FEATURE: Groundwater Monitoring

AND DATE MEASURED: NA

LOCATION: Reach 2A, River Bank Right, Madera County

BEGUN: 9/23/09 FINISHED: 9/23/09 DEPTH AND ELEVATION OF WATER LEVEL PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,169,946.8 E 6,210,378.5 (NAGD83)

TOTAL DEPTH: 47.5 ft.

STATE: California

GROUND SURFACE ELEVATION: 191.0 ft. (NAVD88)

T.O.C ELEVATION: 190.79 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

					LABO	ORAT	ORY	DATA	١		×o		z /	Ŀ	
NOTES	рертн	RE FERY			S		VEL	LIMIT	≻CIT ×	JRE NT %	LABORATORY CLASSIFICATION	NOF	VISUAL CLASSIFICATION SLEVATION	GIC UNIT	CLASSIFICATION AND
		% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	CLASS	ELEVATION	VISUAL CLASSIFICA ELEVATION	GEOLOGIC I SYMBOL	PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.											,		,		0.0 to 47.5 feet QUATERNARY ALLUVIUM (Qal)
PURPOSE OF HOLE: To recover core, collect data to determine geologic and hydrologic site conditions. and install a	-	64											s(ML)		<ul> <li>0.0 to 2.5 ft. <u>SANDY SILT</u>, s(ML): About</li> <li>65% fines with low plasticity, toughness, and</li> <li>medium dry strength, and rapid dilatancy;</li> <li>about 35% fine to coarse sand; trace of fine, hard, subrounded gravel; maximum size: 1/2</li> </ul>
groundwater monitoring well.  DRILLED BY:	-												SM 186.7		inches; dry, light brown, slow reaction with HCl; very firm consistency; organics in top 0.5 feet.
USGS Drill Crew James Huckaby, Driller Jim Rauman, Helper	5-	80											SP/SM		2.5 to 4.1 ft. <u>SILTY SAND, SM</u> : About 80% fine sand; about 20% non-plastic fines with rapid dilatancy; maximum size: fine sand; dry.
DRILL RIG: CME-550	_		36.9	8.0	44.9	55.1	0.0	NP	NP	13.2	SM	184.7	SM 184.7		light brown, no reaction with HCl; soft consistency.
DRILLING & SAMPLING METHODS: Drill hole MW-09-36 was advanced using hollow stem flight augers with continuous dry core sampling	-														4.1 to 5.4 ft. POORLY GRADED SAND  WITH SILT, SP/SM: About 90% fine sand; about 10% non-plastic fines with rapid dilatancy; maximum size: fine sand; dry, light brown to light gray, no reaction with HCl; very
continuous dry core sampling system (FADC) from the ground surface to a total depth of 47.5 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 sample barrel.	_	94													<ul> <li>5.4 to 6.1 ft. SILTY SAND, SM: About 55% fine sand; about 45% fines low plasticity, toughness and dry strength, with rapid dilatancy; maximum size: fine sand; dry, dark</li> </ul>
Interval Method 0.0 to 47.5 ft FADC	_		5.5	0.0	5.5	94.1	0.4	NP	NP	2.6	SP-SM		SP/SM		brown, no reaction with HCl; soft consistency.  Laboratory Data Interval 5.4 to 6.1 ft.
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 32.0 ft smooth drilling 32.0 to 37.0 ft encountered hard sand layer 37.0 to 47.0 ft smooth drilling	-														6.1 to 16.2 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; dry, light brown to light gray, no reaction
DRILL FLUID, RETURN AND COLOR: 0.0 to 27.0 ft None	15-	70										176.1		Qal	with HCl; soft consistency.  Laboratory Data Interval  7.5 to 14.7 ft.
27.0 to 47.0 ft Water, no return  WATER LEVEL: Not Recorded	-	-											174.6 (GP/GM)s <sub>174.0</sub>		16.2 to 16.8 ft. <u>POORLY GRADED</u> — <u>GRAVEL WITH SILT AND SAND</u> , ( <u>GP/GM)s:</u> About 50% fine, hard, subrounded gravel; about 40% fine to coarse
REASON FOR HOLE TERMINATION: The hole was terminated upon	-		3.9	0.0	3.9	50.7	45.4	NP	NP	2.1	(SP)g		SM 173.3 (SP/SM)g		sand; about 10% non-plastic fines; maximum size: 5/8 inches; dry, light brown to light gray, weak reaction with HCl; soft consistency.
successful completion to the target depth.	-		3.9	0.0	3.9	30.7	45.4	INI	INI	2.1	(SF)g	172.0	172.0		16.8 to 17.5 ft. SILTY SAND, SM: About 85% fine to medium sand (mostly fine); about 15% non-plastic fines with rapid dilatancy;
HOLE COMPLETION: Well Casing - 0.2 to 17.0 ft. (T.O.C. El. 190.79 ft.) Dual Pre-pack Screen - 17.0 to 37.0	20-	66													maximum size: medium sand; dry, light brown and light gray, no reaction with HCl; soft consistency.
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand Filter Pack - 14.0 to 37.0 ft. (#3 Sand) Bottom Bentonite Seal - 37.0 to 47.5	-														<ul> <li>17.5 to 18.8 ft. POORLY GRADED SAND WITH SILT AND GRAVEL, (SP/SM)g:         About 55% fine to coarse sand; about 35%         fine, subrounded gravel; 10% non-plastic fines with rapid dilatancy; maximum size: 3/4</li> </ul>
ft.  Bentonite Seal - 1.0 to 14.0 ft.  Well Protection - flush-mounted 18-inch manhole (15/16-inch	-		5.2	0.0	5.2	94.2	0.6	NP	NP	2.2	SP-SM		SP/SM		inches; moist, medium brown, no reaction  with HCl; soft consistency.  Laboratory Data Interval
hexbolts)	25-	80													17.5 to 18.8 ft.  18.8 to 27.5 ft. POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to coarse sand (trace of coarse); about 10% non-plastic fines with rapid dilatancy;
	_	_										163.3	163.3		maximum size: coarse sand; dry, off-white, light brown, and light gray, no reaction with HCl; soft consistency.
COMMENTS: FADC = Fligh HSA = Holloy				!									ompletion inform	ation i	s provided in attached Well

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

Completion Diagram.

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Right, Madera County

BEGUN: 9/23/09 FINISHED: 9/23/09 DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: NA

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,169,946.8 E 6,210,378.5 (NAGD83)

TOTAL DEPTH: 47.5 ft.

STATE: California

GROUND SURFACE ELEVATION: 191.0 ft. (NAVD88)

T.O.C ELEVATION: 190.79 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

					LABO	ORAT	ORY	DATA	A		≻Z	/	z /	_					
NOTES	ОЕРТН	<u>س</u> ک					H	TIMI	Ł	ZE T %	ATOR -	/ 8	UAL FICATIO	IIC UNI	CLASSIFICATION AND				
NOTES	吕	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL CLASSIFICATION ELEVATION	GEOLOGIC UNIT SYMBOL	PHYSICAL CONDITION				
	<u> </u>							_			/		(SM)g 162.9	+	Laboratory Data Interval 18.8 to 27.5 ft.				
	_		59.5	12.1	71.6	28.4	0.0	NP	NP	32.6	(ML)s	161.6	(ML)s		27.5 to 27.9 ft. SILTY SAND WITH GRAVEL, (SM)g: About 70% fine to coarse				
	30 <del>-</del>	78	6.9	0.0	6.9	93.1	0.0	NP	NP	6.6	SP-SM		SP/SM		sand; 15% non-plastic fines with rapid dilatancy; about 15% fine, hard, subrounded gravel; maximum size: 1 inch; dry, light brown, no reaction with HCl; soft consistency; material recovered disturbed.				
	_											158.8	158.8		27.9 to 29.2 ft. SILT WITH SAND, (ML)s:  About 80% fines with rapid dilatancy; about				
	_														20% fine sand; maximum size: fine sand; moist, medium brown, no reaction with HCl; firm consistency.				
	_	_													Laboratory Data Interval 27.9 to 29.2 ft.				
	35 <del></del> -	74	3.6	0.8	4.4	29.5	66.1	NP	NP	2.6	(GW)s	450.0	(GP/GM)s		29.2 to 32.0 ft. POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to medium sand (mostly medium); about 10% non-plastic fines with rapid dilatancy; maximum size: medium sand; dry, banded light brown and orange, no reaction with HCl; soft consistency.				
	_											153.3	Qal	Laboratory Data Interval 29.2 to 32.0 ft.					
	40-	100	31.3	47.7	79.0	21.0	0.0	43.3	21.8	25.8	(CL)s		(CL/ML)s		32.0 to 37.9 ft. POORLY GRADED  GRAVEL WITH SILT AND SAND,  (GP/GM)s: About 55% fine, hard, subrounded gravel; about 35% fine to coarse sand; about 10% non-plastic fines with rapid dilatancy; maximum size: 1.5 inches; dry, light gray from 32.0 32.5 feet and banded light brown, medium brown, light gray and orange from 32.5 to 37.9 feet, no reaction with HCl; firm consistency.				
	_											148.3	147.6		Laboratory Data Interval 32.5 to 37.5 ft.				
	- 45 <del></del>	100											SM		37.9 to 43.2 ft. SILTY CLAY WITH SAND, (CL/ML)s: About 85% fines with medium plasticity, toughness, and dry strength, and no dilatancy; about 15% fine sand; maximum size: fine sand; moist, light brown from 37.9 to 39.2 feet and light greenish-gray 39.2 to 42.5 feet, no reaction with HCl.				
													s(ML) 144.2	Laboratory Data Interval 37.9 to 42.5 ft.					
							В	ОТТО	M OF H	HOLE			SM 143.3		43.2 to 46.6 ft. SILTY SAND, SM: About 80 to 85% fine to medium sand (mostly fine); about 15 to 20% non-plastic fines with rapid dilatancy; maximum size: medium sand; dry, light brown, light gray greenish-brown; no reaction with HCl; soft consistency.				

maximum size: medium sand; dry, light gray; no reaction with HCl; soft consistency.

**46.6 to 46.8 ft. SANDY SILT, s(ML):** About 65% non-plastic fines with rapid dilatancy; about 35% fine sand; maximum size: fine sand; dry, light gray, no reaction with HCl; soft consistency.

**46.8 to 47.5 ft. SILTY SAND, SM**: About 80 to 85% fine to medium sand; about 15 to 20% non-plastic fines with rapid dilatancy;

T.D. = 47.5 ft.

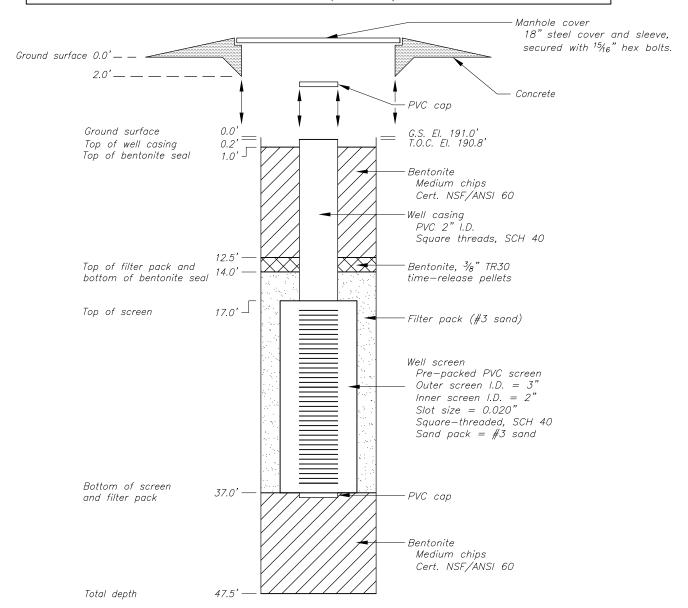
COMMENTS:

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.

MW-09-36	GEOLOGIST: J. VAUK
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 9/23/2009	HELPER: J. RAUMAN

TOP OF WELL CASING COORDINATES:
N2169946.8 E6210378.5 (NAD83) ELEVATION 190.8' (NAVD88)
GROUND SURFACE ELEVATION 191.0' (NAVD88)



# \*NOT TO SCALE

# NOTES:

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 9/12/09 FINISHED: 9/14/09

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 76.7 ft. (El. 114.97 ft.) 9/14/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,169,060.3 E 6,210,550.8 (NAGD83)

TOTAL DEPTH: 87.5 ft.

GROUND SURFACE ELEVATION: 191.8 ft. (NAVD88)

T.O.C ELEVATION: 191.67 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk

STATE: California

	Γ				LARC	DRAT	ORY	DATA	<u> </u>		7		7			
	_					710711				٧,0	ORY	/	L ATION		LN .	CLASSIFICATION AND
NOTES	DEPTH	RE VERY		>	S	۵	GRAVEL	III	ZICITY	URE	ORAT SIFIC	/ NO F	/ISUA SIFIC,	/ NO E	)GIC MBOL	PHYSICAL CONDITION
		% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	%GR⁄	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL	ELEVATION	GEOLOGIC UNIT SYMBOL	THISICAL CONDITION
ALL MEASUREMENTS ARE IN			•`	•`	0,	0,	٥,			20	/		/			SOIL DESCRIPTIONS CHARACTERIZE
FEET FROM THE GROUND SURFACE.	-	100														SAMPLES FROM DRILL HOLE MW-09-37.  - 0.0 to 87.5 feet
PURPOSE OF HOLE: To recover core, collect data to	-												s(ML)			QUATERNARY ALLUVIUM (Qal)
determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-															<ul> <li>0.0 to 4.0 ft. SANDY SILT, s(ML): About</li> <li>65% fines with no to low plasticity, low toughness and dry strength, and rapid</li> </ul>
DRILLED BY:	-													187.7		dilatancy; about 35% fine sand; maximum size: fine sand; dry, brown, weak to moderate
USGS Drill Crew James Huckaby, Driller Jim Rauman, Helper	5-	100	69.2	14.0	83.2	16.8	0.0	19.5	2.7	3.2	(ML)s					reaction with HCl; firm to hard consistency; contains abundant organic debris (roots).
DRILL RIG:	_		69.2	14.0	03.2	10.0	0.0	19.5	2.1	3.2	(IVIL)S	186.2	(ML)s			4.0 to 7.0 ft. SILT WITH SAND, (ML)s:  About 80% fines with low to medium plasticity,
CME-550														184.7		medium toughness and dry strength, and slow dilatancy; about 20% fine sand;
DRILLING & SAMPLING METHODS:																<ul> <li>maximum size: fine sand; dry, light brown (with minor rust-red iron-oxide staining),</li> </ul>
Drill hole MW-09-37 was advanced using hollow stem flight augers with	-															<ul> <li>occasional zones have moderate reaction with HCI; moderately soft to hard consistency; contains minor organic debris (roots).</li> </ul>
continuous dry core sampling system (FADC) from the ground surface to a total depth of 87.5 feet. FADC uses 7-5/8-inch O.D.,	-	100											s(ML)			Lab Data Interval 5.0 to 5.5 ft.
4-1/4-inch I.D. hollow stem augers, with a 5-foot-long, 3-inch I.D. split	10-															7.0 to 11.3 ft. <u>SANDY SILT, s(ML):</u> About
sample barrel.	-													180.4		65% fines with no to low plasticity, low toughness and dry strength, and rapid
Interval Method 0.0 to 87.5 ft FADC	-		56.9	4.2	61.1	38.9	0.0	NP	NP	5.7	s(ML)	179.2				dilatancy; about 35% fine sand; maximum size: fine sand; dry, light gray with gray lenses, no reaction with HCl; soft to firm
Drill hole DH-09-37B was advanced using hollow stem flight augers	-												s(ML)			consistency; contains dark rust-red stringers of iron-oxide staining. Zone of higher sand
(FADC) and a pilot bit from the ground surface to a total depth of	_													477.0		content from 7.5 to 9.8 feet; zone of higher fines content from 9.8 to 11.3 feet.
25.5 feet. FADC uses 7-5/8-inch O.D., 4-1/4-inch I.D. hollow stem	15-	100												177.3	Qal	11.3 to 14.4 ft. SANDY SILT, s(ML): About
augers and a tri-cone pilot bit.	"												SM		Qui	60% fines; about 40% fine sand (grains consist of quartz, dark mica, various other
Interval Method 0.0 to 25.5 ft FADC with pilot bit	-													175.1		<ul> <li>minerals); maximum size: fine sand; dry, light orange-brown: slightly stained with rust-colored iron oxide; no reaction with HCI;</li> </ul>
DRILLING CONDITIONS AND DRILLER'S COMMENTS:	-															soft consistency.
MW-09-37 0.0 to 57.0 ft smooth drilling	-		4.2	0.7	4.9	95.1	0.0	NP	NP	2.3	SP	173.7	SP/SM			<u>Lab Data Interval</u> 12.0 to 12.5 ft.
57.0 to 62.0 ft encountered firm sand layer	-	1														<ul> <li>14.4 to 16.6 ft. <u>SILTY SAND</u>, <u>SM</u>: About 80 to 85% fine to medium sand (grains consist of</li> </ul>
62.0 to 72.0 ft firm clay 72.0 to 77.0 ft very firm clay stalled drill rig, adjust sampler	20-	92												172.1		quartz, mica, various other minerals)(predominantly fine); about 15 to
77.0 to 87.5 ft clay bottom hole was terminated	_															20% fines; maximum size: medium sand; slightly moist; light to medium brown with dark
DRILLING CONDITIONS AND																brown and black streaks (higher fines): slightly stained with rust-colored iron oxide; no
DRILLER'S COMMENTS: MW-09-37B	-															<ul> <li>reaction with HCl; very soft (loose) consistency.</li> </ul>
0.0 to 25.5 ft blind drilled  DRILL FLUID, RETURN AND	-	1											SM & S	P/SM		16.6 to 19.6 ft. POORLY GRADED SAND WITH SILT: SP/SM: About 90% fine to
COLOR: MW-09-37	-	100														medium sand; about 10% fines; maximum size: medium sand; moist, light brown, no
0.0 to 87.5 ft None	25-	100														reaction with HCl; very soft (loose) consistency.
MW-09-37B 0.0 to 25.5 ft None	-	-												46- 1		_ <u>Lab Data Interval</u> 17.5 to 18.0 ft.
<b>WATER LEVEL:</b> 76.7 feet b.g.s. on 9/14/2009 in	-			40.	86.1	40.0		, in	AII:	40.4	K.**		(ML)s	165.1		- 19.6 to 26.6 ft. INTERBEDDED SILTY
MW-09-37	_		09./	10.4	00.1	13.9	0.0	INP	NP	19.4	IVIL	164.3	` -/-	164.0		SAND, SM, AND POORLY GRADED SAND WITH SILT, SP/SM: Grain-size distribution
REASON FOR HOLE TERMINATION: The drill holes were terminated													SM			of interbedded soils layers is listed below.  Most soils sampled have the following  description: maximum size: medium sand;
The drill holes were terminated upon successful completion to the target depth.	-	100												162.2		<ul> <li>description: maximum size: medium sand; slightly moist, light brown; no reaction with HCl; very soft (loose) consistency.</li> </ul>
target deptil.		<del>-</del>						<u> </u>								Tion, very soft (10050) consistency.

