

Attachment A

Geotechnical Logs

EXPLANATION OF DRILL HOLE LOG FORM

1. HEADER

Standard drill hole identification information.

2. NOTES (LEFT COLUMN)

Descriptions of drilling equipment and drilling conditions: drill hole location, drilling and sampling equipment and procedures, drillers comments on drilling conditions, caving conditions, casing record, hole completion and water level data.

3. TABULAR DATA (CENTER COLUMN)

A columnar presentation of drill hole data: core recovery, materials laboratory data (gradation, plasticity data and moisture content), USCS symbol (based on laboratory classification of soil), sediment toxicity sample intervals, geologic unit symbol, USCS classification symbol (based on geologist's visual classification of soil), elevations of contacts and sample intervals.

4. CLASSIFICATION AND PHYSICAL CONDITION (RIGHT COLUMN)

Geologist's field log of soil samples: USCS soil description: estimated percentages by weight of standard size fractions (fines, sand, gravel) and estimated percentage by volume of cobbles; angularity and hardness of sand and gravel; plasticity of fines (based on standard hand tests: dry strength, toughness, plasticity [thread test] and dilatency); moisture; color and reaction with HCL; and geologic description of in-place conditions (consistency [soft, firm, hard], structure [stratified, laminated, fissured, slickensided, lensed, homogeneous], cementation). The intervals of samples taken for lab testing are indicated; the lab data is presented in the Center Column. The soil classification is based primarily on the geologist's **field visual description** that may be adjusted based on lab gradation data as described below.

The geologist's field visual description is compared to the lab data (mainly gradation and plasticity data are compared). Where small differences occur (5 to 10%), size fraction percentages estimated by the geologist are typically adjusted to conform to the lab gradation data. Where larger or consistent differences occur, the reason for the difference is explained in the Comments Section or on an accompanying sheet. In some instances, where the difference between lab and field data is relatively minor and considered to fall within the range of variation within a given soil unit, the field visual description is not always adjusted to conform to the lab data [ex. a field classification of Lean Clay (CL) with low plasticity may not be changed to a lab classification of Silt (ML)].

Soil classification is according to the Unified Soil Classification System with Reclamation standards and symbols used to account for secondary components as shown on the charts on the following two pages (ex. Sandy Lean Clay, s(CL) represents a lean clay with 15 to 30% sand).

5. COMMENTS

Definitions of symbols and abbreviations and miscellaneous comments.

GEOLOGIC LOG OF DRILL HOLE NO. DH-1

1

SHEET 1 OF 1

FEATURE: MATILUJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY
 LOCATION:
 BEGUN: FINISHED:
 DEPTH AND ELEVATION OF WATER LEVEL
 AND DATE MEASURED:

PROJECT: VENTURA RIVER PROJECT
 COORDINATES:
 STATION AND OFFSET:
 TOTAL DEPTH: 35.0
 DEPTH TO BEDROCK:

STATE: CALIFORNIA
 GROUND ELEVATION:
 ANGLE FROM HORIZONTAL: AZIMUTH:
 HOLE LOGGED BY:
 REVIEWED BY:

NOTES	DEPTH	LABORATORY DATA								LABORATORY CLASSIFICATION	ELEVATION	BLOWS / 0.5 FT	SPT (BLOWS / FT)	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION	
		% CORE RECOVERY	% FINES	% CLAY	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE CONTENT									
2																		4
	5																	
	10																	
	15																	
	20																	
	25																	
	30																	
	35																	

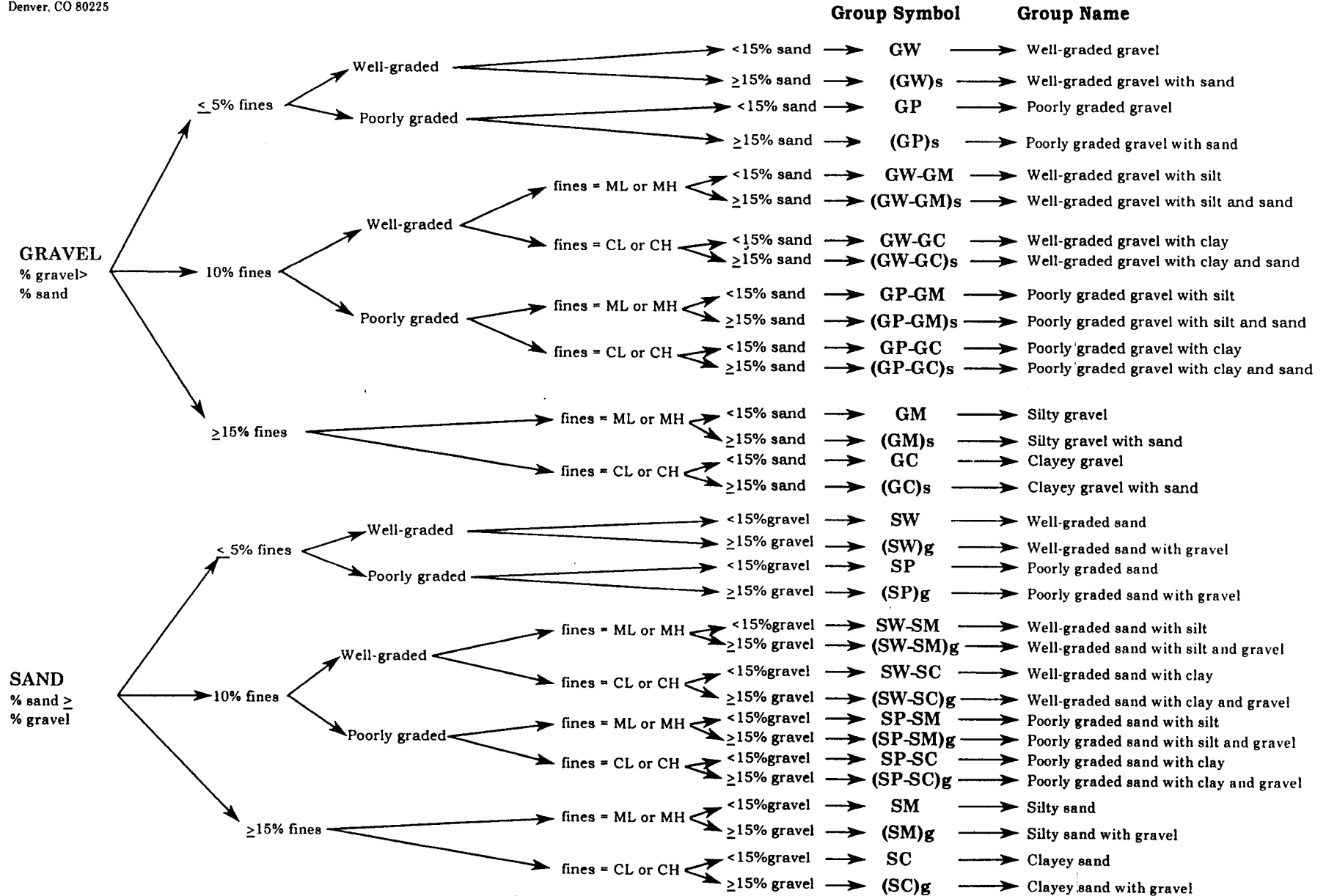
3

BOTTOM OF HOLE

COMMENTS:

5

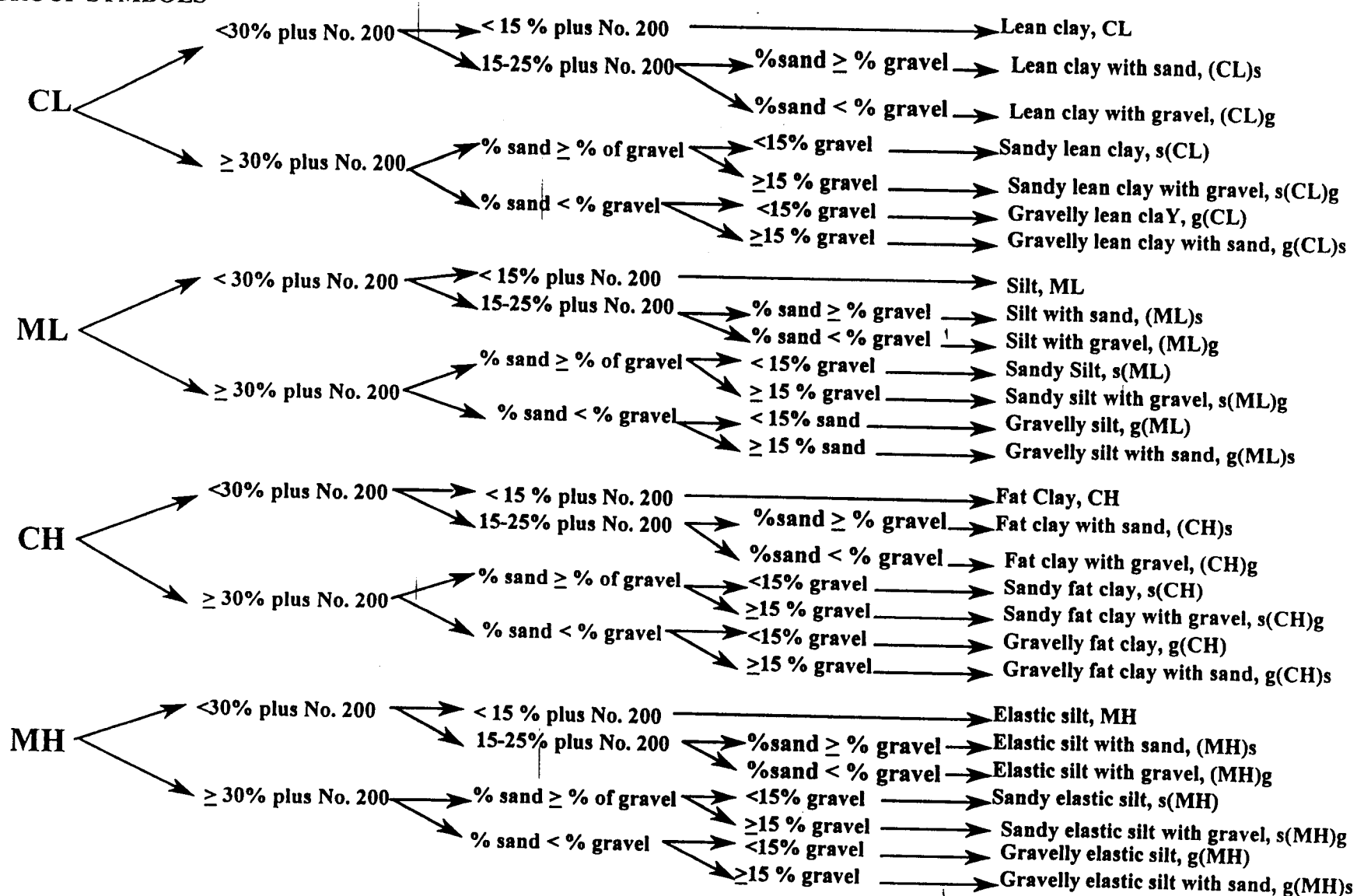
USCS VISUAL FLOW CHART FOR COARSE GRAINED SOILS



NAME CLASSIFICATION FOR FINE GRAINED SOILS

GENERAL
GROUP SYMBOLS

GROUP NAMES AND SYMBOLS



Explanations of Differences between Lab and Field Visual Classifications as Reported on Geologic Drill Hole Logs

MDH-03-01

USACE lab data for the 33.3- to 38.3-foot and the 38.3- to 48.3-foot intervals appear to have been transposed based on a comparison with field visual classifications and Reclamation lab test data.

MDH-08-01, MDH-09-01 and MDH-15-01

Representative samples corresponding to 5-foot-long core runs were submitted to the USACE materials lab for testing. In the above three drill holes, these so-called **composite samples** sometimes included layers of more than one soil type [ex. A sample would include a thin layer of Silty Clay (ML/CL) interbedded in a thicker Silty Sand (SM) layer]. The lab classification of a composite sample containing more than one soil type/layer therefore represents a hybrid or blend of soil types that does not correspond to a discrete soil layer present in the field. When logging the same 5-foot-long core run, the geologist made a field visual classification of each discrete soil layer rather than classifying a sample “composited” from more than one layer/soil type, hence the difference between the lab classification and the field visual classification. In cases where the 5-foot-long sample was all one soil type, the lab and field visual classifications were usually very close with lab and field gradations for like size fractions within 5 to 10%.

Additional lab tests were performed by Reclamation to evaluate samples of **discrete** Silty Clay (CL/ML) and Silty Sand (SM) layers taken from intervals where **composite** samples of an entire 5-foot core run had originally been submitted for testing (MDH-08-01 and MDH-09-01).

A typical comparison showed the following:

COMPOSITE SAMPLE DATA (USACE)				DISCRETE SAMPLE DATA (Reclamation)			
SOIL TYPE	USCS SYMBOL	% SAND	% FINES	SOIL TYPE	USCS SYMBOL	% SAND	% FINES
Silty Sand	SM	50	50	Silty Sand	SM	80	20
				Silty Clay	CL/ML	10	90

The gradation of the composite sample is consistent with the gradation a hybrid sample formed by combining the two discrete samples.

Only the USACE lab data is included on the drill hole logs due to limitations with the electronic logging format (two sets of lab data for the same interval are difficult to show on the same log). The additional Reclamation lab data is included in the Lab Data Section of this report (as is the USACE lab data).

MDH-10-01, MDH-11-01 and MDH-13-01

Field visual descriptions of a few intervals indicate a higher gravel content than is indicated by the lab test data:

DRILL HOLE	FIELD VISUAL CLASSIFICATION		LAB CLASSIFICATION	
	INTERVAL	USCS SYMBOL	INTERVAL	USCS SYMBOL
MDH-10-01	32.8 to 34.8	(GW-GM)s	32.8 to 37.8	(SP-SM)g
	34.8 to 38.0	SM		
MDH-11-01	12.7 to 16.2	(GP-GM)s	13.0 to 16.2	(SW-SM)g
MDH-13-01	18.0 to 23.0	(GP-GM)s	18.0 to 23.0	(SM)g

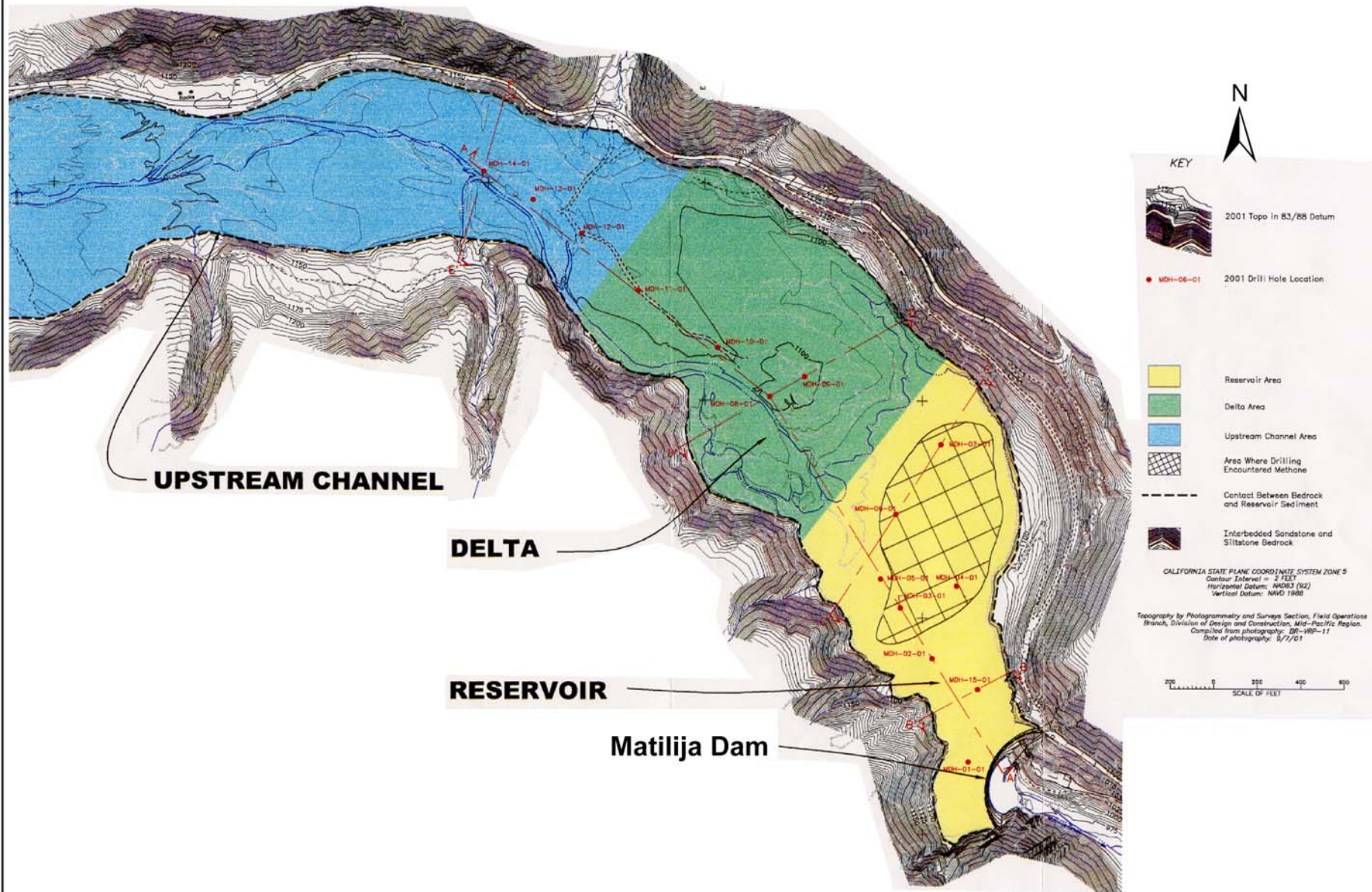
EXPLANATION

MDH-10-01, 32.8 to 34.8: The gradation of a sample combining the 2-foot thick 32.8 to 34.8 ft, (GW-GM)s interval and the 3.2-foot thick 34.8 to 38.0 ft, SM interval is likely to be very similar to the lab classification for the 32.8 to 37.8 ft, (SP-SM)g interval. The gravel fraction may also be somewhat under-represented as discussed for MDH-11-01, 12.7 to 16.2 below.

