

# Appendix B – Soil Boring Logs

## Soil Salinity Monitoring Report





# San Joaquin River Seepage Management Program

Well or Boring# 102-12 Sampler: brummer lee Date: 1/31/2012  
 location wgs84 0740981 4072645 Landform low terrace NRCS Map Unit chino loam  
 Location Notes 180 feet east of tail across from row 100 70ft north and 180 ft east of wellsite r2b-5  
 Topography nearly level Vegetation & Conditon good grapes  
 Irrigation System Type: gravity Irrigation Quadrant 3//5  
 Avg EM Measurements; (tcor25c EM<sub>V</sub> 39 EM<sub>H</sub> 26 EM Calibration Site: EM<sub>V</sub> 39 Emh 25  
 Root depth inches 40 inches plus Soil Temperature, °C (2") 13 (16") 12

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-12	loam	17	45	grbrown	0	moist	none				friable
	12to39	loam	18	40	grbrown	0	smoist	none				friable
	39-47	sil	25	20	grbrown	0	smoist	none				firm
	47-60	sicl	28	20	brgray	0	smoist	few				very faint firm
	60-80	ltsicl	28	20	brgray		moist	few				firm
	80-95	loam	19	35	brgray		moist	few				friable
	95-110	fsl	15	60	brgray		vm-wet	common				prominent
	110-126	sil	23	20	gray		vm	few				black specs, firm
						no3-n						
676	0-12 30x					<1	11.1		7.26	4.19	48.9	slee,sar4.2,gypsum 1.5
677	0-12					<1	10.6		6.43	3.94	46.8	sar3.5,gypsum 5.2
678	12to30					<1	8.9		6.13	3.78	38.7	sar 5.2, gypsum 0.00
679	30-60						12		7.27	4.96	32.8	sar 6.6, gypsum 0.00

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

### EM38 Measurements: EM<sub>V</sub>

30-39; borderline vfsl; excess vegetative growth in area last year; placed red marks on vines and grape stakes opposite central site; yellowish material on soil surface (gypsum) scraped yellowish material away before auguring. Excellent profile for irrigation; EM and comp samples down three rows 100 feet each way from boring. No water table to 126 inches after 15 minutes; Em survey may be questionable due to metal grape wire and trellises in area cap fringe adjustment 1.0 feet too dry for reliable EM38 survey

EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>
42	27	36
40	25	40
39	24	40
39	25*	39
35	21	43
36	23	45
38	25	36

# San Joaquin River Seepage Management Program

Well or Boring#	103-12	Sampler:	brummer, lee	Date:	1/31/2012
location wgs84	0741408 4072344	Landform	low terrace	NRCS Map Unit	chino loam
Location Notes	150ft north and 180 ft east of wellsite pz2b-3				
Topography	nearly level	Vegetation & Conditon	good grapes		
Irrigation System Type:	gravity	Irrigation Quadrant	3//5		
Avg EM Measurements;	(tcor25c EM <sub>v</sub> _____	EM <sub>H</sub> _____	EM Calibration Site: EM <sub>v</sub> _____	Emh _____	
Root depth inches	roots to 60 inches plus	Soil Temperature, °C (2")	(16")		

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-20	loam	15	45	grbrown	0	smoist	none				very friable
	20-38	sl	14	60	grbrown	0	smoist	none				friable
	38-48	ltsl	8	70	brown	0	nd	none				friable
	48-68	sand	2	96	ltbrgr	0	nd	none				loose
	68-90	ltclay	40	30	brgray		smoist	few				very firm, faint
	90-107	cl	34	40	brown		moist	common				firm
	107-126	sl	9	65	rdbrown		vm	common				coarser with depth
						no3-n						
	0-12 30x					<1	8		6.42	3.85	47.1	slee, sar 4.8,gypsum 0.9
	0-12					<1	7.6		6.49	3.83	48.2	sar 4.8, gypsum 0.6
	12to30					<1	6.6		7.08	1.53	34.6	
	30-60					3	2.5		7.37	2.32	28.3	

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

**Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.**

**Site Remarks:**

**Numeric values indicate percent moisture by weight.**

### EM38 Measurements: $EM_v$

[illegible]

site is about 200 feet from the river levee

124-126inches; very moist to wet loamy sand with many mottles; may be top of capillary fringe

no water table to 126 inches after 5 minutes; estimated water table depth is about 11 feet;

comp sample collected from a three row area extending 100 feet down each row from the central

boring; No em survey due to metal grape trellis and wire.

