GEOLOGIC LOG OF DRILL HOLE NO. MW-10-74

FEATURE: Groundwater Monitoring
PROJECT: San Joaquin River Restoration Program
STATE: California
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
COORDINATES: N 2,225,169.7 E 6,133,414.5 (NAGD83)
GROUND SURFACE ELEVATION: 136.0 ft. (NAVD88)
BEGUN: 3/21/10 FINISHED: 3/21/10
TOTAL DEPTH: 31.1 ft.
T.O.C ELEVATION: 139.1 ft. (NAVD88)
WATER LEVEL DEPTH AND ELEVATION: 12.2 ft. b.g.s. (El. 123.8 ft.)
HOLE LOGGED BY: A. Warren
DATE WATER LEVEL WAS MEASURED: 3/21/2010
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE. **PURPOSE OF HOLE:** To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well. **LOCATION:** Reach 3, RM 187, river left, about 350 feet west from the center of the SJR, about 1,200 north of Oxalis Road. **DRILLED BY:** PN-Regional Drill Crew Jerry Hansen, Driller Cody Kelly, Helper Ken Kreitz, Helper **DRILL RIG:** Central Mining Equipment 75 drill rig (CME-75) **DRILLING & SAMPLING METHODS:** Drill hole MW-10-74 was advanced using hollow stem flight augers with a continuous dry core sampling system (FADC) from the ground surface to a total depth of 31.1 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. Interval Method 0.0 to 31.1 ft. - FADC **DRILLING CONDITIONS AND DRILLER'S COMMENTS:** 0.0 to 23.6 ft. smooth drilling, wet at 13.6 ft. 23.6 to 31.1 ft. very firm drilling **CAVING CONDITIONS:** None **DRILL FLUID, RETURN AND COLOR:** 0.0 to 13.6 ft. None 13.6 to 31.1 ft. Water, no return **WATER LEVEL:** 12.2 ft. b.g.s. on 3/21/2010 **REASON FOR HOLE TERMINATION:** The hole was terminated upon successful completion to the target depth. **HOLE COMPLETION:** Well Casing: +3.1 to 10.0 ft. (T.O.C. El. 139.1 ft.) Dual U-pack Screen: 10.0 to 25.0 ft. (Slotted 0.010-inch) Well Screen Filter Pack: 2/12 Sand Filter Pack: 9.5 to 31.1 ft. (#3 Sand) Sump: 25.0 to 27.0 ft. (2-inch blank PVC with cap) Bentonite Seal: 2.0 to 9.5 ft. Well Completion: Steel surface casing with locking top, square 6-inches-wide and 5-foot-long.	5 10	33 100 98	23.9	20.2	44.1	55.9	0.0	28.3	9.2	14.0	SC 131.2	SM 132.3 SC 131.0 SP 128.4 CH 125.3 SC	Qal	***0.0 to 31.1 feet*** ***QUATERNARY ALLUVIUM (Qal)*** **0.0 to 3.7 ft.: SILTY SAND, SM:** About 75% micaceous, fine sand; about 25% nonplastic fines; maximum size: fine sand; dry to moist, brown, organic odor; soft, abundant organic material and roots. **3.7 to 5.0 ft.: CLAYEY SAND, SC:** About 55% micaceous, fine sand; about 45% fines with medium plasticity, toughness and dry strength; maximum size: fine sand; dry to moist, brown, organic odor; soft, abundant organic material and roots. Laboratory Data Interval 3.7 to 4.8 ft. **5.0 to 7.6 ft.: POORLY GRADED SAND, SP :** About 95% micaceous, fine sand; about 5% nonplastic fines; maximum size: fine sand; moist to wet, gray brown; soft. **7.6 to 10.7 ft.: FAT CLAY, CH:** About 95% fines with high plasticity, toughness and dry strength, no dilatancy; about 5% fine sand; maximum size: fine sand; moist, dark brown; no reaction with HCl; firm, lenses of SC from 10.0 to 10.7 ft. **10.7 to 12.2 ft.: CLAYEY SAND, SC:** About 60 % fine sand; about 40 % fines with medium plasticity; maximum size: fine sand; moist, olive brown; moderately soft, sand percentage increases with depth. **12.2 to 13.6 ft.: POORLY GRADED SAND WITH CLAY, SP/SC:** About 90% fine sand; about 10% fines with medium plasticity; maximum size: fine sand; wet, olive brown with reddish brown oxidation; layer of s(CL) with about 65% fines with medium plasticity, toughness and dry strength; about 35 % fine sand; moist, olive brown with reddish brown oxidation layers; moderately firm, stratified. Laboratory Data Interval 12.7 to 12.9 ft. **13.6 to 14.9 ft.: POORLY GRADED SAND, SP :** About 95% fine sand; about 5% fines; maximum size: fine sand; wet, gray to tan; loose, soft, free water at 14.9 ft. Laboratory Data Interval 13.6 to 14.9 ft. **14.9 to 16.3 ft.: CLAYEY SAND, SC:** About 85% fine sand; about 15% fines with medium plasticity; maximum size: fine sand; wet, gray to tan with few reddish brown oxidation veinlets, moderately soft. **16.3 to 18.6 ft.: LEAN CLAY WITH SAND, (CL)s :** About 80% fines with medium plasticity; about 20% fine sand; maximum size: fine sand; moist, olive brown with reddish brown oxidation; firm. Laboratory Data Interval 16.3 to 18.6 ft.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

PROJECT DATABASE: SJRRP.GPJ
REPORT: SJRRP DRILL HOLE

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-74

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
BEGUN: 3/21/10 FINISHED: 3/21/10
WATER LEVEL DEPTH AND ELEVATION: 12.2 ft. b.g.s. (El. 123.8 ft.)
DATE WATER LEVEL WAS MEASURED: 3/21/2010

PROJECT: San Joaquin River Restoration Program
COORDINATES: N 2,225,169.7 E 6,133,414.5 (NAGD83)
TOTAL DEPTH: 31.1 ft.

STATE: California
GROUND SURFACE ELEVATION: 136.0 ft. (NAVD88)
T.O.C ELEVATION: 139.1 ft. (NAVD88)
HOLE LOGGED BY: A. Warren
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
		98	21.4	13.2	34.6	65.4	0.0	NP	NP	17.2	SM 123.1	SC 123.8 SP/SC 122.4		**18.6 to 21.5 ft.: SANDY LEAN CLAY, s(CL) :** About 65% fines with medium plasticity; about 35% fine sand; maximum size: fine sand; moist, olive brown with reddish brown oxidation; firm; interbedded fine layers of SC to s(CL) throughout, layer of SP with about 95% fine sand and 5% fines from 18.6 to 19.1 ft. Laboratory Data Interval 19.1 to 20.1 ft.
	15	100	11.6	6.3	17.9	82.1	0.0	NP	NP	19.1	SM 121.1	SP 121.1 SC 119.7		**21.5 to 22.5 ft.: LEAN CLAY, CL:** About 90% fines with medium plasticity; about 10% fine sand; maximum size: fine sand; moist, olive brown with reddish brown oxidation; firm. **22.5 to 23.6 ft.: CLAYEY SAND, SC:** About 85 to 90% fine sand; about 10 to 15% fines with medium plasticity; maximum size: fine sand; moist to wet, olive brown with reddish brown layers; tree bark present; firm. **23.6 to 27.6 ft.: POORLY GRADED SAND, SP :** About 95 to 100% micaceous, fine sand; about 5% to trace fines; maximum size: fine sand; wet, gray brown; moderately soft. **27.6 to 28.6 ft.: SILT, ML :** About 95 to 100% fines with low plasticity, no toughness, rapid dilatancy; about 5% to trace fine sand; maximum size: fine sand; moist, olive brown; moderately firm. Laboratory Data Interval 27.6 to 28.3 ft.
			44.2	42.3	86.5	13.5	0.0	31.0	14.9	24.0	CL 117.4	(CL)s 117.4	Qal	**28.6 to 31.1 ft.: POORLY GRADED SAND, SP :** About 95 to 100% micaceous, fine sand; about 5% to trace fines; maximum size: fine sand; wet, gray brown; soft, loose. **T.D. = 31.1 ft.**
	20	100	61.1	15.8	76.9	23.1	0.0	24.6	4.5	24.2	(CL-ML)s 115.9	s(CL) 114.5 CL 113.5 SC 112.4		
		74										SP		

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-74

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
BEGUN: 3/21/10 FINISHED: 3/21/10
WATER LEVEL DEPTH AND ELEVATION: 12.2 ft. b.g.s. (El. 123.8 ft.)
DATE WATER LEVEL WAS MEASURED: 3/21/2010

PROJECT: San Joaquin River Restoration Program
COORDINATES: N 2,225,169.7 E 6,133,414.5 (NAGD83)
TOTAL DEPTH: 31.1 ft.

STATE: California
GROUND SURFACE ELEVATION: 136.0 ft. (NAVD88)
T.O.C ELEVATION: 139.1 ft. (NAVD88)
HOLE LOGGED BY: A. Warren
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
	25	74										SP 108.4	Qal	
			73.2	24.1	97.3	2.7	0.0	30.0	7.2	29.6	ML 107.7	ML 107.4		
	30	100										SP 104.9		

BOTTOM OF HOLE

COMMENTS:

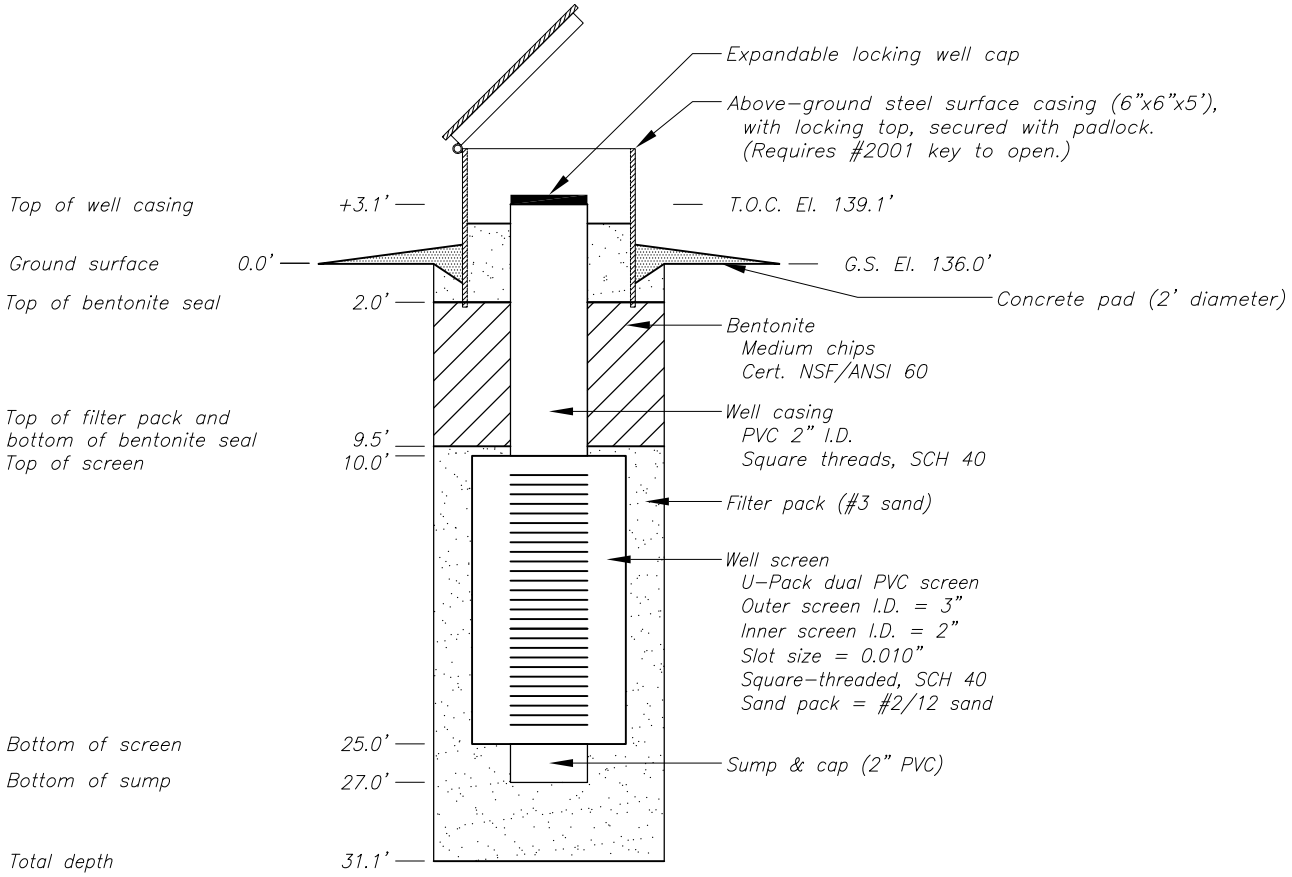
FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

REPORT: SJRRP DRILL HOLE PROJECT DATABASE: SJRRP.GPJ

MW–10–74	GEOLOGIST: A. WARREN
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 3/21/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2225169.7 E6133414.5 (NAD83) ELEVATION 139.1' (NAVD88) GROUND SURFACE ELEVATION 136.0' (NAVD88)	



NOT TO SCALE

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-75

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
BEGUN: 3/20/10 FINISHED: 3/20/10
WATER LEVEL DEPTH AND ELEVATION: NA
DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program
COORDINATES: N 2,225,434.3 E 6,131,821.9 (NAGD83)
TOTAL DEPTH: 30.7 ft.

STATE: California
GROUND SURFACE ELEVATION: 131.8 ft. (NAVD88)
T.O.C ELEVATION: 133.1 ft. (NAVD88)
HOLE LOGGED BY: A. Warren
REVIEWED BY: J. Vauk

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, RM 187, river left, about 1,870 feet west from the center of the SJR, about 1,400 feet north of Oxalis Road.

DRILLED BY:
PN-Regional Drill Crew
Jerry Hansen, Driller
Cody Kelly, Helper
Ken Kreitz, Helper

DRILL RIG:
Central Mining Equipment 75 drill rig (CME-75)

DRILLING & SAMPLING METHODS:
Drill hole MW-10-75 was advanced using hollow stem flight augers with a continuous dry core sampling system (FADC) from the ground surface to a total depth of 30.7 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.

Interval Method
0.0 to 30.7 ft. - FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
0.0 to 4.4 ft. smooth drilling, soft
4.4 to 8.7 ft. moderately soft
8.7 to 18.7 ft. firm
18.7 to 23.7 ft. moderately soft
23.7 to 25.5 ft. refusal, moved sampler inside 0.2 ft.
25.5 to 30.7 ft. - firm

CAVING CONDITIONS:
None

DRILL FLUID, RETURN AND COLOR:
0.0 to 18.7 ft. None
18.7 to 30.7 ft. Water, no return

WATER LEVEL:
Not measured

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

HOLE COMPLETION:
Well Casing: +1.3 to 13.7 ft. (T.O.C. El. 133.1 ft.)
Dual U-pack Screen: 13.7 to 28.7 ft. (Slotted 0.010-inch)
Well Screen Filter Pack: 2/12 Sand Filter Pack: 13.2 to 30.7 ft. (#3 Sand)
Sump: 28.7 to 30.7 ft. (2-inch blank PVC with cap)

DEPTH	% CORE RECOVERY	% SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL
	82										s(CL) 128.8	
											SP 127.7	
5	100										CH 125.5	Qal
											(CL)s 124.1	
											SM 123.1	
		64.3	22.6	86.9	13.1	0.0	27.2	7.2	21.9	CL 122.4	(CL)s 122.4	
10		29.6	13.5	43.1	56.9	0.0	23.4	5.5	18.3	SC-SM 120.9	SC 120.9	
	96										s(CL)	

0.0 to 30.7 feet
QUATERNARY ALLUVIUM (Qal)

0.0 to 3.0 ft.: SANDY LEAN CLAY, s(CL) About 55% fines with low plasticity, slow dilatancy; about 45% fine sand; maximum size: fine sand; moist, brown, organic odor; moderately firm, fine beds of sand.

3.0 to 4.0 ft.: POORLY GRADED SAND, SP : About 100% fine sand; trace fines; maximum size: fine sand; moist to dry, brown; loose, soft, homogenous, micaceous.

4.0 to 6.3 ft.: FAT CLAY, CH: About 95% fines with high plasticity, high toughness; about 5 % fine sand; maximum size: fine sand; moist, dark brown; mottled, very firm.

6.3 to 7.7 ft.: LEAN CLAY WITH SAND, (CL)s : About 85% fines with medium plasticity, slow dilatancy, medium toughness; about 15% fine sand; maximum size: fine sand; moist, olive brown mottled with dark brown, soft, gradual contact between layers.

7.7 to 8.7 ft.: SILTY SAND, SM: About 60% fine sand; about 40% fines with low plasticity; maximum size: fine sand; moist, olive brown; moderately soft, stratified.

8.7 to 9.6 ft.: LEAN CLAY WITH SAND, (CL)s : About 85% fines with medium plasticity; about 15% fine sand; maximum size: fine sand; moist, olive brown; moderately soft, stratified, lightly cemented in layers from 8.7 to 9.6 ft.

Laboratory Data Interval
8.7 to 9.6 ft.

9.6 to 10.9 ft.: CLAYEY SAND, SC: About 60% sand; 40% fines with medium plasticity; maximum size: fine sand; moist, tan; firm, layered.

Laboratory Data Interval
9.6 to 10.9 ft.

10.9 to 14.7 ft.: SANDY LEAN CLAY, s(CL) : About 65% fines with medium to low plasticity, medium toughness; about 35% fine to medium sand; maximum size: medium sand; wet, olive brown with reddish brown oxidation veins; stratified.

14.7 to 17.6 ft.: SILT WITH SAND, (ML)s About 75% fines with low plasticity, rapid dilatancy; about 25% fine sand; maximum size: fine sand; wet, olive brown, moderately firm.