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-09-37B
TOC Coordinates= N 2169064.9 E 6210552.2 (NAGD83) EI. 191.96 (NAVD88)
Ground surface EI.= 192.1 (NAVD88)

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 9/12/09 FINISHED: 9/14/09

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 76.7 ft. (El. 114.97 ft.) 9/14/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,169,060.3 E 6,210,550.8 (NAGD83)

TOTAL DEPTH: 87.5 ft.

GROUND SURFACE ELEVATION: 191.8 ft. (NAVD88)

T.O.C ELEVATION: 191.67 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk

STATE: California

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					LAB(	DRAT	URY	DATA	1		YN   NOT	NOIT	/	L UNIT	01.4001510.4710.1.4115
NOTES	DEPTH	IR'E			,,		垣	ΗMI	Ĕ	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	VISUAL	/ S	SIC U BOL	CLASSIFICATION AND
		% CORE RECOVERY	SILT	CLAY	FINES	SAND	GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	OIST NTE	LABORAT CLASSIFIC, CLASSIFIC,	VI	ELEVATION	GEOLOGIC L SYMBOL	PHYSICAL CONDITION
HOLE COMPLETION:		% HZ	%	%	%	%	%	ĭ	٣_	≅8	_요 / 핔	SM		8	19.6 to 20.0 ft SM: 80% sand; 20% fines.
MW-09-37	_											Sivi	160.7		20.0 to 22.3 ft SP/SM: 90% sand; 10% fines.  22.3 to 22.5 ft SM: 80% sand; 20% fines.
Well Casing - 0.1 to 67.0 ft. (T.O.C. El. 191.67 ft.)															22.5 to 22.9 ft SP/SM: 90% sand; 10% fines. 22.9 to 23.0 ft SM: 70% sand; 30% fines.
Dual Pre-pack Screen - 67.0 to 87.0 ft. (Slotted 0.020-inch)	-														23.0 to 23.5 ft SP/SM: 90% sand; 10% fines. 23.5 to 23.8 ft SM: 70% sand; 30% fines.
Well Screen Filter Pack - #3 Sand Filter Pack - 59.0 to 87.5 ft. (#3	-	1													<ul><li>23.8 to 26.3 ft SP/SM: 90% sand; 10% fines.</li><li>26.3 to 26.6 ft SM: 70% sand; 30% fines.</li></ul>
Sand) Bentonite Seal - 2.0 to 59.0 ft. Well Protection - flush-mounted	-	100	57.4	26.2	83.6	16.4	0.0	21.8	2.9	19.8	(ML)s 157.4	(ML)s			26.6 to 27.7 ft. SILT WITH SAND, (ML)s: About 85% fines with low plasticity, toughness
18-inch manhole (15/16-inch hexbolts)	35-	100													and dry strength; about 15% fine sand; trace gravel; maximum size: fine sand; slightly
MW-09-37B	-														moist, gray-brown, no reaction with HCl; soft to firm consistency.
Well Casing - 0.1 to 15.0 ft. (T.O.C. El. 191.69 ft.)	_												154.8		Lab Data Interval
Dual Pre-pack Screen - 15.0 to 25.0 ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand															27.2 to 27.4 ft.  27.7 to 29.5 ft. SILTY SAND, SM: About
Filter Pack - 12.0 to 25.5 ft. (#3 Sand)	-														85% sand (grains consist of quartz, mica, various other minerals); about 15% fines;
Bentonite Seal - 2.0 to 12.0 ft. Well Protection - flush-mounted	-	100													<ul> <li>maximum size: fine sand; dry, light brown; no reaction with HCl; very soft (loose)</li> </ul>
18-inch manhole (15/16-inch hexbolts)	40-	ł										CL			_ consistency.
	-	-													<ul> <li>29.5 to 31.0 ft. <u>SILTY SAND, SM</u>: About</li> <li>60% sand (grains consist of quartz, dark mica, various other minerals); about 40% fines;</li> </ul>
	-														maximum size: fine sand; dry, light to medium gray, no reaction with HCl; soft consistency;
	_														occasional lenses with higher fines content.
	_		52.2	27.4	79.6	20.4	0.0	34.8	13.4	21.9	(CL)s 147.7		148.0		<ul> <li>31.0 to 36.9 ft. <u>SILT WITH SAND, (ML)s</u>:</li> <li>About 85% fines with low to medium plasticity,</li> <li>medium toughness, low dry strength, and slow</li> </ul>
		100													dilatancy; about 15% fine sand; maximum size: fine sand; moist, dark olive-gray, slightly
	45-	1										(CL)s		Qal	stained with rust-colored iron oxide, no reaction with HCl; firm to hard consistency.
	-	1													<ul> <li>Sandy lenses from 33.3 to 33.4, and 35.6 to 36.0 feet.</li> </ul>
	-												144.2		Lab Data Interval 34.0 to 34.3 ft.
	-	1													36.9 to 43.7 ft. <u>LEAN CLAY, CL</u> : About 90%
	-	-													fines with medium plasticity, toughness, and no to slow dilatancy; about 10% sand;
	50-	100										CM			maximum size: fine sand; moist, blue-green-gray, slightly stained with rust-colored iron oxide, occasional zones have
	_											SM			weak to strong reaction with HCl; very firm to hard consistency.
															43.7 to 47.5 ft. LEAN CLAY WITH SAND,
	-												138.8		(CL)s: About 80% fines with medium plasticity and toughness, and no to slow
	-												100.0		<ul> <li>dilatancy; about 20% sand; maximum size: fine sand; moist, blue-green-gray, slightly stained with rust-colored iron oxide, occasional</li> </ul>
	-	100													zones have weak to strong reaction with HCl; very firm to hard consistency.
	55-	100													Lab Data Interval 43.7 to 44.0 ft.
	-	-										(CL)s			43.7 to 44.0 ft. 47.5 to 52.9 ft.SILTY SAND, SM: About
	-														65% fine to medium sand; about 35% non-plastic fines with rapid dilatancy;
	_														maximum size: medium sand; moist, gray, no reaction with HCl; soft to firm consistency.
															52.9 to 59.5 ft. <u>LEAN CLAY WITH SAND</u> , (CL)s: About 75% fines with medium
		100											132.2		plasticity and toughness, and no to slow dilatancy; about 25% sand; maximum size:
COMMENTS: FADC - Fligh	nt Aug	er Dry	Core					1	1	\/\/ol	l completion i	nforma	tion is pro	vidod	in attached Well Completion Diagram

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-09-37B
TOC Coordinates= N 2169064.9 E 6210552.2 (NAGD83) El. 191.96 (NAVD88)
Ground surface El.= 192.1 (NAVD88)

SHEET 2 OF 3 DRILL HOLE MW-09-37

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 9/12/09 FINISHED: 9/14/09 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 76.7 ft. (El. 114.97 ft.) 9/14/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,169,060.3 E 6,210,550.8 (NAGD83)

TOTAL DEPTH: 87.5 ft.

GROUND SURFACE ELEVATION: 191.8 ft. (NAVD88)

T.O.C ELEVATION: 191.67 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk

STATE: California

					LABO	DRAT	ORY	DATA	4		≻Z	$\overline{}$	Z O	/	_	
NOTEO	 	>						⊥II	<b>&gt;</b>	%	CATIC	Z	CATIC	z	N C	CLASSIFICATION AND
NOTES	DEPTH	% CORE RECOVERY	SILT	₹	% FINES	SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL	ELEVAIION	GEOLOGIC UNIT SYMBOL	PHYSICAL CONDITION
		REC	IS %	% CLAY	% FI	/S %	I9 %	LIQU	PLAS	MOS NO NO NO NO NO	월 /	ELE	2 / E	H F	GEO	
	-										,					fine sand; moist, blue-green-gray, slightly stained with rust-colored iron oxide, occasional zones have weak to strong reaction with HCl; very firm to hard consistency.
	_															59.5 to 74.2 ft. SILTY LEAN CLAY WITH SAND, (CL/ML)s: About 80% fines with
	- 65 <del>-</del>	90	42.8	6.9	49.7	50.3	0.0	NP	NP	24.7	SM	128.3				low plasticity, toughness and dry strength, and slow dilatancy; about 20% fine sand; maximum size: fine sand; very moist, dark blue-green-gray, no reaction with HCl; firm to hard consistency (sandy zones are soft to firm). Occasional layers with 40% to 60% fine sand from 63.0 to 63.2, 64.8 to 64.9, 63.0 to 66.3, and 72.0 to 73.0 feet.
	-												(CL/ML)s			<u>Lab Data Interval</u> 63.0 to 63.4 ft.
	70 <del>-</del>	100														T4.2 to 78.2 ft. Claystone/Siltstone:  Material has properties intermediate between soil and rock. Material breaks into gravel-size to sand-size angular fragments of cemented claystone or siltstone. Very slow and difficult to auger; driller reported that the zone augered like a gravel material. Fragments are very difficult to break with finger pressure; but will break readily with hammer blow. Crushed material appears as sand, but consists of claystone/siltstone grains, with minor quartz grains. Very moist, dark blue-green-gray; no reaction with HCl; hard to
	-	100											11	17.5	Qal	very hard.  78.2 to 79.7 ft.SILTY SAND, SM: About  55% fine sand, about 45% fines; maximum size: fine sand; wet, dark blue-green-gray, no reaction with HCl; soft to firm consistency.
	75-										•	,	Rock			One-inch-thick lens of SILT WITH SAND, (ML)s, encountered in middle of depth interval.
	-	70								:	76.7 ft. (El. 1		11	13.5		79.7 to 86.7 ft. POORLY GRADED SAND WITH SILT: SP/SM: About 90% fine to medium sand (predominantly fine)(grains consist of quartz and various other minerals); about 10% fines; maximum size: medium
	-												SM		-	sand; wet, gray, no reaction with HCl; very soft (loose) consistency.
	80-												1.	12.0		86.7 to 87.5 ft: SILT, ML: About 90% fines with low plasticity, low toughness, no to low
	-															dry strength, and rapid dilatancy; about 10%  fine sand; maximum size: fine sand; wet, dark green-gray, no reaction with HCl; hard consistency.
	-	0											SP/SM			<u>Lab Data Interval</u> 85.5 to 85.7 ft. 87.0 to 87.2 ft.
	-	1													•	 T.D. = 87.5 ft.
	85-		6.5	1.6	8.1	91.7	0.2	NP_	NP.	14.2	SP-SM		_		•	-
	-	100										106.0	11	05.0		_
	-	-	73.8	20.9	94.7	5.3	0.0	29.0	3.1	23.6	ML	104.5	М	04.2	-	-
	-						В	отто	M OF H	HOLE						_

COMMENTS:

FADC = Flight Auger Dry Core HSA = Hollow Stem Auger NP = Non-plastic NR = No Recovery

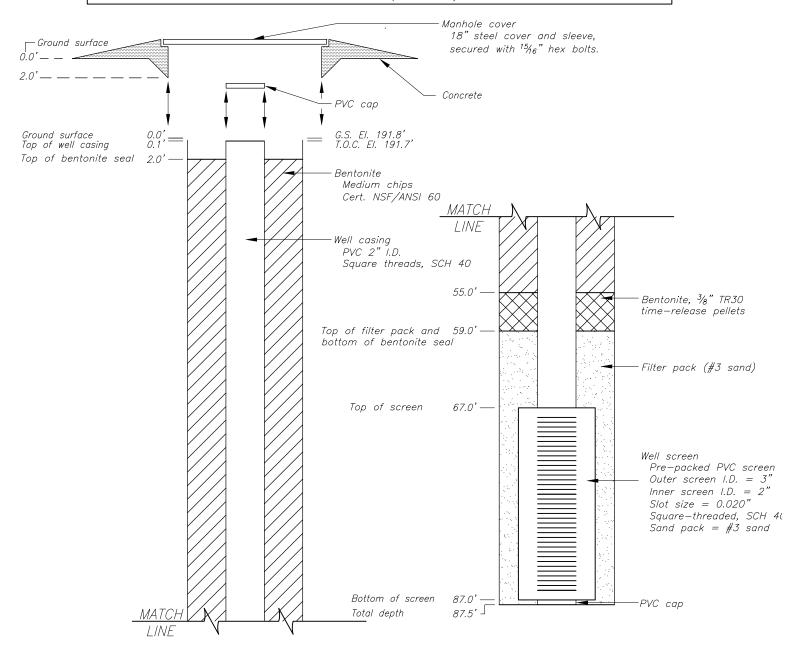
NA = Not applicable
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing

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

MW-09-37B
TOC Coordinates= N 2169064.9 E 6210552.2 (NAGD83) El. 191.96 (NAVD88)
Ground surface El.= 192.1 (NAVD88)

MW-09-37	.GEOLOGIST: G. RUSSELL
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 9/14/2009	HELPER: J. RAUMAN

TOP OF WELL CASING COORDINATES:
N2169060.3 E6210550.8 (NAD83) ELEVATION 191.7' (NAVD88)
GROUND SURFACE ELEVATION 191.8' (NAVD88)



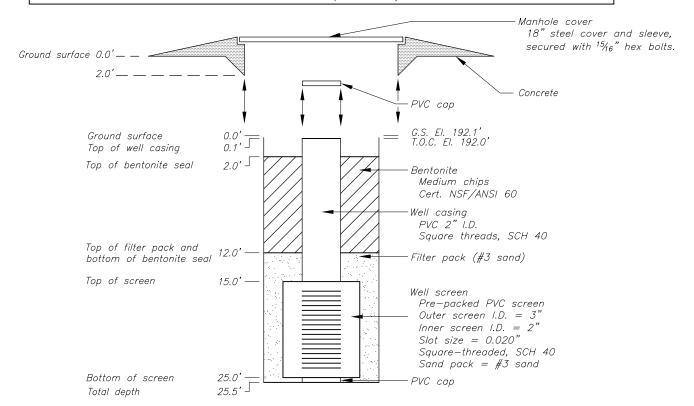
# \*NOT TO SCALE

# NOTES:

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

MW-09-37B	GEOLOGIST: G. RUSSELL
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 9/14/2009	HELPER: J. RAUMAN

TOP OF WELL CASING COORDINATES: N2169064.9 E6210552.2 (NAD83) ELEVATION 192.0' (NAVD88) GROUND SURFACE ELEVATION 192.1' (NAVD88)



# \*NOT TO SCALE

# NOTES:

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 9/8/09 FINISHED: 9/11/09

DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 79.0 ft. (El. 105.89 ft.) 9/11/2009 PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,171,130.1 E 6,204,815.3 (NAGD83)

TOTAL DEPTH: 92.0 ft.

GROUND SURFACE ELEVATION: 184.9 ft. (NAVD88)

T.O.C ELEVATION: 184.89 ft. (NAVD88)

HOLE LOGGED BY: G. Russell

REVIEWED BY: J. Vauk

STATE: California

					LABO	DRAT	ORY	DATA	<b>A</b>		NOI NOI	'	NO /		
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL CLASSIFICATION ELEVATION	GEOLOGIC UNIT	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.	_	55									,		s(ML)		SOIL DESCRIPTIONS CHARACTERIZE SAMPLES FROM DRILL HOLE MW-09-39.
PURPOSE OF HOLE: To recover core, collect data to													182.9		0.0 to 92.0 feet QUATERNARY ALLUVIUM (Qal)
determine geologic and hydrologic site conditions, and install a groundwater monitoring well.	-											•	102.0		<ul> <li>0.0 to 2.0 ft. <u>SANDY SILT, s(ML)</u>: About 55% fines with low plasticity and dry strength, and rapid dilatancy; about 45% fine sand; maximum size: fine sand; dry, brown, no</li> </ul>
<b>DRILLED BY:</b> USGS Drill Crew James Huckaby, Driller Jim Rauman, Helper	-	78													reaction HCl, consistency very soft (loose); contains abundant organic debris; material is road base.
DRILL RIG: CME-550	5-	"													2.0 to 14.0 ft. SILTY SAND, SM: About  85% fine sand; about 15% fines; maximum size: fine sand; dry to moist, light grayish
DRILLING & SAMPLING METHODS: Drill hole MW-09-39 was advanced using hollow stem flight augers with	-   -														brown, no reaction with HCI; very soft (loose) consistency; fines percentage varies from about 5% to 20% in layers. A layer of high fines of 20% occurs from 8.0 to 10.0 feet depth.
continuous dry core sampling system (FADC) from the ground surface to a total depth of 92.0 feet.	_		5.9	0.7	6.6	93.4	0.0	NP	NP	0.4	SP-SM <sub>177</sub>	.4	SM		Lab Data Interval 7.0 to 7.5 ft.
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.	-												SIVI		14.0 to 19.3 ft. POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to coarse sand with grains consisting of quartz,
Interval Method 0.0 to 92.0 ft FADC	10-	86													mica, various other minerals (predominately fine to medium)(coarse sand is sub-angular to angular and hard); about 10% fines; trace of
Drill hole DH-09-39B was advanced using hollow stem flight augers (FADC) and a pilot bit from the ground surface to a total depth of 25.0 feet. The system uses 7-5/8-inch O.D., 4-1/4-inch I.D.	_													Qa	fine to coarse, hard, subrounded gravel (gravel occurs only at the bottom 0.3 feet of interval); maximum size: 1 inch; moist, light orange-gray: slightly stained with rust-colored iron oxide, no reaction with HCl; very soft (loose) consistency.
hollow stem augers and a tri-cone pilot bit.	-														<u>Lab Data Interval</u> — 16.5 to 17.0 ft.
Interval Method 0.0 to 25.0 ft FADC with pilot bit  DRILLING CONDITIONS AND	_	84											170.9		<ul> <li>19.3 to 20.6 ft. SILT WITH SAND, (ML)s:</li> <li>About 80% fines with low plasticity and toughness, and slow dilatancy; about 20% fine sand; maximum size: fine sand; moist,</li> </ul>
DRILLER'S COMMENTS: <u>MW-09-39</u> 0.0 to 22.0 ft smooth drilling 22.0 to 27.0 ft encountered firm	15—														dark olive-gray with dark rust-colored stringers and blebs (iron-oxide); no reaction with HCl; firm consistency.
interbedded sand and clay 27.0 to 92.0 ft smooth drilling, difficult to pull augers during hole completion  DRILLING CONDITIONS AND	-		4.1	0.0	4.1	95.9	0.0	NP	NP	0.9	SP <sub>167</sub> .	.9	SP/SM		20.6 to 23.8 ft. SILTY SAND, SM: About 85% fine sand; about 15% fines; maximum size: fine sand; dry to moist; light orange-gray slightly stained with rust-colored iron oxide; no reaction with HCI; very soft (loose) consistency.
DRILLER'S COMMENTS: MW-09-39B 0.0 to 25.0 ft blind drilled	-   _														23.8 to 24.6 ft. SILTY SAND, SM: About 65% fine to medium sand (predominately fine); about 35% fines; maximum size:
DRILL FLUID, RETURN AND COLOR:  MW-09-39 0.0 to 92.0 ft None	20-	90	63.6	20.4	84.0	15.6	0.4	23.2	4.5	12.3	(CL-ML)\$64.	.8	165.6 (ML)s		medium sand; moist, dark olive-gray, with streaks of rust-colored iron oxide; no reaction with HCl; very firm consistency.
MW-09-39B 0.0 to 25.0 ft None	-	_											164.3		24.6 to 26.5 ft. SANDY SILT, s(ML): About  60% fines with low to medium plasticity, medium toughness, and slow dilatancy; about
<b>WATER LEVEL:</b> 79.0 feet b.g.s. on 9/11/2009 in MW-09-39	-												SM		40% fine sand; maximum size: fine sand; moist, dark olive-gray, no reaction HCl; very firm consistency.
REASON FOR HOLE TERMINATION: The drill holes were terminated upon successful completion to the target depth.	_	100											161.1 SM		-
COMMENTS: FADC = Flight HSA = Hollow NP = Non-pla	v Ster										completion	n in			d in attached Well Completion Diagram.