cap fringe adjustment 1.0 feet;

# San Joaquin River Seepage Management Program

Well or Boring#	104-12	Sampler:	brummer, lee	Date:	1/31/2012
location wgs84	0741273 4072906	Landform	low terrace	NRCS Map Unit	grangeville fsl
Location Notes	site is between rows 56 and 57 about 200 feet west and 70 feet south of wellsite pz2b-4				
Topography	nearly level	Vegetation & Conditon	good grapes		
Irrigation System Type:	gravity	Irrigation Quadrant	2//5		
Avg EM Measurements;	(tcor25c EM <sub>v</sub> _____	EM <sub>H</sub> _____	EM Calibration Site: EM <sub>v</sub> _____	Emh _____	
Root depth inches	48-60 common roots	Soil Temperature, °C (2")	(16")		

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-10	loam	18	40	brgray	0	smoist	none				very friable
	10to22	fsl	14	55	grbrown	0	smoist	none				very friable
	22-48	lt sl	6	70	grbrown	0	smoist	none				very friable
	48-60	ls	4	80	ltbrgr	0	moist	few				very friable
	60-96	sand	2	96	ltbrgr		moist	few				loose
	96-120	grs	0	99	ltgray		m-vm	few				15% fine gravel
	120-128	cos	0	99	ltgray		wet-sat	none				micacious river sand
					no3-n							
	0-12 30x				2 mg/l		7.3		6.52	3.65	44.8	slee, sar3.8, gypsum1.6
	0-12				<1		8.7		6.91	3.36	43.1	sar 5.1, gypsum 0.1
	12to30				<1		7.5		7.7	2.29	27.9	
	30-60				<1		5.4		8.08	1.62	30.8	

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

**Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.**

**Site Remarks:**

**Numeric values indicate percent moisture by weight.**

### EM38 Measurements: $EM_v$

[illegible]

36-60 inches contains some thin vfl layers; capillary fringe about 6-10 inches thick; water table at 10.3 feet after 5 minutes; hole caved to 10.3 feet; red paint on grape stakes opposite the central boring. The comp sample was collected down three rows centered by the central boring. No em survey due to the presence of metal trellis; comp sample area extended 100 feet down the rows from the central boring.  
cap fringe adjustment 0.5 feet

# San Joaquin River Seepage Management Program

Well or Boring# 105-12 Sampler: brummer, lee Date: 2/10/2012  
 location wgs84 0740979 4072332 Landform low terrace NRCS Map Unit chino loam  
 Location Notes 170 feet east and 110 feet north of wellsite pz2b-6; between rows 13 and 14; red paint on grape stakes  
 Topography nearly level Vegetation & Conditon good grapes  
 Irrigation System Type: gravity Irrigation Quadrant 3//5  
 Avg EM Measurements; (tcor25c EM<sub>V</sub> EM<sub>H</sub> EM Calibration Site: EM<sub>V</sub> 27 Emh 19  
 Root depth inches over 60 inches Soil Temperature, °C (2") 14 (16") 13

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-10	loam	23	35	dkgray	0	moist	none				friable
	1to27	ltcl	28	30	dkgray	0	moist	none				firm
	27-44	loam	20	35	grbrown	0	moist	none				very friable
	44-61	fsl	12	55	brown	0	moist	none				very friable
	61-70	sil	24	20	pbrown		vmoist	few-com				common mottles at 68in
	70-86	loam	17	34	pbrown		vmoist	common				very friable
	86-118	vfs	12	60	rbrown		vmoist	many				contains thin loam layers
	118-140	lfs	4	85	ltgrbr		vmoist	common				contains sand layers
						no3-n						
692	0-12 30x					<1 mg/l	10.2		6.87	3.6	43.2	slee, sar4.0 gypsum 0.5
693	0-12					<1	12.4		6.08	3.54	45.4	sar 4.7 gypsum 0.4 meq/100gr
694	12to30					<1	11.7		6.91	2.23	41.6	
695	30-60					<1	8.1		7.17	1.22	28.7	

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

em survey may be ?? Due to metal grape trellis  
 area was affected by powdery mildew last year  
 excellent profile for irrigation  
 appears to have gypsum disked into surface; yellow-white compound  
 no water table after 10 minutes to 11.8 feet  
 capillary fringe factor is 1.0 feet  
 too dry for reliable EM38 survey

