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.

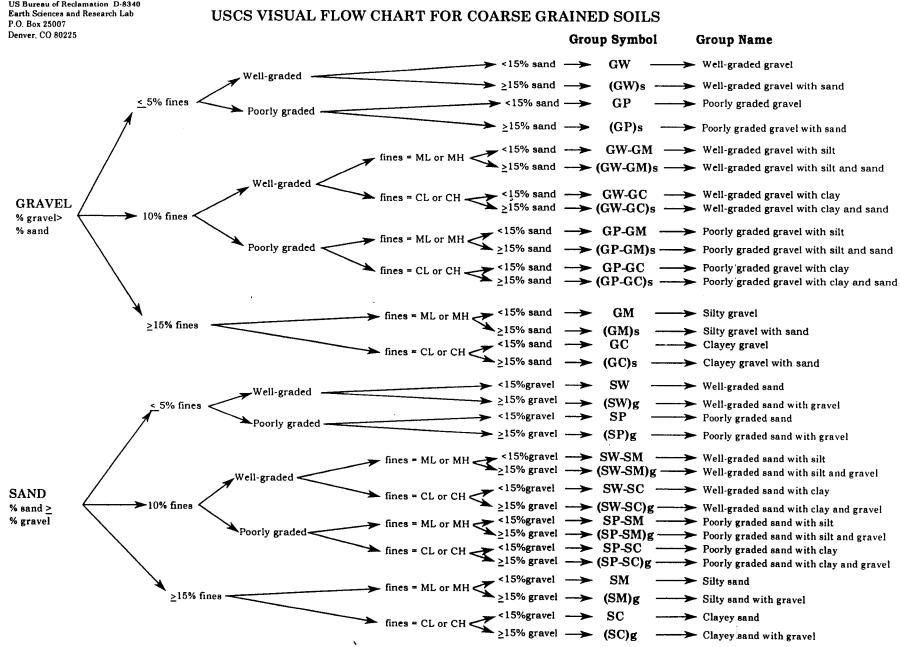
The geologist's field visual description is compared to the lab data (mainly gradation and plasticity data are compared). Where small differences occur (5 to 10%), size fraction percentages estimated by the geologist are typically adjusted to conform to the lab gradation data. Where larger or consistent 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).

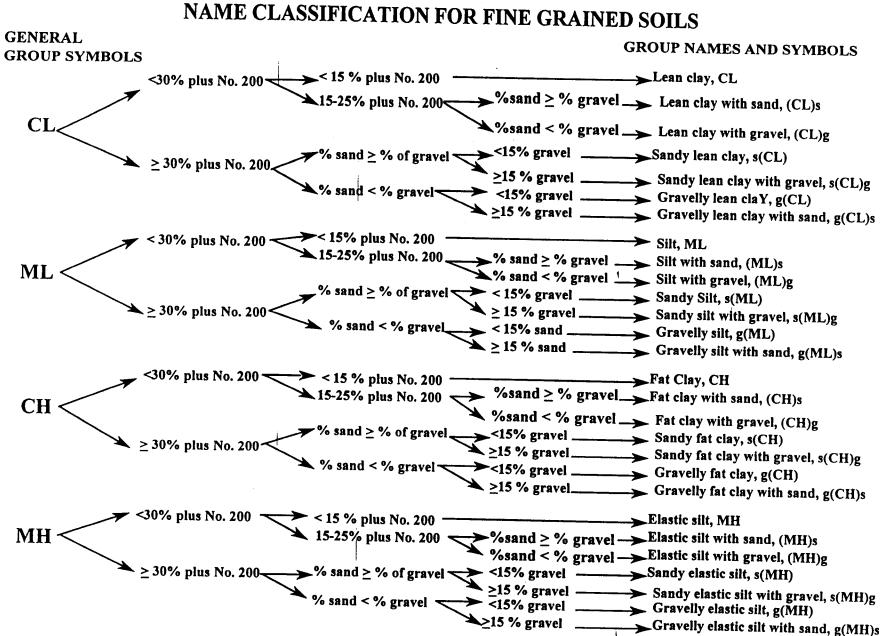
5. COMMENTS

Definitions of symbols and abbreviations and miscellaneous comments.

							GE	OLO	GICI	OG OF DRI	LLH	OLE NO). DH	-1		SHEET 1 OF
EATURE: MATILIJA DAM ECC OCATION: EGUN: FINISHED: EPTH AND ELEVATION OF WA AND DATE MEASURED:			STOR	ATION	FEASI	BILITY	STUD		COORI STATIO TOTAL	CT: VENTURA DINATES: DN AND OFFSE DEPTH: 35.0 I TO BEDROCK:	Г:	R PROJEC	т	I		STATE: CALIFORNIA GROUND ELEVATION: ANGLE FROM HORIZONTAL: AZIMUTH HOLE LOGGED BY: REVIEWED BY:
						ATOF				/	1	1	1	T		
					BOR		1		1	ATION	E	6	TIN	TION		CLASSIFICATION AND
NOTES	DEPTH	re Very	S	~	0	VEL			NT	SIFIC	\$/0.5	PT /S/F1	BOL	ISUAI SIFICA		PHYSICAL CONDITION
		% CORE RECOVERY	% FINES	% CLAY	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	MOISTURE	LABORATORY CLASSIFICATION ELEVATION	BLOWS / 0.5 FT	SPT (BLOWS / FT)	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	
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US Bureau of Reclamation D-8340



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 to10%.

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).

СОМРО	DSITE SAMP	PLE DATA (l	JSACE)	DISC	RETE SAMPI	LE DATA (Recla	mation)
SOIL TYPE	USCS SYMBOL	% SAND	% FINES	SOIL TYPE	USCS SYMBOL	% SAND	% FINES
				Silty Sand	SM	80	20
Silty Sand	SM	50	50	Silty Clay	CL/ML	10	90

A typical comparison showed the following:

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:

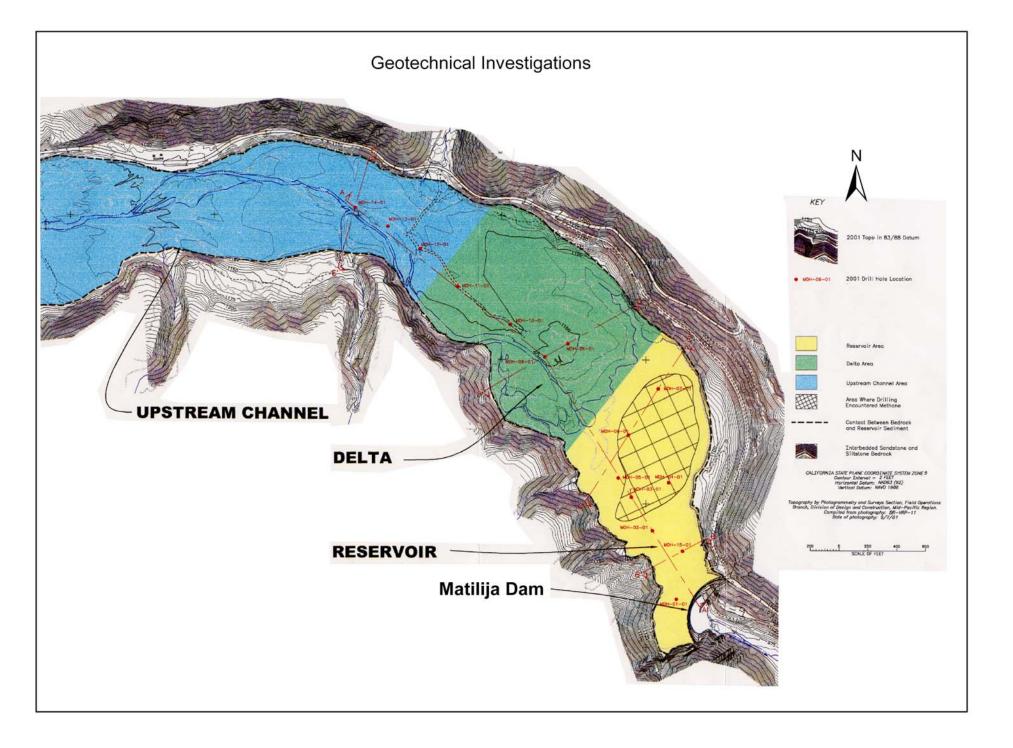
	FIELD VISUA	L CLASSIFICATION	LAB CLASSI	FICATION
DRILL HOLE	INTERVAL	USCS SYMBOL	INTERVAL	USCS SYMBOL
MDH-10-01	32.8 to 34.8	(GW-GM)s	32.8 to 37.8	(SP-SM)g
	34.8 to 38.0	SM		
MDH-11-01	12.7 to 16.2	(GP-GM)s	13.0 to 16.2	(SW-SM)g
MDH-13-01	18.0 to 23.0	(GP-GM)s	18.0 to 23.0	(SM)g

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.