Laboratory Data Interval
14.7 to 17.6 ft.

17.6 to 18.7 ft.: SILTY SAND, SM: About 75% fine sand; about 25% fines with no to low plasticity; maximum size: fine sand; wet, olive brown with reddish brown oxidation; very firm, micaceous.

18.7 to 20.0 ft.: SILTY SAND TO SANDY SILT, SM/ML : About 50% fine sand; about 50% fines with low plasticity, rapid dilatancy; maximum size: fine sand; wet, olive brown, moderately firm.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-75

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
BEGUN: 3/20/10 FINISHED: 3/20/10
WATER LEVEL DEPTH AND ELEVATION: NA
DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program
COORDINATES: N 2,225,434.3 E 6,131,821.9 (NAGD83)
TOTAL DEPTH: 30.7 ft.

STATE: California
GROUND SURFACE ELEVATION: 131.8 ft. (NAVD88)
T.O.C ELEVATION: 133.1 ft. (NAVD88)
HOLE LOGGED BY: A. Warren
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
Bentonite Seal: 2.0 to 13.2 ft. Well Completion: Steel surface casing with locking top, square 6-inches-wide and 5-foot-long.		96										s(CL) 117.1		**20.0 to 23.7 ft.: SILT, ML:** About 95% fines with no plasticity, rapid dilatancy, no toughness; about 5% fine sand; maximum size: fine sand; wet, olive brown with reddish brown veinlets, very firm to firm; finely stratified. Laboratory Data Interval 20.0 to 23.7 ft. **23.7 to 24.7 ft.: POORLY GRADED SAND WITH SILT, SP/SM:** About 90% fine, micaceous sand; about 10% nonplastic fines; maximum size: fine sand; wet, olive brown, flowing and loose. **24.7 to 25.5 ft.: SILT WITH SAND, (ML)s** About 75% fines with no plasticity, toughness or dry strength, rapid dilatancy; about 25% fine sand; maximum size: fine sand; wet, olive brown with reddish brown bands; very firm, lightly to moderately cemented in thin siltstone to sandstone layers. Laboratory Data Interval 24.7 to 25.5 ft. **25.5 to 28.7 ft.: SILTY SAND, SM:** About 75% fine sand; about 25% fines with medium plasticity; maximum size: fine sand; wet, olive brown, flowing and loose. Laboratory Data Interval 25.5 to 28.7 ft. **28.7 to 30.7 ft.: POORLY GRADED SAND WITH SILT, SP/SM:** About 90% fine sand; about 10% fines with medium plasticity; maximum size: fine sand; wet, olive brown, flowing and loose. No recovery from 28.7 to 30.7 ft, residue of sand in sampler and drilling action were used to describe the soil. **T.D. = 30.7 ft.**
	15	100	55.8	17.1	72.9	27.1	0.0	21.9	3.5	27.3	(ML)s 114.2	(ML)s 114.1		
												SM 113.1	Qal	
	20	100	83.5	10.3	93.8	6.2	0.0	NP	NP	28.9	ML 108.1	SM/ML 113.1 ML 108.1		
		100										SP/SM		

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-75

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
BEGUN: 3/20/10 FINISHED: 3/20/10
WATER LEVEL DEPTH AND ELEVATION: NA
DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program
COORDINATES: N 2,225,434.3 E 6,131,821.9 (NAGD83)
TOTAL DEPTH: 30.7 ft.

STATE: California
GROUND SURFACE ELEVATION: 131.8 ft. (NAVD88)
T.O.C ELEVATION: 133.1 ft. (NAVD88)
HOLE LOGGED BY: A. Warren
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
												SP/SM 107.1		
		100												
	25		69.7	18.5	88.2	11.8	0.0	NP	NP	30.3	ML 106.3	(ML)s 106.3		
		63	20.6	7.3	27.9	72.1	0.0	NP	NP	19.5	SM 103.1	SM 103.1	Qal	
		0										SP/SM 101.1		
	30													

BOTTOM OF HOLE

COMMENTS:

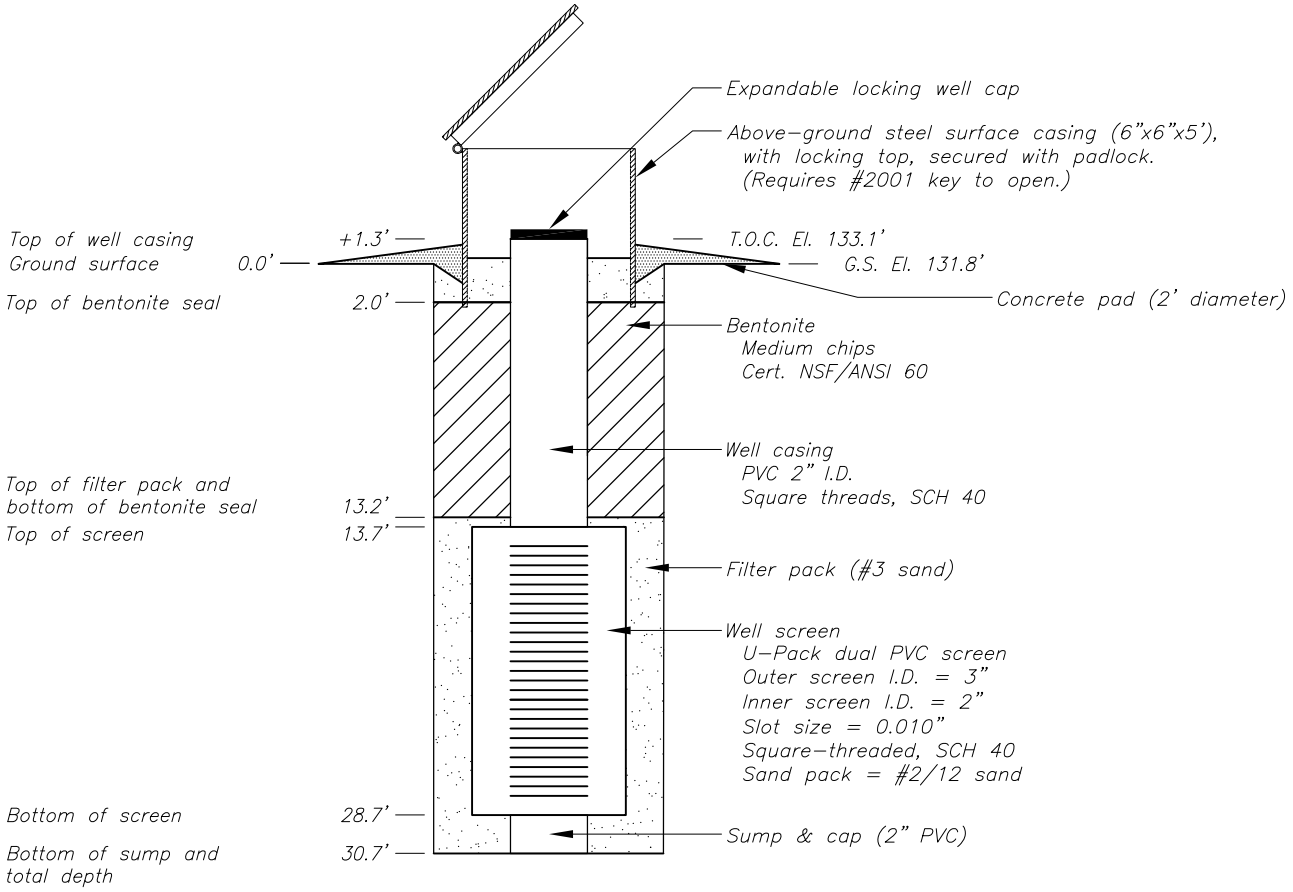
FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

REPORT: SJRRP DRILL HOLE PROJECT DATABASE: SJRRP.GPJ

MW–10–75	GEOLOGIST: A. WARREN
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 3/20/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2225434.3 E6131821.9 (NAD83) ELEVATION 133.1' (NAVD88) GROUND SURFACE ELEVATION 131.8' (NAVD88)	



NOT TO SCALE

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-76

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
BEGUN: 3/19/10 FINISHED: 3/19/10
WATER LEVEL DEPTH AND ELEVATION: NA
DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program
COORDINATES: N 2,224,164.6 E 6,127,385.3 (NAGD83)
TOTAL DEPTH: 34.1 ft.

STATE: California
GROUND SURFACE ELEVATION: 130.7 ft. (NAVD88)
T.O.C ELEVATION: 133.1 ft. (NAVD88)
HOLE LOGGED BY: A. Warren
REVIEWED BY: J. Vauk

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE.

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, RM 187, river left, about 1.3 miles west from the center of the SJR, about 810 feet east of the intersection of Oxalis Road and Orsmby Street.

DRILLED BY:
PN-Regional Drill Crew
Jerry Hansen, Driller
Cody Kelly, Helper
Ken Kreitz, Helper

DRILL RIG:
Central Mining Equipment 75 drill rig (CME-75)

DRILLING & SAMPLING METHODS:
Drill hole MW-10-76 was advanced using hollow stem flight augers with a continuous dry core sampling system (FADC) from the ground surface to a total depth of 34.1 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.

Interval Method
0.0 to 34.1 ft. - FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
0.0 to 14.1 ft. smooth drilling, soft
14.1 to 19.1 ft. soft, wet
19.1 to 34.1 ft. soft, very wet

CAVING CONDITIONS:
None

DRILL FLUID, RETURN AND COLOR:
0.0 to 19.1 ft. None
19.1 to 34.1 ft. Water, no return

WATER LEVEL:
Not measured

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

HOLE COMPLETION:
Well Casing: +2.4 to 10.0 ft. (T.O.C. El. 133.1 ft.)
Dual U-pack Screen: 10.0 to 25.0 ft. (Slotted 0.010-inch)
Well Screen Filter Pack: 2/12 Sand
Filter Pack: 9.5 to 34.1 ft. (#3 Sand)
Sump: 25.0 to 27.0 ft. (2-inch blank PVC with cap)
Bentonite Seal: 2.0 to 9.5 ft.
Well Completion: Steel surface casing with locking top, square 6-inches-wide and 5-foot-long.

DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL
	80										SM	Fill
											128.1	
											CH	
5												
	96											
											123.6	
		54.8	37.4	92.2	7.8	0.0	28.8	5.3	28.2	ML		Qal
										121.6		
											CL/ML	
10												
											119.2	
	92										SP	

0.0 to 2.6 feet
FILL (Fill)

0.0 to 2.6 ft.: SILTY SAND, SM: About 60% fine to medium sand; about 40% nonplastic fines; maximum size: medium sand; dry to moist, dark brown, organic odor; no reaction with HCl; micaceous; soil material has been disturbed by agricultural and road grading activities.

2.6 to 34.1 feet
QUATERNARY ALLUVIUM (Qal)

2.6 to 7.1 ft.: FAT CLAY, CH: About 100% fines with high plasticity, toughness, no dilatancy; trace fine sand; maximum size: fine sand; dry to moist, dark brown; no reaction with HCl, very firm, becomes less firm with depth, roots present from 6.8 to 7.1 ft.

7.1 to 11.5 ft.: SILTY CLAY, CL/ML: About 90% fines with low plasticity and toughness, slow dilatancy; about 10% fine sand; maximum size: fine sand; moist, olive brown with reddish brown oxidation veinlets; no reaction with HCl; moderately soft; finely stratified CL and ML layers.

Laboratory Data Interval
7.1 to 9.1 ft.

11.5 to 13.9 ft.: POORLY GRADED SAND; SP : About 95% fine to medium sand; about 5% nonplastic fines; maximum size: medium sand; moist to wet, olive brown with reddish brown oxidation layers; soft, stratified.

Laboratory Data Interval
11.5 to 13.9 ft.

13.9 to 14.1 ft.: SILTY CLAY, CL/ML: About 90% fines with low plasticity and toughness, slow dilatancy; about 10% fine sand; maximum size: fine sand; moist, olive brown with reddish brown oxidation veinlets; no reaction with HCl; moderately soft.

14.1 to 14.9 ft.: POORLY GRADED SAND WITH SILT, SP/SM: About 90% fine to medium sand; about 10% nonplastic fines; maximum size: medium sand; wet, olive brown; soft.

14.9 to 16.3 ft.: LEAN CLAY WITH SAND, (CL)s : About 80% fines with medium plasticity, low toughness; about 20% fine sand; maximum size: fine sand; moist, olive brown with reddish brown and black oxidation; moderately firm.

16.3 to 17.7 ft.: POORLY GRADED SAND WITH SILT, SP/SM : About 90% fine to medium sand; about 10% fines with no to low plasticity; maximum size: medium sand; wet, olive brown with reddish brown oxidation; band of oxidation at contact from 17.5 to 17.7 ft.

17.7 to 20.5 ft.: SILTY SAND, SM: About 65 to 75% fine sand; about 25 to 35% nonplastic fines; maximum size: fine sand; wet, olive brown; moderately firm, homogenous.

Laboratory Data Interval
17.7 to 19.1 ft.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-76

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
BEGUN: 3/19/10 FINISHED: 3/19/10
WATER LEVEL DEPTH AND ELEVATION: NA
DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program
COORDINATES: N 2,224,164.6 E 6,127,385.3 (NAGD83)
TOTAL DEPTH: 34.1 ft.

STATE: California
GROUND SURFACE ELEVATION: 130.7 ft. (NAVD88)
T.O.C ELEVATION: 133.1 ft. (NAVD88)
HOLE LOGGED BY: A. Warren
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
		92	7.4	1.8	9.2	90.8	0.0	NP	NP	22.8	SP-SM 116.8	SP 116.8		**20.5 to 21.9 ft.: SILTY SAND, SM:** About 65% fine sand; about 35% fines with low plasticity, no dry strength; maximum size: fine sand; moist, olive brown; micaceous, moderately firm.
												CL/ML 116.6		**21.9 to 28.1 ft.: POORLY GRADED SAND, SP :** About 95% fine to coarse, hard, subrounded sand; about 5% to trace fines; maximum size: coarse sand; wet, olive brown with black oxidation; loose to moderately soft; finely stratified with a greater percentage of fines from 24.1 to 28.1 ft.
												SP/SM 115.8		**28.1 to 29.1 ft.: SILTY SAND, SM:** About 85% fine sand; about 15% nonplastic fines; maximum size: fine sand; moist to wet, olive brown; homogenous; firm; lightly cemented lens.
	15													**29.1 to 30.6 ft.: SANDY LEAN CLAY, s(CL) :** About 55% fines with low to medium plasticity; about 45 % fine sand; maximum size: fine sand; moist, olive brown; firm.
												(CL)s 114.4		**30.6 to 33.5 ft.: SILTY SAND, SM:** About 85% fine sand; about 15% nonplastic fines; maximum size: fine sand; moist to wet, olive brown; homogenous; firm, lightly cemented lens.
		100										SP/SM 113.0		**33.5 to 34.1 ft.: SAND CLAY, s(CL):** About 70% fines with low plasticity; about 30% fine sand; maximum size: fine sand; moist, olive brown; moderately soft.
			39.6	7.5	47.1	52.9	0.0	NP	NP	16.7	SM 111.6		Qal	**T.D. = 34.1 ft.**
												SM 110.2		
	20													
		94										SM 108.8		
												SP		

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-76

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, Left Side of River, Near Oxalis Ave.
BEGUN: 3/19/10 FINISHED: 3/19/10
WATER LEVEL DEPTH AND ELEVATION: NA
DATE WATER LEVEL WAS MEASURED: NA

PROJECT: San Joaquin River Restoration Program
COORDINATES: N 2,224,164.6 E 6,127,385.3 (NAGD83)
TOTAL DEPTH: 34.1 ft.

