FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Right, Merced County BEGUN: 11/3/09 FINISHED: 11/5/09 DEPTH AND ELEVATION OF WATER LEVEL

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,274,920.0 E 6,112,632.9 (NAGD83) TOTAL DEPTH: 62.5 ft.

STATE: California

GROUND SURFACE ELEVATION: 114.8 ft. (NAVD88) T.O.C ELEVATION: 114.84 ft. (NAVD88) HOLE LOGGED BY: G. Russell & J. Vauk REVIEWED BY: J. Vauk

AND DATE MEASURED: 50.7 ft. (El. 64.14 ft.) 11/6/2009

					LABC	ORAT	ORY	DATA	١		≻č	z		
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATOR CLASSIFICATIO	VISUAL CLASSIFICATIO	GEOLOGIC UNI' SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND											· · · · ·			SOIL DESCRIPTIONS CHARACTERIZE SAMPLES FROM DRILL HOLE MW-09-83.
SURFACE. PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a	_	100											Fill	0.0 to 2.0 feet RECENT FILL (Fill) 0.0 to 2.0 ft.: FILL/ROAD BASE - LEAN CLAY WITH SAND, (CL)s: About 85% fines
groundwater monitoring well. DRILLED BY: USGS Drill Crew James Huckaby, Driller Todd Mennina, Helber	_	-												<ul> <li>with medium plasticity, slow dilatancy,</li> <li>medium dry strength, and medium toughness; about 15% fine to medium sand; maximum size: medium sand; dry, light brown; firm</li> <li>consistency; contains some organics (roots).</li> </ul>
DRILL RIG: CME-550	5—	00										(CL)s		– 2.0 to 62.5 feet QUATERNARY ALLUVIUM (Qal)
DRILLING & SAMPLING METHODS: Drill hole MW-09-83 was advanced using hollow stem flight augers with continuous dry core sampling system (FADC) from the ground surface to a total depth of 62.5 feet.	-	96												<ul> <li>2.0 to 9.7 ft.: <u>LEAN CLAY WITH SAND</u>, <u>(CL)s</u>: About 85% fines with medium plasticity, toughness, and dry strength, and slow dilatancy; about 15% fine to medium sand; maximum size: medium sand; dry, light brown; firm consistency.</li> </ul>
FADC system uses augers with a 7-5/8-inch O.D. and 4-1/4-inch I.D., and a 5-foot-long, 3-inch I.D. split sample barrel.	_	-										105.1		9.7 to 12.7 ft.: <u>SILTY SAND, SM</u> : About 80% fine to medium sand; about 20% non-plastic fines with rapid dilatancy; maximum size: medium sand; dry, light gray to light brown; soft consistency.
Interval Method 0.0 to 62.5 ft FADC MW-09-83B was drilled and completed as a well using 7-5/8-inch 0.D. and 4-1/4-inch I.D. hollow stem flight augers and a wooden plug.	10—	90										SM		12.7 to 12.8 ft.: LEAN CLAY WITH SAND, (CL)s: About 75% fines with medium plasticity, toughness and dry strength, and slow dilatancy; about 25% fine to medium sand; maximum size: medium sand; moist, light brown; firm consistency.
feet b.g.s. and the bottom of the well screen was set at 42.5 feet of depth. Interval Method 0.0 to 43.0 ft - EADC with wooden	_											102.1 (CL)s 102.0	Qal	<ul> <li>12.8 to 17.1 ft.: <u>SANDY SILT, s(ML)</u>: About 65% fines with low plasticity, toughness and dry strength, and rapid dilatancy; about 35% fine to medium sand; maximum size: medium sand; moist light brown; soft consistency</li> </ul>
plug	-	-												Laboratory Data Interval
DRILLER'S COMMENTS: <u>MW-09-83</u> 0.0 to 37.5 ft smooth drilling 37.5 to 42.5 ft hard clay bogging down augers 42.5 to 50.5 ft smooth drilling 50.5 to 62.5 ft add water, smooth drilling	15 <del></del> -	100	40.5	19.1	59.6	40.4	0.0	26.7	10.7	12.5	s(CL) 99.5	- s(ML) 97.7		<ul> <li>17.1 to 18.6 ft.: <u>SILTY SAND, SM</u>: About 80% fine to medium sand; about 20% non-plastic fines with rapid dilatancy; maximum size: medium sand; moist, light brown; soft consistency.</li> <li>18.6 to 20.6 ft.: SANDY SILT, s(ML): About</li> </ul>
<u>MW-09-83B</u> 0.0 to 43.0 ft blind drilled 43.0 ft knocked out wooden plug and set well	_											SM 96.2	_	70% fines with low plasticity, toughness and dry strength, and no dilatancy; about 30% fine to medium sand; maximum size: medium sand; moist, light brown; firm consistency.
DRILLNG FLUID, RETURN AND COLOR: <u>MW-09-83</u> 0.0 to 50.5 ft None 50.5 to 62.5 ft Water, no return	_ 20—	96	36.2	46.9	83.1	16.9	0.0	40.3	21.7	31.4	(CI )s 03.8	s(ML) 94.2	_	20.6 to 23.0 ft.: <u>LEAN CLAY WITH SAND</u> , <u>(CL)s</u> : About 85% fines with medium plasticity, toughness and dry strength, and no dilatancy; about 15% fine sand; maximum size: fine sand; moist, light brown; firm consistency.
<u>MW-09-83B</u> 0.0 to 43.0 ft None	_										(02)0 00.0			Laboratory Data Interval 20.7 to 21.0 ft.
WATER LEVEL: 50.7 ft. b.g.s. on 11/6/2009 (MW-09-83)	_	- 										91.8		23.0 to 23.7 ft.: <u>SANDY SILT, s(ML)</u> : About 55% non-plastic fines with rapid dilatancy; about 45% fine sand; maximum size: fine sand; eliabtly moist light brown soft
REASON FOR HOLE TERMINATION: The hole was terminated upon successful completion to the target depth.	-	-										s(ML) 91.1 s(ML) 90.9 SM		consistency.
COMMENTS: FADC = Fligh HSA = Hollow NP = Non-pla NR = No Rec NA = No tapp G.S. = Groun b.g.s. = Below T.O.C. = Top	nt Aug v Sten astic overy blicabl d surf w the of we	er Dry n Aug e face ground	d surfa	ace							Vell completic Vell developm Development f IW-09-83B OC Coordina Ground surfac	n information is lent information orm. <u>tes</u> = N 227491 <u>e EI.</u> = 115.0 (N	provid is prov 6.7 E AVD88	6112625.6 (NAGD83) EI. 115.01 (NAVD88)

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Right, Merced County BEGUN: 11/3/09 FINISHED: 11/5/09 DEPTH AND ELEVATION OF WATER LEVEL PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,274,920.0 E 6,112,632.9 (NAGD83) TOTAL DEPTH: 62.5 ft. STATE: California

GROUND SURFACE ELEVATION: 114.8 ft. (NAVD88) T.O.C ELEVATION: 114.84 ft. (NAVD88) HOLE LOGGED BY: G. Russell & J. Vauk REVIEWED BY: J. Vauk

SHEET 2 OF 3

AND DATE MEASURED: 50.7 ft. (El. 64.14 ft.) 11/6/2009

					LAB	ORAT	ORY	DAT	4		, z		z		L	
NOTEO	Ē	≿						ЧIТ	≥	ш%	ATOR		JAL	z		CLASSIFICATION AND
NOTES	DEP	CORE	5	ΓAΥ	INES	AND	RAVE		STICI	STUR	ABOR	VATIC	VISI	VATIC	DLOGI	PHYSICAL CONDITION
		RE(	S %	0 %	4 %	% S	0%	ğ	PLA	8 <u>0</u>	6		ರ/	ELE	GEO	
HOLE COMPLETION:		94												89.5	-	23.7 to 23.9 ft.: <u>SANDY SILT, s(ML)</u> : About
<u>MW-09-83</u> Well Casing - 0.0 to 51.5 ft. (T.O.C.	-	-											м			70% non-plastic tines with rapid dilatancy; about 30% fine sand; maximum size: fine sand; moist, light brown; soft consistency.
El. 114.84 ft.) Dual Pre-pack Screen - 51.5 to 61.5																23.9 to 25.3 ft.: SILTY SAND. SM: About
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand	-		48.1	18.8	66.9	33.1	0.0	30.2	10.2	18.6	s(CL)	87.3		87.6		70% fine to medium sand; about 30%
Filter Pack - 46.5 to 62.5 ft. (#3	_															maximum size: medium sand; dry, light
Bentonite Seal - 2.0 to 46.5 ft.													s(CL/ML)	)		25.2 to 27.2 ft : SILT ML : About 0.0% fines
18-inch manhole (15/16-inch	-	-														<ul> <li>with low to medium plasticity, toughness and</li> </ul>
														84.8		10% fine sand; maximum size: fine sand;
<u>MW-09-83B</u> Well Casing - 0.0 to 22.5 ft. (T.O.C.	30-	100												01.0	1	moist, light brown; soft consistency.
El. 115.01 ft.) Dual Pre-pack Screen - 22.5 to 42.5	_												SM			27.2 to 30.0 ft.: <u>SANDY SILTY CLAY</u> , <u>s(CL/ML)</u> : About 70% fines with medium
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand																plasticity, low to medium dry strength and toughness, no to slow dilatancy; about 30%
Filter Pack - 18.3 to 43.0 ft. (#3 Sand)	-	1	41.7	7.5	49.2	50.8	0.0	NP	NP	13.7	SM	82.8		82.6		<ul> <li>fine sand; maximum size: fine sand; moist, light brown; soft consistency.</li> </ul>
Bentonite Seal - 2.0 to 18.3 ft. Well Protection - flush-mounted			1										SM	817		Laboratory Data Interval
18-inch manhole (15/16-inch hexbolts)													s(ML)	01.7		27.2 to 27.5 ft.
	-	-											SM	80.8		<b>30.0 to 32.2 ft.:</b> <u>SILTY SAND, SM</u> : About 60% fine sand: about 40% non-plastic fines:
	35	100											0	00.0		maximum size: fine sand; moist, light brown; very soft consistency.
	30-												s(CL/ML)	)		Laboratory Data Interval 31.7 to 32.0 ft.
	-	1														
	_	4												77.6		75% fine sand; about 25% non-plastic fines; — maximum size; fine sand; moist, light brown;
			-												Qal	very soft consistency.
	-	1														<ul> <li>33.1 to 34.0 ft.: <u>SANDY SILT, s(ML)</u>: About</li> <li>65% non-plastic fines with slow dilatancy.</li> </ul>
																about 35% fine sand; maximum size: fine sand; moist
	_															34.0 to 34.3 ft · SILTY SAND SM· About
	40-	96	20.2	16.1	36.3	63.7	0.0	24.3	5.9	11.5	SC-SI	M 74.8	SM			60% fine to medium sand; about 40% fines;
																light brown; soft consistency.
	-															34.3 to 37.2 ft.: SANDY SILTY CLAY,
	_															plasticity, medium toughness and dry
			4											72.5		sand; maximum size: fine sand; moist, light
	-	-														brown; soft to firm consistency.
																37.2 to 42.3 ft.: <u>SILTY SAND, SM</u> : About 65% fine sand; about 35% fines; maximum
	-	1														<ul> <li>size: fine sand; moist, brown; soft to firm consistency.</li> </ul>
	45-	100														<ul> <li>Laboratory Data Interval</li> </ul>
													(CL)s			39.7 to 40.0 ft.
	-	-	63.0	24.3	87.3	12.7	0.0	31.5	7.7	24.1	ML	68.6				42.3 to 48.5 ft.: <u>LEAN CLAY WITH SAND</u> , (CL)s: About 75% fines with medium
																plasticity, toughness and dry strength, and no to slow dilatancy: about 25% fine to coarse
	-															sand; trace of gravel; maximum size: 1/2
	-	4														gravel consists of angular fragments of
													SM	66.3		cemented sand with lines.
	-	-											s(CL/ML)	65.8		<ul> <li><u>Laboratory Data Interval</u></li> <li>45.9 to 46.2 ft.</li> </ul>
													SM	6.60		
COMMENTS: FADC = Fligh	nt Aug	jer Dry	y Core	)							Well c	ompletio	on inform	ation is	provid	ded in attached Well Completion Diagram.
HSA = Hollov NP = Non-pla	v Ster astic	n Aug	er								Well d Develo	evelopn opment	nent infor form.	mation	is pro	vided in attached Monitoring Well
NR = No Rec NA = Not apr	overy	/ le									MW-0	9-83B				
G.S. = Groun	id sur	face	deurf	200							TOC C	Coordina	ates= N2	227491	6.7 E	6112625.6 (NAGD83) El. 115.01 (NAVD88)
T.O.C. = Top	of we	ell casi	ing	aue							Gioun	u sund	<u>, , , , , , , , , , , , , , , , , , , </u>	10.0 (N		
1																JULLI Z OL J DIVILLIULL WWW-09-03

#### **GEOLOGIC LOG OF DRILL HOLE NO. MW-09-83** FEATURE: Groundwater Monitoring PROJECT: San Joaquin River Restoration Project STATE: California

LOCATION: Reach 4A, River Bank Right, Merced County BEGUN: 11/3/09 FINISHED: 11/5/09 DEPTH AND ELEVATION OF WATER LEVEL

COORDINATES: N 2,274,920.0 E 6,112,632.9 (NAGD83) TOTAL DEPTH: 62.5 ft.

GROUND SURFACE ELEVATION: 114.8 ft. (NAVD88) T.O.C ELEVATION: 114.84 ft. (NAVD88) HOLE LOGGED BY: G. Russell & J. Vauk REVIEWED BY: J. Vauk

AND DATE MEASURED: 50.7 ft. (El. 64.14 ft.) 11/6/2009

					LABO	ORAT	ORY	DATA	۹		×No		z /	′   <sub>⊨</sub>	_
NOTES	Ŧ	⊳						μ	≿	ш%	ATOF	/ z			CLASSIFICATION AND
NOTES	DEF	OVEF	5	Ą	NES	QN₽	RAVE	חםו	DEX	STUR	BOR	(ATIC	VISI SSIF		PHYSICAL CONDITION
		REC %	% SI	% CI	% FI	% S/	8 G	LIQL	PLA	NON NON NON	5 C C	ELE /	ELE CLA	GEO	5
	_	96									50.7 ft. (	El. 64.14 ft.)	64	.5	48.5 to 49.0 ft.: <u>SILTY SAND, SM</u> : About 85% fine to medium sand; about 15% fines; maximum size: medium sand; moist, light brown; very soft consistency.
			41.2	0.6	41.8	58.2	0.0	NP	NP	24.3	SM	63.1			49.0 to 49.5 ft.: SANDY SILTY CLAY,
	_												SM		s(CL/ML): About 55% fines with low plasticity, toughness and dry strength, and no to slow dilatancy; about 45% sand; maximum size: fine sand; moist, light to medium brown; soft consistency.
	- 55-	8													<ul> <li>49.5 to 50.3 ft.: <u>SILY SAND, SM</u>: About 60% fine sand; about 40% fines; maximum size: fine sand; moist to wet, brown (some rust staining); firm consistency.</li> </ul>
	_	-											57	Q.	50.3 to 57.0 ft.: <u>SILTY SAND, SM</u> : About 80% fine sand; about 20% fines; maximum size: fine sand; wet, gray-brown; very soft consistency.
															Laboratory Data Interval 51.4 to 51.7 ft.
	-												SP		57.0 to 60.3 ft.: POORLY GRADED SAND, SP: About 95% fine to medium sand; about
	-	1	2.1	0.0	2.1	97.9	0.0	NP	NP	18.4	SP	55.5	-		gray-brown; very soft consistency.
	60—	86											54	.5	Laboratory Data Interval 59.0 to 59.3 ft.
	-	-											s(CL/ML)		60.3 to 62.5 ft.: <u>SANDY SILTY CLAY,</u> <u>s(CL/ML):</u> About 65% fines with low plasticity, toughness and dry strength, and
	-		45.1	24.7	69.8	30.2	0.0	37.9	16.9	24.2	s(CL)	52.9			slow dilatancy; about 35% sand; maximum size: coarse sand: moist, green-gray to
													52	.3	brown; firm to hard consistency.
								50110		IULE					Laboratory Data Interval 61.6 to 61.9 ft.
															T.D.= 62.5 ft.

FADC = Flight Auger Dry Core HSA = Hollow Stem Auger COMMENTS: NP = Non-plastic NR = No Recovery NA = Not applicable G.S. = Ground surface b.g.s. = Below the ground surface T.O.C. = Top of well casing

Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.

MW-09-83B <u>TOC Coordinates</u>= N 2274916.7 E 6112625.6 (NAGD83) El. 115.01 (NAVD88) <u>Ground surface El.</u>= 115.0 (NAVD88)

SHEET 3 OF 3 DRILL HOLE MW-09-83



\*NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.



### \*NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.

STATE: California

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Right, Merced County BEGUN: 10/27/09 FINISHED: 10/28/09 DEPTH AND ELEVATION OF WATER LEVEL PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,271,709.4 E 6,110,066.2 (NAGD83) TOTAL DEPTH: 52.5 ft.

GROUND SURFACE ELEVATION: 115.8 ft. (NAVD88) T.O.C ELEVATION: 115.65 ft. (NAVD88) HOLE LOGGED BY: G.Turlington REVIEWED BY: J. Vauk

SHEET 1 OF 2

AND DATE MEASURED: 45.0 ft. (El. 70.65 ft.) 10/28/2009

					LAB	ORAT	ORY	DATA	Ą		≻Z		Z	/	F	
	王	≻						ЛТ	≻	*	CATIC	/ z	IAL CATIC			CLASSIFICATION AND
NOTES	DEP	% CORE RECOVER	% SILT	% CLAY	% FINES	% SAND	% GRAVEI		PLASTICIT INDEX	MOISTURE	LABOR/ CLASSIFI	ELEVATIO		ELEVATIO	GEOLOGIC	PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.			21.4	15.9	37.3	62.3	0.4	22.4	7.6	22			SM			0.0 to 52.5 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic	-	88	21.4	13.3	57.5	02.0	0.4	22.4	7.0	2.2		113.5		113.5	-	0.0 to 2.2 ft.: <u>SILTY SAND, SM</u> : About 80% fine to medium sand; about 20% non-plastic fines with rapid dilatancy; trace of hard to very hard, sub-rounded to sub-angular gravel;
site conditions, and install a groundwater monitoring well.	-		20.3	7.0	27.3	72.7	0.0	NP	NP	1.9	SM	112.1	SM	112.1		<ul> <li>maximum size: 1/2 inches; dy, tan, no reaction with HCl; hard consistency; includes grass and roots from 0.0 to 0.2 feet.</li> </ul>
DRILLED BY: USGS Drill Crew James Huckaby, Driller	5-	84	29.9	53.0	82.9	17.1	0.0	49.0	26.1	20.9	(CL)S	111.3	Сн	111.3		<u>Laboratory Data Interval</u> 0.0 to 2.2 ft.
DRILL RIG: CME-550	-	-														<ul> <li>2.2 to 3.6 ft.: <u>SILTY SAND, SM</u>: About 85%</li> <li>fine to medium sand; about 15% non-plastic fines with rapid dilatancy; maximum size:</li> </ul>
DRILLING & SAMPLING METHODS: Drill hole MW-09-84 was advanced	-		-													HCI; very soft consistency.
using hollow stem flight augers dry core system (FADC) with a 7-5/8-inch O.D. and 4-1/4-inch I.D.,																<ul> <li><u>Laboratory Data Interval</u></li> <li>2.2 to 3.6 ft.</li> <li><b>3.6 to 4.4 ft.: FAT CLAY, CH:</b> About 90%</li> </ul>
and a 5-foot-long 3-inch I.D. split sample barrel.	10—	100	39.7	28.8	68.5	31.5	0.0	29.5	9.9	7.8	s(CL)		s(ML)			fines with medium to high plasticity, medium toughness, high to very high dry strength, and slow dilatancy; about 10% fine sand;
0.0 to 45.2 ft FADC	-	-														<ul> <li>maximum size: fine sand; moist, dark gray to</li> <li>black, no reaction with HCl; very hard consistency.</li> </ul>
DRILLER'S COMMENTS: 0.0 to 47.5 ft smooth drilling 47.5 to 52.5 ft - add water smooth	-		-													Laboratory Data Interval 3.6 to 4.4 ft.
drilling DRILL FLUID, RETURN AND COLOR: 0.0 to 47.5 ft None	-	96										100.6		100.6		<ul> <li>4.4 to 15.1 ft.: <u>SANDY SILT, s(ML)</u>: About 70% non-plastic fines with rapid dilatancy;</li> <li>about 30% fine to medium sand; maximum size: medium sand; dry, brown, no reaction with HCl; very soft consistency.</li> </ul>
47.5 to 52.5 ft Water, no return WATER LEVEL:	-		8.1	1.6	9.7	90.0	0.3	NP	NP	0.8	SW-S	M	SP	99.3	Qal	Laboratory Data Interval — 4.4 to 15.1 ft.
REASON FOR HOLE TERMINATION: The hole was terminated upon successful completion to the target	-	-														15.1 to 16.4 ft.: <u>POORLY GRADED SAND</u> , <u>SP</u> : About 95% fine to coarse sand (coarse sand is sub-rounded to sub-angular, hard to very hard); about 5% non-plastic fines with rapid dilatancy; maximum size: coarse sand; dry, tan, no reaction with HCl; very soft
depth. HOLE COMPLETION: Well Casing - 0.1 to 32.0 ft. (T.O.C.	- 20-	100	53.3	34.2	87.5	12.5	0.0	30.8	14.0	9.0	CL		s(CL)			<ul> <li>consistency.</li> <li><u>Laboratory Data Interval</u></li> <li>15.1 to 16.4 ft.</li> </ul>
El. 115.65 ft.) Dual Pre-pack Screen - 32.0 to 52.0 ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand Filter Pack - 27.0 to 52.5 ft. (#3 Sand) Bentonite Seal - 2.0 to 27.0 ft.	-	-														16.4 to 23.5 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 70% fines with low plasticity and toughness, low to medium dry strength, and slow to rapid dilatancy; about 30% fine to medium sand (mostly fine); maximum size: medium sand; moist, tan, no reaction with
Well Protection - flush-mounted 18-inch manhole (15/16-inch hexbolts)	-	-										92.2		92.2	-	HCI; firm consistency. <u>Laboratory Data Interval</u> 16.4 to 23.5 ft.
	25 <del>-</del> -	100	58.2	12.6	70.8	29.2	0.0	25.9	6.9	7.3	(CL-N	IL)s	(CL)s			23.5 to 28.5 ft.: <u>LEAN CLAY WITH SAND,</u> ( <u>CL)s:</u> About 80% fines with low plasticity, toughness and dry strength, slow to rapid dilatancy; about 20% fine sand; maximum size: fine sand; moist, tan, no reaction with HCl; firm consistency.
	-											87.2		87.2		Laboratory Data Interval 23.5 to 28.5 ft.
	-															_
COMMENTS: FADC = Fligh HSA = Hollow NP = Non-pla NR = No Rec NA = Not app G.S. = Groun b.g.s. = Below	I Aug w Ster astic covery blicabl id surf w the	ler Dry n Aug le face groun	/ y Core ler d surf	ace	<u> </u>	1	<u> </u>	1	1	1	1	Well c Compl provid	I ompletic letion Di ed in att	on inform agram. V ached M	l Vell de Ionitor	s provided in attached Well evelopment information is ing Well Development form.

GEOLO	GIC LOG OF DRILL HOLE NO.	MW-09-84
Monitoring	PROJECT: San Joaquin River Restoration Project	STATE: California
iver Bank Right, Merced County	COORDINATES: N 2.271.709.4 E 6.110.066.2 (N	AGD83) GROUND SURFACE ELEVATION

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Right, Merced County BEGUN: 10/27/09 FINISHED: 10/28/09 DEPTH AND ELEVATION OF WATER LEVEL

8/09 TOTAL DEPTH: 52.5 ft.

aquin River Restoration Project STATE: Ca N 2,271,709.4 E 6,110,066.2 (NAGD83) GROUND S .5 ft. T.O.C ELEV

GROUND SURFACE ELEVATION: 115.8 ft. (NAVD88) T.O.C ELEVATION: 115.65 ft. (NAVD88) HOLE LOGGED BY: G.Turlington REVIEWED BY: J. Vauk

SHEET 2 OF 2

AND DATE MEASURED: 45.0 ft. (EI. 70.65 ft.) 10/28/2009

					LABC	DRAT	ORY	DATA	4		≻o		NO		⊨	
	E	×						ШТ	Y	%	CATIC		AL CATIO	z		CLASSIFICATION AND
NOTES	DEPI	VER	⊢	7	ES	9	AVEL		TICIT	ENT	SIFIC			ATIO	MBC	PHYSICAL CONDITION
			SIL-	, CL/	S FIN	s SAN	6 GR	INNI	LAS-		LAB CLAS			ILEV	SYE	
		100	~	~	~	~	~		₽.	20	/	ш		ш	0	28 5 to 37 2 ft · SANDY   FAN CLAY s(CL):
																About 65% fines with medium plasticity, low
																dilatancy, about 35% fine sand; maximum
	-	1														HCl; soft consistency.
	_		47.8	18.1	65.9	34.1	0.0	29.6	9.6	10.3	s(CL)		s(CL)			Laboratory Data Interval
																28.5 to 37.2 ft.
	-	1														- 37.2 to 45.7 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 55% fines with low plasticity toughness
	35-	94														and dry strength, and slow dilatancy; about
																moist, brown, no reaction with HCl; soft to firm
	-	1										78.5		78.5		- 37.2 to 45.7 ft.
	_		1													_ 45.7 to 52.5 ft.: POORLY GRADED SAND,
																SP: About 95% fine to coarse sand (coarse sand is sub-rounded to sub-angular, hard to
															<ul> <li>very hard); about 5% non-plastic fines with rapid dilatancy: maximum size; coarse sand;</li> </ul>	
	40-	100														brown, wet, no reaction with HCl; very soft consistency.
																- Laboratory Data Interval
			36.0	18.0	54.0	46.0	0.0	29.2	11.6	11.6	s(CL)		s(CL)		Qal	45.7 to 52.5 ft.
	-															- T.D.= 52.5 ft.
	-	-														_
											_	,				
	45-	100									45.0 ft. (El	. 70.65 ft.)		70.0		—
	-	-										70.0		70.0		_
			-													
	-	1														_
	-	-	8.6	1.4	10.0	90.0	0.0	NP	NP	17.3	SP-SM		SP			_
													-			
	50-	38														
	-	-														_
	_															_
	L		I				E		M OF H	HOLE		63.2		63.2		
	L. A											A/. 11		1	- 43	
COMMENTS: FADC = Flig HSA = Hollo	nt Aug w Ster	jer Dry n Aug	/ Core er	•								vvell co Compl	etion Diag	informa gram. V	ation Vell de	is provided in attached Well evelopment information is
NP = Non-pl NR = No Re	astic coverv	,									I	provide	ed in attac	hed M	onitor	ing Well Development form.
NA = Not ap	plicab	le face														
b.g.s. = Belo	w the	groun	d surf	ace												
1.O.C. = Top	o ot we	ell casi	ing													



T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Right, Merced County BEGUN: 10/26/09 FINISHED: 10/27/09 DEPTH AND ELEVATION OF WATER LEVEL

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,271,341.5 E 6,109,606.0 (NAGD83) TOTAL DEPTH: 82.5 ft.

STATE: California

SHEET 1 OF 2

GROUND SURFACE ELEVATION: 120.8 ft. (NAVD88) T.O.C ELEVATION: 120.65 ft. (NAVD88) HOLE LOGGED BY: G.Turlington REVIEWED BY: J. Vauk

AND DATE MEASURED: 34.0 ft. (El. 86.65 ft.) 10/26/2009

					LABO	ORAT	ORY	DATA	4		≻ö	/	z /	⊢	
NOTES	Ŧ	≿					_	МΙΤ	Ł	в.	ATOR ICATI(	/ z	ICATIO		CLASSIFICATION AND
NOTES	DEF	CORE	Ē	ίLAY	INES	AND	RAVE		STICI'	ISTUR	ABOR	VATIO	VISI	DLOGI	PHYSICAL CONDITION
		REC 8	S %	0 %	" "	8%	% 0	ГQ	7	₽Ö	/ <sup>5</sup> –	ELE		ĞĒ	
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.	-	100											SP/SM 118.9		SOIL DESCRIPTIONS CHARACTERIZE – SAMPLES FROM DRILL HOLE MW-09-85.
PURPOSE OF HOLE:	-														0.0 to 82.5 feet QUATERNARY ALLUVIUM (Qal)
determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	- 5	82											(SP/SM)g	Fill	O.0 to 1.8 ft.: <u>POORLY GRADED SAND</u> <u>WITH SILT, SP/SM</u> : About 80% fine to     coarse sand (coarse sand is angular to
DRILLED BY: USGS Drill Crew James Huckaby, Driller Todd Menning, Helper	-	-											112.7		sub-angular, hard to very hard); about 10% fine, hard to very hard, rounded to sub-rounded gravel; about 10% non-plastic fines with rapid dilatancy; maximum size: ½-inch; dry, light brown, no reaction with HCl;
DRILL RIG: CME-550	-														soft consistency; includes grass and roots. 1.8 to 8.0 ft.: <u>POORLY GRADED SAND</u>
DRILLING & SAMPLING	- 10	90													MITH SILT AND GRAVEL, (SP/SM)g: About 75% fine to coarse sand; about 15%
Drill hole MW-09-85 was advanced using hollow stem flight augers with continuous dry core sampling system (FADC) from the ground	-	-	26.0	10.2	36.2	63.8	0.0	NP	NP	5.6	SM		SM		<ul> <li>about 10% non-plastic fines with rapid dilatancy; maximum size: ½-inch; dry, black</li> <li>and tan, no reaction with HCl; very soft consistency; asphalt encountered.</li> </ul>
surface to a total depth of 82.5 feet. FADC system uses augers with a	15-	92										105.4	105.4		8.0 to 15.3 ft.: <u>SILTY SAND, SM</u> : About
and a 5-foot-long, 3-inch I.D. split sample barrel.	-	-													<ul> <li>non-plastic fines with rapid dilatancy;</li> <li>maximum size: medium sand; dry to moist,</li> </ul>
<u>Interval Method</u> 0.0 to 82.5 ft FADC	-		14.4	7.0	21.4	78.6	0.0	NP	NP	4.3	SM		SM		Ight brown, no reaction with HCl; very soft to soft consistency.
MW-09-85B was drilled and completed as a well using hollow	- 20-	100	44.4	26.8	71.2	28.8	0.0	26.3	11.3	20.6	(CL)s	101.5	101.5 s(CL)	-	8.0 to 15.3 ft.
stem flight augers and a wooden plug. The total depth of the hole was 30.0 feet b.g.s. and the bottom of the well screen was set at 29.5 feet of depth	-	-	8.1	0.8	8.9	91.1	0.0	NP	NP	2.4	SP-SM	98.0	SP 98.0		15.3 to 19.2 tt.: <u>SIL1Y SAND, SM</u> : About 80% fine to coarse sand (coarse sand is sub-rounded to sub-angular, hard); about 20% non-plastic fines with rapid dilatancy; maximum size: coarse sand; dw light brown
Interval Method 0.0 to 30.0 ft - FADC with wooden	-	-													no reaction with HCl; very soft consistency.
plug	25—	100	38.3	41.8	80.1	19.9	0.0	31.0	14.8	16.6	(CL)s		(CL)s		15.3 to 19.2 ft.
DRILLING CONDITIONS AND DRILLER'S COMMENTS:		]										93.9	93.9	Qal	19.2 to 20.6 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 60% fines with low plasticity, toughness
<u>MW-09-85</u> 0.0 to 62.5 ft smooth drilling 62.5 to 82.5 ft added water, smooth drilling	-	-													<ul> <li>and dry strength, and slow dilatancy; about</li> <li>40% fine sand; maximum size: fine sand; moist, dark gray, no reaction with HCl; soft</li> <li>consistency.</li> </ul>
<u>MW-09-85B</u> 0.0 to 30.0 ft blind drilled 30.0 ft knocked out wooden plug	30— -	100	74.7	14.7	89.4	10.6	0.0	27.4	6.8	14.0	CL-ML		(ML)s		Laboratory Data Interval 19.2 to 20.6 ft.
and set well	-														<ul> <li>20.6 to 22.7 ft.: <u>POORLY GRADED SAND,</u> <u>SP</u>: About 95% fine to coarse sand, (coarse sand is sub-rounded to sub-angular, bard);</li> </ul>
COLOR: <u>MW-09-85</u> 0.0 to 50.5 ft None	-	-									34.0 ft. (El.	86.65 ft.)			about 5% non-plastic fines with rapid dilatancy; maximum size: coarse sand; dry, light brown po reaction with HCl: yon; coff
50.5 to 82.5 ft Water, no return	35-	100										84.9	84.9	_	consistency.
<u>MW-09-85B</u> 0.0 to 30.0 ft None	-														Laboratory Data Interval     20.6 to 22.7 ft.
WATER LEVEL: 34.0 ft. b.g.s. on 10/27/2009 (MW-09-85)	-														<ul> <li>22.7 to 26.8 ft.: <u>LEAN CLAY WITH SAND,</u></li> <li><u>(CL)s:</u> About 85% fines with low to medium plasticity, medium toughness, no dry strength,</li> </ul>
REASON FOR HOLE TERMINATION: The hole was terminated upon	40-	70	17.2	0.9	18.1	81.9	0.0	NP	NP	15.9	SM		SM		<ul> <li>and rapid dilatancy; about 15% fine sand; maximum size: fine sand; moist, dark gray to brown, no reaction with HCl; hard consistency.</li> </ul>
successful completion to the target depth.	-														<u>Laboratory Data Interval</u> 22.7 to 26.8 ft.
COMMENTS: FADC = Fligh HSA = Hollow NP = Non-pla	nt Aug v Ster astic	ler Dry n Aug	v Core er	•						W W D	Vell com Vell deve Vevelopr	pletior elopme nent fo	n information is ent information orm.	provid is prov	ed in attached Well Completion Diagram. ided in attached Monitoring Well
NR = No Rec NA = Not app	overy	e								м	IW-09-8	5B			
G.S. = Groun b.g.s. = Belov	nd surf w the	face groun	d surfa	ace						T G	OC Coc fround s	ordinat urface	<u>es</u> = N 227134 <u>EI.</u> = 120.63 (I	6.9 E 6 NAVD8	109601.5 (NAGD83) El. 120.51 (NAVD88) 8)
Т.О.С. = Тор	of we	ell casi	ng												

STATE: California

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Right, Merced County BEGUN: 10/26/09 FINISHED: 10/27/09 DEPTH AND ELEVATION OF WATER LEVEL PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,271,341.5 E 6,109,606.0 (NAGD83) TOTAL DEPTH: 82.5 ft.