TOC Coordinates= N 2171125.4 E 6204815.1 (NAGD83) El. 184.80 (NAVD88) Ground surface El.= 184.9 (NAVD88)

NR = No Recovery NA = Not applicable
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 9/8/09 FINISHED: 9/11/09
DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 79.0 ft. (El. 105.89 ft.) 9/11/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,171,130.1 E 6,204,815.3 (NAGD83)

TOTAL DEPTH: 92.0 ft.

STATE: California
GROUND SURFACE ELEVATION: 184.9 ft. (NAVD88)

T.O.C ELEVATION: 184.89 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk

					LABO	ORAT	ORY	DATA	λ		Z		z /		
NOTEO	 	≿						⊢⊩	≥	%	LABORATORY CLASSIFICATION	/ z	VISUAL CLASSIFICATION ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND
NOTES	DEPTH	% CORE RECOVERY	SILT	CLAY	FINES	SAND	GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	ABOR/ ASSIFI	ELEVATION	CLASSIFICA CLASSIFICA ELEVATION	LOGI	PHYSICAL CONDITION
		%C	ıs %	S	₩ H	'S %	9 %	LIQL	P.E.	MOS NOS	77	/ H	CL/ ELE	GEC	
HOLE COMPLETION:													s(ML)		26.5 to 33.0 ft. INTERBEDDED SILTY SAND, SM: CLAYEY SILT WITH SAND,
MW-09-39 Well Casing - 0.0 to 72.0 ft. (T.O.C. El. 184.89 ft.)	-												158.4		(ML/CL)s; and POORLY GRADED SAND WITH SILT, SP/SM: Predominately SILTY SAND, SM, with about 75% fine sand (grains
Dual Pre-pack Screen - 72.0 to 92.0 ft. (Slotted 0.020-inch)	-														consist of quartz, mica, various other minerals); about 25% fines; maximum size:
Well Screen Filter Pack - #3 Sand Filter Pack - 64.0 to 92.0 ft. (#3															fine sand; slightly moist, dark olive-gray to light gray (more sandy intervals), no reaction
Sand) Bentonite Seal - 2.0 to 64.0 ft. Well Protection - flush-mounted			35.4	4.1	39.5	60.5	0.0	NP	NP	3.5	SM	156.4			with HCI. Bottom of unit (33.0 feet) has thin layer of dark rust-colored iron-oxide staining.  Very soft (high sand intervals) to very firm
18-inch manhole (15/16-inch hexbolts)	-	94													(high fines intervals). An interval of higher fines content occurs from 31.0 to 31.8 feet;
MW-09-39B Well Casing - 0.1 to 14.5 ft. (T.O.C.	30-	"											SM SP/SM (CL/ML)s		with about 20% fine sand, about 80% fines.  Fines have slow dilatancy, medium toughness, low to medium plasticity.
El. 184.80 ft.)  Dual Pre-pack Screen - 14.5 to 24.5	_												(CL/WIL)S		Lab Data Interval
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand															28.2 to 28.5 ft.
Filter Pack - 10.5 to 25.0 ft. (#3 Sand) Bentonite Seal - 2.0 to 10.5 ft.	-														33.0 to 39.2 ft. <u>SILTY CLAY WITH SAND</u> , (CL/ML)s: About 75% fines with medium plasticity, low to medium toughness, medium
Well Protection - flush-mounted 18-inch manhole (15/16-inch	-												151.9		to high dry strength, slow dilatancy; about 25% fine sand; maximum size: fine sand;
hexbolts)	-														moist, dark olive-gray with occasional rust-colored stringers (Fe oxide), no reaction with HCl; firm to hard consistency.
	35-	100													Percentage of sand increases with depth and a zone of SILTY SAND, SM, is encountered
															from 36.0 to 36.6 feet.  Lab Data Interval
	-												(CL/ML)s		77.2 to 37.4 ft.
	-		58.2	27.6	85.8	14.2	0.0	25.7	8.4	8.7	CI	147.5			39.2 to 40.7 ft. SILTY SAND, SM: About 60% fine sand (grains consist of quartz, mica, various other minerals); about 40% fines;
	-													Qal	maximum size: fine sand; moist, olive-gray; no reaction with HCl; firm consistency.
															40.7 to 42.1 ft. SANDY SILT, s(ML): About  60% fines with low plasticity and toughness,
		100											145.7		and slow dilatancy; about 40% sand (predominately fine); trace of fine gravel;
	40-	1											SM		maximum size: fine gravel; moist, dark olive-gray; no reaction with HCl; firm to hard consistency.
	-												144.2		42.1 to 47.1 ft. SANDY LEAN CLAY, s(CL):
	_												s(ML)		About 70% fines with medium plasticity, toughness and dry strength, and slow
															dilatancy; about 30% fine to coarse sand (most grains consist of fragments of medium to hard siltstone/claystone and minor amounts
	-														of quartz); maximum size: coarse sand; dry to moist, olive-gray with occasional rust-colored
	-	400	28.1	44.2	72.3	27.7	0.0	45.0	10.7	20.4	(ML)s	140.4			blebs (iron-oxide); strong reaction with HCl in calcareous lenses; very firm to hard consistency.
	45-	100											s(CL)		Lab Data Interval
	_														44.2 to 44.5 ft.  47.1 to 48.6 ft. SILTY SAND, SM: About
															65% fine sand (grains consist of quartz, mica, various other minerals); about 35% fines;
	-												137.8		maximum size: fine sand; moist, olive-gray, slightly rust-colored; no reaction with HCl; firm to hard consistency.
	-	1											SM		
	-	-											136.3		_
		100											s(CL/ML)		
l															

COMMENTS: FADO

FADC = Flight Auger Dry Core HSA = Hollow Stem Auger NP = Non-plastic NP = No Recovery

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.

# MW-09-39B

TOC Coordinates= N 2171125.4 E 6204815.1 (NAGD83) El. 184.80 (NAVD88) Ground surface El.= 184.9 (NAVD88)

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 9/8/09 FINISHED: 9/11/09

DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 79.0 ft. (El. 105.89 ft.) 9/11/2009 PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,171,130.1 E 6,204,815.3 (NAGD83)

TOTAL DEPTH: 92.0 ft.

STATE: California

GROUND SURFACE ELEVATION: 184.9 ft. (NAVD88)

T.O.C ELEVATION: 184.89 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk

					LABC	DRAT	ORY	DATA	١		≻Ö		N O	7	Ŀ	
NOTES	DEPTH	≿					=	IMIT	ΤΥ	₹E T %	MTOR FICATI	/ 8	UAL	\ 8	SYMBOL	CLASSIFICATION AND
110120	DE	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL	ELEVATION	GEOLOG	PHYSICAL CONDITION
	+	1	6	6	6	6	6	7	ш	20	/		-/	134.2	0	48.6 to 50.7 ft. SANDY SILTY CLAY, s(CL/ML): About 60% fines with medium
	-	-											(ML)s	133.4		plasticity, low to medium toughness, medium to high dry strength, and slow dilatancy; about 40% fine sand; maximum size: fine sand;
	-												SM	132.9		moist, gray; no reaction with HCl; firm to hard consistency.
	-												(CL/ML)s	131.5		50.7 to 51.5 ft. SILT WITH SAND, (ML)s: About 85% fines with no to low plasticity, low
	_													131.5		toughness and dry strength, and rapid dilatancy; about 15% fine sand; maximum size: fine sand; moist, gray with dark gray
	55-	100	36.6	0.0	36.6	63.4	0.0	NP	NP	4.9	SM	130.5	SP/SM			streaks; no reaction with HCl; very firm consistency.
	33_													128.9		51.5 to 52.0 ft. <u>SILTY SAND, SM</u> : About 55% fine sand (grains consist of quartz, mica
														120.5		<ul> <li>various other minerals); about 45% fines; maximum size: fine sand; moist, gray, no reaction with HCl; firm consistency.</li> </ul>
	-															52.0 to 53.4 ft. SILTY CLAY WITH SAND, (CL/ML)s: About 80% fines with low to
	-	1														medium plasticity, low toughness, medium di strength, and slow dilatancy; about 20% fine sand; maximum size: fine sand (but sample i
	-	100											SM			<ul> <li>difficult to break down due to hard fragments of siltstone/claystone), moist, gray with dark gray streaks; no reaction with HCl; hard</li> </ul>
	60-	100														consistency.
	-	-												400.5		53.4 to 56.0 ft. POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine sand, about 10% fines; maximum size: fine sand;
	_													123.5		dry, light gray; no reaction with HCl; very soft (loose) consistency.
	_												SM		Qal	Lab Data Interval 54.0 to 54.4 ft.
														121.4		<b>56.0 to 61.4 ft. SILTY SAND, SM:</b> About 60% fine to coarse sand (predominately fine to medium); about 40% fines; maximum size
	-	100											s(CL/ML)			coarse sand; moist, light olive-gray; strong reaction with HCl in calcareous zones; firm
	65-		54.7	36.5	91.2	8.8	0.0	29.2	7.8	17.8	CL	119.1	CL	119.4 119.1		consistency. 61.4 to 63.5 ft. SILTY SAND, SM: About
	-															75% fine to medium sand (grains consist of quartz and various rock types); about 25% fines; maximum size: medium sand; moist,
	-												s(CL/ML)			<ul> <li>light olive-gray; no reaction with HCl; very so consistency.</li> </ul>
	-	-												116.7		63.5 to 65.5 ft. <u>SANDY SILTY CLAY</u> , <u>s(CL/ML):</u> About 70% fines with low plasticity, low to medium dry strength, and
	-	-											SM			slow to rapid dilatancy; about 30% fine sand; maximum size: fine sand (but sample is
	70-	100											s(CL/ML)	115.3		<ul> <li>difficult to break down due to hard fragments of siltstone/claystone); moist, olive-gray; no</li> <li>reaction with HCl; hard consistency.</li> </ul>
	_															65.5 to 65.8 ft. <u>LEAN CLAY, CL</u> : About 90% fines with low plasticity, low to medium
													SM			dry strength, and slow to rapid dilatancy; about 10% fine sand; maximum size: fine sand; moist, olive-gray; no reaction with HCl
														112.4		hard consistency.
	-	1											s(CL/ML)			Lab Data Interval 65.5 to 65.8 ft.
	-	100											S(CL/ML)			_
COMMENTS: FADC = Flig										/-II	1:0			110.0		ttached Well Completion Diagram.

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.

# MW-09-39B

TOC Coordinates= N 2171125.4 E 6204815.1 (NAGD83) El. 184.80 (NAVD88) Ground surface El.= 184.9 (NAVD88)

FEATURE: Groundwater Monitoring BEGUN: 9/8/09 FINISHED: 9/11/09

LOCATION: Reach 2A. River Bank Left, Fresno County

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 79.0 ft. (El. 105.89 ft.) 9/11/2009

PROJECT: San Joaquin River Restoration Project

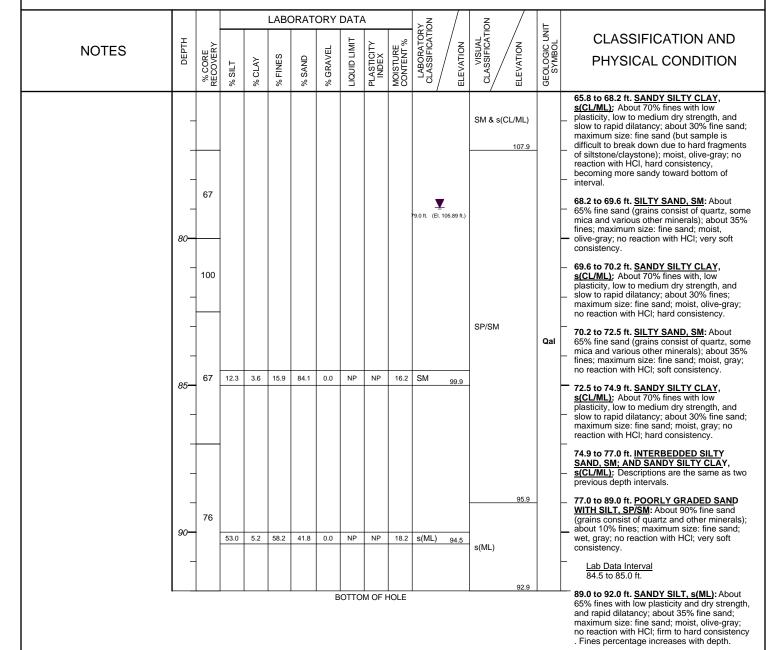
COORDINATES: N 2,171,130.1 E 6,204,815.3 (NAGD83)

TOTAL DEPTH: 92.0 ft.

STATE: California GROUND SURFACE ELEVATION: 184.9 ft. (NAVD88)

T.O.C ELEVATION: 184.89 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk



T.D. = 92.0 ft.

Lab Data Interval 90.0 to 90.4 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

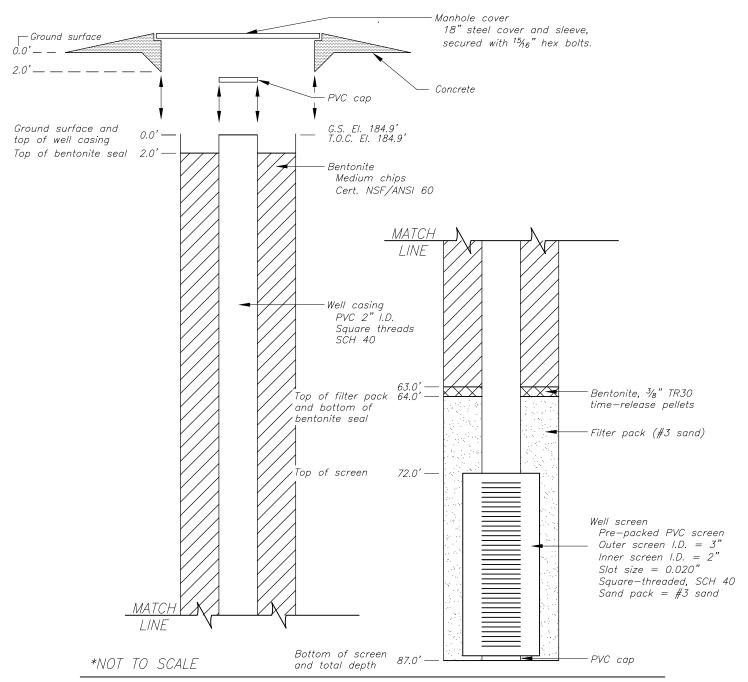
Well completion information is provided in attached Well Completion Diagram.

#### MW-09-39B

TOC Coordinates= N 2171125.4 E 6204815.1 (NAGD83) El. 184.80 (NAVD88) Ground surface El.= 184.9 (NAVD88)

MW-09-39	.GEOLOGIST: G. RUSSELL
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 9/11/2009	HELPER: J. RAUMAN

TOP OF WELL CASING COORDINATES:
N2171130.1 E6204815.3 (NAD83) ELEVATION 184.9' (NAVD88)
GROUND SURFACE ELEVATION 184.9' (NAVD88)

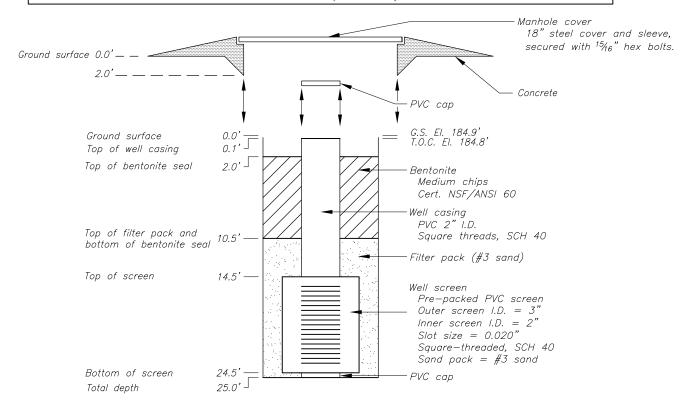


# NOTES:

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

MW-09-39B	GEOLOGIST: G. RUSSELL
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 9/11/2009	HELPER: J. RAUMAN

TOP OF WELL CASING COORDINATES:
N2171125.4 E6204815.1 (NAD83) ELEVATION 184.8' (NAVD88)
GROUND SURFACE ELEVATION 184.9' (NAVD88)



# \*NOT TO SCALE

# NOTES:

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 12/10/08 FINISHED: 12/10/08

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 73.3 ft. (El. 107.23 ft.) 8/27/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,171,186.2 E 6,204,387.3 (NAGD83)

TOTAL DEPTH: 82.0 ft.