STATE: California
GROUND SURFACE ELEVATION: 130.7 ft. (NAVD88)
T.O.C ELEVATION: 133.1 ft. (NAVD88)
HOLE LOGGED BY: A. Warren
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
	25	36										SP		
												102.6		
												SM		
												101.6	Qal	
	30	100										s(CL)		
												100.1		
												SM		
												98.2		
												s(CL)		
												96.6		

BOTTOM OF HOLE

COMMENTS:

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

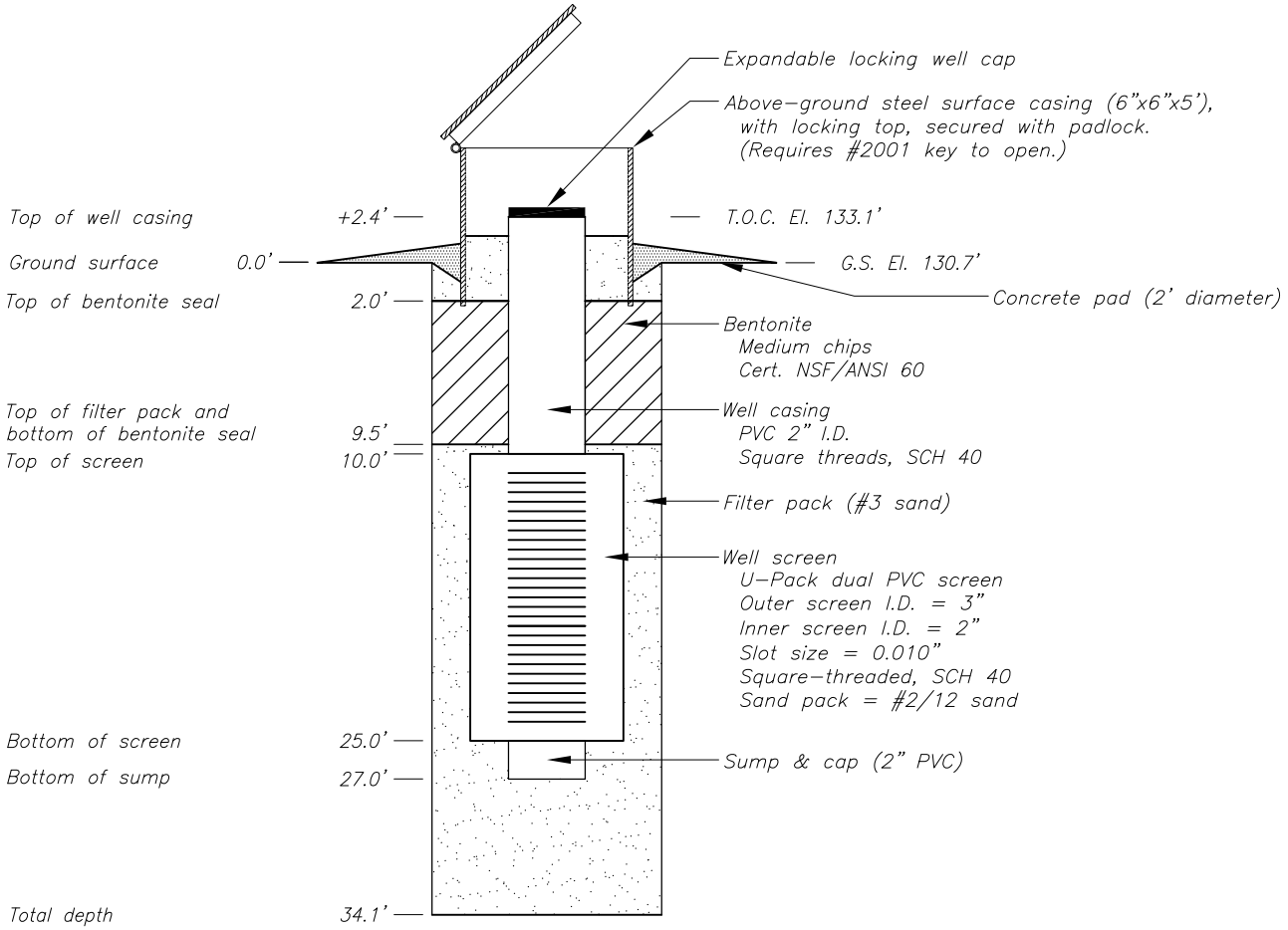
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

PROJECT DATABASE: SJRRP.GPJ
REPORT: SJRRP DRILL HOLE

MW–10–76	GEOLOGIST: A. WARREN
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 3/19/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2224164.6 E6127385.3 (NAD83) ELEVATION 133.1' (NAVD88) GROUND SURFACE ELEVATION 130.7' (NAVD88)	



NOT TO SCALE

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-78

FEATURE: Groundwater Monitoring
PROJECT: San Joaquin River Restoration Program
STATE: California
LOCATION: Reach 3, Right Side of River, South of Sack Dam
COORDINATES: N 2,243,902.1 E 6,124,200.9 (NAGD83)
GROUND SURFACE ELEVATION: 125.3 ft. (NAVD88)
BEGUN: 3/23/10 FINISHED: 3/23/10
TOTAL DEPTH: 31.3 ft.
T.O.C ELEVATION: 127.8 ft. (NAVD88)
WATER LEVEL DEPTH AND ELEVATION: 6.8 ft. b.g.s (El. 118.5 ft.)
HOLE LOGGED BY: A. Warren
DATE WATER LEVEL WAS MEASURED: 3/23/2010
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE. **PURPOSE OF HOLE:** To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well. **LOCATION:** Reach 3, RM 182, river right, about 480 feet east from the center of the SJR, about 1,000 feet east (across the SJR) from the end of Valeria Avenue. **DRILLED BY:** PN-Regional Drill Crew Jerry Hansen, Driller Cody Kelly, Helper Ken Kreitz, Helper **DRILL RIG:** Central Mining Equipment 75 drill rig (CME-75) **DRILLING & SAMPLING METHODS:** Drill hole MW-10-78 was advanced using hollow stem flight augers with a continuous dry core sampling system (FADC) from the ground surface to a total depth of 31.3 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. Interval Method 0.0 to 31.3 ft. - FADC **DRILLING CONDITIONS AND DRILLER'S COMMENTS:** 0.0 to 8.8 ft. smooth drilling, soft 8.8 to 13.8 ft. moderately soft, wet 13.8 to 23.8 ft. moderately soft, add water 23.8 to 31.3 ft. moderately firm **CAVING CONDITIONS:** None **DRILL FLUID, RETURN AND COLOR:** 0.0 to 13.8 ft. None 13.8 to 31.3 ft. Water, no return **WATER LEVEL:** Not measured **REASON FOR HOLE TERMINATION:** The hole was terminated upon successful completion to the target depth. **HOLE COMPLETION:** Well Casing: +2.5 to 10.0 ft. (T.O.C. El. 127.8 ft.) Dual U-pack Screen: 10.0 to 25.0 ft. (Slotted 0.010-inch) Well Screen Filter Pack: 2/12 Sand Filter Pack: 9.5 to 31.3 ft. (#3 Sand) Sump: 25.0 to 27.0 ft. (2-inch blank PVC with cap) Bentonite Seal: 2.0 to 9.5 ft. Well Completion: Steel surface	5 10	76 76 78	51.5	21.0	72.5	27.5	0.0	31.9	6.2	21.7	(ML)s 119.2	SM 123.4 CH 121.6 (CH)s 120.2 (ML)s 119.2 SM 118.5 SP/SM	Qal	***0.0 to 31.3 feet*** ***QUATERNARY ALLUVIUM (Qal)*** **0.0 to 1.9 ft.: SILTY SAND, SM:** About 55 % fine, micaceous sand; about 45 % nonplastic fines; maximum size: fine sand; moist, brown, organic odor; moderately firm; many roots and organic materials present. **1.9 to 3.7 ft.: FAT CLAY, CH:** About 95 % fines with high plasticity, toughness and dry strength, no dilatancy; about 5 % fine sand; maximum size: fine sand; moist, dark brown; very firm, homogenous. **3.7 to 5.1 ft.: FAT CLAY WITH SAND, (CH)s :** About 80 % fines with high plasticity, toughness and dry strength, no dilatancy; about 20 % fine sand with mica; maximum size: fine sand; moist, dark brown; moderately firm. **5.1 to 6.1 ft.: SANDY SILT, (ML)s:** About 75% fines with no to low plasticity; about 25 % fine sand with mica; maximum size: fine sand; moist, olive brown with reddish brown layers; firm. Laboratory Data Interval 5.1 to 6.1 ft. **6.1 to 6.8 ft.: SILTY SAND, SM:** About 70 % fine micaceous sand; about 30 % fines with no to low plasticity; maximum size: fine sand; moist, olive brown with reddish brown layers; firm. **6.8 to 13.8 ft.: POORLY GRADED SAND WITH SILT, SP/SM:** About 90 % fine to medium sand; about 10 % nonplastic fines; maximum size: medium sand; wet, olive brown and gray with reddish brown oxidation; moderately firm, stratified; layer of medium sand from 10.1 to 10.2 ft.; roots encountered from 10.2 to 13.8 ft. **13.8 to 18.7 ft.: POORLY GRADED SAND, SP :** About 95 % fine sand; about 5 % fines; maximum size: fine sand; wet, tan with reddish brown oxidation; moderately soft; homogenous. Laboratory Data Interval 14.5 to 15.5 ft. **18.7 to 23.8 ft.: SANDY LEAN CLAY, s(CL) :** About 65 % fines with medium plasticity; about 35 % fine sand; maximum size: fine sand; moist, olive tan; firm; layer of SM (about 85 % fine sand; 15 % nonplastic fines from 22.5 to 23.0 ft). Laboratory Data Interval 20.0 to 21.0 ft. **23.8 to 31.3 ft.: POORLY GRADED SAND, SP :** About 95 % fine sand; about 5 % nonplastic fines; maximum size: fine sand; wet, olive tan; moderately firm to soft; stratified with lens of SP/SM. Laboratory Data Interval 29.0 to 30.0 ft. **T.D. = 31.3 ft.**

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

PROJECT DATABASE: SJRRP.GPJ
REPORT: SJRRP DRILL HOLE

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-78

FEATURE: Groundwater Monitoring
PROJECT: San Joaquin River Restoration Program
STATE: California
LOCATION: Reach 3, Right Side of River, South of Sack Dam
COORDINATES: N 2,243,902.1 E 6,124,200.9 (NAGD83)
GROUND SURFACE ELEVATION: 125.3 ft. (NAVD88)
BEGUN: 3/23/10 FINISHED: 3/23/10
TOTAL DEPTH: 31.3 ft.
T.O.C ELEVATION: 127.8 ft. (NAVD88)
WATER LEVEL DEPTH AND ELEVATION: 6.8 ft. b.g.s (El. 118.5 ft.)
HOLE LOGGED BY: A. Warren
DATE WATER LEVEL WAS MEASURED: 3/23/2010
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
casing with locking top, square 6-inches-wide and 5-foot-long.		78										SP/SM 111.5		
	15	100	5.3	0.6	5.9	94.1	0.0	NP	NP	23.0	SP-SM 109.8	SP 106.6	Qal	
	20	100	36.4	25.3	61.7	38.3	0.0	30.4	15.8	21.3	s(CL) 104.3	s(CL) 101.5		
		44										SP		

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

REPORT: SJRRP DRILL HOLE PROJECT DATABASE: SJRRP.GPJ

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-78

FEATURE: Groundwater Monitoring
PROJECT: San Joaquin River Restoration Program
STATE: California
LOCATION: Reach 3, Right Side of River, South of Sack Dam
COORDINATES: N 2,243,902.1 E 6,124,200.9 (NAGD83)
GROUND SURFACE ELEVATION: 125.3 ft. (NAVD88)
BEGUN: 3/23/10 FINISHED: 3/23/10
TOTAL DEPTH: 31.3 ft.
T.O.C ELEVATION: 127.8 ft. (NAVD88)
WATER LEVEL DEPTH AND ELEVATION: 6.8 ft. b.g.s (El. 118.5 ft.)
HOLE LOGGED BY: A. Warren
DATE WATER LEVEL WAS MEASURED: 3/23/2010
REVIEWED BY: J. Vauk

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: % SILT	% CLAY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT %	LABORATORY CLASSIFICATION / ELEVATION	VISUAL CLASSIFICATION / ELEVATION	GEOLOGIC UNIT SYMBOL	CLASSIFICATION AND PHYSICAL CONDITION
	25	44										SP	Qal	
			9.0	5.1	14.1	85.9	0.0	NP	NP	25.2	SM / 95.3			
	30	56										94.0		

BOTTOM OF HOLE

COMMENTS:

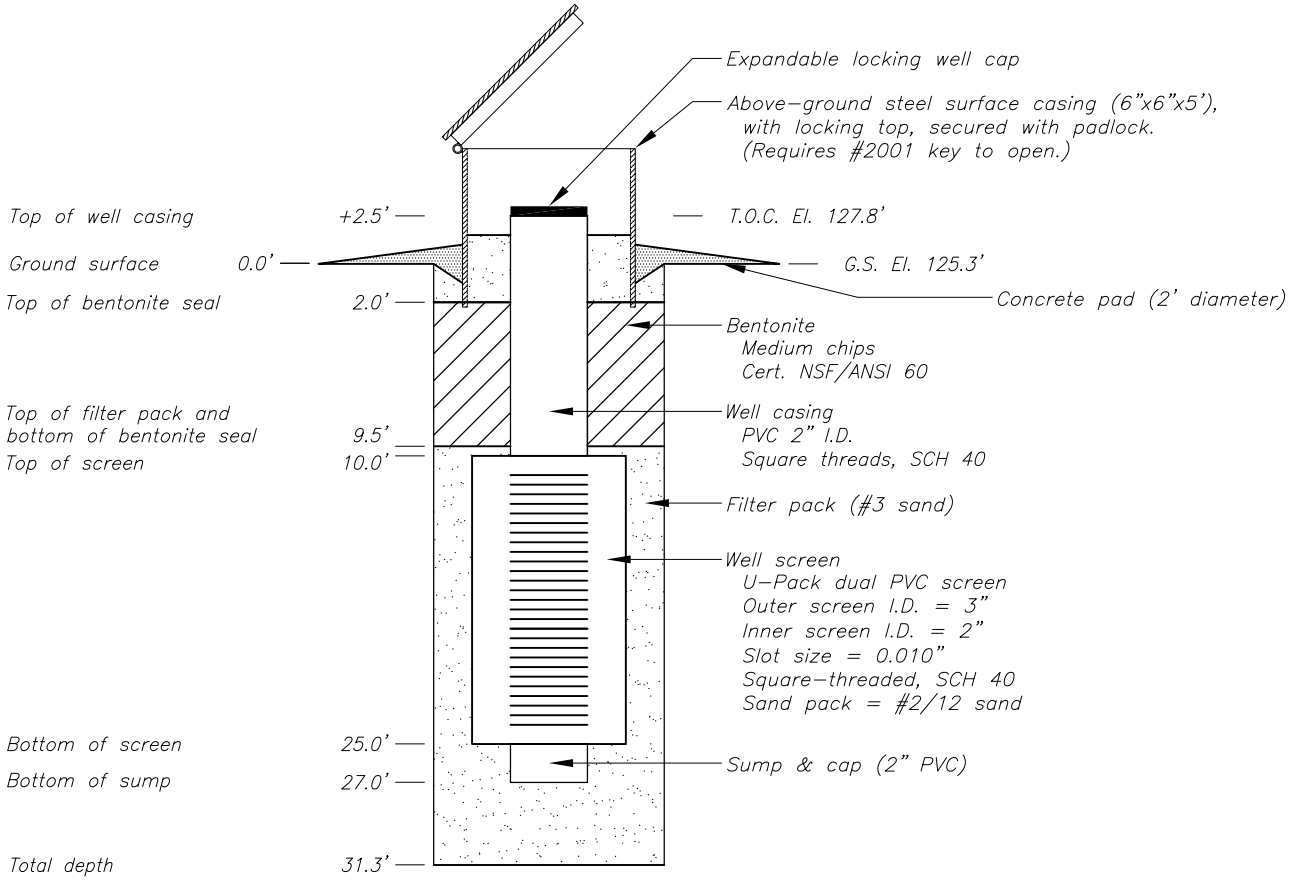
FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
RM = River Mile
O.D. = outer diameter
G.S. = Ground surface
b.g.s. = Below the ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

RECLAMATION
Managing Water in the West

REPORT: SJRRP DRILL HOLE
PROJECT DATABASE: SJRRP.GPJ

MW–10–78	GEOLOGIST: A. WARREN
WELL COMPLETION DIAGRAM	DRILLER: G. HANSEN
DATE COMPLETED: 3/23/2010	HELPER: C. KELLY, K. KREITZ
TOP OF WELL CASING COORDINATES: N2243902.1 E6124200.9 (NAD83) ELEVATION 127.8' (NAVD88) GROUND SURFACE ELEVATION 125.3' (NAVD88)	



NOT TO SCALE

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-117

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/6/10 FINISHED: 12/6/10
DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: Not Encountered

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,219,722.1 E 6,157,664.1 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 147.5 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, River Bank Right, Madera County, on Hemlock Rd. (Road 9), 3.9 miles north of the intersection of Road 9 and Avenue 7 1/2, on the east side of the road.

DRILLED BY:
Bureau of Reclamation: PN Region drill crew:
Gerry Hansen, driller
Chris Peterson, helper
Dennis Read, helper

DRILL RIG:
Truck mounted Central Mining Equipment (CME) 75

DRILLING & SAMPLING METHODS:
The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers.

Interval Method
0.0 to 31.1 ft. FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
None

DRILLING FLUID, RETURN AND COLOR:
0.0 to 31.1 ft. - Drilled without fluid

WATER LEVEL FROM TOC:
Not Encountered

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

HOLE COMPLETION:
Well Casing: 0.5 to 15.1 ft. (2-inch blank PVC)
Dual U-pack Screen: 15.1 to 30.1 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch)
U-Pack Screen Filter Pack: #2/12 Sand
Filter Pack: 13.1 to 31.1 ft. (#3 Sand)
Sump: 30.1 to 31.1 ft. (2-inch blank PVC with slip cap)
Bentonite Seal: 2.0 to 13.1 ft.
Concrete Seal: 0.0 to 2.0 ft. (backfilled with #3 Sand inside well vault)
Well Completion: 8-inch diameter flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot diameter concrete pad.
Lock: #2001 Masterlock

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION	El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	El.
	100	23.8	35.7	40.5	0.0	25.7	2.3	19.6	s(ML)	143.9		s(ML)	143.9
5	92	16.9	61.1	22.0	0.0	19.3	1.2	17.9	(ML)s	138.9		SM	140.9
												SM	138.1
10	80	2.1	5.7	92.1	0.1	NP	NP	5.4	SP-SM	134.9		SP	134.9
												NR	133.9
												SP	132.9
15	100	16.1	68.9	15.0	0.0	27.9	2.7	28.0	(ML)s	128.9	Qal	SM	129.5
												(CL)s	128.5

0.0 to 31.1 ft.
QUATERNARY ALLUVIUM - Qal

0.0 to 3.6 ft. SANDY SILT, s(ML):
About 60% fines with low plasticity, low toughness, low dry strength, slow dilatancy; about 40% fine sand; dry, brown to light brown; broken up from drilling activity; trace medium to coarse sand; hard; subrounded.

Lab Data Interval
0.0 to 3.6 ft.

3.6 to 6.6 ft. SILTY SAND, SM:
About 75% fine sand; about 25% fines with low plasticity, low toughness, low dry strength; dry, light brown to tan; broken up from drilling activity.

6.6 to 8.6 ft. SILT WITH SAND, (ML)s:
About 80% fines with low plasticity, low toughness, low dry strength; about 20% fine sand; dry, tan to brown; soft to firm consistency; small areas of oxidation throughout.

Lab Data Interval
6.6 to 8.6 ft.

8.6 to 9.4 ft. SILTY SAND, SM:
About 70% fine sand; about 30% fines with low plasticity, low toughness, medium dry strength; moist, tan; firm consistency; some oxidation; micaceous.