EM38 Measurements: EM <sub>V</sub>			EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>
Emv	Emh				
		32	26	25	17
23	15	29	20	27	19*
20	16	28	20	31	21
20	14	24	22	31	22
18	13	22	15	27	17
21	15	23	16	26	17
26	18	32	21	23	15
		31	21	25	16

Well or Boring#	106-12	Sampler:	brummer, shamp	Date:	3/14/2012
location wgs84	0734349 4076799	Landform	low terrace	NRCS Map Unit	320 el nido sl
Location Notes	about 215 feet into the orchard				
Topography	nearly level	Vegetation & Conditon	fair almonds		
Irrigation System Type:	micro sprinklers	Irrigation Quadrant			
Avg EM Measurements;	EM <sub>V</sub>	22	EM <sub>H</sub>	17	EM Calibration Site: EM <sub>V</sub>
					22.5 Emh
Root depth inches			Soil Temperature, °C (2")	16	(16")
					15

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-10	fsl	9	65	brgray	0	moist	none				very friable
	10to39	fsl	7	62	grbrown	0	vmoist	none				very friable
	39-45	fsl	7	62	grbrown	0	vmoist	few				friable, very faint rust mottles
	45-60	sil	22	25	dkgray	0	vmoist	common				firm, rust mottles
885	0-12 30x						7.8		6.5	0.92	37.4	
886	0-12						7.9		6.61	1.55	38.5	
887	12to30						13.8		6.63	2.66	47.8	
888	30-60						26.9		6.19	6.82	52.5	sar 11.1 gypsum 0.00

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

**Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.**

Numeric values indicate percent moisture by weight.		EM38 Measurements: EM <sub>V</sub>		EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>
umps nearby; painted one stump red; no water table to 60 inches after 10 about 300 feet from ccid obswell			15.5	10.1	23.2	22.5
	Emv	Emh	17.9	12	20.5	15.3
	22.5	16.5	22.9	22.4	13.1	8.2
	20	15	24.1	19.1	25.5	20.7
	23	15.9	32.8	21	36.9	34.6
	15.4	12.8	27.3	19.8	19.8	14.8
138 survey					16.6	15.5

# San Joaquin River Seepage Management Program

Well or Boring# 107-12 Sampler: brummer, shamp Date: 3/21/2012  
 location wgs84 0745970 4106967 Landform low terrace NRCS Map Unit palazzo sl  
 Location Notes about 500 feet from river and 300 feet from tail of field partially drained  
 Topography nearly level Vegetation & Conditon bedded, disked cotton stubble  
 Irrigation System Type: gravelly, furrow Irrigation Quadrant 3//5  
 Avg EM Measurements; EM<sub>v</sub> 41 EM<sub>H</sub> 26 EM Calibration Site: EM<sub>v</sub> 49 Emh 31  
 Root depth inches Soil Temperature, °C (2") 16 (16") 14

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-16	loam	18	35	grbrown		vmoist	none				friable
	16-26	lt loam	16	40	grbrown		vmoist	none				contains fsl layers
	26-39	sil	22	25	brgray		vmoist	none				
	39-60	cl	37	30	olgray		moist	none				few carbonates
	60-71	cl	35	30	olgray		vmoist	few				faint rust mottles
	71-87	scl	24	50	olgray		wet	few				coarser with depth
	87-93	sl	15	60	olgray		wet	few				
	93-117	lt loam	15	45	olgray		wet	few				sand fraction is fine
	117-124	sl	12	60	olgray		saturated	common				rust mottled
	0-12	30x					20.7		6.34	0.91	42	shamp 50-50 beds/furrows
	0-12						20		6.35	0.9	39.7	
	12to30						24.4		6.58	0.79	40.4	
	30-60						17.9		7.28	1.19	45	

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

em38 indicates sand streaks in area; water table 8.4 after 15 min  
 cappilary fringe from 71 -100 inches

EM38 Measurements: EM <sub>V</sub>			EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>	
emv	emh		49	32	41	29
26	17		35	22	44	29
56	37		21	12	49	31
51	34		18	10	54	36
52	31		39	24	41	30
49	31		35	21	28	20