MDH-11-01, 12.7 to 16.2: A significant amount of the gravel in the sample was up to 75mm (3 in.) in diameter. Due to the relatively small size of the sample bag, larger fragments of gravel could not be included in the sample provided to the materials lab for testing. Therefore, the percentage of gravel was under-represented in the lab sample and so is under-represented in the lab gradation data. The lab data is most representative of the sand fraction of the interval. The field visual description is most representative of the entire interval. Any designs or bidding should be based on the field visual description.

MDH-13-01 18.0 to 23.0: Same as for MDH-11-01, 12.7 to 16.2 ft.

Geotechnical Investigations



GEOLOGIC LOG OF DRILL HOLE NO. MDH-01-01

SHEET 1 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Matilija Reservoir

COORDINATES: N 2,001,337.1 E 6,167,210.6

WATER ELEVATION: 1086.9

BEGUN: 8/15/01 FINISHED: 8/17/01

TOTAL DEPTH: 83.8

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1086.9) 08/14/2001

REVIEWED BY: Joel Sturm

NOTES	DEPTH	LABORATORY DATA								TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
		% CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION					
<p>ALL MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Matilija Reservoir</p> <p>EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was the drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).</p> <p>DRILLING BARGE: The drilling barge has a max. load capacity of approximately 14,000 pounds and is comprised of three separate segments each having its own flotation cells and weighing between 4200 and 5200 pounds. Two of the segments are connected via beams and jacking. The third segment is attached by jacks. The fully assembled barge is self propelled and is moved into position by a 35 hp outboard motor. The barge is secured at drilling sites by a four-point mooring system incorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.</p> <p>DRILL RIG: Ingersoll-Rand, Model A200</p> <p>DRILLING & SAMPLING METHODS: Drilling depth is measured from the water surface of the reservoir pond. The water / sediment interface in this hole is at a depth of 13.3 ft. 13.3 to 73.3 ft.: 3-3/4 inch i.d. by 7-1/4 inch o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring system (FADC) with a bullet bit. From 13.3 to 33.3 ft. the augers and coring system were pushed into the sediment by the drilling equipment without rotating the augers. From 33.3 to 73.3 ft. the augers were rotated. 73.3 to 80.3 ft.: Augers were too tight to rotate and were left at a depth of 73.3 ft. Used drilling equipment to push core barrel out in front of the augers to collect samples. 80.3 to 80.5 ft.: Drilled with casing and casing advancer and set 3-1/16 inch id x 3-1/2 inch od flush coupled NX casing. 80.5 to 81.1 ft.: Used drilling equipment to push NWD-4 core barrel and bit into sediment without success. 81.1 to 82.6 ft.: Used 2-1/2 inch split spoon sampler driven by a 140 lb. weight, dropped from 40 inches, to collect a drive sample. 82.6 to 83.8 ft.: Core drilling using a NWD-4 face discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system.</p>	5													0.0 to 13.3 ft. Reservoir Water Water Surface El. 1086.9 08/14/2001
														13.3 to 81.1 ft. Quaternary Reservoir Sediment (Qrs)
														13.3 to 23.3 ft. Silt, ML: About 95% fines with low plasticity, slow dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine sand; wet, brown, soft; strong reaction with HCl.
														<u>Laboratory Data Interval:</u> 18.3 to 23.3 ft.
	10													23.3 to 23.6 ft. Sandy Silt, s(ML): About 60% nonplastic fines, rapid dilatancy; about 40% predominantly fine sand; trace organics; maximum size, medium sand; moist, brown, soft; strong reaction with HCl.
														23.6 to 31.4 ft. Silt, ML: About 90% fines with low to medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
	15	60											1073.6	<u>Laboratory Data Interval:</u> 28.3 to 33. ft.
														31.4 to 32.5 ft. Sandy Silt, s(ML): About 60% nonplastic fines, rapid dilatancy; about 40% predominantly fine sand; trace organics; maximum size, medium sand; moist, gray, soft; strong reaction with HCl.
	20	100	94	8	0	34	5	47.31	ML					32.5 to 48.3 ft. Silt with Sand, (ML)s: About 85% fines with low to medium plasticity, slow dilatancy, high dry strength; about 15% fine sand; trace organics with wood chips mixed into 0.2 ft. lenses; maximum size, 15mm (wood chips); moist, gray, soft; strong reaction with HCl.
														<u>Laboratory Data Interval:</u> 38.3 to 43.3 ft.
	25	100												46.3 to 48.3 Silt, ML: About 90% fines with medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
														48.3 to 48.9 ft. Silty Sand, SM: About 55% fine sand; about 45% fines with low plasticity, rapid dilatancy; maximum size fine sand; moist, gray, soft; strong reaction with HCl.
	30	84	97	3	0	73	38	64.58	MH					<u>Laboratory Data Interval:</u> 48.3 to 53.3 ft.
														48.9 to 72.1 ft. Silt, ML: About 90% fines with low to medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; maximum size, fine sand; trace organics with wood fragments; moist, gray, soft; strong reaction with HCl.
	35	100												<u>Laboratory Data Intervals:</u> 58.3 to 63.3 ft. 68.3 to 73.3 ft.
														72.1 to 73.3 Silt with Sand, (ML)s: About 80% fines with low plasticity, slow dilatancy, high dry strength; about 20% fine sand; maximum size, fine sand; trace small diameter electrical wire up to 50 mm long; moist, gray, soft; strong reaction with HCl.
	40	96	85	15	0	38	6	47.48	(ML)s					

COMMENTS:

CA = Casing Advancer, no recovery possible
FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
NA = Not Available
NP = Nonplastic
NR = No Recovery
NX = 3-1/16 id x 3-1/2 od flush coupled casing

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

SHEET 2 OF 2

STATE: CALIFORNIA

WATER ELEVATION: 1086 g

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1086.9) 08/14/2001

REVIEWED BY: Joel Sturm

BOTTOM OF HOLE

CA = Casing Advancer, no recovery possible
FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
NA = Not Available
NP = Nonplastic
NR = No Recovery
NX = 3-1/16 id x 3-1/2 od flush coupled casing

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

MATILILJA WATER DRILLHOLE MATILILJA.GPJ MATILILJA.GDT 7/3/02 10:35:56 AM

GEOLOGIC LOG OF DRILL HOLE NO. MDH-02-01

SHEET 1 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Matilija Reservoir

COORDINATES: N 2,001,814.7 E 6,167,044.9

WATER ELEVATION: 1087.0

BEGUN: 8/18/01 FINISHED: 8/20/01

TOTAL DEPTH: 81.0

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1087.0) 8/18/2001

REVIEWED BY: Joel Sturm

NOTES

LABORATORY DATA

CLASSIFICATION AND PHYSICAL CONDITION

ALL MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.

PURPOSE OF HOLE:

Determine gradation and toxicity of sediments impounded behind Matilija Dam.

LOCATION:

Matilija Reservoir

EQUIPMENT MOBILIZATION:

The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was the drill rig, weighing 7,500 lbs and was picked to a radius of less than 105 ft. The company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).

DRILLING BARGE:

The drilling barge has a max. load capacity of approximately 14,000 pounds and is comprised of three separate segments each having its own floatation cells and weighing between 4200 and 5200 pounds. Two of the three segments are connected via beams and locking. The third segment is attached by coits. The fully assembled barge is self propelled and is moved into position by a 35 hp outboard motor. The barge is secured at drilling sites by a four-point mooring system incorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.

DRILL RIG:

Ingersoll-Rand, Model A200

DRILLING & SAMPLING METHODS:

Drilling depth is measured from the water surface of the reservoir pond. The water / sediment interface in this hole is at a depth of 11.5 ft.

11.5 to 76.0 ft.; 3-3/4 inch i.d. by 7-1/4 inch o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring system (FADC) with a bullet bit. From 11.5 to 23.0 ft. the augers and coring system were pushed into the sediment by the drilling equipment without rotating the augers. From 23.0 to 76.0 ft. the augers were rotated. Auger refusal at 76.0 ft.

76.0 to 81.0 ft.; Core drilling using a NWD-4 face discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system.

DRILLED BY:

PN-Regional Drill Crew: Chris Peterson, driller; Jerry Hanson, helper and Kevin Hermann, helper.

DRILLING CONDITIONS AND DRILLER'S

COMMENTS:

0.0 to 11.5 ft.: water
13.0 to 23.0 ft.: pushed

CAVING CONDITIONS:

None

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
NA = Not Available
NP = Nonplastic
NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-02-01

SHEET 2 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT

LOCATION: Matilija Reservoir

STATE: CALIFORNIA

BEGUN: 8/18/01 FINISHED: 8/20/01

COORDINATES: N 2,001,814.7 E 6,167,044.9

WATER ELEVATION: 1087.0

DEPTH AND ELEVATION OF WATER LEVEL

TOTAL DEPTH: 81.0

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1087.0) 8/18/2001

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA								TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION											
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION																	
ESTIMATED DRILLING FLUID RETURN: None used; advanced hole with flight augers. Reservoir water was added to the inside of the flight augers each time the 5 ft. sample barrel was retrieved to keep sand from running in. No casing below 76.0 ft. and drilling fluid during coring could not be monitored. CASING RECORD: <table><tr><td>Casing Size</td><td>Casing Depth</td><td>Interval Drilled</td></tr><tr><td>3-3/4" FA</td><td>0.0 - 76.0 ft.</td><td>0.0 - 76.0 ft.</td></tr><tr><td>3-3/4" FA</td><td>76.0 ft.</td><td>76.0 - 81.0 ft.</td></tr></table> HOLE COMPLETION: As the augers were pulled the hole was allowed to slough in on itself. DEPTH OF WATER: <table><tr><td>Date</td><td>Depth of Water</td></tr><tr><td>8/18/01</td><td>11.5 ft.</td></tr></table>	Casing Size	Casing Depth	Interval Drilled	3-3/4" FA	0.0 - 76.0 ft.	0.0 - 76.0 ft.	3-3/4" FA	76.0 ft.	76.0 - 81.0 ft.	Date	Depth of Water	8/18/01	11.5 ft.	94										CL		58.3 to 68.0 ft. Silt, ML: About 90% fines with low to medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; trace coarse, hard, subrounded gravel; maximum size, 20 mm; moist, brown to gray, soft; one piece of gravel at 63.4 ft.; strong reaction with HCl.
	Casing Size	Casing Depth	Interval Drilled																							
	3-3/4" FA	0.0 - 76.0 ft.	0.0 - 76.0 ft.																							
	3-3/4" FA	76.0 ft.	76.0 - 81.0 ft.																							
	Date	Depth of Water																								
	8/18/01	11.5 ft.																								
	50	78	97	3	0	37	13	48.72	CL				1034.0	<u>Laboratory Data Interval:</u> 63.0 to 68.0 ft.												
													1034.0	68.0 to 75.5 ft. Silt with Sand, (ML)s: About 85% fines with medium plasticity, slow dilatancy, high dry strength; about 15% fine sand; maximum size, medium sand; moist, gray, soft; lenses of silty sand at 68.8 to 69.6 ft. and 72.5 to 72.6 ft.; strong reaction with HCl.												
	55	82										s(ML)	1030.4	<u>Laboratory Data Interval:</u> 73.3 to 75.5 ft.												
												SM	1028.7	75.5 to 81.0 ft. Quaternary Alluvium (Qal)												
60	100										Qrs		75.5 to 76.0 ft. Poorly Graded Gravel with Sand and Cobbles, (GP)sc: About 80% fine to coarse, hard, angular gravel; about 15% fine to coarse sand; about 5% nonplastic fines, rapid dilatancy; trace 3 to 5-inch, hard, angular cobbles; moist, gray, maximum size, 100 mm; strong reaction with HCl.													
65	100	96	4	0	44	16	48.15	ML			ML	1019.0	76.0 to 81.0 ft. Boulders: Recovered broken core segments each 0.1 to 0.42 ft. in length of hard sandstone; interpreted as one continuous boulder of pre-Reservoir Alluvium (Qal) at least 5 ft. in size; strong reaction with HCl.													
70	96										(ML)s															
75	100	84	11	5	37	10	52.17	(ML)s			(GP)sc	1011.5														
												1011.0														
80	43										Qal		BOULDERS													
BOTTOM OF HOLE														1008.0												

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

MATILIJIA WATER DRILL HOLE E MATILIJIA GPJ MATILIJIA GOT 7/3/02 10:35:56 AM

GEOLOGIC LOG OF DRILL HOLE NO. MDH-03-01

SHEET 1 OF 2

FEATURE: MATILAJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Matilija Reservoir

COORDINATES: N 2,002,047.6 E 6,166,898.8

WATER ELEVATION: 1086.9

BEGUN: 8/21/01 FINISHED: 8/22/01

TOTAL DEPTH: 68.3

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1086.9) 08/21/2001

REVIEWED BY: Joel Sturm

NOTES	DEPTH	LABORATORY DATA							TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
		% CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT					
<p>ALL MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Matilija Reservoir</p> <p>EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was the drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).</p> <p>DRILLING BARGE: The drilling barge has a max. load capacity of approximately 14,000 pounds and is comprised of three separate segments each having its own flotation cells and weighing between 4200 and 5200 pounds. Two of the three segments are connected via beams and locking. The third segment is attached by jacks. The fully assembled barge is self propelled and is moved into position by a 35 hp outboard motor. The barge is secured at drilling sites by a four-point mooring system incorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.</p> <p>DRILL RIG: Ingersoll-Rand, Model A200</p> <p>DRILLING & SAMPLING METHODS: Drilling depth is measured from the water surface of the reservoir pond. The water / sediment interface in this hole is at a depth of 9.6 ft. 9.6 to 68.3 ft.: 3-3/4 inch i.d. by 7-1/4 inch o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring system (FADC) with a bullet bit. From 9.6 to 18.3 ft. the augers and coring system were pushed into the sediment by the drilling equipment without rotating the augers. From 18.3 to 68.3 ft. the augers were rotated.</p> <p>DRILLED BY: PN-Regional Drill Crew: Chris Peterson, driller, Jerry Hanson, helper and Mike Edmonson, helper</p> <p>DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 9.6 ft.: water 9.6 to 18.5 ft.: pushed</p> <p>CAVING CONDITIONS: None</p>	5										Water	1077.3	0.0 to 9.6 ft. <u>Reservoir Water</u> Water Surface El. 1086.9 08/21/01
													9.6 to 68.3 ft. <u>Quaternary Reservoir Sediment (Qrs)</u>
													9.6 to 13.3 ft. <u>No Recovery</u>
													13.3 to 18.3 ft. <u>Sandy Silt, (ML)s</u> : About 65% fines with low to no plasticity, rapid dilatancy, no dry strength; about 35% fine sand; trace organics; maximum size, fine sand; wet, brown, soft; lens with 5% organics from 13.3 to 14.2 ft.; lens of lean clay with sand from 14.8 to 15.3 ft.; strong reaction with HCl.
													18.3 to 29.5 ft. <u>Silt, ML</u> : About 90% fines with low to moderate plasticity, slow to no dilatancy, high dry strength; about 10% fine sand; maximum size, fine sand; moist, brown, soft; lenses with organics at 20.7 to 20.9 ft., 22.5 to 22.7 ft., 23.0 to 23.2 ft.; lens of lean clay from 23.3 to 24.4 ft.; strong reaction with HCl.
													<u>Laboratory Data Interval:</u> 23.3 to 28.3 ft.
													29.5 to 30.6 ft. <u>Silty Sand, SM</u> : About 60% fine sand; about 40% nonplastic fines, rapid dilatancy; maximum particle size, fine sand; moist, dark gray, soft; several 6 mm lenses of organic material from 29.5 to 30.5 ft. and one 5 mm lens at 30.2 to 30.4 ft.; strong reaction with HCl.
													30.6 to 34.3 ft. <u>Silt, ML</u> : About 90% fines with low to medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
													<u>Laboratory Data Interval:</u> 33.3 to 38.3 ft.
													34.3 to 38.3 ft. <u>Silty Sand, SM</u> : About 85% fine sand; about 15% nonplastic fines, rapid dilatancy, no dry strength; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
<p>100</p> <p>15</p> <p>88</p> <p>20</p> <p>100</p> <p>25</p> <p>100</p> <p>30</p> <p>100</p> <p>35</p> <p>86</p>													38.3 to 47.0 ft. <u>Silt, ML</u> : About 90% fines with medium plasticity, slow to no dilatancy, high dry strength; about 10% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; lens of silty sand from 42.3 to 42.5 ft.; strong reaction with HCl.
													<u>Laboratory Data Interval:</u> 38.3 to 48.3 ft.
													47.0 to 49.6 ft. <u>Silty Sand, SM</u> : About 60% fine sand; about 40% nonplastic fines, rapid dilatancy; moist, gray, soft; strong reaction with HCl.
													49.6 to 53.8 ft. <u>Lean Clay, CL</u> : About 95% fines with medium plasticity, slow to no dilatancy, high dry strength; about 5% fine sand; trace organics; maximum particle size, fine sand; moist, gray, soft; strong reaction with HCl.
													<u>Laboratory Data Interval:</u> 53.3 to 58.3 ft.
													53.8 to 54.8 ft. <u>Sandy Silt, s(ML)</u> : About 55% nonplastic fines, rapid dilatancy; about 45% predominantly fine sand; trace organics; maximum size, 64 mm by 28 mm (wood fragment); moist, gray, soft; strong reaction with HCl.
													54.8 to 58.1 ft. <u>Silt, ML</u> : About 90% fines with medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
<p>100</p> <p>15</p> <p>88</p> <p>20</p> <p>100</p> <p>25</p> <p>100</p> <p>30</p> <p>100</p> <p>35</p> <p>86</p>													
<p>100</p> <p>15</p> <p>88</p> <p>20</p> <p>100</p> <p>25</p> <p>100</p> <p>30</p> <p>100</p> <p>35</p> <p>86</p>													