9.4 to 12.6 ft. POORLY GRADED SAND, SP:
About 95% fine sand; about 5% fines; moist, reddish-brown (oxidation); loose consistency.

Lab Data Interval
9.4 to 12.6 ft.

12.6 to 13.6 ft. NO RECOVERY

13.6 to 14.6 ft. POORLY GRADED SAND, SP:
About 95% fine sand; about 5% fines; moist, reddish-brown (oxidation); loose consistency.

14.6 to 18.0 ft. SILTY SAND, SM:
About 75% fine sand; about 15% fines with low plasticity, low toughness, rapid dilatancy, no dry strength; moist, olive/tan; soft consistency.

18.0 to 19.0 ft. LEAN CLAY WITH SAND, (CL)s:
About 85% fines with low plasticity, low toughness, slow dilatancy, low dry strength; about 15% fine sand; moist, tan/brown to gray/tan; soft consistency; some oxidation.

Lab Data Interval
18.0 to 18.6 ft,

19.0 to 21.7 ft. SILTY SAND, SM:
About 85% fine sand; about 15% non plastic fines, no toughness, low dry strength; moist, brown to tan/brown; oxidation throughout.

Lab Data Interval
19.0 to 21.7 ft.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-117

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/6/10 FINISHED: 12/6/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: Not Encountered

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,219,722.1 E 6,157,664.1 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 147.5 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
	100	3.9	33.7	62.4	0.0	NP	NP	9.4	SM 125.8		SM 125.8
25	84	52.0	34.7	13.3	0.0	35.6	9.9	26.4	ML 120.8		SP 121.9 / CL 120.8
30	100										SM 116.4

BOTTOM OF HOLE

CLASSIFICATION AND PHYSICAL CONDITION

21.7 to 25.6 ft. POORLY SORTED SAND, SP:
About 100% fine sand; moist; tan/white; loose consistency.

25.6 to 26.7 ft. LEAN CLAY, CL:
About 90% fines with low to medium plasticity, low toughness, no dilatancy, medium dry strength; about 10% fine sand; moist to dry, tan/brown; firm consistency.

Lab Data Interval
25.6 to 26.7 ft.

26.7 to 31.1 ft.SILTY SAND, SM:
About 60% fine sand; about 40% fines with low plasticity, low toughness, low dry strength, rapid dilatancy; moist, tan; loose consistency.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

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

MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRRP	MADERA	MW-10-117

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number

1. Can this well be purged dry? Yes ☐ No ☐ (WELL IS DRY)

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☐ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well _____ min.

4. Depth of well (from top of well casisng) 31.1 ft.

5. Inside diameter of well ___.2 in.

6. Volume of water in filter pack and well casing ____.__ gal.

7. Volume of water removed from well ____.__ gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? (If yes, attach results) ☐ Yes ☐ No

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. ___.__ ft.	___.__ ft.
Date	b. 12/11/2010 (m m d d y y y y)	12/11/2010 (m m d d y y y y)
Time	c. __:__ ☐ a.m. ☐ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	___.__ inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe)	Clear ☐ 20 Turbid ☐ 25 (Describe)
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

Fill in if drilling fluids were used and well is at solid waste facility:

16. Well developed by: Name (first, last) and Firm
First Name: Last Name:
Firm:

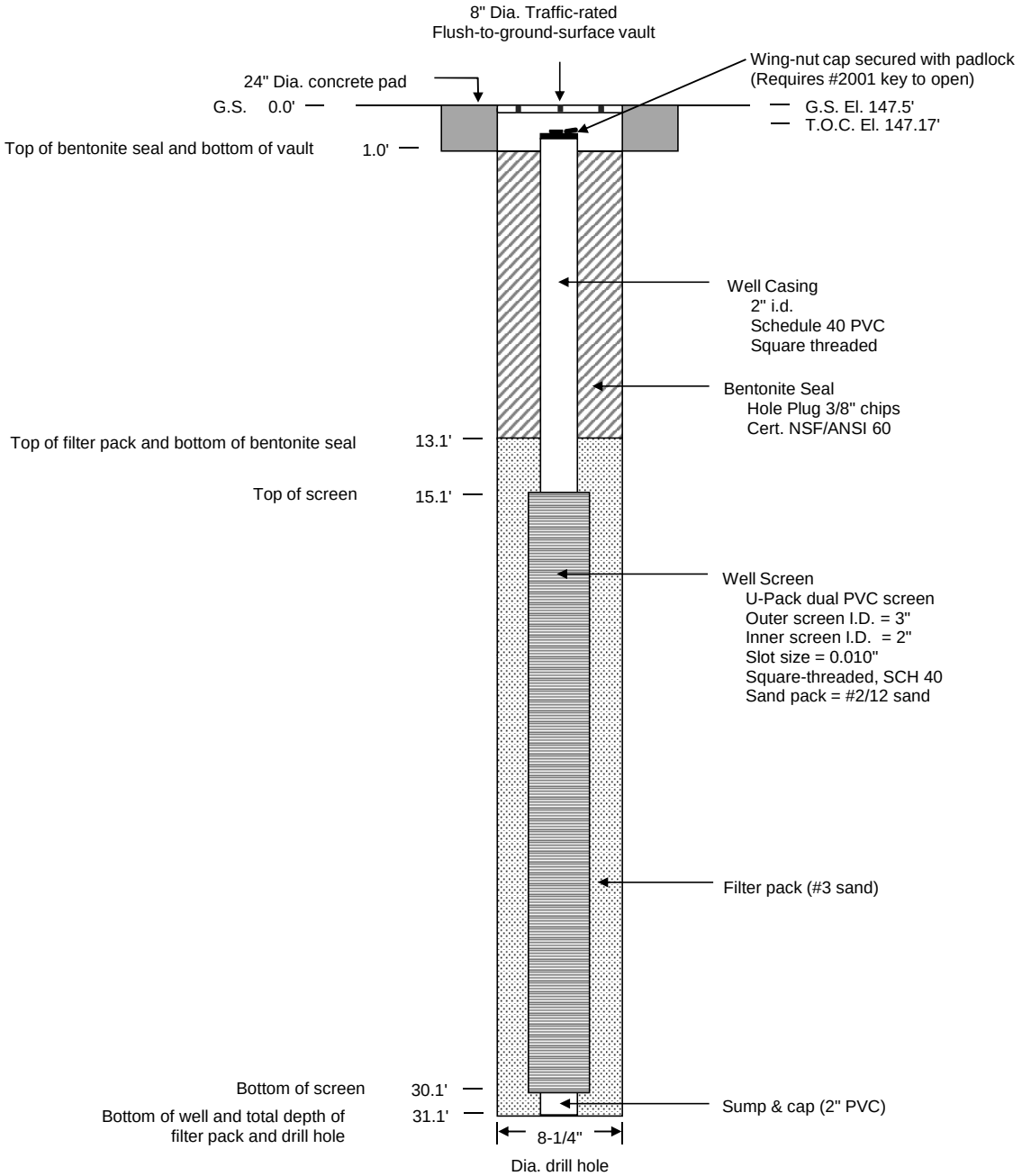
17. Additional comments on development:
WELL WAS DRY AFTER SAMPLING
WELL IS STILL DRY

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

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

MW-10-117	GEOLOGIST: G. Perea
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen
DATE COMPLETED: 12/6/2010	HELPERS: D. Read & C. Peterson
LOCATION: Hemlock Road T.O.C. COORDINATES: N2219722.12 E6157664.14 (NAD83) ELEVATION 147.17' (NAVD88) G.S. ELEVATION: 147.5' (NAVD88)	



***NOT TO SCALE**

NOTES:

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-118

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/4/10 FINISHED: 12/4/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 13.59 ft. (124.7 ft. - 12/11/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,212,737.6 E 6,139,182.6 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 138.3 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, River Bank Right, Madera County, on the east side of Avenue 5 ½, 1.1 miles north of the triple intersection of Road 5 ½, Ave. 9, and Road 6.

DRILLED BY:
Bureau of Reclamation: PN Region drill crew:
Jerry Hansen, driller
Dennis Read, helper

DRILL RIG:
Truck mounted Central Mining Equipment (CME) 75

DRILLING & SAMPLING METHODS:
The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers

Interval Method
0.0 to 31.1 ft. FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
0.0 to 3.8 ft. - Medium soft
18.6 to 23.6 ft. - Add water, catcher with nylon.

DRILLING FLUID, RETURN AND COLOR:
0.0 to 31.1 ft. - Drilled without fluid

WATER LEVEL FROM TOC:
13.32 ft. on 12/11/10.

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

HOLE COMPLETION:
Well Casing: 0.5 to 10.0 ft. (2-inch blank PVC)
Dual U-pack Screen: 10.0 to 25.0 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch)
U-Pack Screen Filter Pack: #2/12 Sand
Filter Pack: 8.0 to 27.0 ft. (#3 Sand)
Sump: 25.0 to 27.0 ft. (2-inch blank PVC with slip cap)
Bentonite Seal: 2.0 to 8.0 ft.; 27.0 to 31.1 ft.
Concrete Seal: 0.0 to 2.0 ft. (backfilled with #3 Sand inside well vault)
Well Completion: 8-inch dia flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot dia concrete pad.
Lock: #2001 Masterlock

DEPTH	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
											(CL)s 136.9
	63										CH 135.4
		28.2	56.0	15.8	0.0	32.5	10.8	21.9	(CL)s 134.5		(CL)s 134.5
		15.7	45.4	38.9	0.0	NP	NP	20.8	s(ML) 133.3		s(ML) 132.5
5	71										SP-SM 131.1
											NR 129.7
10	70	1.1	5.4	93.0	0.5	NP	NP	5.1	SP-SM 126.2		SP-SM 126.2
											NR 124.7
										▼	SP-SM 123.5
15	40										SW 122.7
										Qal	NR 119.7
											SW

0.0 to 31.1 ft.
QUATERNARY ALLUVIUM - Qal

0.0 to 1.4 ft. LEAN CLAY WITH SAND, (CL)s:
About 75% fines with low plasticity, low toughness, low dry strength; about 25% fine sand; moist, brown to dark brown; broken up from drilling activities.

1.4 to 2.9 ft. FAT CLAY, CH:
About 90% fines with medium plasticity, medium toughness, medium to high dry strength; about 10% fine sand; moist, dark brown to brown; firm consistency.

2.9 to 3.8 ft. LEAN CLAY WITH SAND, (CL)s:
About 85% fines with low plasticity, medium toughness, medium dry strength; about 15% fine sand; moist, tan/brown; firm consistency.

Lab Data Interval
2.9 to 3.8 ft.

3.8 to 5.8 ft. SANDY SILT, s(ML):
About 60% fines with low plasticity, low toughness, rapid dilatancy; about 40% fine sand; moist, dark tan; soft to loose consistency.

Lab Data Interval
3.8 to 5.0 ft.

Note: 5.1 to 5.8 ft.: Slight increase in sand.

5.8 to 14.8 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine to medium sand (predominately fine); about 10% fines; trace coarse sand, subrounded, hard; moist, light tan; loose consistency, micaceous.

7.2 to 8.6 ft.: No Recovery

Lab Data Interval
8.6 to 12.1 ft.

Note: 8.6 to 12.1 ft.: Slight increase in medium sand.

12.1 to 13.6 ft.: **No Recovery**

13.6 to 14.8 ft.: Decrease in medium and coarse sand, slight increase in fines.

14.8 to 20.2 ft. WELL GRADED SAND, SW:
About 100% fine to coarse sand; trace fines; wet, tan/brown; loose consistency; subrounded, hard; micaceous; quartz rich.

15.6 to 18.6 ft.: **No Recovery**

20.2 to 20.6 ft. SANDY SILT, s(ML):
About 70% non plastic fines, no toughness, rapid dilatancy; about 30% fine sand; wet, brown/gray; soft consistency.

20.6 to 23.6 ft. No Recovery

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-118

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/4/10 FINISHED: 12/4/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 13.59 ft. (124.7 ft. - 12/11/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,212,737.6 E 6,139,182.6 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 138.3 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
											118.1
											s(ML) 117.7
	40										NR 114.7
											SP 114.2
		54.5	32.4	12.7	0.4	35.1	15.2	30.1	CL 113.4		CL 113.4
25											
	100										CH 111.6
		60.7	33.9	5.4	0.0	34.5	9.5	28.7	ML 109.7		ML 109.7
30	100										SM 107.2

BOTTOM OF HOLE

CLASSIFICATION AND PHYSICAL CONDITION

23.6 to 24.1 ft. POORLY GRADED SAND, SP:
About 95% fine sand; about 5% fines; wet, tan/brown; loose consistency.

24.1 to 24.9 ft. LEAN CLAY, CL:
About 90% fines with medium plasticity, medium toughness, no dilatancy; about 10% fine sand; moist, gray/olive green; firm consistency.

Lab Data Interval
24.1 to 24.9 ft.

24.9 to 26.7 ft. FAT CLAY, CH:
About 90% fines with medium to high plasticity, low to medium toughness, no dilatancy; about 10% fine sand; moist, olive/tan; firm consistency; oxidation layers.

26.7 to 28.6 ft. SILT, ML:
About 100% non plastic fines with no toughness, rapid dilatancy; trace fine sand; moist, tan; oxidation layers; firm to very firm consistency.

Lab Data Interval
26.7 to 28.6 ft.

28.6 to 31.1 ft. SILTY SAND, SM:
About 85% fine sand; about 15% non plastic fines, no toughness, rapid dilatancy; wet, tan/brown; soft consistency.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

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

MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRRP	MADERA	MW-10-118
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well ID Number**

1. Can this well be purged dry? Yes ☐ No ☒

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☒ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well: 32 min.

4. Depth of well (from top of well casisng): 26.7 ft.

5. Inside diameter of well: 2 in.

6. ~~Volume of water in filter pack and~~ well casing: ____ gal.

7. Volume of water removed from well: 80 gal.

8. ~~Volume of water added~~ (if any): ____ gal.

9. Source of water added: _____

10. Analysis performed on water added? ☐ Yes ☐ No (If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 13.32 ft. Flush Mount	13.33 ft.
Date	b. 12/11/2010 (m m d d y y y y)	12/11/2010
Time	c. 08:50 ☒ a.m. ☐ p.m.	09:22 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	TR inches	____ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15	Clear ☒ 20 Turbid ☐ 25
(Describe)	Silty Sand Cloudy	

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: Last Name:
Firm:

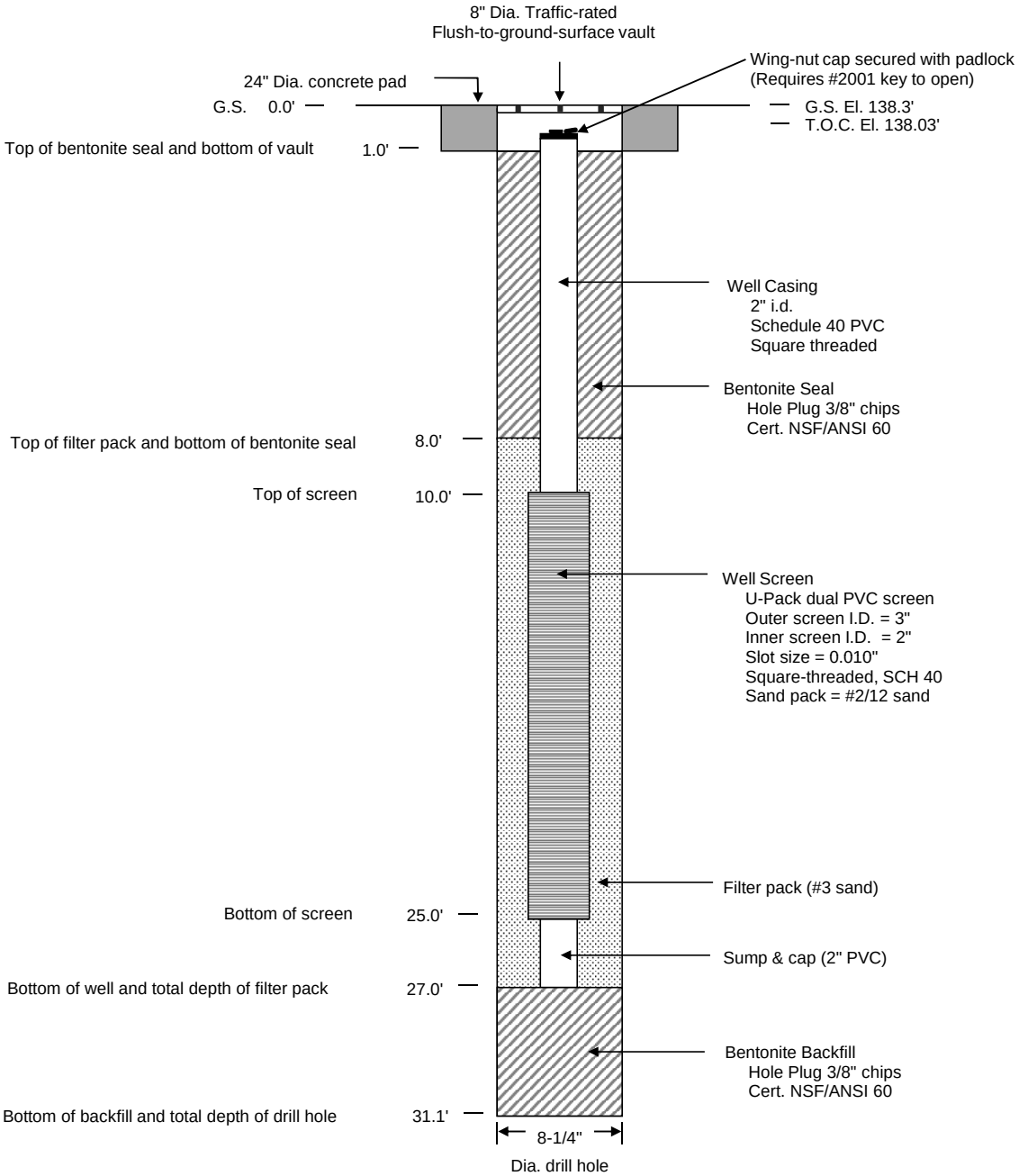
17. Additional comments on development:
0850-0910 Bail 5gal - Silty Sand
0911 0922 Pump 25gal Started Clearing up After 5gals

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

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

MW-10-118	GEOLOGIST: G. Perea
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen
DATE COMPLETED: 12/4/2010	HELPERS: D. Read
LOCATION: Road 5 1/2 T.O.C. COORDINATES: N2212737.56 E6139182.62 (NAD83) ELEVATION 138.03' (NAVD88) G.S. ELEVATION: 138.3' (NAVD88)	



***NOT TO SCALE**

NOTES:

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-119

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/3/10 FINISHED: 12/3/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 11.09 ft. (129.4 ft. - 12/11/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,206,697.0 E 6,139,043.9 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 140.5 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, River Bank Right, Madera County, at the triple intersection of Road 5 ½, Ave. 9, and Road 6, on the northwest corner of the intersection.