GROUND SURFACE ELEVATION: 120.8 ft. (NAVD88) T.O.C ELEVATION: 120.65 ft. (NAVD88) HOLE LOGGED BY: G.Turlington REVIEWED BY: J. Vauk

SHEET 2 OF 2

AND DATE MEASURED: 34.0 ft. (El. 86.65 ft.) 10/26/2009

					LAB	ORAT	ORY	DATA	Ą		Z	/	z	/		
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATIO	ELEVATION	VISUAL CLASSIFICATIO	ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
HOLE COMPLETION:	-	64														26.8 to 35.8 ft.: <u>SILT WITH SAND, (ML)s</u> : About 80% fines with no to low plasticity, low
<u>MW-09-85</u> Well Casing - 0.1 to 52.0 ft. (T.O.C. El. 120.65 ft.)	-											73.2		73.2	-	dilatancy; about 20% fine sand; maximum size: fine sand; moist, brown, no reaction with
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand Filter Pack - 40 Oto 82.5 ft (#3	-	100														<ul> <li>reddish-brown blebs and laminations.</li> </ul>
Sand) Bentonite Seal - 2.0 to 44.0 ft. Well Protection - flush-mounted	- 30															26.8 to 35.8 ft.
18-inch manhole (15/16-inch hexbolts)	-		-													85% fine to coarse sand (mostly fine to medium); about 15% non-plastic fines with rapid dilatancy: maximum size: coarse sand:
<u>MW-09-85B</u> Well Casing - 0.1 to 9.5 ft. (T.O.C. El. 120.51 ft.)	- 55-	98														dry, tan, no reaction with HCI; very soft consistency.
Dual Pre-pack Screen - 9.5 to 29.5 ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand	-	-														<u>Laboratory Data Interval</u> 35.8 to 47.5 ft.
Filter Pack - 8.0 to 30.0 ft. (#3 Sand) Bentonite Seal - 2.0 to 8.0 ft. Well Protection - flush-mounted	-															<ul> <li>47.5 to 72.2 ft.: <u>SANDY SILT, s(ML)</u>: About</li> <li>70% non-plastic fines with slow to rapid dilatancy; about 30% fine sand; maximum</li> </ul>
18-inch manhole (15/16-inch hexbolts)	60-	100	47.9	14.0	61.9	38.1	0.0	25.2	9.2	16.2	s(CL)		s(ML)			size: fine sand; moist, brown, no reaction with HCl; very soft to soft consistency.
	-	-														Laboratory Data Interval     47.5 to 72.2 ft.
	-														Qal	<ul> <li>72.2 to 82.5 ft.: <u>LEAN CLAY WITH SAND</u>,</li> <li><u>(CL)s:</u> About 80% fines with low plasticity, toughness, no to low dry strength, and slow divergence and the strength of the second memory of the strength of the second memory of the second memo</li></ul>
	65-	100														- size: fine sand; moist, brown, no reaction with HCl; soft to firm consistency.
	-															Laboratory Data Interval 72.2 to 82.5 ft.
	-															– T.D.= 82.5 ft.
	70-	100														-
	-											48.5		48.5	-	-
	-	100														_
	-															_
	-		40.8	28.7	69.5	30.5	0.0	37.7	18.9	19.0	s(CL)		(CL)s			-
	- 80-	100														-
	-											38.2		38.3		-
	L			1	1		E	вотто	M OF	HOLE		30.2		36.2	1	
COMMENTS: FADC = Fligh	ht Aug	jer Dr	/ Core	9						We	ell com	pletion	informa	ation is pr	ovide	d in attached Well Completion Diagram.
HSA = Hollo NP = Non-pla NR = No Red	HSA = Hollow Stem Auger NP = Non-plastic NR = No Recovery												nt inforr rm.	nation is	provid	led in attached Monitoring Well
NA = Not ap G.S. = Grour b.g.s. = Belo	olicab nd sur w the	le face groun	d surf	ace						M\ TC Gr	<b>N-09-8</b> OC Coc	<b>35B</b> ordinate surface	<u>es</u> = N 2 El.= 12	271346.9 0.63 (NA	) E 61	09601.5 (NAGD83) El. 120.51 (NAVD88) )
T.O.C. = Top	o of we	ell cas	ing							<u></u>				(,		, 





T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.



\*NOT TO SCALE

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NOTES:
T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface,
EI. = Elevation
Sand backfills the well above the top of bentonite seal, inside the manhole.
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FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, Merced County BEGUN: 11/6/09 FINISHED: 11/8/09 DEPTH AND ELEVATION OF WATER LEVEL

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,271,050.7 E 6,109,195.1 (NAGD83) TOTAL DEPTH: 72.5 ft.

STATE: California

GROUND SURFACE ELEVATION: 121.0 ft. (NAVD88) T.O.C ELEVATION: 120.89 ft. (NAVD88) HOLE LOGGED BY: G.Turlington REVIEWED BY: J. Vauk

SHEET 1 OF 3

AND DATE MEASURED: 37.8 ft. (El. 83.09 ft.) 11/8/2009

					LABO	ORAT	ORY	DATA	4		Z	z	/	_	
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATIC	VISUAL	ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND															SOIL DESCRIPTIONS CHARACTERIZE SAMPLES FROM DRILL HOLE MW-09-86.
PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	40	_									s(ML)g		Fill	0.0 to 72.5 feet QUATERNARY ALLUVIUM (Qal) 0.0 to 4.6 ft.: <u>SANDY SILT WITH GRAVEL</u> , <u>s(ML)g</u> : About 50% fines with low plasticity; about 25% sand; about 25% gravel; movimum cira: 2 inches: du light
DRILLED BY: USGS Drill Crew James Huckaby, Driller Todd Menning, Helper	- 5 <del>-</del>	80											116.3		distribution size: Sincres, dry, light     gray-brown; soft consistency; grass and roots.     4.6 to 7.0 ft.: <u>SANDY LEAN CLAY, s(CL)</u> :     About 70% fines with medium plasticity and
DRILL RIG: CME-550	-											s(CL)			<ul> <li>dilatancy; about 30% fine to medium sand;</li> <li>maximum size: medium sand; moist, brown</li> </ul>
DRILLING & SAMPLING METHODS: Drill hole MW-09-86 was advanced using hollow stern flight augers with continuous dry core sampling system (FADC) from the ground	-	-	-									s(ML)	<u>113.9</u> <u>112.1</u>		<ul> <li>with light brown streaks; hard consistency.</li> <li>7.0 to 8.8 ft.: <u>SANDY SILT, s(ML)</u>: About</li> <li>60% fines with no to low plasticity and dry strength, and rapid dilatancy; about 40% fine sand; maximum size: fine sand; motist, dark</li> <li>brown; very soft to soft consistency.</li> </ul>
surface to a total depth of 72.5 feet. FADC system uses augers with a 7-5/8-inch O.D. and 4-1/4-inch I.D., and a 5-foot-long, 3-inch I.D. split sample barrel.	10	100	29.8	46.6	76.4	23.6	0.0	45.1	26.5	17.0	(CL)s 109.6	(CL/CH)s			8.8 to 12.5 ft.: <u>LEAN TO FAT CLAY WITH</u> <u>SAND, (CL/CH)s</u> : About 80% fines with high plasticity and toughness, very high dry strength, and no dilatancy; about 20% sand; maximum size: fine sand; moist, very dark brows; firm to hord consistency.
0.0 to 72.5 ft FADC	-												108.4		Laboratory Data Interval
completed as a well using 7-5/8-inch O.D. and 4-1/4-inch I.D. hollow stem flight augers and a wooden plug. The total depth of the hole was 25.0 feet b.g.s. and the bottom of the well screen was set at 24.5 feet of depth.	- 15	100	44.1	26.2	70.3	29.7	0.0	26.6	9.8	15.5	<u>(CL)s 106.6</u>	(CL)s s(CL)	107.4		11.0 to 11.3 it. 12.5 to 13.5 ft.: <u>LEAN CLAY WITH SAND</u> , ( <u>CL}s:</u> About 75% fines with medium to high plasticity, medium toughness, high dry strength, and slow dilatancy; about 25% fine sand; maximum size: fine sand; moist, mottled greenish-brown; soft to firm consistency.
Interval Method 0.0 to 25.0 ft FADC with wooden plug	_											SM	103.4	Qal	13.5 to 16.1 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 70% fines with low plasticity and toughness, bigh dry strength, and slow
DRILLING CONDITIONS AND DRILLER'S COMMENTS: <u>MW-09-86</u> 0.0 to 52.5 ft smooth drilling	-	-	5.8	4.8	10.6	89.4	0.0	NP	NP	4.9	SP-SM 101.6	SM			dilatancy; about 30% fine sand; maximum size: fine sand; moist, olive brown; soft to firm consistency.
52.5 to 72.5 ft added water, smooth drilling	20—	88											100.4		Laboratory Data Interval 14.0 to 14.3 ft.
<u>MW-09-86B</u> 0.0 to 25.0 ft blind drilled 25.0 ft knocked out wooden plug and set well	-	-										s(CL)	98.9		<ul> <li>16.1 to 17.5 ft.: <u>SILTY SAND, SM</u>: About</li> <li>75% fine sand with grains consisting of quartz, mica, and various other minerals; about 25% fines; maximum size: fine sand;</li> <li>moist brown: very soft consistency</li> </ul>
DRILL FLUID, RETURN AND COLOR: <u>MW-09-86</u> 0.0 to 52.5 ft None 50.5 to 72.5 ft Water, no return	-	-	6.6	5.4	12.0	88.0	0.0	NP	NP	5.1	SW-SM 98.3	SP/SM s(CL)	97.9 96.7		17.5 to 20.5 ft.: <u>SILTY SAND, SM</u> : About 85% fine sand; about 15% fines; maximum size: fine sand; moist, light greenish-brown; very soft consistency.
<u>MW-09-86B</u> 0.0 to 25.0 ft None	25—	100													Laboratory Data Interval 19.0 to 19.3 ft.
WATER LEVEL: 37.8 ft. b.g.s. on 11/8/2009 (MW-09-86)	-	-	45.1	34.1	79.2	20.8	0.0	29.6	13.8	15.5	<u>(CL)s 94.6</u>	(CL)s			20.5 to 22.0 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 60% fines with low to medium plasticity and toughness, high dry strength, no to slow dilatancy: about 40% fine to medium sand:
REASON FOR HOLE TERMINATION: The holes were terminated upon successful completion to the target depth.	-	-										ML	93.2 91.4		maximum size: medium sand; moist, olive brown with dark brown blotches; hard consistency.
COMMENTS: FADC = Fligt HSA = Hollow NP = Non-pla NR = No Rec NA = Not app G.S. = Groun b.g.s. = Below	nt Aug v Ster astic overy blicabl od surf v the	ler Dry n Aug e face groun	d surf	ace						Well o Well o Devel MW-0 TOC o Grour	completion info development in opment form. 09-86B Coordinates= ndsurface El.=	N 227104 120.87 (N	s provie n is pro 45.1 E NAVD8	ded in vided 6109: 8)	attached Well Completion Diagram. in attached Monitoring Well 201.2 (NAGD83) El. 120.79 (NAVD88)
1.0.0. = 10p	01 110	003	···у												

STATE: California

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, Merced County BEGUN: 11/6/09 FINISHED: 11/8/09 DEPTH AND ELEVATION OF WATER LEVEL PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,271,050.7 E 6,109,195.1 (NAGD83) TOTAL DEPTH: 72.5 ft.

GROUND SURFACE ELEVATION: 121.0 ft. (NAVD88) T.O.C ELEVATION: 120.89 ft. (NAVD88) HOLE LOGGED BY: G.Turlington REVIEWED BY: J. Vauk

SHEET 2 OF 3

AND DATE MEASURED: 37.8 ft. (El. 83.09 ft.) 11/8/2009

					LABO	ORAT	ORY	DATA	4		≻g	z /	⊢	
NOTEO	Ē	≿					_	МIT	≥	ы.»	ATOR ICATIC	JAL ICATIK		CLASSIFICATION AND
NOTES	DEP	% CORE RECOVER	% SILT	% CLAY	% FINES	% SAND	% GRAVE	LIQUID LIN	PLASTICI1 INDEX	MOISTURI	LABOR <sup>J</sup> CLASSIFI CLASSIFI ELEVATIO	UISL CLASSIFI ELEVATIO	GEOLOGI	PHYSICAL CONDITION
HOLE COMPLETION:		100									//	SM		22.0 to 23.0 ft.: POORLY GRADED SAND
MW-09-86 Well Casing - 0.1 to 52.0 ft. (T.O.C. El. 120.89 ft.) Dual Pre-pack Screen - 52.0 to 72.0	-	-										89.6	-	WITH SILT, SP/SM: About 90% fine to           medium sand with grains consisting of quartz, mica, and various other minerals; about 10% non-plastic fines; maximum size: medium sand; moist, brown; very soft consistency.
Well Screen Filter Pack - #3 Sand Filter Pack - 49.0 to 72.5 ft. (#3 Sand)	-	-										(CL/ML)s		<ul> <li><u>Laboratory Data Interval</u></li> <li>22.3 to 22.6 ft.</li> </ul>
Bentonite Seal - 2.0 to 49.0 ft. Well Protection - flush-mounted 18-inch manhole (15/16-inch hexbolts)	- 35—	100										84.0		<ul> <li>23.0 to 24.2 ft.: <u>SANDY LEAN CLAY, s(CL)</u>: About 60% fines with low to medium plasticity and toughness, high dry strength, no to slow dilatancy; about 40% fine to medium sand; maximum size: medium sand; moist, olive</li> </ul>
<u>MW-09-86B</u> Well Casing - 0.1 to 14.5 ft. (T.O.C. El. 120.79 ft.)												64.9		<ul> <li>brown with dark brown blotches; hard consistency.</li> </ul>
Dual Pre-pack Screen - 14.5 to 24.5 ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand Filter Pack - 12.0 to 25.0 ft. (#3 Sand) Bentonite Seal - 2.0 to 12.0 ft.	-	-	37.4	52.0	89.4	10.6	0.0	50.1	27.0	26.9	37.8 ft. (El. 83.09 ft.) CH 81.6	CL/CH		<ul> <li>24.2 to 27.7 ft: LEAN CLAY WITH SAND, (CL)s: About 75% fines with medium</li> <li>plasticity and toughness, high dry strength, and no dilatancy; about 25% sand; maximum size: medium sand; moist, greenish-brown;</li> <li>hard consistency.</li> </ul>
18-inch manhole (15/16-inch hexbolts)	40—	100										80.9		Laboratory Data Interval 26.0 to 26.3 ft.
	-	-										(CL)s		<ul> <li>27.7 to 29.5 ft.: <u>SILT, ML</u>: About 90% fines with low plasticity toughness and dry strength, and slow to rapid dilatancy; about 10% fine sand; maximum size: fine sand; moist, greenish-brown; firm consistency.</li> </ul>
	-	100										SM	0.1	29.5 to 31.3 ft.: <u>SILTY SAND, SM</u> : About 55% fine sand; about 45% fines; maximum size: fine sand; moist, greenish-brown; soft consistency.
	40 - -		57.4	29.4	86.8	13.2	0.0	31.4	10.8	26.8	CL 72.6	75.4	Qai	31.3 to 36.0 ft.: <u>SILTY CLAY WITH SAND,</u> ( <u>CL/ML)s</u> : About 80% fines with low plasticity, toughness and dry strength, and slow to rapid dilatancy; about 20% fine sand; maximum size: fine sand; moist from 31.3 to 34.5 ft. and wet from 34.5 to 36.0 ft., greenish-brown; soft to firm consistency; higher plasticity (clay content) from 33.0 to 34.0 text
	- 50-	100										69.9	-	<ul> <li>36.0 to 40.0 ft.: <u>LEAN TO FAT CLAY</u>, <u>CL/CH</u>: About 95% fines with high plasticity and toughness, high to very high dry strength, and no dilatancy; about 5% fine sand; maximum size: fine sand; moist,</li> <li>greenish-brown with dark brown spots; firm</li> </ul>
	-	-										(CL)s 68.6		consistency. <u>Laboratory Data Interval</u>
	-											SM		39.0 to 39.3 ft. 40.0 to 43.0 ft.: <u>LEAN CLAY WITH SAND,</u> (C) by About 85% fince with low to medium
	-											66.9		<ul> <li>plasticity and toughness, medium dry strength, and slow dilatancy; about 15% fine sand; maximum size: fine sand; moist,</li> </ul>
	- 55	00										SM 64.7		greenish-brown with light stringers; firm consistency.
	-	-	8.7	0.9	9.6	90.4	0.0	NP	NP	19.6	SP-SM 61.6	SM		<ul> <li>43.0 to 45.5 ft.: <u>SILTY SAND, SM</u>: About 60% fine sand with grains consisting of quartz, mica, and various other minerals; about 40% fines; maximum size: fine sand; moist to wet, greenish-brown with light streaks and occasional dark spots; soft consistency; drill rods wet at 44 feet.</li> </ul>
COMMENTS: FADC = Fligh HSA = Hollow NP = Non-pla NR = No Rec NA = Not app G.S. = Groun	nt Aug w Ster astic covery blicabl nd surf	ler Dry n Aug le face	/ Core er	1						Well c Well d Devel <b>MW-0</b> TOC (	completion info levelopment ir opment form. 9-86B Coordinates=	N 2271045.1 E	ded in wided 61092	attached Well Completion Diagram. in attached Monitoring Well 201.2 (NAGD83) El. 120.79 (NAVD88)
b.g.s. = Belov T.O.C. = Top	w the of we	groun ell casi	a surf: ing	ace					9	Groun	iusumace El.=	120.87 (NAVD8	0)	r

FEATURE: Groundwater Monitoring LOCATION: Reach 4A. River Bank Left, Merced County BEGUN: 11/6/09 FINISHED: 11/8/09 DEPTH AND ELEVATION OF WATER LEVEL

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,271,050.7 E 6,109,195.1 (NAGD83) TOTAL DEPTH: 72.5 ft.

STATE: California

GROUND SURFACE ELEVATION: 121.0 ft. (NAVD88) T.O.C ELEVATION: 120.89 ft. (NAVD88) HOLE LOGGED BY: G.Turlington REVIEWED BY: J. Vauk

AND DATE MEASURED: 37.8 ft. (El. 83.09 ft.) 11/8/2009

					LABO	ORAT	ORY	DATA	4		×NO		NO		/	т	
NOTEO	Ŧ	≻						лт	Ł	%	CATI	/ z	JAL CATI	/	/ z		CLASSIFICATION AND
NOTES	DEP	ORE	н	Ą	ZES	Q	RAVE	ID LIV	UEX UEX	TENT	BOR/ SSIFI		VISU		/ATIC	LOGI YMB(	PHYSICAL CONDITION
		REO 0	% SI	% CI	% FII	/S %	B %	LIQU	PLAS	MOIS		ELE/	CLA	/	ELEY	GEO	
		40	2.1	0.0	2.1	97.9	0.0	NP	NP	15.7	SP	55.6	SP		57.9	Qal	<ul> <li>45.5 to 51.0 ft.: LEAN CLAY WITH SAND, (CL)s: About 80% fines with low plasticity, toughness and dry strength, and slow dilatancy; about 20% fine sand; maximum size: fine sand; wet, brown with slight rust-colored mottling; firm consistency.</li> <li>Laboratory Data Interval 48.0 to 48.3 ft.</li> <li>51.0 to 52.3 ft.: LEAN CLAY WITH SAND, (CL)s: About 80% fines with low plasticity, low to medium toughness and dry strength, and slow dilatancy; about 20% fine sand; maximum size: fine sand; wet, brown with occasional dark spots; firm to hard consistency.</li> <li>52.3 to 54.0 ft.: <u>SILTY SAND, SM</u>: About 50% fine sand; about 40% fines; about 10% sub-rounded gravel consistency.</li> <li>54.0 to 56.2 ft.: <u>SILTY SAND, SM</u>: About 65% fine to coarse sand with grains consisting of cemented fragments of fine sand; about 35% fines; trace of gravel that consisted of cemented sand with fines;</li> </ul>
	-	-													40.4		consistency.
	L		I	I	1	I	B	ютто	M OF I	HOLE	1		I		40.4	1	56.2 to 63.0 ft.: <u>SILTY SAND, SM</u> : About 85% fine sand; about 15% fines; maximum size: fine sand; wet, brown; very soft consistency.

Laboratory Data Interval 59.0 to 59.3 ft.

63.0 to 67.5 ft.: <u>POORLY GRADED SAND,</u> <u>SP</u>: About 95% fine to medium sand; about 5% fines; maximum size: medium sand; wet, light gray; very soft consistency.

Laboratory Data Interval 65.0 to 65.3 ft.

67.5 to 72.5 ft.: <u>SILTY SAND, SM</u>: About 85% fine sand; about 15% fines; maximum size: fine sand; wet, gray-brown; very soft consistency.

T.D.= 72.5 ft.

COMMENTS:

FADC = Flight Auger Dry Core HSA = Hollow Stem Auger NP = Non-plastic NR = No Recovery NA = Not applicable G.S. = Ground surface b.g.s. = Below the ground surface T.O.C. = Top of well casing Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.

MW-09-86B

<u>TOC Coordinates</u>= N 2271045.1 E 6109201.2 (NAGD83) El. 120.79 (NAVD88) <u>Groundsurface El.</u>= 120.87 (NAVD88)

SHEET 3 OF 3 DRILL HOLE MW-09-86



\*NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.



\*NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, Merced County BEGUN: 11/8/09 FINISHED: 11/10/09 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: NA

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,270,565.2 E 6,108,221.5 (NAGD83) TOTAL DEPTH: 50.0 ft. STATE: California

SHEET 1 OF 2

GROUND SURFACE ELEVATION: 115.0 ft. (NAVD88) T.O.C ELEVATION: 114.87 ft. (NAVD88) HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk

						JRAT	ORY	DATA	۹ 		ZON	/	NO		Ę	
	돈	≻						₩	≻	%	SATO	/ z	AL	/z	5	CLASSIFICATION AND
NOTES	Ш.	VER		~	ŝ	Ģ	AVEI		ĽΣΫ	ENT BUR	SIFI	/ 10	VISU SIFI	/ I0	MBCG	PHYSICAL CONDITION
			SIL	CLA	N N	SAN	GR/	QUIE	INDI INDI	LSIO	LAB			-EVA	SY SY	
		<u> </u>	%	%	%	%	%		₫	ΣÕ	<u> </u>	Ξ	/	Ξ	U	
FEET FROM THE GROUND													s(ML)g	113.8		SAMPLES FROM DRILL HOLE MW-09-87.
SURFACE.	_	100												113.0	1	0.0 to 50.0 feet
PURPOSE OF HOLE: To recover core, collect data to	-	1	32.6	18.8	51.4	48.6	0.0	31.2	13.0	12.6	s(CL)	112.9	s(ML)			QUATERNARY ALLUVIUM (Qal)
determine geologic and hydrologic site conditions, and install a	_		1											112.3	-	<ul> <li>0.0 to 1.1 ft.: <u>SANDY SILT WITH GRAVEL</u>,</li> <li>s(ML)a: About 50% fines with low plasticity:</li> </ul>
groundwater monitoring well.																about 25% sand; about 25% gravel;
DRILLED BY:	-	1														firm consistency; grass and roots.
Kevin Coy, Driller	5-	76														1.1 to 2.6 ft.: SANDY SILT, s(ML): About
Jim Rauman, Helper																60% fines with low plasticity, no to low dry strength, and slow dilatancy; about 40% fine
DRILL RIG: CME-550	-	1														<ul> <li>sand; maximum size: fine sand; dry, dark brown; firm to hard consistency</li> </ul>
	-	-														
METHODS:			-													1.8 to 2.0 ft.
using hollow stem flight augers with	-	1														2.6 to 15.8 ft.: POORLY GRADED SAND
continuous dry core sampling system (FADC) from the ground	-	-											SP/SM			WITH SILT, SP/SM: About 90% fine to coarse sand with grains consisting of quartz,
surface to a total depth of 50.0 feet. FADC system uses augers with a																mica, and various other minerals (mostly fine to medium)(coarse sand is sub-angular and
7-5/8-inch O.D. and 4-1/4-inch I.D.,	10-	76														hard); about 10% fines; maximum size:
sample barrel.	-	-														<ul> <li>gray-brown; very soft consistency; slightly</li> </ul>
Interval Method																of depth interval.
0.0 to 50.0 ft FADC			10	07	10	05.4		ND			0.0					Laboratory Data Interval
MW-09-87B was drilled and completed as a well using7-5/8-inch	-		4.2	0.7	4.9	95.1	0.0	NP	NP	3.3	5P	101.9				12.5 to 13.0 ft.
O.D. and 4-1/4-inch I.D. hollow stem	_	-														15.8 to 17.4 ft.: <u>LEAN CLAY WITH SAND</u> , (CL)s: About 80% fines with medium
The total depth of the hole was 16.0																plasticity and toughness, high dry strength,
	15-	84														maximum size: fine sand; moist, olive-brown
0.0 to 16.0 ft FADC with wooden	-	-												99.1	Qai	<ul> <li>with occasional iron-oxide staining; firm</li> <li>consistency.</li> </ul>
plug													(CL)s			Laboratory Data Interval
DRILLING CONDITIONS AND DRILLER'S COMMENTS:	-		36.2	25.7	61.9	38.1	0.0	22.7	8.7	15.6	s(CL)	97.6		97.5		- 17.0 to 17.3 ft.
<u>MW-09-87</u> 0.0 to 50.0 ft - smooth drilling	-	-														17.4 to 20.4 ft.: <u>SANDY LEAN CLAY, s(CL)</u> :
MW 00.97P													s(CL)			toughness, high dry strength, and no
0.0 to 16.0 ft blind drilled			30.9	18.5	49.4	50.6	0.0	25.8	8.5	14.8	SC	95.5	-()			size: fine sand; moist, olive-brown (occasional
16.0 ft knocked out wooden plug and set well	20—	98												94.5		1.0-foot has higher sand percentage.
DRILL FLUID, RETURN AND	_															<ul> <li>Laboratory Data Interval</li> </ul>
COLOR: MW-09-87																19.0 to 19.4 ft.
0.0 to 50.0 ft None	-	1														20.4 to 27.5 ft.: POORLY GRADED SAND
<u>MW-09-87B</u>	-	-														medium sand with grains consisting of quartz,
													0.5/014			fines; maximum size: medium sand; moist to
WATER LEVEL: None	-	1	3.2	2.7	5.9	94.1	0.0	NP	NP	7.8	SP-SM	90.6	SP/SM			<ul> <li>wet, olive-brown; very soft consistency.</li> </ul>
REASON FOR HOLE	25-	80														24.0 to 24.3 ft.
TERMINATION: The holes were terminated upon																27.5 to 28.1 ft.; SANDY SILT. s(ML); About
successful completion to the target																60% fines with low plasticity, toughness and
	-	1												874		<ul> <li>fine sand; maximum size: fine sand; wet, dark</li> <li>align group ware off consistency.</li> </ul>
	_		1										s(ML)	86.8	]	
													014			28.1 to 29.5 ft.: <u>SILTY SAND, SM</u> : About 60% fine to medium sand (mostly fine); about
	-	1											SIVI	85.4		<ul> <li>40% fines; maximum size: medium sand; wet, olive-brown with rust-colored staining; verv</li> </ul>
													s(CL)	85.1		soft consistency.
COMMENTS: FADC = Fligh	nt Aug	er Dry	/ Core	!						Well	comple	etion in	formatio	n is prov	vided i	n attached Well Completion Diagram.
NP = Non-pla	astic	n Aug	51							Deve	elopmer	nt form		on is pi	041060	a in allached monitoring weil
NR = No Rec NA = Not app	overy	e								MW-	09-87B	5				
G.S. = Groun	d sur	face	d surf	ace						TOC Grou	Coordi	inates=	N 2270	)557.6 3 (NAV	E 610	8224.1 (NAGD83) El. 114.83 (NAVD88)
T.O.C. = Top	of we	ell casi	ing											- (	,	[]

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, Merced County BEGUN: 11/8/09 FINISHED: 11/10/09 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: NA

#### PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,270,565.2 E 6,108,221.5 (NAGD83) TOTAL DEPTH: 50.0 ft.

STATE: California GROUND SURFACE ELEVATION: 115.0 ft. (NAVD88) T.O.C ELEVATION: 114.87 ft. (NAVD88) HOLE LOGGED BY: G. Russell

SHEET 2 OF 2

REVIEWED BY: J. Vauk

					LAB	ORAT	ORY	DAT	4		×Ω		NC		F	
	Ξ							F	>	%	ATION	/_	AL	/_	IN L	CLASSIFICATION AND
NOTES	DEPT	L R R	Ι.	≻	S		VEL	LIM	Щ Ц Ц	URE URE	ORA SIFIC		/ SIFIC		MBO	
			SILT	CLA	FINE	SAN	GRA	auid	INDE	ONTE	LAB	/ TEVA		LEVA	EOLO	FITTSICAL CONDITION
	<u> </u>	° ≃ 100	~	~	%	~	%			Σŭ		/ =			U	29.5 to 29.8 ft · SANDY   FAN CLAY s(CL)
NUM OD 07													SM '	84.8		About 60% find site distance and site distance a
Well Casing - 0.1 to 37.0 ft. (T.O.C.																fine sand; maximum size: fine sand; wet, olive
EI. 114.87 ft.) Dual Pre-pack Screen - 37.0 to 47.0	-												CL/CH			brown; soft to firm consistency.
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand	_		<u> </u>				•					81.9				<ul> <li>29.8 to 30.1 ft.: <u>SILTY SAND, SM</u>: About</li> <li>60% fine to medium sand; about 40% fines;</li> </ul>
Filter Pack - 36.0 to 48.0 ft. (#3 Sand)			33.6	59.8	93.4	6.6	0.0	58.6	33.8	30.1	СН			80.0		maximum size: medium sand; wet, olive-brown with rust-colored staining: verv
Bottom Backfill (Native Material) - 48.0 to 50.0 ft	-													80.9	1	soft consistency.
Bentonite Seal - 34.0 to 36.0 ft. Backfill - 24.0 to 34.0 ft. (Native	35-	100														30.1 to 34.0 ft.: LEAN TO FAT CLAY,
material caved)													s(CL)			high plasticity, high toughness, high to very
ft.																10% fine sand; maximum size: fine sand;
18-inch manhole (15/16-inch	-	-														moist, olive-brown; firm consistency.
hexbolts)	-		40.7	0.6	50.2	40.7	0.0	ND	ND	22.0	o(ML)	76.6	-	77.2		<ul> <li><u>Laboratory Data Interval</u></li> <li>32.8 to 33.0 ft.</li> </ul>
<u>MW-09-87B</u> Well Casing - 0.1 to 10.0 ft. (T.O.C.			40.7	9.0	50.5	49.7	0.0	INF	INF	23.0		70.0	s(CL/ML)			34.0 to 37.7 ft.: <u>SANDY LEAN CLAY, s(CL)</u> :
El. 114.83 ft.) Dual Pre-pack Screen - 10.0 to 15.0	-	1											0(02/112)			<ul> <li>About 70% fines with medium plasticity, toughness, and high dry strength, and no</li> </ul>
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand	40-	74												75.0	Qal	dilatancy; about 30% fine sand; maximum size; fine sand; moist, olive brown with
Filter Pack - 8.0 to 16.0 ft. (#3 Sand) Bentonite Seal - 2.0 to 8.0 ft.	_															occasional rust and dark brown spots; soft to firm consistency.
Well Protection - flush-mounted			4.0	0.6	4.6	95.4	0.0	NP	NP	12.5	SP	73.4	SP/SM			37.7 to 39.9 ft · SANDY SILTY CLAY
hexbolts)	-															<u>s(CL/ML)</u> : About 55% fines with low plasticity and touchness and slow dilatancy;
	-	-												71.9	-	<ul> <li>about 45% sand; trace of rounded, tan gravel, about 45% sand; trace of rounded, tan gravel,</li> </ul>
		100											(CL)c			<sup>1</sup> / <sub>2</sub> -inch; wet, olive brown; soft consistency.
			46.5	36.9	83.4	16.6	0.0	33.8	14.9	24.6	(CL)s	70.4	- (02)3			Laboratory Data Interval
	45-		1											69.9		
	-	-														<ul> <li><u>WITH SILT: SP/SM</u>: About 90% fine to</li> </ul>
																size: medium sand; moist to wet, olive-brown;
		100											(CL/ML)s			very soft consistency.
	-															Laboratory Data Interval 41.0 to 41.5 ft.
	-	-														<ul> <li>43.0 to 45.0 ft.: <u>LEAN CLAY WITH SAND</u>,</li> </ul>
	50													64.9		(CL)s: About 85% fines with medium plasticity and toughness, high dry strength,
	- 30-						E	BOTTO	M OF I	HOLE						and no dilatancy; about 15% fine sand; maximum size: fine sand; wet, olive brown
																with occasional iron-oxide staining and dark brown spots; firm consistency.
																Laboratory Data Interval
																44.0 to 44.5 ft.
																45.0 to 50.0 ft.: <u>SILTY CLAY WITH SAND</u> , (CL/ML)s: About 75% fines with low
																plasticity and toughness, medium dry strength, and slow dilatancy; about 25% fine
																sand; maximum size: fine sand; very moist, olive brown with occasional iron-oxide
																staining; soft consistency.
																<i>T.D.</i> = 50.0 ft.
COMMENTS: FADC = Fligh	nt Auc	ger Dr	y Core	•					١	Nell c	omplet	tion info	rmation is	s provio	led in	attached Well Completion Diagram.
HSA = Hollow NP = Non-pla	w Ster	m Aug	jer						\ ۲	Nell d Develo	evelop opmen	ment in t form.	formation	is pro	vided i	n attached Monitoring Well
NR = No Rec	covery	/ le								MW-0	9-878					
G.S. = Grour	nd sur	face	dour								Coordir	nates=	N 227055	7.6 E	61082	24.1 (NAGD83) El. 114.83 (NAVD88)
D.g.s. = Belo T.O.C. = Top	vv une of we	groun ell cas	ing	ace					<u>(</u>	JIOUN	u suna	<u>108 El.</u> =	115.03 (	INAVD	00)	r



\*NOT TO SCALE

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.