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

Methane =  Pressurized methane gas encountered

SHEET 1 OF 2 DRILL HOLE MDH-03-01

MATILAJA WATER DRILL HOLE MATILAJA GDT 7/30/02 10:35:56 AM

GEOLOGIC LOG OF DRILL HOLE NO. MDH-03-01

SHEET 2 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Matilija Reservoir

COORDINATES: N 2,002,047.6 E 6,166,898.8

WATER ELEVATION: 1086.9

BEGUN: 8/21/01 FINISHED: 8/22/01

TOTAL DEPTH: 68.3

ANGLE FROM HORIZONTAL: 90 AZIMUTH:


DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1086.9) 08/21/2001

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						
ESTIMATED DRILLING FLUID RETURN: None used; advanced hole with flight augers. Reservoir water was added to the inside of the flight augers each time the 5 ft. sample barrel was retrieved to keep sand from running in. CASING RECORD: Casing Size Casing Depth Interval Drilled 3-3/4" FA 0.0 - 68.3 ft. 0.0 - 68.3 ft. REASON FOR HOLE TERMINATION: The hole was terminated for safety reasons upon encountering large quantities of pressurized methane gas at a depth of 68.3 ft. HOLE COMPLETION: As the augers were pulled the hole was allowed to slough in on itself. DEPTH OF WATER: Date Depth of Water 08/21/01 9.6 ft.	40	100								1048.6				1048.6	58.1 to 62.8 ft. Sandy Silt, s(ML): About 60% fines with low to no plasticity, slow to rapid dilatancy, high dry strength; about 40% fine sand; maximum size, fine sand; moist, gray, soft; about 15% 1 to 2 mm diameter methane gas bubbles in the sediment from 59.8 to 60.1 ft.; strong reaction with HCl. 62.8 to 68.3 ft. Silt, ML: About 90% fines with medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; plant roots at 68.2 ft.; pressurized methane pocket at 68.3 ft., stopped drilling and ended the hole; strong reaction with HCl.
	45	100	49	51	0	NP	NP	NA	SM			ML		1039.9	
	50	100								1038.8		SM		1037.3	
	55	100										CL			
														1033.1	
												s(ML)		1032.1	
		100	80	20	0	NP	NP	NA	(ML)s			ML			
										1028.6				1028.8	
	60	100										s(ML)			
														1024.1	
	65	70										ML			 1018.6

BOTTOM OF HOLE

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

Methane =  Pressurized methane gas encountered

MATILIJIA WATER DRILL HOLE MATILIJIA GPJ MATILIJIA GDT 7/3/02 10:35:56 AM

GEOLOGIC LOG OF DRILL HOLE NO. MDH-04-01

SHEET 1 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY
 LOCATION: Matilija Reservoir
 BEGUN: 8/23/01 FINISHED: 8/23/01
 DEPTH AND ELEVATION OF WATER LEVEL
 AND DATE MEASURED: 0.0 (1087.0) 8/23/01

PROJECT: VENTURA RIVER PROJECT
 COORDINATES: N 2,002,149.6 E 6,167,157.6
 TOTAL DEPTH: 33.0
 DEPTH TO BEDROCK: Not Encountered

STATE: CALIFORNIA
 WATER ELEVATION: 1087.0
 ANGLE FROM HORIZONTAL: 90 AZIMUTH:
 HOLE LOGGED BY: Mike McCulla
 REVIEWED BY: Joel Sturm

NOTES

ALL MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.

PURPOSE OF HOLE:

Determine gradation and toxicity of sediments impounded behind Matilija Dam.

LOCATION:

Matilija Reservoir

EQUIPMENT MOBILIZATION:

The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was the drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).

DRILLING BARGE:

The drilling barge has a max. load capacity of approximately 14,000 pounds and is comprised of three separate segments each having its own flotation cells and weighing between 4200 and 5200 pounds. Two of the three segments are connected via beams and king. The third segment is attached by floats. The fully assembled barge is self propelled and is moved into position by a 35 hp outboard motor. The barge is secured at drilling sites by a four-point mooring system incorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.

DRILL RIG:

Ingersoll-Rand, Model A200

DRILLING & SAMPLING METHODS:

Drilling depth is measured from the water surface of the reservoir pond. The water / sediment interface in this hole is at a depth of 11.1 ft.
 11.1 to 33.0 ft.: 3-3/4 inch i.d. by 7-1/4 inch o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring system (FADC) with a bullet bit.

DRILLED BY:

PN-Regional Drill Crew: Chris Peterson, driller, Jerry Hanson, helper and Mike Edmonson, helper

DRILLING CONDITIONS AND DRILLER'S COMMENTS:

0.0 to 11.1 ft.: water

CAVING CONDITIONS:

None

ESTIMATED DRILLING FLUID RETURN:

None used: advanced hole with flight augers. Reservoir water was added to the inside of the flight augers each time the 5 ft. sample barrel was retrieved to keep sand from running in.

CASING RECORD:

Casing Size Casing Depth Interval Drilled
 FA 0.0 - 33.0 ft. 0.0 - 33.0 ft.

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

LABORATORY DATA

DEPTH	CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION
5												Water	
10													
15	NR												1075.9
15	70	89	31	0	NP	NP	NA	s(ML)	1069.0			s(ML)	
20	100											(ML)s	1068.4 1067.3
25	100											CL	
30	100	90	10	0	33	6	NA	ML				s(ML)	1058.3
									1054.0				1054.0

BOTTOM OF HOLE

CLASSIFICATION AND PHYSICAL CONDITION

0.0 to 11.1 ft. Reservoir Water
 Water Surface El. 1087.0 08/23/01

11.1 to 33.0 ft.
 Quaternary Reservoir Sediment (Qrs)

11.1 to 13.0 ft. No Recovery

13.0 to 18.6 ft. Sandy Silt, s(ML): About 60% fines with low plasticity, rapid dilatancy, high dry strength; about 40% fine sand; plant roots and other organics; maximum size, 30 mm by 10 mm (wood chip); wet, soft; strong reaction with HCl.

Laboratory Data Interval:
 13.0 to 18.0 ft.

18.6 to 19.7 ft. Silt with Sand, (ML)s: About 85% fines with low to moderate plasticity, slow dilatancy, high dry strength; about 15% fine sand; maximum size, fine sand; moist, brown to gray, soft; strong reaction with HCl.

19.7 to 28.7 ft. Lean Clay, CL: About 95% fines with medium plasticity, slow to rapid dilatancy, high dry strength; about 5% fine sand; maximum particle size, fine sand; moist, gray, soft; lens of silty sand (SM) at 25.7 to 25.9 ft.; strong reaction with HCl.

28.7 to 33.0 ft. Sandy Silt, s(ML): About 70% fines with low plasticity, rapid dilatancy, high dry strength; about 30% fine sand; maximum size, fine sand; moist, gray, soft; lens of lean clay with sand (CL)s from 29.1 to 29.6 ft.; pressurized methane pocket at 33.0, stopped drilling and ended the hole; strong reaction with HCl.

Laboratory Data Interval:
 28.0 to 33.0 ft.

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

Methane =  Pressurized methane gas encountered

GEOLOGIC LOG OF DRILL HOLE NO. MDH-04-01

SHEET 2 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Matilija Reservoir

COORDINATES: N 2,002,149.6 E 6,167,157.6

WATER ELEVATION: 1087.0

BEGUN: 8/23/01 FINISHED: 8/23/01

TOTAL DEPTH: 33.0

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1087.0) 8/23/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA								ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION							
REASON FOR HOLE TERMINATION:																

REASON FOR HOLE TERMINATION:

The hole was terminated upon encountering large quantities of pressurized methane gas at a depth of 33.0 feet. The hole was left open for 20 hours without any apparent reduction in the gas flow and then terminated for safety reasons.

HOLE COMPLETION:

As the augers were pulled the hole was allowed to slough in on itself.

DEPTH OF WATER:

Date 8/23/01 Depth of Water 11.1 ft.

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
NA = Not Available
NP = Nonplastic
NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

Methane = 

Pressurized methane gas encountered

GEOLOGIC LOG OF DRILL HOLE NO. MDH-05-01

SHEET 1 OF 2

FEATURE: MATILAJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Matilaja Reservoir

COORDINATES: N 2,002,180.9 E 6,166,807.1

WATER ELEVATION: 1087.4

BEGUN: 8/29/01 FINISHED: 8/29/01

TOTAL DEPTH: 74.8

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1087.4) 8/29/2001

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA								TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION	ELEVATION					
<p>All MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Matilija Reservoir</p> <p>EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was the drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).</p> <p>DRILLING BARGE: The drilling barge has a max. load capacity of approximately 14,000 pounds and is comprised of three separate segments each having its own flotation cells and weighing between 4200 and 5200 pounds. Two of the three segments are connected via beams and piling. The third segment is attached by floats. The fully assembled barge is self propelled and is moved into position by a 35 hp outboard motor. The barge is secured at drilling sites by a four-point mooring system incorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.</p> <p>DRILL RIG: Ingersoll-Rand, Model A200</p> <p>DRILLING & SAMPLING METHODS: Drilling depth is measured from the water surface of the reservoir pond. The water/sediment interface in this hole is at a depth of 9.4 ft. 9.4 to 72.8 ft.: 3-3/4 inch i.d. by 7-1/4 inch o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring system (FADC) and sand basket, with a bullet bit. 72.8 to 74.8 ft.: Core drilling using a NWD-4 face discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system.</p> <p>DRILLED BY: PN-Regional Drill Crew: Chris Peterson, driller; Jerry Hanson, helper and Mike Edmonson, helper</p> <p>DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 9.4 ft.: water 9.4 to 71.3 ft.: silt, clay, sand; used sample catcher (sand fingers) on sampler. 71.3 to 72.8 ft.: change in drilling, it cut rough and had refusal at 72.8 72.8 to 74.8 ft.: sandstone, hard</p> <p>CAVING CONDITIONS: None</p>													0.0 to 9.4 ft. Reservoir Water Water Surface El. 1087.4 08/29/01		
														9.4 to 69.4 ft. Quaternary Reservoir Sediment (Qrs)	
														9.4 ft. to 18.0 ft. No Recovery	
														18.0 to 19.2 ft. Silty Sand, SM: About 60% fine sand; about 40% fines with no to low plasticity, rapid dilatancy, low dry strength; trace organics; maximum size, fine sand; moist, gray-brown, soft; strong reaction with HCl.	
														Laboratory Data Interval: 18.0 to 23.0 ft.	
														19.2 to 28.0 ft. Silt, ML: About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.	
														Laboratory Data Interval: 23.0 to 28.0 ft.	
														28.0 to 29.3 ft. Sandy Silt, s(ML): About 70% fines with low to medium plasticity, slow dilatancy, medium dry strength; about 30% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.	
														29.3 to 33.6 ft. Silt, ML: About 90% fines with medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; maximum size, fine sand; moist, dark-gray to gray, soft; strong reaction with HCl.	
														33.6 to 35.0 ft. Silty Sand, SM: About 80% fine to medium sand; about 20% nonplastic fines, rapid dilatancy, no dry strength; maximum size, medium sand; moist, gray, soft; strong reaction with HCl.	
													35.0 to 35.5 ft. Silt with Sand, (ML)s: About 80% fines with medium plasticity, slow dilatancy, high dry strength; about 20% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.		
													35.5 to 45.0 ft. Silt, ML: About 90% fines with low to medium plasticity, slow dilatancy, medium to high dry strength; about 10% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.		
													Laboratory Data Interval: 43.0 to 48.0 ft.		
													45.0 to 48.0 ft. Silty Sand, SM: About 70% fine to medium sand; about 30% nonplastic fines, rapid dilatancy, no dry strength; maximum size, medium sand; moist, gray, soft; strong reaction with HCl.		
													48.0 to 49.0 ft. Sandy Silt, s(ML): About 60% nonplastic fines, rapid dilatancy, low dry strength; about 40% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.		
													49.0 to 57.5 Silt, ML: About 90% fines with low to medium plasticity, slow dilatancy, medium dry strength; about 10% fine sand; maximum size, fine sand; moist, gray, soft; except a lens of Silty Sand (SM) from 52.8 to 53.0 ft.; strong reaction with HCl.		
													Laboratory Data Interval: 53.0 to 58.0 ft.		
													57.5 to 65.0 ft. Sandy Silt, s(ML): About 60% fines with low plasticity, slow to rapid dilatancy, low dry strength; about 40% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.		

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-05-01

SHEET 2 OF 2

FEATURE: MATILILJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY
 LOCATION: Matilija Reservoir
 BEGUN: 8/29/01 FINISHED: 8/29/01
 DEPTH AND ELEVATION OF WATER LEVEL
 AND DATE MEASURED: 0.0 (1087.4) 8/29/2001

PROJECT: VENTURA RIVER PROJECT
 COORDINATES: N 2,002,180.9 E 6,165,807.1
 TOTAL DEPTH: 74.8
 DEPTH TO BEDROCK: Not Encountered

STATE: CALIFORNIA
 WATER ELEVATION: 1087.4
 ANGLE FROM HORIZONTAL: 90 AZIMUTH:
 HOLE LOGGED BY: Mike McCulla
 REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION												
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION																		
ESTIMATED DRILLING FLUID RETURN: None used while the hole was advanced using flight augers. From 72.8 to 74.8 ft. clean reservoir water was used during diamond drilling. There was no casing below 72.8 ft. and drilling fluid during diamond drilling could not be monitored. Reservoir water was added to the inside of the flight augers each time the 5 ft. sample barrel was retrieved to keep sand from running in. CASING RECORD: <table><tr><td>Casing Size</td><td>Casing Depth</td><td>Interval Drilled</td></tr><tr><td>3-3/4" FA</td><td>0.0 - 72.8 ft.</td><td>0.0 - 72.8 ft.</td></tr><tr><td>3-3/4" FA</td><td>72.8 ft.</td><td>72.8- 74.8 ft.</td></tr></table> HOLE COMPLETION: As the augers were pulled the hole was allowed to slough in on itself. DEPTH OF WATER: <table><tr><td>Date</td><td>Depth of Water</td></tr><tr><td>08/29/01</td><td>9.4 ft.</td></tr></table>	Casing Size	Casing Depth	Interval Drilled	3-3/4" FA	0.0 - 72.8 ft.	0.0 - 72.8 ft.	3-3/4" FA	72.8 ft.	72.8- 74.8 ft.	Date	Depth of Water	08/29/01	9.4 ft.	40	100									ML			<u>Laboratory Data Interval:</u> 63.0 to 68.0 ft. 65.0 to 69.4 ft. Lean Clay, CL: About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl. 69.4 to 74.8 ft. Quaternary Alluvium (Qal) 69.4 to 72.8 ft. Silty Sand with Gravel (SM)g: About 70% fine to coarse sand; about 15% nonplastic fines, rapid dilatancy; about 15% fine to coarse, hard, subangular to subrounded gravel; maximum size, 55 mm; wet, dark gray to gray, soft; strong reaction with HCl. 72.8 to 74.8 ft. Boulders: Recovered one unbroken piece of hard sandstone; interpreted as a boulder of pre-Reservoir Alluvium (Qal) at least 2 ft. in size; strong reaction with HCl.
	Casing Size	Casing Depth	Interval Drilled																								
	3-3/4" FA	0.0 - 72.8 ft.	0.0 - 72.8 ft.																								
	3-3/4" FA	72.8 ft.	72.8- 74.8 ft.																								
	Date	Depth of Water																									
	08/29/01	9.4 ft.																									
	45	90	60	40	0	NP	NP	NA	s(ML)	1039.4		SM	1042.4														
	50	94										s(ML)	1038.4														
	55	100	93	7	0	40	13	NA	ML	1029.4		ML	1029.9														
	60	100										s(ML)															
65	100	98	2	0	40	16	NA	CL	1019.4		CL	1022.4															
70	81										(SM)g	1018.0															
	100										BOULDERS	1014.6															
													1012.6														