DRILLED BY:
Bureau of Reclamation: PN Region drill crew:
Jerry Hansen, driller
Dennis Read, helper
Tom Musial, helper

DRILL RIG:
Truck mounted Central Mining Equipment (CME) 75

DRILLING & SAMPLING METHODS:
The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers

Interval Method
0.0 to 31.1 ft. FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
0.0 to 3.6 ft. - Medium soft
8.6 to 13.6 ft. - Add water and catcher
13.6 to 18.6 ft. - Catcher with bag
18.6 to 23.6 ft. - Catcher with nylon

DRILLING FLUID, RETURN AND COLOR:
0.0 to 31.1 ft. - Drilled without fluid

WATER LEVEL FROM TOC:
10.88 ft. on 12/11/10.

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
	92										s(CL) 137.1
		45.5	22.1	32.4	0.0	45.7	27.2	19.6	s(CL) 137.1		SM 136.9
5											SP-SM 135.6
	72										SP 133.6
		1.0	4.2	94.8	0.0	NP	NP	4.3	SP-SM 133.1		SP 133.1
											NR 131.9
10											NR 129.8
	64										SP 127.8
		1.6	6.4	92.0	0.0	NP	NP	32.5	SP-SM 126.9		SP-SM 126.9
15										Qal	NR 121.9
	0										SP-SM 121.2

CLASSIFICATION AND PHYSICAL CONDITION

0.0 to 31.1 ft.
QUATERNARY ALLUVIUM - Qal

0.0 to 3.4 ft. SANDY LEAN CLAY, s(CL):
About 70% fines with medium plasticity, medium toughness, no dilatancy; about 30% fine sand; dry, dark brown; broken up from drilling activities.

Lab Data Interval
2.0 to 3.4 ft.

3.4 to 3.6 ft. SILTY SAND, SM:
About 70% fine sand; about 30% fines with low plasticity, low toughness, rapid dilatancy; moist, tan/brown; soft to firm consistency.

3.6 to 4.9 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine sand; about 10% fines; moist, dark tan to light brown; loose consistency.

4.9 to 6.9 ft. POORLY GRADED SAND, SP:
About 100% fine sand; trace fines; moist, light tan with salt and pepper; loose consistency.

6.9 to 7.4 ft. POORLY GRADED SAND, SP:
About 100% fine sand; moist, salt and pepper with large zones of oxidation; loose consistency.

Lab Data Interval

7.4 to 8.6 ft. No Recovery

8.6 to 10.7 ft. No Recovery

10.7 to 12.7 ft. POORLY GRADED SAND, SP:
About 95% fine sand; about 5% fines; wet, light brown with oxidation; loose consistency; micaceous.

12.7 to 13.6 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine sand; about 10% fines; wet, brown/gray to gray with oxidized layers; micaceous.

Lab Data Interval
12.7 to 13.6

13.6 to 18.6 ft. No Recovery

18.6 to 19.3 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine sand; about 10% fines; wet, brown/gray to gray with oxidized layers; micaceous.

19.3 to 31.1 ft. No Recovery

Note: 23.6 to 28.6 ft.: Trace recovery in sock: POORLY GRADED SAND WITH SILT, SP-SM: About 90% fine sand; about 10% fines; wet, brown/gray to gray with oxidized layers; micaceous.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-119

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/3/10 FINISHED: 12/3/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 11.09 ft. (129.4 ft. - 12/11/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,206,697.0 E 6,139,043.9 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 140.5 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.	CLASSIFICATION AND PHYSICAL CONDITION
HOLE COMPLETION: Well Casing: 0.5 to 14.7 ft. (2-inch blank PVC) Dual U-pack Screen: 14.7 to 29.7 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch) U-Pack Screen Filter Pack: #2/12 Sand Filter Pack: 12.7 to 31.1 ft. (#3 Sand) Sump: 29.7 to 31.1 ft. (2-inch blank PVC with slip cap) Bentonite Seal: 1.0 to 12.7 ft. Concrete Seal: 0.0 to 1.0 ft. (backfilled with #3 Sand inside well vault) Well Completion: 8-inch diameter flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot diameter concrete pad. Lock: #2001 Masterlock		14										NR 116.9	
	25	0										NR 111.9	
	30	0										NR 109.4	

BOTTOM OF HOLE

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

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

MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRRP	MADERA	MW-10-119

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number

1. Can this well be purged dry? Yes ☐ No ☒

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☒ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐ __

3. Time spent developing well 30 min.

4. Depth of well (from top of well casisng) 303 ft.

5. Inside diameter of well 2.00 in.

~~6. Volume of water in filter pack~~ and well casing ____ gal.

7. Volume of water removed from well 30.0 gal.

~~8. Volume of water added~~ (if any) ____ gal.

9. Source of water added _____

10. Analysis performed on water added? ☐ Yes ☐ No
(If yes, attach results)

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 10.88 ft. Flush Mount	11.0 ft.
Date	b. 12/11/2010 (m m d d y y y y)	12/11/2010
Time	c. 08:05 ☒ a.m. ☐ p.m.	08:35 ☒ a.m. ☐ p.m.
12. Sediment in well bottom	TR. inches	____ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe)	Clear ☒ 20 Turbid ☐ 25 (Describe)
	Silty Sand Cloudy	clear
14. Total suspended solids	____ mg/l	____ mg/l
15. COD	____ mg/l	____ mg/l

Fill in if drilling fluids were used and well is at solid waste facility:

16. Well developed by: Name (first, last) and Firm
First Name: Terry Last Name: Hanson
Firm: BOR

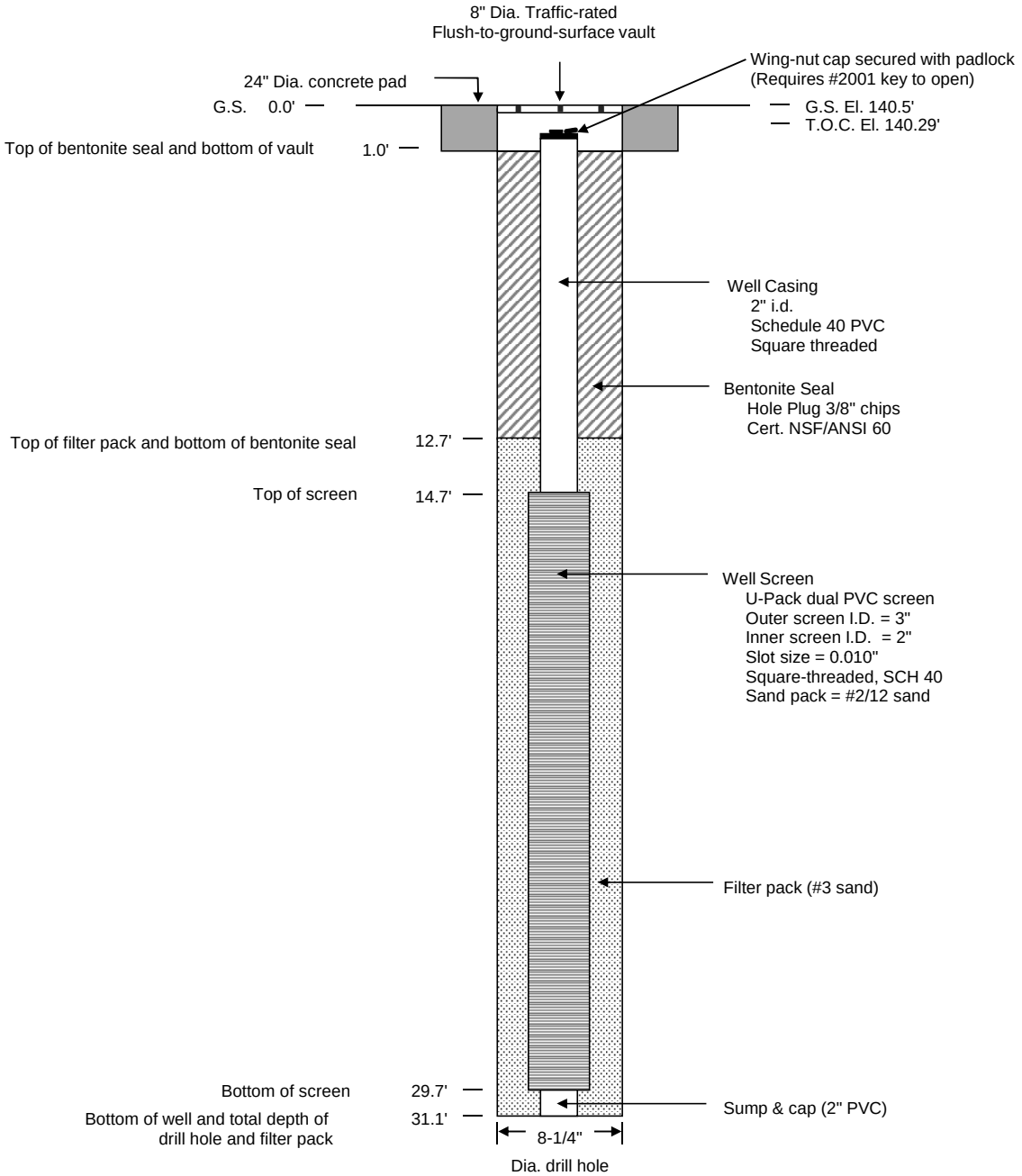
17. Additional comments on development:
0805-0815 bail 5gals
0816-0835 Pump 25gals STARTED Clearing up AFTER 10gals

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

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

MW-10-119	GEOLOGIST: G. Perea
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen
DATE COMPLETED: 12/3/2010	HELPERS: D. Read & T. Musial
LOCATION: Ave 9, Road 6, and Road 5 1/2 T.O.C. COORDINATES: N220669.97 E6139043.93 (NAD83) ELEVATION 140.29' (NAVD88) G.S. ELEVATION: 140.5' (NAVD88)	



***NOT TO SCALE**

NOTES:

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-120

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Left, Fresno County
BEGUN: 12/1/10 FINISHED: 12/2/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 14.78 ft. (152.1 ft. - 12/10/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,184,063.7 E 6,134,855.2 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 166.9 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, River Bank Left, Fresno County, on N Washoe Road, 0.2 miles north of the N Washoe Road and W Barstow Road intersection, on the west side of the road.

DRILLED BY:
Bureau of Reclamation: PN Region drill crew:
Jerry Hansen, driller
Dennis Read, helper
Tom Musial, helper

DRILL RIG:
Truck mounted Central Mining Equipment (CME) 75

DRILLING & SAMPLING METHODS:
The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers

Interval Method
0.0 to 31.1 ft. FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
0.0 to 31.1 ft. - Medium soft

DRILLING FLUID, RETURN AND COLOR:
0.0 to 31.1 ft. - Drilled without fluid

WATER LEVEL FROM TOC:
15.7 ft. on 12/10/10.

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

HOLE COMPLETION:
Well Casing: 0.5 to 18.0 ft. (2-inch blank PVC)
Dual U-pack Screen: 18.0 to 28.0 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch)
U-Pack Screen Filter Pack: #2/12 Sand
Filter Pack: 16.0 to 31.1 ft. (#3 Sand)
Sump: 28.0 to 31.1 ft. (2-inch blank PVC with slip cap)
Bentonite Seal: 1.0 to 16.0 ft.; 27.0 to 31.1 ft.
Concrete Seal: 0.0 to 1.0 ft. (backfilled with #3 Sand inside well vault)
Well Completion: 8-inch diameter flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot diameter concrete pad.
Lock: #2001 Masterlock

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION	El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	El.
												CL	165.6
	100											CH	162.8
												Debris	162.0
5													
	100	64.9	25.3	9.8	0.0	59.3	38.3	27.1	CH	160.4		CH	
													158.3
10												CL	
	100	41.0	53.5	5.5	0.0	45.6	22.6	33.0	CL	154.7			154.7
												CL	
													152.7
15											▼		
	100	58.8	39.0	2.2	0.0	56.2	31.8	37.8	CH	150.9	Qal	CH	
													150.4
												CL	
													148.3
		56.5	27.7	15.8	0.0	47.4	28.3	30.9	(CL)s	146.9		(CL)s	

CLASSIFICATION AND PHYSICAL CONDITION

0.0 to 31.1 ft.
QUATERNARY ALLUVIUM - Qal

0.0 to 1.3ft. LEAN CLAY, (CL):
About 95% fines with low plasticity, medium toughness, no dilatancy; about 5% fine sand; dry, brown; broken up from drilling activities.

1.3 to 4.1 ft. FAT CLAY, CH:
About 100% fines with medium plasticity, medium to high toughness, no dilatancy; trace fine sand; dry, brown to light brown; firm consistency; somewhat broken up from drilling activities.

Note: 4.1 to 4.9 ft.: Solid concrete debris, had water and gray to black material around it.

4.9 to 8.6 ft. FAT CLAY, CH:
About 95% fines with medium plasticity; medium to high toughness, high dry strength, no dilatancy: about 5% fine sand; moist, brown to light brown; firm consistency.

Lab Data Interval
5.6 to 6.5 ft.

8.6 to 12.2 ft. LEAN CLAY, CL:
About 95% fines with low plasticity, low toughness; about 5% fine sand; moist, brown; soft consistency; decreasing moisture towards bottom.

Lab Data Interval
10.6 to 12.2 ft.

12.2 to 14.2 ft. LEAN CLAY, CL:
About 95% fines with low plasticity, low toughness, low to medium dry strength; about 5% fine sand; moist, brown to light brown; soft to firm consistency.

14.2 to 16.5 ft. FAT CLAY, CH:
About 95% fines with high plasticity, high toughness, high dry strength; about 5% fine sand; moist, brown; soft consistency; broken up from drilling.

Lab Data Interval
15.0 to 16.0 ft.

16.5 to 18.6 ft. LEAN CLAY, CL:
About 100% fines wiht medium plasticity, medium toughness, medium dry strength; about 5% fine sand; moist, brown; firm consistency.

18.6 to 20.6 ft. LEAN CLAY WITH SAND, (CL)s:
About 85% fines with medium plasticity, medium toughness; about 15% fine sand; wet, dark tan to brown; very soft consistency.