GROUND SURFACE ELEVATION: 180.7 ft. (NAVD88)

T.O.C ELEVATION: 180.53 ft. (NAVD88)

HOLE LOGGED BY: B. Simpson REVIEWED BY: J. Vauk

STATE: California

7.1.1.2 37.1.2 INIZ.1001.122. 10.10	(		· · · · ·	,2,,20															
					LABO	DRAT	ORY	DATA	١		×O			8 /	⊨				
NOTEO	Į	≿					_	F	≥	%	CATI	/ =	2	CATI	N Z	CLASSIFICATION AND			
NOTES	DEPTH	% CORE RECOVERY	  -	CLAY	FINES	SAND	GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	NOITAVE II	2	VISUAL CLASSIFICATION ELEVATION	GEOLOGIC UNIT SYMBOL	PHYSICAL CONDITION			
		RECC	% SILT	CF	FIIN	SA %	% GF	ΠØΠ	PLAS	MOIS	\$\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	/ À	2	CLA:	GEOL				
ALL MEASUREMENTS ARE IN			<u> </u>	Ť	Ť	_							+			0.0 to 82.0 feet			
FEET FROM GROUND SURFACE.	-	-														QUATERNARY ALLUVIUM (Qa)			
PURPOSE OF HOLE: To recover core, collect data to determine	_															0.0 to 23.0 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to			
geologic and hydrologic site conditions, and install a		50	6.0	1.6	7.6	91.7	0.7	NP	NP	1.0	SP-SM	ı				coarse sand (coarse sand is subrounded); about 10% non-plastic fines with rapid			
groundwater monitoring well.	-	1														dilatancy; maximum size: coarse sand; light brown in color (7.5 YR 6/4), no reaction with			
LOCATION: MW-09-41, Reach 2, River Bank	-	+														HCl; organics encountered in top two inches of sample, extremely micaceous; dark brown			
Left, Fresno County, California	5-											175.5	5			(7.5 YR 3/2) from 9.6 to 10.0 feet; very loose to loose consistency.			
DRILLED BY: USGS-Regional Drill Crew																Laboratory Data Interval			
J. Huckaby, Driller; K. Coy, Helper	-	100														- 0.0 to 5.0 ft. 15.0 to 17.0 ft.			
DRILL RIG:	-															23.0 to 23.4 ft.: LEAN CLAY, (CL): About			
CME 550	-	-														90% fines with low to medium plasticity, low toughness, low dry strength, and no dilatancy;			
DRILLING & SAMPLING METHODS:		84														about 10% fine sand; maximum size: fine sand; light brown (7.5 YR 6/4) to dark brown			
The hole was completed with hollow stem flight augers (FDAC) drilling																(7.5 YR 3/2), moist, no reaction with HCl; firm consistency.			
methods. Advancement of the hole would proceed in this manner until	10-	-														23.4 to 25.6 ft.: <u>SILTY SAND, (SM)</u> : About			
the target depth of the borehole as defined by the scope of work and	-	100														65% fine sand; about 35% non-plastic fines  with slow dilatancy; maximum size: fine sand;			
communication with the project hydrologist. FADC utilizes	_													(SP/SM)		olive brown (2.5Y 4/4), moist, no reaction with HCl; loose consistency.			
7-5/8-inch O.D. by 4-1/4-inch I.D. hollow stem flight augers, advancing																Laboratory Data Interval 24.5 to 25.0 ft.			
a 5-foot-long, 3-1/2-inch I.D. Split Barrel dry core system (FDAC)	-	87																	
using NWF rods, typically advanced on 2-, 3- or 5-foot intervals.	-	+														25.6 to 34.8 ft.: SANDY SILT, s(ML): About 65% non-plastic fines with no dilatancy; about 35% fine sand; maximum size: fine sand;			
INTERVAL AND METHOD: 0.0 to 82.0 ft.: FADC	15-														Qal	moist, olive brown (2.5Y 4/4 to gray brown (2.5Y 4/2); no reaction with HCl.			
DRILLING CONDITIONS AND		1,00			l					l	00.01					, , , ,			
DRILLER'S COMMENTS:  0.0 to 82.0 ft.: smooth, soft to firm	-	100	3.4	1.7	5.1	94.9	0.0	NP	NP	4.1	SP-SM					Laboratory Data Interval 26.5 to 27.0 ft.			
DRILLNG FLUID:	-											163.5	5			34.8 to 38.8 ft.: LEAN CLAY, (CL): About 90% fines with low plastic and toughness, low			
0.0 to 82.0 ft.: Drilled without water	-	-														to medium dry strength, and no dilatancy; about 10% fine sand: maximum size: fine			
DRILL FLUID RETURN AND COLOR:	_	100														sand; olive brown (2.5 YR 4/4), moist, no reaction with HCl, firm consistency.			
NA NA																38.8 to 39.6. ft.: SILT WITH SAND, (ML)s:			
CAVING CONDITIONS: Upper 23 feet of boring had loose	20-															About 80% fines with low plasticity and toughness, no dry strength, and no dilatancy;			
sands.	-	100														about 20% fine sand; maximum size: fine sand: moist, gray brown (2.5Y 4/2), no			
WATER LEVEL: 73.3 feet b.g.s. on 8-28-2009.	-															reaction with HCl; firm consistency.			
REASON FOR HOLE														157.5		Laboratory Data Interval 38.8 to 39.6 ft.			
TERMINATION: The hole terminated upon		100											F	CL 157.1	-	39.6 to 40.8 ft.: SILTY SAND, (SM): About			
successful completion to the depth requested in the FER.	-	1												SM		80% fine to medium sand; about 20% non-plastic fines with slow dilatancy;			
HOLE COMPLETION:	25-		32.8	12.9	45.7	54.3	0.0	20.6	4.5	12.1	SC-SM	1 155.5	5		maximum size: medium sand; moist, light brown (7.5Y 6/4) moist, no reaction with HCI;				
Well Casing - 0.2 to 62.0 ft. (T.O.C. El. 180.53 ft.)	_	100											+	154.9	loose consistency.				
Dual Pre-pack Screen - 62.0 to 82.0 ft. (Slotted 0.020-inch)		100	42.7	3.3	46.0	54.0	0.0	NP	NP	8.2	SM	153.5				<u>Laboratory Data Interval</u> 39.6 to 40.8 ft.			
Well Screen Filter Pack - #3 Sand Filter Pack - 55.0 to 82.0 ft. (#3	-		1.2.7	5.5	.5.0	3 7.0	0.0			5.2	Civi	153.5	,			40.8 to 41.5 ft.: SILT WITH SAND, (ML)s:			
Sand) Bentonite Seal - 2.0 to 55.0 ft.	-	1														About 80% non-plastic fines with slow dilatancy; about 20% fine sand; maximum			
Well Protection - flush-mounted 18-inch manhole (15/16-inch	-															size: fine sand; moist, gray brown (2.5Y 4/2), no reaction with HCI.			
hexbolts)		100														41.5 to 43.2 ft.: <u>SILTY SAND, (SM)</u> : About			
COMMENTS: FADC - Fligh	ht Auc	or Dr	, Coro									\\\all	cor	mplotion inform	nation	is provided in attached Well			

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 12/10/08 FINISHED: 12/10/08
DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 73.3 ft. (El. 107.23 ft.) 8/27/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,171,186.2 E 6,204,387.3 (NAGD83)

TOTAL DEPTH: 82.0 ft.

STATE: California
GROUND SURFACE ELEVATION: 180.7 ft. (NAVD88)

T.O.C ELEVATION: 180.53 ft. (NAVD88)

HOLE LOGGED BY: B. Simpson

REVIEWED BY: J. Vauk

					LABO	DRAT	ORY	DATA	4		≻C	7	N <sub>O</sub>		Ŀ		
NOTES	рертн	٣.					1	TIMI	Ţ	₹E T%	RATOR	/ 2	UAL	/ 8	IC UNI	CLASSIFICATION AND	
NOTEG	DE	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL	ELEVATION	GEOLOGIC UNIT SYMBOL	PHYSICAL CONDITION	
	-	_				-					/_		s(ML)		0	60% fine to medium sand; about 40% non-plastic fines with slow dilatancy;  maximum size: medium sand; gray (2.5Y N5), moist, no reaction with HCl; loose consistency.	
	-	100												145.7		<ul> <li>43.2 to 43.9 ft.: LEAN CLAY, (CL): About</li> <li>90% fines, low plasticity and toughness, low to medium dry strength, no dilatancy; about 10% fine sand; maximum sand: fine sand; gray brown (2.5 YR 4/2), moist, no reaction HCL; firm consistency.</li> </ul>	
	35-															Laboratory Data Interval 43.2 to 43.9 ft.	
	-												CL			43.9 to 45.3 ft.: SANDY SILT, s(ML): About 65% non-plastic fines with slow dilatancy; about 35% fine sand; maximum size: fine sand; moist, olive brown (2.5Y 4/4), no reaction with HCl; firm consistency.	
	-		71.3	5.7	77.0	23.0	0.0	27.0	2.4	25.0	(ML)s		(ML)o	141.7		<b>45.3 to 47.3 ft.:</b> <u>SILTY SAND, (SM)</u> : About 65% fine to medium sand; about 35%	
	40-	100						NP	NP		, ,	140.9	(ML)s	140.9		non-plastic fines with slow dilatancy; maximum size: medium sand; olive brown (5Y	
	_		12.2	1.2	13.4	86.6	0.0	NP	NP	5.5	SM	139.7	SM	139.7		4/2) to light brown (7.5YR 6/4), moist, no reaction with HCl; loose consistency.	
	_												(ML)s	139.0		<u>Laboratory Data Interval</u> 45.3 to 47.3 ft.	
													SM			47.3 to 49.3 ft.: SILT, (ML): About 90% non-plastic fines with slow dilatancy; about	
	-		30.8	52.9	83.7	16.3	0.0	35.8	16.4	22.8	(CL)s	136.6	CL	137.3		10% fine sand; maximum size: fine sand; moist, gray brown (2.5Y 4/2), moist, no	
	45-	100											s(ML)		Qal	<ul> <li>reaction with HCl.</li> <li>49.3 to 51.7 ft.: SILTY SAND, SM: About 60% fine to medium sand; about 40%</li> </ul>	
	-	-	24.5	3.6	28.1	71.9	0.0	NP	NP	8.4	SM	133.5	SM	135.2		60% fine to medium sand; about 40% non-plastic fines with slow dilatancy; maximum size: medium sand; gray (2.5Y N5), moist, no reaction with HCl; ½ to ¼ inch laminations observed with black banding; soft (loose) consistency.	
	-												ML			Laboratory Data Interval 49.5 to 49.6 ft.	
	-	97	12.0	0.0	12.0	88.0	0.0	NP	NP	13.0	SP-SM	130.9		131.2		<ul> <li>51.7 to 60.3 ft.: <u>SILT, (ML)</u>: About 90% non-plastic fines with slow dilatancy; about 10% fine sand: maximum size: fine sand:</li> </ul>	
	50-	-	12.0	0.0	12.0	00.0	0.0			10.0	OI OIVI		SM			moist, gray brown (2.5Y 4/2), strong reaction with HCl (calcareous); firm consistency.	
	_													128.8		60.3 to 61.5 ft.: <u>SILTY SAND, SM</u> : About 80% fine to medium sand; about 20% non-plastic fines with slow dilatancy; maximum size: medium sand; moist, light	
	-	_														_ brown (7.5Y 6/4), no reaction with HCl; soft (loose) consistency.	
	55-	100	20.0	00.5	50.7	47.0	0.0	10.0	7.0	05.7	-(841)	125.4	_			- 61.5 to 64.9 ft.: SILT, (ML): About 90% non-plastic fines with slow dilatancy; about 10% fine sand; maximum size: fine sand; moist, gray brown (2.5Y 4/2), no reaction with HCl; loose consistency.  - 64.9 to 65.6 ft.: SILTY SAND, (SM): About 80% fine to medium sand; about 20% non-plastic fines with rapid dilatancy; maximum size: medium sand; light brown (7.5Y 6/4), moist, no reaction with HCl; loose consistency.	
	-		32.2	20.5	52.7	47.3	0.0	40.3	7.3	35.7	s(ML)		ML				
	-	100														_	
COMMENTS: FADC - Flig	COMMENTS: FADC = Flight Auger Dry Core Well completion information is provided in attached Well																

COMMENTS: FADC = Flight Auger Dry Core
HSA = Hollow Stem Auger
NP = Non-plastic
NR = No Recovery
NA = Not applicable

NA = Not applicable
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 12/10/08 FINISHED: 12/10/08
DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 73.3 ft. (El. 107.23 ft.) 8/27/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,171,186.2 E 6,204,387.3 (NAGD83)

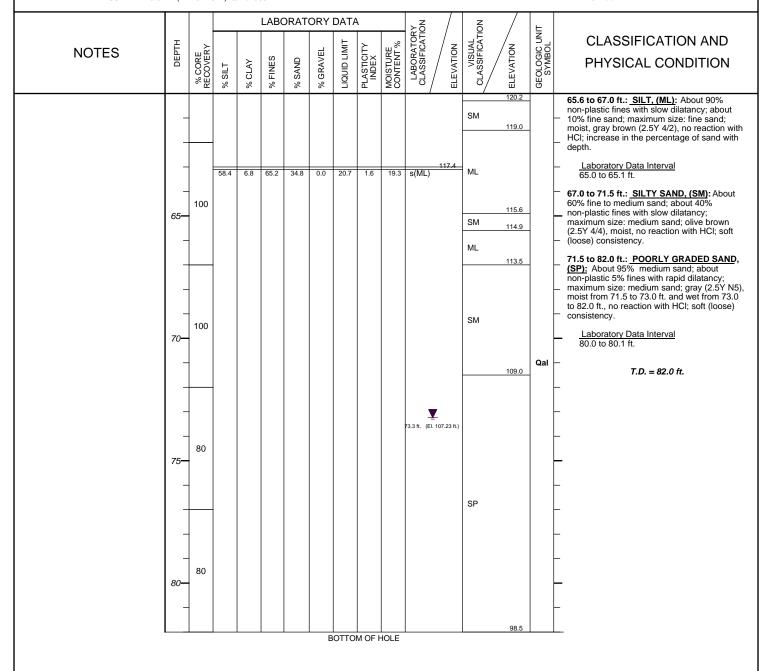
TOTAL DEPTH: 82.0 ft.

GROUND SURFACE ELEVATION: 180.7 ft. (NAVD88)

T.O.C ELEVATION: 180.53 ft. (NAVD88)

HOLE LOGGED BY: B. Simpson REVIEWED BY: J. Vauk

STATE: California



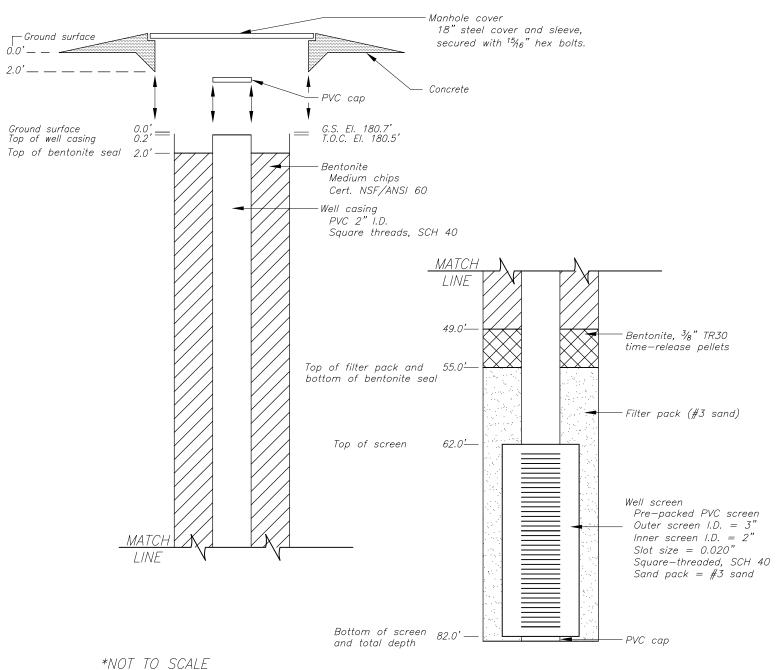
COMMENTS: FADC = Flight Auger Dry Core HSA = Hollow Stem Auger

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

MW-09-41	.GEOLOGIST: J. VAUK
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 8/27/2009	HELPER: K. COY

TOP OF WELL CASING COORDINATES:
N2171186.2 E6204387.3 (NAD83) ELEVATION 180.5' (NAVD88)
GROUND SURFACE ELEVATION 180.7' (NAVD88)



#### TVOT TO SOME

# NOTES:

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 8/19/09 FINISHED: 8/20/09

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 45.7 ft. (El. 133.46 ft.) 8/20/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,165,488.3 E 6,199,215.8 (NAGD83)

TOTAL DEPTH: 67.0 ft.

STATE: California GROUND SURFACE ELEVATION: 179.2 ft. (NAVD88)

T.O.C ELEVATION: 179.16 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk

REVIEWED BY: A. Warren

					LABO	DRAT	ORY	DATA	A		> N		N C		_		
	l _							Ŀ	_	%	YORY	/_	ATIC /	/_	Į Š	CLASSIFICATION AND	
NOTES	DEPTH	% CORE RECOVERY	١.	  -	မ္မ		GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL	ELEVATION	SYMBOL	PHYSICAL CONDITION	
	"	80	SILT	CLAY	% FINES	SAND	GRA	au D	AST	OIST	LAB	/ EV	LAS.	EV.	SYI	FITTSICAL CONDITION	
444 MEAQUIDENENTO ADE IN		° Z	%	%	%	%	%	Ĭ	굽	ĕŏ	0	<u> </u>	6/	ш	ЭĞ		
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND																0.0 to 67.0 feet QUATERNARY ALLUVIUM (Qal)	
SURFACE.	-	15											SM			<b>0.0 to 2.0 ft. <u>SILTY SAND, SM</u>:</b> About 70%	
PURPOSE OF HOLE: To recover core, collect data to														177.2		fine to medium sand; about 30% non-plastic fines with rapid dilatancy; maximum size:	
determine geologic and hydrologic site conditions, and install a	-															medium sand; dry, light brown, no reaction with HCl; contains organics roots and grass;	
groundwater monitoring well.	-															soft consistency.	
DRILLED BY: USGS Drill Crew		117	65.8	18.7	84.5	15.5	0.0	NP	NP	7.7	(ML)s					2.0 to 7.0 ft. SILT WITH SAND, (ML)s: About 85% fines with low plasticity,	
James Huckaby, Driller	-	1														toughness, and dry strength, and rapid dilatancy; about 15% fine sand; maximum	
Kevin Coy, Helper	_ ا											174.2	(ML)s			size: fine sand; dry, light brown (dark brown	
DRILL RIG: CME-550	5-															<ul> <li>when wet), no reaction with HCI; firm consistency.</li> </ul>	
DRILLING & SAMPLING	-	100														Laboratory Data Interval	
METHODS: Drill hole MW-09-44 was advanced																2.0 to 5.0 ft.	
using hollow stem flight augers with continuous dry core sampling	-		1											172.2		_ 7.0 to 10.0 ft. <u>No Recovery</u>	
system (FADC) from the ground surface to a total depth of 67.0 feet.																10.0 to 16.6 ft. WELL GRADED SAND, SW: About 85 to 90% fine to coarse sand; about 5	
FADC uses 7-5/8-inch O.D., 4-1/4-inch I.D. hollow stem augers,	-	NR											NR			to 10% fine, hard, subrounded gravel; about 5% non-plastic fines with rapid dilatancy;	
with a 5-foot-long, 3-inch I.D. split sample barrel.	-	''''														maximum size: 3/8 inches; dry, light brown and off-white, no reaction with HCl; soft	
																(loose) consistency.	
Interval Method 0.0 to 67.0 ft FADC	10-													169.2		Laboratory Data Interval	
DRILLING CONDITIONS AND		400														10.0 to 15.0 ft.	
DRILLER'S COMMENTS: 0.0 to 7.0 ft slow and smooth	-	100														<ul> <li>16.6 to 17.1 ft. <u>SILT WITH SAND</u>, (ML)s:</li> <li>About 80% fines with low to medium plasticity,</li> </ul>	
drilling 7.0 to 10.0 ft no recovery	-															low toughness, low to medium dry strength,  and rapid dilatancy; about 20% fine to	
10.0 to 67.0 ft slow and smooth drilling			3.6	1.2	4.8	81.0	14.2	NP	NP	1.0	GW				Qal	medium sand (mostly fine); maximum size: medium sand; moist, medium brown, no	
DRILL FLUID, RETURN AND	-	1											SW			<ul> <li>reaction with HCl; soft consistency.</li> </ul>	
COLOR: 0.0 to 42.0 ft None,		93											0			17.1 to 17.6 ft. SILT, ML: About 95% fines with low to medium plasticity, low toughness,	
42.0 to 67.0 ft Water, no return	-															low to medium dry strength, and rapid dilatancy; about 5% fine sand; maximum size:	
WATER LEVEL:	15-											164.2				fine sand; moist, medium brown, no reaction	
41.8 feet b.g.s. on 8/19/2009																with HCI; soft consistency.	
REASON FOR HOLE TERMINATION:	-	100														Laboratory Data Interval 17.1 to 17.6 ft.	
The hole was terminated upon successful completion to the target													(ML)s	162.6		17.6 to 17.7 ft. SILT WITH SAND, (ML)s:	
depth.	-		59.8	37.4	97.2	2.8	0.0	39.0	14.4	37.2	CL	161.6	ML	162.1 161.6		About 85% fines with low to medium plasticity, low toughness, low to medium dry strength,	
HOLE COMPLETION: Well Casing - 0.0 to 41.5 ft. (T.O.C.	-													161.5		rapid dilatancy; about 15% fine sand; maximum size: fine sand; moist, medium	
El. 179.16 ft.)  Dual Pre-pack Screen - 41.5 to 61.5		107									(1	ML)s				brown, no reaction with HCl; soft consistency.	
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand	-	1														17.7 to 29.2 ft. <u>INTERBEDDED SILT, ML;</u> AND SILT WITH SAND, (ML)s:Grain-size	
Filter Pack - 36.0 to 62.0 ft. (#3																distribution of interbedded soils layers is listed	
Sand) Bottom Bentonite Seal - 62.0 to 67.0	20-		1													<ul> <li>below. Soil descriptions for SILT, ML, is the same as described in depth interval 17.1 to</li> </ul>	
ft. Bentonite Seal - 2.0 to 36.0 ft.	-	100														17.6 feet. Soil description for SILT WITH SAND, (ML)s, is the same as described in	
Well Protection - flush-mounted 18-inch manhole (15/16-inch													ML & (ML)	)s		depth interval 17.6 to 17.7 feet. 17.7 to 17.9 ft ML: 95% fines; 5% sand.	
hexbolts)	-															_ 17.9 to 18.1 ft (ML)s: 85% fines; 15% sand. 18.1 to 19.2 ft ML: 95% fines; 5% sand.	
			64.3	28.0	92.3	7.7	0.0	35.1	11.6	34.8	CL					19.2 to 20.2 ft (ML)s: 85% fines; 15% sand. 20.2 to 20.3 ft ML: 95% fines; 5% sand.	
	-	100										155.7				20.3 to 20.7 ft (ML)s: 85% fines; 15% sand. 20.7 to 20.8 ft ML: 95% fines; 5% sand.	
	-	100														20.8 to 21.8 ft (ML)s: 85% fines; 15% sand. 21.8 to 23.5 ft ML: 95% fines; 5% sand.	
															23.5 to 24.4 ft (ML)s: 80% fines; 20% sand. 24.4 to 25.3 ft ML: 90% fines; 10% sand.		
COMMENTO FARO 5"												10/- "		:	_4!	, , , , , , , , , , , , , , , , , , ,	
COMMENTS: FADC = Flight	าt Aug	er Dry	Core									vvell co	ompletion i	ıntorm	atıon i	s provided in attached Well	