# San Joaquin River Seepage Management Program

Well or Boring# 108-12 Sampler: brummer, shamp Date: 3/21/2012  
 location wgs84 0715891 4107295 Landform low terrace NRCS Map Unit palazzo sl  
 Location Notes 200 feet into field partially drained  
 Topography nearly level Vegetation & Conditon disked fallow, bedded  
 Irrigation System Type: gravity furrow Irrigation Quadrant 3/5  
 Avg EM Measurements; EM<sub>V</sub> 58 EM<sub>H</sub> 42 EM Calibration Site: EM<sub>V</sub> 59 Emh 47  
 Root depth inches Soil Temperature, °C (2") 19 (16") 16

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-14	loam	22	35	dkgray	0	vmoist	none				friable
	14-23	sil	20	25	vdkggray	0	vmoist	none				firm
	23-43	sil	22	25	olbr	++	moist	none				firm
	43-62	hsl	18	52	olbr	++	sm-m	none				crunchy, firm
	62-72	loam	18	33	olgr		moist	few				friable, faint rust
	72-82	sl	10	60	olgr		vmoist	few				friable, faint rust
	82-88	sl	10	60	olgr		vmoist	none				calcium cemented in spots
	88-94	loam	18	40	olgr		vm-wet	few				friable
	94-115	loam	18	35	olgr		wet-sat	few				suction at 9 feet
	0-12 30x						23.9		6.16	1.42	50.2	shamp
	0-12						23.6		6.41	1.72	52.3	
	12to30						26.8		7.35	1.6	51.2	
	30-60						20.8		7.93	1.67	36.6	

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

43-62in, many calcium cemented frags; may be scl  
 capillary fringe 91-98 inches  
 water table 8.1 after 15 minutes  
 82-88in, very hard hardpan remnant, ca cemented  
 psa 50in  
 sand 42  
 silt 46  
 clay 12 texture light loam

EM38 Measurements: EM <sub>V</sub>			EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>
Emv	Emh				
		61	47	47	33
62	44	72	47	47	34
59	44	66	45	58	42
59	47	65	45	52	42
		55	37	61	50
		54	39	52	35

# San Joaquin River Seepage Management Program

Well or Boring# 109-12 Sampler: brummer, shamp Date: 3/21/2012  
 location wgs84 0715608 4107125 Landform basin NRCS Map Unit palazzo sl  
 Location Notes 265 feet from tail of field wp265 partially drained  
 Topography nearly level Vegetation & Conditon disked stubble, bedded  
 Irrigation System Type: gravity, furrow Irrigation Quadrant 4//5  
 Avg EM Measurements; EM<sub>V</sub> 50 EM<sub>H</sub> 43 EM Calibration Site: EM<sub>V</sub> 52 Emh 35  
 Root depth inches to 30 inches Soil Temperature, °C (2") 19 (16") 16

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-21	loam	20	35	dkgray	0	vm-wet	none				friable
	21-45	fsl	14	55	brgray	0	vmoist	few-com				vfriable
	45-54	ltsicl	28	25	vdkg	trace	vmoist	few				firm, faint rust
	54-62	cl	37	25	dkolgr	trace	vmoist	few				very frim
	62-82	sic	42	20	dkolgr		vmoist	few				firm, faint rust
	82-100	sicl	35	20	dkolgr		wet-sat	few				
	100-106	cl	30	35	olgray		saturated	few				friable
	0-12	30x					22.6		6.44	1	44.8	shamp
	0-12						22.5		6.85	1.07	44.2	
	12to30						22.1		7.31	0.92	33.8	
	30-60						29		7.37	1.06	42.1	cap fringe 45-68 lab

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

0-21 site is wet from recent irrigation and rainfall  
 water table 5.8 after 15 minutes  
 capillary fringe about 8 inches thick; hard to evaluate in heavy soil  
 lab data indicates cap fringe about 24 inches thick.

EM38 Measurements: EM <sub>V</sub>		EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>	
emv	emh	47	31	43	28
49	31	40	26	52	32
48	33	42	27	60	41
42	26	42	31	61	44
52	35	55	34	66	48

# San Joaquin River Seepage Management Program

Well or Boring# 110-12 Sampler: brummer Date: 3/23/2012  
 location wgs84 0715446 4110580 Landform basin rim NRCS Map Unit Fresno loam  
 Location Notes about 500 feet from bypass levee slt saline / alkali  
 Topography nearly level Vegetation & Conditon poor wheat  
 Irrigation System Type: gravity, check Irrigation Quadrant 4//5  
 Avg EM Measurements; EM<sub>v</sub> 79 emh 70 EM Calibration Site: EM<sub>v</sub> 97 Emh 77  
 Root depth inches roots to 36 plus Soil Temperature, °C (2") 14 (16") 13