\*NOT TO SCALE

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, Merced County BEGUN: 11/11/09 FINISHED: 11/12/09 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: NA

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,269,675.6 E 6,103,010.8 (NAGD83) TOTAL DEPTH: 50.2 ft. STATE: California

STATE: California GROUND SURFACE ELEVATION: 112.0 ft. (NAVD88) T.O.C ELEVATION: 111.84 ft. (NAVD88) HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

					LAB	ORAT	ORY	DAT	4		_z		z			
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATIC	ELEVATION	VISUAL CLASSIFICATIC	ELEVATION	GEOLOGIC UNIT	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND												1				0.0 to 50.2 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	100											(CL)s			<ul> <li>0.0 to 2.5 ft.: LEAN CLAY WITH SAND,</li> <li>(CL)s: About 85% fines with low plasticity, toughness and dry strength, and slow dilatancy; about 15% fine sand; maximum size: fine sand; dry, dark brown, no reaction with HCl; soft consistency.</li> </ul>
DRILLED BY: USGS Drill Crew Kevin Coy, Driller Jim Rauman, Helper DRILL RIG:	-													109.3	-	<ul> <li>2.5 to 7.8 ft.: LEAN CLAY, CL: About 95% fines with medium plasticity, toughness and dry strength, and no dilatancy; about 5% fine</li> <li>to medium sand; maximum size: medium sand; moist, dark brown (from 2.5 to 5.3 feet) and light brown (from 5.3 to 7.5 feet), strong</li> </ul>
CME-550	_															reaction with HCl; firm consistency; spots of calcium carbonate.
METHODS: Drill hole MW-09-88 was advanced using bollow stem flight augers dry																Laboratory Data Interval 2.5 to 7.8 ft.
core system (FADC) with a 7-5/8-inch O.D. and 4-1/4-inch I.D., and a 5-foot-long 3-inch I.D. split sample barrel.	5-	100	53.5	38.4	91.9	8.1	0.0	30.6	11.2	24.3	CL		CL			7.8 to 12.6 ft.: <u>SILTY SAND, SM</u> : About 70% fine to coarse sand (trace of coarse); about 30% non-plastic fines with rapid dilatancy; maximum size: coarse sand; moist, light brown and brownish-gray, no reaction with HCI: soft consistency
0.0 to 50.2 ft FADC																Laboratory Data Interval
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 45.0 ft smooth drilling 45.0 to 50.2 ft add water, smooth drilling	-	-		k								101.0	_	104.0		<ul> <li>7.5 to 12.5 tt.</li> <li>12.6 to 15.1 ft.: <u>SILT, ML</u>: About 90% fines with low plasticity, toughness and dry strength, and rapid dilatancy; about 10% fine strength, and rapid dilatancy; about 10% fine</li> </ul>
DRILL FLUID, RETURN AND COLOR: 0.0 to 45.0 ft None 45.0 to 50.2 ft Water, no return	-											104.0		104.0	Qal	<ul> <li>brown and greenish-gray, no reaction with</li> <li>HCI; moderate to firm consistency.</li> </ul>
WATER LEVEL:	-															12.6 to 15.1 ft.
45.0 ft. from ground surface, on 10/28/09 REASON FOR HOLE TERMINATION:	10-	72	11.8	3.4	15.2	84.8	0.0	NP	NP	17.0	SM		SM			15.1 to 15.6 ft.: <u>SANDY SLL1, s(ML)</u> : About 55% non-plastic fines with rapid dilatancy; about 45% fine sand; maximum size: fine sand; wet, light brown, no reaction with HCl; soft consistency.
HOLE COMPLETION:	-	_														<b>15.6 to 16.3 ft.: <u>SILTY SAND, SM</u>:</b> About 80% fine to medium sand; about 20% – non-plastic fines with rapid dilatancy; maximum size: medium sand; wet, light
Well Casing - 0.4 to 25.0 ft. (1.O.C. El. 111.84 ft.) Dual Pre-pack Screen - 25.0 to 45.0 ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand	-	-										00.0				<ul> <li>brown, no reaction with HCI; soft consistency.</li> <li>16.3 to 16.4 ft.: <u>LEAN CLAY, CL</u>: About</li> <li>90% fines with medium plasticity, toughness and dry strength, and no dilatancy; about 10%</li> </ul>
Filter Pack - 20.3 to 46.5 ft. (#3 Sand and Native material caved) Bentonite Seal - 2.0 to 20.3 ft.				r								99.3		99.2		fine sand; maximum size: fine sand; moist, greenish-gray, no reaction with HCl; firm consistency.
Bottom Backfill (Bentonite) - 46.5 to 50.2 ft. Well Protection - flush-mounted 18-inch manhole (15/16-inch hexbolts)	-		60.7	30.0	90.7	9.3	0.0	28.8	9.0	25.0	CL		ML			<b>16.4 to 16.7 ft.: <u>SILTY SAND, SM</u>:</b> About 60% fine to medium sand; about 40% non-plastic fines with rapid dilatancy; maximum size: medium sand; wet, no reaction with HCI; soft consistency.
	15-											00.7		00.7		16.7 to 17.5 ft.: <u>SILTY CLAY, CL/ML</u> : About 90% fines with medium plasticity, low
	15	90										96.7	s(ML)	96.7	-	toughness and dry strength, and rapid dilatancy; about 10% fine sand; maximum size: fine sand; moist, medium brown streaked with orange, no reaction with HCl; moderate to firm consistency.
													CL SM	95.5 95.4 95.1		instantio to min conditionaly.
COMMENTS FADC = Fligt	L ht Auc	l aer Dry		 }								Well c	ompletio	n inform	 nation i	s provided in attached Well
HSA = Hollow NP = Non-pla NR = No Ret NA = Not app G.S. = Grour b.g.s. = Below	w Ster astic covery plicabl nd sur w the	n Aug / le groun	er id surf	ace								Comp provid	letion Dia ed in atta	agram. \ ached N	Vell de Ionitor	velopment information is ing Well Development form.
I.U.C. = Top	o ot we	ell cas	ing													

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, Merced County BEGUN: 11/11/09 FINISHED: 11/12/09 DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: NA PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,269,675.6 E 6,103,010.8 (NAGD83) TOTAL DEPTH: 50.2 ft. STATE: California

SHEET 2 OF 3

GROUND SURFACE ELEVATION: 112.0 ft. (NAVD88) T.O.C ELEVATION: 111.84 ft. (NAVD88) HOLE LOGGED BY: J. Vauk

REVIEWED BY: A. Warren

F																	
						LABO	ORAT	ORY	DATA	۹		×No		NO		╘	
	NOTES	Ŧ	≿					_	μ	≥	ш%	ATOF ICAT	/ z	ICATI	/z	L CN	CLASSIFICATION AND
	NOTES	DEP	ORE	6	Α	ZES	g	RAVE		DEX	TENT	BOR	ATIC	VISU SSIFI	ATIC	YMB(	PHYSICAL CONDITION
			RECC	% SII	% CL	% FIN	% SA	% GF	LIQU	PLAS	MOIS	CLA			ELEV	GEO	
F												- /		CL/ML			17.5 to 22.5 ft.: SILTY CLAY WITH SAND,
															94.3		<u>(CL/ML)s</u> : About 75% fines with medium plasticity, low toughness and dry strength,
		-	-														<ul> <li>maximum size: fine sand; moist, medium</li> </ul>
																	HCl; moderate to firm consistency.
		-															Laboratory Data Interval 17.5 to 22.5 ft.
																	22.5 to 24.3 ft.: SILT, ML: About 90% fines
		20-	94	55.7	18.4	74.1	25.9	0.0	28.4	4.9	27.9	(ML)s		(CL/ML)s			<ul> <li>dry strength, and rapid dilatancy; about 10%</li> <li>fine conducts</li> </ul>
																	greenish-gray, no reaction with HCl; moderate
		_															24.3 to 24.4 ft · SANDY SILT s(ML)· About
																	70% fines with no to low plasticity, low toughness and dry strength, and rapid
																	dilatancy; about 30% fine sand; maximum size: fine sand; wet, greenish-gray, no
													89.3		89.3		reaction with HCI; moderate to firm consistency.
																	24.4 to 27.1 ft.: <u>SILT, ML</u> : About 90% fines
		-	1														<ul> <li>with no to low plasticity, low toughness and dry strength, and rapid dilatancy; about 10%</li> </ul>
														ML			fine sand; maximum size: fine sand; wet, greenish-gray, no reaction with HCl; moderate
		-													87.5		_ to firm consistency.
														_s(ML)	87.4		22.5 to 27.1 ft.
		25-	80	72.6	13.1	85.7	14.3	0.0	NP	NP	30.7	ML					27.1 to 27.5 ft.: <u>SILTY SAND, SM</u> : About 60% fine to medium sand: about 40%
																Qal	non-plastic fines with rapid dilatancy; maximum size: medium sand: wet
		_	-											ML			orange-brown, no reaction with HCl; soft
																	27.5 to 31.6 ft.: SILTY SAND, SM: About
		_											84 7		84 7		75% fine to coarse sand (trace of coarse _ sand); about 25% non-plastic fines with rapid
													04.1	SM	84.3		dilatancy; maximum size: coarse sand; wet, light brown, no reaction with HCl; soft to firm
																	consistency.
																	27.5 to 31.6 ft.
																	<b>31.6 to 32.0 ft.: <u>SANDY LEAN CLAY, s(CL)</u></b> About 70% fines with medium plasticity,
		-	1														<ul> <li>toughness and dry strength, and no dilatancy; about 30% fine to medium sand; maximum</li> </ul>
				8.5	4.8	13.3	86.7	0.0	NP	NP	22.6	SM		SM			size: medium sand; moist, light brown, no reaction with HCI; firm consistency.
		30—	70														32.0 to 37.5 ft.: SILTY SAND, SM: About
																	80% fine sand; about 20% non-plastic fines with rapid dilatancy; maximum size: fine sand;
		-	-														<ul> <li>wet, light brown, no reaction with HCI; firm</li> <li>consistency.</li> </ul>
													80.2		80.2		Laboratory Data Interval
		-	-											s(CL)	79.8		- 37.5 to 41.7 ft.: SILTY SAND SM: About
				4													60% fine to coarse sand (trace of coarse sand ): about 40% non-plastic fines with rapid
		_															dilatancy; maximum size: coarse sand; wet, — light brown, no reaction with HCI: firm
																	consistency.
Γ	COMMENTS: FADC = Fligh	nt Aug	jer Dry	/ Core									Well co	ompletion	inform	ation i	s provided in attached Well
	HSA = Hollov NP = Non-pla	v Ster	n Aug	ler									provide	ed in atta	ched M	onitori	ng Well Development form.
	NR = No Rec NA = Not app	licabl	le														
	G.S. = Groun b.g.s. = Belov	d surf w the	race groun	d surfa	ace												
	Т.О.С. = Тор	of we	ell cas	ing													SHEET 2 OF 3 DRILL HOLE MW-09-88

EATURE: Groundwater Moni OCATION: Reach 4A, River B	toring Bank Left, N	lerced	<b>G</b> County	iEO	LOG	PROJE	LOG	San Joa ES: N	<b>DR</b> aquin F N 2,269	River Re 9,675.6	HOLE estoration I E 6,103,	NO Projec ,010.8	2. <b>MW-09</b> - ct 5 (NAGD83)	STATE GROU	SHEET 3 :: California ND SURFACE ELEVATION: 112.0 ft. (NAVD86 ELEVATION: 111.84 ft. (NAVD89)
EPTH AND ELEVATION OF V AND DATE MEASURED:	VATER LEV	/EL				TOTAL	DEFT	11. 30	.z n.					HOLE	LOGGED BY: J. Vauk WED BY: A. Warren
NOTES	ЭЕРТН	RE VERY		×	LABO		ORY			URE ENT %	ORATORY SIFICATION	TION	/ISUAL SIFICATION VTION	DGIC UNIT MBOL	
		% CC RECO	% SILT	% CLA	% FINE	% SAN	% GRA	LIQUID	PLAST	MOIST	CLAB	ELEVA	CLAS	GEOL(	
	35-	50											SM		41.7 to 45.6 ft.: <u>SILTY SAND, SM</u> : Abou 85% fine to coarse sand; about 15% non-plastic fines; maximum size: coarse sand; wet, light brown, no reaction with h soft to firm consistency.
															Laboratory Data Interval 41.7 to 45.6 ft.
	-		8.8	4.8	13.6	86.4	0.0	NP	NP	27.3	SM				<ul> <li>45.6 to 50.2 ft.: FAT CLAY, CH: About 9 fines with high plasticity, medium toughr and dry strength, and no dilatancy; abou fine sand; maximum size: fine sand; moi greenish-gray, no reaction with HCl; firm consistency.</li> </ul>
													74.	3	Laboratory Data Interval 45.6 to 50.2 ft.
															T.D. = 50.2 ft.
	-	-													_
	40-	78											SM		
	-	-													_
	_											70.1	70.	1	_
			-											Qai	
	-														_
	-	-	7.5	1.4	8.9	88.6	2.5	NP	NP	19.7	SW-SM		SM		_
	45-	88										66.2	66		_
	-	-										00.2	00.	<u> </u>	_
	-														
	-	-	47.0	48.1	95.1	4.9	0.0	44.9	25.3	26.0	CL		сн		-
	-	100													_
	50-											61.6	61.	6	_
	L				1		E	вотто	M OF I	HOLE		01.0	1 01.	~	<u>+</u>

COMMENTS:

- FADC = Flight Auger Dry Core HSA = Hollow Stem Auger NP = Non-plastic NR = No Recovery NA = Not applicable G.S. = Ground surface b.g.s. = Below the ground surface T.O.C. = Top of well casing

SHEET 3 OF 3 DRILL HOLE MW-09-88

Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.



# \*NOT TO SCALE

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Sand backfills the well above the top of bentonite seal, inside the manhole.

NOTES         NOTES <th< th=""><th></th><th></th><th></th><th></th><th></th><th>LABO</th><th>ORAT</th><th>ORY</th><th>DATA</th><th>4</th><th></th><th>7</th><th>/</th><th>z</th><th>7</th><th></th><th></th></th<>						LABO	ORAT	ORY	DATA	4		7	/	z	7		
ALL MEAUREMENTS ARE IN PERFORM THE GROUP       0.0 - 0.00 hit         DURING SCHOOLD       0.0 - 0.00 hit         SUMPACE:       0.0 - 0.00 hit         DURING SCHOOLD       0.0 - 0.00 hit         SUMPACE:       0.0 - 0.00 hit         DURING SCHOOLD       0.0 - 0.00 hit         DURING SCHOOLD       -         DURING SC	NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL		PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL	ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
Construction         Construction         Construction         Construction         Construction           Provide construction provide constructin provide construction provide construction provide	ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.																0.0 to 30.5 feet QUATERNARY ALLUVIUM (Qal)
LOCATION: Location:	PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	-														<ul> <li>0.0 to 8.0 ft.: <u>SANDY SILTY CLAY</u>, <u>s(CL/ML</u>): About 60% fines with low plasticity, medium toughness, slow dilatand about 40% fine sand; maximum size: fine sand; dry, brown; soft to firm, lightly cemen lenses; organic odor and high organic cont encountered near the surface.</li> </ul>
Intersection of Road 4 and Avenue 195.       Bo to 31 ft: SLTY CLAY, (CLALL) APPR-Regional Dia Celv Construction of Road 4 and Avenue PR-Regional Dia Celv Construction Const	LOCATION: Reach 4A, river right, about 400 feet east from the center of the SJR, about 2.2 miles southwest from the	-	47														Laboratory Data Interval 4.3 to 6.5 ft.
<pre>Intro the intro the interval is a construction of the interval is constructed in the int</pre>	intersection of Road 4 and Avenue 18½. DRILLED BY:																8.0 to 9.1 ft: <u>SILTY CLAY, (CLML</u> ) Abou 90% fines with low plasticity, medium toughness, slow dilatancy; about 10% fine sand; maximum size: fine sand; dry, brown firm thigh headeds
DRILL RG: Control Mining Equipment 75 drilling CME-750       9.1 to 54 ft: SANDY SULT, SMIL + SAND SULT, SMIL + SANDY SULT, SMIL + SANDY SULT, SMIL + SANDY SULT, SMIL + SANDY SULT, SMIL + SANDY SULT, SMIL + SANDY SULT, SMIL + SANDY SULT, SMIL + SANDY SUBJECT SULT, SMIL + SMIL + SMIL + SMIL SWIL + SMIL +	Jerry Hansen, Driller Cody Kelly, Helper Ken Kreitz, Helper	-	-														Laboratory Data Interval 8.0 to 9.0 ft.
MEI HUUS:       Addition of the set when addition of the set when a transformed a set when a transformed a transformed at the set of the	DRILL RIG: Central Mining Equipment 75 drill rig (CME-75) DRILLING & SAMPLING	-												s(CL/ML)			9.1 to 9.5 ft.: <u>SANDY SILT, s(ML)</u> : About 65% fines with no plasticity, low toughness about 35% fine sand; maximum size: fine sand; moist, olive brown to reddish oxidati moderately firm, several lenses of fine sand
FACC uses 7-58-inch 0.D. d. 44-in (D. hollow stem augers, with a 5-foot-long, 3-inch 1D. split ample barrier, with a 5-foot-long, 3-inch 1D. split ample barrier, with a 5-foot-long, 3-inch 1D. split ample barrier, b	METHODS: Drill hole MW-10-80 was advanced using hollow stem flight augers with a continuous dry core sampling system (FADC) from the ground surface to a total depth of 30.5 feet.	5-	-														9.5 to 10.5 ft.: <u>SILT, ML</u> : About 90% fines with low plasticity and toughness, slow dilatancy; about 10% fine sand; maximum size: fine sand; dry, brown; firm, thinly bedded.
Berneral Method OU to 30.5 ft FADC       81       10       10.5 to 13.0 ft.: CLAYEY TO SLITY 52 SCISM: About 20% fines with low to medium plasticity: about 20% fines with size: medium plasticity: mices, and size: medium plasticity: mices, and size: medium plasticity: mices, and fieldspars. 31 to 23.3 ft: PDORLY GRAED 23 with Size: file and, wet olive brow with the brown with few plasticity: mices size: file and, wet olive brow with rederive with file size: file and, wet olive brow with rederive with form 2.1 file about 10% fines with medium size: file and, wet olive brow with rederive with file size size file and wet also brow with reduction size: file and, wet olive brow with rederive with file size size file about 10% fines with medium size: file and, wet olive brow with rederive with size size file about 10% file size size file and wet olive brow with rederive with file size size file and wet olive brow with reduction rederive with size size file about 10% file size size file and wet olive brow with rederive with file size size file and wet olive brow with rederive with file size siz	FADC uses 7-5/8-inch O.D., 4-1/4-inch I.D. hollow stem augers, with a 5-foot-long, 3-inch I.D. split sample barrel			46.1	23.9	70.0	30.0	0.0	NP	NP	9.4	(ML)s					Laboratory Data Interval 9.5 to 10.5 ft.
DRILLING CONDITIONS AND DRILLER'S COMMENTS:       Image: Comparison of the same of the	Interval Method 0.0 to 30.5 ft FADC	-	81													Qal	10.5 to 13.0 ft.: <u>CLAYEY TO SILTY SANI</u> <u>SC/SM</u> : About 20% fines with low to medium plasticity; about 80% fine sand; maximum size; fine sand; we to moist oli the sand;
8.0 to 13.0 ft. damp 18.0 to 23.0 ft. soft o very soft 23.0 to 33.5 ft. fm CAVING CONDITIONS: None CAVING CONDITIONS: None CAVING CONDITIONS: None COLOR: OU to 18.0 ft. None 18.0 to 30.5 ft. Water, no return WATER LEVEL: 12.0 ft. 5g. 3/22/2010 REASON FOR HOLE TERMINATION: The hole was terminated upon successful completion to the target depth. HOLE COMPLETION: Well Casing: +2.5 to 10.0 ft. (T.O.C. E.1.27.5 ft. 20.0 s.7, ft. (20.0 ft. (33.6 ft. (33.3 md)) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.1 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.1 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.1 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.1 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.1 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.5 to 30.5 ft. (43.3 md) Well Screen Filter Pack: 9.1 to 43.5 ft. (43.3 md) Scrism Well Screen Filter Pack: 9.5 th. (43.3 md) Scrism Well Screen	DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 8.0 ft. smooth drilling, soft												121.0				brown with reddish brown oxidation; moderately soft.
CAVING CONDITIONS: None       Image: Control of the stand from 12 in the s	8.0 to 13.0 ft. damp 13.0 to 18.0 ft. very wet 18.0 to 23.0 ft. soft to very soft 23.0 to 30.5 ft. firm	-															<ul> <li>13.0 to 21.3 ft:: <u>POORLY GRADED SAN</u> <u>SP</u>: About 95 to 100% fine to medium sand; about a trace to 5% fines; maximum size: medium sand; wet, gray; loose, sand consists of quartz biotite micras and</li> </ul>
DRIL FLUID, RETORN AND COLOR:       DRIL FLUID, RETORN AND COLOR:       For 2       29.9       97.1       2.9       0.0       40.8       13.5       23.1       ML       (CL/ML)       Image: Click and the set of the	CAVING CONDITIONS: None	-													116.9		feldspars. 3 lenses of fine sand from 13.0 13.1 ft., 14.1 to 14.2 ft., and 15.0 to 15.1 ft tree bark present.
WATER LEVEL: 12.0 ft. b.g.s. 3/22/2010       is given consistent of the series of the se	COLOR: 0.0 to 18.0 ft. None 18.0 to 30.5 ft. Water, no return			67.2	29.9	97.1	2.9	0.0	40.8	13.5	23.1	ML		(CL/ML)			21.3 to 23.3 ft.: POORLY GRADED SAND <u>WITH SILT, SP/SM</u> : About 90% fine sand about 10% fines with low plasticity; maxim
REASON FOR HOLE TERMINATION: The hole was terminated upon successful completion to the target depth.       10-       10-       115.4       115.4       115.4       115.4         HOLE COMPLETION: Well Casing: +2.6 to 10.0 ft. (T.O.C. EI. 127.5 ft.) Dual U-pack Screen: 10.0 to 25.0 ft. (Slotted 0.010-inch)       10-       98       11.2       0.0       33.8       9.1       29.2       ML       ML       114.4       114.4         114.4       114.4       114.4       114.4       114.4       114.4       114.4       24.5 to 25.8 ft.:       24.5 to 25.8 ft	WATER LEVEL: 12.0 ft. b.g.s. 3/22/2010	-	-										115.9		115.8		<ul> <li>size: fine sand; wet, olive brown with reddi</li> <li>brown oxidation layers; micaceous, stratifier</li> <li>moderately soft to firm. Organic layer</li> <li>(decomposed organic data) containing bla</li> </ul>
The hole was terminated upon successful completion to the target depth.       10       64.9       23.9       88.8       11.2       0.0       33.8       9.1       29.2       ML       ML       ML       23.3 to 24.5 ft.:SILTY SAND, SM: Abore and the stress of the	REASON FOR HOLE TERMINATION:													S(IVIL)	115.4		bark and sand from 21.7 to 22.2 ft. dipping about 45°.
Well Casing: +2.6 to 10.0 ft. (T.O.C.       98       98       114.4       114.4       114.4         El. 127.5 ft.)       98       98       114.4       114.4       114.4       24.5 to 25.8 ft.:]EAN CLAY WITH SAN         Ual U-pack Screen: 10.0 to 25.0 ft.       (Slotted 0.010-inch)       98       114.4       114.4       114.4       24.5 to 25.8 ft.:]EAN CLAY WITH SAN         Well Screen Filter Pack: 2/12 Sand       114.4       114.4       114.4       114.4       114.4       24.5 to 25.8 ft.:]EAN CLAY WITH SAN         Screen Filter Pack: 2/12 Sand       114.4       114.4       114.4       114.4       114.4       114.4       24.5 to 25.8 ft.:]EAN CLAY WITH SAN         Screen Filter Pack: 2/12 Sand       114.4       114.4       114.4       114.4       114.4       114.4       24.5 to 25.8 ft.:]EAN CLAY WITH SAN         Screen Filter Pack: 2/12 Sand       114.4       114.4       114.4       114.4       114.4       114.4       114.4       114.4       24.5 to 25.8 ft.:]       24.5 to 25.	The hole was terminated upon successful completion to the target depth. HOLE COMPLETION:	10—	-	64.9	23.9	88.8	11.2	0.0	33.8	9.1	29.2	ML	114.4	ML	114.4		23.3 to 24.5 ft.: <u>SILTY SAND, SM</u> : About 85% fine sand; about 15% nonplastic fines maximum size: fine sand; wet, olive brown gray; moderately firm.
FVC with Cap)       SC/SM       Laboratory Data Interval 24.5 to 25.8 ft.         Bentonite Seal: 2.0 to 9.5 ft.       Well Completion: Steel surface       24.5 to 25.8 ft.         COMMENTS:       FADC = Flight Auger Dry Core NP = Non-plastic       O.D. = outer diameter G.S. = Ground surface       Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.         NA = Not applicable       T.O.C. = Top of well casing L.D. = inner diameter       SJR = San Joaquin River	Well Casing: +2.6 to 10.0 ft. (T.O.C. El. 127.5 ft.) Dual U-pack Screen: 10.0 to 25.0 ft. (Slotted 0.010-inch) Well Screen Filter Pack: 2/12 Sand Filter Pack: 9.5 to 30.5 ft. (#3 Sand) Sump: 25.0 to 27.0 ft. (2-inch blank	-	98										114.4		114.4		<ul> <li>24.5 to 25.8 ft.:LEAN CLAY WITH SAND (CL)s: About 80% fines with medium plasticity, no dilatancy; about 20% fine to medium sand; maximum size: medim sand moist, olive gray; firm, lightly cemented in layers.</li> </ul>
FADC = Flight Auger Dry Core       O.D. = outer diameter       Well completion information is provided in attached Well         NP = Non-plastic       G.S. = Ground surface       Completion Diagram. Well development information is         NR = No Recovery       b.g.s. = Below the ground surface       provided in attached Mell Completion Diagram. Well Development form.         NA = Not applicable       T.O.C. = Top of well casing       SJR = San Joaquin River	Well Completion: Steel surface													SC/SM			Laboratory Data Interval 24.5 to 25.8 ft.
	FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable		0.D. G.S. b.g.s. T.O.C S.IR	= oute = Gro = Bel 2. = To = San	er diar und si low th op of v	neter urface e grou well ca	e und su asing ver	Irface			\ (	Vell co Comple provide	mpletio etion Dia d in atta	n informati agram. We ached Mon	on is      deve itoring	orovid elopm g Well	ed in attached Well ent information is Development form.

COORDINATES: N 2,251,292.7 E 6,121,295.6 (NAGD83)

PROJECT: San Joaquin River Restoration Program

TOTAL DEPTH: 30.5 ft.

FEATURE: Groundwater Monitoring

BEGUN: 3/22/10 FINISHED: 3/22/10

LOCATION: Reach 4A, Right Side of River, North of Sack Dam

RECLAMATION Managing Water in the West

SHEET 1 OF 3

STATE: California

GROUND SURFACE ELEVATION: 124.9 ft. (NAVD88)

T.O.C ELEVATION: 127.5 ft. (NAVD88)

Γ				G	EOI	LOG	IC L	.0G	OF	DR	ILL		). MW-10-	80	SHEET 2 OF 3
	FEATURE: Groundwater Monitoring LOCATION: Reach 4A, Right Side of BEGUN: 3/22/10 FINISHED: 3/22 WATER LEVEL DEPTH AND ELEVA DATE WATER LEVEL WAS MEASU	of River 2/10 ATION: RED:	r, North 12.0 3/22/2	n of Sa ft. b.g.: 2010	ck Dan s. (El.	n 112.9	PROJE COORI TOTAL ft.)	CT: S DINAT DEPT	San Jo ES: I 'H: 30	aquin I N 2,25 <sup>,</sup> ).5 ft.	River R 1,292.7	estoration Prog E 6,121,295.	am 6 (NAGD83)	STATE GROU T.O.C HOLE REVIE	:: California ND SURFACE ELEVATION: 124.9 ft. (NAVD88) ELEVATION: 127.5 ft. (NAVD88) LOGGED BY: A. Warren WED BY: J. Vauk
Γ						LABO	DRAT	ORY	DAT	۹ 	1	NOI	NOI	TI	
	NOTES	TH	n R≺			0		Ē	LIMIT	È	님 ~	IFICAT	SUAL		CLASSIFICATION AND
		B	% COR RECOVE	% SILT	% CLAY	% FINES	% SAND	% GRA	LIQUID	PLASTIC INDE)	MOISTU	LABO CLASS	CLASS	CEOLOG SYM	PHYSICAL CONDITION
é	asing with locking top, square ⊱inches-wide and 5-foot-long.	_	98										SC/SM		25.8 to 27.0 ft.:POORLY GRADED SAND <u>WITH SILT. SP/SM</u> : About 90% fine sand; about 10% fines with low plasticity; maximum size: fine sand; wet, olive brown with reddish brown oxidation layers; micaceous, stratified, moderately soft to firm.
		_													27.0 to 29.5 ft.: <u>LEAN CLAY WITH SAND,</u> ( <u>CL)s</u> : About 80% fines with medium plasticity, no dilatancy; about 20% fine to medium sand; maximum size: medium sand; moist, olive gray; firm, lightly cemented in layers.
		15—													29.5 to 30.5 ft.:POORLY GRADED SAND <u>WITH SILT, SP/SM</u> : About 90% fine sand; about 10% nonplastic fines; maximum size: fine sand; wet, olive brown with reddish brown oxidation, moderately soft.
															T.D. = 30.5 ft.
			58												
		-	-												_
		_	-												_
													SP		
		-												Qal	_
		_													_
		20—	+												-
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		_													_
G													103.6		
JRRP.G															
ASE: S.		-													_
DATAB/													SP/SM		
OUECT															
PR													101.6		
			100												
THOLE	COMMENTS:												SM		
TT: SJRRP DRILI	FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter		O.D. G.S. b.g.s. T.O.C S.JR =	= oute = Gro = Bel C. = To = San	er dian und su low th op of v Joagu	neter urface e grou well ca uin Rit	und su asing ver	ırface			Р С	Vell completio Completion Di provided in att	on information i agram. Well de ached Monitori	s provid velopm ng Wel	ded in attached Well nent information is Development form.
REPOF	RM = River Mile				DA	<u>TE:</u> 9/	<u>15/2</u> 01	0	SHEE	T_2	OF_3	DRILL HOL	E MW-10-80		RECLAMATION Managing Water in the West
-															

				G	EOI	_OG	IC L	.0G	OF	DRI		HOLE	NO	. MW-10-8	30	SHEET 3 OF 3
FEATURE: LOCATION BEGUN: 3 WATER LE DATE WAT	Groundwater Monitorin Reach 4A, Right Side 3/22/10 FINISHED: 3/2 VEL DEPTH AND ELEV FER LEVEL WAS MEAS	ng 22/10 ATION: URED:	r, North 12.0 3/22/2	n of Sa ft. b.g.: 010	ck Darr s. (El.	112.9	PROJE COORI TOTAL ft.)	CT: S DINAT DEPT	San Joa ES: N H: 30	aquin R N 2,251 D.5 ft.	River Ro ,292.7	estoratior E 6,12 <sup>-</sup>	Progra	am ; (NAGD83)	STATE GROU T.O.C I HOLE REVIE	: California ND SURFACE ELEVATION: 124.9 ft. (NAVD88) ELEVATION: 127.5 ft. (NAVD88) LOGGED BY: A. Warren WED BY: J. Vauk
						LABC	ORAT	ORY	DATA	4		≻ Z	/	z /		
	NOTES	TH						ц	MIT	≿	r%	ATOR' ICATIO	/ z			CLASSIFICATION AND
		DE	% CORE RECOVE	% SILT	% CLAY	% FINES	% SAND	% GRAVI	רומחום ר	PLASTICI INDEX	MOISTUF	LABOR CLASSIF	ELEVATI	CLASSIF	GEOLOG	PHYSICAL CONDITION
														SM 100.4	-	
		25-	-	41.7	30.1	71.8	28.2	0.0	24.4	9.2	23.8	(CL)s		(CL)s		_
			100										99.1	99.1		_
														SP/SM		
		-	-											97.9	Qal	_
		_														_
														(CL)s		
		-	92											95.4		_
		30-	-											SP/SM		-
								F						94.4		
								-			IOLL					
C-19.																
FADC = NP = No NR = No NA = No	NTS: Flight Auger Dry Core n-plastic Recovery t applicable	e	O.D. G.S. b.g.s.	= oute = Gro = Bel	er dian und su low the	neter urface e grou vell ca	und su	rface			V C	Vell com Completi provided	pletio on Dia in atta	n information is agram. Well dev ached Monitorir	provic velopm ig Well	led in attached Well ent information is Development form.
$\begin{bmatrix} I.D. = INO \\ I.D. = INO \\ RM = Riv$	ver Mile		SJR =	- San	Joaqu		ver 15/201	0	SHFF	T 3 (	DF 3	DRII	- HOLF	MW-10-80		RECLAMATION Managing Water in the West
L					DA	. <b>L</b> . 3/	.0/201	~ L	JULL		J J					

MW-10-80	GEOLOGIST: A. WARREN
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 3/22/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2251292.7 E6121295.6 (NAD83) E GROUND SURFACE ELEVATION 124.9	LEVATION 127.5' (NAVD88) ' (NAVD88)



### NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation #3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring

LOCATION: Reach 4A, Right Side of River, SW of Road 1 and Ave. 21 BEGUN: 3/24/10 FINISHED: 3/24/10 WATER LEVEL DEPTH AND ELEVATION: NA

DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,260,977.3 E 6,110,854.1 (NAGD83) TOTAL DEPTH: 31.5 ft.