BOTTOM OF HOLE

BOTTOM OF HOLE

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-06-01

SHEET 1 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Matilija Reservoir

COORDINATES: N 2,002,479.5 E 6,166,877.8

WATER ELEVATION: 1087.4

BEGUN: 8/28/01 FINISHED: 8/28/01

TOTAL DEPTH: 38.0

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Mike McCulla

AND DATE MEASURED: 0.0 (1087.4) 8/28/2001

REVIEWED BY: Joel Sturm


NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION	
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						
															ELEVATION
<p>ALL MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Matilija Reservoir</p> <p>EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was the drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).</p> <p>DRILLING BARGE: The drilling barge has a max. load capacity of approximately 14,000 pounds and is comprised of three separate segments each having its own floatation cells and weighing between 4200 and 5200 pounds. Two of the three segments are connected via beams and jacking. The third segment is attached by jacks. The fully assembled barge is self propelled and is moved into position by a 35 hp outboard motor. The barge is secured at drilling sites by a four-point mooring system incorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.</p> <p>DRILL RIG: Ingersoll-Rand, Model A200</p> <p>DRILLING & SAMPLING METHODS: Drilling depth is measured from the water surface of the reservoir pond. The water / sediment interface in this hole is at a depth of 9.4 ft. 9.4 to 38.0 ft.; 3-3/4 inch i.d. by 7-1/4 inch o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring system (FADC) and sand basket, with a bullet bit.</p> <p>DRILLED BY: PN-Regional Drill Crew: Chris Peterson, driller; Jerry Hanson, helper and Mike Edmonson, helper</p> <p>DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 9.4 ft.: water 9.4 to 33.0ft.: used FADC with catcher (sand basket). Hit high pressure methane at 33.0 ft. that blew mud over the top of the tower. 33.0 to 38.0 ft.: drilled with augers only, no inner sample barrel, in an attempt to drill through the pocket of methane. Between 33.0 and 38.0 ft. methane was eroding along the outside of the augers and frothing up through the water violent like bubbles in a Jacuzzi.</p> <p>CAVING CONDITIONS: None</p>													0.0 to 9.4 ft. Reservoir Water Water Surface El. 1087.4 08/28/01		
														9.4 to 38.0 ft. Quaternary Reservoir Sediment (Qrs)	
	5													Water	9.4 to 17.1 ft. <u>Silt, ML</u> : About 90% fines with low plasticity, slow to rapid dilatancy, low dry strength; about 10% fine sand; trace organics; maximum size, fine sand; wet, brown to gray, very soft; several parts of live plants and their roots are present; strong reaction with HCl.
															17.1 to 18.0 ft. <u>Sandy Silt, s(ML)</u> : About 70% nonplastic fines, rapid dilatancy, low dry strength; about 30% fine sand; trace organics; maximum size, fine sand; moist, brown to gray, soft; strong reaction with HCl.
															18.0 to 23.0 ft. <u>Silt, ML</u> : About 95% fines with low to medium plasticity, slow to rapid dilatancy, medium dry strength; about 5% fine sand; maximum size, fine sand; trace organics; moist, gray, soft; except a lens of Silt with Sand (ML)s from 18.5 to 19.0 ft.; strong reaction with HCl.
	10	53										1078.0			<u>Laboratory Data Interval:</u> 18.0 to 23.0 ft.
															23.0 to 24.4 ft. <u>Silt with Sand, (ML)s</u> : About 85% fines with medium plasticity, slow dilatancy, moderate dry strength; about 15% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
														ML	24.4 to 26.0 ft. <u>Silt, ML</u> : About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; trace organics; moist, gray, soft; strong reaction with HCl.
	15	46													26.0 to 27.4 ft. <u>Sandy Silt, s(ML)</u> : About 65% fines with low plasticity, rapid dilatancy, low dry strength; about 35% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
															27.4 to 28.0 ft. <u>Lean Clay, CL</u> : About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; trace organics; moist, gray, soft; strong reaction with HCl.
														s(ML)	28.0 to 29.1 ft. <u>Sandy Silt, s(ML)</u> : About 65% fines with low plasticity, rapid dilatancy, low dry strength; about 35% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
	20	100	97	3	0	35	5	NA	ML						29.1 to 30.0 ft. <u>Lean Clay, CL</u> : About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; trace organics; moist, gray, soft; strong reaction with HCl.
															30.0 to 31.5 ft. <u>Silt, ML</u> : About 95% fines with low to medium plasticity, medium dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; trace organics; moist, gray, soft; the core surface hosts about 20% methane gas bubbles up to 30 mm in diameter; strong reaction with HCl.
															31.5 to 33.0 ft. <u>Silty Sand with Gravel, (SM)lg</u> : About 70% fine sand; about 15% nonplastic fines, rapid dilatancy, low dry strength; about 15% fine to coarse, hard, subrounded gravel; maximum size, 30 mm; wet, gray; the gravel present in the sample interval was blown out of the drill hole by methane gas and picked up off the deck of the barge, allowing for only a rough estimation of the percentage of gravel in this sediment interval; strong reaction with HCl.
	25	100													
	</														

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

Methane =  Pressurized methane gas encountered

GEOLOGIC LOG OF DRILL HOLE NO. MDH-06-01

SHEET 2 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT
 LOCATION: Matilija Reservoir COORDINATES: N 2,002,479.5 E 6,166,877.8
 BEGUN: 8/28/01 FINISHED: 8/28/01 TOTAL DEPTH: 38.0
 DEPTH AND ELEVATION OF WATER LEVEL DEPTH TO BEDROCK: Not Encountered
 AND DATE MEASURED: 0.0 (1087.4) 8/28/2001


STATE: CALIFORNIA
 WATER ELEVATION: 1087.4
 ANGLE FROM HORIZONTAL: 90 AZIMUTH:
 HOLE LOGGED BY: Mike McCulla
 REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA								ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION		
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION									
ESTIMATED DRILLING FLUID RETURN: None used; advanced hole with flight augers. Reservoir water was added to the inside of the flight augers each time the 5 ft. sample barrel was retrieved to keep sand from running in. CASING RECORD: <u>Casing Size</u> <u>Casing Depth</u> <u>Interval Drilled</u> 3-3/4" FA 0.0 - 38.0 ft. 0.0 - 38.0 ft. HOLE COMPLETION: As the augers were pulled the hole was allowed to slough in on itself. It took several days for the hole to slough in completely and stop methane gas from bubbling up through the sediment and water. DEPTH OF WATER: <u>Date</u> <u>Depth of Water</u> 8/28/01 9.4 ft.	30	74														33.0 to 38.0 ft. No Recovery: Large quantity of pressurized methane gas.		
	35	NR																
BOTTOM OF HOLE																		

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88
 Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

Methane =  Pressurized methane gas encountered

GEOLOGIC LOG OF DRILL HOLE NO. MDH-07-01

SHEET 1 OF 2

FEATURE: MATILUJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY
 LOCATION: Matilija Reservoir
 BEGUN: 9/5/01 FINISHED: 9/6/01
 DEPTH AND ELEVATION OF WATER LEVEL
 AND DATE MEASURED: 0.0 (1087.8) Not Encountered


PROJECT: VENTURA RIVER PROJECT
 COORDINATES: N 2,002,800.8 E 6,167,085.6
 TOTAL DEPTH: 38.0
 DEPTH TO BEDROCK: Not Encountered

STATE: CALIFORNIA
 WATER ELEVATION: 1087.8
 ANGLE FROM HORIZONTAL: 90 AZIMUTH:
 HOLE LOGGED BY: Greg Mongano
 REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION					
<p>All MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Matilija Reservoir</p> <p>EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was the drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).</p> <p>DRILLING BARGE: The drilling barge has a max. load capacity of approximately 14,000 pounds and is comprised of three separate segments each having its own floatation cells and weighing between 4200 and 5200 pounds. Two of the three segments are connected via beams and locking. The third segment is attached by jibs. The fully assembled barge is self propelled and is moved into position by a 35 hp outboard motor. The barge is secured at drilling sites by a four-point mooring system incorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.</p> <p>DRILL RIG: Ingersoll-Rand, Model A200</p> <p>DRILLING & SAMPLING METHODS: Drilling depth is measured from the water surface of the reservoir pond. The water / sediment interface in this hole is at a depth of 8.3 ft. 8.3 to 38.0 ft.: 3-3/4 inch i.d. by 7-1/4 inch o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring system (FADC) with a bullet bit.</p> <p>DRILLED BY: PN-Regional Drill Crew; C. Whisnant, Driller; D. Steinke, Helper</p> <p>DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 8.3 ft.: water 8.3 to 38.0 ft.: fast and smooth</p> <p>CAVING CONDITIONS: None</p> <p>ESTIMATED DRILLING FLUID RETURN: None used; advanced hole with flight augers. Reservoir water was added to the inside of the flight augers each time the 5 ft. sample barrel was retrieved to keep sand from running in.</p> <p>CASING RECORD: Casing Size Casing Depth Interval Drilled 1" FA 0.0 - 38.0 ft. 0.0 - 38.0 ft.</p>	5													0.0 to 8.3 ft. Reservoir Water Water Surface El. 1087.8 09/05/01
														8.3 to 38.0 ft. Quaternary Reservoir Sediment (Qrs)
														8.3 to 14.2 ft. Silty Sand, SM: About 55% fine sand; maximum size, fine sand; about 45% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; silt lens from 12.6 to 12.8 ft.; trace of organics; wet, gray to brown, soft; strong reaction with HCl.
														<u>Laboratory Data Intervals:</u> 8.3 to 13.0 ft. 13.0 to 18.0 ft.
														14.2 to 14.7 ft. Silt with Sand, (ML)s: About 80% fines with low to medium plasticity, toughness, and dry strength, and rapid dilatancy; about 20% fine sand; maximum size, fine sand; wet, gray, soft; organic material present; strong reaction with HCl.
														14.7 to 16.6 ft. Sandy Silt, s(ML): About 60% fines with low to medium plasticity, toughness, and dry strength, and rapid dilatancy; about 40% fine sand; maximum size, fine sand; wet, gray, soft; organic material present; strong reaction with HCl.
														16.6 to 18.5 ft. Silt with Sand, (ML)s: About 80% fines with low to medium plasticity, toughness, and dry strength, and rapid dilatancy; about 20% fine sand; maximum size, fine sand; wet, gray, soft; organic material present; strong reaction with HCl.
														<u>Laboratory Data Interval:</u> 18.0 to 23.0 ft.
														18.5 to 22.6 ft. Silt, ML: About 90% fines with low to medium plasticity and toughness, medium dry strength, and slow dilatancy; about 10% fine sand; maximum size, fine sand; trace organics; wet, gray, soft; strong reaction with HCl.
														22.6 to 23.1 ft. Sandy Silt, s(ML): About 60% fines with low to medium plasticity, toughness, and dry strength, and rapid dilatancy; about 40% fine sand; maximum size, fine sand; wet, gray, soft; organic material present; strong reaction with HCl.
														23.1 to 24.9 ft. Peat, PT: About 90% organic matter of bark, roots, and wood fibers, looked like mulch; about 5% non plastic fines with low dry strength and no dilatancy; about 5% fine sand; wet, black, spongy consistency; organic odor.
														24.9 to 25.1 ft. Silty Sand, SM: About 65% fine sand; maximum size, fine sand; about 35% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; wet, gray, soft; strong reaction with HCl.
														25.1 to 26.6 ft. Silt with Sand, (ML)s: About 85% fines with medium plasticity, toughness, and dry strength, and slow dilatancy; about 15% fine sand; maximum size, fine sand; wet, gray, soft; organic material present; strong reaction with HCl.
														26.6 to 28.0 ft. Sandy Silt, s(ML): About 60% fines with low to medium plasticity, toughness, and dry strength, and rapid dilatancy; about 40% fine sand; maximum size, fine sand; wet, gray, soft; organic material present; strong reaction with HCl.
														28.0 to 35.5 ft. Silty Sand, SM: About 70-90% fine and medium sand; maximum size, medium sand; about 10-30% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; trace of organics; wet, gray, soft; strong reaction with HCl.

COMMENTS:
 FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88
 Materials testing was performed by the USACE Los Angeles District.
 Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.
 A methane sample was collected at 38.0 ft. using a SUMA canister.
 Sample was sent to and analyzed by Zymax Envirotechnology, San Luis Obispo, CA.

Methane =  Pressurized methane gas encountered

SHEET 2 OF 2

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

COORDINATES: N 2,002,800.8 E 6,167,085.6

WATER ELEVATION: 1087.8

TOTAL DEPTH: 38.0

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Monzano

AND DATE MEASURED: 0.0 (1087.8) Not Encountered

REVIEWED BY: Joel Sturm

MATILIJJA WATER DRILL HOLE MATILIJJA GPJ MATILIJJA.GDT 7/3/02 10:35:56 AM

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
NA = Not Available
NP = Nonplastic
NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A. A methane sample was collected at 38.0 ft. using a SUMA canister. Sample was sent to and analyzed by Zymax Envirotechnology, San Luis Obispo, CA.

Methane =

Pressurized methane gas encountered

SHEET 1 OF 4

AND DATE MEASURED: 5.9 (1094.9) 8/22/01

DEPTH TO BEDROCK: Not Encountered

REVIEWED BY: Joel Sturm

COMMENTS:

FA = 6-5/8" id x 10-1/2" od Mobile hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
NA = Not Available
NP = Nonplastic
NR = No Recovery

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-08-01

SHEET 2 OF 4

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,020.5 E 6,166,296.2

GROUND ELEVATION: 1100.8

BEGUN: 8/21/01 FINISHED: 8/23/01

TOTAL DEPTH: 64.8

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 5.9 (1094.9) 8/22/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						
	20	50	17	88	17	NP	NP	NA	(SM)g	1078.3		(GP-GM)s		21.0 to 22.6 ft. <u>Poorly Graded Sand with Silt (SP-SM)</u> : About 90% fine to coarse (predominantly fine), subrounded to subangular sand, crumbles with hammer blow; about 10% fines with low plasticity, toughness, and dry strength, and rapid dilatancy; trace of fine, subrounded to subangular, gravel, crumbles with moderate hammer blow; maximum size, 15 mm; wet; black; strong reaction with HCl; organic material present.	
											1079.8			22.6 to 22.7 ft. <u>Silty Clay (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCl.	
												(SP-SM)		22.7 to 27.4 ft. <u>Poorly Graded Sand with Silt (SP-SM)</u> : About 80% fine to coarse (predominantly fine), subrounded to subangular sand; about 10% fines with low plasticity, toughness, and dry strength, and rapid dilatancy; about 10% fine, subrounded to subangular, gravel, crumbles with moderate hammer blow; maximum size, 15 mm; wet; black; strong reaction with HCl; organic material present.	
												(CL/ML)	1078.2		
													1078.1	27.4 to 27.5 ft. <u>Silty Clay (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCl.	
	25	60										(SP-SM)		27.5 to 29.5 ft. <u>Poorly Graded Sand with Silt (SP-SM)</u> : About 90% fine to coarse (predominantly fine), subrounded to subangular sand; about 10% fines with low plasticity, toughness, and dry strength, and rapid dilatancy; trace of fine, subrounded to subangular, gravel, crumbles with moderate hammer blow; maximum size, 15 mm; wet; black; strong reaction with HCl; organic material present.	
														<u>Laboratory Data Interval:</u> 27.5 to 32.5 ft.	
												(CL/ML)	1073.4	29.5 to 32.5 ft. <u>Silty Sand, SM</u> : About 80% fine sand; maximum size, fine sand; about 20% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; wet; black; strong reaction with HCl; some organic material.	
													1073.3		
												(SP-SM)		32.5 to 34.0 ft. <u>Silty Sand, SM</u> : About 80% fine to coarse (predominantly medium), subrounded to subangular sand; about 10% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; about 10% fine and coarse, subangular, hard gravel; maximum size, 50 mm; wet; soft; dark gray to black; strong reaction with HCl; some organic material.	
													1071.3		
	30	100	88	32	0	NP	NP	NA	s(ML)					<u>Laboratory Data Interval:</u> 32.5 to 37.5 ft.	
												SM		34.0 to 34.3 ft. <u>Silty Clay (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; strong reaction with HCl.	
														34.3 to 35.9 ft. <u>Silty Sand, SM</u> : About 80% fine to coarse (predominantly medium), subrounded to subangular sand; about 10% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; about 10% fine and coarse, subangular, hard gravel; maximum size, 50 mm; wet; soft; dark gray to black; strong reaction with HCl; some organic material.	
													1068.3		
	90											SM			

COMMENTS:

FA = 6-5/8" id x 10-1/2" od Mobile hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District.
 Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-08-01

SHEET 3 OF 4

FEATURE: MATILJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,020.5 E 6,166,296.2

GROUND ELEVATION: 1100.8

BEGUN: 8/21/01 FINISHED: 8/23/01

TOTAL DEPTH: 64.8

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 5.9 (1094.9) 8/22/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						
	35	90	38	61	1	NP	NP	NA	SM	1083.3			(CL/ML) _{1086.5}		35.9 to 36.1 ft. <u>Silty Clay, (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCl.
													SM	1084.9	36.1 to 37.5 ft. <u>Silty Sand, SM</u> : About 80% fine to coarse (predominantly medium), subrounded to subangular sand; about 10% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; about 10% fine and coarse, subangular, hard gravel; maximum size, 50 mm; wet; soft; dark gray to black; strong reaction with HCl; roots, bark and other organic material present.
													SM	1083.3	
													SM		37.5 to 40.8 ft. <u>Silty Sand, SM</u> : About 75% fine to coarse (predominantly medium), subrounded to subangular sand; about 15% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; about 10% fine and coarse, subrounded to subangular, hard gravel; maximum size, 75 mm; wet; soft; dark gray to black; strong reaction with HCl; roots, bark and other organic material present.
	40	82											SM	1080.0	40.8 to 41.2 ft. <u>Silty Clay, (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCl.
													SM	(CL/ML) _{1059.6}	41.2 to 42.5 ft. <u>Silty Sand, SM</u> : About 75% fine to coarse (predominantly medium), subrounded to subangular sand; about 15% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; about 10% fine and coarse, subrounded to subangular, hard gravel; maximum size, 75 mm; wet; soft; dark gray to black; strong reaction with HCl; roots, bark and other organic material present.
												Qrs	SM	1058.3	
													SM	1058.8	42.5 to 44.0 ft. <u>Silty Sand, SM</u> : About 80% fine and medium sand (predominantly fine); about 20% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; wet; soft; dark gray; strong reaction with HCl; roots, bark and other organic material present.
	45	100	52	48	0	NP	NP	NA	s(ML)				(CL/ML) _{1056.3}		<u>Laboratory Data Interval:</u> 42.5 to 47.5 ft.
													SM		44.0 to 44.5 ft. <u>Silty Clay, (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCl.
													SM	1053.3	44.5 to 47.5 ft. <u>Silty Sand, SM</u> : About 70% fine and medium sand (predominantly fine); about 30% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; trace of coarse gravel; maximum size, 50 mm; wet; soft; dark gray; strong reaction with HCl; roots, bark and other organic material present.
													SM		47.5 to 49.4 ft. <u>Silty Sand, SM</u> : About 80% fine and medium sand (predominantly fine); about 20% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; trace of coarse gravel; maximum size, 50 mm; wet; soft; dark gray; strong reaction with HCl.
	50	100	43	57	0	NP	NP	NA	SM				(CL/ML) _{1051.4}		<u>Laboratory Data Interval:</u> 47.5 to 52.5 ft.
													SM	1049.8	

COMMENTS:

FA = 6-5/8" id x 10-1/2" od Mobile hollow stem flight augers

FADC = 5-foot split barrel continuous dry coring system

NA = Not Available

NP = Nonplastic

NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-08-01

SHEET 4 OF 4

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,020.5 E 6,166,296.2

GROUND ELEVATION: 1100.8

BEGUN: 8/21/01 FINISHED: 8/23/01

TOTAL DEPTH: 64.8

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 5.9 (1094.9) 8/22/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA								ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION							
		100	43	57	0	NP	NP	NA	SM	1048.3					49.4 to 50.2 ft. <u>Silty Clay, (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCl.	
												SM			50.2 to 55.3 ft. <u>Silty Sand, SM</u> : About 80% fine and medium sand (predominantly fine); about 20% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; trace of fine and coarse gravel; maximum size, 50 mm; wet; soft; dark gray; strong reaction with HCl.	
	55	100										Qrs		1045.5	55.3 to 57.5 ft. <u>Silty Clay, (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCl.	
												(CL/ML)			57.5 to 58.2 ft. <u>Silty Sand, SM</u> : About 80% fine and medium sand (predominantly fine); about 20% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; wet; soft; dark gray; strong reaction with HCl.	
														1043.3	<u>Laboratory Data Interval:</u> 57.5 to 59.7 ft.	
												SM		1042.6	58.2 to 59.0 ft. <u>Silty Clay, (CL/ML)</u> : About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sand; maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCl.	
		100	48	49	5	34	8	NA	SM			(CL/ML)		1041.8		
										1041.1		(SW)g		1041.1	59.0 to 59.7 ft. <u>Well Graded Sand with Gravel, (SW)g</u> : About 55% fine to coarse (predominantly medium), subrounded to subangular sand, crumbles with hammer blow; about 40% fine and coarse, subrounded to subangular, hard, gravel, maximum size, 75 mm; about 5% nonplastic fines with no dry strength, and rapid dilatancy; wet; strong reaction with HCl.	
	60														59.7 to 64.8 ft. <u>Quaternary Alluvium (Qal)</u>	
															59.7 to 64.8 ft. <u>Cobbles and Boulders</u> : Recovered pieces of broken core ranging in length from 1/2 inch to 8 inches of hard sandstone; interpreted as pre-Reservoir Alluvium (Qal); strong reaction with HCl.	
	92											Qal	COBBLES AND BOULDERS			
														1036.0		
BOTTOM OF HOLE																

COMMENTS:

FA = 6-5/8" id x 10-1/2" od Mobile hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDPH-09-01

SHEET 1 OF 4

FEATURE: MATILILJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT
LOCATION: Upstream of Matilija reservoir in delta area COORDINATES: N 2,003,112.7 E 6,166,456.5
BEGUN: 8/25/01 FINISHED: 8/27/01 TOTAL DEPTH: 68.8
DEPTH AND ELEVATION OF WATER LEVEL DEPTH TO BEDROCK: Not Encountered
AND DATE MEASURED: 7.1 (1093.5) 8/27/01

STATE: CALIFORNIA
WATER ELEVATION: 1100.6
ANGLE FROM HORIZONTAL: 90 AZIMUTH:
HOLE LOGGED BY: Greg Mongano
REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION										
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						ELEVATION									
<p>All MEASUREMENTS ARE IN FEET FROM GROUND SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Upstream of Matilija reservoir in delta area.</p> <p>DRILL RIG: Central Mining Equipment (CME 75)</p> <p>DRILLING & SAMPLING METHODS: 0.0 to 64.5 ft.: Drilled with 4-1/4-inch i.d. by 8-1/2 inch o.d. hollow stem flight augers and with 3-1/2 inch i.d. by 5-foot split barrel dry coring system (FADC). 64.5 to 68.8 ft.: Core drilling using a HWD-4 face discharge diamond bit with a 3.0 inch i.d. and 3.9 inch o.d. system.</p> <p>DRILLED BY: PN-Regional Drill Crew; C. Whisnant, Driller; D. Steinke, Helper.</p> <p>DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 64.5 ft.: fast and smooth 64.5 to 68.8 ft.: slow and rough Refusal with augers at 64.5 ft.</p> <p>CAVING CONDITIONS: 62.7 to 64.5 ft.: about 3.0 ft. of slough.</p> <p>ASING RECORD:</p> <table><tr><th>Casing Size</th><th>Casing Depth</th><th>Interval Drilled</th></tr><tr><td>4-1/4" FA</td><td>0.0 - 64.5 ft.</td><td>0.0 - 64.5 ft.</td></tr><tr><td>4-1/4" FA</td><td>64.5 ft.</td><td>64.5 - 68.8 ft.</td></tr></table> <p>HOLE COMPLETION: Backfilled hole with auger cuttings and surface material.</p> <p>DEPTH OF WATER: Date 08/27/01 Depth to Water 7.1 ft.</p>	Casing Size	Casing Depth	Interval Drilled	4-1/4" FA	0.0 - 64.5 ft.	0.0 - 64.5 ft.	4-1/4" FA	64.5 ft.	64.5 - 68.8 ft.	5	FAPB													0.0 to 64.5 ft. Quaternary Reservoir Sediments (Qrs)
	Casing Size	Casing Depth	Interval Drilled																					
	4-1/4" FA	0.0 - 64.5 ft.	0.0 - 64.5 ft.																					
	4-1/4" FA	64.5 ft.	64.5 - 68.8 ft.																					
																	0.0 to 7.7 ft. Poorly Graded Sand with Gravel, (SP/GP): About 45% fine to coarse, subrounded to subangular sand; about 45% fine and coarse, hard, subrounded to subangular gravel; about 5% subrounded, hard cobbles; maximum size, 80 mm; about 5% nonplastic fines with no dry strength and rapid dilatancy; dry; tan; strong reaction with HCl.							
																7.7 to 12.7 ft. Poorly Graded Sand with Silt, (SP-SM): About 80% fine to coarse, subrounded to subangular sand; about 10% fines with low toughness and plasticity, low dry strength, and rapid dilatancy; about 10% fine to coarse, subrounded to subangular gravel; wet; dark brown; strong reaction with HCl.								
																Laboratory Data Interval: 7.7 to 12.7 ft.								
																12.7 to 17.7 ft. Poorly Graded Sand with Gravel, (SP/GP): About 50% fine to coarse (predominantly medium), subrounded sand; crumbles with hammer blow; about 45% fine and coarse, hard, subrounded to subangular gravel; maximum size, 75 mm; about 5% nonplastic fines with no dry strength and rapid dilatancy; wet, dark gray, strong reaction with HCl.								
																Laboratory Data Interval: 12.7 to 17.7 ft.								
	10	NR														17.7 to 22.7 ft. Well Graded Sand with Silt, (SW-SM): About 85% fine to coarse, subrounded to subangular sand; about 10% non plastic fines with no dry strength and rapid dilatancy; about 5% fine and coarse, hard, subrounded to subangular gravel; maximum size, 20 mm; wet, gray to black, roots, bark and other organic material present; strong reaction with HCl.								
																22.7 to 31.2 ft. Silty Sand, SM: About 55% fine sand; maximum size, fine sand; about 45% fines with no to low toughness, plasticity and dry strength, and rapid dilatancy; wet; dark gray to black; trace of organic material; strong reaction with HCl.								
																Laboratory Data Interval: 22.7 to 27.7 ft.								
																31.2 to 31.7 ft. Sandy Silty Clay, s(CL/ML): About 60% fines with medium toughness, plasticity and dry strength, and slow to rapid dilatancy; about 40% fine sand; maximum size, fine sand; wet; soft; gray; trace of organic material; strong reaction with HCl.								
																31.7 to 33.4 ft. Poorly Graded Sand with Silt, (SP-SM): About 90% fine sand; maximum size, fine sand; about 10% nonplastic fines with no dry strength, and rapid dilatancy; wet; dark gray to black; trace of organic material; strong reaction with HCl.								
																Laboratory Data Interval: 32.7 to 37.7 ft.								
																33.4 to 34.0 ft. Peat, PT: About 90% organic matter of bark, roots, and wood fibers, looked like mulch; about 10% nonplastic fines with low dry strength and no dilatancy; wet; black; spongy consistency; organic odor.								
																34.0 to 36.0 ft. Silty Sand, SM: About 70% fine and medium sand; maximum size, medium sand; about 30% fines with low toughness, plasticity and dry strength, and rapid dilatancy; wet; dark gray; trace of organic material; strong reaction with HCl.								
	15																							

COMMENTS:

FA = 4-1/4" id x 8-1/2" od Mobile hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
FAPB = Flight Auger Pilot Bit
NA = Not Available
NP = Nonplastic
NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-09-01

SHEET 2 OF 4

FEATURE: MATILAJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,112.7 E 6,166,456.5

WATER ELEVATION: 1100.6

BEGUN: 8/25/01 FINISHED: 8/27/01

TOTAL DEPTH: 68.8

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 7.1 (1093.5) 8/27/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						
	20	90										(SW-SM)		36.0 to 37.1 ft. Sandy Silty Clay, s(CL/ML): About 65% fines with medium toughness, plasticity and dry strength, and slow to rapid dilatancy; about 35% fine sand; wet; soft to firm; gray; bark, wood, and other organic material; strong reaction with HCl.	
														37.1 to 37.7 ft. Poorly Graded Sand with Silt and Gravel, (SP-SM)g: About 70% fine sand; about 20% coarse, hard, subrounded to subangular gravel; maximum size, 70 mm; about 10% non plastic fines with no to low dry strength, and rapid dilatancy; wet; black; strong reaction with HCl.	
														37.7 to 40.0 ft. Silty Sand, SM: About 85% fine to coarse (predominantly fine), subrounded sand; about 15% nonplastic fines with no dry strength and rapid dilatancy; trace of fine, hard, gravel; maximum size, 25 mm; wet; dark gray to black; strong reaction with HCl.	
													1077.9	<u>Laboratory Data Interval:</u> 37.7 to 42.7 ft.	
	25	80	59	41	0	NP	NP	NA	s(ML)					40.0 to 40.1 ft. Silty Clay with Sand, (CL/ML)s: About 80% fines with medium toughness, plasticity and dry strength, and slow to rapid dilatancy; about 20% fine sand; maximum size, fine sand; wet; firm; gray; trace of organic material; strong reaction with HCl.	
														40.1 to 42.6 ft. Poorly Graded Sand with Silt, (SP-SM): About 90% fine to coarse (predominantly medium), subrounded sand; about 10% non plastic fines with no dry strength and rapid dilatancy; trace of fine, hard, gravel; maximum size, 25 mm; wet; dark gray to black; strong reaction with HCl.	
														42.6 to 42.7 ft. Silty Clay with Sand, (CL/ML)s: About 80% fines with medium toughness, plasticity and dry strength, and slow to rapid dilatancy; about 20% fine sand; maximum size, fine sand; wet; firm; gray; trace of organic material; strong reaction with HCl.	
														42.7 to 43.9 ft. Silty Sand, SM: About 65% fine sand; about 35% fines with no to low toughness, plasticity and dry strength, and rapid dilatancy; trace of fine, hard, gravel; maximum size, 25 mm; wet; soft; dark gray; spongy organic material present; strong reaction with HCl.	
														<u>Laboratory Data Interval:</u> 42.7 to 47.0 ft.	
	30	100												43.9 to 44.2 ft. Silty Clay with Sand, (CL/ML)s: About 80% fines with medium toughness, plasticity and dry strength, and slow to rapid dilatancy; about 20% fine sand; maximum size, fine sand; wet; firm; gray; trace of organic material; strong reaction with HCl.	
													1069.4	44.2 to 46.6 ft. Silty Sand, SM: About 65% fine sand; about 35% fines with no to low toughness, plasticity and dry strength, and rapid dilatancy; trace of fine, hard, gravel; maximum size, 25 mm; wet; soft; dark gray; spongy organic material present; strong reaction with HCl.	
														(SP-SM)	
														1067.2	
														PT	
														1066.6	
	35	90	45	55	0	NP	NP	NA	SM					SM	

COMMENTS:

1064.6

COMMENTS:

FA = 4-1/4" id x 8-1/2" od Mobile hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
FAPB = Flight Auger Pilot Bit
NA = Not Available
NP = Nonplastic
NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-09-01

SHEET 3 OF 4

FEATURE: MATILJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,112.7 E 6,166,456.5

WATER ELEVATION: 1100.6

BEGUN: 8/25/01 FINISHED: 8/27/01

TOTAL DEPTH: 68.8

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 7.1 (1093.5) 8/27/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	LABORATORY DATA								TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
		% CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION					
														48.2 to 48.4 ft. Peat, PT : About 90% organic matter of bark, roots, and wood fibers, looked like mulch; about 5% non plastic fines with low dry strength and no dilatancy; about 5% fine sand; wet; black; spongy consistency; organic odor.
											s(CL/ML)		1063.5	
											(SP-SM)g		1062.9	48.4 to 52.7 ft. Silty Sand, SM : About 65% fine sand; maximum size, fine sand; about 35% fines with no to low toughness, plasticity and dry strength, and rapid dilatancy; trace of fine, hard, subrounded to subangular gravel; maximum size, 20 mm; wet; soft; dark gray; black laminations of organic material up to 5 mm thick from 51.8 to 52.7 ft.; strong reaction with HCl.
											SM			
	40	100	38	63	1	NP	NP	NA	SM		(CL/ML)s		1060.5	52.7 to 55.0 ft. Poorly Graded Sand, SP : About 95% fine sand; maximum size, fine sand, about 5% non plastic fines with no dry strength and rapid dilatancy; wet; dark gray; strong reaction with HCl.
													1060.5	
											(SP-SM)			<u>Laboratory Data Interval:</u> 52.7 to 55.0 ft.
											(CL/ML)s		1058.0	55.0 to 57.7 ft. Poorly Graded Gravel with Silt and Sand, (GP-GMs) : About 60% fine and coarse (predominantly coarse), hard, subrounded to subangular, gravel; maximum size, 75 mm; about 30% fine to coarse (predominantly medium), subrounded sand; about 10% fines with low to medium plasticity, toughness, and dry strength, and rapid dilatancy; trace of fine and coarse, hard, gravel; maximum size, 25 mm; wet; dark gray to black; strong reaction with HCl.
													1057.9	
											SM			
											(CL/ML)s		1056.4	57.7 to 58.7 ft. Clayey Sand with Silt and Gravel, (SM-SC)g : About 60% fine to coarse (predominantly medium), subrounded sand; about 25% fines with medium toughness and plasticity, high dry strength and slow dilatancy; about 15% fine and coarse, hard, subrounded to subangular, gravel; maximum size, 65 mm; wet; gray and brown; strong reaction with HCl.
	45	84	53	42	5	NP	NP	NA	s(ML)				1054.0	<u>Laboratory Data Interval:</u> 57.7 to 62.7 ft.
											SM			
											(CL/ML)s		1053.7	58.7 to 62.5 ft. Lean to Fat Clay, (CL-CH) : About 95% fines with medium to high toughness and plasticity, high dry strength, and no dilatancy; about 5% fine sand; maximum size, fine sand; moist; firm to hard; gray; strong reaction with HCl.
													1054.0	
											SM			
											PT		1052.2	62.5 to 64.5 ft. Silty Sand, SM : About 85% fine to coarse, subrounded sand; about 15% fines with no to low toughness, plasticity and dry strength, and rapid dilatancy; trace of fine and coarse, hard, subrounded to subangular gravel; maximum size, 40 mm; wet; soft; gray to dark brown; strong reaction with HCl.
													1052.2	
														<u>Laboratory Data Interval:</u> 62.7 to 64.5 ft.
	50	56												64.5 to 68.8 ft. Quaternary Alluvium (Qal)
											SM			64.5 to 68.8 ft. Gravel, Cobbles and Boulders : Recovered pieces of broken core ranging in length from 1/2 inch to 5 inches of hard sandstone; interpreted as pre-Reservoir Alluvium (Qal); strong reaction with HCl.
													1047.9	
											SP			
													1046.6	
		21	79	0	NP	NP	NA	SM						

COMMENTS:

FA = 4-1/4" id x 8-1/2" od Mobile hollow stem flight augers

FADC = 5-foot split barrel continuous dry coring system

FAPB = Flight Auger Pilot Bit

NA = Not Available

NP = Nonplastic

NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-09-01

SHEET 4 OF 4

FEATURE: MATILAJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,112.7 E 6,166,456.5

WATER ELEVATION: 1100.6

BEGUN: 8/25/01 FINISHED: 8/27/01

TOTAL DEPTH: 68.8

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 7.1 (1093.5) 8/27/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE	LAB CLASSIFICATION						
	55	90								1045.6		SP		1045.6	
												(GP-GM)s			
										1042.9		(SM-SC)g		1042.9	
														1041.9	
	60	100	97	3	0	NP	NP	NA	ML		Qrs	(CL-CH)			
										1037.9					
		100	24	75	1	NP	NP	NA	SM			SM			
										1038.1					
	65														
		88									Qal	GRAVEL COBBLES AND BOULDERS			
														1031.8	

BOTTOM OF HOLE

COMMENTS:

FA = 4-1/4" id x 8-1/2" od Mobile hollow stem flight augers

FADC = 5-foot split barrel continuous dry coring system

FAPB = Flight Auger Pilot Bit

NA = Not Available

NP = Nonplastic

NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-10-01

SHEET 1 OF 3

FEATURE: MATILAJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,245.6 E 6,166,059.3

GROUND ELEVATION: 1101.4

BEGUN: 8/28/01 FINISHED: 9/4/01

TOTAL DEPTH: 58.1

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mangano

AND DATE MEASURED: 4.3 (1097.1) 8/28/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						