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-18	h loam	25	30	dkgray	++	vmoist	none				common roots
	18-25	h loam	25	30	olgray	++	wet	none				
	25-40	hsl	17	55	olbrown	++	vm-wet	none				ripped hardpan
	40-48	lt loam	17	35	olbrown	++	saturated	few				rust mottles
	48-52	lt loam	17	35	olgray	++	saturated	few				too wet to sample
	0-12 30x						27.4		7.65	5.02	45.9	brummer
	0-12						28.2		7.84	3.75	44.2	
	12to30						27.2		7.87	6.03	37.7	
	30-48						29.5		8.19	3.68	42.3	

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

24-40in many hardpan fragments

18-25in wet soil may be perched on hardpan

water table 2.4 feet after 20 minutes

18-29 capillary fringe zone

EM38 Measurements: EM <sub>v</sub>		EM <sub>H</sub>	EM <sub>v</sub>	EM <sub>H</sub>	
emv	emh	92	88	81	63
74	71	61	56	66	49
112	109	100	91	72	61
98	96	67	59	57	46
92	77	64	55	68	56
		103	86	69	62

# San Joaquin River Seepage Management Program

Well or Boring# 110-12 Sampler: brummer Date: 3/23/2012  
 location wgs84 0715446 4110580 Landform basin rim NRCS Map Unit Fresno loam  
 Location Notes about 500 feet from bypass levee slt saline / alkali  
 Topography nearly level Vegetation & Conditon poor wheat  
 Irrigation System Type: gravity, check Irrigation Quadrant 4//5  
 Avg EM Measurements; EM<sub>v</sub> 79 emh 70 EM Calibration Site: EM<sub>v</sub> 97 Emh 77  
 Root depth inches roots to 36 plus Soil Temperature, °C (2") 14 (16") 13

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-18	h loam	25	30	dkgray	++	vmoist	none				common roots
	18-25	h loam	25	30	olgray	++	wet	none				
	25-40	hsl	17	55	olbrown	++	vm-wet	none				ripped hardpan
	40-48	lt loam	17	35	olbrown	++	saturated	few				rust mottles
	48-52	lt loam	17	35	olgray	++	saturated	few				too wet to sample
	0-12 30x						27.4		7.65	5.02	45.9	brummer
	0-12						28.2		7.84	3.75	44.2	
	12to30						27.2		7.87	6.03	37.7	
	30-48						29.5		8.19	3.68	42.3	

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

24-40in many hardpan fragments

18-25in wet soil may be perched on hardpan

water table 2.4 feet after 20 minutes

18-29 capillary fringe zone

EM38 Measurements: EM <sub>v</sub>		EM <sub>H</sub>	EM <sub>v</sub>	EM <sub>H</sub>	
emv	emh	92	88	81	63
74	71	61	56	66	49
112	109	100	91	72	61
98	96	67	59	57	46
92	77	64	55	68	56
		103	86	69	62

# San Joaquin River Seepage Management Program

Well or Boring# 111-12 Sampler: brummer, lee Date: 3/27/2012  
 location wgs84 0714487 4110028 Landform basin NRCS Map Unit columbia silt loam  
 Location Notes 340 feet from the edge of the field, 400 feet from obswell stake  
 Topography nearly level Vegetation & Conditon bedded fallow  
 Irrigation System Type: gravity, furrow Irrigation Quadrant 2//5  
 Avg EM Measurements; EM<sub>v</sub> 217 EM<sub>H</sub> 177 EM Calibration Site: EM<sub>v</sub> 225 Emh 184  
 Root depth inches Soil Temperature, °C (2") 17 (16") 16

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-11	sil	24	25	vdkgray	0-+	vm	none				friable to firm
	11to36	loam	21	35	olgray	++	m-vm	none				friable
	36-52	loam	18	40	olgray	++	vm	few				few hardpan fragments
	52-62	loam	18	35	olgray	++	wet	few				suction at 61 inches
	62-78	sil	23	25	olgray	++	saturated	few				faint rust mottles
	0-12 30x						26.2		6.88	21.9	62.5	sar 12.6 gypsum 16.5 meq/100gr
	0-12						30.7		6.97	19.3	64.7	sar 13.4 gyp 12.3 meq/ 100 gr
	12to30						27.7		7.41	16.7	52.8	sar 10.5 gyp 8.54 meq/100gr
	30-60						23.5		7.77	10.5	40.3	sar 8.8 gyp 4.22 meq/100gr

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

Area is subject to flooding during high flows. Surface layer appears to have applied gypsum fragments. Cappillary fringe about 6 inches thick. 36-52in contains ripped lime silica hardpan. water table is 4.7 below the bottom of the furrow and 5.4 feet below the top of the beds after 20 minutes.