GEOLOGIC L	OG OF DRILL HOLE NO. MDH-01-01	
LOCATION: Matilia Berenois	PROJECT: VENTURA RIVER PROJECT COORDINATES: N 2.001,337.1 E 6,167,210.6	STATE: CALIFORNIA WATER ELEVATION: ANGLE FROM HORIZO

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

Т Т T DEPTH TO BEDROCK: Not Encountered

1086.9 ONTAL: 90 AZIMUTH: HOLE LOGGED BY: Mike McCuila REVIEWED BY: Joel Sturm

SHEET 1 OF 2

			≿			LAB	OR.	ATO	RY	DATA	 		ES	ΗE			/	
NOTES	ЕРТН	%	CORE RECOVERY	EINES	SAND	6 GRAVEL	LIQUID LIMIT	LASTICITY	MOISTURE	CLASSIFICATION	/	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT	SYMBOL	VISUAL CLASSIFICATION	EVATION	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 7,600 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	5- - - - 		CORE	% FINE	% SAN	% GRA	LIQUID	PLASTI	% WIS		/	ELEVAT	TOXICITY	GEOL		/	1 EVA 1	PHYSICAL CONDITION 0.0 to 13.3 ft. Reservoir Water Water Suifface EI. 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 HCI. Laboratory Data Interval; 18.3 to 23.3 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 HCI. 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 HCI.
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 "ee segments are connected via beams and sking. The third segment is attached by ults. 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.	15	60 100	94	6	0		34	5 4	7.31	ML	1063.6				ML	- 	- - - - - - -	 Laboratory Data Interval: 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 HCI. 32.5 to 46.3 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 HCI.
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 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 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 ge quipment 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.		100 84 100	97	3	0	73	3 3	5 64.	.58 M		1053,6			Qrs	ML s(Mi	1055		Laboratory Data Interval: 38.3 to 43.3 ft. 46.3 to 43.3 ft. 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 HCI. 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 HCI. Laboratory Data Interval: 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 HCI. Laboratory Data Intervals: 58.3 to 63.3 ft. 68.3 to 73.3 ft.
W 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.: Comments, to collect a drive sample. 82.6 to 83.8 ft.: Comments, to collect a drive sample. 82.6 to 83.8 ft.: Comments, to collect a drive sample. 82.6 to 83.8 ft.: Comments and 2.980 o.d. system. Comments CA = Casing Advancer, no recovery poss FA = 3-3/4" id x 7-1/4" od CME hollow ste FADC = 5-foot split barriel continuous dry NA = Not Available NP = Nonplastic NR = No Recovery NX = 3-1/16 id x 3-1/2 od flush coupled call	ible m fligh coring		ers	15	0	38	6	47.4	(M		<u>943.6</u>			Da Ma See Ch	ateri dirr	n = 83/8 iais test ient tox	38 ting w b und	72.1 to 73.3 <u>Silt with Sand. (ML)s:</u> About 80% fines with low plasticity, slow dilatancy, high dry strength; bout 20% fine sand: maximum size, fine sand: trace imail diameter electrical wire up to 50 mm long; moist, ray, soft; strong reaction with HCl. as performed by the USACE Los Angeles District. nalyses were performed by the Navy Environmental er a USACE contract. A summary of the sediment is contained in Appendix A.

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

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT LOCATION: Matilija Reservoir

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

DEPTH AND ELEVATION OF WATER LEVEL

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

COORDINATES: N 2.001,337.1 E 6,167,210.6 TOTAL DEPTH: 83.8 DEPTH TO BEDROCK: Not Encountered

SHEET 2 OF 2 STATE: CALIFORNIA WATER ELEVATION: 1086.9 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Mike McCulla

REVIEWED 8Y: Joel Sturm

			~		L	ABC	DRA	TOF	RYI	DATA	1		S	E			/
NOTES	DEDTU	verun	CORE RECOVERY	% FINES	SAND	1		_	_	CLASSIFICATION		ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL		CLASSIFICATION AND PHYSICAL CONDITION
DRILLED BY: PN-Regional Dril Crew: Chris Peterson, driller, Jeny Hanson, helper and Kevin Herman, helper	4	5- 10	0														73.3 to 78.3 <u>Silt, ML</u> : About 95% fines with low to medium plasticity, slow dilatancy, high dry strength; about 5% fine sand i trace or regime.
DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 13.3 ft.: water															ML	1040.6	from 74.8 to 74.9 ft, dark gray, and a lens with 5% organics from 74.8 to 74.9 ft, dark gray, and a lens of Lean Clay (CL) from 76.4 to 76.5 ft, light gray; strong reaction with
13.3 to 58.3 ft.: soft 58.3 to 68.3 ft.: soft, smooth 68.3 to 73.3 ft.: soft 80.3 to 80.5 ft.: smooth, soft 80.5 to 81.1 ft.: very hard, NWD-4 82.6 to 83.8 ft.: hard, slow, blocked	50	- - ⁸⁶	91	9 1		o 2	29	3 4	7.08	ML						1038.0	 <u>Laboratory Data Interval:</u> 73.3 to 78.3 78.3 to 80.3 ft. <u>Silt with Sand. (ML)s:</u> About 85% These with low to medium placticity below 21 to 25%
CAVING CONDITIONS: 73.3 to 80.3 ft. The hole became too tight to continue rotation of the augers below 73.3 ft. The hole was not cased below the auger depth of 73.3 ft. and from there to 80.3 the	Î										1033	i.6					dry strength; about 10% predominantly fine sand; about 5% fine, hard, subrounded to subangular gravel; maximum size, 10 mm; moist, gray, soft, except a lens of Clayey Gravel (GC) from 78.8 to 78.9 ft.; strong – reaction with HCl.
hole sloughed in between samples. The hole was then cased to 80.5 ft.	55	88															- 80.3 to 81.1 ft. <u>No Recovery</u> - 81.1 to 83.8 ft. - Quaternary Alluvium (Qal)
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		<u> </u>						-									81.1 to 82.6 ft. <u>Poorty Graded Gravel with Silt and</u> <u>Sand. (GP-GM)s</u> : About 60% fine to coarse, hard, submunded gravel: about 30% fine to coarse, hard,
CASING RECORD: Casing Size Casing Depth Interval Drilled 3-3/4" FA 0.0 - 73.3 ft. 0.0 - 73.3 ft. "3/4" FA 73.3 ft. 73.3 - 80.3 ft. "16" NX 0.0 - 80.5 ft. 80.5 - 83.8 ft. 1/16" NX 80.5 ft. 80.5 - 83.8 ft.	60-	98	96	4	0	30	3	42	6 1	ML	1023.6	1	c	lrs .	ML		angular to subrounded sand; about 10% nonplastic fines, rapid dilatancy; maximum size, 60 mm; moist, gray to green-gray, firm; some of the rock was fractured to angular sand size particles during collection of the sample by pounding with a 140 lb. SPT weight; strong reaction with HCI.
REASON FOR HOLE TERMINATION: The hole was terminated upon successful completion of the investigation through the reservoir sediment (Qrs) and into the pre-dam alluvium (Qal).	65 -	100															broken core, each piece about 1 to 3-inches long (28 to 77 mm) of hard sandstone; interpreted as cobbles of pre-Reservoir Alluvium (Qal); strong reaction with HCI.
HOLE COMPLETION: As the augers were pulled the hole was allowed to slough in on itself.											·					F	
DEPTH OF WATER: Date Depth of Water 8/14/01 13.3 ft.	-	100	99	1	0	47	17	42	м	1L					101	4.8	
	-									· <u> </u>	<u>1013.6</u>			()	/L)s 101	<u>13.6</u> –	
	75	94	98	2	0	44	10	49.66	м	L				м	L	- -	
	8008	100 2A-7 NR			_					;	1008.6			(M	<u>1006</u> L)s 1006	┣	
		47 83						ł					Qa	-	P-GM)s 1004 BBLES 1003	\neg	
		_				E	3077	OM C	OF H	OLE			<u> </u>		1003	<u>ل</u> لن	

COMMENTS:

MATHLIA_WATER DRILLHOLE MATILLIA.GPJ MATILLIA GDT 7/3/02 10:35:56 AM

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.