Lab Data Interval
18.0 to 20.0 ft.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-120

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Left, Fresno County
BEGUN: 12/1/10 FINISHED: 12/2/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 14.78 ft. (152.1 ft. - 12/10/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,184,063.7 E 6,134,855.2 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 166.9 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.	CLASSIFICATION AND PHYSICAL CONDITION
												146.3	**20.6 to 28.6 ft. SANDY SILT, s(ML):** About 70% fines with low to medium plasticity, medium toughness; about 30% fine sand; moist, brown; firm consistency; gypsum veins and crystals throughout.
		90										s(ML)	**22.1 to 23.6 ft.:** Increase in consistency.
													23.6 to 25.2 ft.: No Recovery.
													27.6 to 28.6 ft.: Slight increase in sand.
												143.3	**28.6 to 29.8 ft. SANDY LEAN CLAY, s(CL):** About 85% fines with medium plasticity, medium toughness; about 15% fine sand; wet, brown; firm consistency.
												NR	Lab Data Interval 28.6 to 29.0 ft.
	25											141.7	
		72										s(ML)	**29.8 to 31.1 ft. SANDY SILT, s(ML):** About 70% plasticity fines with low to medium plasticity, medium toughness; about 30% fine sand; wet, brown to tan; firm consistency; gypsum veins and crystals throughout.
												138.3	
			31.1	56.1	12.8	0.0	38.0	17.0	38.5	CL 137.9		CL	
												137.1	
	30	100										s(ML)	
												135.8	

BOTTOM OF HOLE

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

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

MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRRP	FRESNO	MW-10-120
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well ID Number**
	--		

1. Can this well be purged dry? Yes ☒ No ☐

2. Well development method

surged with bailer and bailed	☐	41
surged with bailer and pumped	☒	61
surged with block and bailed	☐	42
surged with block and pumped	☐	62
surged with block, bailed and pumped	☐	70
compressed air	☐	20
bailed only	☐	10
pumped only	☐	51
pumped slowly	☐	50
Other _____	☐	--

3. Time spent developing well 32 min.

4. Depth of well (from top of well casisng) 30.2 ft.

5. Inside diameter of well 2. in.

6. Volume of water in filter pack and well casing ____.__ gal.

7. Volume of water removed from well 14.0 gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? (If yes, attach results) ☐ Yes ☐ No

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 15.71 ft. Flush Mount	26.43 ft.
Date	b. 12/10/2010 (mm dd yyyy)	12/10/2010 (mm dd yyyy)
Time	c. 1452 ☐ a.m. ☒ p.m.	1524 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	IR. inches	IR. inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) (Cloudy) Silty Sand	Clear ☐ 20 Turbid ☒ 25 (Describe) Silty Sand

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: JERRY Last Name: HANSEN
Firm: BOR

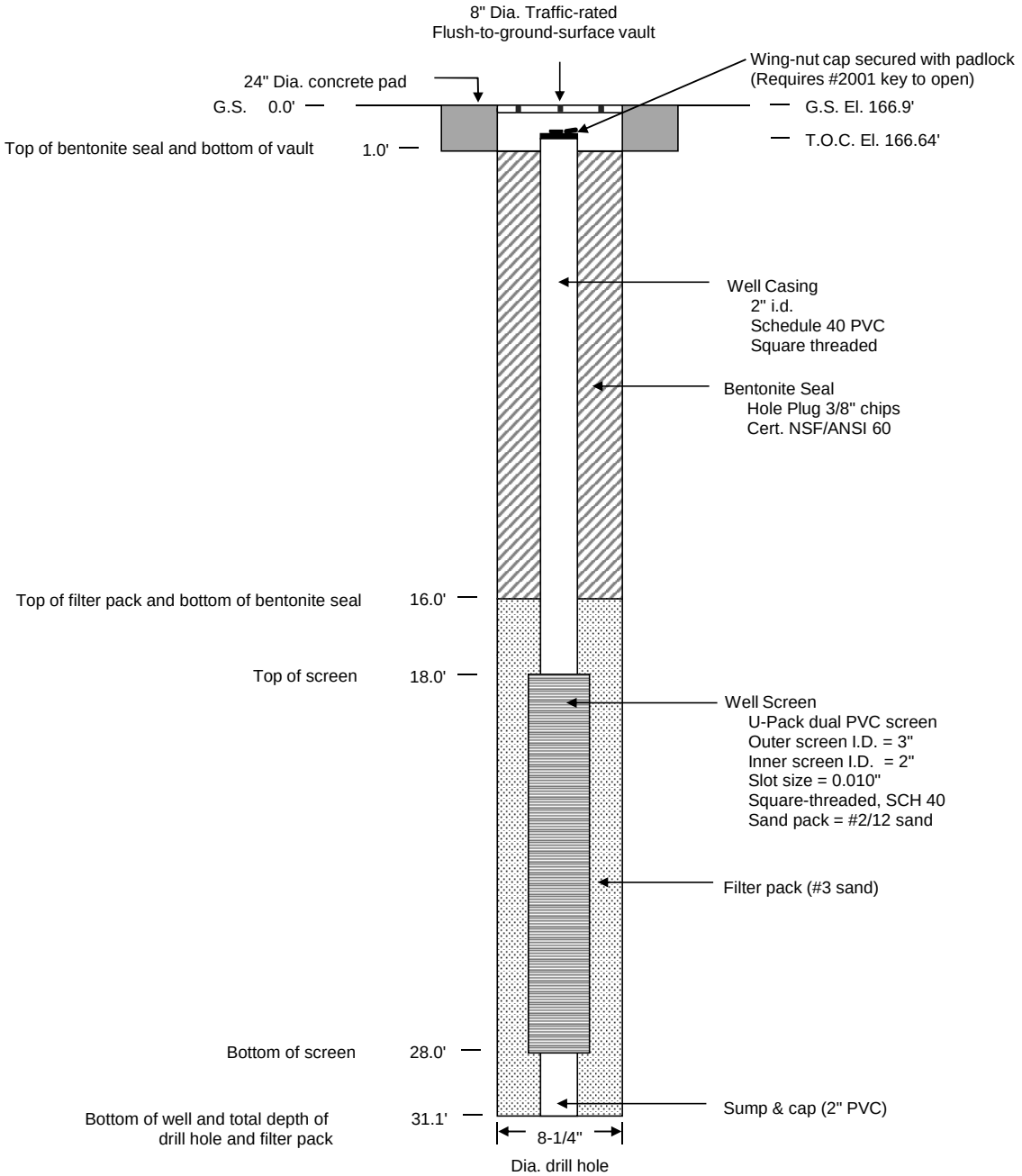
17. Additional comments on development:
1452-1508 Bail 5gal very Cloudy
1511-1517 - Pump 7gal Pump very Silty (very Cloudy
1517-1522 LET SIT Recharge
1522-1524 Pump 2gal
(well is Recharging very Slow

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

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

MW-10-120	GEOLOGIST: G. Perea
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen
DATE COMPLETED: 12/2/2010	HELPERS: D. Read & T. Musial
LOCATION: N Washoe Ave & W Barstow Ave T.O.C. COORDINATES: N2184063.74 E6134855.22 (NAD83) ELEVATION 166.64' (NAVD88) G.S. ELEVATION: 166.9' (NAVD88)	



***NOT TO SCALE**

NOTES:

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-121

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Left, Fresno County
BEGUN: 12/2/10 FINISHED: 12/2/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 17.76 ft. (132.6 ft. - 12/10/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,189,548.4 E 6,143,359.3 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 150.4 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, River Bank Left, Fresno County, at the intersection of Sierra Avenue and Helm Canal Road, on the west side of Helm Canal Road just north of the intersection.

DRILLED BY:
Bureau of Reclamation: PN Region drill crew:
Jerry Hansen, driller
Dennis Read, helper
Tom Musial, helper

DRILL RIG:
Truck mounted Central Mining Equipment (CME) 75

DRILLING & SAMPLING METHODS:
The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers

Interval Method
0.0 to 31.1 ft. FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
0.0 to 3.6 ft. - Soft
18.6 to 23.6 ft. - Medium soft

DRILLING FLUID, RETURN AND COLOR:
0.0 to 31.1 ft. - Drilled without fluid

WATER LEVEL FROM TOC:
17.31 ft. on 12/10/10.

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

HOLE COMPLETION:
Well Casing: 0.5 to 14.6 ft. (2-inch blank PVC)
Dual U-pack Screen: 14.6 to 29.6 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch)
U-Pack Screen Filter Pack: #2/12 Sand
Filter Pack: 12.6 to 31.1 ft. (#3 Sand)
Sump: 29.6 to 31.1 ft. (2-inch blank PVC with slip cap)
Bentonite Seal: 1.0 to 12.6 ft.; 27.0 to 31.1 ft.
Concrete Seal: 0.0 to 1.0 ft. (backfilled with #3 Sand inside well vault)
Well Completion: 8-inch diameter flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot diameter concrete pad.
Lock: #2001 Masterlock

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
											CL 148.9
	89	75.9	15.9	7.9	0.3	70.1	49.1	22.2	CH 146.8		
5	100										CH 137.8
10	100	76.3	18.6	5.1	0.0	88.3	61.0	28.6	CH 139.4		CL/CH 137.4
											CH 136.8
	100	43.1	50.3	6.6	0.0	45.8	25.1	31.9	CL 135.6		CL 135.6
15	100	17.9	47.4	34.7	0.0	NP	NP	30.7	s(ML) 131.8	Qal	SM 133.0
											s(ML) 130.4

CLASSIFICATION AND PHYSICAL CONDITION

0.0 to 31.1 ft.
QUATERNARY ALLUVIUM - Qal

0.0 to 1.5 ft. LEAN CLAY, CL:
About 80% fines with low plasticity, low toughness, low dry strength; about 20% fine sand; dry, dark tan to brown; broken up from drilling activity; some gypsum crystals.

1.5 to 12.6 ft. FAT CLAY, CH:
About 90 to 95% fines with high plasticity, medium toughness, medium dry strength; about 5 to 10% fine sand; dry, dark brown to tan; gypsum crystals throughout; firm consistency.

Lab Data Interval
1.5 to 3.6 ft.

Lab Data Interval
10.0 to 11.0 ft.

12.6 to 13.0 ft. FAT TO LEAN CLAY, CH/CL:
About 95% fines with medium plasticity, medium toughness, medium dry strength; about 5% fine sand; dry, tan; gypsum present; firm consistency.

13.0 to 13.6 ft. FAT CLAY, CH:
About 100% fines with high plasticity, high toughness, medium to high dry strength; trace fine sand; moist, tan to olive/brown; decrease in gypsum.

13.6 to 14.8 ft. LEAN CLAY, CL:
About 100% fines with low plasticity, low toughness, no dilatancy, medium to high dry strength; moist, tan; firm consistency; gypsum throughout.

Lab Data Interval
13.6 to 14.8 ft.

14.8 to 17.4 ft. SILTY SAND, SM:
About 85% fine sand; About 15% fines; moist, red/brown to gray/tan marbled; soft consistency; oxidation zones.

17.4 to 20.0 ft. SANDY SILT, s(ML):
About 35% fines; about 65% fine sand; moist, gray/tan with oxidation zones; soft to firm consistency.

Lab Data Interval
17.4 to 18.6 ft.

Note: 18.6 to 20.0 ft.: Wet, slight increase in fines.

20.0 to 21.4 ft. SILTY SAND, SM:
About 85% fine sand; about 15% fines with low plasticity, low toughness, rapid dilatancy; wet, dark tan; very soft consistency.

21.4 to 25.1 ft. SANDY SILT, s(ML):
About 80% non plastic fines with no toughness, rapid dilatancy; about 20% fine sand; wet, gray to gray/blue; soft consistency.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-121

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Left, Fresno County
BEGUN: 12/2/10 FINISHED: 12/2/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 17.76 ft. (132.6 ft. - 12/10/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,189,548.4 E 6,143,359.3 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 150.4 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.	CLASSIFICATION AND PHYSICAL CONDITION
		100										SM 129.0	Lab Data Interval 21.4 to 23.6 ft.
			23.3	56.7	20.0	0.0	NP	NP	34.2	(ML)s 126.8		(ML)s	**Note: 23.3 to 25.1 ft.:** Woody debris
													25.1 to 25.9 ft. POORLY GRADED SAND WITH SILT, SP-SM: About 90% fine sand; about 10% fines; wet, light tan; very soft consistency.
													Lab Data Interval 25.1 to 25.9 ft.
													25.9 to 28.6 ft. No Recovery
	25											125.3	**28.6 to 28.9 ft. SILTY SAND, SM:** About 80% fine sand; about 20% non plastic fines, no toughness, rapid dilatancy; wet, gray to gray/blue; soft consistency.
			1.0	3.8	94.4	0.8	NP	NP	24.6	SP 124.5		SP-SM 124.5	**28.9 to 31.1 ft. No Recovery**
		40										NR 121.8	
												SP-SM 121.5	
	30	12										NR 119.3	

BOTTOM OF HOLE

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

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

MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRRP	FRESNO	MW-10-121
Facility License, Permit or Monitoring Number	**County Code**	**Wis. Unique Well Number**	**DNR Well ID Number**

1. Can this well be purged dry? Yes ☐ No ☐

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☒ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐ __

3. Time spent developing well 32 min.

4. Depth of well (from top of well casisng) 28.7 ft.

5. Inside diameter of well 2.00 in.

6. ~~Volume of water in filter pack and well casing~~ ~~30.0~~ ~~gal.~~

7. Volume of water removed from well 30.0 gal.

8. ~~Volume of water added (if any)~~ ___.__ gal.

9. Source of water added _____

10. Analysis performed on water added? (If yes, attach results) ☐ Yes ☐ No

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 17.31 ft. Flush Mount	19.31 ft.
Date	b. 12/10/2010 (m m d d y y y y)	12/10/2010 (m m d d y y y y)
Time	c. 15:42 ☐ a.m. ☒ p.m.	__:__ ☐ a.m. ☐ p.m.
12. Sediment in well bottom	TR. inches	__.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) Tint Green	Clear ☒ 20 Turbid ☐ 25 (Describe) CLEAR
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

Fill in if drilling fluids were used and well is at solid waste facility:

16. Well developed by: Name (first, last) and Firm
First Name: JERRY Last Name: HANSEN
Firm:

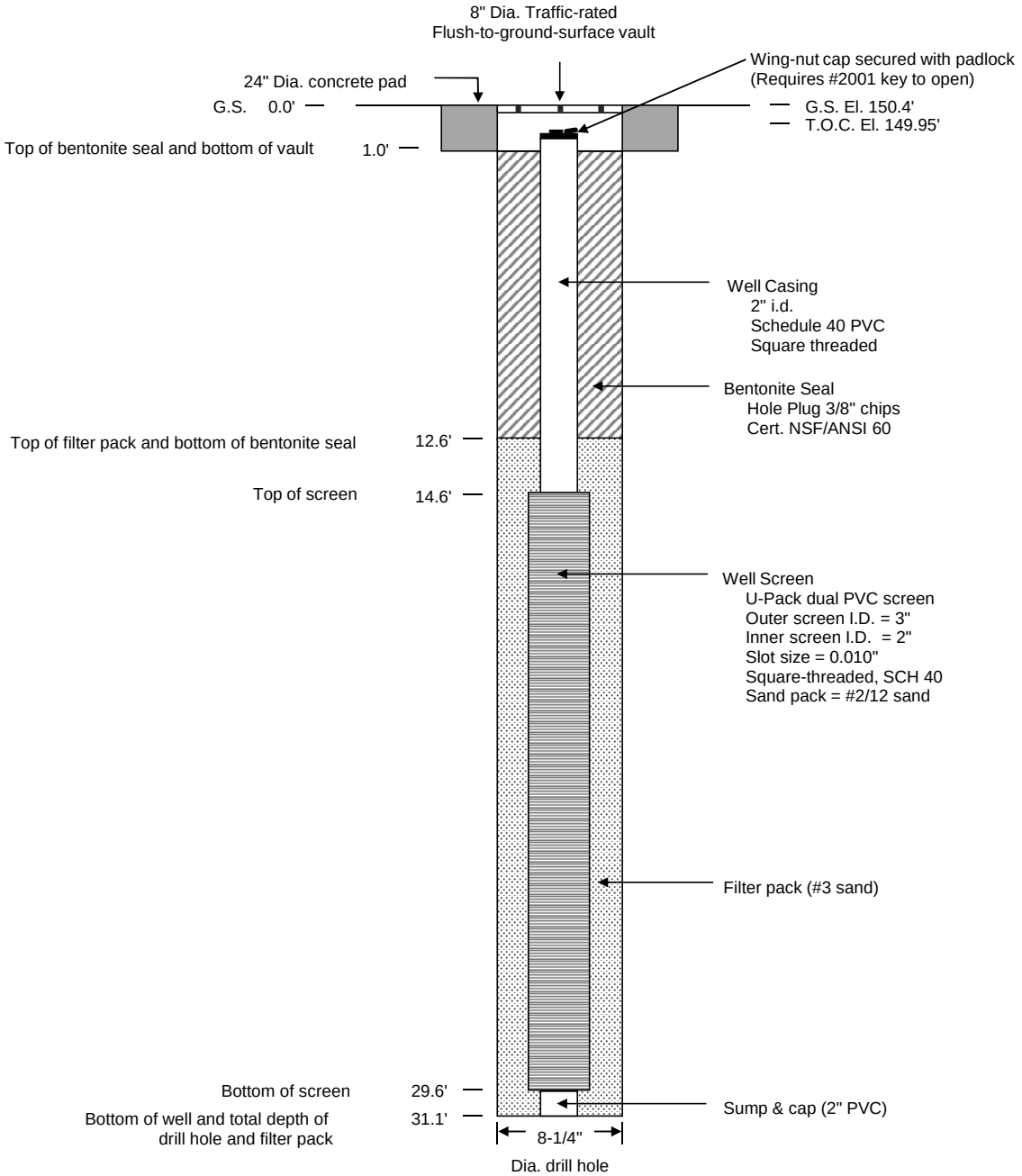
17. Additional comments on development:
1542 - 1558 Tint Green Bucket 5gals
1600 - 1615 Pump 25gal STARTED Clearing up After 5gal

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

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

MW-10-121	GEOLOGIST: G. Perea
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen
DATE COMPLETED: 12/2/2010	HELPERS: D. Read & T. Musial
LOCATION: Helm Canal Road and Sierra Ave T.O.C. COORDINATES: N2189548.42 E6143359.32 (NAD83) ELEVATION 149.95' (NAVD88) G.S. ELEVATION: 150.4' (NAVD88)	



***NOT TO SCALE**

NOTES:

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-122

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/5/10 FINISHED: 12/5/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 24.49 ft. (123.3 ft. - 12/11/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,195,546.9 E 6,154,732.3 NAD83
TOTAL DEPTH: 31.2 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 147.8 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, River Bank Right, Madera County, on Road 8 ½, 0.5 miles south of the intersection of Avenue 7 ½ and Road 8 ½, on the east side of the road.

DRILLED BY:
Bureau of Reclamation: PN Region drill crew:
Jerry Hansen, driller
Dennis Read, helper
Chris Peterson, helper

DRILL RIG:
Truck mounted Central Mining Equipment (CME) 75

DRILLING & SAMPLING METHODS:
The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers

Interval Method
0.0 to 31.2 ft. FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
0.0 to 3.7 ft. - Soft
3.7 to 8.7 ft. - Add Catcher
13.7 to 18.7 - Moderately soft

DRILLING FLUID, RETURN AND COLOR:
0.0 to 31.2 ft. - Drilled without fluid

WATER LEVEL FROM TOC:
24.24 ft. on 12/11/10.

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
	86										(CL)s 144.7
		41.1	36.6	22.3	0.0	43.3	19.7	21.9	(CL)s 144.7		s(CL) 144.1
5	62	2.3	8.0	89.7	0.0	NP	NP	5.6	SW-SM 141.2		SM 142.1 / SP-SM 141.2
											NR 139.1 / SP-SM 138.8
10	66	0.6	4.7	94.2	0.5	NP	NP	4.8	SP-SM 135.8		SP 135.8
											NR 134.1
15	72	2.6	13.1	84.2	0.1	NP	NP	9.0	SM 130.5	Qal	SP 132.5 / SP 131.1 / SM 130.5
											NR 129.1

CLASSIFICATION AND PHYSICAL CONDITION

0.0 to 31.2 ft.
QUATERNARY ALLUVIUM - Qal

0.0 to 3.1 ft. LEAN CLAY WITH SAND, (CL)s:
About 85% fines with low to medium plasticity, low toughness, no dilatancy, low dry strength; about 15% fine sand with trace coarse sand; dry, brown; broken up from drilling activities.