0-12comp; lee 50/50 beds and furrows

Em38 survey in bottom of furrow

### EM38 Measurements: EM<sub>v</sub>

### EM<sub>H</sub>

### EM<sub>v</sub>

### EM<sub>H</sub>

212	162	162	148
232	207	198	155
257	233	296	266
206	152	278	200
154	130	239	203
172	126	241	188
168	137	213	165
		225	184

# San Joaquin River Seepage Management Program

Well or Boring# 112-12 Sampler: brummer, lee Date: 3/27/2012  
 location wgs84 0714584 4109516 Landform low terrace NRCS Map Unit columbia  
 Location Notes 320 feet from head of field, about 500 feet from well stake channelled  
 Topography nearly level Vegetation & Conditon bedded fallow  
 Irrigation System Type: gravity, furrow Irrigation Quadrant 2//5  
 Avg EM Measurements; EM<sub>v</sub> 173 EM<sub>H</sub> 110 EM Calibration Site: EM<sub>v</sub> 181 Emh 101  
 Root depth inches Soil Temperature, °C (2") 18 (16") 16

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-15	sl	12	62	brgray	0	moist	none				friable
	15-20	loam	18	35	black	0	moist	none				buried A horizon
	20-36	sil	24	25	dkgray	++	moist	few				drab color, firm
	36-64	sil	20	25	olgray	+	m-vm	few				friable faint mottles
	64-78	loam	17	48	olgray	++	wet-sat	few				contains thin sl layers, rust
	0-12	30x					11.1		6.95	13.2	35	sar 8.1 gyp 7.4 meq/ 100gr
	0-12						7.8		7.26	7.42	26.2	sar 7.1 gyp 3.6 meq/100gr
	12to30						20		7.03	10.7	58.1	sar 8.1 gyp 5.4 meq/100gr
	30-60						18.7		7.57	6.45	50.9	sar 10 gyp 0.00

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

### EM38 Measurements: EM<sub>v</sub>

### EM<sub>H</sub>

### EM<sub>v</sub>

### EM<sub>H</sub>

large 3 foot wide beds. Boring measurements are from the bottom of the furrow. Beds are 12 in high; water table is 6.3 feet from the top of the beds after 15 minutes; capillary fringe only a few in thick; 36-64; contains a few hardpan fragments;  
 0-12 comp lee 66/34 beds and furrows  
 psa 42 inches; sand 26; silt 51; clay 23; silt loam  
 most EM measurements in bottom of furrows  
 upper portion of beds appears to be high in salts.

188	105	182	89
141	79	104	117bed
154	111	186	92
200	133	175	105
217	138	152	154bed
196	115	225	130
207	105	134	77
182	101	117	109bed

# San Joaquin River Seepage Management Program

Well or Boring# 113-12 Sampler: brummer lee Date: 3/27/2012  
 location wgs84 0715406 4110089 Landform basin NRCS Map Unit fresno loam  
 Location Notes 300 feet from the head of the field slt saline/alkali  
 Topography nearly level Vegetation & Conditon bedded corn stubble  
 Irrigation System Type: gravity furrow Irrigation Quadrant 2//5  
 Avg EM Measurements; EM<sub>v</sub> 133 EM<sub>H</sub> 99 EM Calibration Site: EM<sub>v</sub> 130 Emh 96  
 Root depth inches Soil Temperature, °C (2") 19 (16") 17

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-19	loam	19	40	brgray	++	moist	none				friable
	19-25	chloam	20	40	olbrown	++	moist	none				contains dense hardpan layer
	25-33	loam	17	42	olbrown	++	moist	none				few hardpan fragments
	33-40	fsl	12	60	olbrown	++	vm	none				friable
	40-52	lt loam	15	40	olbrown	++	vm	none				
	52-64	loam	19	35	dkbrown	++	vm	few				varegated colors,com carbonates
	64-74	loam	18	40	brown	++	wet	few				
	74-80	sl	6	78	brown	++	saturated	none				
	0-12 30x						19.5		7.23	27.8	43	sar 15.4 gyp 13.7 meq/100gr
	0-12						19.5		7.42	16.1	39.7	sar 12.6 gyp 6.27 meq/100gr
	12to30						22.7		7.67	12	34.3	sar 11.2 gyp 3.98 meq/100gr
	30-60						24.6		7.77	8.08	39.9	sar 12.4 gyp 0.00

