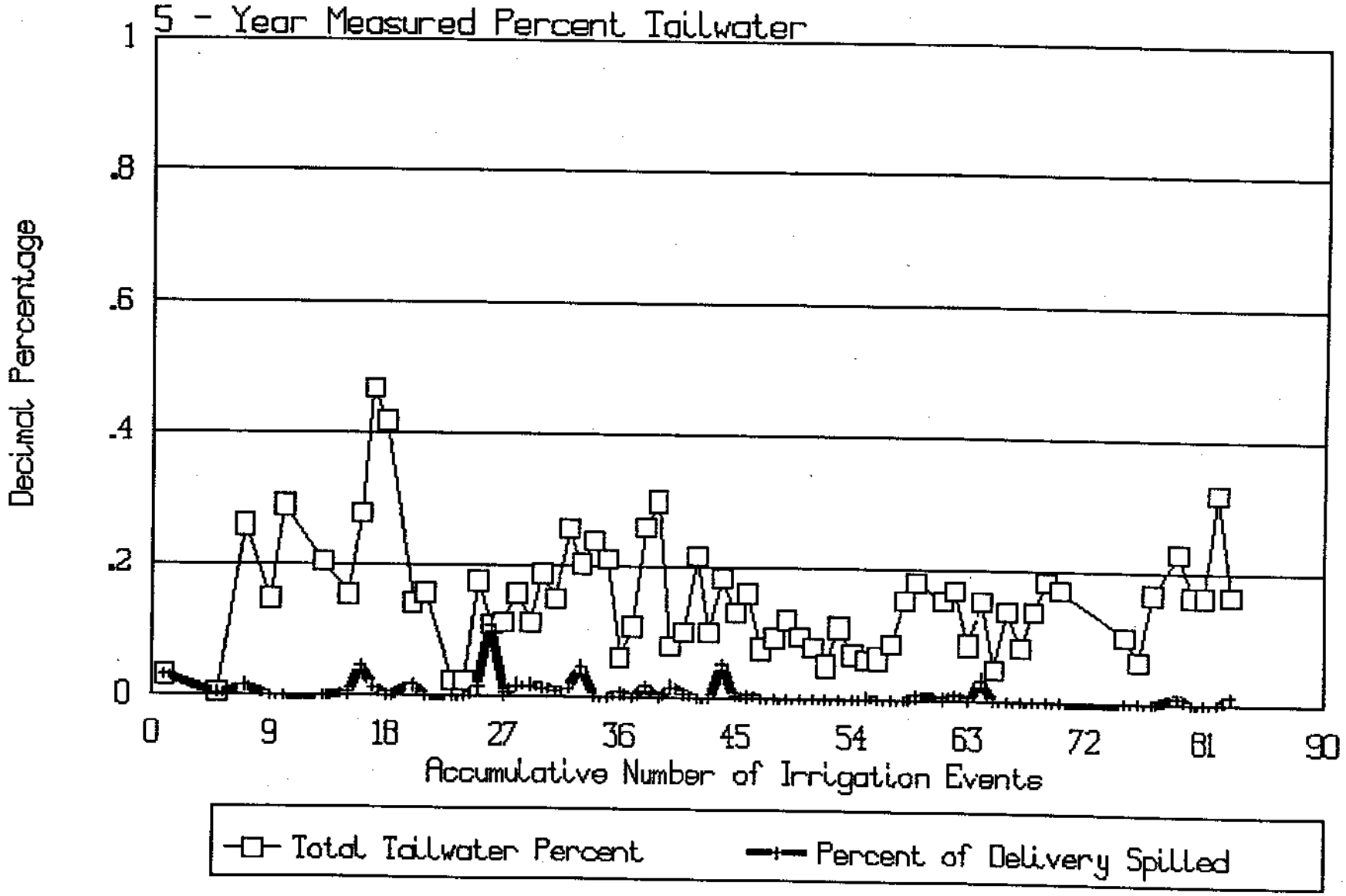
EVENT (1)	DATE (2)	CROP (3)	WATER QUANTITIES (ACRE FEET) DELIVERY (4)	SPILL (5)	RECYCLED TAILWATER (6)	TOTAL TAILWATER (7)	%TAILWATER SPILLED (8)	%DELIVERY SPILLED (9)	%DELIVERY TAILWATER (10)	NO RECORD (11)	COMMENTS (12)
21	12/ 6/86	SUGAR BEETS	40.3	.0	6.3	6.3	0%	0%	16%		
22	12/11/86	SUGAR BEETS	*24.0								
23	1/12/87	SUGAR BEETS	37.4	.0	.9	.9	0%	0%	2%		
24	1/14/87	SUGAR BEETS	47.4	.0	1.1	1.1	0%	0%	2%		
25	2/13/87	SUGAR BEETS	84.6	1.1	13.6	14.7	7%	1%	17%		
26	2/14/87	SUGAR BEETS	9.2	1.0	.0	1.0	100%	11%	11%		
27	3/ 9/87	SUGAR BEETS	74.9	.3	8.1	8.4	4%	0%	11%		
28	3/21/87	SUGAR BEETS	58.8	1.0	8.2	9.2	11%	2%	16%		
29	4/ 3/87	SUGAR BEETS	97.8	1.7	9.3	11.0	15%	2%	11%		
30	4/14/87	SUGAR BEETS	73.2	1.0	12.6	13.6	7%	1%	19%		
31	4/25/87	SUGAR BEETS	85.4	.8	11.9	12.7	6%	1%	15%		
32	5/ 3/87	SUGAR BEETS	65.1	.9	15.6	16.5	5%	1%	25%		
33	5/13/87	SUGAR BEETS	69.0	3.2	10.7	13.9	23%	5%	20%		
34	5/22/87	SUGAR BEETS	43.1	.0	10.2	10.2	0%	0%	24%		
35	6/ 2/87	SUGAR BEETS	48.6	.0	10.1	10.1	0%	0%	21%		
36	8/16/87	FLAT FLOOD	180.7	1.3	9.6	10.9	12%	1%	6%		
37	8/24/87	FLAT FLOOD	187.0	.0	20.0	20.0	0%	0%	11%		
38	10/16/87	ROW ALFALFA	135.6	2.5	32.5	35.0	7%	2%	26%		
39	12/ 8/87	ROW ALFALFA	41.7	.0	12.4	12.4	0%	0%	30%		
40	12/29/87	ROW ALFALFA	40.9	.7	2.5	3.2	22%	2%	8%		
41	2/19/88	ROW ALFALFA	87.5	.5	8.2	8.7	6%	1%	10%		