FEATURE: MATILUA DAM ECORYSTE	MOES	TOO		G	ΕO	LO	GIC		OG	OF	DR	ILL	H	OLE	ΞN	NO. MD	H-02-01 SHEET 1 OF
FEATURE: MATILIJA DAM ECOSYSTE LOCATION: Matilija Reservoir	MRES	IORA	TION	N FEA	SIBI	LITY	STU	DY	PROJ	ECT:	VEN	TURA	RIV	/ER P	RO	JECT E 6, 167,044.9	STATE: CALIFORNIA
BEGUN: 8/18/01 FINISHED: 8/20/01											PTH:		.001,	,014./	(1	E 6,167,044.9	WATER ELEVATION: 1087.0 ANGLE FROM HORIZONTAL: 90 AZIMUTH
DEPTH AND ELEVATION OF WATER LE AND DATE MEASURED: 0.0 (1087		8/200	1					I	DEPTI	н то	BEDR	OCK:	No	ot Enc	our	ntered	HOLE LOGGED BY: Mike McCulla
		T				1.00		A T (REVIEWED BY: Joel Sturm
			/ERY			LAE						7	SAMPLES			NOI	/
NOTES			CO			ᆸ	TIMI	È	URE	ATION		'N	SAM		BOL 2		CLASSIFICATION AND
	11000		CORE RECOVERY	FINES	SAND	GRAVEL	LIQUID LIMIT	ASTIC	MOISTURE	LAB		ELEVATION	LOXICITY	EOLO	SYMBOL	VISUAL CLASSIFICATION	PHYSICAL CONDITION
AII MEASUREMENTS ARE IN FEET FROM		5	8	%	%	%	E	Ē	80	5	/	ELE	ě		, Y		
RESERVOIR SURFACE.		-															0.0 to 11.5 ft. Reservoir Water Water Surface El. 1087.0 08/18/01
PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.																	- 11.5 to 75.5 ft
LOCATION:		-															Quaternary Reservoir Sediment (Qrs) 11.5 to 13.0 ft. <u>No Recovery</u>
Matilija Reservoir	5	;															13.0 to 20.4 ft Sandy Silt statist About Store
EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment]														Water	low to no dry strength; shout 25% for anothing
were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane																	organics; maximum size, fine sand; wet, gray to brown,
from a dam access road, over inaccessible		4															ft., 17.0 to 17.1 ft.; lens of silty sand at 17.1 to 18.0 ft.; strong reaction with HCl.
The crane was a GROVE 120 ton crane with a 130 ft, boom, having a lifting capacity of	10	-															Laboratory Data Interval: 13.0 to 18.0 ft.
about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was]_						l								1075.5	
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			R				_										about 5% fine sand: maximum size, fine sand: maximum
and Cranes from Ventura, CA (phone number 800-400-4852).		-															 gray to brown, soft, strong reaction with HCI. 23.0 to 35.5 ft. Silt. ML; About 90% fines with low to
DRILLING BARGE:	15-	88	3 a	0 2	20	0	NP	NP	38.25	(ML)s	s						about 10% fine sand: trace organizes maximum size
The drilling barge has a max, load capacity of approximately 14,000 pounds and is	۲ -]													s((ML)	to 23.2 ft.; 4 mm varves of alternation lass along at
comprised of three separate segments each having its own floatation cells and weighing between 4200 and 5200 pounds. Two of the	-	+		+-	+						1069	.0					organics from 29.3 to 29.8 ft.; strong reaction with HCI. Laboratory Data Interval;
lecking. The third segment is attached by	20-																23.0 to 28.0 ft.
propelled and is moved into position by a 35 propelled and is moved into position by a 35 hp outboard motor. The barge is secured at		100													\vdash	1066.6	 35.5 to 37.7 ft. <u>Slity Sand, SM</u>: About 80% fine sand; about 20% nonplastic fines, rapid dilatancy;
aniling sites by a four-point mooring system	-														CL	-	 moist, gray, soft; strong reaction with HCl. 37.7 to 39.6 ft. Site. ML: About 90% fines with low plesticity along illustrations.
Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.	·]		\uparrow		+-	1-										1064.0	fine sand: maximum size, fine sand: moint arout 10%
DRILL RIG: Ingersoll-Rand, Model A200	25-	100	92													ļ	- brown, solt, strong reaction with HCI.
DRILLING & SAMPLING METHODS		100	92	8	0	4	2 1	3 5	7.52 N	۸Ľ		į					 39.6 to 40.9 ft. <u>Silty Sand, SM:</u> About 70% fine sand; about 30% nonplastic fines, rapid dilatancy; maximum particle size, fine sand; moist, gray, soft;
Drilling depth is measured from the water surface of the reservoir pond. The water (1059.0						strong reaction with HCI.
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	-							1					7	Qrs			- <u>Laboratory Data Interval:</u> 39.5 to 43.0 ft.
o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous day corigo	30-	64													ML	.	40.9 to 53.0 ft. Lean Clay, CL: About 90% fines with medium plasticity, slow to no dilatancy, high dry
to 23.0 ft, the augers and coring system users																ŀ	strength; about 10% fine sand; maximum particle size, fine sand; moist, gray, soft; lenses of silty sand at 43.0
equipment without rotating the augers. Error	4															Ľ	organics at 45.3 ft.; brown from 51.3 to 53.0 ft.; strong
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	-															-	reaction with HCI.
ace discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system.	35	100												-		1051.5	48.0 to 53.0 ft.
DRILLED BY:	4													s	SM	Ľ	53.0 to 56.6 ft. Sandy Silt, s(ML): About 70% nonplastic fines, rapid dilatancy; about 30%
PN-Regional Drill Crew: Chris Peterson, driller, Jerry Hanson, helper and Kevin Hermann, helper.	+													┝		1049.3	moist, gray, soft; predominantly medium sond from 52.0
DRILLING CONDITIONS AND DRILLER'S	40													N	ЛL.		to 53.5 ft.; strong reaction with HCl. 56.6 to 58.3 ft. <u>Silty Sand, SM:</u> About 80% fine
DO to 11.5 ft.; water		100	91	9	0	30								s	M	1046.1	maximum particle size, fine sand: moist array soft
3.0 to 23.0 ft.: pushed CAVING CONDITIONS:	+				Ū			38.0	D1 CL	•						F	strong reaction with HCI.
lone	1			-							1044.0					-	
COMMENTS:																	
FA = 3-3/4" id x 7-1/4" od CME hollow ste	em fligi	nt aug	jers													n = 83/88	
FADC = 5-foot split barrel continuous dry NA = Not Available NP = Nonplastic	coring	syste	em												uni		was performed by the USACE Los Angeles District. analyses were performed by the Navy Environmental
NR = No Recovery														0.16	CIII		ider a USACE contract. A summary of the sediment s is contained in Appendix A.

			6	EC	LO	GIC	; L(CG	OF	DRIL	LH	OL	EI	NO. 1	MDH	-02-01 SHEET 2 OF 2
FEATURE: MATILIJA DAM ECOSYSTEM LOCATION: Matilija Reservoir BEGUN: 8/18/01 FINISHED: 8/20/01 DEPTH AND ELEVATION OF WATER LEV AND DATE MEASURED: 0.0 (1087.)	/EL		ON FE	ASIB	ILITY	STUE	ז צו נ ד	PROJI COOR TOTAL	ECT: DINA ⁻ DEP	VENTU	JRA RI N 2,001 .0	VER ,814	1.7	UECT E 6,167,6		STATE: CALIFORNIA WATER ELEVATION: 1087.0 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Mike McCulla REVIEWED BY: Joel Sturm
NOTES	DEPTH	<u> </u>	_	% SAND	GRAVEL				CLASSIFICATION	•	ELEVATION	I UNIULT SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
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 fluid during coring could not be monitored. CASING RECORD: 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. HOLE COMPLETON: As the augers were pulled the hole was allowed to slough in on itself. DEPTH OF WATER: Date Depth of Water 8/18/01 11.5 ft.		- 94 - 78 - 78	97	3	0	44	13	3 2 4 8 .72	CL	1034	0		lins N	S(ML) 5M 1		 58.3 to 68.0 ft. <u>Silt, ML</u>: 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. <u>Laboratory Data Interval:</u> 63.0 to 68.0 ft. 68.0 to 75.5 ft. <u>Silt with Sand, (ML)s</u>: 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. <u>Laboratory Data Interval:</u> 73.3 to 75.5 ft. 75.5 to 81.0 ft. Quaternary Alluvium (Qal) 75.5 to 76.0 ft. <u>Poorly Graded Gravel with Sand and Cobbles, (GP)sc</u>; About 85% 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. 76.0 to 81.0 ft. <u>Boulders</u>; 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.
		43				80			HOLE	1011.5		Qa		101 P)sc 101 DULDER	s _	
						ь			TULE							

MATILIJA WATER DRILLHOLE MATILIJA GPJ MATILIJA 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 = 53/88 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-03-01

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT LOCATION: Matilija Reservoir

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

DEPTH AND ELEVATION OF WATER LEVEL

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

COORDINATES: N 2.002,047.6 E 6,166,898.8 TOTAL DEPTH: 68.3 DEPTH TO BEDROCK: Not Encountered

SHEET 1 OF 2 STATE: CALIFORNIA WATER ELEVATION: 1086.9 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Mike McCulla REVIEWED BY: Joel Sturm