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 8/19/09 FINISHED: 8/20/09

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 45.7 ft. (El. 133.46 ft.) 8/20/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,165,488.3 E 6,199,215.8 (NAGD83)

TOTAL DEPTH: 67.0 ft.

STATE: California GROUND SURFACE ELEVATION: 179.2 ft. (NAVD88)

T.O.C ELEVATION: 179.16 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

							:					- /	/		
					LABO	ORAT	ORY	DATA	٩		≿o	/		⊨	
	<sub>E</sub>	>						   	>	%	LABORATORY CLASSIFICATION	/ z	VISUAL CLASSIFICATION SLEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND
NOTES	DEPTH	AR.	١.	<b> </b> ≻	ပ္သ		VEL	N I	ĮξΧ	I S I	ORA	/ jo	SIFIC	MBC	PHYSICAL CONDITION
		% CORE RECOVERY	SILT	CLAY	FINES	SAND	GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LAB	ELEVATION	VISUA CLASSIFICA ELEVATION	SYI	FITISICAL CONDITION
		~ 2	%	%	%	%	%	ĭ	굽	ĭĕĕ	0/	<u> </u>	٥/ ਜ਼	Ö	
															25.3 to 25.5 ft (ML)s: 85% fines; 15% sand. 25.5 to 27.8 ft ML: 90% fines; 10% sand.
	-	100													27.8 to 29.2 ft (ML)s: 85% fines; 15% sand.
			62.1	20.3	82.4	17.6	0.0	NP	NP	31.5	(ML)s				Laboratory Data Interval
	-		1								, , ,				21.8 to 23.5 ft. 25.5 to 27.8 ft.
												151.4			29.2 to 30.5 ft. SILTY SAND, SM: About
	-	1,00													80% fine sand; about 20% non-plastic fines with rapid dilatancy; maximum size: fine sand;
	l _	100											450.0		dry, light brown, no reaction with HCl; soft
													150.0	1	consistency.
	30-		15.7	4.4	20.1	79.9	0.0	NP	NP	12.9	SM		SM		Laboratory Data Interval 29.2 to 30.5 ft.
												148.7	148.7 ML 148.4	-	<b>30.5 to 30.8 ft. SILT, ML:</b> About 95%
	-	80											s(ML) 148.0	1	<ul> <li>non-plastic fines with rapid dilatancy; about 5% fine sand; maximum size: fine sand;</li> </ul>
											s(ML	.)——•	SP 147.6 (SP)g 147.5		moist, dark gray, no reaction with HCl; soft
	-												147.2		_ consistency.
	_														30.8 to 31.2 ft. <u>SANDY SILT, s(ML)</u> : About 55% non-plastic fines with rapid dilatancy;
		57													about 45% fine sand; maximum size: fine sand; moist, light brown and orange, no
	-	ļ °.													reaction with HCl; soft consistency.
			2.4	1.0	3.4	36.6	60.0	NP	NP	2.3	(GP)s				31.2 to 31.6 ft. POORLY GRADED SAND,
	35-		+										(GP)s		SP: About 95% fine to medium sand (mostly fine); about 5% non-plastic fines with
															rapid dilatancy; maximum size: medium sand; dry, light brown; soft consistency.
	-	50													31.6 to 31.7 ft. SANDY SILT, s(ML): About
	_											142.2			60% non-plastic fines with rapid dilatancy;
														Qal	<ul> <li>about 40% fine sand; maximum size: fine sand; moist, medium brown, no reaction with</li> </ul>
	-	1											141.4	-	HCI; soft consistency.
		83													31.7 to 32.0 ft. POORLY GRADED SAND WITH GRAVEL, (SP)g: About 65% fine to
	-	1											(ML)s		<ul> <li>coarse sand; about 30% fine, hard, subrounded gravel; about 5% non-plastic</li> </ul>
													139.2		fines with rapid dilatancy; maximum size: 1 inch; dry, light brown, no reaction with HCl;
	40-		1										139.2	1	soft consistency.
		115													32.0 to 37.8 ft. POORLY GRADED
		] 113											s(ML)		GRAVEL WITH SAND, (GP)s:About 55% fine to coarse (mostly fine), hard, subrounded
	-		1												gravel; about 40% fine to coarse sand; about 5% non-plastic fines; maximum size: 1.25
													136.4		inches; moist; light brown, no reaction with
	-	1											100.1	Ī	HCI, soft consistency.
		97													<u>Laboratory Data Interval</u> 32.0 to 37.0 ft.
	-	1													— 37.8 to 40.0 ft. <u>SILT WITH SAND, (ML)s</u> :
	45-		10.5	5.2	15.7	84.3	0.0	NP	NP	21.9	SM				About 80% non-plastic fines with rapid dilatancy; about 20% fine sand; maximum
											_	_			size: fine sand; moist, gray, no reaction with
	-	40									45.7 ft. (E	El. 133.46 ft.)	SM		HCl; soft consistency.
															<b>40.0 to 42.8 ft. SANDY SILT, s(ML):</b> About 60% non-plastic fines with rapid dilatancy;
	-											132.2			about 40% fine sand; maximum size: fine sand; moist from 40.0 to 41.8 ft., wet from
															41.8 to 42.8 ft.; strong reaction with HCl, calcite veins.
	-	1													
		50													<b>42.8 to 49.3 ft.</b> SILTY SAND, SM: About 70% fine sand; about 30% non-plastic fines;
													129.9	-	<ul> <li>maximum size: fine sand; moist to wet, gray, no reaction with HCI; soft consistency.</li> </ul>
													SM 129.2		- , · · · · · · · · · · · · · · · · ·
COMMENTS: FADC - Fligh	at A.110	D-	Coro									Mall of	amplation inform	otion i	s provided in attached Well

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 8/19/09 FINISHED: 8/20/09 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 45.7 ft. (El. 133.46 ft.) 8/20/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,165,488.3 E 6,199,215.8 (NAGD83)

TOTAL DEPTH: 67.0 ft.

STATE: California GROUND SURFACE ELEVATION: 179.2 ft. (NAVD88)

T.O.C ELEVATION: 179.16 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

					LABO	DRAT	ORY	DATA	4		×O		N O		╘						
NOTES	DEPTH	 					ᆸ	LIMI	<u></u>	# 2	RATOF	\ \g	SUAL	8	SOL UN	CLASSIFICATION AND					
110120		% CORE RECOVERY	SILT	% CLAY	% FINES	SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL	ELEVATION	GEOLOGIC UNIT SYMBOL	PHYSICAL CONDITION					
	$\vdash$	88	%	%	%	%	%	ĭ	곱	<u>≅</u> 8	٥ /		0/		35	Laboratory Data Interval					
	_	10														42.8 to 47.0 ft.					
	_	10														49.3 to 50.0 ft. SILTY SAND, SM: About 60% fine sand; about 40% non-plastic fines with rapid dilatancy; maximum size: fine sand; moist, gray, no reaction with HCl; firm consistency.					
	_	NR														<ul> <li>50.0 to 59.9 ft. <u>SILTY SAND</u>, <u>SM</u>: About 80 to 85% fine sand; about 15 to 20% non-plastic fines with rapid dilatancy; maximum size: fine sand; moist to wet, gray, no reaction with HCl; soft consistency.</li> </ul>					
	55-												SM			Laboratory Data Interval 55.0 to 57.0 ft.					
	-	- 55	6.2	2.4	8.6	91.4	0.0	NP	NP	25.1	SP-SM	122.2				<ul> <li>59.9 to 60.1 ft. SILT WITH SAND, (ML)s:         About 80% fines with medium plasticity,         toughness, and dry strength, and no         dilatancy; about 20% fine sand; maximum         size: fine sand; gray, no reaction with HCl;         firm consistency.</li> </ul>					
	_															firm consistency.					
	-	76												110 3	Qal	60.1 to 63.9 ft. SILTY SAND, SM: About 80% fine sand; about 20% non-plastic fines with rapid dilatancy; maximum size: fine sand; wet, gray, no reaction with HCl; soft consistency.					
	60-												(ML)s	119.3 119.1		Laboratory Data Interval 60.1 to 62.0 ft.					
	-	-	8.6	5.9	14.5	85.5	0.0	NP	NP	24.1	SM	117.2	- SM			<ul> <li>63.9 to 67.0 ft. LEAN CLAY WITH SAND, (CL)s: About 80% fines with low plasticity, toughness, and dry strength, and rapid dilatancy; about 20% fine sand; maximum size: fine sand; moist, greenish-gray, no</li> </ul>					
	-															reaction with HCI; firm consistency.					
	_													115.3		Laboratory Data Interval 63.9 to 67.0 ft.					
		62														T.D. = 67.0 ft.					
	65-	1	45.6	39.8	85.4	14.6	0.0	28.9	12	24.9	CL		(CL)s			_					
	-	1														_					
	BOTTOM OF HOLE																				
								5.10	51 1												

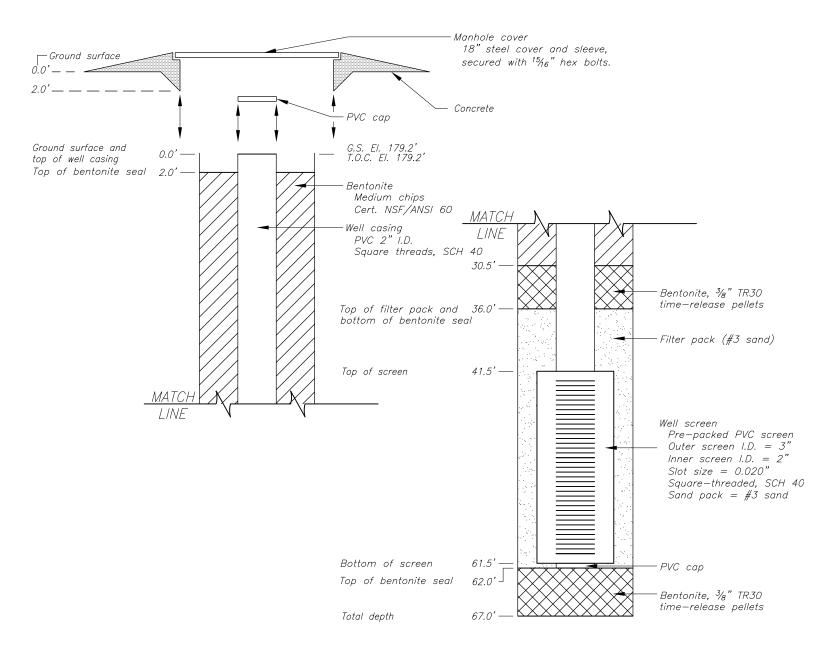
FADC = Flight Auger Dry Core HSA = Hollow Stem Auger COMMENTS:

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

MW-09-44	GEOLOGIST: J. VAUK
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 8/20/2009	HELPER: K. COY

TOP OF WELL CASING COORDINATES:
N2165488.3 E6199215.8 (NAD83) ELEVATION 179.2' (NAVD88)
GROUND SURFACE ELEVATION 179.2' (NAVD88)



# \*NOT TO SCALE

# NOTES:

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 8/16/09 FINISHED: 8/17/09

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 19.3 ft. (El. 154.08 ft.) 8/16/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,166,236.8 E 6,192,397.8 (NAGD83)

TOTAL DEPTH: 67.0 ft.

STATE: California GROUND SURFACE ELEVATION: 173.5 ft. (NAVD88)

T.O.C ELEVATION: 173.38 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk

REVIEWED BY: A. Warren

					LABO	DRAT	ORY	DATA	A		Z		z /	_							
	l _							Ŀ		%	LABORATORY	/_	VISUAL CLASSIFICATION SLEVATION	Į Į	CLASSIFICATION AND						
NOTES	DEPTH	胀			ι S		VEL	Ĭ	E×	a S F S	SIFIC /	Į	ISUA SIFIC TION	ABO	PHYSICAL CONDITION						
		% CORE RECOVERY	SILT	CLAY	FINES	SAND	GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LAB(	ELEVATION	VISUAI CLASSIFICA ELEVATION	GEOLOGIC I SYMBOL	PHYSICAL CONDITION						
		8.8	%	%	%	%	%	ĭ	굽	ĭŏ	٥/	ᆸ	٥/ ਜ਼	ö							
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND															0.0 to 67.0 feet QUATERNARY ALLUVIUM (Qal)						
SURFACE.	-	1											SM		- 0.0 to 1.8 ft.: <u>SILTY SAND, SM</u> : About 75%						
PURPOSE OF HOLE: To recover core, collect data to	-	-											171.6 SP/SM 171.3		fine sand; about 25% non-plastic fines with rapid dilatancy; maximum size; medium sand:						
determine geologic and hydrologic site conditions, and install a		62													dry, light brown, no reaction with HCl; soft consistency.						
groundwater monitoring well.															,						
DRILLED BY:	-	1													1.8 to 2.1 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to						
USGS Drill Crew James Huckaby, Driller	5-														coarse sand; about 10% non-plastic fines with rapid dilatancy; maximum size: coarse sand;						
Kevin Coy, Helper															dry, light brown, no reaction with HCl; soft consistency.						
DRILL RIG: CME-550	-	1											SM								
DRILLING & SAMPLING	-	1													85% fine to medium sand; about 15% non-plastic fines with rapid dilatancy;						
METHODS: Drill hole MW-09-46 was advanced		40	8.3	2.4	10.7	89.3	0.0	NP	NP	2.2	SW-SM				maximum size: medium sand; dry, light  brown, no reaction with HCl; soft consistency.						
using hollow stem flight augers with continuous dry core sampling	-																				
system (FADC) from the ground	-	-													Laboratory Data Interval 5.0 to 10.0 ft.						
surface to a total depth of 67.0 feet. FADC uses 7-5/8-inch O.D.,	10-										16	3.4	163.4		10.0 to 12.0 ft.: SILTY GRAVEL WITH						
4-1/4-inch I.D. hollow stem augers, with a 5-foot-long 3-inch I.D. split															SAND. (GM)s: About 50% fine to coarse, hard, sub-rounded gravel; about 35% fine						
sample barrel.	-	30											(GM)s		<ul> <li>sand; about 15% non-plastic fines with rapid dilatancy; maximum size: 3/4 inches; dark and</li> </ul>						
Interval Method 0.0 to 67.0 ft FADC	-												161.4	-	light brown, no reaction with HCl; soft consistency.						
DRILLING CONDITIONS AND	l _														_ Laboratory Data Interval						
DRILLER'S COMMENTS: 0.0 To 27.0 ft slow and smooth			1.7	2.2	3.9	94.5	1.6	NP	NP	1.6	SP				12.0 to 14.9 ft.						
drilling 27.0 to 37.0 ft extend sampler out	-												SP/SM		<ul> <li>12.0 to 15.8 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to</li> </ul>						
in-front of shoe, smooth drilling 37.0 to 67.0 ft shorten run length	15-	60									15	58.5		Qal	coarse sand (coarse subrounded sand encountered from 12.0 to 14.9 ft.); about 10%						
to 2 to 3 feet, smooth drilling													157.6		non-plastic fines with rapid dilatancy;						
DRILL FLUID, RETURN AND	-												(GP)s		<ul> <li>maximum size: 1/8 inches; light gray and light brown, no reaction with HCl; soft consistency.</li> </ul>						
COLOR: 0.0 to 27.0 ft None	-												156.6	1	15.8 to 16.8 ft.: POORLY GRADED						
27.0 to 67.0 ft Water, no return	l _												SM 155.3		GRAVEL WITH SAND, (GP)s: About 50% fine to coarse, hard, rounded to sub-rounded						
WATER LEVEL: 19.3 feet b.g.s. on 8/16/2009			1.6	1.3	2.9	57.4	39.7	NP	NP	3.6	(SP)g <sub>15</sub>	54.8			gravel; about 45% fine to coarse sand; about 5% non-plastic fines with rapid dilatancy;						
REASON FOR HOLE	-	32									19.3 ft. (El. 154				<ul> <li>maximum size: 1 inch; dry, light brown, no reaction with HCl.</li> </ul>						
TERMINATION: The hole was terminated upon	20-	32									19.3 ft. (El. 154	i.us it.)	(SP/SM)g		16.8 to 18.1 ft.: <u>SILTY SAND, SM</u> : About						
successful completion to the target depth.															80% fine to coarse sand; about 20%  non-plastic fines with rapid dilatancy;						
HOLE COMPLETION:															maximum size: coarse sand; dry, light brown to off white, no reaction with HCl; soft						
Well Casing - 0.1 to 42.0 ft. (T.O.C.	-		-										151.4	-	consistency.						
El. 173.38 ft.)  Dual Pre-pack Screen - 42.0 to 62.0	_														18.1 to 22.0 ft.: POORLY GRADED SAND						
ft. (Slotted 0.020-inch) Well Screen Filter Pack - #3 Sand															WITH SILT AND GRAVEL, (SP/SM)g: About 50% fine to coarse sand; about 40%						
Filter Pack - 37.0 to 62.5 ft. (#3 Sand)	-	26											(SM)g		<ul> <li>fine, hard, rounded to sub-rounded gravel;</li> <li>about 10% non-plastic fines with rapid</li> </ul>						
Bottom Bentonite Seal - 62.5 to 67.0 ft.	25-												, , ,		dilatancy; maximum size: 3/4 inches; wet, light brown, no reaction with HCl; soft consistency.						
Bentonite Seal - 2.0 to 37.0 ft. Well Protection - flush-mounted	l _														Laboratory Data Interval						
18-inch manhole (15/16-inch hexbolts)															18.1 to 18.6 ft.						
	-												146.4	1	<ul> <li>22.0 to 27.0 ft.: <u>SILTY SAND WITH</u></li> <li>GRAVEL, (SM)g: About 65% fine to coarse</li> </ul>						
	-	-				05.5				40.5	0.0		OD/OM		sand; about 20% fine, hard, rounded to sub-rounded gravel; about 15% non-plastic						
			2.7	0.6	3.3	96.3	0.4	NP	NP	13.5	SP		SP/SM	fines with rapid dilatancy; maximum size: 3/4							
	-	36									14	13.9	143.9		<ul> <li>inches; wet, light brown, no reaction with HCl; soft consistency; poor recovery due to loose</li> </ul>						
	<u> </u>												(SM)g <sub>143.4</sub>	<u> </u>	wet sand.						
COMMENTS: FADC = Flight	nt Aug	er Dry	/ Core								We	ell co	ompletion inforn	nation i	s provided in attached Well						

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 8/16/09 FINISHED: 8/17/09

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 19.3 ft. (El. 154.08 ft.) 8/16/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,166,236.8 E 6,192,397.8 (NAGD83)

TOTAL DEPTH: 67.0 ft.