Lab Data Interval
1.7 to 3.1 ft.

3.1 to 3.7 ft. SANDY LEAN CLAY, s(CL):
About 55% fines with low plasticity, low toughnes; about 45% fine sand; dry, light brown; soft to firm consistency.

3.7 to 5.7 ft. SILTY SAND, SM:
About 80% fine sand; about 20% fines; moist, brown; loose consistency; increasing sand towards bottom.

5.7 to 9.0 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine sand; about 10% fines; dry, white/tan; loose consistency; oxidation layer at 6.4.

Lab Data Interval
5.7 to 6.6 ft.

6.6 to 8.7 ft.:No Recovery

9.0 to 15.3 ft. POORLY GRADED SAND, SP:
About 95% fine to medium (predominately fine) sand; about 5% fines; trace coarse sand, subrounded, hard; moist, tan to tan/white; some oxidation; micaceous; alternating layers of fine/medium and fine sand throughout.

Lab Data Interval
9.0 to 12.0 ft.

12.0 to 13.7 ft.:No Recovery

15.3 to 16.7 ft. POORLY GRADED SAND, SP:
About 95% fine to medium (predominately fine) sand; about 5% fines; moist, white/ tan with some orange oxidation; loose consistency; two clay layers, each about 0.1 ft. thick.

16.7 to 21.8 ft. SILTY SAND, SM:
About 85% fine sand; about 15% fines; trace medium sand, subrounded, quartz rich; moist, white/tan; loose consistency; 0.1 ft. thick clay layer at 17.2 ft.

Lab Data Interval
16.7 to 17.3 ft.

17.3 to 18.7 ft.:No Recovery

18.7 to 21.8 ft.: Layers with increased medium and coarse sand.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-122

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/5/10 FINISHED: 12/5/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 24.49 ft. (123.3 ft. - 12/11/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,195,546.9 E 6,154,732.3 NAD83
TOTAL DEPTH: 31.2 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 147.8 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

HOLE COMPLETION:
Well Casing: 0.5 to 14.2 ft. (2-inch blank PVC)
Dual U-pack Screen: 14.2 to 29.2 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch)
U-Pack Screen Filter Pack: #2/12 Sand
Filter Pack: 12.2 to 31.2 ft. (#3 Sand)
Sump: 29.2 to 31.2 ft. (2-inch blank PVC with slip cap)
Bentonite Seal: 1.0 to 12.2 ft.; 27.0 to 31.1 ft.
Concrete Seal: 0.0 to 1.0 ft. (backfilled with #3 Sand inside well vault)
Well Completion: 8-inch diameter flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot diameter concrete pad.
Lock: #2001 Masterlock

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
	78										SP 126.0
											SP 125.2
											NR 124.1
											NR 123.7
25	92	0.6	5.4	94.0	0.0	NP	NP	29.3	SP-SM 119.7	▼	SP-SM 119.7
											SM 119.1
											SP-SM 118.3
30	100										SP-SM 117.4
											CL/CH 117.1
											SM 116.6

BOTTOM OF HOLE

CLASSIFICATION AND PHYSICAL CONDITION

21.8 to 22.6 ft. POORLY GRADED SAND, SP:
About 95% fine sand; about 5% fines; moist, tan/brown; loose consistency.

22.6 to 24.1 ft. No Recovery

24.1 to 28.1 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine sand; about 10% fines; moist to wet, brown; oxidation layers.

Lab Data Interval
24.1 to 28.1 ft.

28.1 to 28.7 ft. SILTY SAND, SM:
About 70% fine sand; about 30% fines with low plasticity, low to medium toughness, slow dilatancy; moist, tan/olive; firm consistency; oxidation layers.

28.7 to 29.8 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine sand; about 10% fines; wet, tan/brown; soft consistency, oxidation layers from 29.5 to 29.8 ft.

29.8 to 30.4 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine sand; about 10% fines with low plasticity, low toughness; wet, brown; soft consistency.

30.4 to 30.7 ft. LEAN TO FAT CLAY, CL/CH:
About 95% fines with low to medium plasticity, low toughness, no dilatancy; about 5% fine sand; moist, tan/olive with areas of oxidation; firm to very firm consistency.

30.7 to 31.2 ft. SILTY SAND, SM:
About 85% fine sand; about 15% fines; moist, red/brown; soft to loose consistency; oxidation layers.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

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

MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRRP	MADERA	MW-10-122

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number

1. Can this well be purged dry? Yes ☐ No ☒

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☒ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well 31 min.

4. Depth of well (from top of well casisng) 30.8 ft.

5. Inside diameter of well 2 in.

6. ~~Volume of water~~ in filter pack and well casing ~~gal.~~

7. Volume of water removed from well 25.0 gal.

8. ~~Volume of water added (if any)~~ ~~gal.~~

9. Source of water added _____

10. Analysis performed on water added? (If yes, attach results) ☐ Yes ☐ No

11. Depth to Water (from top of well casing)	Before Development	After Development
a.	24.24 ft. Flush Mount	24.48 ft.
Date b. (m m d d y y y y)	12/11/2010	12/11/2010
Time c.	10:37 ☒ a.m. ☐ p.m.	11:15 ☒ a.m. ☐ p.m.

12. Sediment in well bottom: Before Development TR inches; After Development ___.__ inches

13. Water clarity

Before Development	After Development
Clear ☐ 10	Clear ☒ 20
Turbid ☒ 15	Turbid ☐ 25
(Describe) Tan Silty Sand	(Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

	Before Development	After Development
14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: Jeremy Last Name: Hanson
Firm:

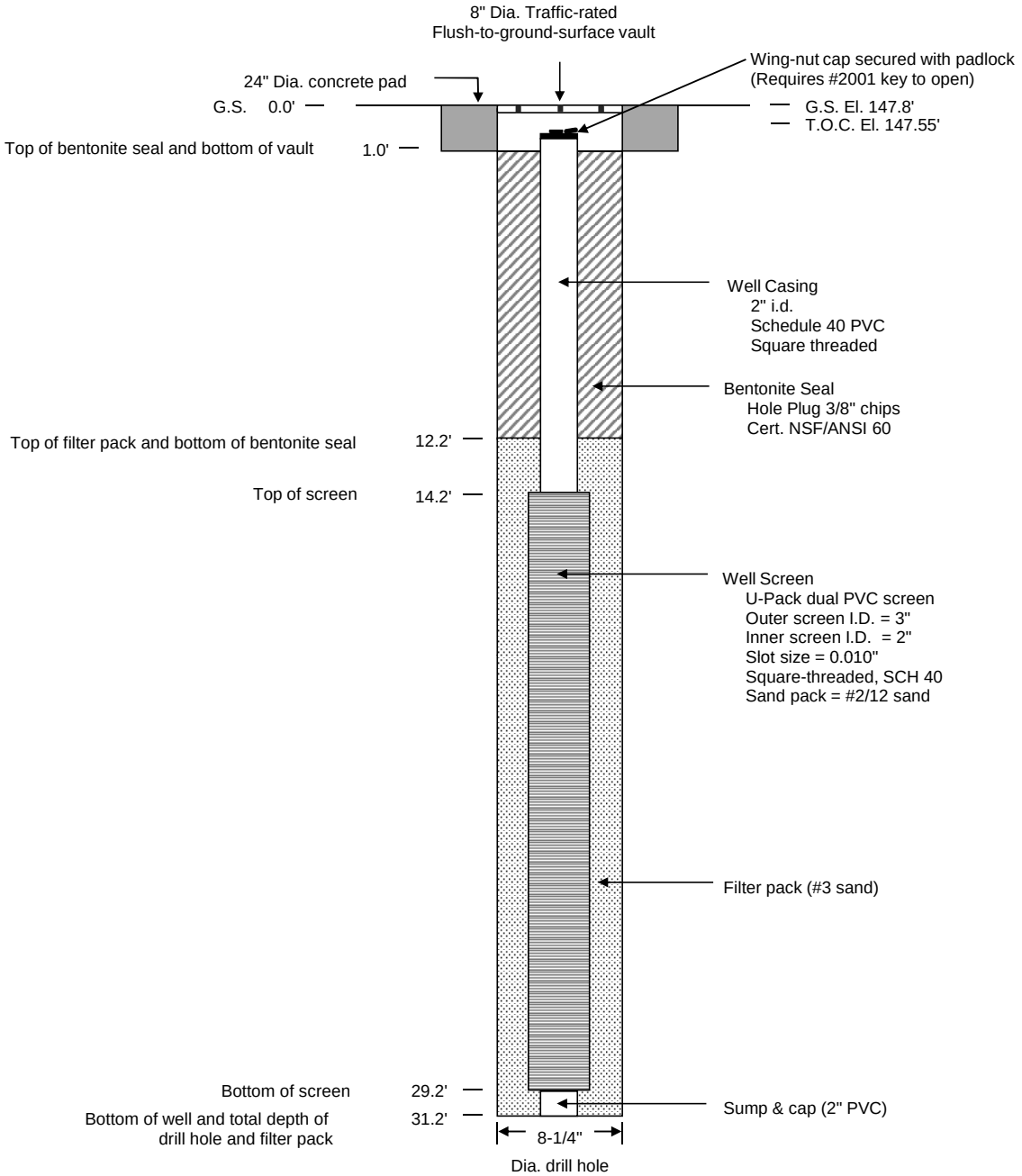
17. Additional comments on development:
1037-1051 Bail 5gal Very Silty with Fine Sand
1052 1115 Pump 20gal (Clear After 5gals Pump)

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

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

MW-10-122	GEOLOGIST: G. Perea
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen
DATE COMPLETED: 12/5/2010	HELPERS: D. Read & C. Peterson
LOCATION: Road 8 1/2 T.O.C. COORDINATES: N2195546.90 E6154732.31 (NAD83) ELEVATION 147.55' (NAVD88) G.S. ELEVATION: 147.8' (NAVD88)	



***NOT TO SCALE**

NOTES:

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-123

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Left, Fresno County
BEGUN: 11/30/10 FINISHED: 12/1/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 9.50 ft. (158.5 ft. - 12/10/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,172,009.0 E 6,148,245.3 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 168.0 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, River Bank Left, Fresno County, on N Santa Fe Grade, 1.5 miles south of the intersection of N Santa Fe Grade and Ashlan Avenue.

DRILLED BY:
Bureau of Reclamation: PN Region drill crew:
Jerry Hansen, driller
Dennis Read, helper
Tom Musial, helper

DRILL RIG:
Truck mounted Central Mining Equipment (CME) 75

DRILLING & SAMPLING METHODS:
The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers

Interval Method
0.0 to 31.1 ft. FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
0.0 to 3.7 ft. - Soft
18.6 to 23.6 ft. - Soft to moderately soft

DRILLING FLUID, RETURN AND COLOR:
0.0 to 31.1 ft. - Drilled without fluid

WATER LEVEL FROM TOC:
9.35 ft. on 12/10/10.

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

DEPTH	% CORE RECOVERY	<0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION	El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	El.
	86	64.1	27.8	8.1	0.0	60.8	36.6	24.2	CH	166.0		CH	
5	100	70.1	25.7	4.2	0.0	66.1	42.2	36.1	CH	163.2		CH	163.2
												CL/CH	161.2
		74.3	21.8	3.9	0.0	64.2	39.4	33.2	CH	159.4		CH	159.4
10	100	61.6	24.0	14.4	0.0	52.2	30.8	29.1	CH	157.7	▼	CL	157.7
												CL	154.7
												CH	154.1
												s(ML)	153.3
15	100										Qal		
		72.2	25.9	1.9	0.0	63.9	37.4	34.7	CH	150.7		CH	
	100												149.4

0.0 to 31.1 ft.
QUATERNARY ALLUVIUM - Qal

0.0 to 4.8 ft. FAT CLAY, CH:
About 95% fines with high plasticity, medium toughness; about 5% fine sand; dry, dark brown to tan; CaCO3 veins throughout; broken up from drilling activities.

Lab Data Interval
0.0 to 2.0 ft.

Lab Data Interval
3.7 to 4.8 ft.

4.8 to 6.8 ft. LEAN CLAY/FAT CLAY, CL/CH:
About 95% fines with medium plasticity, low toughness; about 5% fine sand; dry to moist, light tan to tan; soft consistency.

6.8 to 8.6 ft. FAT CLAY, CH:
About 100% fines with high plasticity, high toughness; trace fine sand; moist, brown to tan; firm consistency.

Lab Data Interval
6.8 to 8.6 ft.

8.6 to 10.3 ft. LEAN CLAY, CL:
About 95% fines with medium to high plasticity, medium toughness; about 5% fine sand; moist, brown; soft consistency; broken up from drilling activities; CaCO3 veins.

Lab Data Interval
8.6 to 10.3 ft.

10.3 to 13.3 ft. LEAN CLAY, CL:
About 90% fines with medium plasticity, low toughness; about 10% fine sand; dry, tan to light brown; soft to firm consistency, CaCO3 nodules.

13.3 to 13.9 ft. FAT CLAY, CH:
About 100% fines with high plasticity, high toughness; trace fine sand; dry, tan to light brown; very firm consistency.

13.9 to 14.7 ft. SANDY SILT, s(ML):
About 60% fines with low plasticity, low to medium toughness; about 40% fine sand; moist, brown to tan; soft consistency.

14.7 to 18.6 ft. FAT CLAY, CH:
About 100% fines with high plasticity, high toughness, slow dilatancy; trace fine sand; wet, tan; very soft consistency.

Lab Data Interval
16.3 to 17.3 ft.

Note: 16.7 to 16.9 ft. and 17.1 to 17.3 ft.: Lens of SILTY SAND, SM: About 70% fine sand; about 30% fines with low plasticity, low toughness, slow dilatancy; wet.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-123

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Left, Fresno County
BEGUN: 11/30/10 FINISHED: 12/1/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 9.50 ft. (158.5 ft. - 12/10/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,172,009.0 E 6,148,245.3 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 168.0 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: G. Perea
REVIEWED BY: S. Dalton

NOTES

HOLE COMPLETION:
Well Casing: 0.5 to 15.5 ft. (2-inch blank PVC)
Dual U-pack Screen: 15.5 to 30.5 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch)
U-Pack Screen Filter Pack: #2/12 Sand
Filter Pack: 13.0 to 31.1 ft. (#3 Sand)
Sump: 29.2 to 31.2 ft. (2-inch blank PVC with slip cap)
Bentonite Seal: 1.0 to 13.0 ft.
Concrete Seal: 0.0 to 1.0 ft. (backfilled with #3 Sand inside well vault)
Well Completion: 8-inch diameter flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot diameter concrete pad.
Lock: #2001 Masterlock

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
	100										CH 145.4
		30.5	53.1	16.4	0.0	37.4	15.4	32.8	(CL)s 144.4		(CL)s 144.4
25	100										s(ML) 141.8
											s(ML) 138.3
30	100										SM 136.9

BOTTOM OF HOLE

CLASSIFICATION AND PHYSICAL CONDITION

18.6 to 22.6 ft. FAT CLAY, CH:
About 95% fines with high plasticity, high toughness, no dilatancy, high dry strength; about 5% fine sand; moist, light brown; firm to very firm consistency; CaCO3 nodules throughout; gradational contact with unit below.

22.6 to 23.6 ft. LEAN CLAY WITH SAND, (CL)s:
About 85% fines with low plasticity, low toughness, rapid dilatancy; about 15% fine sand; moist, gray/green to gray/blue mottled; soft consistency.

Lab Data Interval
22.6 to 23.6 ft.

23.6 to 26.2 ft. SANDY SILT, s(ML):
About 70% non plastic fines with low toughness, rapid dilatancy; about 30% fine sand; wet, gray/green mottled with red to brown; soft consistency.

26.2 to 29.7 ft. SANDY SILT, s(ML):
About 55% fines with low plasticity, no toughness; about 45% fine sand; moist, light brown; soft to firm consistency.

Note: 28.6 to 29.7 ft.: Slight increase in sand and moisture.

29.7 to 31.1 ft. SILTY SAND, SM:
About 60% fine sand; about 40% non plastic fines with no toughness; wet, dark tan to light brown; soft consistency.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

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

MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRRP	Fresno	MW-10-123

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number

1. Can this well be purged dry? Yes ☐ No ☒

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☒ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well 1 HR min.