				 >	<u> </u>		1 4 5			pv r	DATA		l vi	<u> </u>			71
·	1			VER		1						7	PLE	IN	lion	/	/
	NOTES		_	% RECO	s		Ē	LIMIT	Ľ N X	In the	CATIO	NO	SAN	D00	FICA		CLASSIFICATION AND
			DEPTH	CORE RECOVERY	% FINES	SAND	% GRAVEL	aup	ASTI	MOIS	LAB CLASSIFICATION	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL	/	PHYSICAL CONDITION
	All MEASUREMENTS ARE IN FEET FROM			<u> </u>	*	%	*	Ĕ	۲ ۲	*0	ರ/	ŭ	ĝ	Y		/	
	RESERVOIR SURFACE.		-						i								0.0 to 9.6 ft. Reservoir Water Water Surface El. 1086.9 08/21/01
	PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.		4														9.6 to 68.3 ft.
	LOCATION:		-														<i>Quaternary Reservoir Sediment (Qrs)</i> 9.6 to 13.3 ft. <u>No Recovery</u>
	Matilija Reservoir		-														13.3 to 18.3 ft Sandy Silt (MI) to About Cont a
	EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment		5								•				Water		about 35% fine sand: trace organizer and dilatancy, no dry strength;
	PN-Region via trucks. The barries drill no		-														13.3 to 14.2 ft; lens of lean clay with sold from
- 1	and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond.		-														- 13.3 ft., strong reaction with HCI.
1	The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of		1														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
	about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was		1_													1077.3	song in about 10% line 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
	the drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The	10	7														from 23.3 to 24.4 ft; strong reaction with HCI.
	company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number 800-400-4852).			R													Laboratory Data Interval: 23.3 to 28.3 ft.
	DRILLING BARGE:]														29.5 to 30.6 ft. <u>Silty Sand, SM:</u> About 60% fine sand; about 40% nonplastic fines, rapid dilatancy;
	The drilling barge has a max. load capacity of		1														several 6 mm lenses of ormanic material from 20 c.
	comprised of three separate segments each laving its own floatation cells and weighing	15															 30.5 ft. and one 5 mm lens at 30.2 to 30.4 ft.; strong reaction with HCI.
15	between 4200 and 5200 pounds. Two of the bree segments are connected via beams and cking. The third segment is attached by		88												ML)s		30.6 to 34.3 ft. Silt. ML: About 90% fines with low to
٦	popelled and is moved into position by a 35		4												,-	ĺ	 medium plasticity, slow dilatancy, high dry strength; about 10% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCi.
d	rilling sites by a four-point mooring system		-													068.6	Laboratory Data Interval: 33.3 to 38.3 ft.
	corporating deck winches, cables and panforth anchors (soft bottom anchors) each reighing approximately 30 pounds.		-												'	000.0	
	RILL RIG:	20-	1													ļ	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;
	igersoll-Rand, Model A200	-	100													┝	stong reaction with HCI.
	RILLING & SAMPLING METHODS: rilling depth is measured from the water	-	1													╞	38.3 to 47.0 ft. <u>Silt, ML:</u> About 90% fines with medium plasticity, slow to no dilatancy, high dry
50	urface of the reservoir pond. The water / adiment interface in this hole is at a depth of 6 ft.	-	1	╇	+	+-		+	-				Q	15		┝	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 HCI.
10.	6 to 68.3 ft.; 3-3/4 inch i.d. by 7-1/4 inch d. flight augers with 3-inch i.d. by 3-1/2 o.d.		1											м	L	-	Laboratory Data Interval:
5	stem (FADC) with a bullet bit From 9.6 to	20-	100	95	5	0	41	10	NA	ML						F	. 38.3 to 48.3 ft.
D.	3.3 ft. the augers and coring system were ished into the sediment by the drilling uppment without rotating the augers. From	_									•					F	47.0 to 49.6 ft. <u>Silty Sand, SM:</u> About 60% fine sand: about 40% nonplastic fines, rapid dilatancy;
110	.3 to 68.3 ft. the augers were rotated.	_														F	moist, gray, soft; strong reaction with HCI. 49.6 to 53.8 ft. Lean Clay, CL: About 95% fines with
I Ph	RILLED BY: I-Regional Drill Crew: Chris Peterson,	-			1	\top	1	1			1058.6					F	strength; about 5% fine sand; trace organize; maximum
Ec	iller, Jerry Hanson, helper and Mike Imonson, helper	30-												SM		57.4	particle size, fine sand; moist, gray, soft; strong reaction with HCl.
DF	RILLING CONDITIONS AND DRILLER'S	4	1 00											-	105	58.3	Laboratory Data Interval: 53.3 to 58.3 ft.
0.0 9.6	to 9.6 ft.: water to 18.5 ft.: pushed	-														Ļ	53.8 to 54.8 ft. Sandy Silt s(AH): About 559/
	VING CONDITIONS:	4				<u> </u>								ML		L	predominantly fine sand: trace organize: maximum size
No		-													105		64 mm by 28 mm (wood fragment); moist, gray, soft; strong reaction with HCl.
	:	35-			_											-	54.8 to 58.1 ft. <u>Silt. ML:</u> About 90% fines with medium plasticity, slow dilatancy, high dry strength;
		4	86	95	5	0	NP	NP	NA	ML				SM			about 10% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCI.
)														<u> </u>			_
	FA = 3-3/4" id x 7-1/4" od CME hollow ster FADC = 5-foot split barrel continuous dry o NA = Not Available	m flig corine	iht aug g syste	gers em										Mate	m = 83 mals te	stina v	vas performed by the USACE Los Angeles District.
	NP = Nonplastic NR = No Recovery													Cher	nistry L	ab un	analyses were performed by the Navy Environmental der a USACE contract. A summary of the sediment is contained in Appendix A.
	<i>,</i>													بها الحب	.,	. counts	na contained in Appendix A.

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

	FEATURE: MATHUA DAM ECONVOTE			(GEO	CLC	GI	CL	.00	OF	DRIL	L	IOL	E	NO. M	DH	-03-01				SHEET	2 05	. 2
	FEATURE: MATILIJA DAM ECOSYSTEN LOCATION: Matilija Reservoir BEGUN: 8/21/01 FINISHED: 8/22/01 DEPTH AND ELEVATION OF WATER LEV AND DATE MEASURED: 0.0 (1086.9	/EL		ONF	EASI	BILIT	Y STI	JDY	PRO COC TOT,	JECT: IRDINA AL DEI	VENTUR	RA R 2,00 3	IVER 2.047	PR(.6	DJECT E 6,166,896			STATE: WATER E ANGLE FI HOLE LO	LEVATIO ROM HOI GGED BY	DN: 1086 RIZONTAL 1: Mike M	.9 L: 90 IcCuila	AZIMUT	
 -				¥.		LA	BOI	_		DAT			LES	LIN .	Z	_7	·	REVIEWE	DBY: J	oel Sturm			
	NOTES.	DEPTH	%	" EINER	% SAND	% GRAVEI		PLASTICITY	NDEX % MOISTURE	CONTENT LAB CLASSIFICATION	EI EVATION		TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	C Pł	LASSII HYSIC/					
	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.	40-									1048.6					48.6	58.1 to 62.8 with low to strength; at sand; moist methane ga	no plasticit cout 40% fi , gray, soft is bubbles	y, slow t ne sand; ; about 1 in the se	o rapid di maximun	latancy, n size, fi	high dry ne	,
	CASING RECORD: <u>Casing Size</u> <u>Casing Depth</u> <u>Interval Drilled</u> 3-3/4* FA 0.0 - 68.3 ft. 0.0 - 68.3 ft. REASON FOR HOLE TERMINATION:	+0	100															ft. <u>Silt, Mi</u> sticity, slov ine sand; t	About dilatan race org:	: 90% fine cy, high d anics; ma	es with iry streng	ith; ize,	
L F	The hole was terminated for safety reasons pon encountering large quantities of ressurized methane gas at a depth of 68.3	45-	 	49	51	0	NP	NP	NA	SM					ML		pressurized - and ended ti -	methane p he hole; str	ocket at ong read	68.3 ft., s tion with	topped c HCI.	frilling	
A a D D	Sthe augers were pulled the hole was llowed to slough in on itself. EPTH OF WATER: <u>ate Depth of Water</u> 3/21/01 9.6 ft.	-	100								1038.6				1035	<u></u>	- , ,			•			
	9.0 IL		100												5M 1037	. <u>3</u>	•						
_		-											Qr		L	1							
		55	100	80	20	0	NP	NP	NA	(ML)s				s(M	ML) <u>1032.</u> -								
						_					1028.6	_			1028.8	┝╴ ╩┽╍ ┝╴							
		60	100											s()	ML)								
															1024.1								
			70										alu,	ML									
	L		··												1018.6							1	

BOTTOM OF HOLE

OMMENTS:

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

Methane = Pressurized methane gas encountered

Datum = 83/88

SHEET 2 OF 2 DRILL HOLE MDH-03-01

Datim = 53/88 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	F DRILL HOLE NO. MDH-04-01

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT LOCATION: Matilija Reservoir COORDINATES: N 2.002,149.6 E 6,167,157.6 BEGUN: 8/23/01 FINISHED: 8/23/01