STATE: California GROUND SURFACE ELEVATION: 173.5 ft. (NAVD88)

T.O.C ELEVATION: 173.38 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

					LABO	DRAT	ORY	DATA	4		Z	1	z		_	
NOTES	рертн	\ \ \ \					-:	ΔIM	È	ZE T%	ATOR)	/ 8	UAL FICATIC	\ \ 8	SYMBOL	CLASSIFICATION AND
NOTES	DEF	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY	ELEVATION	VISUAL	ELEVATION	GEOLOG SYMB	PHYSICAL CONDITION
	-	-		0.	0.		0.				<i>/</i>		SM			27.0 to 29.5 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 85% fine to coarse sand; about 10% non-plastic fines with rapid dilatancy; about 5% hard, sub-rounded gravel; maximum size: 1/2 inches; wet, light brown, no reaction with HCI; soft consistency.
	-	87														<ul> <li><u>Laboratory Data Interval</u></li> <li>27.0 to 29.5 ft.</li> </ul>
	35-	- 30	59.7	18.9	78.6	21.4	0.0	24.4	5.6	22.3	(CL-ML)ş	37.8	SM	139.1		29.5 to 30.0 ft.: <u>SILTY SAND WITH</u> GRAVEL, (SM)g: About 45% fine to coarse sand; about 35% fine to coarse, hard, rounded to sub-rounded gravel; about 20% non-plastic fines with rapid dilatancy; maximum size: coarse gravel; light brown, no
		30											(ML)s			reaction with HCI; soft consistency.
	-	87												134.9		<ul> <li>30.0 to 34.3 ft.: <u>SILTY SAND, SM</u>: About 75% fine sand; about 25% non-plastic fines</li> <li>with rapid dilatancy; maximum size: fine sand; wet, light brown, no reaction with HCI.</li> </ul>
	40-		9.6	2.3	11.9	88.1	0.0	NP	NP	21.2		33.4	SP/SM			34.3 to 35.0 ft.: <u>SILTY SAND, SM</u> : About 55% fine sand; about 45% non-plastic to low plasticity fines; maximum size: fine sand; wet, light brown, no reaction with HCl.
	-	85											_s(ML)	131: <u>4</u>		— 35.0 to 38.5 ft.: <u>SILT WITH SAND, (ML)s</u> : About 75% fines with low plasticity, toughness, and dry strength, and rapid dilatancy; about 25% fine sand; maximum size: fine sand; medium brown, no reaction with HCl; soft consistency.
	-	60											NR			Laboratory Data Interval 35.0 to 35.6 ft.
	45 <del>-</del>	95	24.6	14.6	39.2	60.8	0.0	NP	NP	16.2	SM 1	27.7	SM	128.4	Qal	38.5 to 42.0 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine sand; about 10% non-plastic fines; maximum size: fine sand; light brown and light gray, no
	-												SM	126.4		reaction with HCl; soft consistency.  Laboratory Data Interval 38.5 to 40.0 ft.
	-	100	5.7	4.9	10.6	89.4	0.0	NP	NP	22.8	SP-SM	23.4	SM			42.0 to 42.2 ft.: SANDY SILT, s(ML): About 55% non-plastic fines; about 45% fine sand; maximum size: fine sand; wet, light brown, no reaction with HCl; soft consistency.
	50-	00										23.4	SP	123.0 122.6		42.2 to 45.0 ft.: <u>No Recovery</u> 45.0 to 45.7 ft.: SILTY SAND, SM: About
	-	60														55% fine sand; about 45% non-plastic fines; maximum size: fine sand; wet, light brown, no reaction with HCl; soft consistency.
	-	47											SM			Laboratory Data Interval 45.0 to 45.7 ft.
	55 <del>-</del>												(ML)s	119.0 118.4		<ul> <li>45.7 to 47.0 ft.: <u>SILTY SAND, SM</u>: About 80% fine to medium sand; about 20% non-plastic fines; maximum size: medium sand; wet, light brown to light gray; soft consistency.</li> </ul>
	-	30											s(ML)	116.4		47.0 to 50.4 ft.: SILTY SAND, SM: About 70% fine to medium sand; about 30% non-plastic fines; maximum size: medium sand; wet, greenish-gray, no reaction with HCl; firm consistency.
	-	50											s(ML)			Laboratory Data Interval 47.0 to 50.0 ft.
COMMENTS: FADC - Fligh		_	18.5	6.8	25.3	74.7	0.0	NP	NP	17.2		13.4		113.4		s provided in attached Well

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

SHEET 3 OF 3

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A. River Bank Left, Fresno County

BEGUN: 8/16/09 FINISHED: 8/17/09

AND DATE MEASURED: 19.3 ft. (El. 154.08 ft.) 8/16/2009

DEPTH AND ELEVATION OF WATER LEVEL

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,166,236.8 E 6,192,397.8 (NAGD83)

TOTAL DEPTH: 67.0 ft.

GROUND SURFACE ELEVATION: 173.5 ft. (NAVD88)

T.O.C ELEVATION: 173.38 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

STATE: California

					LABO	DRAT	ORY	DATA	٨		.≻.O	Γ	N O		Ŀ
NOTES	DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY	ELEVATION	VISUAL	ELEVATION	GEOLOGIC UNIT SYMBOL
	_	NR											NR	111.4	
	- - - 65-	100	47.8	16.8	64.6	35.4	0.0	27.1	8.5	25.0	s(CL)		s(CL)		Qal
	-	- 80							MOFI		10	06.4		106.4	_

BOTTOM OF HOLE

# CLASSIFICATION AND PHYSICAL CONDITION

50.4 to 50.8 ft.: POORLY GRADED SAND, SP: About 95% fine to medium sand; about 5% non-plastic fines; maximum size: medium sand; wet, light brown to off white, no reaction

with HCI; soft consistency.

50.8 to 54.4 ft.: SILTY SAND, SM: About 85% fine sand; about 15% non-plastic fines with rapid dilatancy; maximum size: fine sand; wet, light brown, no reaction with HCI; soft

54.4 to 55.0 ft.: SILT WITH SAND, (ML)s: About 80% fines with low plasticity, toughness and dry strength, and rapid dilatancy; about 20% fine sand; maximum size: fine sand; moist, greenish-gray, no reaction with HCI; firm consistency.

55.0 to 57.0 ft.: SANDY SILT, s(ML): About 70% non-plastic fines with rapid dilatancy; about 30% fine sand; maximum size: fine sand; moist, greenish-gray, no reaction with HCI; soft consistency.

57.0 to 60.0 ft.: SANDY SILT, s(ML): About 55% non-plastic fines with rapid dilatancy; about 45% fine sand; maximum size: fine sand; moist, greenish-gray with tan sand bands 2mm in length, no reaction with HCl; soft consistency.

<u>Laboratory Data Interval</u> 59.4 to 60.0 ft.

60.0 to 62.0 ft.: No Recovery

62.0 to 67.0 ft.: SANDY LEAN CLAY, s(CL): About 70% fines with low plasticity, toughness and dry strength, and rapid dilatancy; about 30% fine sand; maximum size: fine sand; moist, greenish-gray, strong reaction with HCI; firm consistency; streaked with calcium carbonate.

Laboratory Data Interval 62.0 to 67.0 ft.

T.D. = 67.0 ft.

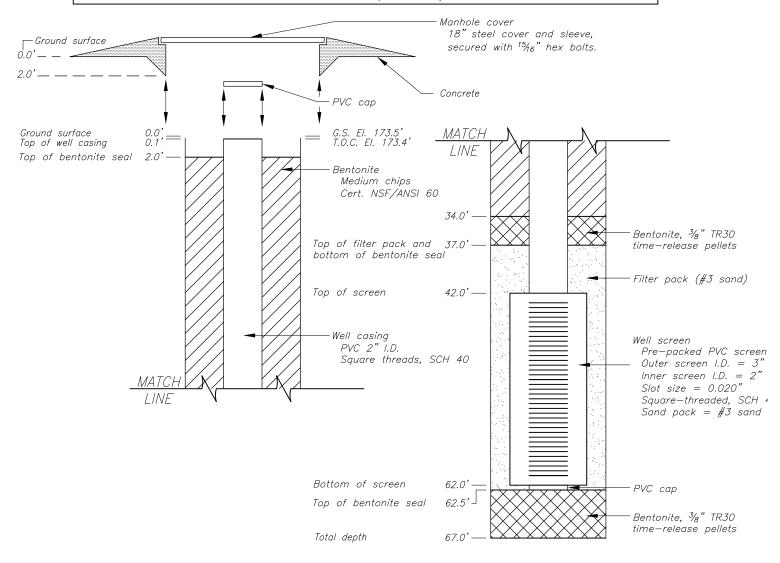
COMMENTS: FADC = Flight Auger Dry Core HSA = Hollow Stem Auger

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

MW-09-46	GEOLOGIST: J. VAUK
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 8/17/2009	HELPER: K. COY

TOP OF WELL CASING COORDINATES:
N2166236.8 E6192397.8 (NAD83) ELEVATION 173.4' (NAVD88)
GROUND SURFACE ELEVATION 173.5' (NAVD88)



# \*NOT TO SCALE

# NOTES:

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Right, Madera County

BEGUN: 9/15/09 FINISHED: 9/17/09

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 27.4 ft. (El. 147.24 ft.) 9/17/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,166,619.1 E 6,192,701.7 (NAGD83)

TOTAL DEPTH: 50.0 ft.

STATE: California GROUND SURFACE ELEVATION: 174.7 ft. (NAVD88)

T.O.C ELEVATION: 174.64 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk

					LABO	DRAT	ORY	DATA	4		ΣZ		z		<b>-</b>	
NOTES	рертн	<u></u> ≿					닒	ΗM	<u>F</u>	ZE T%	ATOR)	/ N	UAL	/N	IIC UNIT	CLASSIFICATION AND
NOTES	DEI	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION	ELEVATION	VISUAL	ELEVATION	GEOLOGIC U SYMBOL	PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.											,					0.0 to 50.0 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											s(ML)			<ul> <li>0.0 to 4.7 ft.: <u>SANDY SILT, s(ML)</u>: About 65% fines with low plasticity, toughness and dry strength, and rapid dilatancy; about 35% fine sand; maximum size: very fine sand; dry, brown, no reaction with HCl; firm to hard consistency; contains some organics (roots).</li> </ul>
DRILLED BY: USGS Drill Crew James Huckaby, Driller	_												- (···-)			Laboratory Data Interval  3.5 to 3.8 ft.
Kevin Coy, Helper  DRILL RIG: CME-550	_		50.0	15.5	65.5	34.5	0.0	29.8	6.8	5.5	s(ML)	170.8				4.7 to 7.0 ft.: <u>SILTY SAND, SM</u> About 65% fine sand; about 35% fines; maximum size: fine sand; dry, brown, no reaction with HCl; soft consistency; contains layers with a higher
DRILLING & SAMPLING METHODS: Drill hole MW-09-47 was advanced	5—	86	15.2	0.7	15.9	83.8	0.3	NP	NP	2.0	SM	169.3		169.9		percentage of fines.  Laboratory Data Interval 5.0 to 5.3 ft.
using hollow stem flight augers with continuous dry core sampling system (FADC) from the ground surface to a total depth of 50.0 feet. FADC uses 7-5/8-inch 0.D., 4-1/4-inch I.D. hollow stem augers, with a 5-foot-long, 3-inch I.D. split	-												SM	167.6		7.0 to 9.8 ft.: POORLY GRADED SAND  WITH SILT. SP/SM: About 90% fine to medium sand; about 10% fines; maximum size: medium sand; moist, orange-brown with darker lenses, no reaction with HCl; very soft consistency.
sample barrel.  Interval Method 0.0 to 50.0 ft FADC	_															9.8 to 10.5 ft.: SILTY SAND WITH GRAVEL, (SM)g: About 55% fine sand; about 30% fine to coarse, very hard,
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 22.0 ft smooth drilling	_												SP/SM			sub-rounded, gravel; about 15% fines; maximum size: 2-inches; moist, brown, no reaction with HCl; very soft consistency.
22.0 to 27.0 ft encountered gravel layer, rough drilling 27.0 to 42.0 ft difficult drilling heaving sands 42.0 ft ream hole with pilot-bit	10-	70											(SM)g	164.8 164.1	Qal	10.5 to 13.5 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to coarse sand (coarse sand is hard and sub-angular, grains consist of quartz, mica, various other minerals); about 10% fines;
42.0 to 50.0 ft smooth drilling.  DRILL FLUID, RETURN AND COLOR:	_													104.1		maximum size: coarse sand; moist, light brown-gray, no reaction with HCl; very soft consistency; minor iron-oxide staining.
0.0 to 32.0 ft None 32.0 to 50.0 ft Water, no return	_		6.5	0.0	6.5	93.5	0.0	NP	NP	0.5	SP-SM	1 162.4	SP/SM			Laboratory Data Interval 11.8 to 12.2 ft.
WATER LEVEL: 27.4 feet b.g.s. on 9/15/2009 REASON FOR HOLE	_															13.5 to 14.1 ft.: POORLY GRADED SAND WITH GRAVEL, (SP)g: About 75% fine to coarse sand (coarse sand is hard and sub-angular, with grains consisting of quartz,
TERMINATION: The hole was terminated upon successful completion to the target depth.	_												(SP)g	160.5		mica, various other minerals); about 20% fine to coarse, hard, sub-rounded gravel; about 5% fines; maximum size: 1 inch; moist, light brown-gray, no reaction with HCl; very soft
HOLE COMPLETION: Well Casing - 0.1 to 20.0 ft. (T.O.C. El. 174.64 ft.) Dual Pre-pack Screen - 20.0 to 40.0 ft. (Slotted 0.020-inch)	15—	74											SP	450.0		consistency.  — 14.1 to 16.0 ft.: POORLY GRADED SAND,  SP: About 95% fine to coarse sand; about 5% fines; trace of fine, hard, sub-rounded gravel; maximum size: 1/2 inches; moist, light
Well Screen Filter Pack - #3 Sand Filter Pack - 17.0 to 41.5 ft. (#3 Sand) Bottom Bentonite Seal - 41.5 to 50.0	_												(SM)g	158.6		gray, no reaction with HCl; very soft consistency; minor iron-oxide staining.  16.0 to 16.9 ft.: SILTY SAND WITH
ft. Bentonite Seal - 2.0 to 17.0 ft. Well Protection - flush-mounted 18-inch manhole (15/16-inch hexbolts)	_												SP	.07.7		<ul> <li>GRAVEL, (SM)g: About 70% fine to coarse sand with grains consisting of quartz, mica, and various other minerals; about 15% fine to coarse, hard, sub-rounded gravel; about 15% fines; maximum size: 1 inch; moist, gray-brown, no reaction with HCl; very soft consistency.</li> </ul>
	_	76										_		155.6		
COMMENTS: FADC - Fligh	ot Aug	or Dr	Coro									\Moll or	omplotic	on inform	otion i	s provided in attached Well

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Right, Madera County

BEGUN: 9/15/09 FINISHED: 9/17/09
DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 27.4 ft. (El. 147.24 ft.) 9/17/2009

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,166,619.1 E 6,192,701.7 (NAGD83)

TOTAL DEPTH: 50.0 ft.