<p>ALL MEASUREMENTS ARE IN FEET FROM GROUND SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Upstream of Matilija reservoir in delta area.</p> <p>DRILL RIG: Central Mining Equipment (CME 75)</p> <p>DRILLING & SAMPLING METHODS: 0.0 to 54.3 ft.: Drilled with 4-1/4-inch i.d. by 8-1/2 inch o.d. hollow stem flight augers and with 3-1/2 inch i.d. by 5-foot split barrel dry coring system (FADC). 54.3 to 58.1 ft.: Core drilling using a HWD-4 face discharge diamond bit with a 3.0 inch i.d. and 3.9 inch o.d. system.</p> <p>DRILLED BY: PN-Regional Drill Crew; C. Whisnant, Driller; D. Steinke, Helper</p> <p>DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 54.3 ft.: fast and smooth 54.3 to 58.1 ft.: slow Refusal with augers at 59.3 ft.</p> <p>CAVING CONDITIONS: None</p> <p>ASING RECORD:</p> <table><tr><td>Casing Size</td><td>Casing Depth</td><td>Interval Drilled</td></tr><tr><td>4-1/4" FA</td><td>0.0 - 54.3 ft.</td><td>0.0 - 54.3 ft.</td></tr><tr><td>4-1/4" FA</td><td>54.3 ft.</td><td>54.3 - 58.1 ft.</td></tr></table> <p>HOLE COMPLETION: Backfilled hole with auger cuttings and surface material.</p> <p>DEPTH OF WATER: Date 08/28/01 Depth to Water 4.3 ft.</p>	Casing Size	Casing Depth	Interval Drilled	4-1/4" FA	0.0 - 54.3 ft.	0.0 - 54.3 ft.	4-1/4" FA	54.3 ft.	54.3 - 58.1 ft.														0.0 to 54.3 ft. <i>Quaternary Reservoir Sediments (Qrs)</i>
	Casing Size	Casing Depth	Interval Drilled																				
	4-1/4" FA	0.0 - 54.3 ft.	0.0 - 54.3 ft.																				
	4-1/4" FA	54.3 ft.	54.3 - 58.1 ft.																				
																0.0 to 4.5 ft. <u>Poorly Graded Sand with Gravel and Cobbles, (SP/GP)c</u> : About 35% fine to coarse, subrounded to subangular sand; about 35% fine and coarse, hard, subrounded to subangular gravel; about 25% subrounded, hard cobbles; maximum size, 300 mm; about 5% nonplastic fines with no dry strength and rapid dilatancy; dry; tan; strong reaction with HCl.							
																4.5 to 6.9 ft. <u>Silty Sand, SM</u> : About 65% fine to coarse (predominantly fine) sand; about 35% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; moist; brown; strong reaction with HCl.							
																<u>Laboratory Data Interval:</u> 4.5 to 7.8 ft.							
																6.9 to 7.8 ft. <u>Silt with Sand, (ML)s</u> : About 75% fines with medium toughness, plasticity and dry strength, and slow to rapid dilatancy; about 25% fine sand; maximum size, fine sand; wet; soft to firm; brown; trace of organic material; strong reaction with HCl.							
																7.8 to 11.3 ft. <u>Silty Sand, SM</u> : About 65% fine to coarse (predominantly fine) sand; about 35% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; trace of fine, subrounded to subangular gravel; maximum size, 20 mm; wet; brown; strong reaction with HCl.							
																<u>Laboratory Data Interval:</u> 7.8 to 12.8 ft.							
																11.3 to 12.8 ft. <u>Poorly Graded Sand with Silt, (SP-SM)</u> : About 90% fine to coarse (predominantly fine) sand; about 10% nonplastic fines with no dry strength, and rapid dilatancy; trace of fine, subrounded gravel; maximum size, 20 mm; wet; brown; trace of organic material; strong reaction with HCl.							
															12.8 to 13.3 ft. <u>Silty Sand, SM</u> : About 70% fine sand; maximum size, fine sand; about 30% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; wet; brown and gray; strong reaction with HCl.								
															<u>Laboratory Data Interval:</u> 12.8 to 17.8 ft.								
															13.3 to 16.1 ft. <u>Sandy Silt, s(ML)</u> : About 65% fines with low to medium toughness and plasticity, medium dry strength, and slow to rapid dilatancy; about 35% fine to coarse sand; maximum size, coarse sand; wet; soft; gray; trace of organic material; strong reaction with HCl.								
															16.1 to 17.8 ft. <u>Silty Sand, SM</u> : About 75% fine sand; maximum size, fine sand; about 25% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; wet; gray; strong reaction with HCl.								
															17.8 to 22.9 ft. <u>Poorly Graded Sand with Silt, (SP-SM)</u> : About 90% fine to coarse (predominantly fine), subrounded sand; crumbles with hammer blow; about 10% nonplastic fines with no dry strength, and rapid dilatancy; trace of fine, hard, subrounded gravel; maximum size, 20 mm; wet; dark gray to black; trace of organic material; strong reaction with HCl.								
															<u>Laboratory Data Interval:</u> 22.8 to 27.8 ft.								

<p>COMMENTS:</p> <p>FA = 4-1/4" id x 8-1/2" od Mobile hollow stem flight augers FADC = 5-foot split barrel continuous dry coring system NA = Not Available NP = Nonplastic NR = No Recovery</p>																<p>Datum = 83/88 Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.</p>															
---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

SHEET 1 OF 3

DRILL HOLE MDH-10-01

MATILAJA DRILL HOLE MATILAJA GDT 7/3/02 10:35:56 AM

SHEET 2 OF 3

STATE: CALIFORNIA

GROUND ELEVATION: 1101.4

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

HOLE LOGGED BY: Greg Mongano

REVIEWED BY: Joel Sturm

COMMENTS:

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-10-01

SHEET 3 OF 3

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,245.6 E 6,166,059.3

GROUND ELEVATION: 1101.4

BEGUN: 8/28/01 FINISHED: 9/4/01

TOTAL DEPTH: 58.1

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 4.3 (1097.1) 8/28/01

REVIEWED BY: Joel Sturm

DEPTH	% CORE RECOVERY	LABORATORY DATA								ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
		% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION							
84									1080.6		SM			38.5 to 40.8 ft. Silty Sand, SM: About 80% fine to coarse (predominantly fine) sand; about 15% nonplastic fines with no dry strength, and rapid dilatancy; about 5% fine, subrounded to subangular, hard, gravel; maximum size, 20 mm; wet; gray; strong reaction with HCl.	
											(ML)s				
											SM			40.8 to 41.4 ft. Silt with Sand, (ML)s: About 75% fines with low to medium toughness, plasticity and dry strength, and slow dilatancy; about 25% fine sand; maximum size, fine sand; wet; soft to firm; gray to black; trace of organics; strong reaction with HCl.	
											SP			41.4 to 42.8 ft. Silty Sand, SM: About 85% fine and medium (predominantly fine) sand; about 15% non plastic fines with no dry strength, and rapid dilatancy; trace of fine, subrounded, hard, gravel; maximum size, 15 mm; wet; gray; strong reaction with HCl.	
45	100										SM			42.8 to 44.0 ft. Poorly Graded Sand, SP: About 95% fine sand; maximum size, fine sand, about 5% non plastic fines with no dry strength and rapid dilatancy; wet; dark gray; strong reaction with HCl.	
											s(ML)			44.0 to 46.6 ft. Silty Sand, SM: About 80% fine to coarse (predominantly fine) sand; about 20% non plastic fines with no to low dry strength, and rapid dilatancy; trace of fine, subrounded, hard, gravel; maximum size, 20 mm; wet; gray; organic material present; strong reaction with HCl.	
											SP			46.6 to 47.8 ft. Sandy Silt, s(ML): About 70% fines with low toughness and plasticity, medium dry strength, and slow to rapid dilatancy; about 30% fine sand; maximum size, fine sand; wet; soft; gray to black; organic material present; strong reaction with HCl.	
50	18	11	89	0	NP	NP	NA	SP-SM						47.8 to 52.8 ft. Poorly Graded Sand, SP: About 95% fine sand; maximum size, fine sand, about 5% non plastic fines with no dry strength and rapid dilatancy; wet; dark gray; strong reaction with HCl.	
														<u>Laboratory Data Interval:</u> 47.8 to 52.8 ft.	
	100	10	51	39	NP	NP	NA	(SP-SM)g	1048.6		(GW-GM)s			52.8 to 54.3 ft. Well Graded Gravel with Silt and Sand, (GW-GM)s: About 70% fine and coarse, hard, subrounded, gravel; maximum size, 75 mm; about 20% fine to coarse (predominantly coarse) sand; about 10% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; wet; gray; strong reaction with HCl.	
									1047.1					<u>Laboratory Data Interval:</u> 52.8 to 54.3 ft.	
55														54.3 to 58.1 ft. Quaternary Alluvium (Qal)	
	84										Qal	GRAVEL COBBLES AND BOULDERS		54.3 to 58.1 ft. Gravel, Cobbles and Boulders: Recovered pieces of broken core ranging in length from 1/2 inch to 4 inches of hard sandstone; interpreted as pre-Reservoir Alluvium (Qal); strong reaction with HCl.	

BOTTOM OF HOLE

COMMENTS:

FA = 4-1/4" id x 8-1/2" od Mobile hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-11-01

SHEET 1 OF 3

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,509.5 E 6,165,690.2

GROUND ELEVATION: 1104.1

BEGUN: 9/8/01 FINISHED: 9/9/01

TOTAL DEPTH: 50.5

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 4.8 (1099.3) 9/08/01

REVIEWED BY: Joel Stumm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						

<p>All MEASUREMENTS ARE IN FEET FROM GROUND SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Upstream of Matilija reservoir in delta area.</p> <p>DRILL RIG: Central Mining Equipment (CME 75)</p> <p>DRILLING & SAMPLING METHODS: 0.0 to 31.6 ft.: Drilled with 6-5/8 inch i.d. by 10-1/2 inch o.d. hollow stem flight augers and with 5-3/4 inch i.d. by 5-foot split barrel dry coring system (FADC). 31.6 to 35.7 ft.: Core drilling using a HWD-4 face discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system. 35.7 to 45.5 ft.: Drilled with 6-5/8 inch i.d. by 10-1/2 inch o.d. hollow stem flight augers and with 5-3/4 inch i.d. by 5-foot split barrel dry coring system (FADC). 45.5 to 50.5 ft.: Core drilling using a HWD-4 face discharge diamond bit with a 3.0 inch i.d. and 3.9 inch o.d. system.</p> <p>DRILLED BY: PN-Regional Drill Crew; C. Whisnant, driller; D. Steinke, helper</p> <p>DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0 to 8.0 ft.: hard and rough 8.0 to 31.5 ft.: fast and smooth 31.5 to 50.5 ft.: rough Refusal with augers at 31.6 ft. and 45.5 ft.</p> <p>COMMENTS: This log is a composite of two drill holes, MDH-11-01 and MDH-11B-01. MDH-01-11 was completed to a depth of 35.7 ft., the hole was terminated in a cobble zone which was initially mistaken as Cal. MDH-11B-01 was completed about 10.0 ft. downstream (south) of MDH-01-11 to a depth of 50.5 ft. A pilot bit was used to a depth of 23.0 ft. on MDH-11B-01.</p> <p>CAVING CONDITIONS: 23.0 to 28.0 ft.: 0.8 ft. of slough 31.2 to 31.6 ft.: 0.7 ft. of slough</p> <p>CASING RECORD: <table><tr><th>Casing Size</th><th>Casing Depth</th><th>Interval Drilled</th></tr><tr><td>6-5/8" FA</td><td>0.0 - 31.6 ft.</td><td>0.0 - 31.6 ft.</td></tr><tr><td>6-5/8" FA</td><td>31.6 ft.</td><td>31.6 - 35.7 ft.</td></tr><tr><td>6-5/8" FA</td><td>35.7 - 45.5 ft.</td><td>35.7 - 45.5 ft.</td></tr><tr><td>6-5/8" FA</td><td>45.5</td><td>45.5 - 50.5 ft.</td></tr></table></p> <p>HOLE COMPLETION: Backfilled hole with auger cuttings and surface material.</p> <p>DEPTH OF WATER: Date Depth to Water 09/08/01 4.8 ft.</p>	Casing Size	Casing Depth	Interval Drilled	6-5/8" FA	0.0 - 31.6 ft.	0.0 - 31.6 ft.	6-5/8" FA	31.6 ft.	31.6 - 35.7 ft.	6-5/8" FA	35.7 - 45.5 ft.	35.7 - 45.5 ft.	6-5/8" FA	45.5	45.5 - 50.5 ft.	NR											(SP/GP)c		0.0 to 45.5 ft. Quaternary Reservoir Sediments (Qrs)
	Casing Size	Casing Depth	Interval Drilled																										
	6-5/8" FA	0.0 - 31.6 ft.	0.0 - 31.6 ft.																										
	6-5/8" FA	31.6 ft.	31.6 - 35.7 ft.																										
	6-5/8" FA	35.7 - 45.5 ft.	35.7 - 45.5 ft.																										
	6-5/8" FA	45.5	45.5 - 50.5 ft.																										
	5	30	32	47	21	NP	NP	NA	(SM)g						0.0 to 4.7 ft. Poorly Graded Sand with Gravel and Cobbles, (SP/GP)c: About 40% fine to coarse, subrounded to subangular sand; about 40% fine and coarse, hard, subrounded to subangular gravel; about 15% subrounded, hard cobbles; maximum size, 200 mm; about 5% nonplastic fines with no dry strength and rapid dilatancy; dry; tan; strong reaction with HCl.														
										1099.4					4.7 to 8.0 ft. Silty Sand with Gravel, (SM)g: About 50% fine to coarse (predominantly fine) sand; about 25% fines with no to low toughness, plasticity, and dry strength, and rapid dilatancy; about 25% fine and coarse, subrounded to subangular, hard, gravel; moist; brown; organic material present; strong reaction with HCl.														
											1098.1				Laboratory Data Interval: 4.7 to 8.0 ft.														
	10	90	12	74	14	NP	NP	NA	(SW-SM)g						8.0 to 9.5 ft. Well Graded Gravel with Sand, (GW)s: About 70% fine and coarse, hard, subrounded to subangular, gravel; maximum size, 70 mm; about 20% fine sand; about 10% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; moist; brown; strong reaction with HCl.														
										1094.6				Laboratory Data Interval: 8.0 to 13.0 ft.															
										1092.0				9.5 to 12.1 ft. Silty Sand with Gravel, (SM)g: About 65% fine to coarse sand; about 20% fine and coarse (predominantly fine), subrounded to subangular, hard, gravel; maximum size, 50 mm; about 15% nonplastic fines with no dry strength, and rapid dilatancy; wet; strong reaction with HCl.															
										1091.4				12.1 to 12.7 ft. Silty Sand, (ML/SM): Alternating lenses of silt and silty sand generally less than 10 mm thick; about 50% fine sand; maximum size, fine sand; about 50% fines with low toughness and plasticity, medium dry strength and rapid dilatancy; wet; soft; gray and brown; strong reaction with HCl.															
15	100	8	74	18	NP	NP	NA	(SW-SM)g						12.7 to 16.2 ft. Poorly Graded Gravel with Silt and Sand, (GP-GM)s: About 50% fine and coarse (predominantly fine), hard, subrounded to subangular, gravel; maximum size, 75 mm; about 40% fine to coarse (predominantly coarse), subrounded sand; about 10% nonplastic fines with no dry strength and rapid dilatancy; wet; gray; strong reaction with HCl.															
										1087.9				Laboratory Data Interval: 13.0 to 16.2 ft.															
														16.2 to 18.0 ft. Silty Sand, SM: About 65% fine sand; maximum size, fine sand; about 35% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; wet; brown; strong reaction with HCl.															
20	66													18.0 to 22.8 ft. Well Graded Gravel with Sand, (GW)sc: About 60% fine and coarse, hard, subrounded to subangular, gravel; about 35% fine to coarse (predominantly medium), sand; about 5% nonplastic fines with no dry strength and rapid dilatancy; trace of hard, subangular cobbles; maximum size, 250 mm; wet; brown; strong reaction with HCl.															
										1081.3				22.8 to 23.0 ft. Silt with Sand, (ML)s: About 85% fines with low to medium toughness, plasticity and dry strength, and slow to rapid dilatancy; about 15% fine sand; maximum size, fine sand; wet; soft to firm; brown; trace of organic material; strong reaction with HCl.															
		25	74	1	NP	NP	NA	SM																					
25										1079.6																			
	100																												

COMMENTS:

FA = 6-5/8" id x 10-1/2" od Mobile hollow stem flight augers
FADC = 5-foot split barrel continuous dry coring system
NA = Not Available
NP = Nonplastic
NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-11-01

SHEET 2 OF 3

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,509.5 E 6,165,690.2

GROUND ELEVATION: 1104.1

BEGUN: 9/8/01 FINISHED: 9/9/01

TOTAL DEPTH: 50.5

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 4.8 (1099.3) 9/08/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						
															23.0 to 24.5 ft. Silty Sand, SM: About 75% fine sand; about 25% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; trace of fine and coarse, subrounded gravel; maximum size, 25 mm; wet; gray; strong reaction with HCl.
										1077.1					
										(ML/CL)s					
										1076.4					
										SM					<u>Laboratory Data Interval:</u> 23.0 to 24.5 ft.
			92	8	0	42	16	NA	ML						
	30	80								1073.8					24.5 to 27.0 ft. Silty Sand, SM: About 60% fine sand; maximum size, fine sand; about 40% fines with low toughness and plasticity, low to medium dry strength, and rapid dilatancy; wet; gray; strong reaction with HCl.
			13	86	1	NP	NP	NA	SM	1072.9					
			8	38	56	NP	NP	NA	(GW-GM)s	1071.1					27.0 to 27.7 ft. Silty Clay with Sand, (ML/CL)s: About 85% fines with medium toughness, plasticity and dry strength, and slow dilatancy; about 15% fine sand; maximum size, fine sand; wet; soft to firm; gray; trace of organic material; strong reaction with HCl.
			12	79	9	NP	NP	NA	SW-SM						27.7 to 28.0 ft. Silty Sand, SM: About 60% fine sand; maximum size, fine sand; about 40% fines with low toughness and plasticity, low to medium dry strength, and rapid dilatancy; wet; gray; strong reaction with HCl.
	35	90								1068.6					28.0 to 30.5 ft. Silt with Sand, (ML)s: About 80% fines with low to medium toughness, plasticity and dry strength, and slow dilatancy; about 20% fine sand; maximum size, fine sand; wet; soft to firm; gray; trace of organic material; strong reaction with HCl.
															<u>Laboratory Data Interval:</u> 28.0 to 30.3 ft.
															30.5 to 31.5 ft. Silty Sand, SM: About 75% fine to coarse (predominantly fine) sand; about 25% non plastic fines with no dry strength, and rapid dilatancy; trace of fine, subrounded gravel; maximum size, 15 mm; wet; gray; strong reaction with HCl.
										1065.1					
															<u>Laboratory Data Interval:</u> 30.3 to 31.2 ft.
	40	100								1063.4					31.5 to 33.0 ft. Silty Gravel with Sand, (GW-GM)sc: About 40% fine and coarse, hard, subrounded to subangular, gravel; about 30% fine to coarse sand; about 20% hard, subrounded cobbles; maximum size, 150 mm; about 10 about 30% fine to coarse sand; nonplastic fines with no dry strength and rapid dilatancy; wet; gray; strong reaction with HCl.
										1062.6					
															<u>Laboratory Data Interval:</u> 31.5 to 33.0 ft.
										1061.1					
															33.0 to 35.5 ft. Silty Sand, SM: About 70% fine to coarse (predominantly coarse), subrounded to subangular sand; about 20% nonplastic fines with no dry strength and rapid dilatancy; about 10% fine, hard, subrounded gravel; maximum size, 15 mm; wet; dark gray to black; trace of organic material; strong reaction with HCl.
	45	NR													<u>Laboratory Data Interval:</u> 33.0 to 35.5 ft.
															35.5 to 39.0 ft. Well Graded Gravel with Silt and Sand, (GW-GM)s: About 70% fine and coarse, hard, subrounded to subangular gravel; about 20% fine to coarse (predominantly coarse), subrounded sand; about 10% nonplastic fines with no dry strength and rapid dilatancy; trace of subangular, hard cobbles; maximum size, 100 mm; wet; gray; strong reaction with HCl.
	80														
	50									1053.6					39.0 to 40.7 ft. Silty Sand, SM: About 65% fine sand; about 35% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; trace of fine, hard, subrounded gravel; maximum size, 10 mm; wet; gray; trace of organic material; strong reaction with HCl.