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

9 inch high beds; Boring in furrow; Large hp chunks on surface;  
 Mottles are faint rust mottles; suction at 74 inches; water table  
 is 6.0 feet from the top of the beds after 15 minutes.  
 all other measurements on log are from the bottom of the furrow;  
 0-12comp lee 50/50 beds/furrows  
 cap fringe estimate 33-62 inches bottom of furrow; lab adj.  
 EM38 survey in bottom of furrow.

EM38 Measurements: EM <sub>V</sub>			EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>
Emv	Emh				
		142	88	130	96
128	102	127	112	158	119
127	121	132	88	140	93
106	85	135	100		
117	77	156	107		

# San Joaquin River Seepage Management Program

Well or Boring# 114-12 Sampler: brummer lee Date: 3/27/2012  
 location wgs84 0716241 4110014 Landform basin NRCS Map Unit fresno loam  
 Location Notes 320 feet from the head of the field slt saline alkali  
 Topography nearly level Vegetation & Conditon bedded fallow  
 Irrigation System Type: gravity furrow Irrigation Quadrant 2//5  
 Avg EM Measurements; EM<sub>V</sub> 68 EM<sub>H</sub> 49 EM Calibration Site: EM<sub>V</sub> Emh  
 Root depth inches Soil Temperature, °C (2") 18 (16") 16

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
ns	0-9	loam	21	40	brgray	++	moist	none				friable
	9to34	ch sl	10	60	brown	++	moist	none				common hardpan fragments
	34-55	sl	15	55	brown	++	vmoist	few				friable
	55-75	fsl	12	57	brown	++	vmoist	few				friable
	75-100	sil	19	25	grbrown	trace	vmoist	few				friable
	100-130	fsl	15	55	grbrown	trace	wet	few				suction at 129 inches

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

em38 only; 9-34in; contains lime silica hardpan fragments;  
 water table is 10.7 feet deep from the top of the beds after 15 minutes  
 all other measurements are from the bottom of the furrow.  
 cap fringe about 21 inches thick;

EM38 Measurements: EM <sub>V</sub>			EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>
Emv	Emh				
		73	46	81	54
61	45	69	51	82	58
61	50	64	50	64	46
72	52	62	44	72	53
72	47	72	53	63	45
				50	42



# San Joaquin River Seepage Management Program

Well or Boring# 115-12 Sampler: brummer lee Date: 3/27/2012  
 location wgs84 0716451 4109626 Landform basin NRCS Map Unit fresno loam  
 Location Notes 320 feet from the head of the field slt saline alkali  
 Topography nearly level Vegetation & Condition bedded,wide deep beds  
 Irrigation System Type: gravity furrow Irrigation Quadrant 2//5  
 Avg EM Measurements; EM<sub>V</sub> 74 EM<sub>H</sub> 48 EM Calibration Site: EM<sub>V</sub>      Emh       
 Root depth inches                                  Soil Temperature, °C (2") 19 (16") 17

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-25	loam	22	30	brgray	+	moist	none				friable
	25-49	ch sl	9	65	olbrown	++	moist	none				common hardpan fragments
	49-64	fsl	11	65	olbrown	++	vmoist	few				friable
	64-88	loam	21	35	brgray	++	vmoist	few				friable
	88-109	fsl	14	60	brgray	+	vmoist	few				few cemented fragments
	109-118	sl	8	68	brgray	+	vmoist	few				v friable
	118-128	fsl	14	55	brgray	+	vmoist	common				partially cemented in spots

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

em readings in furrows unless indicated otherwise; em38 only  
 No water table encountered to a depth of 140 inches from the top  
 of the beds; Nearby wells are pumping irrigation water;

EM38 Measurements: EM <sub>V</sub>			EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>	
Emv	Emh					
			71	49	97	56
67	49		87	49	78	52
73	39		48	39bed	69	43
78	53		74	40	75	44
51	49bed		70	44	68	39
69	48		105	69		