42	2/25/88	ROW ALFALFA	20.9	.0	4.5	4.5	0%	0%	22%		
43	3/28/88	ROW ALFALFA	133.2	.0	13.3	13.3	0%	0%	10%		
44	4/ 9/88	ROW ALFALFA	61.5	3.2	7.9	11.1	29%	5%	18%		
45	4/29/88	ROW ALFALFA	104.1	.3	13.1	13.4	2%	0%	13%		
46	5/13/88	ROW ALFALFA	101.5	.4	15.8	16.2	2%	0%	16%		
47	6/ 3/88	ROW ALFALFA	130.8	.0	9.8	9.8	0%	0%	7%		
48	6/16/88	ROW ALFALFA	92.8	.0	8.6	8.6	0%	0%	9%		
49	7/ 7/88	ROW ALFALFA	179.3	.0	21.3	21.3	0%	0%	12%		
50	7/20/88	ROW ALFALFA	113.1	.0	10.4	10.4	0%	0%	9%		
51	8/ 2/88	ROW ALFALFA	82.2	.0	6.3	6.3	0%	0%	8%		
52	8/13/88	ROW ALFALFA	95.0	.0	4.8	4.8	0%	0%	5%		
53	8/28/88	ROW ALFALFA	113.8	.0	12.3	12.3	0%	0%	11%		
54	9/12/88	ROW ALFALFA	79.2	.0	5.4	5.4	0%	0%	7%		
55	9/27/88	ROW ALFALFA	98.4	.2	5.7	5.9	3%	0%	6%		
56	10/18/88	ROW ALFALFA	104.1	.0	6.5	6.5	0%	0%	6%		
57	11/ 6/88	ROW ALFALFA	59.3	.0	5.0	5.0	0%	0%	8%		
58	12/ 3/88	ROW ALFALFA	65.8	.0	10.0	10.0	0%	0%	15%		
59	1/ 1/89	ROW ALFALFA	56.8	.4	9.8	10.2	4%	1%	18%		
60	2/ 5/89	ROW ALFALFA	*73.9		*11.0	*11.0				NR	GRADE PULLED ON SPILL
61	3/ 6/89	ROW ALFALFA	100.2	.4	14.6	15.0	3%	0%	15%		RECYCLED TW CALCULATED POWER
62	3/27/89	ROW ALFALFA	100.6	.9	15.7	16.6	5%	1%	17%		RECYCLED TW CALCULATED POWER
63	4/15/89	ROW ALFALFA	102.6	.0	8.6	8.6	0%	0%	8%		
64	4/28/89	ROW ALFALFA	76.4	2.5	9.1	11.6	22%	3%	15%		
65	5/14/89	ROW ALFALFA	92.7	.0	4.5	4.5	0%	0%	5%		