DEPTH AND ELEVATION OF WATER LEVEL

TOTAL DEPTH: 33.0

DEPTH TO BEDROCK: Not Encountered

SHEET 1 OF 2 STATE: CALIFORNIA WATER ELEVATION: 1087.0 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Mike McCulla DEVICACE OV

	AND DATE MEASURED: 0.0 (1087.0) 8/23	VO1						-				JUN.	NOL	Enco	unter	ea			HOLE LOGGED BY: Mike McCulla REVIEWED BY: Joel Sturm
· .			Τ	<u>ک</u>			LAB	OR/	ATC	RY	DAT	4		ES	Ę		z		71	
)	NOTES	ОЕРТН	*	CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY	% MOISTURE	CUNIENI LAB CLASSIFICATION		ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT	VISHA	CLASSIFICATION	/	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
	AII MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.										1					1				0.0 to 11.1 ft. Reservoir Water
	PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.																			Water Surface El. 1087.0 08/23/01 11.1 to 33.0 ft. Quaternary Reservoir Sediment (Qrs) 11.1 to 13.0 ft. <u>No Recovery</u>
	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 he 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 (obnen number	5-														w	ater	1075.9		 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 HCI. 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 HCI. 19.7 to 28.7 ft. Lean Clay, Clay About 05% for sand; maximum size, fine sand; moist, brown to gray, soft, strong reaction with HCI.
	DRILLING BARGE: The drilling barge has a max, load capacity of pproximately 14,000 pounds and is omprised of three separate segments each aving its own floatation cells and weighing etween 4200 and 5200 pounds. Two of the "ree segments are connected via beams and king. The third segment is attached by _its. The fully assembled barge is self ropelled and is moved into position by a 35 p outboard motor. The barge is secured at rilling sites by a four-point mooring system corporating deck winches, cables and anforth anchors (soft bottom anchors) each	-	NR 70	69	31	0		IP I	NP	NA	s(ML)	1069.	0			s(MI	-)			medium plasticity, slow to rapid dilatancy, high dry strength; about 5% fine sand; maximum particle size, fine sand; moist, gray, soft; lens of sitly sand (SM) at 25.7 to 25.9 ft; strong reaction with HCI. 28.7 to 33.0 ft. <u>Sandy Sitt, s(ML)</u> : 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 HCI. <u>Laboratory Data Interval</u> : 28.0 to 33.0 ft.
D In	eighing approximately 30 pounds. RILL RIG: gersoli-Rand, Model A200 RILLING & SAMPLING METHODS:	 20	100													(ML)	5	067.3		
D su se	rilling depth is measured from the water urface of the reservoir pond. The water / idiment interface in this hole is at a depth of 1 ft													Ċ)rs					
o. by sy	.1 to 33.0 ft.: 3-3/4 inch i.d. by 7-1/4 inch d. flight augers with 3-inch i.d. by 3-1/2 o.d. / 5-foot split barrel continuous dry coring stem (FADC) with a bullet bit.	25														CL			-	
10:35:56 FI - FI FI - FI FI FI FI FI FI FI FI FI FI FI FI FI F	RILLED BY: -Regional Drill Crew: Chris Peterson, iller, Jerry Hanson, helper and Mike imonson, helper		100																-	
	RILLING CONDITIONS AND DRILLER'S DMMENTS: D to 11.1 ft.; water	+							_				4						-	
8	WING CONDITIONS:	-													-		105	<u>i8.3</u>	-	
Td9 the	TIMATED DRILLING FLUID RETURN: ne used; advanced hole with flight augers. servoir water was added to the inside of flight augers each time the 5 ft. sample rel was retrieved to keep sand from ning in.	30	100	90	10	0	33	6	N		AL.	1054.0		24		(ML)			- -	
ul C	SING RECORD: ^{ring} Size <u>Casing Depth</u> Interval Drilled FA 0.0 - 33.0 ft. 0.0 - 33.0 ft.							вот	TON	A OF	HOLE	-03 4 .U	<u>L.,</u>		- , 1		105	<u></u>		
MATULIA WATER DRULHOL	COMMENTS: FA = 3-3/4" id x 7-1/4" od CME hollow ste FADC = 5-foot spilt barrel continuous dry NA = Not Available NP = Nonplastic NR = No Recovery	rm flig coring	ht aug syste	jers em		Math	ane	_ 3	<u>in.</u>	Dee	ssuriz	ort			Ma Se Ch tox	dime omis cicity	test	sting xicit ab u resu	y ar Inde	is performed by the USACE Los Angeles District. halyses were performed by the Navy Environmental or a USACE contract. A summary of the sediment s contained in Appendix A.

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

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT LOCATION: Matilija Reservoir COORDINATES: N 2,002,149.6 E 6,167,157.6 BEGUN: 8/23/01 FINISHED: 8/23/01

TOTAL DEPTH: 33.0 DEPTH TO BEDROCK: Not Encountered

SHEET 2 OF 2 STATE: CALIFORNIA WATER ELEVATION: 1087.0 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Mike McCulla REVIEWED BY: Joel Sturm

		₹			LAB	ORATORY DATA	ES	NIT	N	71
NOTES	DEPTH	% CORE RECOVE	% FINES	% SAND	% GRAVEL	LIQUID LIMIT PLASTICITY INDEX MOISTURE CONTENT CONTENT CLASSIFICATION ELEVATION	DXICITY SAMPI	GEOLOGIC UI SYMBOL	VISUAL CLASSIFICATIC	ELEVATION

CLASSIFICATION AND PHYSICAL CONDITION

REASON FOR HOLE TERMINATION:

DEPTH AND ELEVATION OF WATER LEVEL

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

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 11.1 ft. <u>Date</u> 8/23/01

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	
FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT STATE: CALIFORNIA	T 1 OF 2
LOCATION: MENUER O	
LOCATION: Matilija Reservoir COORDINATES: N 2,002,180,9 E 6,166,807.1 WATER ELEVATION: 1087.4	
DEPTH AND ELEVATION OF WATER LEVEL DEPTH TO BEDPOCK, NO 5	AZIMUTH:

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

TH TO BEDROCK: Not Encountered UE

0 AZIMUTH: HOLE LOGGED BY: Mike McCulla REVIEWED BY: Joel Sturm

				≻		L	АВС	RA	TOR	YD,	ATA		Т	ŝ	Е	1 -		//
	NOTES	DEDTU		CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	INDEX	CONTENT	LAB CLASSIFICATION		ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT	VISUAL		CLASSIFICATION AND PHYSICAL CONDITION
	AII MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.													1		1	(0.0 to 9.4 ft. Reservoir Water
	PURPOSE OF HOLE:		1															Water Surface El. 1087.4 08/29/01
	Determine gradation and toxicity of sediments impounded behind Matilija Dam.		1															9.4 to 69.4 ft. Quaternary Reservoir Sediment (Qrs)
	LOCATION:		1															9.4 ft. to 18.0 ft. <u>No Recovery</u>
	Matilija Reservoir		-															18.0 to 19.2 ft. <u>Silty Sand. SM:</u> About 60% fine
	EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig,	5														Wate	r.	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 HCI.
	and equipment was then lifted with a crane from a dam access road, over inaccessible terrain and placed onto the reservoir pond.]															Laboratory Data interval: 18.0 to 23.0 ft.
	The crane was a GROVE 120 ton crane with a 130 ft. boom, having a lifting capacity of about 500 lbs.		-															19.2 to 28.0 ft. Silt. ML: About 95% fines with
	about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was	10-												┢			1078.0	medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine
	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																	- sand; moist, gray, soft, strong reaction with HCI Laboratory Data Interval:
	and Cranes from Ventura, CA (phone number 800-400-4852).		-															23.0 to 28.0 ft.
	DRILLING BARGE: The drilling barge has a max. load capacity of approximately 14,000 pounds and is	·	+	-														28.0 to 29.3 ft. <u>Sandy Slit, s(ML)</u> : 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 HCI.
	comprised of three separate segments each having its own floatation cells and weighing between 4200 and 5200 pounds. Two of the "tree segments are connected via beams and sking. The third segment is attached by	15-	NR															 29.3 to 33.6 ft. <u>Silt. ML</u>: 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 HCI.
	Its. 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	-								+					s	SM	1068.2	33.6 to 35.0 ft. <u>Silty Sand, SM</u> : 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 HCI.
ľ	Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds. DRILL RIG:	20	100	90	10	0	38	6	NA	ML	L							35.0 to 35.5 ft. <u>Silt with Sand. (ML)s;</u> About 80% fines with medium plasticity, slow dilatancy, high dry strength; about 20% fine sand; maximum size, fine
	Ingersoll-Rand, Model A200	_	ļ														F	sand; moist, gray, soft; strong reaction with HCl.
	DRILING & SAMPLING METHODS: Drilling depth is measured from the water surface of the reservoir pond. The water/sediment interface in this hole is at a									+	1	084.4		Qr	s M	1L	F	35.5 to 45.0 ft. <u>Silt, ML</u> : 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 HCI.
	depth of 9.4 ft. 9.4 to 72.8 ft.: 3-3/4 inch i d by 7-1/4 inch	25-												-			-	Laboratory Data Interval
l	D.d. might augers with 3-inch i.d. by 3-1/2 o.d.		100	97	3	0	NP	NP	NA	ML	-							43.0 to 48.0 ft.
NA 1	system (FADC) and sand basket, with a pullet bit. 72.8 to 74.8 ft.: Core drilling using a NWD-4	-															Ĺ	45.0 to 48.0 ft. <u>Silty Sand, SM:</u> About 70% fine to medium sand; about 30% nonplastic fines, rapid dilatancy, no dry strength; maximum size, medium
1 1 2	ace discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system.	┥									10	59.4			-		1059.4	sand; moist, gray, soft; strong reaction with HCI.
S F	RILLED BY: N-Regional Drill Crew: Chris Peterson, hiller, Jerry Hanson, helper and Mike	30-						,							s(i	ML)	1058.1	48.0 to 49.0 ft. <u>Sandy Silt, s(ML)</u> : About 60% nonplastic fines, rapid dilatancy, low dry strength; about 40% fine sand; maximum size, fine sand; moist, gray, soft; strong reaction with HCI.
JA.GDT	Idmonson, helper		100		-										ML	L	-	49.0 to 57.5 <u>Silt, ML:</u> About 90% fines with low to medium plasticity, slow dilatancy, medium dry strength; about 10% fine sand; maximum size, fine sand; moist,
MATIL 6 O	.0 to 9.4 ft.: water .4 to 71.3 ft.: silt, clay, sand; used sample	+															Ļ	gray, soft: except a lens of Silty Sand (SM) from 52.8 to 53.0 ft.; strong reaction with HCl.
GPJ	atcher (sand fingers) on sampler. 1.3 to 72.8 ft.: change in drilling, it cut rough nd had refusal at 72.8	4													SM		<u>053.8</u> 	Laboratory Data Interval: 53.0 to 58.0 ft.
17	2.8 to 74.8 ft.: sandstone, hard	35-	92													1	052.4	57.5 to 65.0 ft. Sandy Silt. s(ML): About 60% finas
	AVING CONDITIONS: one	-															-	strength; about 40% fine sand: maximum size, fine
MATILIJA WATER DRILLHOLE		1															┢	sand; moist, gray, soft; strong reaction with HCI.
DRILL			.		<u> </u>				i						- <u></u>			
TER	FA = $3-3/4$ " id x 7-1/4" od CME hollow ste FADC = 5-foot split barrel continuous dry (m flig coring	nt aug j syste	ers em											Mate	um = (erials	testina v	vas performed by the USACE Los Angeles District.
A WA	NA = Not Available NP = Nonplastic NR = No Possives														Che	mistry	Lab un	der a USACE contract. A summary of the sediment
111.17	NR = No Recovery														OXIC	aty te:	st result	is contained in Appendix A.
MA																		

SHEET 1 OF 2 DRILL HOLE MDH-05-01

				G	EO	LO	GIC	: L()G		RIL	LH		= N	O. MDI	H-05-01 SHEET 2 OF 2
	FEATURE: MATILIJA DAM ECOSYSTEM LOCATION: Matilija Reservoir BEGUN: 8/29/01 FINISHED: 8/29/01 DEPTH AND ELEVATION OF WATER LEVI AND DATE MEASURED: 0.0 (1087.4	EL		ON FE	ASIBI	LITY	STU	PY F C T	PROJE COOR OTAL	ECT: V	'ENTUF IS: N H: 74,8	RA RIN 2,002, 3	'ER PI 180.9	ROJI E	ECT 6,165,807.1	STATE: CALIFORNIA
	NOTES	DEPTH	% CORF RECOVEDV	% FINES	% SAND	% GRAVEL				CLASSIFICATION	ELEVATION.	TOXICITY SAMPLES	GEOLOGIC UNIT	SYMBOL	VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
	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.	40-	100					¢						٨	мц	Laboratory Data Interval: 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 HCI. 69.4 to 74.8 ft.
	CASING RECORD: 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. HOLE COMPLETION: As the augers were pulled the hole was allowed to slough in on itself.	45-	90	60	40	0	NP	NP	NA	s(ML)				s	1042.4 M	subangular to subrounded gravel; maximum size, 55 mm; wet, dark gray to gray, soft; strong reaction with HCI. 72.8 to 74.8 ft. Boulders: Recovered one unbroken
1	DEPTH OF WATER: Date Depth of Water 98/29/01 9.4 ft.		94								1039.4			s(1039.4 [ML]1038.4	pre-Reservoir Alluvium (Qal) at least 2 ft. in size; strong
T			100	93	7	0	40	13	NA	ML			Qrs	M		-
			100								1029,4			s(M	1029.9 fL)	-
		-				+		-+-								_

MATILIA WATER DRILJ "TE MATILIJA GPJ MATILIJA GDT 7/3/02 10:35:56 AM

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

65-

7**0**-81

100 98 2 0 40 18 NA CL

100

NA = Not Available NP = Nonplastic NR = No Recovery

BOULDERS 1012.6

1022

1018.0

1014.5

CL

(SM)g

Qai

1019.4

BOTTOM OF HOLE

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 L	OG OF DRILL HOLE NO. MDH-06-01		 	-
LOCATION: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY LOCATION: Matilija Reservoir BEGUN: 8/28/01 FINISHED: 8/28/01	PROJECT: VENTURA RIVER PROJECT COORDINATES: N 2,002,479.5 E 6,166,877.8 TOTAL DEPTH: 38.0 DEPTH TO BEDROCK: Not Encountered	SHE STATE: CALIFORNIA WATER ELEVATION: 1087.4 ANGLE FROM HORIZONTAL: 90 HOLE LOGGED BY: Mike McCuila REVIEWED BY: Joel Sturm		

				≿L		LAB	ORA	TOR	RY DA	TA		ES	날	z		
	NOTES	DEPTH	%	CORE RECOVERY	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT LAB	CLASSIFICATION	ELEVATION	FOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
	AII MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE.										-					0.0 to 9.4 ft. Reservoir Water
	PURPOSE OF HOLE:		-											j		Water Surface El. 1087.4 08/28/01
	Determine gradation and toxicity of sediments impounded behind Matilija Dam.		4												L	9.4 to 38.0 ft. Quaternary Reservoir Sediment (Qrs)
	LOCATION: Matilija Reservoir]													9.4 to 17.1 ft. Silt, ML: About 90% fines with low
	EQUIPMENT MOBILIZATION: The barge, drill rig, and drilling equipment were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig	5-												Water		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 HCI.
	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														-	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 HCI.
	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).	-													-	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.
	DRILLING BARGE: The drilling barge has a max load capacity of	10-	╞─									-		1078.0	_	Laboratory Data Interval: 18.0 to 23.0 ft.
	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 acking. The third segment is attached by atts. The fully assembled hame is calf	-	53													23.0 to 24.4 ft. Sitt with Sand, (ML)s: About 85% ines with medium plasticity, slow dilatancy, moderate iny strength; about 15% fine sand; trace organics; naximum size, fine sand; moist, gray, soft, strong eaction with HCI.
	propelled and is moved into position by a 35 poutboard motor. The barge is secured at drilling sites by a four-point mooring system ncorporating deck winches, cables and Danforth anchors (soft bottom anchors) each weighing approximately 30 pounds.	-											N	IL.	1 2 0	4.4 to 26.0 ft. <u>Silt ML</u> : About 95% fines with nedium plasticity, slow dilatancy, high dry strength; bout 5% fine sand; maximum size, fine sand; trace rganics; moist, gray, soft; strong reaction with HCl. 6.0 to 27.4 ft. <u>Sandy Silt, s(ML)</u> ; About 65% fines
	DRILL RIG: ngersoll-Rand, Model A200	15 -	46												۲ a	the low part of the sandy site site of the sandy strength; the low plasticity, rapid dilatancy, low dry strength; bout 35% fine sand; trace organics; maximum size, ne sand; moist, gray, soft; strong reaction with HCl.
S	DRILLING & SAMPLING METHODS: Drilling depth is measured from the water urface of the reservoir pond. The water / ediment interface in this hole is at a depth of .4 ft.												s(1070.3 ML)	- al	7.4 to 28.0 ft. Lean Clay, CL: About 95% fines with edium plasticity, slow dilatancy, high dry strength; pout 5% fine sand; maximum size, fine sand; trace ganics; moist, gray, soft; strong reaction with HCI.
910 b s b	14 to 38.0 ft.; 3-3/4 inch i.d. by 7-1/4 inch 1.d. flight augers with 3-inch i.d. by 3-1/2 o.d. y 5-foot split barrel continuous dry coring ystem (FADC) and sand basket, with a ulat bit.	4										Qr	8	1069,4	_ at	3.0 to 29.1 ft. <u>Sandy Silt, s(ML)</u> : About 65% fines ith low plasticity, rapid dilatancy, low dry strength; yout 35% fine sand; trace organics; maximum size, le sand; moist, gray, soft; strong reaction with HCI.
10:35:56 AN	RILLED BY: N-Regional Drill Crew: Chris Peterson, niller: Jerry Hanson, heiper and Mike dmonson, heiper	20	100	97	3 0	35	5	NA	ML				ML	. 	ab - on	I.1 to 30.0 ft. Lean Clay, CL: About 95% fines with edium plasticity, slow dilatancy, high dry strength; yout 5% fine sand; maximum size, fine sand; trace ganics; moist, gray, soft; strong reaction with HCI.
	RILLING CONDITIONS AND DRILLER'S OMMENTS: 0 to 9.4 ft. water									1054.4				1084.4	ab orc	.0 to 31.5 ft. <u>Slit, ML</u> ; About 95% fines with low to adium plasticity, medium dilatancy, high dry strength; out 5% fine sand; maximum size, fine sand; trace janics; moist, gray, soft; the core surface hosts about
	4 to 33.0ft.; used FADC with catcher (sand ssket). Hit high pressure methane at 33.0 ft. at blew mud over the top of the tower. 10 to 38.0 ft.; drilled with augers only, no	+											(MI	_)s 1063.0	20 stn - 31.	% memane gas bubbles up to 30 mm in diameter, ong reaction with HCI. 5 to 33.0 ft. Silfy Sand with Gravel (SMas About
inr	Provide the pocket of methane. Between 33.0	25-													_ dila	atancy, low dry strength; about 15% fine to coarse
	tside of the augers and frothing up through i	j	100								l		ML	1000	nar gra	 a. Subrounded gravel; maximum size, 30 mm; wet, y; the gravel present in the sample interval was
I I I I I I I I I I I I I I I I I I I	water violent like bubbles in a Jacuzzi.													1061.4	up -	off the deck of the barre, allowing for only a rough
	VING CONDITIONS:	-											s(M	L) 1060.0	esu	mation of the percentage of gravel in this sediment rval; strong reaction with HCI.
	COMMENTS:												CL	1059.4		
	FA = 3-3/4" id x 7-1/4" og CME hollow ster	m fligr	nt aug	ers										m = 83/88		
ATE	NA = Not Available	coring	syste	m									ocun		v ana	performed by the USACE Los Angeles District. alyses were performed by the Navy Environmental
N AU	NP = Nonplastic NR = No Recovery													ilisiry Lao u	inder	a USACE contract. A summary of the sediment contained in Appendix A.
MATILIJA WATER					Met	hane =	= 9 ¹	ь р	ressur	ized met	hane					
×۲										met	10110	943		and eQ		