STATE: California
GROUND SURFACE ELEVATION: 174.7 ft. (NAVD88)

T.O.C ELEVATION: 174.64 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk

NOTES  ### A 12 N. 1 N						LABO	DRAT	ORY	DATA	١		Z		z /	L	
## 10 4 5 8 6 9 8 6 8 8 6 8 8 8 8 8 8 8 8 8 8 8 8	NOTES		<b> </b>						⊥W	>	%	TOR	Z	CATIC	L CNI	CLASSIFICATION AND
## 10 4 5 8 6 9 8 6 8 8 6 8 8 8 8 8 8 8 8 8 8 8 8	NOTES	DEP	ORE	-	ΑY	SH	Q.	RAVEL	ID LIN	EX	TURE	BORA	/ATIO	VISU SSIFI	YMBC	PHYSICAL CONDITION
1934   193   194   194   195			RECC	lls %	"CL	% FII	% SA	% GF	LIQU	PLAS	MOIS	CLA	/ A	CLA CLA	GEOI	
133.6  4.6 0.0 4.0 000 5.7 No														(SP/SM)g		
40  40  40  40  40  40  40  40  40  40		_												153.6		sand is hard and sub-angular, with grains consisting of quartz, mica, and various other
## 19  ##																coarse sand; moist, gray-brown, no reaction
### A		-		16	0.0	16	90.2	5.2	NID	NID	6.4	QD.				=
SPSM   SP				4.0	0.0	4.0	30.2	0.2		141	0.4	51	152.2			WITH SILT AND GRAVEL, (SP/SM)g:
40  25-  40  40  41  40  44  41  40  44  41  40  44  41  40  44  41  40  44  41  40  44  41  40  44  44		-												SP/SM		<ul> <li>fine to coarse, hard, sub-rounded gravel;</li> </ul>
19.1   19.1																
140   16   18   18   18   18   18   18   18		-	10													21.0 to 25.5 ft.: POORLY GRADED SAND
148.1		25-	"													coarse sand; about 10% fines; about 5% fine,
SA															-	inches; moist, orange-brown, no reaction with HCI; very soft consistency; minor iron-oxide
25.5 to 26.0 ft. POORLY GRADED GRAVEL WITH SLIT AND SAND.  (SP/SMig)  144.6  30-  30-  30-  30-  30-  30-  30-  30		-	-	6.4	1.9	8.3	48.8	42.9	NP	NP	5.8	(SP-SN	Л)g <sub>148.3</sub>	(GP/GM)s 148.6	-	- ·
### Part																<u>Laboratory Data Interval</u> 22.0 to 22.4 ft.
SP/SM/g		-										_	<u> </u>			
inches, wet, brown, no reaction with HCl; very soft consistency.  26.0 to 28 of it: POORLY GRADED SAND WITH SLIT AND GRAVEL. (SPSIM): About 50 in 60% line to coarse sand; about 30 to 40% fine to coarse hard, about 30 to 40% fine to coarse hard, about 30 to 40% fine to coarse hard, about 40% fines; maximum size 2 inches; moist, light gray-brown reaction with HCl; very soft consistency; increases in percentage of sand with depth.  39 to 39 to 39 861 to 00 NP NP 137 SP 1423  30 to 30 set 10												27.4 ft. (E	El. 147.24 ft.)			sub-rounded gravel; about 35% fine to coarse
144.8   144.																inches; wet, brown, no reaction with HCI; very
144.8     144.8		-	-													·
30 to 40% fines to coarse, hard, sub-rounded gravel; about 10% fines; maximum size: 2 inches; moist, light gray-brown, no reaction with HCl; very soft consistency; no reaction with HCl; about 10% fines; maximum size: 2 inches; moist, grange-brown, no reaction with HCl; about 10% fines; about 5% fines; maximum size: 1/2 inches; moist, orange-brown, no reaction with HCl; very soft consistency.  30 0.0 3.9 96.1 0.0 NP NP 13.7 SP 142.3  31 32 32 32 32 32 32 32 32 32 32 32 32 32			56											144.8		WITH SILT AND GRAVEL, (SP/SM)g: About 50 to 60% fine to coarse sand; about
SP/SM  SP		30-	1												Qal	gravel; about 10% fines; maximum size: 2
142.6     142.														ep/eM		with HCl; very soft consistency; increases in
3.9 0.0 3.9 96.1 0.0 NP NP 13.7 SP 142.3  3.9 0.0 3.9 96.1 0.0 NP NP 13.7 SP 142.3  3.9 0.0 3.9 96.1 0.0 NP NP 13.7 SP 142.3  3.9 0.0 3.9 96.1 0.0 NP NP 13.7 SP 142.3  3.9 0.0 3.9 96.1 0.0 NP NP 13.7 SP 142.3  3.9 0.0 3.9 96.1 0.0 NP NP 13.7 SP 142.3  3.0 10 38.0 11.1 (SP/SM): About 85% fine to medium sand; about 10% fines; moist, orange-brown, no reaction with HCl; very soft consistency.  3.0 10 38.0 ft.: POORLY GRADED SAND, SP: About 95% fine to medium sand; about 5% fines; maximum size: medium sand; moist, orange-brown, no reaction with HCl; very soft consistency.  4.0 Laboratory Data Interval 3.2 to 32.3 ft.  3.0 10 41.0 ft.: SILTY SAND, SM: About 85% fine sand; about 15% fines; maximum size: fine sand; wet, brown-gray, no reaction with HCl; very soft consistency.		-	1											GI /GIVI		Laboratory Data Interval
WITH SILT. (SPSM): About 18% fines; about 5% fine, hard, sub-rounded gravel; maximum size: 1/2 inches; moist, orange-brown, no reaction with HCl; very soft consistency.  32 35—  32 35—  SP 32 36—  SP 38.0 to 41.0 ft.: SILTY SAND, SM: About 85% fines and; about 15% fines and; wet, frown-gray, no reaction with HCl; very soft consistency.		_		2.0	0.0	2.0	00.4	0.0	ND	ND	40.7	CD		142.6		_
SP  Ine, hard, sub-rounded gravel; maximum size: 1/2 inches; moist, orange-brown, no reaction with HCl; very soft consistency.  32 to 38.0 ft.: POORLY GRADED SAND, SP: About 95% fines; maximum sand; about 5% fines; maximum sand; moist, orange-brown, no reaction with HCl; very soft consistency.  Laboratory Data Interval 32.0 to 32.3 ft.  38.0 to 41.0 ft.: SILTY SAND, SM: About 95% fines sand; about 15% fines; maximum size: fine sand; about 15% fines; maximum with HCl; very soft consistency.  Maximum size: fine sand; weth brown-gray, no reaction with HCl; very soft consistency.				3.9	0.0	3.9	96.1	0.0	NP	NP	13.7	51	142.3			WITH SILT, (SP/SM): About 85% fine to
reaction with HCl; very soft consistency.  32.0 to 38.0 ft.: POORLY GRADED SAND, SP: About 95% fines to medium sand; about 55% fines; maximum size: medium sand; moist, orange-brown, no reaction with HCl; very soft consistency.  Laboratory Data Interval 32.0 to 32.3 ft.  38.0 to 41.0 ft.: SILTY SAND, SM: About 85% fine sand; about 15% fines; maximum size: fine sand; wet, brown-gray, no reaction with HCl; very soft consistency.  136.6  SM		-	-												-	_ fine, hard, sub-rounded gravel; maximum
SP: About 95% fine to medium sand; about 5% fines; maximum size: medium sand; about 5% fines; maximum size: medium sand; moist, orange-brown, no reaction with HCl; very soft consistency.  Laboratory Data Interval 32.0 to 32.3 ft.  38.0 to 41.0 ft.: SILTY SAND, SM: About 85% fine sand; about 15% fines; maximum size: fine sand; wet, brown-gray, no reaction with HCl; very soft consistency.  40  SM																reaction with HCI; very soft consistency.
SP    SP   moist, orange-brown, no reaction with HCl; very soft consistency.   Laboratory Data Interval 32.0 to 32.3 ft.     38.0 to 41.0 ft.: SILTY SAND, SM: About 85% fine sand; about 15% fines; maximum size: fine sand; wet, brown-gray, no reaction with HCl; very soft consistency.   40		-	1													SP: About 95% fine to medium sand; about
Laboratory Data Interval 32.0 to 32.3 ft.  38.0 to 41.0 ft.: SILTY SAND, SM: About 85% fine sand; about 15% fines; maximum size: fine sand; wet, brown-gray, no reaction with HCI; very soft consistency.		25	32											CD.		moist, orange-brown, no reaction with HCl;
32.0 to 32.3 ft.  38.0 to 41.0 ft.: SILTY SAND, SM: About 85% fine sand; about 15% fines; maximum size: fine sand; wet, brown-gray, no reaction with HCl; very soft consistency.		35-												94		Laboratory Data Interval
85% fine sand; about 15% fines; maximum size: fine sand; wet, brown-gray, no reaction with HCl; very soft consistency.		-	-													32.0 to 32.3 ft.
40 SM																85% fine sand; about 15% fines; maximum
40 SM		-														
40 SM														400 =		
SM SM		-	1,											136.6		_
		_	40													_
														SM		
COMMENTS: FADC = Flight Auger Dry Core Well completion information is provided in attached Well																

COMMENTS: FADC = HSA = H

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

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Right, Madera County

BEGUN: 9/15/09 FINISHED: 9/17/09
DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 27.4 ft. (El. 147.24 ft.) 9/17/2009

PROJECT: San Joaquin River Restoration Project

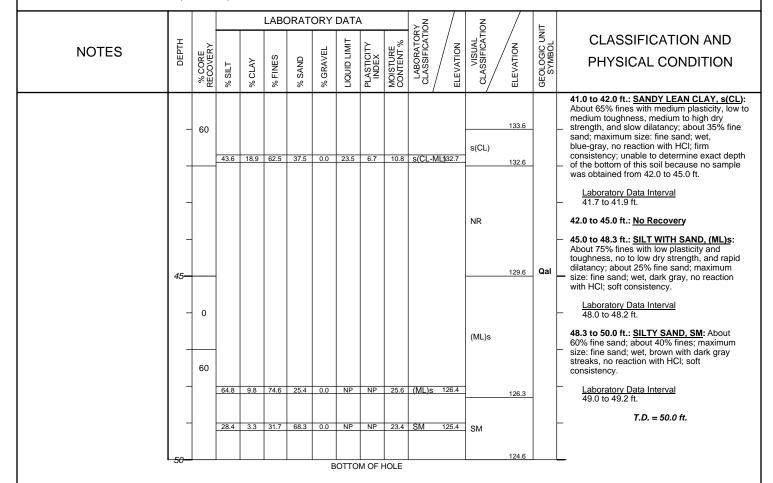
COORDINATES: N 2,166,619.1 E 6,192,701.7 (NAGD83)

TOTAL DEPTH: 50.0 ft.

STATE: California
GROUND SURFACE ELEVATION: 174.7 ft. (NAVD88)

T.O.C ELEVATION: 174.64 ft. (NAVD88)

HOLE LOGGED BY: G. Russell REVIEWED BY: J. Vauk



COMMENTS: FADC = Flight Auger Dry Core

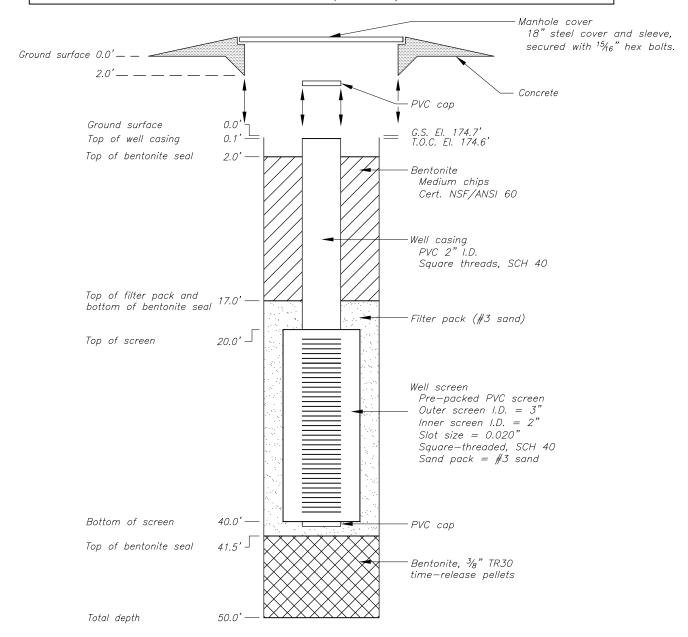
HSA = Hollow Stem Auger NP = Non-plastic

NR = No Recovery NA = Not applicable G.S. = Ground surface

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

MW-09-47	GEOLOGIST: G. RUSSELL
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 9/17/2009	HELPER: J. RAUMAN

TOP OF WELL CASING COORDINATES:
N2166619.1 E6192701.7 (NAD83) ELEVATION 174.6' (NAVD88)
GROUND SURFACE ELEVATION 174.7' (NAVD88)



# \*NOT TO SCALE

# NOTES:

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

FEATURE: Groundwater Monitoring

AND DATE MEASURED: NA

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 8/3/09 FINISHED: 8/4/09 DEPTH AND ELEVATION OF WATER LEVEL PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,166,341.5 E 6,189,657.4 (NAGD83)

TOTAL DEPTH: 65.0 ft.

STATE: California

GROUND SURFACE ELEVATION: 171.0 ft. (NAVD88)

T.O.C ELEVATION: 170.83 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

					LABO	ORAT	ORY	DATA	4		≻Z		N C	/	_	
	l <sub>±</sub>							╘	_	%	YOR.	/_	'ATIC	,	₹_	CLASSIFICATION AND
NOTES	DEPTH	% CORE RECOVERY			ις,		VEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY	ELEVATION	VISUAL		SYMBOL	DHYSICAL CONDITION
		88	SILT	% CLAY	% FINES	SAND	% GRAVEL		ASTI	LSIST	ASS /	EVA:	V / Y	ξ > ⊔	SYN	PHYSICAL CONDITION
		88	%	%	%	%	%	임	٦_	88	_요/	급	ਹੈ/ ਾ	1	GE	
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND																SOIL DESCRIPTIONS CHARACTERIZE SAMPLES FROM DRILL HOLE MW-09-49.
SURFACE.	-	1														_
PURPOSE OF HOLE:																0.0 to 65.0 feet QUATERNARY ALLUVIUM (Qal)
To recover core, collect data to determine geologic and hydrologic	-	1											s(ML)		-	0.0 to 4.0 ft.: <u>SANDY SILT, s(ML)</u> : About
site conditions, and install a groundwater monitoring well.		86														70% fines with no to low plasticity, low toughness and dry strength, and slow to rapid
DRILLED BY:	-	1													ŀ	dilatancy; about 30% fine sand; maximum
USGS Drill Crew													16	6.8		size: fine sand; dry, brown, no reaction with HCl; soft to firm consistency; lower 1-foot of
James Huckaby, Driller Jim Rauman, Helper	-	1													Ī	<ul> <li>interval increasing in sand content (to about 50%).</li> </ul>
DRILL RIG:	5-												SM		L	- 4.0 to 5.5 ft.: SILTY SAND, SM:About 65%
CME-550													16	55.3		fine sand; about 35% fines; maximum size:
DRILLING & SAMPLING	-	-													-	fine sand; dry, brown, no reaction with HCl; very soft consistency.
METHODS: Drill hole MW-09-49 was advanced																5.5 to 11.0 ft.: POORLY GRADED SAND
using hollow stem flight augers with continuous dry core sampling	-	1													ŀ	WITH SILT, SP/SM: About 90% fine to medium sand; about 10% fines; maximum
system (FADC) from the ground surface to a total depth of 65.0 feet.		72														size: medium sand; dry, light brown-gray, no reaction with HCl; very soft consistency.
FADC uses 7-5/8-inch O.D.,	-	1											SP/SM		İ	•
4-1/4-inch I.D. hollow stem augers, with a 5-foot-long, 3-inch I.D. and a	_															<u>Laboratory Data Interval</u> _ 9.0 to 9.5 ft.
split sample barrel sampler.			3.5	2.2	5.7	94.2	0.1	NP	NP	2.6	SP-SM <sub>1</sub>	61.3				11.0 to 14.5 ft.: POORLY GRADED SAND
Interval Method 0.0 to 65.0 ft FADC	10-		-												-	WITH SILT, SP/SM: About 85% fine to coarse sand (coarse sand is hard and
Drill hole DH-09-49B was advanced																sub-angular, with grains consisting of quartz, mica, and various other minerals); about 10%
using hollow stem flight augers	-	1											18	59.8	ŀ	fines; about 5% fine, hard, sub-rounded, hard
(FADC) and a pilot bit from the ground surface to a total depth of																gravel; maximum size: 3/4 inches; moist, light gray, no reaction with HCl; very soft
22.0 feet. FADC uses 7-5/8-inch O.D., 4-1/4-inch I.D. hollow stem	-	60													Qal	- consistency.
augers and a tri-cone pilot bit.	_ ا	] 60											SP/SM		Qai	14.5 to 21.2 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to
Interval Method 0.0 to 22.0 ft FADC with pilot bit																medium sand; about 10% fines; maximum size: medium sand; moist, light gray with
DRILLING CONDITIONS AND	-	1													-	<ul> <li>darker streaks in lower 2.5 feet, no reaction with HCl; very soft consistency; sampling</li> </ul>
DRILLER'S COMMENTS:													15	6.3		procedure may consolidate the sand in the
MW-09-49 0.0 to 30.0 ft smooth drilling	15-		1												ŀ	sample barrel and result in less-than-full recovery.
30.0 to 35.0 ft flowing sands, add water																Laboratory Data Interval
35.0 to 40.0 ft poor recovery 40.0 to 60.0 ft flowing sands,																18.5 to 19.0 ft.
difficult drilling 60.0 to 65.0 ft encountered clay,	-	1														21.2 to 28.0 ft.: SILT WITH SAND, (ML)s: About 85% fines with low to no plasticity, low
firm drilling		80														toughness, no to low dry strength, and rapid dilatancy; about 15% fine sand; maximum
DRILLING CONDITIONS AND	-	1											SP/SM		}	size: fine sand: moist, greenish gray, no
DRILLER'S COMMENTS: MW-09-49B			2.9	2.2	5.1	94.6	0.3	NP	NP	2.1	SP-SM <sub>1</sub>	51.8				reaction with HCI; firm consistency.
0.0 to 22.0 ft blind drilled	-	1									<u>'</u>					<ul> <li><u>Laboratory Data Interval</u></li> <li>23.1 to 23.4 ft.</li> </ul>
DRILL FLUID, RETURN AND COLOR:	20-															- 28.0 to 29.0 ft.: SILTY SAND, SM: About
MW-09-49 0.0 to 30.0 ft None	- "															65% fine sand with abundant mica; about 35% fines; maximum size: fine sand; moist to
30.0 to 65.0 ft Water, no return	-	-											14	19.6	}	<ul> <li>wet, greenish gray, no reaction with HCl; very</li> </ul>
MW-09-49B																soft consistency.
0.0 to 22.0 ft None	-	1													}	_ <b>29.0 to 31.7.:</b> <u>SILTY SAND, SM</u> : About 85% fine to medium sand; about 15% fines;
WATER LEVEL: Not measured		94														maximum size: medium sand; wet, greenish brown, no reaction with HCI; very soft
REASON FOR HOLE	-		79.6	11.6	91.2	8.8	0.0	NP	NP	25.2	ML 1	47.4			ļ	consistency; layer of higher fines content from 29.5 to 29.7 ft. depth.
TERMINATION: The drill holes were terminated	١.															
upon successful completion to the													(ML)s			
target depth.	<u> </u>															
COMMENTS: FADC = Flight	nt Aug	er Dry	/ Core	;						Well	completi	on in	tormation is	prov	ided ir	n attached Well Completion Diagram.

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-09-49B**<u>TOC Coordinates</u>= N 2166345.1 E 6189660.9 (NAGD83) El. 170.85 (NAVD88)
<u>Groundsurface El.</u>= 170.9 (NAVD88)

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 8/3/09 FINISHED: 8/4/09 DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: NA

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,166,341.5 E 6,189,657.4 (NAGD83)

TOTAL DEPTH: 65.0 ft.