BOTTOM OF HOLE

COMMENTS:

FA = 6-5/8" id x 10-1/2" od Mobile hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-11-01

SHEET 3 OF 3

FEATURE: MATILILJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY
 LOCATION: Upstream of Matililja reservoir in delta area
 BEGUN: 9/8/01 FINISHED: 9/9/01
 DEPTH AND ELEVATION OF WATER LEVEL
 AND DATE MEASURED: 4.8 (1099.3) 9/08/01

PROJECT: VENTURA RIVER PROJECT
 COORDINATES: N 2,003,509.5 E 6,165,690.2
 TOTAL DEPTH: 50.5
 DEPTH TO BEDROCK: Not Encountered

STATE: CALIFORNIA
 GROUND ELEVATION: 1104.1
 ANGLE FROM HORIZONTAL: 90 AZIMUTH:
 HOLE LOGGED BY: Greg Mongano
 REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA								ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION							

COMMENTS:

FA = 6-5/8" id x 10-1/2" od Mobile hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88
 Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-12-01

SHEET 1 OF 2

FEATURE: MATILAJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,771.5 E 6,165,428.1

GROUND ELEVATION: 1104.3

BEGUN: 9/10/01 FINISHED: 9/11/01

TOTAL DEPTH: 41.2

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 4.4 (1099.9) 9/10/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION	
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION							
ALL MEASUREMENTS ARE IN FEET FROM GROUND SURFACE.																0.0 to 38.0 ft. Quaternary Reservoir Sediments (Qrs)
PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.		FAPB										(SP/GP)c				0.0 to 4.7 ft. <u>Poorly Graded Sand with Gravel and Cobbles, (SP/GP)c</u> : About 40% fine to coarse, subrounded to subangular sand; about 40% fine and coarse, hard, subrounded to subangular gravel; about 15% subrounded, hard cobbles; maximum size, 200 mm; about 5% nonplastic fines with no dry strength and rapid dilatancy; dry; tan; strong reaction with HCl.
LOCATION: Upstream of Matilija reservoir in delta area.																4.7 to 8.0 ft. <u>Poorly Graded Gravel with Sand, (GP)sc</u> : About 60% fine and coarse (predominantly coarse), subrounded to subangular, hard, gravel; about 20% fine to coarse sand; about 10% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; about 10% hard, subangular cobbles; maximum size, 450 mm; dry to moist; brown; strong reaction with HCl; wood, bark and other organics.
DRILL RIG: Central Mining Equipment (CME 75)	5										1099.6					
DRILLING & SAMPLING METHODS: 0.0 to 25.9 ft.: Drilled with 6-5/8-inch i.d. by 10-1/2 inch o.d. hollow stem flight augers and with 5-3/4 inch i.d. by 5-foot split barrel dry coring system (FADC). 25.9 to 30.7 ft.: Core drilling using a HWD-4 face discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system. 30.7 to 38.0 ft.: Drilled with 6-5/8-inch i.d. by 10-1/2 inch o.d. hollow stem flight augers and with 5-3/4 inch i.d. by 5-foot split barrel dry coring system (FADC). 38.0 to 41.2 ft.: Core drilling using a HWD-4 face discharge diamond bit with a 3.0 inch i.d. and 3.9 inch o.d. system.		67	7	28	67	NP	NP	NA	(GP-GM)s			(GP)sc				<u>Laboratory Data Interval:</u> 4.7 to 8.0 ft.
DRILLED BY: PN-Regional Drill Crew; C. Whisnant, driller; D. Steinke, helper.										1098.3						8.0 to 13.0 ft. <u>No Recovery</u>
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0 to 41.2 ft.: slow and rough Refusal with augers at 25.9 ft. and 38.0 ft.		NR														13.0 to 21.2 ft. <u>Well Graded Gravel with Sand, (GW)sc</u> : About 55% fine and coarse, hard, subrounded to subangular gravel; about 30% fine to coarse (predominantly coarse), subrounded sand; crumbles with hammer blow; about 10% hard, subangular cobbles; maximum size, 125 mm; about 5% nonplastic fines with no dry strength and rapid dilatancy; wet; gray; strong reaction with HCl.
CAVING CONDITIONS: 8.8 to 13.0 ft.: about 3.0 ft. of slough 30.7 to 33.0 ft.: about 2.5 ft. of slough	10															<u>Laboratory Data Interval:</u> 13.0 to 18.0 ft.
CASING RECORD: Casing Size Casing Depth Interval Drilled 6-5/8" FA 0.0 - 25.9 ft. 0.0 - 25.9 ft. 6-5/8" FA 25.9 ft. 25.9 - 30.7 ft. 6-5/8" FA 30.7 - 38.0 ft. 30.7 - 38.0 ft. 6-5/8" FA 38.0 38.0 - 41.2 ft.		FAPB														21.2 to 23.0 ft. <u>Sandy Silt, s(ML)</u> : About 55% fines with low to medium toughness and plasticity, medium dry strength, and rapid dilatancy; about 45% fine and medium sand; maximum size, medium sand; wet; soft; gray to black; trace of organic material; strong reaction with HCl.
HOLE COMPLETION: Backfilled hole with auger cuttings and surface material.																<u>Laboratory Data Interval:</u> 21.2 to 22.9 ft.
DEPTH OF WATER: Date 09/10/01 Depth to Water 4.4 ft.	15															23.0 to 24.0 ft. <u>Silty Sand, SM</u> : About 75% fine to coarse sand; about 15% fines with no to low toughness, plasticity, and dry strength, and rapid dilatancy; about 10% fine, subrounded gravel; maximum size, 20 mm; wet; gray; strong reaction with HCl.
		54	4	47	49	NP	NP	NA	(GW)s							<u>Laboratory Data Interval:</u> 23.0 to 24.0 ft.
										1088.3						24.0 to 25.4 ft. <u>Poorly Graded Gravel with Sand and Cobbles, (GP)sc</u> : About 75% fine and coarse (predominantly coarse), subrounded to subangular, hard, gravel; about 15% hard, subangular cobbles; maximum size, maximum size, 150 mm; about 10% fine to coarse sand; trace of nonplastic fines; wet; gray; strong reaction with HCl; wood, bark and other organics.
																25.4 to 25.9 ft. <u>No Recovery</u>
																25.9 to 30.7 ft. <u>Poorly Graded Gravel with Cobbles, (GP)c</u> : About 70% fine and coarse, subrounded to angular, hard, gravel; about 30% broken core fragments (hard, mechanically broken sandstone cobbles); trace of fine to coarse sand; wet; gray; strong reaction with HCl.
	20															30.7 to 33.0 ft. <u>No Recovery</u>
		70														

COMMENTS:

FA = 6-5/8" od x 10-1/2" od Mobile hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 FAPB = Flight Auger Pilot Bit
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District.
 Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDPH-12-01

SHEET 2 OF 2

FEATURE: MATILIJDA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

LOCATION: Upstream of Matilija reservoir in delta area

BEGUN: 9/10/01 FINISHED: 9/11/01

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 4.4 (1099.9) 9/10/01

PROJECT: VENTURA RIVER PROJECT

COORDINATES: N 2,003,771.5 E 6,165,428.1

TOTAL DEPTH: 41.2

DEPTH TO BEDROCK: Not Encountered

STATE: CALIFORNIA

GROUND ELEVATION: 1104.3

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

HOLE LOGGED BY: Greg Mangano

REVIEWED BY: Joel Sturm

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						

			64	36	0	NP	NP	NA	s(ML)	1081.4		s(ML)	1083.1	33.0 to 33.8 ft. Silty Sand, SM ; About 60% fine to coarse sand; about 30% fines with low to medium toughness and plasticity, medium dry strength, and rapid dilatancy; about 10% fine, subrounded gravel; maximum size, 15 mm; wet; gray; strong reaction with HCl.
			12	87	21	NP	NP	NA	(SW-SM)g	1080.3		SM	1081.3	33.8 to 34.6 ft. Silty Clay with Sand, (ML/CL)s ; About 80% fines with medium toughness, plasticity and dry strength, and slow dilatancy; about 20% fine sand; maximum size, fine sand; wet; soft to firm; gray; trace of organic material; strong reaction with HCl.
	42											(GP)sc	1080.3	<u>Laboratory Data Interval:</u> 33.8 to 34.6 ft.
	25	FAPB											1078.9	34.6 to 35.2 ft. Cobbles ; Recovered mechanically broken, hard, gray sandstone wedged in cutting shoe; strong reaction with HCl.
	46											(GP)c		35.2 to 38.0 ft. Well Graded Gravel with Sand, (GW)s ; About 65% fine and coarse, hard, subrounded to subangular gravel; about 25% fine to coarse (predominantly coarse), subrounded sand; about 10% nonplastic fines with no dry strength and rapid dilatancy; trace of subangular, hard cobbles; maximum size, 150 mm; wet; gray; strong reaction with HCl.
	30													38.0 to 41.2 ft. Quaternary Alluvium (Qal)
		FAPB											1073.6	38.0 to 41.2 ft. Gravel, Cobbles and Boulders ; Recovered pieces of broken core ranging in length from 1/4 inch to 3-inches of hard sandstone; interpreted as pre-Reservoir Alluvium (Qal); strong reaction with HCl.
	100		98	2	0	38	13	NA	ML	1069.7		SM	1070.5	
	35											(ML/CL)s	1069.7	
												COBBLES	1069.1	
	65											(GW)s		
	69												1066.3	
	40											Qal	GRAVEL, COBBLES AND BOULDERS	1063.1

BOTTOM OF HOLE

COMMENTS:

FA = 6-5/8" od x 10-1/2" od Mobile hollow stem flight augers

FADC = 5-foot split barrel continuous dry coring system

FAPB = Flight Auger Pilot Bit

NA = Not Available

NP = Nonplastic

NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-13-01

SHEET 1 OF 2

FEATURE: MATILIJIA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,927.1 E 6,165,205.6

WATER ELEVATION: 1104.5

BEGUN: 9/12/01 FINISHED: 9/13/01

TOTAL DEPTH: 32.5

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 3.7 (1100.8) 9/13/01

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						

<p>ALL MEASUREMENTS ARE IN FEET FROM GROUND SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Upstream of Matilija reservoir in delta area.</p> <p>DRILL RIG: Central Mining Equipment (CME 75)</p> <p>DRILLING & SAMPLING METHODS: 0.0 to 10.0 ft.: No core recovery, drilled with Flight Auger Pilot Bit 10.0 to 29.0 ft.: Drilled with 6-5/8 inch i.d. by 10-1/2 inch o.d. hollow stem flight augers and with 5-3/4 inch i.d. by 5-foot split barrel dry coring system (FADC). 29.0 to 32.5 ft.: Core drilling using a HWD-4 face discharge diamond bit with a 3.0 inch i.d. and 3.9 inch o.d. system.</p> <p>DRILLED BY: PN-Regional Drill Crew; C. Whisnant, Driller; D. Steinke, helper.</p> <p>DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 32.5 ft.: hard and rough; difficult drilling conditions through cobbles and boulders, drill rig rocking and augers screeching Refusal with augers at 29.0 ft.</p> <p>WING CONDITIONS: One</p> <p>CASING RECORD: Casing Size Casing Depth Interval Drilled 6-5/8" FA 0.0 - 29.0 ft. 0.0 - 29.0 ft. 6-5/8" FA 29.0 ft. 29.0 - 32.5 ft.</p> <p>HOLE COMPLETION: Backfilled hole with auger cuttings and surface material.</p> <p>DEPTH OF WATER: Date Depth to Water 08/14/01 13.3 ft.</p>	5	FAPB													0.0 to 29.0 ft. Quaternary Reservoir Sediments (Qrs)
															0.0 to 10.0 ft. No Recovery
															10.0 to 15.0 ft. Silty Sand with Gravel, (SM)g; About 50% fine to coarse, subrounded sand; about 25% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; about 25% fine and coarse (predominantly fine), subrounded to subangular, hard, gravel; wet; brown and gray; organic material present; strong reaction with HCl.
															Laboratory Data Intervals: 10.0 to 12.0 ft. 13.5 to 15.0 ft.
															15.0 to 18.0 ft. No Recovery
															18.0 to 23.0 ft. Well Graded Gravel with Silt and Sand, (GW-GM)s; About 70% fine and coarse, hard, subrounded gravel; maximum size, 70 mm; about 20% fine to coarse (predominantly coarse), subrounded sand; crumbles with hammer blow; about 10% fines with no to low toughness, plasticity, and dry strength and slow dilatancy; wet; brown; organic material present; strong reaction with HCl.
															Laboratory Data Interval: 18.0 to 23.0 ft.
															23.0 to 23.7 ft. Silty Gravel with Sand, (GM)s; About 50% fine and coarse (predominantly coarse), hard, subrounded gravel; maximum size, 75 mm; about 25% fine to coarse (predominantly fine) sand; about 25% fines with low plasticity, toughness, and dry strength and rapid dilatancy; wet; gray; strong reaction with HCl.
															Laboratory Data Interval: 23.0 to 26.5 ft.
															23.7 to 28.5 ft. Silty Sand, SM; About 60% fine to coarse sand; about 40% fines with low toughness and plasticity, medium dry strength, and rapid dilatancy; trace of mechanically broken subrounded to angular, hard cobbles; maximum size, 150 mm; wet; gray to black; organic material present; strong reaction with HCl.
	10		10	67	23	NP	NP	NA	(SW-SM)g	1092.5				Laboratory Data Interval: 26.5 to 27.7 ft.	
	90													28.5 to 29.0 ft. Silty Sand with Gravel, (SM)g; About 55% fine to coarse (predominantly fine), subrounded sand; about 40% fines with low toughness and plasticity, low to medium dry strength, and rapid dilatancy; about 5% fine, mechanically broken, subrounded to angular, hard, gravel; wet; gray to black; organic material present; strong reaction with HCl.	
			30	48	22	NP	NP	NA	(SM)g	1089.5				29.0 to 32.5 ft. Quaternary Alluvium (Qal)	
	15													29.0 to 32.5 ft. Gravel, Cobbles and Boulders: Recovered pieces of broken core ranging in length from 1/2 inch to 6 inches of hard sandstone; interpreted as pre-Reservoir Alluvium (Qal); strong reaction with HCl.	
	NR														

COMMENTS:

FA = 6-5/8" od x 10-1/2" od Mobile hollow stem flight augers
 FADC = 5-foot split barrel continuous dry coring system
 FAPB = Flight Auger Pilot Bit
 NA = Not Available
 NP = Nonplastic
 NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District.
 Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

MATILIJIA WATER DRILL HOLE MATILIJIA GPJ MATILIJIA GDT 7/3/02 10:35:56 AM

GEOLOGIC LOG OF DRILL HOLE NO. MDH-13-01

SHEET 2 OF 2

FEATURE: MATILJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY
LOCATION: Uppströmmen, 16 km north of Gäddede, Sweden

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir in delta area

COORDINATES: N 2,003,927.1 E 6,165,205.6

WATER ELEVATION: 1104.5

BEGUN: 9/12/01 FINISHED: 9/13/01

TOTAL DEPTH: 32.5

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 3.7 (1100.8) 9/13/01

REVIEWED BY: Joe Sturm															
DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION	
		% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION							
20	80	7	51	42	NP	NP	NA	(SM)g	1081.5	Qrs	(GW-GM)s	1081.5			
25	100	48	52	0	NP	NP	NA	SM	1078.0		(GM)s	1080.8			
		47	52	1	NP	NP	NA	SM	1078.8		SM				
120												1076.0	(SM)g	1075.5	
30	66									Qal	GRAVEL COBBLES AND BOULDERS				
BOTTOM OF HOLE															

BOTTOM OF HOLE

COMMENTS:

FA = 6-5/8" od x 10-1/2" od Mobile hollow stem flight augers

FADC = 5-foot split barrel continuous dry coring system

FAPB = Flight Auger Pilot Bit

NA = Not Available

NP = Nonplastic

NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-14-01

SHEET 1 OF 1

FEATURE: MATILAJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY

PROJECT: VENTURA RIVER PROJECT

STATE: CALIFORNIA

LOCATION: Upstream of Matilija reservoir pond in delta area

COORDINATES: N 2,004,057.0 E 6,164,977.8

GROUND ELEVATION: 1106.6

BEGUN: 9/13/01 FINISHED: 9/14/01

TOTAL DEPTH: 25.0

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LEVEL

DEPTH TO BEDROCK: Not Encountered

HOLE LOGGED BY: Greg Mongano

AND DATE MEASURED: 3.3 (1103.3) 9/14/01

REVIEWED BY: Joel Sturm

NOTES

ALL MEASUREMENTS ARE IN FEET FROM GROUND SURFACE.