	FEATURE: MATILIJA DAM ECOSYSTEM F LOCATION: Matilija Reservoir BEGUN: 8/28/01 FINISHED: 8/28/01 DEPTH AND ELEVATION OF WATER LEVE AND DATE MEASURED: 0.0 (1087.4)	EL		G DN FE	ASIBI	LO	GIC STUD	Y F C T	PROJE COOR OTAL	ECT: DINA DEI	VENT	URA N 2,0 8.0	RIVE 002,4	R PR(79.5	E 6,166,877.8	-06-01	SHI STATE: CALIFORNIA WATER ELEVATION: 1087.4 ANGLE FROM HORIZONTAL: 90 HOLE LOGGED BY: Mike McCuil REVIEWED BY: Joel Sturm	
-	NOTES	DEPTH	% CORE RECOVERY	% FINES	% SAND	% GRAVEL			% MOISTURE			ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOI	CLASSIFICATION	, (CLASSIFICATION AND PHYSICAL CONDITION	
	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 - 38.0 ft.	30-	74											*	s(ML) 1058.3 CL 1057.4 ML 1055.9	pressuriz	3.0 ft. <u>No Recovery:</u> Large quantity ed methane gas.	of
	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: Date Depth of Water 8/28/01 9.4 ft.	35	NR											Qrs	(SM)g 1054.4	- - -	·	

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

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 L	.OG OF DR	ILL HOLE N	10. MDH-07-01		SHEET	
FEATURE: MATILIJA DAM ECOSY	STEM RESTORATION FEASIBILITY STUDY	RPO ICOT. LINI				SHEET 1	OF 2
LOCATION: Matilija Reservoir					STATE: CALIFORNIA		
BEGUN: 9/5/01 CINICUED area		COORDINATES:	N 2,002,800.8 E	E 6,167,085.6	WATER ELEVATION: 1087	' a	

BEGUN: 9/5/01 FINISHED: 9/6/01

DEPTH AND ELEVATION OF WATER LEVEL

AND DATE MEASURED: 0.0 (1087.8) Not Encountered

T

TOTAL DEPTH: 38.0 DEPTH TO BEDROCK: Not Encountered ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm

				≿			LABO	DRA	TOF	RY DA	4 <i>TA</i>			ES	Ę		z		
	NOTES			CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASHCITY INDEX	% MOISTURE CONTENT	CLASSIFICATION	ELEVATION		IOXICITY SAMPLES	GEOLOGIC UNIT	VISUAL	CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
	RESERVOIR SURFACE.												T						0.0 to 8.3 ft. Reservoir Water
	PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.																		Water Surface El. 1087.8 09/05/01 - 8.3 to 38.0 ft. Quaternary Reservoir Sediment (Qrs)
	LOCATION: Matilija Resevoir		4																8.3 to 14.2 ft. <u>Silty Sand, SM:</u> About 55% fine sand; maximum size, fine sand; about 45% fines with law;
	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																		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 HCI. <u>Laboratory Data Intervals;</u> 8.3 to 13.0 ft.
11	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		1													Wai	er		13.0 to 18.0 ft.
r t F	about 6,500 lbs. at a radius of 120 ft. The maximum load lifted during the project was he drill rig, weighing 7,600 lbs and was picked to a radius of less than 105 ft. The Sompany supplying the grape is OST Traves	5																	14.2 to 14.7 ft. <u>Silt with Sand. (ML)s:</u> 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 HCI.
D T a	Ind Cranes from Ventura, CA (phone number 00-400-4852). RILLING BARGE: he drilling barge has a max. load capacity of pproximately 14,000 pounds and is																		14.7 to 16.6 ft. <u>Sandy Silt, s(ML);</u> 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 HCI.
b th	omprised of three separate segments each aving its own floatation cells and weighing etween 4200 and 5200 pounds. Two of the iree segments are connected via beams and acking. The third segment is attached by olts. The fully assembled barge is self	-	 			+											1079.5	F	16.6 to 18.5 ft. <u>Silt with Sand, (ML)s:</u> 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 HCI.
- pr The	o outboard motor. The barge is setting a 35 o outboard motor. The barge is secured at illing sites by a four-point mooring system																	ŀ	Laboratory Data Interval: 18.0 to 23.0 ft.
	corporating deck winches, cables and anforth anchors (soft bottom anchors) each eighing approximately 30 pounds. RILL RIG:	10	47	55	45	. 0	NP	NP	NA	ML								a	8.5 to 22.6 ft. <u>Silt. ML.</u> : About 90% fines with low to nedium plasticity and toughness, medium dry strength, ind slow dilatancy; about 10% fine sand; maximum ize, fine sand; trace organics; wet, gray, soft; strong acction with HCl.
DF	gersoll-Rand, Model A200 RILLING & SAMPLING METHODS:														s	М		2	2.5 to 23.1 ft. Sandy Silt, s(ML): About 60% fines with low to medium plasticity, toughness, and dry
Dr su se	illing depth is measured from the water rface of the reservoir pond. The water / diment interface in this hole is at a depth of 3 ft.																	_ s	trength, and rapid dilatancy; about 40% fine sand; naximum size, fine sand; wet, gray, soft, organic naterial present; strong reaction with HCl.
8.3 0.0 by sys	3 to 38.0 ft.: 3-3/4 inch i.d. by 7-1/4 inch 1. flight augers with 3-inch i.d. by 3-1/2 o.d. 5-foot split barrel continuous dry coring stern (FADC) with a bullet bit. RILED BY:	-							1		1074	.8		Qrs			1073.6	5' di	3.1 to 24.9 ft. <u>Peat, PT</u> ; About 90% organic matter bark, roots, and wood fibers, looked like mulch; about % non plastic fines with low dry strength and no latancy; about 5% fine sand; wet, black, spongy onsistency; organic odor.
3 PN	-Regional Drill Crew; C. Whisnant, Driller,	15-												403	(M	IL)s	1073.1	24 52	I.9 to 25.1 ft. <u>Sitty Sand, SM:</u> About 65% fine
3100	ILLING CONDITIONS AND DRILLER'S MMENTS:		96	82	18	0	NP	NP	NA	(ML)s	;				S/N	VIL)	ľ	di	atancy; wet, gray, soft; strong reaction with HCl.
109 CA	to 8.3 ft.: water to 38.0 ft.: fast and smooth VING CONDITIONS:																1071.2	str	.1 to 26.6 ft. <u>Silt with Sand. (ML)s:</u> About 85% es with medium plasticity, toughness, and dry ength, and slow dilatancy; about 15% fine sand; aximum size, fine sand; wet, gray, soft; organic
		1																	aterial present; strong reaction with HCI. 6 to 28.0 ft. <u>Sandy Silt, s(ML)</u>; About 60% fines
	e used: advanced hole with flight augers. ervoir water was added to the inside of flight augers each time the 5 ft sample	+							_		1089.6	4			(ML	L)s		str	ength, and rapid dilatancy; about 40% fine sand;
⊒irunn ≰i	el was retrieved to keep sand from																1089.3	28.	0 to 35.5 ft. Silty Sand SM: About 70 909 5ac
ш Са	Sing RECORD: Ing Size Casing Depth Interval Drilled 1* FA 0.0 - 38.0 ft. 0.0 - 38.0 ft.																	10- stre	30% fines with low toughness, plasticity, and dry angth, and rapid dilatancy: trace of organics: wer
	OMMENTS:	t.					<u> </u>				Dati	- m	 83/	88				yia	y, sort; strong reaction with HCl.
	FA = 3-3/4" id x 7-1/4" od CME hollow sten FADC = 5-foot solit barrel continuous dry c	n fligt	nt aug	jers							Mat Sed	erials iment	tes to	ting kicity	ana	aivsi	is were	nert	ne USACE Los Angeles District. orned by the Navy Environmental
WAT	NA = Not Available NP = Nonplastic	Jung	Jyait	111								unany	1	10 01	IOFL	ас	SALE	contr	orned by the Navy Environmental act. A summary of the sediment pendix A.
V	NR = No Recovery										Am	ethan	e si	amol	ie w	ras r	nilantad	at 3	BO # USIDO O CLIMA
MATILIJA WATER	_				٨	detha	ane =		t Pr	essuri	ized m	bie w	35	sent	10 5	ang	analyzed	ј Бу	Zymax Envirotechnology, San Luis Obispo, CA.