STATE: California

GROUND SURFACE ELEVATION: 171.0 ft. (NAVD88)

T.O.C ELEVATION: 170.83 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren

NOTES    A		Г				ΙΔRC	)RAT	ORY	DATA	7		7	7			
## 13.1 to 32.8 ft. SALTY SALD SML-November (15.6 methods)  ## 10.2 methods (15.6 methods)  ##									Π.			\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	OF.		FIN	CLASSIFICATION AND
## 13.1 to 32.8 ft. SALTY SALD SML-November (15.6 methods)  ## 10.2 methods (15.6 methods)  ##	NOTES	F	≿					岀	Ĭ	≽	#"	S   S	-ICA	/ g	SOL 30L	CLASSIFICATION AND
## 13.1 to 32.8 ft. SALTY SALD SML-November (15.6 methods)  ## 10.2 methods (15.6 methods)  ##	113123	믬	88	5	₹	NES	QN.	RA/	   	STIC		BOR SSII	ISSII /	/ FA	LOG	PHYSICAL CONDITION
## NOLE COMM-LETION: ## DOUBLE OF THE COLOR			REC 8	S 8	I	₩ E	/S %	8	릴	ΡĘ	Š Š	22   H	ਰੋ/	ELE	GEC	
Valid Casing - 1.0 to 50.0 k, T.O. C. Deal Pro-pack Screen - 50.00 k 50.0 k																
EL 170.28 (f) A Corean - 50 Or 60 O Dec 20 O	MW-09-49 Well Casing - 0.2 to 50.0 ft. (T.O.C.															
14. (Silente 0.02-binch)  58.	El. 170.83 ft.)	-	1													
Filter Pack - 4-90 to 65 0.1t, (R2 Sandhard Seals - 2.4 a) to 65 0.1t, (R2 Sandhard Seals - 3.5 to 4.5 to 1.1 Backilli - 3.5) to 3.5 to 1.4 and 4.3 to 6.5 to 4.5 to 1.5 should be seen a second to the second to 1.5 to 1.	ft. (Slotted 0.020-inch)	l _														
Bentolinis Soil - 36.0 to 43.0 to 1. and 43.0 to			98													toughness and dry strength, rapid dilatancy;
Backfill 1, 33 to 3 to 3 to 1 to 1 to 1 to 1 to 1 t		-												142.8		
Bacifil   2 to   2 to   3 d. ft. (Benorinity   Well Protection   International (15 February   1981)   SM	Backfill - 33.0 to 36.0 ft. and 43.0 to												SM			HCI; soft consistency.
18-inch markole (15/16-inch habdots)  MM-09-489  MM-09-489  MM-09-489  MM-09-489  MM-09-180  MM-09-	Backfill - 2.0 to 33.0 ft. (Bentonite)	-	1											141.8		33.6 to 40.0 ft.: <u>SILTY SAND, SM</u> : About
Mile   Capture   Color   Col																60% fine sand; about 40% fines; maximum size: fine sand; wet, greenish gray, no
May - Color   1921	hexbolts)	30-		1									SM			reaction with HCl; very soft consistency.
EL 170 88 fü)  BY Pack Screen - 10.0 to 20.0 It. (Solted 0.020-inch) It. (Solt 0.020-inch) I													OW			
Mail   Street   Price   Pack - #3 Sand   Filter   Pack - #3 Sand - #3 Sa	El. 170.85 ft.)	-	1													about 10% fines; maximum size: fine sand;
September   Sept	Dual Pre-pack Screen - 10.0 to 20.0 ft. (Slotted 0.020-inch)	l _												139.1		
Mail   Protection   Problem   Prob			80										SM	420.0		Laboratory Data Interval
18-inch manhole (15/16-inch hexbolts)  36  37  38  38  40  20  38  40  40  40  40  40  40  40  40  40  4	Bentonite Seal - 2.0 to 7.5 ft.	-	1										o(ML)	138.0		
Size: fine sand: well, greenish gray, no reaction with HCl; very soft consistency.	18-inch manhole (15/16-inch												S(IVIL)	137.2		
40 SM  40 Cal  40 I 128.8  SM  40 I 128.8  SM  40 I 128.8  SP/SM  45 I 128.8  SM  46 I 128.8  SM  46 I 128.8  SM  47 I 14.0 to 45.0 ft.: SANDY SILT, s(ML): About 65% lines with no to low plasticity lines, low toughness and only strength, and rapid mistre. In consistency.  45.0 to 47.5 ft.: SILTY SAND, SM: About 15% fines and containing micr, about 15% fines and sub-angular); about 30% fines micromisely fine to medium (locarse sand); sub-angular); about 30% fines micromisely fine to medium (locarse sand); sub-angular); about 30% fines and fine of the medium locarse sand (predominately fine to medium (locarse sand); sub-angular); about 30% fines and fine of the medium locarse sand (predominately fine to medium locarse sand); sub-angular); about 30% fines and fine of the medium locarse sand in white in the first of the medium locarse sand; and containing micromisely.  45. To 43.5 ft.: SANDY, SILTY SAND, SM: About 75% fines and containing micromisely.  45. To 45.5 ft.: SANDY, SILTY CLAY, CLML; About 90% fines with low to medium plasticity, medium toughness and low dy strength, and not about 25% fines, and micromisely fines, maximum size fine sand; we dead of the first of th	nexboits)	-	1													size: fine sand; wet, greenish gray, no
SM 22 8.0 92.0 0.0 NP NP 13.9 SP-SM 130.2  58 22 8.0 92.0 0.0 NP NP 13.9 SP-SM 130.2  58 SP/SM SM 128.8 SM 128.																reaction with HCI; very soft consistency.
SM   SM   SM   SM   SM   SM   SM   SM		35-		İ												44.0 to 45.0 ft.: SANDY SILT, s(ML): About
20   20   3   3   3   3   5   5   5   5   5   5		l _														toughness and dry strength, and rapid
45. 10 47.5 ft.: SILTY SAND, SM: About 15% fines and containing mice; about 15% fines and containing mice; about 15% fines and containing mice; about 15% fines and containing mice; about 15% fines and containing mice; about 15% fines coards and (predominately fine to medium) (coarse sand is sub-angular); about 30% fines; maximum size: coarse sand; sub-angular); about 30% fines; maximum size: coarse sand; wet, greenish gray, no reaction with HCl; soft to firm consistency.  48.7 to 49.5 ft.: SILTY SAND, SM: About 70% fines with low to medium plasticty, medium toughness and low fine medium plasticty, medium size: line sand; molst, dark gray, no reaction with HCl; firm to hard consistency.  49.5 to 50.0 ft.: SILTY CLAY, CLML; About 90% fines with low to medium plasticty, medium toughness and low dry strength, and no dilatency; about 10% fines and; maximum size: line sand; molst, dark gray, no reaction with HCl; firm to hard consistency.  SM  SM  123.3  SM  123.3  SM  123.3  SM  124.5  SO.0 to 55.0 ft.: SILTY SAND, SM: About 70% fines and; maximum size: line sand; molst, dark gray, no reaction with HCl; time to hard consistency.  125.0  126.6  SM  127.5  SM  128.6  SM  128.7  SM  129.8  SM  120.8															size: fine sand; wet, greenish gray, no	
85% fine sand containing mica; about 15% fines; maximum size: fine sand, reading hash the City et greenish gray, no reaction with HCl; very soft consistency.  47.5 to 48.7 ft.: SILTY SAND, SM: About 70% fine to coarse sand (predominately fine to medium) (coarse sand is updangular); about 30% fines; maximum size: coarse sand; wet, greenish gray, no reaction with HCl; soft to firm consistency.  47.5 to 48.7 ft.: SILTY SAND, SM: About 70% fine to coarse sand (predominately fine to medium) (coarse sand is updangular); about 30% fines; maximum size: coarse sand; wet, greenish gray, no reaction with HCl; soft to firm consistency.  47.5 to 48.7 ft.: SILTY SAND, SM: About 70% fines maximum size: fines and; myth HCl; soft to firm consistency.  48.7 to 49.5 ft.: SANDY, SILTY CLAY, SICI/MIL; About 70% fines and low day strength, and no dilatancy; about 10% fine sand; maximum size: fines and; moist, dark gray, no reaction with HCl; firm to hard consistency.  49.5 to 50.0 ft.: SILTY CLAY, CL/MI.: About 90% fines suith low to medium plasticity, medium toughness and low day strength, and no dilatancy; about 10% fine sand; maximum size: fines and; moist, dark gray, no reaction with HCl; firm to hard consistency.  47.5 to 48.7 ft.: SILTY SAND, SM: About 70% fines; maximum size: fines and; moist, dark gray, no reaction with HCl; rim to hard consistency.  48.5 to 49.5 ft.: SILTY CLAY, CL/MI.: About 90% fines and; maximum size: fines and; moist, dark gray, no reaction with HCl; rim to hard consistency.  48.5 to 50.0 ft.: SILTY CLAY, CL/MI.: About 90% fines and; maximum size: fines and; wet, dark gray, no reaction with HCl; very soft consistency.  49.5 to 48.7 ft.: SILTY SAND, SM: About 75% fine sand, about 25% fines; maximum size: fines and; wet, stending gray, no reaction with HCl; very soft consistency.  49.5 to 48.7 ft.: SILTY SAND, SM: About 75% fines and stending gray, no reaction with HCl; very soft consistency.		-	-										SM			_
fines; maximum size: fine sand; wet, greenish gray, no reaction with HCl; very soft consistency.  40  5.8 22 8.0 920 0.0 NP NP 13.9 SP-SM 1302  SP/SM  5.8 22 8.0 920 0.0 NP NP 13.9 SP-SM 1302  SP/SM  5.8 22 8.0 920 0.0 NP NP 13.9 SP-SM 1302  SP/SM  48.7 to 48.7 ft.: SILTY SAND. SM: About 70% fines with low to medium plasticity; medium toughness and low dry strength, and no dilatancy; about 70% fines and; meximum size: fine sand; most, dark gray, no reaction with HCl; firm to hard consistency.  45. SM  5M  5M  5M  5M  5M  5M  5M  5M  5M			20												Qal	
130.8   130.		-	1													<ul> <li>fines; maximum size: fine sand; wet, greenish</li> </ul>
130.8   130.																
130.8   130.		-	1													
## SP/SM   SP/		40_												130.8		
SP/SM   SM   SM   SM   SM   SM   SM   SM		40-		5.8	2.2	8.0	92.0	0.0	NP	NP	13.9	SP-SM 130.2				
128.0   128.0   128.0   128.0   SM   126.8   S(ML)   125.8   S(ML)   125.8   SM   126.8   SM   SM   SW   SW   SW   SW   SW   SW		_ ا														
Table   Tabl													SP/SM			48.7 to 49.5 ft.: SANDY, SILTY CLAY,
128.0   SM   126.8   s(ML)   125.8   s(ML)   125.8     125.8		-	1													
SM   126.8   s(ML)   125.8     ML)   125.8     s(ML)   125.8   s(ML)   125.8   s(ML)   125.8     s(ML)   125.8   s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)   125.8     s(ML)			66											128.0		
126.8   s(ML)   125.8     125.8		-	1										SM SM			gray, no reaction with HCl; firm to hard
S(ML)   125.8													OIVI	126.8		•
125.8   125.													s(ML)			90% fines with low to medium plasticity,
SM   Laboratory Data Interval   49.6 to 49.9 ft.   SM   Laboratory Data Interval   49.6 to 49.9 ft.   SM   T5% fine sand; about 25% fines; maximum size: fine sand; wet, dark gray, no reaction with HCl; very soft consistency.   With HCl; very soft consistency.   Laboratory Data Interval   49.6 to 49.9 ft.   SOL to 55.0 ft.: SILTY SAND, SM: About 75% fine sand; about 25% fines; maximum size: fine sand; wet, dark gray, no reaction with HCl; very soft consistency.   Wi		45-											- ( /	125.8		<ul> <li>no dilatancy; about 10% fine sand; maximum</li> </ul>
SM  123.3 SM  123.3 SM  122.1 s(CL/ML) 121.3 G0.5 31.3 91.8 8.2 0.0 22.6 5.7 17.5 CL-ML 120.9  SM  Laboratory Data Interval 49.6 to 49.9 ft.  50.0 to 55.0 ft.: SILTY SAND, SM: About 75% fines sand; about 25% fines; maximum size: fine sand; wet, dark gray, no reaction with HCl; very soft consistency.																
80   123.3   1		-	1										SM			L ahoratory Data Interval
SM 122.1 s(CL/ML) 121.3 (CL/ML) 120.8 (CL/ML) 120.8 (CL/ML) 120.8													""			49.6 to 49.9 ft.
SM 122.1 s(CL/ML) 121.3		-	1											123.3		
SM			80											0.0		
-   s(CL/ML)   121.3   60.5   31.3   91.8   8.2   0.0   22.6   5.7   17.5   CL-ML   120.9   CL/ML   120.8													SM	122.1		
60.5 31.3 91.8 8.2 0.0 22.6 5.7 17.5 CL-ML 120.9 CL/ML 120.8		-	1										s(CL/MI			_
120.0				00.5	24.0	04.0	0.0	0.0	00.0		47.5	OL MIL (22.		121.3		
COMMENTS: FADC = Flight Auger Dry Core Well completion information is provided in attached Well Completion Diagram.		<u> </u>				91.8	6.2	0.0	22.6	5./			1			

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-09-49B**<u>TOC Coordinates</u>= N 2166345.1 E 6189660.9 (NAGD83) El. 170.85 (NAVD88)
<u>Groundsurface El.</u>= 170.9 (NAVD88)

SHEET 3 OF 3

FEATURE: Groundwater Monitoring

LOCATION: Reach 2A, River Bank Left, Fresno County

BEGUN: 8/3/09 FINISHED: 8/4/09
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: NA

PROJECT: San Joaquin River Restoration Project

COORDINATES: N 2,166,341.5 E 6,189,657.4 (NAGD83)

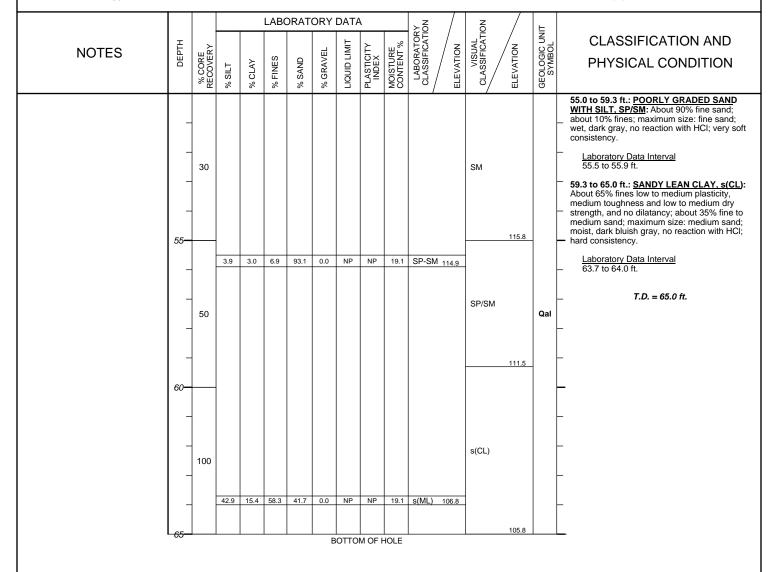
TOTAL DEPTH: 65.0 ft.

STATE: California

GROUND SURFACE ELEVATION: 171.0 ft. (NAVD88)

T.O.C ELEVATION: 170.83 ft. (NAVD88)

HOLE LOGGED BY: J. Vauk REVIEWED BY: A. Warren



COMMENTS: FADC = Flight Auger Dry Core HSA = Hollow Stem Auger

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

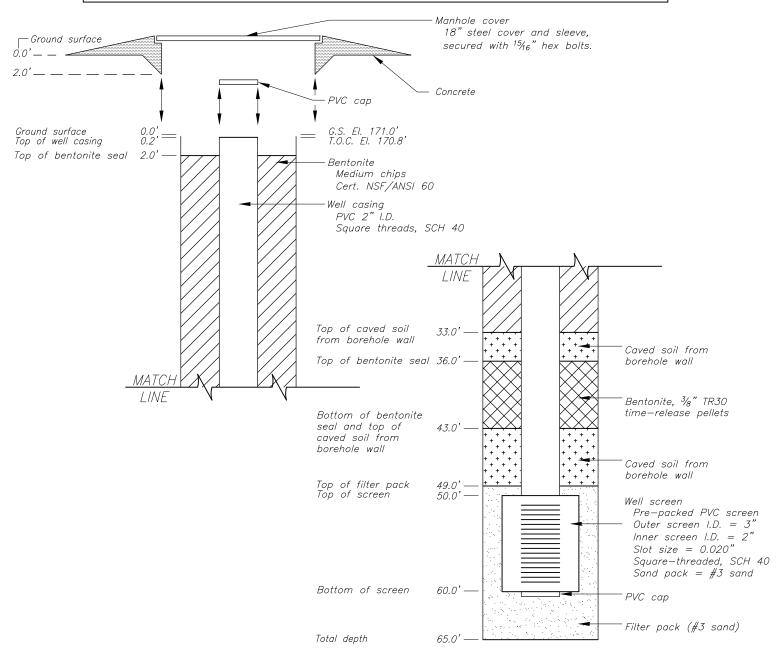
Well completion information is provided in attached Well Completion Diagram. Well development information is provided in attached Monitoring Well Development form.

#### MW-09-49B

<u>TOC Coordinates</u>= N 2166345.1 E 6189660.9 (NAGD83) El. 170.85 (NAVD88) <u>Groundsurface El.</u>= 170.9 (NAVD88)

MW-09-49	GEOLOGIST: J. VAUK
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 8/4/2009	HELPER: J. RAUMAN

TOP OF WELL CASING COORDINATES:
N2166341.5 E6189657.4 (NAD83) ELEVATION 170.8' (NAVD88)
GROUND SURFACE ELEVATION 171.0' (NAVD88)



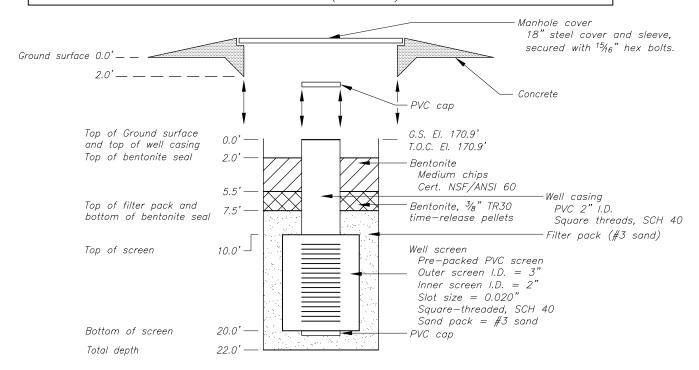
# \*NOT TO SCALE

# NOTES:

 $T.O.C. = Top \ of \ well \ casing, \ l.D. = Inner \ Diameter, \ G.S. = Ground \ Surface, \ El. = Elevation$ 

MW-09-49B	.GEOLOGIST: J. VAUK
WELL COMPLETION DIAGRAM	DRILLER: J. HUCKABY
DATE COMPLETED: 8/5/2009	HELPER: J. RAUMAN

TOP OF WELL CASING COORDINATES:
N2166345.1 E6189660.9 (NAD83) ELEVATION 170.9' (NAVD88)
GROUND SURFACE ELEVATION 170.9' (NAVD88)



# \*NOT TO SCALE

# NOTES:

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