STATE: California

GROUND SURFACE ELEVATION: 118.8 ft. (NAVD88) T.O.C ELEVATION: 121.5 ft. (NAVD88) HOLE LOGGED BY: A. Warren REVIEWED BY: J. Vauk

SHEET 1 OF 3

						LABO	ORAT	ORY	DATA	Ą		Z	/	Z			
	NOTES	DEPTH	% CORE ECOVERY	SILT	CLAY	FINES	SAND	GRAVEL	QUID LIMIT	ASTICITY	OISTURE DNTENT %	LABORATORY	EVATION	VISUAL	EVATION	EOLOGIC UNIT	CLASSIFICATION AND PHYSICAL CONDITION
	ALL MEASUREMENTS ARE IN FEET FROM THE GROUND		°.#	%	%	%	%	%	5	2	Ξŏ	0	/ 🖬	0/ SM	<u> </u>	0	0.0 to 31.5 feet QUATERNARY ALLUVIUM (Qal)
	SURFACE. PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a	_													118.2	-	<b>0.0 to 0.6 ft.:</b> <u>SILTY SAND, SM</u> : About 55% fine sand; about 45% fines with low plasticity; maximum size: fine sand; moist, brown, organic odor; moderately soft.
	groundwater monitoring well. LOCATION: Reach 4A, river right, about 350 feet east from the center of the SJR.													s(ML)			0.6 to 2.2 ft.: <u>SANDY SILT, s(ML)</u> : About 60% fines with low plasticity; about 40% fine sand; maximum size: fine sand; moist, dark brown, organic odor; firm.
	about 1.8 miles south and 0.9 miles west of the intersection of Road 1 and Avenue 21.	_	71												116.6		2.2 to 19.0 ft.: <u>POORLY GRADED SAND</u> , <u>SP</u> : About 100% fine to medium sand; trace fines; maximum size: medium sand; dry, moist at 5.0 ft. and wet at 9.0 ft., tan, gray at
	DRILLED BY: PN-Regional Drill Crew Jerry Hansen, Driller Cody Kelly, Helper Ken Kreitz, Helper	_															<ul> <li>14.0 ft.; soft, loose, uniform, orange oxidation discoloration from 2.2 to 2.5 ft. SP/SM from</li> <li>6.3 to 9.0 ft., alternating beds about 0.6 ft. thick of fine and medium sand throughout interval.</li> </ul>
	DRILL RIG: Central Mining Equipment 75 drill rig (CME-75)	_															Laboratory Data Interval 10.0 to 11.0 ft. 16.0 to 17.0 ft.
	DRILLING & SAMPLING METHODS: Drill hole MW-10-89 was advanced using hollow stem flight augers with a continuous dry core sampling system (FADC) from the ground surface to a total depth of 31.5 feet. FADC uses 7-5/8-inch O.D., 4-1/4-inch I.D. hollow stem augers,	5—															19.0 to 25.0 ft.: FAT CLAY WITH SAND, (CH)s: About 80 to 85% fines with high plasticity and toughness, no dilatancy; about 15 to 20% fine sand; maximum size: fine sand; moist; olive tan with reddish brown oxidation veins from 19.0 to 24.0 feet; very firm; stratified with infrequent layers of fine sand and s(CH); dark gray blue, hydrogen sulfide odor from 24.0 to 25.0 feet.
	with a 5-foot-long, 3-inch I.D. split sample barrel. Interval Method	_														Qal	Laboratory Data Interval 21.0 to 22.0 ft.
	0.0 to 31.5 tt FADC <b>DRILLING CONDITIONS AND</b> <b>DRILLER'S COMMENTS:</b> 0.0 to 4.5 ft. smooth drilling, soft 1.5 to 19.0 ft. wet, add water 19.0 to 29.0 ft. firm 29.0 to 31.5 ft. firm to moderately firm	_	44														<ul> <li>25.0 to 26.2 ft: POORLY GRADED SAND WITH CLAY, SP/SC: About 90% fine sand; about 10% nonplastic fines; maximum size: fine sand; wet, brown; moderately soft.</li> <li>26.2 to 27.6 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 65% fines with medium plasticity, high toughness; about 35% fine sand; maximum size: fine sand; moist, orange</li> </ul>
	CAVING CONDITIONS: None																brown; moderately soft, stratified.
	DRILL FLUID, RETURN AND COLOR: 0.0 to 4.9 ft. None 4.9 to 31.5 ft. Water, no return																27.6 to 28.5 ft.: <u>POORLY GRADED SAND</u> <u>WITH SILT, SP/SM</u> : About 90% fine sand; about 10% nonplastic fines; maximum size:
	WATER LEVEL: Not measured	_															fine sand; wet, brown; moderately soft. 28.5 to 29.0 ft.: <u>SANDY LEAN CLAY, s(CL)</u>
SJRRP.GPJ	REASON FOR HOLE TERMINATION: The hole was terminated upon successful completion to the target	10															high toughness; about 35% fine sand; maximum size: fine sand; moist, orange brown; moderately soft, stratified.
OJECT DATABASE:	depth. HOLE COMPLETION: Well Casing: +2.7 to 10.0 ft. (T.O.C. El. 121.5 ft.) Dual U-pack Screen: 10.0 to 25.0 ft. (Stotted 0.010.ipcb)	10—		2.5	1.1	3.6	96.2	0.2	NP	NP	19.8	SP	107.8	SP			29.0 to 31.5 ft.: <u>POORLY GRADED SAND,</u> <u>SP</u> : About 95% fine to medium sand; about 5% fines; maximum size: fine sand; wet, brown; soft. T.D. = 31.5 ft.
PR	Well Screen Filter Pack: 2/12 Sand Filter Pack: 9.5 to 31.5 ft. (#3 Sand) Sump: 25.0 to 27.0 ft. (2-inch blank PVC with cap) Bentonite Seal: 2.0 to 9.5 ft.	_	60														
OLE	Well Completion: Steel surface																
PORT: SJRRP DRILL HO	COMMENTS: FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile		O.D. G.S. b.g.s. T.O.C SJR =	= oute = Gro = Bel C. = To = San	er diar und si low th op of v Joaqi	neter urface e grou well ca uin Ri <sup>i</sup>	e und su asing ver	rface			t O	Vell c Comp provid	ompletio letion Dia ed in atta	n inforr agram. ached I	nation is Well dev Monitorir	provi velopn ig Wel	ded in attached Well nent information is I Development form.
REF				Г	<b>.</b>	TE 6	4 5 10 0 1		0	<b>T</b> 4	05 0						RECLAMATION Managing Water in the West

			G	EOI	LOG	IC L	.0G	OF	DRI	LL	IOLE N	0.	MW-10-8	9	SHEET 1 OF 3
FEATURE: Groundwater Monitoring LOCATION: Reach 4A, Right Side of F BEGUN: 3/24/10 FINISHED: 3/24/1 WATER LEVEL DEPTH AND ELEVATI DATE WATER LEVEL WAS MEASURE	River, S 0 ON: M ED: N	SW of F NA A	Road 1	and Av	/e. 21	PF CC TC	ROJEC DORDI DTAL E	T: Sa NATE: DEPTH	an Joaq S: N 2 I: 31.5	uin Riv 2,260,9 ft.	er Restoratior 77.3 E 6,11	n Pr 0,8	rogram 54.1 (NAGD83)	S <sup>-</sup> G T. HI RI	TATE: California ROUND SURFACE ELEVATION: 118.8 ft. (NAVD88) O.C ELEVATION: 121.5 ft. (NAVD88) DLE LOGGED BY: A. Warren EVIEWED BY: J. Vauk
NOTES	DЕРТН	% CORE RECOVERY	% SILT	% CLAY	LABC	ORAT	% GRAVEL		PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL CLASSIFICATION ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
casing with locking top, square 6-inches-wide and 5-foot-long.															

SP

Qal

99.8

24.1 SP-SM

(CL)s

96.8

(CH)s

16.3 21.4

32.3

101.8

NP

NP

PROJECT DATABASE: SJRRP.GPJ REPORT: SJRRP DRILL HOLE

COMMENTS: FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile

O.D. = outer diameter G.S. = Ground surface b.g.s. = Below the ground surface T.O.C. = Top of well casing

41.4 81.3 18.7 0.0

60

15-

20

100

39.9

28 6.1 1.0 7.1 92.9 0.0

SJR = San Joaquin River

Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.

RECLAMATION Managing Water in the West

			G	EOI	LOG	SIC L	.0G	OF	DR	ILL I	HOL	E NO	. MW	-10-8	9	SHEET 1 OF 3
FEATURE: Groundwater Monitoring LOCATION: Reach 4A, Right Side of I BEGUN: 3/24/10 FINISHED: 3/24/1 WATER LEVEL DEPTH AND ELEVATI DATE WATER LEVEL WAS MEASURE	River, S 0 ION: I ED: N	SW of F NA A	- Road 1	and Av	ve. 21	PI Ci Ti	ROJEC OORDI DTAL [	T: Sa INATE DEPTH	an Joad S: N I: 31.5	quin Riv 2,260,9 5 ft.	ver Rest	toration F E 6,110,i	Program 854.1 (NA	GD83)	S <sup>-</sup> G T. H <sup>I</sup> RI	TATE: California ROUND SURFACE ELEVATION: 118.8 ft. (NAVD88) O.C ELEVATION: 121.5 ft. (NAVD88) OLE LOGGED BY: A. Warren EVIEWED BY: J. Vauk
					LABO	ORAT	ORY	DAT	4		≻o		NO		E	
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL		PLASTICITY INDEX	MOISTURE CONTENT %	LABORATOR CLASSIFICATI	ELEVATION	VISUAL CLASSIFICATI	ELEVATION	GEOLOGIC UN SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
											, 		(CH)s			
	25-	-												93.8		_
													SP/SC			
	-													92.6	-	-
	-	100	38.9	33.9	72.8	27.2	0.0	29.1	16.3	19.4	(CL)s	04.2	s(CL)			_
	-	-										91.3	SP/SM	91.2	Qal	_
														90.3	-	
	-		-										s(CL)	89.8		_
	30-	88											SP			-

BOTTOM OF HOLE

REPORT: SJRRP DRILL HOLE PROJECT DATABASE: SJRRP.GPJ

COMMENTS: FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile

O.D. = outer diameter G.S. = Ground surface b.g.s. = Below the ground surface T.O.C. = Top of well casing SJR = San Joaquin River Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.

> RECLAMATION Managing Water in the West

MW-10-89	GEOLOGIST: A. WARREN
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 3/24/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2260977.3 E6110854.1 (NAD83) EL GROUND SURFACE ELEVATION 118.8	_EVATION 121.5' (NAVD88) ' (NAVD88)



# NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation #3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring

LOCATION: Reach 4B1, River Bank Right, North of Sand Slough Structure BEGUN: 4/17/10 FINISHED: 4/17/10 WATER LEVEL DEPTH AND ELEVATION: NA

DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,297,746.3 E 6,099,622.5 (NAGD83) TOTAL DEPTH: 31.2 ft.

STATE: California GROUND SURFACE ELEVATION: 101.3 ft. (NAVD88)

SHEET 1 OF 3

T.O.C ELEVATION: 103.9 ft. (NAVD88) HOLE LOGGED BY: A. Warren REVIEWED BY: J. Vauk

												-	7	7		
	NOTES	DEPTH	& CORE ECOVERY	SILT	CLAY	FINES	SAND	GRAVEL			OISTURE DNTENT %	LABORATORY	VISUAL	EVATION	EOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
	ALL MEASUREMENTS ARE IN		° #	%	%	%	%	%	i i	E.	Ξŏ	0/ <u></u>	- 0/	Ξ	Ū	0.0 to 31.2 feet QUATERNARY ALLUVIUM (Qal)
	SURFACE. PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	_											SC			0.0 to 2.5 ft.: <u>CLAYEY SAND WITH</u> <u>ORGANIC FINES, SC</u> : About 60% fine sand; about 40% fines with medium plasticity and organic soil; trace of fine, elongated, flat, hard, angular gravel; maximum size: fine gravel; moist, brown; moderately soft consistency, soil is previouely disturbed
	LOCATION: Reach 4B1, river right, about 850 feet east of the center of the Eastside Bypass, north-side of the W. El Nido Road at its intersection with the Eastside Bypass levee.	_	91											98.8		<ul> <li>2.5 to 4.5 ft.: <u>SILTY SAND, SM</u>: About 70% fine to coarse sand; about 30% fines with low plasticity; maximum size: coarse sand; moist, tan; soft consistency; several clayey layers; cemented lens approximately 0.1- to 1-inch-thick.</li> </ul>
	DRILLED BY: PN-Regional Drill Crew Jerry Hansen, Driller Cody Kelly, Helper Ken Kreitz, Helper	_											SM			<ul> <li>4.5 to 7.6 ft.: <u>SILTY CLAYEY SAND</u>,</li> <li><u>SC/SM</u>: About 55% fine sand containing mica; about 45% fines with low plasticity; maximum size: fine sand; moist to wet, brown; soft consistency.</li> </ul>
	DRILL RIG: Central Mining Equipment 75 drill rig (CME-75)	_														Laboratory Data Interval 6.0 to 7.0 ft.
	DRILLING & SAMPLING METHODS: Drill hole MW-10-90 was advanced using hollow stem flight augers with a continuous dry core sampling system (FADC) from the ground	5—												96.8		<ul> <li>7.6 to 8.7 ft.: LEAN CLAY WITH SAND, (CL)s: About 85% fines with medium plasticity, low toughness, and slow dilatancy; about 15% fine sand; maximum size: fine sand; moist, dark brown with reddish brown;</li> <li>moderately firm consistency.</li> </ul>
	surface to a total depth of 31.2 feet. FADC uses 7-5/8-inch O.D., 4-1/4-inch I.D. hollow stem augers, with a 5-foot-long, 3-inch I.D. split sample barrel.	_											00/014		Qal	8.7 to 10.0 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 65% fines with medium plasticity, low toughness, and slow dilatancy; about 35% fine sand; maximum size: fine sand; moist, dark brown with reddish brown; moderately
	Interval Method 0.0 to 31.2 ft FADC			42.3	14.5	56.8	43.2	0.0	24.3	5.1	20.2	s(CL-ML)	SC/SM		Qui	firm consistency; percentage of sand increases with depth.
	DRILLER'S COMMENTS: 0.0 to 4.3 ft. smooth drilling, soft 4.3 to 8.7 ft. moved sampler out	_	100									94.3	-			9.0 to 10.0 ft. - 10.0 to 11.8 ft.: <u>SITY SAND, SM</u> : About
	0.2 ft. 8.7 to 13.7 ft. moved sampler out 0.2 ft. 13.7 to 18.7 ft. moved sampler in													93.7		80% fine sand containing mica; about 20% non-plastic fines; maximum size: fine sand; wet, brown; moderately firm consistency; percentage of sand increases with depth.
	18.7 to 31.2 ft. soft CAVING CONDITIONS: None	_											(CL)s			11.8 to 18.7 ft.: POORLY GRADED SAND, <u>SP:</u> About 95% fine to medium sand; about 5% non-plastic fines; maximum size: medium sand; wet, gray; soft consistency; percentage
	DRILL FLUID, RETURN AND COLOR:													92.6		of sand increases with depth.
ſ	0.0 to 8.7 ft. None 8.7 to 31.2 ft. Water, no return	_											s(CL)			<ul> <li>12.0 to 13.0 ft.</li> <li>18.7 to 23.7 ft.: CLAYEY SAND, SC: About</li> </ul>
SJRRP.GI	Not measured REASON FOR HOLE			38.2	27.7	65.9	34.1	0.0	31.0	15.8	17.2	s(CL)		91.3		45% fine sand (trace of medium sand); about 45% fines with medium to high plasticity; maximum size: medium sand; moist, brown; very firm consistency; stratified in 0.1- to
DATABASE:	TERMINATION: The hole was terminated upon successful completion to the target depth.	10—														0.3-foot-thick layers of +/-10% fines.     Laboratory Data Interval     22.0 to 23.0 ft.
PROJECT [	HOLE COMPLETION: Well Casing: +2.6 to 10.0 ft. (T.O.C. El. 103.9 ft.) Dual U-pack Screen: 10.0 to 25.0 ft. (Slotted 0.010-inch)	_	100										SM			<ul> <li>23.7 to 25.2 ft.: CLAYEY SAND, SC: About</li> <li>80% medium sand; about 20% fines with low plasticity; maximum size: medium sand; wet to moist, brown; firm consistency.</li> </ul>
DLE	Filter Pack: 9.0 to 31.2 ft. (#3 Sand) Sump: 25.0 to 27.0 ft. (2-inch blank													89.5		
EPORT: SJRRP DRILL HC	COMMENTS: FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile		0.D. G.S. b.g.s. T.O.C SJR =	= oute = Groi . = Bel C. = To = San	er diar und si low th op of v Joaqi	neter urface e grou well ca uin Riv	und su asing ver	rface			V C P	Vell completic Completion Di provided in att	n informat agram. We ached Mor	ion is   ell deve hitoring	orovide elopme g Well	ed in attached Well ent information is Development form. RECLAMATION
-					D ^		1 5/204	• I	01100	F 4 6			= MMM 10.00	n I		Managing Water in the West

**GEOLOGIC LOG OF DRILL HOLE NO. MW-10-90** SHEET 2 OF 3 PROJECT: San Joaquin River Restoration Program FEATURE: Groundwater Monitoring STATE: California COORDINATES: N 2,297,746.3 E 6,099,622.5 (NAGD83) GROUND SURFACE ELEVATION: 101.3 ft. (NAVD88) LOCATION: Reach 4B1, River Bank Right, North of Sand Slough Structure BEGUN: 4/17/10 FINISHED: 4/17/10 TOTAL DEPTH: 31.2 ft. T.O.C ELEVATION: 103.9 ft. (NAVD88) WATER LEVEL DEPTH AND ELEVATION: NA HOLE LOGGED BY: A. Warren DATE WATER LEVEL WAS MEASURED: NA REVIEWED BY: J. Vauk LABORATORY DATA VISUAL LABORATORY CLASSIFICATION UNIT CLASSIFICATION AND MOISTURE CONTENT % DEPTH GEOLOGIC U LIMU LIMIT PLASTICITY INDEX % CORE RECOVERY ELEVATION ELEVATION NOTES % GRAVEL % FINES PHYSICAL CONDITION % CLAY % SAND % SILT PVC with cap) Bentonite Seal: 2.0 to 9.0 ft. 25.2 to 31.2 ft.: SILTY CLAY, CL/ML: About 95% fines with low plasticity and toughness, Well Completion: Steel surface casing with locking top, square slow dilatancy; about 5% sand; moist, brown with reddish brown oxidation; firm 7.2 2.0 9.2 90.8 0.0 NP NP 19.0 SW-SM 100 consistency; contains mica, layers of (CL)s to s(CL) from 28.7 to 31.2 feet. 6-inches-wide and 5-foot-long. 88.3 Laboratory Data Interval 27.0 to 28.0 ft. T.D.= 31.2 ft. 15 SP

10 Qal 82.6 20 100 SC PROJECT DATABASE: SJRRP.GPJ 23.7 58.0 42.0 0.0 26.9 9.6 16.6 s(CL) 34.3 78.3 77.6 100 SC SJRRP DRILL HOLE COMMENTS: Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form. FADC = Flight Auger Dry Core O.D. = outer diameter NP = Non-plastic G.S. = Ground surface b.g.s. = Below the ground surface T.O.C. = Top of well casing NR = No Recovery NA = Not applicable REPORT: SJR = San Joaquin River I.D. = inner diameter RM = River Mile RECLAMATION Managing Water in the West DATE: 9/15/2010 SHEET 2 OF 3 DRILL HOLE MW-10-90

FEATURE: Groundwater Monitoring LOCATION: Reach 4B1, River Bank Right, North of Sand Slough Structure BEGUN: 4/17/10 FINISHED: 4/17/10 WATER LEVEL DEPTH AND ELEVATION: NA

DATE WATER LEVEL WAS MEASURED: NA

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-90

PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,297,746.3 E 6,099,622.5 (NAGD83) TOTAL DEPTH: 31.2 ft. STATE: California GROUND SURFACE ELEVATION: 101.3 ft. (NAVD88) T.O.C ELEVATION: 103.9 ft. (NAVD88) HOLE LOGGED BY: A. Warren REVIEWED BY: J. Vauk

SHEET 3 OF 3

					LABO	ORAT	ORY	DAT	۹ ۱		DRY TION			TION	/	INIT	
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATO			VISUAL	ELEVATION	GEOLOGIC U SYMBOL	PHYSICAL CONDITION
													s	SC			
	25-	100													76.1	-	_
	_	-															-
	-	-	62.5	32.4	94.9	5.1	0.0	34.0	12.9	23.1	CL					Qal	-
	-	-										73.3		CL/ML			_
	-	-															-
	30-	100															-
							F		M OF	HOLE					70.1		<u> </u>
								-									

COMMENTS:

FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile

O.D. = outer diameter G.S. = Ground surface b.g.s. = Below the ground surface T.O.C. = Top of well casing SJR = San Joaquin River Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.


MW-10-90	GEOLOGIST: A. WARREN
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 4/17/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2297746.3 E6099622.5 (NAD83) EL GROUND SURFACE ELEVATION 101.3	LEVATION 103.9' (NAVD88) ' (NAVD88)



### NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation #3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A1, River Bank Left, RM 169.0 BEGUN: 4/7/10 FINISHED: 4/7/10 WATER LEVEL DEPTH AND ELEVATION: NA DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,289,756.4 E 6,098,164.1 (NAGD83) TOTAL DEPTH: 29.8 ft.

STATE: California

GROUND SURFACE ELEVATION: 107.2 ft. (NAVD88) T.O.C ELEVATION: 109.9 ft. (NAVD88) HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

					LABO		ORY	DATA	۹ ۱	1	IRY TION	/	LION	/	′	ЦN	
NOTES	EPTH	RE ERY			6		Æ	LIMIT	, E D X	NT %	RATO		SUAL		NO	GIC UI IBOL	CLASSIFICATION AND
	ä	% COR	% SILT	% CLAY	% FINES	% SAND	% GRA\	LIQUID	PLASTI(	MOISTU	LABO CLASSI	ELEVAT	CLASSI	/	ELEVAT	GEOLO( SYM	PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND											/						0.0 to 29.8 feet QUATERNARY ALLUVIUM (Qal)
SURFACE. PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	_																0.0 to 4.3 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 55% fines with medium plasticity, toughness, and dry strength, slow dilatancy; about 45% fine sand; maximum size: fine sand; moist, dark brown, no reaction to HCI; soft consistency; roots in top 0.5 feet.
LOCATION: Reach 4B1, RM 169, river left, about																	Laboratory Data Interval 1.0 to 4.0 ft.
400 feet southwest from the center of the SJR, about 2,160 feet south-southwest of the Sand Slough Control Structure. DRILLED BY:	-												s(CL)				<ul> <li>4.3 to 5.3 ft.: <u>CLAYEY SAND, SC</u>: About</li> <li>65% fine to medium sand (mostly fine); abo</li> <li>35% fines with low plasticity and toughness no dry strength, rapid dilatancy; maximum size: medium sand: moist, dark brown, no</li> </ul>
PN-Regional Drill Crew Jerry Hansen, Driller Cody Kelly, Helper		54	25.7	31.8	57.5	42.5	0.0	30.4	14.1	18.2	s(CL)						reaction to HCI; soft consistency.
Ken Kreitz, Helper																	4.5 to 5.1 ft.
DRILL RIG: Central Mining Equipment 75 drill rig (CME-75) DRILLING & SAMPLING METHODS:	_																5.3 to 9.8 ft:: FAT CLAY, CH: About 90% fines with high plasticity, toughness, and dry strength, no dilatancy; about 10% fine sand; maximum size: fine sand; moist, brown, strong reaction to HCI; very firm consistency, nodules of calcium carbonate present.
Drill hole MW-10-91 was advanced using hollow stem flight augers with a continuous dry core sampling	_	-										103.2					Laboratory Data Interval
a continuous dry core sampling system (FADC) from the ground surface to a total depth of 29.8 feet.														102	2.9		9.8 to 10.0 ft.: <u>CLAYEY SAND, SC</u> : About
FADC Uses 7-5/8-Inch O.D., 4-1/4-inch I.D. hollow stem augers, with a 5-foot-long, 3-inch I.D. split sample barrel.			14.4	12.2	26.6	73.4	0.0	NP	NP	13.6	SM		sc				with low plasticity, no dry strength, rapid dilatancy; maximum size: medium sand; we brown, no reaction to HCl; soft consistency.
Interval Method 0.0 to 29.8 ft FADC	5											102.1		101	.9	Qal	10.0 to13.7 ft.: FAT CLAY, CH: About 90% fines with high plasticity, toughness, and dry
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 4.8 ft. smooth drilling,																	strength, no dilatancy; about 10% fine sand maximum size: fine sand; moist, brown, strong reaction to HCl; very firm consistency streaked with calcium carbonate.
4.8 to 8.9 ft. moderately soft to firm, moved sampler out to 0.3 ft.	-	-															<ul> <li><u>Laboratory Data Interval</u></li> <li>10.2 to 13.5 ft.</li> </ul>
8.9 to 12.3 ft. soft, moved sampler out 0.1 ft. 12.3 to 17.3 ft. soft, moved sampler out 0.1 ft. 17.3 to 29.8 ft. soft, moved sampler out 0.1 ft.																	13.7 to 15.9 ft.: <u>CLAYEY SAND, SC</u> : About 55% fine sand; about 45% fines with low plasticity, toughness, and dry strength, rapic dilatancy; maximum size: fine sand; moist, brown.
CAVING CONDITIONS: None	-															-	<ul> <li><u>Laboratory Data Interval</u></li> <li>13.9 to 15.7 ft.</li> </ul>
DRILL FLUID, RETURN AND COLOR: 0.0 to 12.3 ft. None 12.3 to 29.8 ft. Water, no return	_	100	26.8	43.6	70.4	27.1	2.5	35.6	19.3	21.0	(CL)s		СН				<ul> <li>15.9 to 16.9 ft.: <u>CLAYEY SAND. SC</u>: About 70% fine to coarse sand (mostly fine to medium); about 30% fines with low plasticity no dry strength, rapid dilatancy; maximum size: coarse sand, moist, brown, no reaction</li> </ul>
WATER LEVEL: Not measured																	to HCl; soft consistency.
REASON FOR HOLE TERMINATION: The hole was terminated upon successful completion to the target depth.	_	-															fines with high plasticity, toughness, and dry strength, no dilatancy; about 10% fine sand maximum size: fine sand; moist, brown, no strong reaction to HCI; soft consistency; gravel-sized calcium carbonate encountered from 17.3 to 19.8 ft.
												97.6					Laboratory Data Interval 17.1 to 19.6 ft.
		100											sc	97	7.4		
COMMENTS:			1			1	1	1	1	1	1			97	.2		
FADC = Flight Auger Dry Core NP = Non-plastic NB = No Recovery		O.D. G.S.	= oute = Gro	er diar und s	neter urface	ind st	irface			V	Vell cor Comple	npletio tion Dia	n inforr agram.	nation Well d	is p leve	rovide lopme Woll	ed in attached Well ent information is Development form
NP = Non-plastic       G.S. = Ground surface       Completion Diagram. Well development information is         NR = No Recovery       b.g.s. = Below the ground surface       provided in attached Monitoring Well Development form.         NA = Not applicable       T.O.C. = Top of well casing       big.s.         LD = inservicementer       SUB_S case heavier       big.s.															y		Bovolopmont torm.

SHEET 1 OF 3

FEATURE: Groundwater Monitoring LOCATION: Reach 4A1, River Bank Left, RM 169 BEGUN: 4/7/10 FINISHED: 4/7/10 WATER LEVEL DEPTH AND ELEVATION: NA DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,289,756.4 E 6,098,164.1 (NAGD83) TOTAL DEPTH: 29.8 ft.

STATE: California

GROUND SURFACE ELEVATION: 107.2 ft. (NAVD88) T.O.C ELEVATION: 109.9 ft. (NAVD88) HOLE LOGGED BY: J. Vauk

SHEET 2 OF 3

REVIEWED BY: A. Warren

						LABO	ORAT	ORY	DATA	1		Z	/	z		
	NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	IQUID LIMIT	PLASTICITY INDEX	AOISTURE CONTENT %	LABORATOR) CLASSIFICATIC	ELEVATION	VISUAL CLASSIFICATIO		CLASSIFICATION AND PHYSICAL CONDITION
	HOLE COMPLETION: Well Casing: +2.7 to 12.8 ft. (T.O.C. El. 109.9 ft.) Dual U-pack Screen: 12.8 to 27.8 ft. (Slotted 0.010-inch) Well Screen Filter Pack: 2/12 Sand Filter Pack: 7.5 to 29.8 ft. (#3 Sand) Sump: 27.8 to 29.8 ft. (2-inch blank PVC with cap) Bentonite Seal: 2.0 to 7.5 ft. Well Completion: Steel surface casing with locking top, square 6-inches-wide and 5-foot-long.	_	100	45.3	40.8	86.1	13.6	0.3	34.4	15.1	26.8	CL	/	СН		<ul> <li>19.8 to 20.4 ft.: <u>SILTY CLAY WITH SAND</u>, (<u>CL/ML)s</u>: About 85% fines with medium plasticity, low toughness and dry strength, and no dilatancy; about 15% fine sand; maximum size: fine sand; wet, brown, strong reaction to HCl; soft consistency.</li> <li><u>Laboratory Data Interval</u> 19.9 to 20.3 ft.</li> <li>20.4 to 27.9 ft.: <u>FAT CLAY, CH</u>: About 90% fines with high plasticity, toughness, and dry strength, no dilatancy; about 10% fine sand; maximum size: fine sand; moist, brown, no reaction to HCl; soft consistency.</li> </ul>
		_	100										93.7			Laboratory Data Interval 20.0 to 27.7 ft. 27.9 to 28.4 ft.: SILTY CLAY WITH SAND, (CL/ML)s: About 75% fines with medium plasticity, low toughness and dry strength, rapid dilatancy; about 25% fine sand; maximum size: fine sand; moist, brown, no reaction to HCl; soft consistency. 28.4 to 29.8 ft.: LEAN CLAY WITH SAND, (CL)s: About 80% fines with medium
		-	100											93.5	_	plasticity, toughness, and dry strength, no dilatancy; about 20% fine sand; maximum size: fine sand; moist, brown, no reaction to HCI; firm consistency.
		15—		• 31.5	14.2	45.7	54.3	0.0	NP	NP	21.0	SM		SC	Qal	1.D. = 29.8 π.
		_	96										91.5	91.3		_
		_	-											SC 90.3	_	
ASE: SJRRP.GPJ		_		48.9	30.9	79.8	20.2	0.0	31.2	12.4	28.5	(CL)s		СН		_
PROJECT DATAE		-											87.6			
			400											87.4	-	
REPORT: SJRRP DRILL HOLE	COMMENTS: FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile	<u> </u>	0.D. G.S. b.g.s. T.O.0 SJR :	= oute = Gro . = Be C. = To = San	er dian und su low th op of v Joaqu	neter urface e grou well ca uin Ri <sup>-</sup>	und su asing ver	Irface			V C P	Vell cc Comple provide	ompletio etion Dia ed in atta	n information is agram. Well de ached Monitori	s provi velopr ng We	ded in attached Well nent information is Il Development form.