# San Joaquin River Seepage Management Program

Well or Boring# 116-12 Sampler: brummer lee Date: 4/19/2012  
 location wgs84 0719312 4102130 Landform basin rim NRCS Map Unit Rossi loam,  
 Location Notes wp 282 slt saline alkali  
 Topography nearly level, boring in 2 foot cut area Vegetation & Conditon almonds, pale green and yellow foliage  
 Irrigation System Type: drip Irrigation Quadrant  
 Avg EM Measurements; EM<sub>V</sub> 47 EM<sub>H</sub> 55 EM Calibration Site: EM<sub>V</sub> 65 Emh 69  
 Root depth inches roots to 64 inches Soil Temperature, °C (2") 20 (16") 19

## PROFILE DESCRIPTION AND LABORATORY DATA

Sample No.	Depth (Inches)	USDA Texture	% Clay	% Sand	Color	Reaction to HCL <sup>1</sup>	Moisture Content <sup>2</sup>	Mottles	pH Paste	ECe dS/m	Sat. %	Notes:
	0-9	loam	22	35	dkgray	+	vm	none				friable
	9to21	loam	21	40	olive gray	++	moist	none				mixed colors, dkgr
	21-30	loam	20	35	olive gray	+++	moist	none				contains hp frags
	30-60	loam	18	40	olive gray	++	vm	none				friable, stratified l/sil/ltl
	60-72	fsl	13	54	olbrown	+	m-vm	none				friable
	72-82	fsl	8	60	olbrown	0	vm	few				v friable, v faint rust mottles
	82-102	sil	20	25	pale br	0	vm	few				stratified l, sil
	102-112	loam	17	40	pale br	0	vm	few				
	112-140	sil	21	25	pale br	0	m-vm	few				loam in spots, firm
1204	0-12 30x	lee	75rows/25 beds				18.8		7.39	4.97	50.7	sar 2.6 gypsum 7.9 meq/100 gr
1205	0-12						20.5		7.62	4.94	50.5	sar 3.6 gypsum 6.1
1206	12to30						26.9		7.72	3.26	51.5	sar 4.3 gypsum 0.00
1207	30-60						15.9		7.68	3.31	31.7	sar 6.1 gypsum 0.00

<sup>1</sup> Lime content; HCL reaction 0 none; + slight; ++ moderate +++ strong

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.

### Site Remarks:

Numeric values indicate percent moisture by weight.

site is about 100 feet from the orchard edge. Backhoe pit is about 90 feet to the north.

sulfur granuales on surface; hardpan fragments from 10-30 inches; no water table to 140 inches

no reaction to hcl below about 82 inches;

EM38 Measurements: EM <sub>V</sub>		EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>	
the north.		53	65	35	80
r table to 140 inches		58	54	44	54
h Emv		35	54	59	58
32	50	56	60	58	58
51	42	51	46	44	42
53	53	34	59	34	47
65	69*	51	51	34	49

Emh Emv

32 50

51 42

53 53

65 69\*

Well or Boring#	117-12 (also sam3)	Sampler:	brummer, lee	Date:	4/25/2012
location wgs84	0732383 4078668	Landform	low terrace	NRCS Map Unit	columbia fsl
Location Notes	about 230 feet into field				
Topography	nearly level	Vegetation & Condition	young corn, just emerging		
Irrigation System Type:	gravity / furrow	Irrigation Quadrant	3//5		
Avg EM Measurements;	EM <sub>v</sub>	5	Emh	5	EM Calibration Site: EM <sub>v</sub>
Root depth inches			Soil Temperature, °C (2")	25	(16") 20

[illegible]

<sup>2</sup> Soil moist: nearly dry=nd; slightly moist = sm; moist = m; very moist= vm; wet = w; saturated=S;

**Field capacity will be considered very moist. Wet will be considered capillary fringe conditions.**

**Numeric values indicate percent moisture by weight.**

suction at 10.5 feet; water table 10.0. boring caved to 10.0; capillary fringe about 3-4 inches thick; em38 indicates very low soil salinity levels;

EM38 Measurements:	EM <sub>V</sub>	EM <sub>H</sub>	EM <sub>V</sub>	EM <sub>H</sub>
about 3-4 inches	4.6	5.5	5.7	5.6
	4.7	8.1	5.2	5.1
	3.6	4.3	6	4.8
	3.2	4.4	5.8	4.4
	4.7	4.7	5.2	5.2
	4	5.4	5.5	4.6
	4.2	5.5	5.1	4.8