PURPOSE OF HOLE:

Determine gradation and toxicity of sediments impounded behind Matilija Dam.

LOCATION:

Upstream of Matilija reservoir in delta area.

DRILL RIG:

Central Mining Equipment (CME 75)

DRILLING & SAMPLING METHODS:

0.0 to 21.5 ft.: Drilled with 6-5/8-inch i.d. by 10-1/2 inch o.d. hollow stem flight augers and with 5-3/4 inch i.d. by 5-foot split barrel dry coring system (FADC).

21.5 to 25.0 ft.: Core drilling using a HWD-4 face discharge diamond bit with a 3.0 inch i.d. and 3.9 inch o.d. system.

DRILLED BY:

PN-Regional Drill Crew; C. Whisnant, Driller; D. Steinke, Helper

DRILLING CONDITIONS AND DRILLER'S COMMENTS:

Had to replace broken spades and bullets on auger head that were damaged while drilling MDH-13-01.

0.0 to 25.0 ft.: slow and rough; difficult drilling conditions through cobbles and boulders, drill rig rocking and augers screeching. fusil with augers at 21.5 ft.

SAVING CONDITIONS:

0.0 to 10.0 ft.: about 2.1 ft. of slough

CASING RECORD:

Casing Size	Casing Depth	Interval Drilled
6-5/8" FA	0.0 - 21.5 ft.	0.0 - 21.5 ft.
6-5/8" FA	21.5	21.5 - 25.0 ft.

HOLE COMPLETION:

Backfilled hole with auger cuttings and surface material.

DEPTH OF WATER:

Date	Depth to Water
09/14/01	3.3 ft.

LABORATORY DATA

DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION
		% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION					
5	FAPB												
10		100	7	42	51	NP	NP	NA	(GW-GM)s				
									1094.7				
		100	9	35	58	NP	NP	NA	(GW-GM)s				
									1093.1				
15		62	4	23	73	NP	NP	NA	(GP)s				
									1088.6				
20		71	17	80	3	NP	NP	NA	SM				
									1085.1				
		34											
25													

BOTTOM OF HOLE

CLASSIFICATION AND PHYSICAL CONDITION

0.0 to 21.5 ft.

Quaternary Reservoir Sediments (Qrs)

0.0 to 10.0 ft. **No Recovery**: Predominantly Gravel and Cobbles with Sand and Boulders, this visual classification is based on an adjacent stream bank exposure and material seen from the surface after the augers were pulled. About 30% fine and coarse, subrounded, hard gravel; about 30% hard, subrounded cobbles, about 15% fine to coarse sand; about 15% hard, subrounded to subangular, boulders; maximum size, 15 inches; dry (surface) to wet; gray and brown; trace organics; strong reaction with HCl.

10.0 to 13.5 ft. **Well Graded Gravel with Sand, (GW)s**: About 70% fine and coarse, hard, subrounded to angular (mechanically broken) gravel; about 15% fine to coarse (predominantly coarse), subrounded to subangular sand; crumbles with hammer blow; about 15% fines with low plasticity, toughness, and dry strength, and rapid dilatancy; trace of hard, subrounded cobbles; maximum size, 125 mm; wet; gray; strong reaction with HCl.

Laboratory Data Intervals:

10.0 to 11.9 ft.

11.9 to 13.5 ft.

13.5 to 18.0 ft. **Well Graded Gravel with Sand, (GW)s**:

About 60% fine and coarse, hard, subrounded to angular (mechanically broken) gravel; about 30% fine to coarse (predominantly coarse), subrounded to subangular sand; crumbles with hammer blow; about 10% fines with low plasticity, toughness, and dry strength, and rapid dilatancy; trace of hard, subrounded cobbles; maximum size, 150 mm; wet; gray to black; organic material present; strong reaction with HCl.

Laboratory Data Interval:

13.5 to 18.0 ft.

18.0 to 21.5 ft.

18.0 to 21.5 ft. **Silty Sand, SM**: About 85% fine to coarse sand; maximum size, coarse sand; about 15% non plastic fines with no dry strength and rapid dilatancy; wet; gray to black; organic material present; strong reaction with HCl.

21.5 to 25.0 ft.

Quaternary Alluvium (Qal)

21.5 to 25.0 ft. **Gravel, Cobbles and Boulders**: Recovered pieces of broken core ranging in length from 1/2 inch to 5 inches of hard sandstone; interpreted as pre-Reservoir Alluvium (Qal); some silt present; strong reaction with HCl.

COMMENTS:

FA = 6-5/8" od x 10-1/2" od Mobile hollow stem flight augers

FADC = 5-foot split barrel continuous dry coring system

FAPB = Flight Auger Pilot Bit

NA = Not Available

NP = Nonplastic

NR = No Recovery

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

GEOLOGIC LOG OF DRILL HOLE NO. MDH-15-01

SHEET 1 OF 2

FEATURE: MATILIJDA DAM DECOMMISSIONING
LOCATION: Matilija Reservoir
BEGUN: 8/25/01 FINISHED: 8/27/01
DEPTH AND ELEVATION OF WATER LEVEL
AND DATE MEASURED: 0.0 (1087.2) 8/25/2001

PROJECT: VENTURA RIVER PROJECT
COORDINATES: N 2,001,671.8 E 616,254.3
TOTAL DEPTH: 91.0
DEPTH TO BEDROCK: Not Encountered

STATE: CALIFORNIA
WATER ELEVATION: 1087.2
ANGLE FROM HORIZONTAL: 90 AZIMUTH:
HOLE LOGGED BY: Mike McCulla
REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA							ELEVATION	*TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION						
<p>ALL MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.</p> <p>PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.</p> <p>LOCATION: Matilija Reservoir</p> <p>EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was the drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).</p> <p>DRILLING BARGE: The drilling barge has a max. load capacity of approximately 14,000 pounds and is comprised of three separate segments each having its own flotation cells and weighing between 4200 and 5200 pounds. Two of the three segments are connected via beams and king. The third segment is attached by s. The fully assembled barge is self propelled and is moved into position by a 35 hp outboard motor. The barge is secured at drilling sites by a four-point mooring system incorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.</p> <p>DRILL RIG: Ingersoll-Rand, Model A200</p> <p>DRILLING & SAMPLING METHODS: Drilling depth is measured from the water surface of the reservoir pond. The water / sediment interface in this hole is at a depth of 12.8 ft.</p> <p>12.8 to 18.0 ft.: Due to the presence of a loosely arranged, noncohesive sediment the sample was collected using a 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel pushed into the reservoir sediment.</p> <p>18.0 to 85.0 ft.: 3-3/4 inch i.d. by 7-1/4 inch o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring system (FADC) with a bullet bit. Auger refusal at 85.0 ft.</p> <p>85.0 to 91.0 ft.: Core drilling using a NWD-4 face discharge diamond bit with a 3.0 inch i.d. and 3.9 inch o.d. system.</p> <p>DRILLED BY: PN-Regional Drill Crew: Chris Peterson, driller; Jerry Hanson, helper and Mike Edmonson, helper</p>	5														0.0 to 12.8 ft. Reservoir Water Water Surface El. 1087.2 ft. 08/25/01
	10														12.8 to 85.0 ft. Quaternary Reservoir Sediment (Qrs)
	15	35	83	17	0	NP	NP	NA	(ML)s	1074.4		Water			12.8 to 17.8 ft. <u>Silt with Sand (ML)s</u> : About 85% fines with low to no plasticity, rapid dilatancy, high dry strength; about 15% fine sand; trace organics; maximum size, 20 mm (wood fragments); wet, dark gray, very soft; strong reaction with HCl.
	20	100								1089.2					<u>Laboratory Data Interval:</u> 12.8 to 18.0 ft.
	25	100	97	3	0	38	10	NA	ML	1089.4					17.8 to 28.0 ft. <u>Silt ML</u> : About 95% fines with low to medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine sand; moist to wet, gray, soft; except a lens of Silty Sand (SM) from 21.0 to 21.2 ft.; gas detector indicated 1% methane at the end of the run; strong reaction with HCl.
	30	100								1059.2					<u>Laboratory Data Interval:</u> 18.0 to 28.0 ft.
	35	92	96	4	0	58	28	NA	CL	1057.7					28.0 to 29.5 ft. <u>Lean Clay, CL</u> : About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
	40	100								1055.8					29.5 to 31.4 ft. <u>Silty Sand, SM</u> : About 60% fine sand; about 40% nonplastic fines, rapid dilatancy, low dry strength; trace organics; maximum size, fine sand; moist, dark gray to gray, soft; organics are in 6 mm lenses alternating with silty sand; strong reaction with HCl.
	45	100								1049.9					<u>Laboratory Data Interval:</u> 28.0 to 38.0 ft.
										1049.2					31.4 to 37.3 ft. <u>Lean Clay, CL</u> : About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; moist, gray, soft; except a lens of Silty Sand (SM) at 34.8 to 35.1 ft.; strong reaction with HCl.
										1047.0					37.3 to 38.0 ft. <u>Poorly Graded Sand, SP</u> : About 95% predominantly medium sand; about 5% nonplastic fines, rapid dilatancy, low dry strength; maximum size, medium sand; wet, gray, soft; gas detector indicated 1% methane at the end of the run; strong reaction with HCl.
										1044.2					38.0 to 40.2 ft. <u>Silty Sand, SM</u> : About 70% fine sand; about 30% nonplastic fines, rapid dilatancy, low dry strength; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
										1042.5					<u>Laboratory Data Interval:</u> 38.0 to 48.0 ft.
															40.2 to 43.0 ft. <u>Silt, ML</u> : About 90% fines with medium plasticity, slow to no dilatancy, high dry strength; about 10% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; a lens of organics from 40.0 to 40.3 ft.; strong reaction with HCl.
															43.0 to 44.7 ft. <u>Silty Sand, SM</u> : About 70% fine sand; about 30% nonplastic fines, rapid dilatancy, low dry strength; trace organics; maximum size, fine sand; moist, gray, soft; about 20% 1 to 2 mm diameter methane gas bubbles on the surface of the core from 44.0 to 44.2 ft.; strong reaction with HCl.

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

28.0 to 38.0 ft. 1% methane detected at the end of each run.

SHEET 1 OF 2 DRILL HOLE MDH-15-01

GEOLOGIC LOG OF DRILL HOLE NO. MDH-15-01

SHEET 2 OF 2

FEATURE: MATILIJIA DAM DECOMMISSIONING

LOCATION: Matilija Reservoir

BEGIN: 8/25/01 FINISHED: 8/27/01

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 0.0 (1087.2) 8/25/2001

PROJECT: VENTURA RIVER PROJECT

COORDINATES: N 2,001,671.8 E 516,254.3

TOTAL DEPTH: 91.0

DEPTH TO BEDROCK: Not Encountered

STATE: CALIFORNIA

WATER ELEVATION: 1087.2

ANGLE FROM HORIZONTAL: 90 AZIMUTH:

HOLE LOGGED BY: Mike McCulla

REVIEWED BY: Joel Sturm

NOTES	DEPTH	% CORE RECOVERY	LABORATORY DATA								ELEVATION	*TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION																														
			% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION																																					
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 12.8 ft.: water 12.8 to 18.0 ft.: pushed sample barrel into reservoir sediment without augers. 63.0 to 85.0 ft.: sample fell out, put sand finger basket (sample catcher) on and went back in and retrieved sample, continued drilling with sample catcher to 85.0 ft.; picked up traces of methane at 28.0 ft. and 38.0 ft. CAVING CONDITIONS: None ESTIMATED DRILLING FLUID RETURN: None used while the hole was advanced using flight augers. From 85.0 to 91.0 ft. clean reservoir water was used during diamond drilling. There was no casing below 85.0 ft. and drilling fluid during diamond drilling could not be monitored. Reservoir water was added to the inside of the flight augers each time the 5 ft. sample barrel was retrieved to keep sand from running in. CASING RECORD: <table><tr><td>Casing Size</td><td>Casing Depth</td><td>Interval Drilled</td></tr><tr><td>3-3/4" FA</td><td>0.0 - 85.0 ft.</td><td>0.0 - 85.0 ft.</td></tr><tr><td>3-3/4" FA</td><td>85.0 ft.</td><td>85.0 - 91.0 ft.</td></tr></table> HOLE COMPLETION: As the augers were pulled the hole was allowed to slough in on itself. PTH OF WATER: <table><tr><td>a</td><td>Depth of Water</td></tr><tr><td>8/25/01</td><td>12.8 ft.</td></tr></table> *TOXICITY SAMPLE INTERVALS: <table><tr><td>From</td><td>To</td></tr><tr><td>12.8 ft.</td><td>18.0 ft.</td></tr><tr><td>18.0 ft.</td><td>28.0 ft.</td></tr><tr><td>28.0 ft.</td><td>38.0 ft.</td></tr><tr><td>38.0 ft.</td><td>48.0 ft.</td></tr><tr><td>48.0 ft.</td><td>58.0 ft.</td></tr><tr><td>58.0 ft.</td><td>68.0 ft.</td></tr><tr><td>68.0 ft.</td><td>78.0 ft.</td></tr><tr><td>78.0 ft.</td><td>85.0 ft.</td></tr></table>	Casing Size	Casing Depth	Interval Drilled	3-3/4" FA	0.0 - 85.0 ft.	0.0 - 85.0 ft.	3-3/4" FA	85.0 ft.	85.0 - 91.0 ft.	a	Depth of Water	8/25/01	12.8 ft.	From	To	12.8 ft.	18.0 ft.	18.0 ft.	28.0 ft.	28.0 ft.	38.0 ft.	38.0 ft.	48.0 ft.	48.0 ft.	58.0 ft.	58.0 ft.	68.0 ft.	68.0 ft.	78.0 ft.	78.0 ft.	85.0 ft.															
	Casing Size	Casing Depth	Interval Drilled																																											
	3-3/4" FA	0.0 - 85.0 ft.	0.0 - 85.0 ft.																																											
	3-3/4" FA	85.0 ft.	85.0 - 91.0 ft.																																											
	a	Depth of Water																																												
	8/25/01	12.8 ft.																																												
	From	To																																												
	12.8 ft.	18.0 ft.																																												
	18.0 ft.	28.0 ft.																																												
	28.0 ft.	38.0 ft.																																												
	38.0 ft.	48.0 ft.																																												
	48.0 ft.	58.0 ft.																																												
	58.0 ft.	68.0 ft.																																												
	68.0 ft.	78.0 ft.																																												
	78.0 ft.	85.0 ft.																																												
	50	100								1039.2		ML		44.7 to 52.0 ft. <u>Silt, ML</u> : About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCl. <u>Laboratory Data Interval:</u> 48.0 to 58.0 ft.																																
			93	7	0	39	7	NA	ML		1035.2	SM		52.0 to 54.7 ft. <u>Silty Sand, SM</u> : About 70% fine sand; about 30% nonplastic fines, rapid dilatancy, low dry strength; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.																																
	55	96								1032.5				54.7 to 72.2 ft. <u>Silt, ML</u> : About 95% fines with medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl. <u>Laboratory Data Interval:</u> 58.0 to 68.0 ft. 68.0 to 78.0 ft.																																
										1029.2																																				
	60	100												72.2 to 73.5 ft. <u>Silty Sand, SM</u> : About 55% fine sand; about 45% nonplastic fines, rapid dilatancy, low dry strength; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.																																
			96	4	0	34	6	NA	ML			ML		73.5 to 78.0 ft. <u>Silt, ML</u> : About 95% fines with medium plasticity, no dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; 4 mm lenses of organics at 74.3 ft. and 75.6 ft.; strong reaction with HCl.																																
	65	66										Qrs		78.0 to 85.0 ft. <u>Lean Clay, CL</u> : About 95% fines with medium plasticity, no dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; lens of Silty Sand (SM) and organics from 81.2 to 81.3 ft.; strong reaction with HCl. <u>Laboratory Data Interval:</u> 78.0 to 85.0 ft.																																
										1019.2																																				
	70	100												85.0 to 91.0 ft. <u>Quaternary Alluvium (Qal)</u>																																
			99	1	0	38	9	NA	ML		1015.0	SM		85.0 to 91.0 ft. <u>Poorly Graded Gravel with Cobbles (GP)c</u> : About 55% coarse, hard, subangular gravel; about 45% 5 to 12 inch, hard, subangular cobbles; wet, gray, maximum size, 300 mm; any sand and silt that was present in the sediment was washed out during drilling and was not collected in the core barrel, one 11.4 inch size cobble was present with the gravel; strong reaction with HCl.																																
	75	100									1013.7		ML																																	
										1009.2																																				
	80	100																																												
			99	1	0	47	7	NA	ML			CL																																		
	85									1002.2																																				
	33											Qal (GP)c																																		
	90																																													

COMMENTS:

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers

FADC = 5-foot split barrel continuous dry coring system

NA = Not Available

NP = Nonplastic

NR = No Recovery

* See Toxicity Sample Intervals

Datum = 83/88

Materials testing was performed by the USACE Los Angeles District. Sediment toxicity analyses were performed by the Navy Environmental Chemistry Lab under a USACE contract. A summary of the sediment toxicity test results is contained in Appendix A.

28.0 to 38.0 ft. 1% methane detected at the end of each run.