	FEATURE: Groundwater Monitoring LOCATION: Reach 4A1, River Ban BEGUN: 4/7/10 FINISHED: 4/7/1 WATER LEVEL DEPTH AND ELEV/ DATE WATER LEVEL WAS MEASU	9 k Left, 0 ATION IRED:	RM 169 : NA NA	9			PROJE COORI TOTAL	CT: S DINAT DEPT	San Joa ES: N 'H: 29	aquin F N 2,289 .8 ft.	River Re 9,756.4	estoratio E 6,09	n Progra 18,164.1	am (NAGD83)	STATE GROUM T.O.C E HOLE L REVIE\	: California ND SURFACE ELEVATION: 107.2 ft. (NAVD88) ELEVATION: 109.9 ft. (NAVD88) LOGGED BY: J. Vauk WED BY: A. Warren
ŀ						LABO	ORAT	ORY	DATA	4		≻Z	/	z		
	NOTEO	王	≻						μ	≥	ш.%	ATOR' ICATIO	/ z	JAL ICATIO		CLASSIFICATION AND
	NOTES	DEP	% CORE	% SILT	% CLAY	% FINES	% SAND	% GRAVE				LABOR/ CLASSIFI		VISU CLASSIFI	SYMBG	PHYSICAL CONDITION
RILL HOLE PROJECT DATABASE: SJRRP.GPJ	COMMENTS:		92	34.9	42.4	73.5	26.5	0.0 0.0	30.3 29.6	12.1 12.5	30.8	(CL)s	79.5	(CL/ML)s 86.8 CH CL/ML)s 79.3 (CL/ML)s 78.8 (CL)s 77.4 n information is	Qal	
FPORT: SJRRP DRI	FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile		O.D. G.S. b.g.s. T.O.C SJR =	= oute = Gro = Bel 2. = To = San	er dian und su low th op of v Joaqu	neter urface e grou vell ca uin Rit	und su asing ver	ırface			P V	Vell cor Comple provided	npletio tion Dia 1 in atta	n information is agram. Well dev ached Monitoring	provid elopm g Well	ed in attached Well ent information is Development form. RECLAMATION
R					DA	TE: 9/	14/201	0	SHEE	Т 3 (	OF 3	DRIL	L HOLE	MW-10-91		Managing Water in the West

SHEET 3 OF 3

MW-10-91	GEOLOGIST: J. VAUK
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 4/07/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2289756.4 E6098164.1 (NAD83) ELL GROUND SURFACE ELEVATION 107.2	EVATION 109.9' (NAVD88) ' (NAVD88)



#### NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation #3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring LOCATION: Reach 4B1, River Bank Left, RM 169 BEGUN: 4/4/10 FINISHED: 4/4/10 WATER LEVEL DEPTH AND ELEVATION: NA DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,289,060.6 E 6,097,531.8 (NAGD83) TOTAL DEPTH: 28.5 ft.

STATE: California

GROUND SURFACE ELEVATION: 106.0 ft. (NAVD88) T.O.C ELEVATION: 107.4 ft. (NAVD88) HOLE LOGGED BY: J. Vauk

SHEET 1 OF 3

REVIEWED BY: A. Warren

					LABO		ORY	DATA	۹ ۱	1	R√ NOI		NOI	/	/	μ	
NOTES	FTH	ш. К					Ē	IMIT	Σ	RE 4T %	RATO FICAT	/ <u>v</u>	SUAL		NOI	BOL	CLASSIFICATION AND
	B	% COR	% SILT	% CLAY	% FINES	% SAND	% GRA\	LIQUID I	PLASTIC INDE)	MOISTU	LABO CLASSI	ELEVAT	CLASS	/	ELEVAT	GEOLO( SYM	PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND											· · ·						0.0 to 28.5 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	_	-											s(CL)				<ul> <li>0.0 to 2.0 ft.: <u>SANDY LEAN CLAY, s(CL)</u>: About 60% fines with high plasticity, low toughness and dry strength, and slow dilatancy; about 40% fine sand (trace of medium sand); maximum size: medium sand; dry to moist, brown, mostly strong reaction to HCI (zones with no reaction to HCI); soft</li> </ul>
Reach 4B1, RM 169, river left, about 1,800 feet southwest from the center of the SJR, about 3,370 feet south-southwest of the Sand Slough Control Structure.	-	01												10-	4.0		consistency. 2.0 to 2.5 ft.: LEAN CLAY, CL: About 95% fines with medium plasticity, toughness, and dry strength, no dilatancy; about 5% fine sand; maximum size: fine sand; moist, dark brown, no reaction to HCl
DRILLED BY: PN-Regional Drill Crew Jerry Hansen, Driller Cody Kelly, Helper Ken Kreitz, Helper		01											CL	10	3.5		2.5 to 3.5 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 60% fines with high plasticity, low toughness and dry strength, slow dilatancy; about 40% fine sand (trace of medium sand); maximum size: medium sand: drv to moist.
DRILL RIG: Central Mining Equipment 75 drill rig (CME-75)	-												s(CL)				<ul> <li>brown, mostly strong reaction to HCI (zones with no reaction to HCI); soft consistency.</li> </ul>
DRILLING & SAMPLING METHODS: Drill hole MW-10-92 was advanced using hollow stem flight augers with	_												CL	10: 10:	2.5 2.2		3.5 to 3.8 ft.: <u>LEAN CLAY, CL</u> : About 95% fines with medium plasticity, toughness, and dry strength, no dilatancy; about 5% fine sand; maximum size: fine sand; moist, dark brown, no reaction to HCI.
system (FADC) from the ground surface to a total depth of 28.5 feet. FADC uses 7-5/8-inch Q.D.			-										СН	10	01.7		3.8 to 4.3 ft.: FAT CLAY, CH: About 95% fines with high plasticity, toughness, and dry strength. no dilatancy: about 5% fine sand:
4-1/4-inch I.D. hollow stem augers, with a 5-foot-long, 3-inch I.D. split sample barrel.																	maximum size: fine sand; moist, strong reaction to HCl; hard nodules of calcium carbonate present.
Interval Method 0.0 to 28.5 ft FADC	5-															Qal	4.3 to 8.5 ft.: <u>LEAN CLAY, CL</u> : About 90% fines with medium plasticity and toughness, low dry strength no dilatancy: about 10% fine
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 4.3 ft. smooth drilling, moderately soft 4.3 to 8.5 ft. very soft moved																	to medium sand; maximum size: medium sand; moist, brown, strong reaction to HCI; firm consistency; sand-sized calcium carbonate.
sampler out to 0.4 ft. 8.5 to 13.5 ft. soft to very firm, add catcher		100	39.3	52.7	91.0		0.0	42.4	23.7	23.8	C		C				<u>Laboratory Data Interval</u> 4.5 to 8.3 ft.
13.5 to 18.5 ft. moved sampler out 0.2 ft. 18.5 to 28.5 ft. soft			30.3	52.7	31.0	3.0	0.0	42.4	23.7	23.0							8.5 to 8.9 ft.: <u>SANDY LEAN CLAY, s(CL)</u> : About 65% fines with low plasticity, toughness, and dry strength, no dilatancy; about 35% fine to coarse sand; maximum size: coarse sand; wet brown on reaction to.
Soil caved from the borehole wall from 27.2 to 28.5 ft.																	<ul> <li>HCI; soft consistency.</li> <li>8.9 to 9.9 ft.: SILTY SAND, SM: About 70%</li> </ul>
DRILL FLUID, RETURN AND COLOR: 0.0 to 13.5 ft. None 13.5 to 28.5 ft. Water, no return	_	_															fine to coarse sand, coarse sand is hard and sub-angular; about 30% fines with low plasticity, toughness and dry strength, and rapid dilatancy; maximum size: coarse sand; wet, brown, no reaction to HCI; soft
کة <b>WATER LEVEL:</b> Not measured												97.7	-	0	7.5		consistency. Laboratory Data Interval
Mathematical Structure       REASON FOR HOLE         Mathematical Structure       The hole was terminated upon													s(CL)	9	7.5		9.0 to 9.8 ft. 9.9 to 10.8 ft.: <u>CLAYEY SAND, SC</u> : About
depth.	-	90	24.8	4.7	29.5	70.3	0.2	19.8	2.8	10.3	SM		SM	9	7.1		80% fine to coarse sand, coarse sand is sub-angular and hard; about 20% fines with low plasticity, toughness, and dry strength, rapid dilatancy; maximum size: coarse sand; wet, brown, no reaction to HCl; soft consistency.
щ												96.2		9	6.1		
FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter		O.D. G.S. b.g.s. T.O.C SJR :	= oute = Gro . = Be C. = To = San	er diar und s low th op of s Joag	neter urface e grou well ca uin Ri <sup>i</sup>	und su asing ver	irface			, C	Vell co Comple provide	mpletio tion Dia d in atta	n infor agram. ached l	matior Well ( Monito	n is p deve oring	orovid lopm Well	ed in attached Well ent information is Development form.
RM = River Mile			Г					0						0.00	1		RECLAMATION Managing Water in the West

FEATURE: Groundwater Monitoring LOCATION: Reach 4B1, River Bank Left, RM 169 BEGUN: 4/4/10 FINISHED: 4/4/10 WATER LEVEL DEPTH AND ELEVATION: NA DATE WATER LEVEL WAS MEASURED: NA PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,289,060.6 E 6,097,531.8 (NAGD83) TOTAL DEPTH: 28.5 ft. STATE: California

GROUND SURFACE ELEVATION: 106.0 ft. (NAVD88) T.O.C ELEVATION: 107.4 ft. (NAVD88) HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

SHEET 2 OF 3

												1		1			
						LABO	ORAT	ORY	DATA	4		×NO		NO	/	⊨	
	NOTEO	王	⊢ ×					Ι.	Ŧ	≻	%	CATI	/ z	CATI	z	L C	CLASSIFICATION AND
	NOTES	DEP	VER	_	≽	BS	₽	AVEI		ΞÄ	ENT	SIFL	ATIO		ATIO	MBC MBC	PHYSICAL CONDITION
				SIL	CLA	N L	SAN	GRV	guit	LAS DD	OISI	LAB	/ Å		-EV	SY	
			<u> </u>	%	%	%	%	%	5	₫	Ξŏ	<u> </u>		- 0/	Π	Ū	
	Well Casing: +1.4 to 10.2 ft. (T.O.C.																<b>SP:</b> About 95% fine to coarse sand (mostly
	El. 107.4 ft.) Dual U-pack Screen: 10.2 to 25.2 ft.													SC			coarse), coarse sand is sub-angular, hard, and contains guartz and feldspar; about 5%
	(Slotted 0.010-inch) Well Screen Filter Pack: 2/12 Sand														05.0		non-plastic fines with rapid dilatancy;
	Filter Pack: 9.4 to 27.2 ft. (#3 Sand)														95.2		no reaction to HCI; soft consistency; greater
	PVC with cap)	-	90											-			<ul> <li>percentage of fine sand with depth.</li> </ul>
	Bottom Backfill: 27.2 to 28.5 ft. (soil caved from borehole wall)																Laboratory Data Interval 11.0 to 13.3 ft.
	Bentonite Seal: 2.0 to 9.4 ft.																13.5 to 23.5 ft - No Pecovery - POOPLY
	casing with locking top, square																GRADED SAND WITH SILT, SP/SM:
	6-inches-wide and 5-foot-long.	-	-														<ul> <li>Description is based on soil collected in the</li> <li>shoe and drilling conditions.</li> </ul>
				4.8	2.7	7.5	91.9	0.6	NP	NP	10.5	SW-S	М	SP			23.5 to 25.2 ft.: SILT WITH SAND. (ML)s:
																	About 80% fines with medium plasticity, low
																	dilatancy; about 20% fine sand; maximum
																	size: fine sand; wet, light brown, no reaction to HCl; firm consistency.
		-	1														Laboratory Data Interval
													92.7	-			23.7 to 25.0 ft.
															92.5		25.2 to 25.6 ft.: SILTY SAND, SM: About
																	non-plastic fines with rapid dilatancy;
		-	-														<ul> <li>maximum size: medium sand; wet, medium</li> <li>brown, no reaction to HCl; soft consistency.</li> </ul>
																	25.6 to 26.4 ft SILT WITH SAND (MI)s
																	About 85% fines with medium plasticity, low
																	dilatancy; about 15% fine sand; maximum
																	size: fine sand; light brown, no reaction to HCI: hard consistency.
		15-	1													Qal	26 4 to 28 5 ft - No Pecovery-SILTY SAND
																	<u>SM:</u> Description is based on soil collected in
																	the shoe and drilling conditions.
																	T.D. = 28.5 ft.
		-	0														_
																	_
ЗРJ																	
RP.0		-	1														_
SJI																	
BASE			<u> </u>											SP/SM			
DATA																	
ECT I		_	4														_
PROJ																	
-																	
щ																	
HOL	COMMENTS:					I		I	I	I	I	1		1		<u> </u>	
JRILL	FADC = Flight Auger Dry Core		0.D.	= oute	er diar	neter					٧	Vell co	mpletio	n informatio	on is	provide	ed in attached Well
RRP I	NP = Non-plastic NR = No Recovery		G.S.: b.a.s	= Gro	und si low th	urface e arou	und su	Irface			( r	Comple	tion Dia d in att	agram. Wel	I devi	elopme a Well	ent information is Development form
L: SJI	NA = Not applicable		T.O.C	C. = To	op of v	vell ca	asing				٢					,	
PORT	RM = River Mile		SJR =	= San	Joadi	un Ri	ver										RECI AMATION
R				Г		<b>TE</b> -			0	<b>T</b> 0	<b>NF</b> 6	DE		-			Managing Water in the West

WATER LEVEL DEPTH AND EI DATE WATER LEVEL WAS ME	EVATION ASURED:	NA NA						20						HOLE	LOGGED BY: J. Vauk WED BY: A. Warren
					LABO	ORAT	ORY	DAT	A 	-	RY TION			ЦN	
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATC CLASSIFICA	ELEVATION	VISUAL CLASSIFICA'	GEOLOGIC U	PHYSICAL CONDITIO
	-	0											SP/SM		-
	-														
	-														-
													82.5	_	
	-		53.7	19.6	73.3	26.7	0.0	23.4	5.4	19.9	(CL-M	L)s	(ML)s	Qal	_
	25 <del>-</del>											81.0	80.8		-
													SM 80.4	_	
	-	- 58											(ML)s 79.6	_	_
	_	-													_
													SM		
	-	-													_
	L	<u>I</u>	<u>I</u>	<u>I</u>	<u>I</u>	<u>I</u>	I E	i Botto	I M OF I	I HOLE	<u> </u>		1 77.5		<u> </u>
COMMENTS:															

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DATE: 9/14/2010 SHEET 3 OF 3 DRILL HOLE MW-10-92 RECLAMATION Managing Water in the West

MW-10-92	GEOLOGIST: J. VAUK
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 4/04/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2289060.6 E6097531.8 (NAD83) EL GROUND SURFACE ELEVATION 106.0	EVATION 107.4' (NAVD88) ' (NAVD88)



#### NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation #3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank BEGUN: 4/3/10 FINISHED: 4/3/1 WATER LEVEL DEPTH AND ELEV/ DATE WATER LEVEL WAS MEASU	9 Right, 0 ATION IRED:	RM 16 : 9.3 f 4/17/2	<b>G</b> 8.9 t. b.g.s	EOI	LOG 6.1 ft.)	PROJE COORI	OG CT: S DINAT . DEPT	OF San Joa ES: 1 H: 26	<b>DRI</b> aquin R N 2,288 5.5 ft.	<b>LL I</b> tiver Re	HOLE estoration E 6,096	Progra 5,811.9	am (NAGD83)	<b>)-9:</b> כי ד א R	<b>3</b> GROUN C.O.C E IOLE L REVIEV	SHEET 1 OF 3 California ID SURFACE ELEVATION: 105.4 ft. (NAVD88) LEVATION: 108.5 ft. (NAVD88) OGGED BY: J. Vauk VED BY: A. Warren
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	LABC	ORAT	ORY 884VEL %	DATA	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL CLASSIFICATION	ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE. PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well. LOCATION: Reach 4B1, RM 169, river left, about 2,450 feet southwest from the center of the SJR, about 4,000 feet south-southwest of the Sand Slough Control Structure. DRILLED BY: PN-Regional Drill Crew Jerry Hansen, Driller Cody Kelly, Helper Ken Kreitz, Helper Ken Kreitz, Helper SDRILL RIG: Central Mining Equipment 75 drill rig (CME-75) DRILLING & SAMPLING METHODS: Drill hole MW-10-93 was advanced using hollow stem flight auroers with	-	43	25.9	25.3	51.2	48.8	0.0	27.5	11.2	16.7	s(CL)		CH/SC			O.0 to 26.5 feet QUATERNARY ALLUVIUM (Qal)     O.0 to 4.4 ft.: <u>SANDY FAT CLAY, CH/SC</u> : About 50% fines with high plasticity, low toughness, medium dry strength, slow dilatancy; about 50% fine sand; maximum size: fine sand; dry to moist, dark brown to black, no reaction with HCl; soft to firm consistency. <u>Laboratory Data Interval</u> 1.0 to 4.2 ft. <b>4.4 to 7.6 ft.: <u>SANDY LEAN CLAY, s(CL)</u>: About 70% fines with medium plasticity, toughness, and dry strength, no dilatancy; about 30% fine sand; maximum size: fine sand; moist, light brown, strong reaction with HCl and veins of calcium carbonate; firm consistency.     <u>Laboratory Data Interval</u> 4.6 to 8.0 ft.     <b>7.6 to 8.5 ft.: <u>LEAN CLAY, CL</u>:</b> About 90% fines with medium plasticity, toughness, and dry strength, no dilatancy; about 10% fine sand; maximum size: fine sand; moist, light brown, no reaction with HCl; firm consistency </b>

101.2

s(CL)

97.4

SP-SM

CL

s(CL)

SP/SM

104.1

Qal

8.5 to 9.0 ft.: SANDY LEAN CLAY, s(CL):
About 60% fines with medium plasticity, low
toughness and dry strength, rapid dilatancy;
about 40% fine sand with a trace of medium
sand; maximum size: medium sand; moist,
light brown, no reaction with HCI; firm
consistency.

3

9.0 to 19.0 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to medium sand; about 10% non-plastic fines with rapid dilatancy; maximum size: medium sand; wet, light brown, no reaction with HCl; soft consistency; no recovery from 14.0 to 19.0 ft. but traces of SP/SM and SM were found in sample barrel.

Laboratory Data Interval 9.2 to 13.8 ft.

19.0 to 23.6 ft.: SILTY SAND, SM: About 75% fine to medium sand: about 25% non-plastic fines with rapid dilatancy; maximum size: medium sand; wet, light brown, no reaction with HCI; soft consistency.

Laboratory Data Interval 19.2 to 23.4 ft.

23.6 to 26.2 ft.: <u>LEAN CLAY WITH SAND</u>, (<u>CL)s</u>: About 75% fines with medium plasticity, low toughness and dry strength, and no dilatancy; about 25% fine sand; maximum size: fine sand; moist, light brown, no reaction with HCl; firm consistency.

Laboratory Data Interval 23.8 to 26.0 ft.

26.2 to 26.5 ft .: SILTY SAND, SM: About 75% fine to medium sand; about 25% non-plastic fines with rapid dilatancy; maximum size: medium sand; wet, brown, no reaction with HCI; soft consistency.

T.D. = 26.5 ft.

COMMENTS:

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a continuous dry core sampling system (FADC) from the ground

surface to a total depth of 26.5 feet.

FADC uses 7-5/8-inch O.D., 4-1/4-inch I.D. hollow stem augers, with a 5-foot-long, 3-inch I.D. split

DRILLING CONDITIONS AND DRILLER'S COMMENTS:

0.0 to 4.2 ft. smooth drilling, soft 4.2 to 9.0 ft. moved sampler out

9.0 to 14.0 ft. moved sampler out 0.1 ft., wet, add water

14.0 to 19.0 ft. firm 19.0 to 26.5 ft. moved sampler out

CAVING CONDITIONS:

DRILL FLUID, RETURN AND COLOR: 0.0 to 9.0 ft. None

9.0 to 26.5 ft. Water, no return

The hole was terminated upon

successful completion to the target

5

35.1 33.5 68.6 31.4 0.0 35.2 21.6 19.7 s(CL)

100

28

sample barrel.

0.2 ft.

0.1 ft.

WATER LEVEL:

9.3 ft. b.g.s. on 4/7/2010

REASON FOR HOLE TERMINATION:

None

SJRRP.GP.

PROJECT DATABASE:

HOH

SJRRP DRILL

REPORT:

depth.

Interval Method 0.0 to 26.5 ft. - FADC

FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile

O.D. = outer diameter G.S. = Ground surface

b.g.s. = Below the ground surface T.O.C. = Top of well casing

SJR = San Joaquin River

Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.

97.8

96.9

96.4





FEATURE: Groundwater Monitorin LOCATION: Reach 4A, River Bank BEGUN: 4/3/10 FINISHED: 4/3/ WATER LEVEL DEPTH AND ELEV DATE WATER LEVEL WAS MEASI	g Right, 10 ATION	RM 16 : 9.3 f 4/17/2	8.9 t. b.g.s	5 (El. 96	5.1 ft.)	PROJE COORI TOTAL	DINAT	OF San Joa ES: N H: 26	<b>DRI</b> aquin R N 2,288 .5 ft.	River Re 3,314.4	<b>TOLE</b> estoratio E 6,09	<b>E NO</b> n Progra 96,811.9	am (NAGD83) (	STATE GROU T.O.C I HOLE REVIE	SHEET 2 OF 3 California ND SURFACE ELEVATION: 105.4 ft. (NAVD88) ELEVATION: 108.5 ft. (NAVD88) LOGGED BY: J. Vauk WED BY: A Warren
					LAR				<u>```</u>		7		- /		
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL			MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL CLASSIFICATION ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
HOLE COMPLETION: Well Casing: +3.1 to 8.5 ft. (T.O.C. El. 108.5 ft.) Dual U-pack Screen: 8.5 to 23.5 ft. (Slotted 0.010-inch) Well Screen Filter Pack: 2/12 Sand Filter Pack: 8.0 to 25.5 ft. (2-inch blank PVC with cap) Bottom Backfill: 25.5 to 26.5 ft. (Bentonite) Bentonite Seal: 2.0 to 8.0 ft. Well Completion: Steel surface casing with locking top, square 6-inches-wide and 5-foot-long.		28	4.8	2.5	7.3	92.7	0.0	NP	NP	20.1	SP-SM	91.6	SP/SM 86.4 SM	Qal	
COMMENTS: FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile	•	O.D. G.S. b.g.s. T.O.C SJR =	= oute = Gro = Be 2. = Te = San	er diar und su low th op of v Joaqu	neter urface e grou well ca uin Ri	und su asing ver		QUEE	T 2 (	V C P	Vell cor Complet provideo	npletio tion Dia d in atta	n information is agram. Well dev ached Monitoring	provic elopm g Well	ded in attached Well ent information is Development form. RECLAMATION Managing Water in the West

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Righ												-		
WATER LEVEL DEPTH AND ELEVATIO DATE WATER LEVEL WAS MEASURED	DN: 9.3 D: 4/17/2	8.9 ft. b.g.s 2010	s (El. 96	6.1 ft.)	COORI TOTAL	DINATI DEPT	San Joa ES: N H: 26	aquin R N 2,288 .5 ft.	River Re 1,314.4	estoration Prog E 6,096,811.	ram 9 (NAGD83)	S G T H R	GTATE: GROUN CO.CE IOLEL	: California ND SURFACE ELEVATION: 105.4 ft. (NAVD88) ELEVATION: 108.5 ft. (NAVD88) LOGGED BY: J. Vauk WED BY: A. Warren
				LABO	ORAT	ORY	DATA	۹.		, z	z	/		
NOTES	% CORE	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATIO CLASSIFICATIO	VISUAL	ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
	100	19.4	6.8	26.2	73.8	0.0	NP	NP	20.5	SM	SM			-
														-
										82.0			Qal	-
										62.0		31.8		
		-												_
26		62.3	12.4	74.7	25.3	0.0	23.3	4.9	21.4	(CL-ML)s	(CL)s			
20	100													
	-									79.4		79.2		
											SM	78.9		
						B	OTTO	M OF I	HOLE					

REPORT: SJRRP DRILL HOLE PROJECT DATABASE: SJRRP.GPJ

#### COMMENTS:

FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter RM = River Mile

O.D. = outer diameter G.S. = Ground surface b.g.s. = Below the ground surface T.O.C. = Top of well casing SJR = San Joaquin River Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.

> RECLAMATION Managing Water in the West

DATE: 9/14/2010 SHEET 3 OF 3 DRILL HOLE MW-10-93

MW-10-93	GEOLOGIST: J. VAUK								
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN								
DATE COMPLETED: 4/03/2010	HELPER: C. KELLY, K. KREITZ								
DATE COMPLETED:     4/03/2010     HELPER:     C. KELLT, K. KREITZ       TOP OF WELL CASING COORDINATES:     N2288314.4 E6096811.9 (NAD83) ELEVATION 108.5' (NAVD88)       GROUND SURFACE ELEVATION 105.4' (NAVD88)									



#### NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation #3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left BEGUN: 5/1/10 FINISHED: 5/1/10 WATER LEVEL DEPTH AND ELEVATION: NA DATE WATER LEVEL WAS MEASURED. NA

REPORT:

RM = River Mile

PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,262,126.4 E 6,111,217.2 (NAGD83) TOTAL DEPTH: 28.6 ft.

STATE: California

SHEET 1 OF 2

GROUND SURFACE ELEVATION: 116.9 ft. (NAVD88) T.O.C ELEVATION: 120.0 ft. (NAVD88) HOLE LOGGED BY: J. Vauk

					LABO	ORAT	ORY	DAT	۹.		×NO		NO	/	F	
NOTES	TH H	~						μ	≥	ш%	ATOF	/ z	UAL ICATI	/ z		CLASSIFICATION AND
NOTES	DEF	CORE	5	LAY	INES	AND	RAVE	חמר	STICI	STUR	ABOR	VATIO	ASSIF	VATIO	OLOG SYMB	PHYSICAL CONDITION
		REC	S %	% C	% F	s %	9 %	LIQ	PLA	<b>D</b> O NO NO NO NO NO NO NO NO NO NO NO NO NO	/ <sup>5</sup> ۲	ELE	5	ELE	GEO	
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND																0.0 to 28.6 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE																0.0 to 2.7 ft.: <u>SILTY CLAY, CL/ML</u> : About
To recover core, collect data to determine geologic and hydrologic	-															and dry strength, no dilatancy; about 10% fine sand: maximum size: fine sand: dry. dark
site conditions, and install a groundwater monitoring well.													CL/ML			brown, no reaction to HCl; soft consistency; organics in top 0.5 feet.
LOCATION: Reach 44 river left, about 250 feet	-	73														- 2.7 to 4.6 ft.: <u>SANDY SILT, s(ML)</u> : About
northwest from the center of the SJR, about 4.500 feet southeast of														114.2		about 40% fine sand; maximum size: fine sand; drv. light brown, no reaction to HCI: soft
the intersection of Island Road and Emory Road.	-															consistency.
DRILLED BY:																Laboratory Data Interval 2.7 to 5.6 ft.
PN-Regional Drill Crew Jerry Hansen, Driller Cody Kelly, Helper													s(ML)			<b>4.6 to 5.6 ft.: <u>SILTY SAND, SM</u>:</b> About 75%
Ken Kreitz, Helper	-	1	21.5	10.0	31.5	68.5	0.0	NP	NP	2.2	SM					rapid dilatancy; maximum size: fine sand; dry, light brown no reaction to HCI: soft
DRILL RIG: Central Mining Equipment 75 drill rig														112.3		consistency.
(CME-75)	5-	1											SM			5.6 to 8.6 ft.: <u>POORLY GRADED SAND</u> <u>WITH SILT, SP/SM</u> : About 90% fine to
DRILLING & SAMPLING METHODS: Drill hele MW 10 199 was advanced												111.3		111.3		medium sand; about 10% non-plastic fines with rapid dilatancy; maximum size: medium
using hollow stem flight augers with	-															consistency, loose; moist from 8.0 to 8.6 ft.
system (FADC) from the ground surface to a total depth of 28.6 feet.		69														Laboratory Data Interval 5.6 to 8.6 ft.
FADC uses 7-5/8-inch O.D., 4-1/4-inch I.D. hollow stem augers,																8.6 to 14.4 ft.: POORLY GRADED SAND,
with a 5-foot-long, 3-inch I.D. split sample barrel.	-	1	6.7	2.1	8.8	91.2	0.0	NP	NP	12.9	SP-SM		SP/SM			<ul> <li><u>SP:</u> About 95% fine to medium sand; about 5% non-plastic fines with rapid dilatancy;</li> </ul>
Interval Method 0.0 to 28.6 ft FADC															Qal	reaction to HCl; soft consistency.
DRILLING CONDITIONS AND	-															<ul> <li><u>Laboratory Data Interval</u></li> <li>8.6 to 14.4 ft.</li> </ul>
DRILLER'S COMMENTS: 0.0 to 8.6 ft. smooth drilling, soft												108.3		108.3		14.4 to 17.3 ft.: LEAN CLAY WITH SAND,
8.6 to 13.6 ft. very soft and wet 13.6 to 28.6 ft. soft	-															(CL)S: About 85% tines with medium to high plasticity, medium toughness and dry strength po dilatancy: about 15% fine sand;
CAVING CONDITIONS: Soil caved from the borehole wall at																maximum size: fine sand; moist, medium brown, no reaction to HCI: firm consistency.
14.6 to 15.6 ft.	10-	4														Laboratory Data Interval
COLOR: 0.0 to 8.6 ft. – None																17.3 to 18.6 ft.: SANDY LEAN CLAY, s(CL):
8.6 to 28.6 ft. – Water, no return																About 70% fines with medium plasticity, toughness, and dry strength, rapid dilatancy;
WATER LEVEL: Not measured	-	4														<ul> <li>about 30% fine to medium sand; maximum size: medium sand; moist, medium brown, no</li> </ul>
REASON FOR HOLE			4.5	0.6	5.1	94.9	0.0	NP	NP	25.2	SP-SM		SP			reaction to HCI.
The hole was terminated upon successful completion to the target	-															<ul> <li>60% fine to medium sand; about 40% fines</li> <li>with medium plasticity, low toughness and dry</li> </ul>
depth.																strength, rapid dilatancy; maximum size: medium sand; moist, brown, no reaction to
HOLE COMPLETION: Well Casing: +3.1 to 8.6 ft. (T.O.C.	-															HCl; firm consistency.
EI. 120.0 ft.) Dual U-pack Screen: 8.6 to 13.6 ft.																Laboratory Data Interval 18.6 to 20.2 ft.
Well Screen Filter Pack: 2/12 Sand Filter Pack: 7 0 to 14 6 ft (#3 Sand)																20.2 to 23.6 ft.: <u>No Recovery</u> .
Sump: 13.6 to 14.6 ft. (2-inch blank PVC with cap)	-	100										102.5		102.5		_
Bottom Backfill: 15.6 to 28.6 ft. (Bentonite)		100														
Bottom Backtill: 14.6 to 15.6 ft. (Soil COMMENTS:																
FADC = Flight Auger Dry Core		O.D.	= oute	er diar	meter					V	Vell con	npletio	n informati	on is j	orovid	ed in attached Well
NP = Non-plastic NR = No Recovery		b.g.s.	= Gro	low th	urrace le groi	und su	urface			Ę	provided	ion Dia in atta	agram. we ached Mon	itoring	g Well	Development form.
I.D. = inner diameter		SJR =	∍. = 1 = San	up or Joaq	well ca uin Ri	asing ver										

DATE: 9/14/2010 SHEET 1 OF 2 DRILL HOLE MW-10-188



FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left BEGUN: 5/1/10 FINISHED: 5/1/10 WATER LEVEL DEPTH AND ELEVATION: NA DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program COORDINATES: N 2,262,126.4 E 6,111,217.2 (NAGD83) TOTAL DEPTH: 28.6 ft.