4. Depth of well (from top of well casisng) 28.1 ft.

5. Inside diameter of well 2.00 in.

6. Volume of water in filter pack and well casing ____.__ gal.

7. Volume of water removed from well 69.0 gal.

8. Volume of water added (if any) ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? (If yes, attach results) ☐ Yes ☐ No

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 9.25 ft. Flush Mount	25.15 ft.
Date	b. 12/10/2010 (m m d d y y y y)	12/10/2010 (m m d d y y y y)
Time	c. 13:27 ☐ a.m. ☒ p.m.	14:26 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	TR. inches	___.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☒ 15 (Describe) Cloudy Light Brown	Clear ☐ 20 Turbid ☒ 25 (Describe) Cloudy

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: JERRY Last Name: HANSEN
Firm: BOR

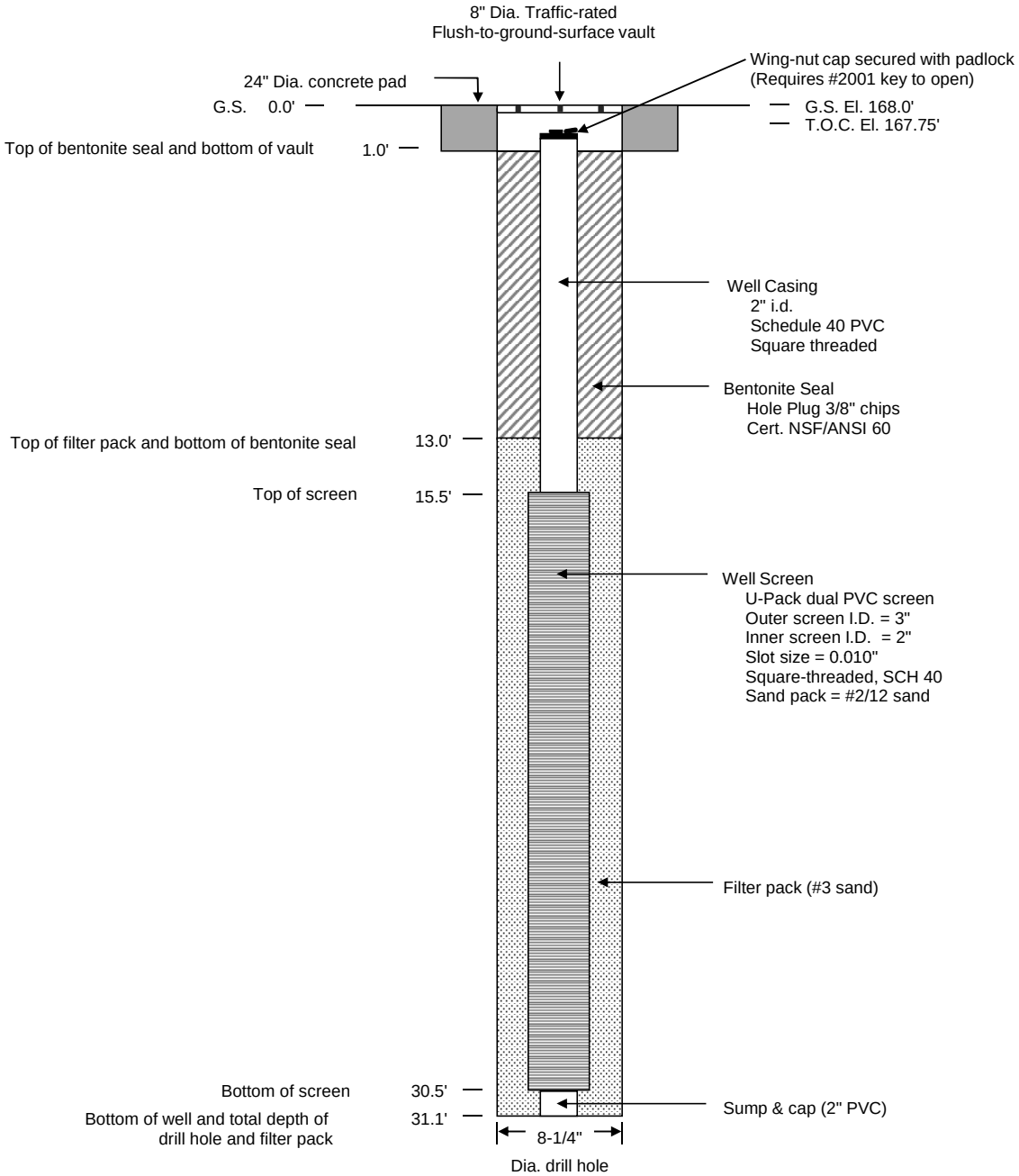
17. Additional comments on development:
1327-1334 Bail 5gals-Cloudy
1335-1352 Pump very Cloudy-T/Cloudy 37gals
1352-1358 LET SET
1358-1407 Pump 10gal Stg Hvy Cloudy
1407-1412 LET SET
1412-1426 Pump 17gal Cloudy

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

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

MW-10-123	GEOLOGIST: G. Perea
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen
DATE COMPLETED: 12/1/2010	HELPERS: D. Read & T. Musial
LOCATION: Santa Fe Grade T.O.C. COORDINATES: N2172009.04 E6148245.28 (NAD83) ELEVATION 167.75' (NAVD88) G.S. ELEVATION: 168.0' (NAVD88)	



***NOT TO SCALE**

NOTES:

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-124

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/7/10 FINISHED: 12/7/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 28.39 ft. (125.4 ft. - 12/11/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,180,343.1 E 6,163,772.4 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 153.8 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: A. Warren
REVIEWED BY: S. Dalton

NOTES

ALL MEASUREMENTS ARE IN FEET FROM THE GROUND SURFACE

PURPOSE OF HOLE:
To recover core, collect data to determine geologic and hydrologic site conditions, and install a groundwater monitoring well.

LOCATION:
Reach 3, River Bank Right, Madera County, on the north side of Eastside Drive, 2.5 miles south of the intersection of Eastside Drive and Avenue 6.

DRILLED BY:
Bureau of Reclamation: PN Region drill crew:
Gerry Hansen, driller
Chris Peterson, helper
Dennis Read, helper

DRILL RIG:
Truck mounted Central Mining Equipment (CME) 75

DRILLING & SAMPLING METHODS:
The drill hole was advanced using 8-1/4 inch o.d. by 4-1/4 inch i.d. hollow stem flight augers equipped with an 8-1/2 inch o.d. bullet and spade drill bit. Continuous (undisturbed) sampling was performed by advancing a 4 inch o.d. by 3-3/8 inch i.d. by 5 feet long split barrel dry core system (FADC). Unless indicated otherwise, the FADC was placed inside the augers and the cutting shoe of the FADC extended 0.2 foot beyond the auger drill bit. A free-spinning adapter was placed at the top of the FADC, so that the FADC did not rotate while advancing the augers.

Interval Method
0.0 to 31.1 ft. FADC

DRILLING CONDITIONS AND DRILLER'S COMMENTS:
8.6 to 13.6 ft. - Add catcher

DRILLING FLUID, RETURN AND COLOR:
0.0 to 31.1 ft. - Drilled without fluid

WATER LEVEL FROM TOC:
28.02 ft. on 12/11/2010

REASON FOR HOLE TERMINATION:
The hole was terminated upon successful completion to the target depth.

HOLE COMPLETION:
Well Casing: 0.5 to 10.0 ft. (2-inch blank PVC)
Dual U-pack Screen: 10.0 to 20.0 ft. (2-inch inner screen; 3-inch outer screen; slotted 0.010-inch)
U-Pack Screen Filter Pack: #2/12 Sand
Filter Pack: 8.0 to 31.1 ft. (#3 Sand)
Sump: 20.0 to 31.1 ft. (2-inch blank PVC with slip cap)
Bentonite Seal: 1.0 to 8.0 ft.
Concrete Seal: 0.0 to 1.0 ft. (backfilled with #3 Sand inside well vault)
Well Completion: 8-inch diameter flush-mount traffic vault secured with 2 5/16" hex bolts; 2-foot diameter concrete pad.
Lock: #2001 Masterlock

DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.
											CH 153.1
	100										s(CL) 151.8
		30.1	63.0	6.9	0.0	41.1	16.8	22.1	CL 150.8		CL 149.7
5											SM 148.1
	78										SP-SM 145.3
10		1.5	6.2	89.5	2.8	NP	NP	3.9	SP-SM 142.8		SP 138.8
	70									Qal	CL 137.5
15	98										SM 135.0

CLASSIFICATION AND PHYSICAL CONDITION

0.0 to 31.1 ft.
QUATERNARY ALLUVIUM - Qal

0.0 to 0.7 ft. FAT CLAY, CH:
About 100% fines with high plasticity, high toughness; moist, dark brown; very firm consistency.

0.7 to 2.0 ft. SANDY LEAN CLAY, s(CL):
About 80% fines with low to medium plasticity, medium toughness; about 20% fine sand; dry to moist, dark brown; soft consistency; silty.

2.0 to 4.1 ft. LEAN CLAY, CL:
About 100% fines with low plasticity,low toughness; trace fine sand; dry, tan with slight reddish brown oxidation at 3.0 to 3.6 ft.; firm consistency.

Lab Data Interval
2.0 to 3.0 ft.

4.1 to 5.7 ft. SILTY SAND, SM:
About 65% fine sand; about 35% non plastic fines; dry, tan; soft consistency; layered.

5.7 to 8.5 ft. POORLY GRADED SAND WITH SILT, SP-SM:
About 90% fine to medium sand; about 10% non plastic fines; dry, reddish orange; dark brown FAT CLAY, CH layer at 7.5 to 7.6 ft.

8.5 to 15.0 ft. POORLY GRADED SAND, SP:
About 95% fine to medium sand; about 5% non plastic fines; dry, gray; trace hard, rounded coarse sand; homogenous.

Note: 10.0 ft.: A 0.1 ft. band of fine, rounded, hard gravel, max size 3/4 inch.

Lab Data Interval
10.0 to 11.0 ft.

Note: 14.3 to 15.0 ft.: Moist; reddish brown; traces coarse gravel, hard, rounded.

15.0 to 16.3 ft. LEAN CLAY, CL:
About 95% fines with low to medium plasticity; about 5% fine sand; moist, tan; some layers of cemented sand and trace gravel and upper contact; firm.

16.3 to 18.8 ft. SILTY SAND, SM:
About 60% fine sand; about 40% non plastic fines; moist, tan; lightly cemented (breaks with weak finger pressure).

18.8 to 22.4 ft. SANDY SILT, s(ML):
About 60% fines with low to medium plasticity; about 40% fine sand; moist, tan; firm; CL band from 20.8 to 21.9 ft.; oxidation veinlets from 18.6 to 19.6 ft.

Lab Data Interval
20.5 to 21.3 ft.

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

GEOLOGIC LOG OF DRILL HOLE NO. MW-10-124

FEATURE: Groundwater Monitoring
LOCATION: Reach 3, River Bank Right, Madera County
BEGUN: 12/7/10 FINISHED: 12/7/10
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 28.39 ft. (125.4 ft. - 12/11/2010)

PROJECT: San Joaquin River Restoration Project
COORDINATES: N 2,180,343.1 E 6,163,772.4 NAD83
TOTAL DEPTH: 31.1 ft.
DEPTH TO BEDROCK: Not Encountered

STATE: California
GROUND ELEVATION: 153.8 ft. NADV88
ANGLE FROM HORIZONTAL: -90°
HOLE LOGGED BY: A. Warren
REVIEWED BY: S. Dalton

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA: <0.005	<0.075	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT	LABORATORY CLASSIFICATION / El.	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION / El.	CLASSIFICATION AND PHYSICAL CONDITION
												s(ML)	**22.4 to 25.7 ft. SILTY SAND, SM:** About 80% fine sand; about 20% non plastic fines; moist, tan to reddish brown; moderately soft.
		100	16.6	41.9	41.5	0.0	23.7	6.7	21.2	s(CL-ML) 132.5		131.4	
												SM	**25.7 to 31.1 ft. POORLY GRADED SAND, SP:** About 100% fine to medium sand; moist, gray.
	25	90										128.1	Lab Data Interval 27.5 to 28.5 ft.
			0.7	5.0	94.3	0.0	NP	NP	9.5	SP-SM 125.3	▼	SP	
	30	80										122.7	

BOTTOM OF HOLE

COMMENTS:

FADC = Flight Auger Dry Core
NP = Non-plastic
NR = No Recovery
NA = Not applicable
I.D. = inner diameter
O.D. = outer diameter
G.S. = Ground surface
T.O.C. = Top of well casing
SJR = San Joaquin River

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

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

MONITORING WELL DEVELOPMENT

Facility/Project Name	County Name	Well Name
SJRRP	MADERA	MW-10-124

Facility License, Permit or Monitoring Number	County Code	Wis. Unique Well Number	DNR Well ID Number

1. Can this well be purged dry? Yes ☐ No ☒

2. Well development method

surged with bailer and bailed	☐ 41
surged with bailer and pumped	☒ 61
surged with block and bailed	☐ 42
surged with block and pumped	☐ 62
surged with block, bailed and pumped	☐ 70
compressed air	☐ 20
bailed only	☐ 10
pumped only	☐ 51
pumped slowly	☐ 50
Other _____	☐

3. Time spent developing well 33 min.

4. Depth of well (from top of well casisng) 30.9 ft.

5. Inside diameter of well 2 in.

6. ~~Volume of water in filter pack and well casing~~ ____.__ gal.

7. Volume of water removed from well ____.__ gal.

8. ~~Volume of water added (if any)~~ ____.__ gal.

9. Source of water added _____

10. Analysis performed on water added? (If yes, attach results) ☐ Yes ☐ No

	Before Development	After Development
11. Depth to Water (from top of well casing)	a. 28.02 ft. (Flush)	28.11 ft.
Date	b. 12/11/2010 (m m d d y y y y)	12/11/2010 (m m d d y y y y)
Time	c. 11:46 ☒ a.m. ☐ p.m.	12:21 ☐ a.m. ☒ p.m.
12. Sediment in well bottom	TR. inches	____.__ inches
13. Water clarity	Clear ☐ 10 Turbid ☐ 15 (Describe) Silty Sand (Buddy Tan)	Clear ☒ 20 Turbid ☐ 25 (Describe)

Fill in if drilling fluids were used and well is at solid waste facility:

14. Total suspended solids	____.__ mg/l	____.__ mg/l
15. COD	____.__ mg/l	____.__ mg/l

16. Well developed by: Name (first, last) and Firm
First Name: ~~J~~ ERIK Last Name: HANSEN
Firm: BOR

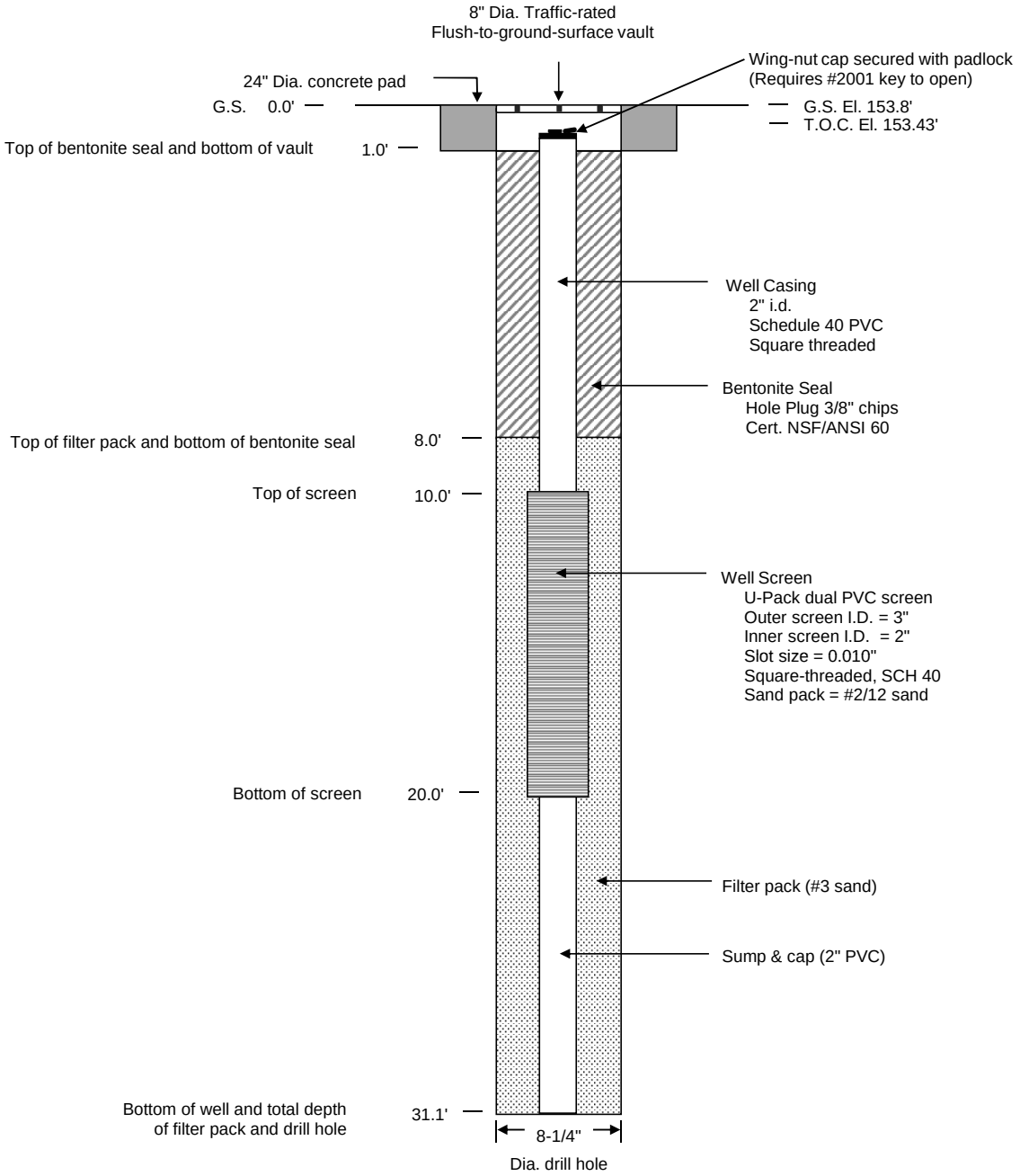
17. Additional comments on development:
1146-1202 - bail 5gals Silty Sand
1203 1220 Pump 20gals Starts Clearing up After 2gals

Name and Address of Facility Contact /Owner/Responsible Party
First Name: _____ Last Name: _____
Facility/Firm: _____
Street: _____
City/State/Zip: _____

I hereby certify that the above information is true and correct to the best of my knowledge.
Signature: _____
Print Name: _____
Firm: _____

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

MW-10-124	GEOLOGIST: G. Perea
WELL COMPLETION DIAGRAM	DRILLER: G. Hansen
DATE COMPLETED: 12/7/2010	HELPERS: D. Read & C. Peterson
LOCATION: Eastside Drive T.O.C. COORDINATES: N2180343.08 E6163772.44 (NAD83) ELEVATION 153.43' (NAVD88) G.S. ELEVATION: 153.8' (NAVD88)	



***NOT TO SCALE**

NOTES:

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