PUMPBACK SYSTEM #3

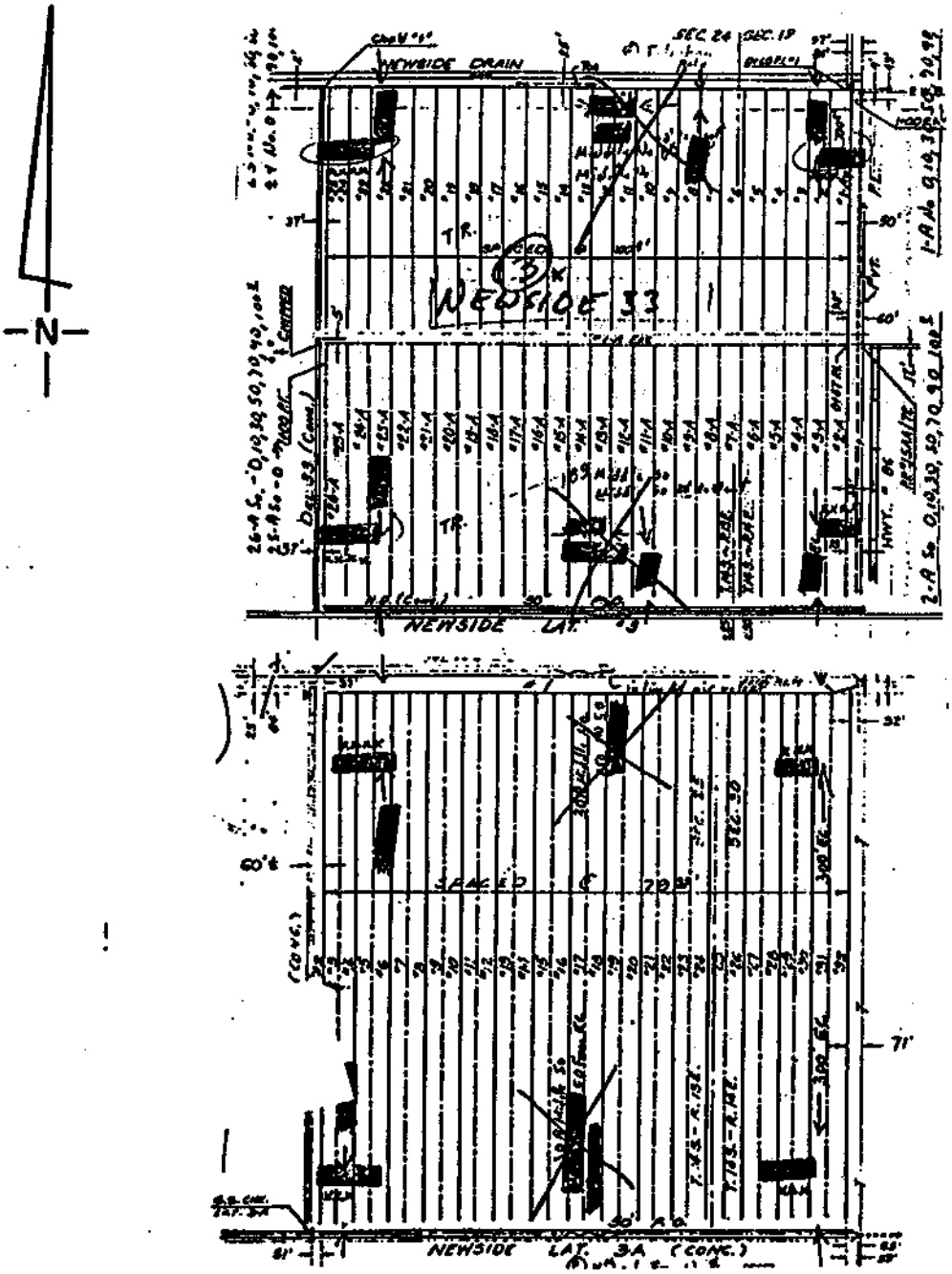
EVENT (1)	DATE (2)	CROP (3)	WATER QUANTITIES (ACRE FEET) DELIVERY (4)	SPILL (5)	RECYCLED TAILWATER (6)	TOTAL TAILWATER (7)	%TAILWATER SPILLED (8)	%DELIVERY SPILLED (9)	%DELIVERY TAILWATER (10)	NO RECORD (11)	COMMENTS (12)
66	5/24/89	ROW ALFALFA	77.2	.0	10.5	10.5	0%	0%	14%		
67	6/ 2/89	ROW ALFALFA	90.9	.0	7.4	7.4	0%	0%	8%		
68	6/14/89	ROW ALFALFA	96.9	.0	13.2	13.2	0%	0%	14%		
69	6/24/89	ROW ALFALFA	83.2	.0	15.0	15.0	0%	0%	18%		
70	7/ 3/89	ROW ALFALFA	77.3	.0	13.0	13.0	0%	0%	17%		
71	7/19/89	ROW ALFALFA	*123.0		*11.8	*11.8					NR ON SPILL TW BOX DAMAGED
72	7/29/89	ROW ALFALFA	*68.9		*13.3	*13.3				NR	SPILL TW BOX DAMAGED
73	8/ 7/89	ROW ALFALFA	*79.9		*11.3	*11.3				NR	
74	8/24/89	ROW ALFALFA	*109.0		*10.8	*10.8				NR	SIPHONS USED ON SPILL
75	9/ 2/89	ROW ALFALFA	69.8	.0	7.0	7.0	0%	0%	10%	NR	SIPHONS USED ON SPILL
76	9/14/89	ROW ALFALFA	85.4	.0	5.4	5.4	0%	0%	6%		
77	10/ 1/89	ROW ALFALFA	56.4	.0	9.3	9.3	0%	0%	16%		
78	10/11/89	ROW ALFALFA	*65.2		*7.1	*7.1					
79	10/17/89	ROW ALFALFA	34.9	.3	7.6	7.9	4%	1%	23%	NR	SIPHONS USED ON SPILL
80	11/ 9/89	ROW ALFALFA	78.7	.0	12.8	12.8	0%	0%	16%		
81	12/ 7/89	ROW ALFALFA	69.3	.0	11.2	11.2	0%	0%	16%		
82	1/26/90	ROW ALFALFA	36.5	.0	11.6	11.6	0%	0%	32%		
83	2/24/90	ROW ALFALFA	69.4	.7	10.7	11.4	6%	1%	16%		RAN WATER BACK TO CANAL
		TOTAL	5,321.9	34.3	711.3	745.6	5%	1%	14%		
		AVG	79.4	.5	10.8	11.1					
		STD DEV	38.6	.9	7.0	7.3					


IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 3
5 - Year Measured Water Application
Total Water Measured (Acre-feet)
6000
4800
3600
2400
1200
0
0
18
36
54
72
90
Accumulative Number of Irrigation Events
Destination
Applied
Spill
Tailwater

IMPERIAL IRRIGATION DISTRICT
Pumpback Demonstration Project - Site 3



SOIL SALINITY



PUMPBACK SYSYTEM #3

TR.S 65, 177, and 189
T.14S. - R.13E.

IMPERIAL IRRIGATION DISTRICT
AVERAGE SOIL SALINITY ACROSS SELECTED LOCATIONS - PUMPBACK SYSTEM #3-NORTH

NORTHWEST - SITE 3-NORTH

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	1.2	2.2	83%	3.2	45%
12	1.7	2.1	24%	3.5	67%
24	3.3	3.6	9%	5.0	39%
36	3.7	4.9	32%	4.9	0%
48	4.1	4.6	12%	4.9	7%
60	4.1	3.3	-20%	4.4	33%
AVG	3.0	3.5	14%	4.3	25%

NORTHEAST - SITE 3-NORTH

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	7.0	8.1	16%	6.4	-21%
12	7.1	8.0	13%	7.5	-6%
24	7.2	9.2	28%	7.0	-24%
36	7.1	8.6	21%	7.7	-10%
48	6.7	7.3	9%	7.3	0%
60	6.6	6.5	-2%	6.5	0%
AVG	7.0	8.0	14%	7.1	-11%

SOUTHWEST - SITE 3-NORTH

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	1.6	2.1	31%	2.8	33%
12	1.7	2.1	24%	2.9	38%
24	3.5	3.3	-6%	3.9	18%
36	3.8	3.3	-13%	5.0	52%
48	3.8	2.7	-29%	3.9	44%
60	3.1	1.7	-45%	3.4	100%
AVG	2.9	2.5	-13%	3.7	44%

SOUTHEAST - SITE 3-NORTH

DEPTH (in.)	EC SUMMER 1985	EC SUMMER 1988	'85 TO '88 PERCENT INCREASE	EC WINTER 1990	'88 TO '90 PERCENT INCREASE
6	6.4	7.9	23%	14.0	77%
12	7.0	7.3	4%	10.0	37%
24	7.5	7.5	0%	9.8	31%
36	6.9	6.8	-1%	9.7	43%
48	5.8	5.5	-5%	9.1	65%
60	5.8	4.9	-16%	8.2	67%
AVG	6.6	6.7	1%	10.1	52%

AVERAGE ELECTRICAL CONDUCTIVITY 1985 TO 1988 PERCENT INCREASE FOR SITE 3N = 6%
AVERAGE ELECTRICAL CONDUCTIVITY 1988 TO 1990 PERCENT INCREASE FOR SITE 3N = 22%
AVERAGE ELECTRICAL CONDUCTIVITY 1985 TO 1990 PERCENT INCREASE FOR SITE 3N = 29%

NOTE: NEGATIVE VALUES SIGNIFY DECREASES IN THE AVERAGE SOIL SALINITY.
ECe VALUES (MMHOS/CM) AVERAGED FROM SAMPLES OVER TILE DRAINS.