STATE: California

SHEET 2 OF 2

GROUND SURFACE ELEVATION: 116.9 ft. (NAVD88) T.O.C ELEVATION: 120.0 ft. (NAVD88) HOLE LOGGED BY: J. Vauk

REVIEWED BY: A. Warren

							ORY	DATA	۹ ۱		ZO		NO	/	Ę	
	王	≻						Ę	≻	%	CATO	/ z	CAT	/ z	L C	CLASSIFICATION AND
NOTES	DE	VER		>	S	<u> </u>	AVEI		ΠÖΥ	IN THE	SIFI	/ I	ISI/	VTI0	MBC	PHYSICAL CONDITION
			SIL	CLA	N I	SAN	GR/		IND AST	LSIO	LAB	/ Å		EV4	SY SY	
		<u>ي ج</u>	%	%	%	%	%	5	₫	Ξŏ	<u> </u>	Ē		Π	ō	
caved from the borehole wall) Bentonite Seal: 2.0 to 7.0 ft.																23.6 to 24.1 ft.: <u>CLAYEY SAND, SC</u> : About 60% fine to medium sand; about 40% fines
Well Completion: Steel surface																with medium plasticity, low toughness and dry
6-inches-wide and 5-foot-long.	_		52.0	25.7	77.7	22.3	0.0	30.8	15.4	22.3	(CL)s		(CL)s			medium sand; moist, brown, no reaction to
		100														HCl; firm consistency.
																24.1 to 28.6 ft.: LEAN CLAY, CL: About
																toughness and dry strength, no dilatancy;
												99.6		99.6		about 10% fine sand; maximum size: fine sand; moist, light brown, no reaction to HCI;
																firm consistency.
													c(CL)			Laboratory Data Interval
	-	1											S(CL)			- 24.1 to 28.6 ft.
														98.3		T.D.= 28.6 ft.
															]	
	-	1														–
			29.6	10.4	40.0	60.0	0.0	NP	NP	15.3	SM		SC			
	20-	1										96.7		96.7		—
	-	38														—
															Qal	
	-	{											No Rec			_
	-	-														_
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			1										80	93.3		
	-	-											30	92.8		_
	25-	-														<b>—</b>
	-	100														_
			51.8	24.1	75.9	24.1	0.0	24.6	9.7	22.1	(CL)s		CL			
2																
0. 0.	-	-														_
SOR Solution																
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АТАВ	-	-														_
ROLE		1	1	1			l B	I BOTTO	M OF	HOLE	1	91.4	1	91.4		
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				or all -	nct					,	Noll ac	nnlotic	n informa	tion in	oroviel	ad in attached Well
ה האסט = Flight Auger Dry Core NP = Non-plastic		0.D. G.S.	= oute = Gro	und s	urface	•				(	Comple	tion Dia	agram. We	ell dev	elopm	ent information is
NR = No Recovery		b.g.s.	. = Ве С = т	low th	e groi	und su	irface			Ŗ	orovideo	d in atta	ached Mo	nitoring	g Well	Development form.
I.D. = inner diameter		SJR	= San	Joaq	uin Ri	ver										
			Г		<b>TC</b> (			0	<b>T</b> -	0.5 -			-			RECLAMATION

#### COMMENTS:



MW-10-188	GEOLOGIST: J. VAUK							
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN							
DATE COMPLETED: 5/01/2010	HELPER: C. KELLY, K. KREITZ							
TOP OF WELL CASING COORDINATES: N2262126.4 E6111217.2 (NAD83) E GROUND SURFACE ELEVATION 116.9	ELEVATION 120.0' (NAVD88) ' (NAVD88)							



### NOT TO SCALE

NOTES: T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation #3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, Merced County BEGUN: 11/19/10 FINISHED: 11/19/10 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 6.70 ft. (- 724.3 ft. - 12/09/2010 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,276,117.6 E 6,089,808.7 NAD83 TOTAL DEPTH: 31.1 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 108.1 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: G. Perea REVIEWED BY: S. Dalton

				LAB	ORA	TOF	RY D	ΑΤΑ	1	Re		IQUAL LIQU	Λ	
NOTES	DEPTH	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	CLASSIFICAT CLASSIFICAT	GEOLOGIC UNIT SYMBOL	CLASSIFICAT	/ =1.	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE												(ML)s <sub>107</sub>	.8	0.0 to 31.1 ft. QUATERNARY ALLUVIUM - Qal
<b>PURPOSE OF HOLE:</b> To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	92										(CL)s	- .1	0.0 to 0.3 ft. <u>SILT WITH SAND, (ML)s</u> : About 80% fines with low plasticity, low toughness; about 20% fine sand; dry, tan; lightly cemented.
<b>LOCATION:</b> Reach 4A, River Bank Left, Merced County, at the intersection of Palm Avenue and Roxbury Road, about 30 ft. south and 5 ft. east of intersection.	-		43.2	32.5	24.3	0.0	44.3	26.3	21.6	(CL)s 104.6		(CH)s	_	0.3 to 2.0 ft. <u>LEAN CLAY WITH SAND</u> , (CL)s: About 75% fines with medium plasticity, low to medium toughness; about 25% fine sand; dry, brown to dark brown; trace toots; broken up from drilling activity.
DRILLED BY: Bureau of Reclamation: PN Region drill crew: Gerry Hansen, driller Chris Peterson, helper Dennis Read, helper	- 5-											s(CL)	<u>.1</u>	2.0 to 4.0 ft. <u>FAT CLAY WITH SAND, (CH)s</u> : About 75% fines with medium to high plasticity, medium toughness; about 25% fine sand; dry to moist, dark brown; interbedded with (ML)s.
DRILL RIG: Truck mounted Central Mining Equipment (CME) 75	-	94									_	102	<u></u> –	Lab Data Interval 3.0 to 3.5 ft.
<b>DRILLING &amp; SAMPLING METHODS:</b> The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was	-		12.5	45.2	42.3	0.0	NP	NP	19.4	s(ML) 100.9	Ţ	s(ML) 100 SM	<u>.9</u>	4.0 to 6.1 ft. <u>SANDY LEAN CLAY, s(CL)</u> : About 65% fines with low plasticity; about 35% fine sand; moist to wet, olive tan; disturbed by drilling action; layered about 0.5 inch thick, interbedded with (CH)s described in previous
performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers.	 10											99	<u>.7</u> _	interval. 6.1 to 7.2 ft. <u>SANDY SILT, s(ML)</u> : About 55% fines with low plasticity; about 45% fine sand; wet, orange brown; medium firm. <u>Lab Data Interval</u> 6.1 to 7.2 ft.
Interval Method 0.0 to 31.1 ft. FADC	_	64	28.2	65.4	6.4	0.0	26.7	6.7	20.3	CL-ML		97 ML	<u>-</u>	7.2 to 8.4 ft. <u>SILTY SAND, SM</u> : About 70% fine sand; about 30% fines with medium plasticity; wet, orange brown; micaceous; moderate soft to firm.
COMMENTS: 0.0 to 3.8 ft Soft 3.8 to 8.6 ft Moderate soft 8.6 to 13.6 ft Add water, catcher with nylon, moderate firm 13.6 to 18.6 ft Very firm	-									96.1		95 SP-SM	<u>8</u>	8.4 to 10.7 ft. <u>POORLY GRADED SAND</u> <u>WITH SILT, SP-SM</u> : About 90% fine to medium sand; about 10% non plastic fines; wet, orange brown; soft; homogenous.
<ul> <li>18.6 to 31.1 ft Catcher with nylon</li> <li>DRILLING FLUID, RETURN AND COLOR:</li> <li>0.0 to 31.1 ft Drilled without fluid</li> </ul>	_											93 s(CL/ML)	1.9 1.5	10.7 to 12.8 ft. <u>SILT, ML:</u> About 95% non plastic fines, no toughness; about 5% fine sand; moist, olive brown; layers of oxidation; thin layer of sand; firm consistency.
WATER LEVEL FROM TOC: 6.7 ft. on 12/7/2010	15—										Qal		F	Lab Data Interval
<b>REASON FOR HOLE TERMINATION:</b> The hole was terminated upon successful completion to the target depth.	-	64											_	12.8 to 14.2 ft. <u>POORLY GRADED SAND</u> <u>WITH SILT, SP-SM</u> : About 90% fine sand; about 10% non plastic fines; moist, reddish-tan to light brown.
	_	 	1.0	4.7	94.2	0.1	NP	NP	23.2	SP-SM 89.5		SP-SM	-	14.2 to 14.6 ft. <u>SANDY LEAN CLAY/SANDY</u> <u>SILT, s(CL/ML)</u> : About 60% fines with low plasticity, medium toughness; about 40% fine sand; moist to wet, olive gray with reddish brown oxidation swirls; firm.

### COMMENTS:

FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter

- O.D. = outer diameter G.S. = Ground surface T.O.C. = Top of well casing SJR = San Joaquin River

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, Merced County BEGUN: 11/19/10 FINISHED: 11/19/10 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 6.70 ft. (- 724.3 ft. - 12/09/2010 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,276,117.6 E 6,089,808.7 NAD83 TOTAL DEPTH: 31.1 ft. DEPTH TO BEDROCK: Not Encountered STATE: California GROUND ELEVATION: 108.1 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: G. Perea REVIEWED BY: S. Dalton

SHEET 2 OF 2

				LAB	ORA			ATA	۱	ORY TION	1_		Λ
NOTES	ЭЕРТН	6 CORE RECOVERY	:0.005	:0.075	6 SAND	6 GRAVEL	IQUID LIMIT	LASTICITY NDEX	AOISTURE CONTENT	LABORAT CLASSIFICA	SYMBOL	CLASSIFICA	CLASSIFICATION AND PHYSICAL CONDITION
HOLE COMPLETION: Well Casing: 0.5 to 15.0 ft. (2-inch blank PVC) Dual U-pack Screen: 15.0 to 30.0 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch) U-Pack Screen Filter Pack: #2/12 Sand Filter Pack: 9.0 to 31.1 ft. (#3 Sand) Sump: 30.0 to 31.1 ft. (2-inch blank PVC with slip cap) Bentonite Seal: 2.0 to 9.0 ft.	-	64			ð	8			20			SW-SP	<ul> <li>14.6 to 20.1 ft. <u>POORLY GRADED SAND</u> <u>WITH SILT, SP-SM</u>: About 90% fine to medium sand; about 10% non plastic fines; olive gray with reddish browr oxidation; layered; soft.</li> <li>Note: 19.1 to 19.21 ft.: lens of gray-green SANDY LEAN CLAY, s(CL): about 55% fines with medium plasticity; about 45% fine sand.</li> </ul>
Concrete Seal: 0.0 to 2.0 ft. (backfilled with #3 Sand inside well vault) Well Completion: 8-inch dia flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot diameter concrete pad.	-		2.2	8.8	88.0	1.0	NP	NP	NA	SW-SM 84.5		84	<ul> <li>20.1 to 24.0 ft. WELL GRADED SAND WITH SILT, SW-SM: About 90% fine to coarse sand, rounded, hard (basalt and quartz); about 10% fines; wet,</li> </ul>
Lock: #2001 Masterlock	25-											(SP)g 83	gray; soft. <u>Lab Data Interval</u> 22.6 to 23.6 ft.
	-	52										SP-SM	<ul> <li>24.0 to 24.5 ft. <u>POORLY GRADED SAND</u> <u>WITH GRAVEL, (SP)g:</u></li> <li>About 50% fine to coarse sand; about 45% fin gravel, hard, rounded (agate and basalt); about 5% fines; maximum size 1/2 inch; moist to wet; gray.</li> </ul>
	-	-	1.9	7.4	88.8	1.9	NP	NP	22.3	SP-SM 79.5	-	79	24.5 to 28.6 ft. <u>POORLY GRADED SAND</u> <u>WITH SILT, SP-SM</u> : About 90% fine to coarse sand, predominately fine to medium sand, subrounded, hard; about 10% fines; wet, green/gray; soft; layered.
	-	-											<ul> <li><u>Lab Data Interval</u></li> <li>27.6 to 28.6 ft.</li> </ul>
	30—	0										NR	28.6 to 31.1 ft. <u>NO RECOVERY</u> Note: Trace SILTY SAND, SM: About 75-80% fine sand; about 20-25% non plastic fines; wet gray.
	<u> </u>	1	I	I	I	BOT	TOM	OF H	OLE	I		77	<u>u</u> -

SJRRP DH SJRRP.GPJ SJRRP.GPJ 8/10/11 4:19:32 PM

### COMMENTS:

 $\begin{array}{l} \mathsf{FADC} = \mathsf{Flight} \ \mathsf{Auger} \ \mathsf{Dry} \ \mathsf{Core} \\ \mathsf{NP} = \mathsf{Non-plastic} \\ \mathsf{NR} = \mathsf{No} \ \mathsf{Recovery} \\ \mathsf{NA} = \mathsf{Not} \ \mathsf{applicable} \\ \mathsf{I.D.} = \mathsf{inner} \ \mathsf{diameter} \end{array}$ 

O.D. = outer diameter G.S. = Ground surface T.O.C. = Top of well casing SJR = San Joaquin River

# San Joaquin River Restoration Program

U.S. Department of Interior, Bureau of Reclamation

# MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name		Well Name	
STRRP	MER	CED	Mie)-	10-115
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Nu	umber	DNR Well ID Number
1. Can this well be purged dry? Yes		11. Depth to Water	Before Deve	lopment After Development
2. Well development method		(from top of		$L_{1}$
surged with bailer and bailed $\Box 4$	11	well casing)		
surged with bailer and pumped	51	- F	434 100	
surged with block and bailed	2	Date .	17,09	12010 121091240
surged with block and pumped	52		mm d d	
surged with block, bailed and pumped 7	0			Mam - Mam
compressed air	2 0	Time o	:09: <u>33</u>	□ p.m. △9:59 p.m.
bailed only	0			
pumped only 🖸 5	1	12. Sediment in well	TL.	_ inches inches
pumped slowly	0	bottom		
Other 0	4	13. Water clarity	Clear 🔲 10	Clear 20
			Turbid 🖾 15	Turbad 2 5
3. Time spent developing well2	<u></u> min.	STAT	(Describe)	(Describe)
4. Depth of well (from top of well casisng)	<u>, 3</u> ft.	-	Tent Ga	<u> </u>
5. Inside diameter of well	<u> </u>			
6. Volume of water in filter pack and well casing	gal.			
		Fill in if drilling fluids	were used and	well is at solid waste facility:
7. Volume of water removed from well	2 <u> </u>			
8. Volume of water added (if any)	gal	solids		mg/img/i
9. Source of water added		15. COD		mg/l mg/l
		<ol><li>Well developed by</li></ol>	: Name (first, las	() and Firm
10. Analysis performed on water added? Yes (If yes, attach results)	s 🗆 No	First Name: EA	ing 1	ast Name ( 10 K C)
17 4 4 4 4		Firm: BOR		
17. Additional comments on development:		- 1		
0933-0941 JA11	sgats	Sig/kg	(car D.	1
0943 - 0954 Pany	0258	Fal		
Start Cleaking up A CTER	Pumpi	10 Fals		
Name and Address of Facility Contact /Owner/Responsible	Party	I hereby certify that	the shows infor	mation is true and correct to the best
First Last		of my knowledge.	the noove shior	mation is true and correct to the best
Facility/Firm:		Signature:		
Street:		Print Name:		
City/State/Zip:		Firm:		

NOTE: See instructions for more information including a list of county codes and well type codes.

MW-10-115	GEOLOGIST: A. Warren							
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen							
DATE COMPLETED: 11/19/2010	HELPERS: D. Read & C. Peterson							
LOCATION: Roxbury Road and Palm Ave								
T.O.C. COORDINATES: N2276117.55 E6089808.65 (NAD83) ELEVATION NS								
G.S. ELEVATION: 108.1 (NAVD88)								



### \*NOT TO SCALE

#### NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Dia. = Diameter NS = Not Surveyed #3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Right, Merced County BEGUN: 11/20/10 FINISHED: 11/20/10 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 6.63 ft. (- 698.1 ft. - 12/10/2010 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,297,428.6 E 61,055,524.6 NAD83 TOTAL DEPTH: 31.1 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 105.3 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren/G. Perea REVIEWED BY: S. Dalton

SHEET 1 OF 2

				LAB	ORA	TOF	RY D	ATA	1	NON NON	Λ.		UAL 10N	Λ
NOTES	рертн	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATO CLASSIFICAT		GEOLOGIC UNIT SYMBOL	UIS CLASSIFICAT	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE					-								ASPHAG	0.0 to 31.1 ft. QUATERNARY ALLUVIUM - Qal
<b>PURPOSE OF HOLE:</b> To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	81											s(CL) 103.2	<ul> <li>0.0 to 0.2 ft. <u>ASPHALT</u></li> <li>0.2 to 2.1 ft. <u>SANDY LEAN CLAY, s(CL)</u>: About 70% fines with low to medium plasticity,</li> </ul>
LOCATION: Reach 4A, River Bank Right, Merced County, at the southwest corner of the termination of the paved portion of El Nido Rd.	_	_											SM	low toughness, rapid dilatancy; about 30% fine sand; dry, brown todark brown; top 1.0 ft. lightly cemented and broken up from drilling activity.
DRILLED BY: Bureau of Reclamation: PN Region drill crew: Gerry Hansen, driller Chris Peterson, helper	-												101.1	2.1 to 4.2 ft. SILTY SAND, SM: About 80% fine to medium sand (predominately fine); about 20% non plastic fines, no toughness; dry, tan to light brown.
Dennis Read, helper DRILL RIG: Truck mounted Central Mining Equipment (CME) 75	5	100											SM 99.6	<ul> <li>4.2 to 5.7 ft. SILTY SAND, SM: About 70% fine to medium sand (predominately fine), hard, subounded; about 30% fines with low plasticity; dry, tan to light brown; white CaCO3 veinlettes and 1/4 inch</li> </ul>
<b>DRILLING &amp; SAMPLING METHODS:</b> The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undicturbed) compliance was	_	-	17.3	48.3	34.4	0.0	29.1	7.8	15.7	s(CL) 97	.8	Ţ		thick cementing layers. 5.7 to 13.0 ft. <u>LEAN CLAY WITH SAND,</u> ( <u>CL)s:</u> About 75% fines with low plasticity, no toutherses what 25% fine conductions
performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the	_	-												towards bottom, light brown to dark brown; CaCO3 veinlettes and 1/4 inch thick cementing layers.
cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers.													(CL)s	<ul> <li><u>Lab Data Interval</u></li> <li>6.5 to 7.5 ft.</li> <li><u>Lab Data Interval</u></li> <li>10.0 to 11.0 ft.</li> </ul>
Interval Method 0.0 to 31.1 ft. FADC	-	100	18.0	61.9	20.1	0.0	27.2	6.4	19.9	(CL-ML)s 94	.3			13.0 to 15.7 ft. <u>SILTY SAND, SM</u> : About 65% fine sand; about 35% fines with low
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 3.6 to 8.6 ft Add catcher 18.6 to 23.6 ft Add water	_													<ul> <li>plasticity, low toughness; wet, brown; firm consistency.</li> <li>15.7 to 18.4 ft. <u>LEAN CLAY WITH SAND,</u> (CL)s:</li> </ul>
DRILLING FLUID, RETURN AND COLOR: 0.0 to 31.1 ft Drilled without fluid	_												92.3	About 75% fines with medium plasticity, low toughness, no dilatancy; about 25% fine sand; moist, brown; firm consistency; CaCO3 veinlettes
WATER LEVEL FROM TOC: 6.63 ft. on 12/10/2010	-													<ul> <li>Lab Data Interval</li> <li>16.5 to 17.5 ft</li> </ul>
<b>REASON FOR HOLE TERMINATION:</b> The hole was terminated upon successful completion to the target depth.	15—	-										0.1	SM	<ul> <li>18.4 to 21.6 ft. <u>SILTY SAND, SM</u>:</li> <li>About 60% fine sand; about 40% fines with low plasticity, no toughness; moist, brown to dark</li> </ul>
HOLE COMPLETION: Well Casing: 0.5 to 18.0 ft. (2-inch blank PVC) Dual U-pack Screen: 18.0 to 28.0 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch) U-Pack Screen Filter Pack: #2/12 Sand	-	100										Yai	89.6	Note: 18.6 to 21.6 ft.: Slight increase in sand towards bottom.
Filter Pack: 16.0 to 31.1 ft. (#3 Sand) Sump: 28.0 to 31.1 ft. (2-inch blank PVC with slip cap)	-		26.0	51.4	22.6	0.0	33.7	12.2	29.0	(CL)s 87	<u>.8</u>		(CL)s	<ul> <li><u>Lab Data Interval</u></li> <li>19.5 to 20.5 ft.</li> </ul>
Bentonite Seal: 2.0 to 16.0 ft. Concrete Seal: 0.0 to 2.0 ft. (backfilled with #3 Sand inside well vault) Well Completion: 8-inch diameter flush-mount	-												86.9	21.6 to 23.0 ft. <u>SILTY SAND, SM</u> : About 80-85% fine sand; about 15-20% fines with low plasticity; wet, brown; firm consistency; coarsens downwards; trace
diameter concrete pad. Lock: #2001 Masterlock	_													_ meaium sana.

#### COMMENTS:

SJRRP.GPJ 8/10/11 4:19:32 PM

SJRRP.GPJ

SJRRP DH

FADC = Flight Auger Dry Core NP = Non-plastic NR = No Recovery NA = Not applicable I.D. = inner diameter

- O.D. = outer diameter G.S. = Ground surface T.O.C. = Top of well casing

- SJR = San Joaquin River



#### COMMENTS:

 $\begin{array}{l} \mathsf{FADC} = \mathsf{Flight} \ \mathsf{Auger} \ \mathsf{Dry} \ \mathsf{Core} \\ \mathsf{NP} = \mathsf{Non-plastic} \\ \mathsf{NR} = \mathsf{No} \ \mathsf{Recovery} \\ \mathsf{NA} = \mathsf{Not} \ \mathsf{applicable} \\ \mathsf{I.D.} = \mathsf{inner} \ \mathsf{diameter} \end{array}$ 

O.D. = outer diameter G.S. = Ground surface T.O.C. = Top of well casing SJR = San Joaquin River

# San Joaquin River Restoration Program U.S. Department of Interior, Bureau of Reclamation

Bureau of Reclamation MONI

# MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name		Well Name	
SIRRI	.MER	$c \in T$	MW-1	0-116
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well N	lumber	DNR Well ID Number
1. Can this well be purged dry? Yes	No 🗌		Before Dev	elopment After Development
2. Well development method		(from top of	. 6	63 ft ft
surged with bailer and bailed 4	1	well casing)		ef electronic and the second s
surged with bailer and pumped ba 6	1		1-1-4	shrieu
surged with block and bailed	2	Date		12010 12 10 - 01
surged with block and pumped	2		$b \perp \leq 1 \leq 1 \leq 1$	12010 1410/201
surged with block, bailed and pumped 7	0			y y y y m m u u y y y
compressed air	0	Time	.09.48	A.a.m.
bailed only	0		C. <u>2</u> <u>1</u> .	
pumped only	1	12. Sediment in well		inches TR inches
pumped slowly	0	bottom	TIC	inches
Other	0	13 Water claring		
	-	15. Water clarity		
3 Time spent developing well	-			5 Turbid 12 5
- 2	1.7 min.		(Describe)	(Describe)
A Depth of well (from the of well) 70	8.		-ta -t	1 Clarpy
4. Deput of well (from top of well casising) $\leq \leq \leq$	. <u> </u>		yorowish	had Sulthy
5 Inside diameter of mult	0.		1 BROW	<u> </u>
	in.		/	
				· · · · · · · · · · · · · · · · · · ·
o. Volume of water in filter pack and well				
washig	gal.			
7 V-1		Fill in if drilling fluid	is were used an	d well is at solid waste facility:
$\sim$ volume of water removed from well $\sim$	<u> </u>			
8. Volume of water added (if any)	gal.	14. Total suspended solids		mg/1 mg/1
6				
9. Source of water added		15. COD		mg/lmg/l
		16. Well developed by	y: Name (first, la	st) and Firm
10. Analysis performed on water added?  Yes (If yes, attach results)	s 🗆 No	First Name:	ny	Last Name: Hansen
		Firm:		
1. Additional comments on development:	Hadaid			1107-1117-4941
01110.00 Den 2011	1 crain	Un alla	Nar	+
INAL-IOIS LET TUP	comp org	VERY STILY S	top lon le	
ALZ-1036 WOOPA JIL KAY	51	(	well.	15 haduncer sha
1037-1039 Terris 5041-10	Sola.		wasik	- Ry Sitter D' her
1042 1045- Pierro 1901 (	Performance	ZEE Sound)	STAR	Ten II and
1056 101 Puns 551	Paling	~		- 4
ame and Address of Facility Contact /Owner/lesponsible	Party	epc		
irst Last	- ally	I hereby certify that	the above info	rmation is true and correct to the best
ame:Name:		of my knowledge.		
acility/Firm:		Signature:		
treet:		Print Name:		
Lity/State/Zip:		Firm		

NOTE: See instructions for more information including a list of county codes and well type codes.

MW-10-116	GEOLOGIST: A. Warren							
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen							
DATE COMPLETED: 11/20/2010	HELPERS: D. Read & C. Peterson							
LOCATION: W El Nido Road								
T.O.C. COORDINATES: N2297428.55 E6105524.61 (NAD83) ELEVATION NS								

G.S. ELEVATION: 105.3' (NAVD88)



### **\*NOT TO SCALE**

#### NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Dia. = Diameter

#3 Sand backfills the well above the top of the bentonite seal.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County BEGUN: 4/15/11 FINISHED: 4/15/11 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 4.6 ft. ( 117.4 ft. - 5/15/2011 )

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PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,249,992.2 E 6,119,289.7 NAD83 TOTAL DEPTH: 27.1 ft. DEPTH TO BEDROCK: Not Encountered STATE: California GROUND ELEVATION: 122.02 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 1 OF 2

				LAB	ORA	TOF	RY D	ΑΤΑ	١	ORY TION	_			1
NOTES	рертн	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	CLASSIFICAT CLASSIFICAT	GEOLOGIC UNI <sup>-</sup> SYMBOL	VIS	/ EI.	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.													/	0.0 to 27.1 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover a continuous soil core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	_	-										CL		<ul> <li>0.0 to 3.1 ft. <u>LEAN CLAY, CL:</u></li> <li>About 90% fines with low plasticity, slow dilatancy, low toughness; about 10% fine sand; dry to moist, dark brown; strong reaction with HCL; sticky when wet from CaCO<sub>3</sub> content; organic odor.</li> </ul>
LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County. North side of farm road, about ¼ mile seast of Wolfson Ranch.	_	91.3											140.0	3.1 to 4.4 ft. <u>SANDY SILT, s(ML)</u> : About 50% fine, micaceous sand; about 50% fines with no plasticity, low dry strength, rapid dilatancy, low toughness; moist, brown; trace
JRILLED BY: Bureau of Reclamation: PN Region drill crew: Chris Peterson, driller Dennis Read, helper Cody Kelly, belper			16.5	36.2	47.3	0.0	NP	NP	19.0	s(ML)		s(ML)	118.9	Lab Data Interval 3.5 to 4.0 ft.
DRILL RIG: Fruck mounted Central Mining Equipment (CME) DC512	-									118.0	Ţ		<u>117.6</u>	<ul> <li>4.4 to 5.1 ft. <u>SILTY SAND, SM</u>:</li> <li>About 75% fine, micaceous sand; about 25% fines with no plasticity, no toughness; moist, brown.</li> </ul>
DRILLING & SAMPLING METHODS: The drill hole was advanced and sample using a Flight Auger Dry Core system (FADC). The drill nole was advanced using 8-1/4 inch o.d. by 4-1/4 nch i.d. hollow stem flight augers equipped with	5—													5.1 to 13.6 ft. <u>SILTY SAND, SM</u> : About 85% fine to medium, micaceous sand; about 15% fines with no plasticity; wet, brown; layered.
an 8-1/2 inch o.d. bullet and spade drill bit. Continuous sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5-foot long split barrel dry core sample system sampler). Unless indicated otherwise, the	_	46.0												Note: Red oxidation layers at lower contact, from 13.3 to 13.6 ft. Lab Data Interval - 8.6 to 9.6 ft.
sampler was placed inside the augers and the sutting shoe of the sampler extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the sampler to avoid rotation while advancing the augers.	_	46.0												13.6 to 15.2 ft. <u>SANDY SILT, s(ML)</u> : About 65% fines with no plasticity, rapid dilatancy, no toughness; about 35% fine, micaceous sand; wet, brown with reddish brown oxidation layers; finely layered.
<u>nterval Method</u> ).0 to 27.1 ft. FADC DRILLING CONDITIONS AND DRILLER'S COMMENTS:	_	-	0.7	8.9	90.4	0.0	NP	NP	24.8	SP-SM		SM		Note: From 14.6 to 15.2 ft. sand content increases; dark reddish brown at lower contact. Contains a 1/2 inch layer of moderate cementation at 15.2 ft.
4.6 to 9.6 ft Wet at 7.5 ft. 19.6 to 23.4 ft Very hard drilling.										112.4	-			Lab Data Interval 14.0 to 14.5 ft.
DRILLNG FLUID, RETURN AND COLOR: 0.0 to 31.1 ft Drilled without fluid NATER LEVEL:	10—													<ul> <li>15.2 to 15.5 ft. <u>CLAYEY SAND, SC</u>: About 65% fine sand; about 35% fines with medium plasticity; wet, gray; micaceous; firm.</li> </ul>
REASON FOR HOLE TERMINATION: The hole was terminated upon reaching the arget depth.	-													15.5 to 16.1 ft. LEAN CLAY, CL: About 90% fines with low plasticity; high dry strength; low toughness; about 10% fine sand; moist, gray; CaCO <sub>3</sub> ); very fine silty layers abundant, very firm.
		40.0												Lab Data Interval 15.5 to 16.0 ft.
	-	-									Qal		108.4	<ul> <li>16.1 to 17.0 ft. <u>SANDY LEAN CLAY, s(CL)</u>: About 65% fines with medium plasticity, medium toughness; about 35% fine sand; moist, finely layered gray-brown and reddish-brown; very firm.</li> </ul>
			5.7	61.3	33.0	0.0	NP	NP	26.9	s(ML) 107.5	-	s(ML)	)	

### COMMENTS:

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter G.S. = Ground Surface + = Above Ground Surface T.O.C. = Top of Well Casing SJR = San Joaquin River  $\frac{V}{2}$  = Top of Groundwater

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County BEGUN: 4/15/11 FINISHED: 4/15/11 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 4.6 ft. ( 117.4 ft. - 5/15/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,249,992.2 E 6,119,289.7 NAD83 TOTAL DEPTH: 27.1 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 122.02 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 2 OF 2

				LAB	ORA	TOF	RY D	ΑΤΑ	١.	JRY 10N	1	4.	UAL	NOI	Δ	
NOTES	рертн	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORAT CLASSIFICAT	/ EI.	GEOLOGIC UNIT		CLASSIFICAT	CLASSIFICATION AND PHYSICAL CONDITION	
NOTES HOLE COMPLETION: Completed as a groundwater monitoring well. Well Casing: +2.84 to 5.0 ft. (2-inch I.D. blank PVC) Dual U-pack Screen: 5.0 to 15.0 ft. (2-inch I.D. inner screen; 3-inch I.D. outer screen; slotted 0.010-inch) U-Pack Screen Filter Pack: (#2/12 Sand) Filter Pack: 4.0 to 20.0 ft. (#3 Sand) Sump: 15.0 to 18.0 ft. (2-inch I.D. blank PVC with slip cap) Concrete Seal: 0.0 to 2.0 ft. Bentonite Seat: 2.0 to 4.0 ft. Bentonite Seat: 2.0 to 4.0 ft. Well Completion: 6-inch by 6-inch by 5-foot long steel surface casing with locking top; 2.0-foot diameter concrete pad. Lock: #2006 Masterlock	евдн - - - - - -	4 CONER	900'0v 311.7 8.1	\$2000> 56.1 64.4	CINES % 12.2	0.0 % CKAVEI	29.4 P	NPEXICIT INDEX	21.3 36.8	CLASS CLASS	EI. 106.0	GEOLOGIC		Image: Weight of the second	PHYSICAL CONDITION         Intervention         Intervention <tr< td=""><td>w te w i; I</td></tr<>	w te w i; I
COMMENTS	- 25- -	72.0				BOTT	-com (	DF H(	OLE				(С	98.( ):L)s 97.: 94.:		

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#### **\*NOT TO SCALE**

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Dia. = Diameter

# San Joaquin River Restoration Program

#### MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name MERCE	50	Well Name W-3 / MW-11-130						
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well N	umber DNR Well ID Number						
1. Can this well be purged dry? Yes	No 🗶	11. Depth to Water	Before Development After Development						
2. Well development method		(from top of	$a = \frac{1}{6} \frac{6}{6t}$ ft. $\frac{3}{2} \frac{1}{6t}$ ft.						
surged with bailer and bailed	4 1	well casing)							
surged with bailer and pumped	5 1								
surged with block and bailed	4 2	Date	x0511517011 051151701						
surged with block and pumped	5.2		mm $d$ $d$ $y$ $y$ $y$ $y$ $mm$ $d$ $d$ $y$ $y$ $y$						
surged with block, bailed and pumped	70		о с. П.8.Т. – . П.А.Т.						
compressed air	20	Time	$c. \underline{2}: \underline{0} \underline{0} \underline{p.m}. \underline{3}: \underline{05} \underline{p.m}.$						
bailed only	10	2.							
pumped only	51	12. Sediment in well	inches inches						
pumped slowly	5.0	bottom							
Other		13. Water clarity	Clear 🔲 10 Clear 🕅 20						
			Turbid 🗹 15 Turbid 🖸 25						
3. Time spent developing well	5 min		(Describe) (Describe)						
			Brown,						
4. Depth of well (from top of well casisng) $-\frac{2}{2}$	ft.		SAUD						
5. Inside diameter of well	0 0_ in.								
6. Volume of water in filter pack and well									
casing	gal.	1							
	-	Fill in if drilling flui	ds were used and well is at solid waste facility						
7. Volume of water removed from well $5.5$	gal.								
~		14. Total suspended	lmg/lmg/l						
8. Volume of water added (if any)	gal.	solids							
9. Source of water added	er röften utb verstatigenseter	15. COD	mg/l mg/l						
		16. Well developed 1	by: Name (first, last) and Firm						
10. Analysis performed on water added?	cs 🗆 No	First Name:	Last Name:						
(If yes, attach results)									
		Firm:							
17. Additional comments on development:	LI CHECK	VALUE FO	IL SEVERIAL MINUTOS BACH Z						

SURFED WITH BLOCK + BALL CHECK VALUE FOR SEUBACAL MINUTOS UNTIL PUMPED 5 GALS. PUMPED WITH SUMP PUMP UNTIL CLEAM ABOUT 50 6465.

Name and Address of Facility Contact /Owner/Responsible Party         First       Last         Name:       Name:	I hereby certify that the above information is true and correct to the best of my knowledge.
Facility/Firm:	Signature:
Street:	Print Narne:
City/State/Zip:	Firm:
	<u> </u>

NOTE: See instructions for more information including a list of county codes and well type codes.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County BEGUN: 4/16/11 FINISHED: 4/16/11 DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 5.1 ft. (116.9 ft. - 5/15/2011) PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,250,184.6 E 6,120,234.3 NAD83 TOTAL DEPTH: 29.6 ft. DEPTH TO BEDROCK: Not Encountered STATE: California GROUND ELEVATION: 121.96 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 1 OF 2

											_			
				LAB	ORA	TOF	RYE	DATA	۱ 	TION	/⊢			
NOTES	рертн	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORAT CLASSIFICA m	GEOLOGIC UNI	SYMBOL	CLASSIFICA'	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.					-									0.0 to 29.5 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover a continuous soil core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	_										:	SC	<ul> <li>0.0 to 2.9 ft. <u>CLAYEY SAND, SC</u>:</li> <li>About 70% fine sand, with trace medium sand; about 30% fines with medium plasticity; dry to moist, brown; firm; organic odor; micaceous.</li> </ul>
LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County. Field east of Jerrold Avenue.	-	100.0												<ul> <li>2.9 to 6.0 ft. <u>SILT WITH SAND, (ML)s</u>:</li> <li>About 85% fines with low plasticity, no dry strength, no toughness; about 15% fine, micaceous sand; dry to moist, brown; moderately firm; trace plastic fines layers.</li> </ul>
DRILLED BY: Bureau of Reclamation: PN Region drill crew: Chris Peterson, driller Dennis Read, helper Cody Kelley, helper	-	-											119.1	6.0 to 6.9 ft. <u>LEAN CLAY, CL</u> : About 95% fines with medium plasticity, no dilatancy, medium toughness; trace fine sand; moist, dark brown; very firm.
DRILL RIG: Truck mounted Central Mining Equipment (CME) DC512	-	-										1	(ML)s	6.9 to 9.3 ft. <u>SANDY LEAN CLAY, s(CL)</u> : About 70% fines with medium plasticity, medium toughness; about 30% fine sand; wet, tan; moderately soft; some reddish brown iron
DRILLING & SAMPLING METHODS: The drill hole was advanced and sample using a Flight Auger Dry Core system (FADC). The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. bollow stem flight aurors equipped with	5—										Ţ	<u> </u>		<u>Lab Data Interval</u> 7.0 to 8.0 ft.
nch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by i-foot long split barrel dry core sample system sampler). Unless indicated otherwise, the	-	_										116.0 CL 115.1	9.3 to 10.8 ft. <u>SANDY SILT, s(ML)</u> : About 70% fines with low plasticity, rapid dilatancy, low toughness; about 30% fine, micaceous sand; moist to wet, tan with reddish brown iron oxidation; moderately soft.	
sampler was placed inside the augers and the cutting shoe of the sampler extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the sampler to avoid rotation while advancing the augers.	-	88.0	26.7	42.4	30.7	0.2	30.8	16.2	29.1	s(CL) 114.	0	-		<b>10.8 to 13.5 ft. <u>SILTY SAND, SM</u>:</b> About 85% fine sand; about 15% fines with no plasticity; wet, tan with reddish brown oxidation; 1 to 5 mm thick laminations.
Interval Method 0.0 to 29.6 ft. FADC	_											1	s(CL)	Lab Data Interval 12.5 to 13.5 ft.
DRILLING CONDITIONS AND DRILLER'S COMMENTS: NA	-												112.7	<ul> <li>13.5 to 14.6 ft. <u>SILT, ML:</u></li> <li>About 95% fines with low to no plasticity, low dry strength, rapid dilatancy; about 5% to trace fine sand: moist tan with reddish brown iron</li> </ul>
DRILLING FLUID, RETURN AND COLOR: 0.0 to 29.6 ft Drilled without fluid	10-												s(ML)	oxidation; very firm.
WATER LEVEL: 5.1 ft 5/15/2011													S(WE)	About 65% fine sand, with trace medium sand; about 35% fines with low plasticity; wet, dark
<b>REASON FOR HOLE TERMINATION:</b> The hole was terminated upon reaching the target depth.	-												111.2	laminations; some 1 to 2 mm thick CaCO <sub>3</sub> layers, strong reaction with HCI.
	-	62.0												<u>Lab Data Interval</u> 15.0 to 16.0 ft. - -
		02.0											SM	(CL)s: About 80% fines with low plasticity, medium toughness: about 20% fine sand: moist to dry.
	-		0.5	14.9	84.6	0.0	NP	NP	28.7	SM 108.	5		108.5	tan with reddish brown iron oxidation.
	-												ML	
			-								Qa	al	107.4	
COMMENTS:		<u> </u>						L						
			Cf.							Well co	mple	eti	on inform	nation is provided in attached Well Completion

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter

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G.S. = Ground Surface + = Above Ground Surface T.O.C. = Top of Well Casing SJR = San Joaquin River ¥ = Top of Groundwater

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County BEGUN: 4/16/11 FINISHED: 4/16/11 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 5.1 ft. ( 116.9 ft. - 5/15/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,250,184.6 E 6,120,234.3 NAD83 TOTAL DEPTH: 29.6 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 121.96 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 2 OF 2

					LAB	ORA	TOF	RY D	ΟΑΤΑ	١.	NON V	/		UAL 10N	Λ
	NOTES	DEPTH	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORATO CLASSIFICAT		GEOLOGIC UNIT SYMBOL	CLASSIFICAT	CLASSIFICATION AND PHYSICAL CONDITION
	HOLE COMPLETION: Completed as a groundwater monitoring well.														19.6 to 25.0 ft. <u>CLAYEY SAND, SC</u> : About 60% fine sand; about 40% fines with
	Well Casing: +2.82 to 12.5 ft. (2-inch I.D. blank			13.1	18.8	68.1	0.0	NP	NP	16.5	SM	106.0			medium plasticity; wet, dark tan; moderately firm; layered with 1 mm to 3 mm thick $CaCO_3$
	PVC) Dual U-pack Screen: 12.5 to 27.5 ft. (2-inch I.D.	-										100.0			<ul> <li>accretions, strong reaction with HCl; moderately cemented zone from 20.0 to 20.2</li> </ul>
	0.010-inch) U-Pack Screen Filter Pack: (#2/12 Sand)													SM	Note: 23.5 to 25.0 ft : less CaCO
	Filter Pack: 11.0 to 29.5 ft. (#3 Sand) Sump: 27.5 to 29.5 ft. (2-inch I.D blank PVC with	-	56.0												25.0 to 29.6 ft. SILTY SAND, SM:
	slip cap) Concrete Seal: 0.0 to 2.0 ft. Bentonite Seal: 2.0 to 11.0 ft.														About 75-70% fine sand; about 25-30% fines with low to no plasticity; wet, tan; moderately soft; flowing; homogeneous.
	Well Completion: 6-inch by 6-inch by 5-toot long steel surface casing with locking top; 2.0-foot diameter concrete pad.												-	103	<u>Lab Data Interval</u> 27.0 to 28.0 ft.
		-	_	35.8	44.8	19.4	0.0	31.8	14.3	21.4	(CL)s			(CL)s	-
											1	102.5		102	.4
		20-	-												_
		-													_
		_													_
			100.0											sc	
		-													
		-													-
		25-												97	.0
		-													-
		-	62.0												-
V				4.5	15.9	79.6	0.0	NP	NP	17.8	SM			SM	
:03 PN		-	_									94.0			_
1 3:54															
11/8/1		-													-
P.GPJ														92	
SJRR							BOT	ГОМ	OF H	OLE					
o.GPJ	COMMENTS: FADC = Flight Auger Dry Core G.S.	= Gro	ound	Surfa	ace						Well Diag	con Iram	npleti . We	ion infoi Il develo	rmation is provided in attached Well Completion opment information is provided in attached Monitoring
SJRRF	NP = Non-Plastic+ = ANR = No RecoveryT.O.O	Above C. = 1	Grou op o	und S f We	Surfa	ce sing					Well	Dev	velop	oment fo	

#### COMMENTS:

SJRRP DH

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#### **\*NOT TO SCALE**

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Dia. = Diameter

# San Joaquin River Restoration Program

#### MONITORING WELL DEVELOPMENT

U.S. Department of Interior, Bureau of Reclamation

Facility/Project Name	County Name	0	Well Name	1 Mus - 11-	- 171
	MERCO	+C	Pro F.		121
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well N	umber	DNR Well ID Nu	nber
1. Can this well be purged dry? Yes	No 🗶	11. Depth to Water	Before Dev	velopment After	Development
2. Well development method		(from top of	a	<u>/ 0</u> ft	<b>8</b> 10 ft.
surged with bailer and bailed 🔲 41		well casing)			
surged with bailer and pumped					
surged with block and bailed $\Box$ 42		Date	LD5119	512011	05, 15,2011
surged with block and pumped 🛛 🕅 6.2	ł		mm d d	<del>jyyyy</del> π	$\overline{\mathbf{n}}' \overline{\mathbf{d}} \overline{\mathbf{d}}' \overline{\mathbf{y}} \overline{\mathbf{y}} \overline{\mathbf{y}} \overline{\mathbf{y}}$
surged with block, bailed and pumped 7 0	)				с. Палу
compressed air		Time	c. 12:44	5 p.m. [	50 p.m.
bailed only	,				
pumped only		12. Sediment in well		inches	inches
pumped slowly	)	bottom			. alignedig S secondary
Other		13. Water clarity	Clear 🗆 I	0 Clear	DRA 2.0
	e		Turbid 🗹 1	5 Turbid	Q 25
3. Time spent developing well	*_		(Describe)	(Descri	bc)
	m.		<b>(</b> ,	<b>L</b>	
4. Depth of well (from top of well casisne)	$\frac{7}{1}$ ft.		Brown	v	
			SUND	/	······
5. Inside diameter of well 2, 0	o in.				
					ինիկերկություններում անհանդան անհանդան է հետու չու է ու է ու է ու է ու է ու է ու է ո
6. Volume of water in filter pack and well			Appropriate of the state of the	apanan maara maldaraldaradiinin oo toks	sandrand Maril MMM Malakeen dholaan ee dhaalaa aanaa aana
casing	eal				anner hiddiaddiaddiadd ferd ann ann ann ann an a an an ann
	<b>5</b> 41.	Fill in if drilling flui	ids were used a	nd well is at solid y	vaste facility:
7 Volume of water removed from well 60	0 eal 🦉				
	B	14 Total suspender	1	meЛ	mg/l
8 Volume of water added (if any)	anl	solids	·		
	gai.	001100			
9. Source of water added		15. COD		mg/l	mg/l
		16. Well developed	by: Name (first,	last) and Firm	
10. Analysis performed on water added?	🗆 No	First Name:		Last Name:	
(If yes, attach results)					
		Firm:			
PUMPED WITH SUMPED	CHEC	IC VALUE F NTIL CLEAD	a Albur	IT 55 FI	5 EMCIH 2 F 4-CS.
Name and Address of Facility Contact /Owner/Responsible	Party	I herebu onstifu st	at the above in	formation is tous	ad contract to the best
First Last		of my knowledge	iat the above m	normanon is une ai	ia correct to the best
Name:Name:		of my knowledge	•		
Facility/Firm		Signature:		·····	
Street:		Print Name:	, <u>, , , , , , , , , , , , , , , , </u>		
C'ELCON R'S		Firm			
City/State/Zip:	·	1°000:			

NOTE: See instructions for more information including a list of county codes and well type codes.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County BEGUN: 4/17/11 FINISHED: 4/17/11 DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 4.0 ft. (119.8 ft. - 5/15/2011) PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,250,689.0 E 6,120,617.8 NAD83 TOTAL DEPTH: 30.3 ft. DEPTH TO BEDROCK: Not Encountered STATE: California GROUND ELEVATION: 123.78 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

				LAB	ORA	TOF	RY D	ΑΤΑ	۱	NON V			ION		
NOTES	DEPTH	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORATO CLASSIFICAT	/ EI.	GEOLOGIC UNIT SYMBOL	VISI CLASSIFICAT	EI.	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.															0.0 to 30.3 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover a continuous soil core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	-											s(ML)	-	<b>0.0 to 2.5 ft.</b> <u>SANDY SILT, s(ML)</u> : About 60% fines with low plasticity, low toughness; about 40% fine, micaceous sand; moist, brown; moderately firm; 1 - 5 mm thick stratifications; abundant clam shells, woody debrie
LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County. Adjacent to the Poso Creek Drain.	_	68											1:	21.3	<ul> <li>2.5 to 6.2 ft. <u>SILTY SAND, SM</u>:</li> <li>About 75% fine, micaceous sand; about 25% fines with no plasticity: moist, brown: loose:</li> </ul>
DRILLED BY: Bureau of Reclamation: PN Region drill crew: Chris Peterson, driller Dennis Read, helper	_	-	4.9	21.4	73.7	0.0	NP	NP	14.3	SM	110.0	-			<ul> <li>homogenous.</li> <li><u>Lab Data Interval</u></li> <li>3.0 to 4.0 ft.</li> </ul>
DRILL RIG: Truck mounted Central Mining Equipment (CME) DC512	_	-									119.8	÷	SM		<ul> <li>6.2 to 8.0 ft. FAT CLAY, CH: About 95% fines with medium to high plasticity, no dilatancy, high toughness; trace fine sand; moist to wet, dark brown; moderately firm.</li> </ul>
DRILLING & SAMPLING METHODS: The drill hole was advanced and sample using a Flight Auger Dry Core system (FADC). The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i d hollow stem flight augers equipped with	5-	-											1	17.6	<ul> <li>8.0 to 10.0 ft. <u>SANDY LEAN CLAY, s(CL)</u>: About 60% fines with medium plasticity, medium toughness; about 40% fine sand; wet, tan; soft.</li> </ul>
an 8-1/2 inch o.d. bullet and spade drill bit. Continuous sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by		100.0												11.0	Lab Data Interval 9.0 to 10.0 ft.
(sampler). Unless indicated otherwise, the sampler was placed inside the augers and the cutting shoe of the sampler extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the sampler to	-	_											CH1	15.8	About 80% fine, micaceous sand; about 20% fines with low plasticity, high dilatancy; wet, brown; loose consistency, does not hold shape when removed from sampler.
avoid rotation while advancing the augers. Interval <u>Method</u> 0.0 to 30.3 ft. FADC	-												s(CL)	-	11.5 to 14.3 ft. <u>SANDY LEAN CLAY, s(CL)</u> : About 65% fines with low to medium plasticity; about 35% fine sand; wet, tan with reddish brown iron oxidation; 5 mm to 10 mm thick layers of up to 70% fine sand; firm.
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 5.0 to 8.3 ft Wet at 6.0 ft.	10-		20.3	40.0	39.7	0.0	28.3	12.6	32.8	s(CL)	) <u>113.8</u>		1 <sup>.</sup>	13.8	14.3 to 15.2 ft. <u>LEAN CLAY WITH SAND,</u> (CL)s: About 80% fines with low to medium plasticity:
DRILLNG FLUID, RETURN AND COLOR: 0.0 to 30.3 ft Drilled without fluid WATER LEVEL:	-	92.0											SM		about 20% fine sand; moist, tan with reddish brown iron oxidation; moderately firm; layered with up to 3 mm thick layers of fines with no plasticity, SILT ML.
REASON FOR HOLE TERMINATION: The hole was terminated upon reaching the target depth.	-	-											1	12.3	<b>15.2 to 15.8 ft. <u>SILT, ML</u>:</b> About 95-100% fines with low plasticity, rapid dilatancy, no toughness; trace fine sand; wet, tan with abundant reddish brown iron oxidation.
	-	_											s(CL)	-	<b>15.8 to 18.3 ft. <u>SILTY SAND, SM</u>:</b> About 85% fine, micaceous sand; about 15% fines with no plasticity; wet, tan with reddish brown iron oxidation; loose, does not hold shape when removed from sampler.
	-												10	09.5	<ul> <li><u>Lab Data Interval</u></li> <li>16.0 to 17.0 ft.</li> </ul>
	15	-										Qal	(CL)s 10 ML	08.6	18.3 to 22.0 ft. <u>POORLY GRADED SAND</u> <u>WITH SILT, SP-SM:</u> About 90% fine and medium sand; about 10% fines with no plasticity; wet, tan; loose, does
		74.0											1	08.0	not nota shape when removed from sampler.

#### COMMENTS:

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SJRRP DH

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter G.S. = Ground Surface + = Above Ground Surface T.O.C. = Top of Well Casing SJR = San Joaquin River  $\frac{V}{2}$  = Top of Groundwater

SHEET	1	OF	2

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County BEGUN: 4/17/11 FINISHED: 4/17/11 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 4.0 ft. ( 119.8 ft. - 5/15/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,250,689.0 E 6,120,617.8 NAD83 TOTAL DEPTH: 30.3 ft. DEPTH TO BEDROCK: Not Encountered STATE: California GROUND ELEVATION: 123.78 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 2 OF 2

				LAB	ORA	TOF	RY D	ΑΤΑ	۹.	NON V		1.	UAL 10N	Λ
NOTES	рертн	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORAT CLASSIFICAT	/ EI.	GEOLOGIC UNIT SYMBOL	CLASSIFICAT	CLASSIFICATION AND PHYSICAL CONDITION
HOLE COMPLETION: Completed as a groundwater monitoring well.			1.8	24.2	74.0	0.0	NP	NP	24.4	SM				Lab Data Interval 21.0 to 22.0 ft.
Well Casing: +3.05 to 10.0 ft. (2-inch I.D. blank PVC) Dual U-pack Screen: 10.0 to 25.0 ft. (2-inch I.D. inner screen; 3-inch I.D. outer screen; slotted 0.010-inch) U-Pack Screen Eilter Pack: (#2/12 Sand)	-	-									106.8		SM	<b>22.0 to 24.8 ft. SANDY LEAN CLAY, s(CL):</b> About 70% fines with medium plasticity, no dilatancy; about 30% fine sand; moist, brown; very firm; moderately cemented CaCO <sub>3</sub> , reacts strongly with HCl, crumbles with firm pressure.
Filter Pack: 8.0 to 30.3 ft. (#3 Sand) Sump: 25.0 to 30.0 ft. (2-inch I.D. blank PVC with slip cap) Concrete Seal: 0.0 to 2.0 ft. Bentonite Seal: 2.0 to 8.0 ft.	-	-											105	5.5 <b>24.8 to 25.2 ft.</b> <u>CLAYEY SAND, SC</u> : About 85% fine and medium sand; about 15% fines with low plasticity; wet, brown; moderately soft; saturated with free water.
Well Completion: 6-inch by 6-inch by 5-foot long steel surface casing with locking top; 2.0-foot diameter concrete pad. Lock: #2006 Masterlock	20—	-											SP-SM	25.2 to 28.3 ft. <u>SILTY SAND</u> : About 85% fine and medium sand, wih trace coarse sand; about 15% fines with low plasticity, low toughness; moist, brown; firm; crumbles with handling.
		50.0												Lab Data Interval 26.0 to 27.0 ft.
	-	-	0.7	4.4	94.9	0.0	NP	NP	23.1	SP-S	M 101.8		101	<b>28.3 to 29.5 ft.</b> <u>CLAYEY SAND, SC</u> : About 85% fine sand; about 15% fines with low plasticity; wet, brown; loose; some small (less than 3 mm dia) concretions of fine sand.
														Lab Data Interval 28.5 to 29.5 ft.
	-	_											s(CL)	<ul> <li>29.5 to 30.3 ft. <u>SILTY SAND, SM</u>: About 60% fine sand; about 40% fines with low to no plasticity; wet, brown; firm; holds shape when removed from sampler.</li> </ul>
	- 25 <del>-</del>												99 SC 98	<u>1.0</u> 1.6
	_	70.0												_
	_	-	4.9	10.6	84.5	0.0	NP	NP	23.9	SM	96.8		SM	-
	-	-											95	
	-	100.0	16.4	32.7	50.9	0.0	25.5	9.5	17.6	sc	94.3		SC 94	<u></u>
	30-												SM93	<u></u>
						BOT	ГОМ	OF H	OLE					_

#### COMMENTS:

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter G.S. = Ground Surface + = Above Ground Surface T.O.C. = Top of Well Casing SJR = San Joaquin River  $\frac{V}{2}$  = Top of Groundwater



#### \*NOT TO SCALE

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Dia. = Diameter

# **San Joaquin River Restoration Program** U.S. Department of Interior, Bureau of Reclamation

# MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRAP	MERC	80 W-1/MW-11-132
Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number DNR Well ID Number
1. Can this well be purged dry? Yes	No 🔀	11. Depth to Water
2. Well development method		(from top of $a_{t} = \frac{700}{100}$ ft. $700$ ft.
surged with bailer and bailed	1	well casing)
surged with bailer and pumped	51	
surged with block and bailed 4	2	Date 5,15,2011 5,15,20
surged with block and pumped	2	$\frac{d}{m m} \frac{d}{d} \frac{d}{y} \frac{y}{y} \frac{y}{y} \frac{y}{y} \frac{m m}{m} \frac{d}{d} \frac{d}{y} \frac{y}{y} \frac{y}{y}$
surged with block, bailed and pumped 🛛 7	0	1 // Pr a.m
compressed air 2	2.0	Time $c. \frac{1}{2}: \frac{7}{2} \square p.m. = \frac{12}{2}: \frac{30}{2} \square p.m.$
bailed only	0	
pumped only	51	12. Sediment in well inches inches
pumped slowly	0	bottom
Other	<u> </u>	13. Water clarity Clear 10 Clear 20
3. Time spent developing well	<u>15 min.</u>	(Describe) (Describe)
4. Depth of well (from top of well casisng) $33$	. <u>D</u> ft.	Brown
5. Inside diameter of well $\frac{2}{2}$	in.	
6. Volume of water in filter pack and well casing	gal.	Fill in if drilling fluids were used and well is at solid waste facility:
7. Volume of water removed from well 55	Øgal.	14 Total suspended me/l me/l
8. Volume of water added (if any)	gal.	solids
9. Source of water added		15. COD mg/l mg/l
		16. Well developed by: Name (first, last) and Firm
10. Analysis performed on water added?	28 🗆 No	First Name: Last Name:
		Firm: USBR PN DRILL CROW
17. Additional comments on development: SURCESS WITH W/BLOCK + E 2 FEET UNTIL 5 GALS, PL PUMPER WITH SUMP PUM	3ACC CH UMPED, PUNTIL	ECK VALVE FOR SEVERAL MINUTESEVENY CLEAR,
Name and Address of Facility Contact (Oumar/Demonstel	a Partu	
First Last Name: Name:	e Farty	I hereby certify that the above information is true and correct to the best of my knowledge.
Facility/Firm		Signature:
Street:		Print Name:
City/State/Zip:		Firm:

NOTE: See instructions for more information including a list of county codes and well type codes.
FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County BEGUN: 4/18/11 FINISHED: 4/18/11 DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 5.2 ft. ( 113.9 ft. - 4/27/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,250,112.1 E 6,114,595.3 NAD83 TOTAL DEPTH: 29.7 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 119.10 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 1 OF 2

		LABORATORY DATA								ORY 10N	/		UAL TION	/	
NOTES	рертн	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORATO CLASSIFICAT	EI.	GEOLOGIC UNIT SYMBOL	CLASSIFICAT	/ EI.	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.															0.0 to 29.7 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover a continuous soil core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	-											s(CH)	-	<ul> <li>0.0 to 2.4 ft. <u>SANDY FAT CLAY, s(CH)</u>:</li> <li>About 60% fines with high plasticity, high toughness; about 40% fine sand; dry to moist, dark brown; moderately soft; trace live roots, woody material, worms; organic odor.</li> </ul>
LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County. Field west of Jerrold Avenue, at Arroyo Canal.	-	91.5											116	<u>6.7</u>	<ul> <li>2.4 to 11.3 ft. FAT CLAY, CH: About 90% fines with high plasticity, high toughness; about 10% fine, micaceous, sand; moist to dry, dark brown; very firm; homogenous.</li> </ul>
DRILLED BY: Bureau of Reclamation: PN Region drill crew: Chris Peterson, driller Dennis Read, helper Cody Kelley, helper	_	-													Note: 9.7 to 11.3 ft.: About 0.5 ft. thick sandy pockets with reddish brown iron oxidation at contacts.
DRILL RIG: Truck mounted Central Mining Equipment (CME)	_														Lab Data Interval 6.0 to 7.0 ft.
DC512 DRILLING & SAMPLING METHODS: The drill hole was advanced and sample using a Flight Auger Dry Core system (FADC). The drill	5—											Ţ			11.3 to 12.9 ft. <u>SANDY LEAN CLAY, s(CL)</u> : About 70% fines with medium plasticity, medium toughness; about 30% fine sand; dry to moist, tan; firm but crumbled under drilling action.
inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5-foot long split barrel dry core sample system (sampler). Unless indicated otherwise, the	-	-	45.1	40.0	14.9	0.0	46.6	27.5	25.0	CL 1	12.1		СН		<b>12.9 to 13.8 ft. <u>LEAN CLAY, CL</u>:</b> About 90-95% fines with medium plasticity, medium toughness; about 5-10% fine sand; wet, tan and gray with reddish brown iron oxidation; moderately firm; 1 to 5 mm thick layers.
sampler was placed inside the augers and the cutting shoe of the sampler extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the sampler to avoid rotation while advancing the augers.	_	100.0												-	<b>13.8 to 14.7 ft.</b> <u>SILT WITH SAND, (ML)s</u> : About 80% fines with low plasticity, low toughness; about 20% fine sand; wet, tan and gray with reddish brown iron oxidation; moderately firm; holds shape when removed from sampler.
0.0 to 29.7 ft. FADC	_														Lab Data Interval
9.7 to 14.7 ft Wet at bottom.															14.7 to 22.5 ft. <u>No Recovery</u> Classified as POOPLY SOPTED SAND WITH
DRILLNG FLUID, RETURN AND COLOR: 0.0 to 29.7 ft Drilled without fluid	10—													-	<ul> <li>SILT, (SP-SM) from trace present on shoe and</li> <li>from drilling action; About 90% fine sand; about 10% fines with no plasticity; wet, gray.</li> </ul>
WATER LEVEL: 5.2 ft 4/27/2011 REASON FOR HOLE TERMINATION: The hole was terminated upon reaching the target depth.	_	-											10	7.8	22.5 to 24.8 ft. <u>POORLY GRADED SAND</u> <u>WITH SILT, SP-SM</u> : About 95-90% fine and medium sand, with trace coarse sand; about 5-10% fines with no plasticity; wet, tan; holds form when removed from sampler; layered in 0.1 to 0.5 ft. thick
	_	84.0											s(CL)		Lab Data Interval 23.0 to 24.0 ft.
	-	-											106 CL 105	<u>5.2</u>	<ul> <li>24.8 to 26.0 ft. <u>SILTY SAND, SM:</u> About 85% fine sand; about 15% fines with no plasticity; wet, tan, black and reddish brown layers; dense, holds shapes when removed from sampler; layered in 0.1 to 0.2 ft. thick</li> <li>stratifications .</li> </ul>
			17.0	65.8	17.2	0.0	NP	NP	24.1	(ML)s 10	04.4	Qal	(ML)s 104	4.4	Lab Data Interval 25.0 to 26.0 ft.
COMMENTS		<u> </u>	L						L	I			I	-	

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FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter

G.S. = Ground Surface + = Above Ground Surface T.O.C. = Top of Well Casing SJR = San Joaquin River

Top of Groundwater

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 180, Fresno County BEGUN: 4/18/11 FINISHED: 4/18/11 DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 5.2 ft. ( 113.9 ft. - 4/27/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,250,112.1 E 6,114,595.3 NAD83 TOTAL DEPTH: 29.7 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 119.10 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 2 OF 2

					LAB	ORA	TOF	RY D	ΟΑΤΑ	۶	10N		TION	Λ
	NOTES	DEPTH	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORAT CLASSIFICAT	GEOLOGIC UNIT SYMBOL	CLASSIFICAT	CLASSIFICATION AND PHYSICAL CONDITION
	HOLE COMPLETION: Completed as a groundwater monitoring well.	_	-										/	26.0 to 28.2 ft. POORLY GRADED SAND WITH SILT. SP-SM:
	Well Casing: +3.1 to 14.4 ft. (2-inch I.D. blank													About 90% fine and medium sand, with trace coarse sand; about 10% fines with no
	PVC) Dual U-pack Screen: 14.4 to 29.4 ft. (2-inch I.D.	-												<ul> <li>plasticity; wet, tan; layered in 0.2 to 0.5 ft. thick stratifications.</li> </ul>
	0.010-inch) U-Pack Screen Filter Pack: (#2/12 Sand) Filter Pack: 12.0 to 29.7 ft. (#3 Sand) Sump: 29.4 to 29.7 ft. (2-inch I.D. blank PVC with slip cap)	-	_											<ul> <li>28.2 to 29.7 ft. <u>SILTY SAND, SM</u>: About 55% fine sand; about 45% fines with no plasticity, rapid dilatancy; wet, tan with reddish brown; moderately dense; free water pooled on surface after being placed into box.</li> </ul>
	Concrete Seal: 0.0 to 2.0 ft. Bentonite Seal: 2.0 to 12.0 ft. Well Completion: 6-inch by 6-inch by 5-foot long	-												_
	diameter concrete pad. Lock: #2006 Masterlock		0.0										SP-SM	
		-												-
		20-												_
		20												
		-	_											-
		-	-											-
													96.	6
		-												-
			100.0	0.6	5.5	93.9	0.0	NP	NP	22.0	SP-SM		SP-SM	
		-									95.1			-
													94.	3
		25-		4.0	4.1	01.1	0.0	ND		27.0	ed em		SM	-
				4.0	4.1	91.1	0.0			27.0	93.1		93.	1
			100.0											
		-	-										SP-SM	-
4:04 PN		-											90.	9
/11 3:5-			100.0											
J 11/6		-											SM	-
RRP.GF							BOT						89.	4
PJ SJI	COMMENTS:						501			JLL	Well cor	nnlot	ion infor	mation is provided in attached Well Completion
SJRRP.G	FADC = Flight Auger Dry CoreG.S.NP = Non-Plastic+ = ANR = No RecoveryT.O.	= Gro Above C. = 1	ound Grou Fop of	Surfa und S We	ace Surfa II Ca	ce sing					Diagram Well Dev	velop	Il develo ment fo	opment information is provided in attached Monitoring rm.

# COMMENTS:

SJRRP DH

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter

G.S. = Ground Surface + = Above Ground Surface T.O.C. = Top of Well Casing SJR = San Joaquin River

Top of Groundwater



# \*NOT TO SCALE

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Dia. = Diameter

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# **San Joaquin River Restoration Program** U.S. Department of Interior, Bureau of Reclamation

		12	-
MONITORING	WELL	DEVEL	OPMENT

					1.1
Facility/Project Name STRRP	County Name	Fresha	Well Name	MMI-I	1-133
Facility License, Permit or Monitoring Number	County Code	Wis, Unique Well N	umber	DNR Well ID	Number
1. Can this well be purged dry? Yes			Before Dev	elopment A	fter Development
2. Well development method	, ,	(from top of	a5.	22ft	5.120
surged with bailer and bailed $\Box$	4 1	well casing)			
surged with bailer and pumped	61		A 0-	7	1 0 + 0 -
surged with block and bailed	4 2	Date	b.0412	12011	041271201
surged with block and pumped	62		mm do	зуууу	mm dd yyy
surged with block, bailed and pumped	70	Time	13.49	7 [] <sup>a.m.</sup>	5.12 a.m.
hailed only	20	1 mic	C. <u>I.</u>		
pumped only	51	12. Sediment in well	trace	- inches	inches
pumped slowly	50	bottom			
Other []		13. Water clarity	Clear 📋 1	0 Cle	ar 72×20
			Turbid 251	5 Tu	rbid 🗆 25
3. Time spent developing well	min.		(Describe)	(De	scribe)
ing: 3.1 stick-rup	7.		time so	ina, (	lear, gray
4. Depth of well (from top of well casisne)	<u> </u>		prown	C	est, po
5 Inside diameters of well	- 6 U		1. 1111		Sand
5. Inside diameter of well $\underline{-}$	<u> </u>				and the second second second second for the or second
6. Volume of water in filter pack and well					and was a state of the production of the communication of the state of the state of the state of the state of the
casing	eal.	- 2			annanderformerekannen an an en en en en en en er en er en er en er en
		Fill in if drilling fluid	ds were used a	nd well is at so	lid waste facility:
7. Volume of water removed from well	gal.	1			
8. Volume of water added (if any)	gal.	14. Total suspended solids		mg/l	mg/l
9. Source of water added	. R. marr	15. COD		mg/l	mg/l
10 Applying performed on vertex added?		16. Well developed t	by: Name (first,	last) and Firm	11-ace
(If yes, attach results)	CS DA NO	First Name: Mile		Last Name: L	Jarren
		Firm: BGR		li.	
17. Additional comments on development: 1349 Builed & gallons using ba @ 15 feet, and pumpin,	y value &	min each	starting foot, 8	from Water 1ª	top of scree sturbid, brow
& contained ~ I inch in Due	cket tru	2; micaceou	S JUITION	. /	
442: Purge pump @ bottom ; ,	2 g/m	pump rate	2,45	Galkh	S Until
he sand	Sec.		/		
Name and Address of Facility Contact /Owner/Responsil	ole Party	I hereby cartify the	at the above in	formation is to	w and correct to the hest
First Last		of my knowledge	at the alkove III	iornation is tu	a and correct to the pest
Name: Name:		1			
Facility/Firm		Signature:	A	~	
1 uviiii j/1 iiii	· · · · · ·	40	A		
Street:		Print Name:	AII W	avrer	<u>\</u>
City/State/Zip		Firm: R	OR		
		l			
NOTE: See instructions for more information in	neluding a list o	f county codes and v	vell type code	es,	
Desid the could be follow	V Good	-		12-	
16221 PA PANEC IN ATTAC	JENNO.				
				2	

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 177.4, Fresno County BEGUN: 4/19/11 FINISHED: 4/19/11 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 5.5 ft. ( 111.6 ft. - 5/15/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,256,655.8 E 6,112,405.1 NAD83 TOTAL DEPTH: 29.5 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 117.08 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 1 OF 2

				LAB	ORA	TOF	RY D	DATA	Ą	ORY 10N	/		UAL		
NOTES	DEPTH	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORATO CLASSIFICAT	EI.	GEOLOGIC UNIT SYMBOL			CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.															0.0 to 29.0 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover a continuous soil core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-												(CL	/OL)s	0.0 to 3.0 ft. <u>LEAN CLAY WITH</u> <u>SAND/ORGANIC WITH SAND, (CL/OL)</u> s: About 80% fines with medium plasticity, low toughness; about 20% fine sand; moist, dark brown; very firm; sticky texture when wet, moderate reaction with HCl; finely layered from 2.1 to 2.0 ft, with proprior addre updoting dates the second sec
Reach 4A, River Bank Left, RM 177.4, Fresno County. In a field to the east of the intersection of Jerrold Avenue and Hudson Avenue.		97.8													3.0 to 4.0 ft. <u>SANDY SILT. s(ML):</u> About 65% fines with low plasticity: about 45% fines with low plasticity: about 45%
DRILLED BY: Bureau of Reclamation: PN Region drill crew: Chris Peterson, driller	-		16.1	36.8	47.1	0.0	NP	NP	20.2	s(ML)			s(M	<u>114.1</u> IL)	moderately soft; layered with 0.1 to 0.3 ft. thick stratifications.
Cody Kelley, helper	_										113.1			113.1	3.0 to 4.0 ft.
DRILL RIG: Truck mounted Central Mining Equipment (CME) DC512													CL	112.7	4.0 to 4.4 ft. <u>LEAN CLAY, CL</u> : About 95% fines with low plasticity, slow dilatancy, low toughness; about 5% fine sand; moist brown: firm
DRILLING & SAMPLING METHODS: The drill hole was advanced and sample using a Flight Auger Dry Core system (FADC). The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous sampling was performed by	5-	-										Ţ			<ul> <li>4.4 to 9.5 ft. <u>SILTY SAND, SM</u>: About 70% fine sand; about 30% fines with low plasticity; wet, brown; micaceous; soft and crumbles, does not hold form when removed from sampler.</li> </ul>
advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5-foot long split barrel dry core sample system (sampler). Unless indicated otherwise, the sampler was placed inside the augers and the cutting shoe of the sampler extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the sampler to avoid rotation while advancing the augers.	-	30.0											SM		Lab Data Interval 8.5 to 9.5 ft. 9.5 to 19.5 ft. <u>No Recovery</u> Classified as POORLY SORTED SAND, SP, from drilling action and trace recovery in sampler shoe. About 95% fine to medium sand, trace coarse sand; about 5% fines with no plasticity; wet,
Interval Method 0.0 to 29.5 ft. FADC															gray; loose. 19.5 to 20.4 ft. <u>LEAN CLAY WITH SAND,</u>
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 4.5 to 9.5 ft Wet at 7.0 ft. 9.5 to 14.5 ft Add catcher. 14.5 to 19.5 ft Add catcher and baggie.	-		11.6	20.0	68.4	0.0	NP	NP	23.0	SM	107.6			107.6	<ul> <li>About 85% fines with medium plasticity, no dilatancy, high toughness; about 15% fine sand; trace mica; moist, gray; very firm; homogenous.</li> </ul>
DRILLING FLUID, RETURN AND COLOR: 0.0 to 29.5 ft Drilled without fluid	10—														<ul> <li><u>Lab Data Interval</u></li> <li>19.5 to 20.0 ft.</li> </ul>
WATER LEVEL: 5.5 ft 5/15/2011	-														20.4 to 21.4 ft. <u>SANDY LEAN CLAY, s(CL)</u> : About 60% fines with medium plasticity; about 40% fine sand; moist, gray; moderately firm; gradated lower contact.
<b>REASON FOR HOLE TERMINATION:</b> The hole was terminated upon reaching the target depth.	-	0.0													21.4 to 24.0 ft. <u>CLAYEY SAND, SC</u> : About 70% fine sand; about 30% fines with low plasticity; moist, brown; micaceous; moderately dense.
	_	-													24.0 to 24.9 ft. <u>SILT, ML:</u> About 95-100% fines with low plasticity, no toughness; trace fine sand; moist, brown to tan; firm.
	-														Lab Data Interval 24.0 to 24.9 ft.
												Qal	SP		
COMMENTS:	I	<u> </u>		I				I							L

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SJRRP DH SJRRP.GPJ SJRRP.GPJ 11/8/11 3:54:04 PM

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter

G.S. = Ground Surface H = Above Ground Surface
 T.O.C. = Top of Well Casing
 SJR = San Joaquin River
 F = Top of Groundwater



# COMMENTS:

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SJRRP DH

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter G.S. = Ground Surface + = Above Ground Surface T.O.C. = Top of Well Casing SJR = San Joaquin River ¥ = Top of Groundwater

MW-11-134	GEOLOGIST: A. Warren					
WELL COMPLETION DIAGRAM	DRILLER: C. Peterson					
DATE COMPLETED: 4/19/2011 HELPERS: D. Read & C. Kelly						
LOCATION: In a field to the east of the intersection of Jerrold Ave and Hudson Ave. Reach 4A. River Bank Left.						

RM 177.4, Fresno County.

T.O.C. COORDINATES: N2256655.75 E6112405.0 (NAD83) ELEVATION 116.87' (NAVD88)

G.S. ELEVATION: 117.08' (NAVD88) (measured at vault rim)



8" Dia. Traffic-rated Flush-to-ground-surface vault - Requires 9/16" socket wrench to open

# **\*NOT TO SCALE**

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, EI. = Elevation Dia. = Diameter

# San Joaquin River Restoration Program U.S. Department of Interior, Bureau of Reclamation

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# MONITORING WELL DEVELOPMENT

E-cilia./Devices Norma		Wall Mama
S TP D D	County Name AAprel	Well Name W-5 /MWI-11-134
Facility License, Permit or Monitoring Number	County Code	Wis, Unique Well Number DNR-Well ID'Number
The first state of the first sta		
1. Can this well be purged dry? Yes		Before Development After Development
		11. Depth to Water
2. Well development method		(from twp-of a. $220$ ft. $560$ ft.
surged with bailer and bailed	4.1	wellcasing) Ground
surged with bailer and pumped	61	
surged with block and bailed	<sup>42</sup>	Date b. $5/15/2011 - 5/51/201$
surged with block and pumped	62	mm dd yyyy mm dd yyy
surged with block, bailed and pumped	70	9.45×a.m. 1/22×a.m.
compressed air	20	$c. \underline{-i}: \underline{-2} \square p.m. \underline{-1}: \underline{-2} \square p.m.$
	10	12 Sediment in well inchae inchae
pumped only	51	bottom
	50	13 Water clarity Clear D 10 Clear D 20
	11 H	Turbid 15 Turbid 25
3. Time spent developing well	98.	(Describe) (Describe)
oraind	<u></u> min.	brown,
4. Depth of well (from top of well casisne)	9.9 ft.	Sandy
5. Inside diameter of well	O O in.	
.21		
6. Volume of water in filter pack and well	$\sim$	
casing (_\_	gal.	
5	10.	Fill in if drilling fluids were used and well is at solid waster facility:
7. Volume of water removed from well	$\underline{\bigcirc}$ $\underline{\bigcirc}$ gal.	
8 Volume of water added (if any)		14. Total suspended mg/
8. Volume of water added (if any)	gai.	sonor
9. Source of water added		15. COD mg/l
		anna anna anna anna tana "''O"'''''''''''''''''''''''''''''''''
		16. Well developed by: Name (first, last) and Firm
10. Analysis performed on water added?	Yes 🛛 No	First Name: Last Name:
(If yes, attach results)		ILSOP DN Region Only
17. 4.452		Firm: USDK 114
17. Additional comments on development:	la value	for general minutes every 2 feet
Durged we block a ball cried		
Until D gallens pum	PEQ .	
· pumpéd w/ sump pump -	- purged d	dry after 3 gallons pumped @ 10:10
i end i i li	F /	V reduce to 19,1 @ 10:12,17.50101400
· pumped   gallons to purge dry, ver	tharge	
Name and Address of Facility Contact /Owner/Respon	sible Party	I have by east for that the phone information is town and partner to the best
First Last		of my knowledge.
Name: Name:		or my monoreger
Prolition (Rimme		Signature:
Facility/Fitm:		· · · · · · · · · · · · · · · · · · ·
Street:		Print Name:
City/State/Zip:		Firm
R		
NOTE: See instructions for more information	including a list o	of county codes and well type codes.

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FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 177.4, Fresno County BEGUN: 4/20/11 FINISHED: 4/20/11 DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 5.1 ft. ( 114.0 ft. - 5/15/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,256,427.0 E 6,111,860.2 NAD83 TOTAL DEPTH: 29.5 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 119.12 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 1 OF 2

													1.	UAL	NO /		
NOTES	ЭЕРТН	% CORE		GUU.U>	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY NDEX	% MOISTURE	LABORATC CLASSIFICATI	EI.	GEOLOGIC UNIT		CLASSIFICAT		CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.					v	0.	0.					1					0.0 to 29.5 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover a continuous soil core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.		-												(MI	L)s	0. – A fir oi	0 to 2.6 ft. <u>SILT WITH SAND, (ML)s</u> : bout 70% fines with no plasticity; about 30% ne sand; moist, brown; moderately firm; trace rganic content; living roots, woody debris.
LOCATION: Reach 4A, River Bank Left, RM 177.4, Fresno County. Field east of Jerrold Avenue.		93.:	3												116.5	– A w se	6 to 4.9 ft. <u>POORLY GRADED SAND, SP</u> : bout 95% fine to coarse sand; about 5% fines ith no plasticity; dry, gray; fining upward equence; loose.
DRILLED BY: Bureau of Reclamation: PN Region drill crew: Chris Peterson, driller		_	_	_												- <u>La</u> - 3.	<u>ab Data Interval</u> 0 to 4.0 ft.
Dennis Read, helper Cody Kelley, helper			1	.5 6	6.6	91.9	0.0	NP	NP	7.1	SP-S	5M 115.1	-	SP		<b>4</b> . A di	9 to 9.2 ft. FAT CLAY, CH: bout 100% fines with high plasticity, no latancy, high toughness; moist, dark brown;
Truck mounted Central Mining Equipment (CME) DC512																Li 8	ab Data Interval
DRILLING & SAMPLING METHODS: The drill hole was advanced and sample using a Flight Auger Dry Core system (FADC). The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by	5-	-											Ţ		114.2	- 9. A m _ se u	<b>2 to 11.4 ft. <u>SANDY LEAN CLAY, s(CL</u>):</b> bout 65% fines with medium plasticity, ledium toughness; about 35% fine sand; loist, tan; 5 mm to 10 mm thick laminations; equence from 9.2 to 12.2 ft. gradually fines owards.
5-foot long split barrel dry core sample system (sampler). Unless indicated otherwise, the sampler was placed inside the augers and the cutting shoe of the sampler extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the sampler to avoid rotation while advancing the augers.		-100.	0											СН	I	1 A – w de 12 A	<ul> <li>1.4 to 12.2 ft. <u>CLAYEY SAND, SC</u>: bout 50-55% fine sand; about 50-45% fines ith medium plasticity; moist to wet, tan; ense; 0.1 thick stratifications.</li> <li>2.2 to 23.5 ft. <u>SILTY SAND, SM</u>: bout 70% fine sand; about 30% fines with low</li> </ul>
Interval Method 0.0 to 29.5 ft. FADC			55	5.9 3	6.6	7.5	0.0	56.8	35.9	26.9	сн					- pi fc	asticity; wet, tan; moderately loose; holds irm when removed from sampler.
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 9.5 to 14.5 ft - Heaving sand in auger		-	_	_								110.1			109.9	- <u>1</u>	7.0 to 18.0 ft.
DRILLING FLUID, RETURN AND COLOR: 0.0 to 29.5 ft Drilled without fluid	10-															A pl	bout 90% fine sand; about 10% fines with no asticity; wet, gray.
WATER LEVEL: 5.1 ft 5/15/2011	10													s(C	CL)	<u>La</u> 23	<u>ab Data Interval</u> 3.5 to 24.5 ft.
<b>REASON FOR HOLE TERMINATION:</b> The hole was terminated upon reaching the target depth.															107.7	– <b>2</b> A fir 02	8.2 to 29.5 ft. <u>SANDY SILT, s(ML)</u> : bout 60% fines with no plasticity; about 40% ne sand; moist, tan with reddish brown iron kidation; firm; about 1 mm to 3 mm thick yers of coarse sand moderately cemented
		50.0	þ												106.9	– w H	ith CaCO $_3$ and oxidation, strong reaction with Cl.
		-														-	
																_	
													Qal				
COMMENTS: FADC = Flight Auger Dry Core G.S	6. = Gi	ound	d Su	urfac	ce						We Dia	ll cor gram	nple . W	tion ell d	inform levelop	ation ment	is provided in attached Well Completion information is provided in attached Monitoring

# SJRRP DH SJRRP.GPJ SJRRP.GPJ 11/8/11 3:54:05 PM

NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter H = Above Ground Surface
 T.O.C. = Top of Well Casing
 SJR = San Joaquin River
 F = Top of Groundwater

Well Development form.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 177.4, Fresno County BEGUN: 4/20/11 FINISHED: 4/20/11 DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 5.1 ft. ( 114.0 ft. - 5/15/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,256,427.0 E 6,111,860.2 NAD83 TOTAL DEPTH: 29.5 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 119.12 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 2 OF 2

					LAB	ORA	TOF	RY D	ΑΤΑ		ION (			
	NOTES	ЭЕРТН	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	-Ιαυιρ μιμιτ	PLASTICITY NDEX	% MOISTURE CONTENT	CLASSIFICAT CLASSIFICAT	GEOLOGIC UNI SYMBOL	CLASSIFICAT	CLASSIFICATION AND PHYSICAL CONDITION
	HOLE COMPLETION:		0.1	V	V	01	01		<u> </u>					
	Well Casing: +2.39 to 14.2.0 ft. (2-inch I.D. blank PVC) Dual U-pack Screen: 14.2 to 29.2 ft. (2-inch I.D. inner screen; 3-inch I.D. outer screen; slotted 0.010-inch) U-Pack Screen Filter Pack: (#2/12 Sand)	-	-											_
	Filter Pack: 11.0 to 29.5 ft. (#3 Sand) Sump: 29.2 to 29.5 ft. (2-inch I.D. blank PVC with slip cap) Concrete Seal: 0.0 to 2.0 ft. Bentonite Seal: 2.0 to 11.0 ft. Well Completion: 6-inch by 6-inch by 5-foot long steel surface casing with locking top; 2.0-foot diameter concrete pad.	_	- 22.0	6.8	6.5	86.7	0.0	NP	NP	26.6	SM 101.1		SM	-
	Lock: #2006 Masterlock	-												_
		20-												
		-	-											_
		-	- 38.0											_
		-											95.6	-
		-	-	5.2	6.6	88.2	0.0	NP	NP	26.6	SP-SM 94.6			_
		25-											SP-SM	-
		_	48.0											_
05 PM		-	-											_
11/8/11 3:54:0		-	-										s(ML)	-
RP.GPJ							вотт	TOM (	DF H	OLE			89.6	]
3PJ SJR	COMMENTS:										Well con	nplet	tion inform	nation is provided in attached Well Completion
SJRRP DH SJRRP.(	FADC = Flight Auger Dry CoreG.S.NP = Non-Plastic+ = ANR = No RecoveryT.O.CNA = Not ApplicableSJRI.D. = Inner Diameter¥ = 1O.D. = Outer Diameter¥ = 1	= Gro Nove C. = T = Sar Top o	ound Grou Top o n Joa f Gro	Surfa und S f We quin oundv	ace Surfa II Ca Rive vater	ce sing r					Diagram Well Dev	. We velop	ell develop oment forr	SHEET 2 OF 2 DRILL HOLE MW-11-135



# \*NOT TO SCALE

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Dia. = Diameter

# **San Joaquin River Restoration Program** U.S. Department of Interior, Bureau of Reclamation

# MONITORING WELL DEVELOPMENT

E			1337-11 M						
$\sim \langle \nabla \rho \rho \rho$	County Name	ad	Well Name W-6/MW-11-135						
Facility License Permit or Monitoring Number	County Code	Wis Unique Well N	umber DNR Well ID Number						
racinty Electric, remit of Moldoring Pulliber	county code	ma. onque men re							
1. Can this well be purged dry? Yes	No 🕅	11 Depth to Water	Before Development After Development						
2. Well development method		(from top of	.9100 9300						
surved with bailer and bailed $\Box$ 4	1	well casing)	684 andin even even a even same <sup>3 v</sup> even' ander and a mile even <sup>6 3</sup> *						
surged with bailer and pumped	1								
surged with block and bailed	2	Date	5,15,2011 5,15,20						
surged with block and pumped	2		m m d d y y y y m m d d y y y y						
surged with block, bailed and pumped 7	0								
compressed air	0	Time	$c_{1} = 1 = 0$ $p_{m}$ $q_{1} = 1$ $p_{m}$						
bailed only	0	1							
pumped only	1	12. Sediment in well	<u>inches</u> inches						
pumped slowly	0	bottom							
Other		13. Water clarity	Clear 10 Clear 20						
		-	Turbid 15 Turbid 25						
3. Time spent developing well 4	O min.		(Describe) (Describe)						
25	6		brown & Sr. cloudy						
4. Depth of well (from top of well casisng)	. <u> </u>		sandy						
· (	()								
5. Inside diameter of well	$2 \subseteq in.$								
			Mehrinzeiten eine Mehrinzeiten zum der Bereine Stehnisten der Versten der Vers						
6. Volume of water in filter pack and well	2	18							
casing	gal.	12							
10	0	Fill in if drilling flui	ds were used and well is at solid waste facility:						
7. Volume of water removed from well	gal.								
		14. Total suspended	mg/l						
8. Volume of water added (if any)	gal.	solids							
9 Source of water added		15 COD	mg/l mg/l						
	0101111	15.000							
	~	16. Well developed b	Dy: Name (first, last) and Firm						
10. Analysis performed on water added?	s X No	First Name:	Last Name:						
(If yes, attach results)		LISOV	DN Oull and						
Ann		Firm: USDL	Th Drul crew						
Surged w/ block & ball check	k valve	, surged, at	Pout 5 gallons of brown						
pumped w/ Sump pump unt	1 viciti TH	is clear for . M.I.	10 saliona						
Name and Address of Facility Contact/Owner/Responsibl	e Party	I hereby certify the	at the above information is true and correct to the best						
First Last		of my knowledge.							
Name: Name:			an a						
Facility/Firm:	-	Signature:							
Street:		Print Name:							
City/State/Zip:		Firm:							
	·····	1							

NOTE: See instructions for more information including a list of county codes and well type codes.

FEATURE: Groundwater Monitoring LOCATION: Reach 4A, River Bank Left, RM 177.4, Fresno County BEGUN: 4/27/11 FINISHED: 4/27/11 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 4.8 ft. ( 111.9 ft. - 5/16/2011 )

PROJECT: San Joaquin River Restoration Project COORDINATES: N 2,256,245.7 E 6,110,606.5 NAD83 TOTAL DEPTH: 29.6 ft. DEPTH TO BEDROCK: Not Encountered

STATE: California GROUND ELEVATION: 116.72 ft. NADV88 ANGLE FROM HORIZONTAL: -90° HOLE LOGGED BY: A. Warren REVIEWED BY: T. Lewis

SHEET 1 OF 2

			LABORATORY DATA										UAL 10N	/	
NOTES	рертн	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LABORATO CLASSIFICAT	/ EI.	GEOLOGIC UNIT SYMBOL	UIS CLASSIFICAT	1.	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.															0.0 to 29.6 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover a continuous soil core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-	_											s(ML) 114	.9	0.0 to 1.8 ft. <u>SANDY SILT, s(ML)</u> : About 60% fines with no to low plasticity, low toughness; about 40% fine sand, with trace medium sand; dry, brown; firm; no reaction with HCL.
<b>LOCATION:</b> Reach 4A, River Bank Left, RM 177.4, Fresno County. At a yard of the intersection of Jerrold Avenue and Hudson Avenue in the southwest corner.	-	100.0													<b>1.8 to 7.2 ft. FAT CLAY, CH:</b> About 100% fines with high plasticity, no dilatancy, high toughness; trace fine sand; moist, dark brown; very firm; weak reaction with HCL on white CaCO <sub>3</sub> concretions from 5.5 to 7.2 ft.
DRILLED BY: Bureau of Reclamation: PN Region drill crew: Chris Peterson, driller Dennis Read, helper	_														Lab Data Interval 4.0 to 5.0 ft.
Cody Kelley, helper <b>DRILL RIG:</b> Truck mounted Central Mining Equipment (CME) DC512	5-		58.8	33.2	8.0	0.0	54.6	36.7	24.7	СН 11	11.7	Ţ	СН		7.2 to 11.1 ft. LEAN CLAY, CL: About 90% fines with low plasticity, no toughness; about 10% fine sand; wet to moist, tan with trace reddish brown iron oxidation; moderately firm.
DRILLING & SAMPLING METHODS: The drill hole was advanced and sample using a															Lab Data Interval 10.0 to 11.0 ft.
Flight Auger Dry Core system (FADC). The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous sampling was performed by	-	_												_	<b>11.1 to 19.0 ft. <u>SILTY SAND, SM</u>:</b> About 85% fine sand; about 15% fines with no plasticity; wet, brown; loose; flows into box.
advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5-foot long split barrel dry core sample system (sampler). Unless indicated otherwise, the sampler was placed inside the augers and the	-	100.0											109	.5	Note: 14.6 to 19.0 ft.: 15 to 20% fines; sand grain size coarsens to include medium. Lab Data Interval
cutting shoe of the sampler extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the sampler to avoid rotation while advancing the augers.	-													-	14.0 to 15.0 ft. 19.0 to 20.6 ft. <u>LEAN CLAY WITH SAND,</u> (CL)s:
Interval Method 0.0 to 29.6 ft. FADC	-												CL	_	About 85% fines with low plasticity, medium toughness; about 15% fine sand, with trace medium sand; wet, olive brown with reddish brown iron oxidation at upper contact; firm; no
COMMENTS: NA															Lab Data Interval
DRILLING FLUID, RETURN AND COLOR: 0.0 to 29.6 ft Drilled without fluid	10—	1												┢	20.6 to 21.3 ft. <u>CLAYEY SAND. SC</u> :
WATER LEVEL: 4.8 ft 5/16/2011	_		44.4	42.1	13.5	0.0	37.6	19.8	28.0	CL 10	05.7		105	6	plasticity, low to medium toughness; moist, olive brown; very dense; no reaction with HCL.
<b>REASON FOR HOLE TERMINATION:</b> The hole was terminated upon successful completion to the target depth.	-	68.0												_	21.3 to 24.2 ft. Interbedded CLAYEY SAND AND SANDY LEAN CLAY, SC & s(CL): About 70% fine sand; about 30% fines with low plasticity layered in stratifications about 0.1 to 0.4 ft. thick with about 70% fines with low plasticity; about 30% fine sand; moist, olive brown; moderately firm: no reaction with HCL.
	-	-												_	<b>24.2 to 25.5 ft. <u>CLAYSTONE</u>:</b> About 90% fines with medium plasticity; about 10% fine sand; moist, tan with reddish brown iron oxidation layers throughout; finely laminated in 1 to 5 mm weakly to strongly cemented layers; no reaction with HCL.
			4.6	6.7	88.7	0.0	NP	NP	21.4	SW-SM	01.7	Qal			
COMMENTS:															

# С

SJRRP DH SJRRP.GPJ SJRRP.GPJ 11/8/11 3:54:05 PM

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter

G.S. = Ground Surface H = Above Ground Surface
 T.O.C. = Top of Well Casing
 SJR = San Joaquin River
 F = Top of Groundwater



# COMMENTS:

SJRRP.GPJ 11/8/11 3:54:05 PM

SJRRP.GPJ

SJRRP DH

FADC = Flight Auger Dry Core NP = Non-Plastic NR = No Recovery NA = Not Applicable I.D. = Inner Diameter O.D. = Outer Diameter G.S. = Ground Surface + = Above Ground Surface T.O.C. = Top of Well Casing SJR = San Joaquin River ₹ = Top of Groundwater

MW-11-136	GEOLOGIST: A. Warren
WELL COMPLETION DIAGRAM	DRILLER: C. Peterson
DATE COMPLETED: 4/27/2011	HELPERS: D. Read & C. Kelly

LOCATION: Southwest corner of yard at intersection of Jerrold Ave and Hudson Ave. Reach 4A, River Bank Left, RM 177.4, Fresno County.

T.O.C. COORDINATES: N2256245.68 E6110606.47 (NAD83) ELEVATION 116.39' (NAVD88)

G.S. ELEVATION: 116.72' (NAVD88) (measured at vault rim)



8" Dia. Traffic-rated Flush-to-ground-surface vault - Requires 5/16" Allen wrench to open

# **\*NOT TO SCALE**

NOTES:

T.O.C. = Top of well casing, I.D. = Inner Diameter, G.S. = Ground Surface, El. = Elevation Dia. = Diameter

# **San Joaquin River Restoration Program** U.S. Department of Interior, Bureau of Reclamation

# MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name	-11A4136
S S KKI <sup>-</sup>	NEVCEO Course Code Wis I	Wall Number I DNP V	/ MW-100
Facility License, Fernin of Monitoring Munoci			<u> </u>
1. Can this well be purged dry? Yes	No 11. D	Before Developme	nt After Developmen
2. Well development method	(frc	n top of $a = 4.90$ f	4 59 1
surged with bailer and bailed $\Box$ 4	1 wel	casing)	round custome
surged with bailer and pumped $\Box$ 6	1	A	joura journe
surged with block and bailed 4	2 Da	· . 4,16,20	11 4,16,2
surged with block and pumped $\Box_{-6}$	2	mm d d y y	yy mm dd
surged with block, bailed and pumped $\Box$ 7	0	TAC X B.T	n. $O / O \mathbb{R}^{a.n}$
compressed air 2	0 Tu	e c/: <u></u> p_	n. <u>0:13</u> p.r
bailed only	0	t	
pumped only 🔲 5	1 12. Sec	ment in well <u></u> inche	es inche
pumped slowly	0 bott	m	0.82
Other 🛛 🔤	13. Wa	er clarity Clear 10	Clear 20
		Turbid St 15	Turbid 🖵 2.5
3. Time spent developing well6	<u>O</u> min.	(Describe)	(Describe)
72	0.	10.001.00	al a u
شد هد	. <u>_</u> n.	Drown	CLEAV
5. Inside diameter of well	<u>)</u> in.		
			waandeen and bade arabatemeterki ferolooreenis aaaa aaa aa aaa aa ayaayaayay
6. Volume of water in filter pack and well	-	· · · · · · · · · · · · · · · · · · ·	
casing	gal.		
7 Velues of manual formula		I drilling fluids were used and well i	is at solid waste facility;
7. Volume of water removed from well	gai.	al automation and the second sec	
8 Volume of water added (if any)	[14, 10		$n = m_{g}$
	gai		
9. Source of water added	15. CO	Dmr	/lmg
	IC W		<b>.</b>
10. Analysis performed on water added?	s VI No First	l developed by: Name (hrst, last) and r Name: Fast N	ame:
(If yes, attach results)		IKRD PN Dulla	~/
17. Additional comments on development:	Firm	VODR IN DIMERCION	
Surge w/ block & ball check & surged 5 gailtons of brown	value for a	bout 1 minute every.	tew test-
plumpt from brutting cal sup	10 DUMD LIN	1 clear for 10 gallo	inco
pumper rearing of sum	T P P VI		
	111 Htt		
Name and Address of Facility Contact /Owner/Responsible	Party Lbe	by certify that the above informatic	m is true and correct to th
First Last	of m	y knowledge.	
Name: Name:			
Facility/Firm:	Signa	ие:	,
Street:	Print 1	ame:	······································
City/Stau/Zip;	Firm:		
· · · · · · · · · · · · · · · · · · ·		4	······································

NOTE: See instructions for more information including a list of county codes and well type codes.

MW-16-219	Geologist: S. Lee
WELL COMPLETION DIAGRAM	DRILLER: R. Burnett
DATE COMPLETED: 7/27/2016	HELPERS: J. Papendick, C. Wagner
Willis Property, Reach 4A San Joaquin River	
Latitude: 37.06756	Longitude: -120.55745
Top of Casing Elevation: TBD	



MW-16-220	Geologist: S. Lee
WELL COMPLETION DIAGRAM	DRILLER: R. Burnett
DATE COMPLETED: 7/26/2016	HELPERS: J. Papendick, C. Wagner
Willis Property, Reach 4A San Joaquin River	
Latitude: 37.07085	Longitude: -120.56314
Top of Casing Elevation: TBD	



MW-16-221	Geologist: S. Lee	
WELL COMPLETION DIAGRAM	DRILLER: S. Lee	
DATE COMPLETED: 7/12/2016	HELPERS: J. Papendick	
Willis Property, Reach 4A San Joaquin River		
Latitude: 37.07093	Longitude: -120.55920	
Top of Casing Elevation: TBD		



MW-16-222	Geologist: S. Lee
WELL COMPLETION DIAGRAM	DRILLER: R. Burnett
DATE COMPLETED: 7/25/2016	HELPERS: J. Papendick, C. Wagner
Willis Property, Reach 4A San Joaquin River	
Latitude: 37.06895	Longitude: -120.55562
Top of Casing Elevation: TBD	



MW-16-224	GEOLOGIST: S. Lee
WELL COMPLETION DIAGRAM	DRILLER: R. Burnett
DATE COMPLETED: 7/26/16	HELPERS: J. Papendick, C. Wagner
Willis Property, Reach 4A SJR	
Latitude: 37.07501	Longitude: -120.56179
Top of Casing elevation: TBD	