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

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY PROJECT: VENTURA RIVER PROJECT LOCATION: Matilija Reservoir COORDINATES: N 2.002,800.8 E 6,167,085.6 BEGUN: 9/5/01 FINISHED: 9/6/01 TOTAL DEPTH: 38.0

DEPTH AND ELEVATION OF WATER LEVEL

SHEET 2 OF 2 STATE: CALIFORNIA

WATER ELEVATION: 1087,8 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Greg Mongano

		,	-		LAE	BOR	ATC	DRY	DA	TA		, e	3 -			//
NOTES	рертн	CORE RECOVERY	% FINES	% SAND	% GRAVEL				CONTENT LAB		ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT	SYMBOL VISUAL CLASSIFICATION		CLASSIFICATION AND PHYSICAL CONDITION
REASON FOR HOLE TERMINATION: The hole was terminated upon encountering large quantities of pressurized methane gas at a depth of 38.0 ft.		100	87	13	0	43	13					+		ML		Laboratory Data Interval: 28.0 to 33.0 ft.
HOLE COMPLETION: Backfilled hole using a bentonite with barite plug.																 35.5 to 37.0 ft. <u>Sandy Silt, s(ML)</u>: About 65% fines with low plasticity and toughness, low to medium dr strength, and rapid dilatancy; about 35% fine sand; maximum size, fine sand; wet, gray, soft; trace of
DEPTH OF WATER: Date Depth of Water 09/05/01 8.3 ft.	-									1	064.8			s(ML)	1065.2 1064.7	medium plasticity and toughness, medium dry stree
•	_													PT		
	25-	100												SM	1082.9 1082.7	
														(1412)3	1061.2	
	4													s(ML)	1059.8	-
	-												Qrs			
	30-	78	27	72	1 1	۱P	NP	NA	SM						ŀ	-
														SM	-	
						_				105	4.8		۴			
															-	
	35	00												1	052.3	
	-													s(ML)	-	
												ì		ИL	49.8	
						BO.	TON	N OF	HOLI	E					<u>_</u>	
COMMENTS: FA = 3-3/4" id x 7-1/4" od CME hollow ster	n fliaht	auge	—— rs						N	/aten	n = 83 Iais te	stinc	was	perform	ed by #	ne USACE Los Angeles District.
FADC = 5-foot split barrel continuous dry c NA = Not Available NP = Nonplastic NR = No Recovery	oring :	systen	ที						C to A	hemi Dixicity	istry L y test	ab u resu	y ana Inder Ills is	iyses we a USAC	E contr d in Ap	act. A summary of the sediment pendix A. 8.0 ft. using a SUMA canister.

GEOLOGIC LOG	OF DRILL HOLD	ENO. MDH-08-01

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY LOCATION: Upstream of Matilija reservoir in delta area BEGUN: 8/21/01 FINISHED: 8/23/01 DEPTH AND ELEVATION OF WATER LEVEL

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

PROJECT: VENTURA RIVER PROJECT COORDINATES: N 2,003,020.5 E 6,166,296.2 TOTAL DEPTH: 64.8 DEPTH TO BEDROCK: Not Encountered SHEET 1 OF 4 STATE: CALIFORNIA GROUND ELEVATION: 1100.8 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm

			1	1		1 41		ATO		047		1 00	1.				
	NOTES	DEDTU		CORE RECOVERY	% FINES	GRAVEL		-	% MOISTURE	CONTENT LAB CLASSIFICATION		TOXICITY SAMPLES	GEOLOGIC LINIT	SYMBOL	VISUAL CLASSIFICATION	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
	AII MEASUREMENTS ARE IN FEET FROM GROUND SURFACE.												1				0.0 to 59.7 ft.
	PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam.		87	,		-									(GP)s		Quaternary Reservoir Sediments (Qrs) 0.0 to 2.3 ft. <u>Poorty Graded Gravel with Sand, (GP)s:</u> About 55% fine and coarse (predominantly coarse), subrounded, hard, less than 5% flat, gravel; about 40% fine to coarse (predominantly coarse), subrounded
	Upstream of Matilija reservoir in delta area. DRILL RIG:		-												10	98.5	and, crumbles with hammer blow; about 5% non-plastic fines with rapid dilatancy and no dry strength; trace of cobbles and boulders, maximum size 400 mm; dry; soft, brown; strong reaction with HCl;
	Central Mining Equipment 750 (CME 75)																wood, bark and other organics.
() i () 5] fi	DRILLING & SAMPLING METHODS: <u>1.0 to 59.7 ft</u> : Drilled with 6-5/8 inch i.d. by 10-1/2 inch o.d. flight augers with 5-3/4 inch d. by 5-foot split barrel dry coring system FADC). <u>19.7 to 64.8 ft</u> : Core drilling using a HWD-4 ace discharge diamond bit with a 3.0 inch d. and 3.9 inch o.d. system.												L.	((SP/GP)		2.3 to 4.8 ft. <u>Poorty Graded Sand and Gravel</u> . (SP/GP): About 50% fine to coarse (predominantly fine), subrounded sand, crumbles with hammer blow; about 45% fine and coarse (predominantly fine), subrounded to subangular, hard, gravel; maximum size, 75mm; about 5% non-plastic fines with rapid dilatancy and no dry strength; dry; soft; brown; strong reaction
	RILLED BY:	5	100											+	109	HB.0	with HCI; less than 5% organic material. 4.8 to 10.0 ft. <u>Poorty Graded Sand with Silt</u>
P	N-Regional Drill Crew; C. Whisnant, Driller, D. Steinke, Helper												Ţ	,			Sand, crumbles with harmer blow; about 5 to 10%
0 5	RILLING CONDITIONS AND DRILLER'S OMMENTS: .0 to 59.7 ft.: fast and smooth 9.7 to 64.8 ft.: slow and rough efusal with augers at 59.7 ft.												÷	•		-	strength; trace of fine, subrounded to subangular, gravel, crumbles with moderate hammer blow; maximum size, 75 mm; moist; dark brown; trace organics; strong reaction with HCI.
1_	AVING CONDITIONS:	-	1													F	Laboratory Data Interval: 8.8 to 10.8 ft.
EN	STIMATED DRILLING FLUID RETURN: one used; advanced hole with filght augers.	-												(S	P-SM)	L	10.0 to 12.5 ft. <u>Poorty Graded Gravel with Sand,</u> (<u>GP)s:</u> About 65% fine and coarse (predominantly coarse), subrounded to subangular, hard, gravel; about
	ASING RECORD: asing Size Casing Depth Interval Drilleg 5/8" FA 0.0 - 59.7 ft. 0.0 - 59.7 ft. 5/8" FA 59.7 ft. 59.7 - 64.8 ft.	-						_					Qrs				30% fine to coarse (predominantly coarse), subrounded, sand, crumbles with hammer blow; about 5% non-plastic fines with rapid dilatancy and no dry strength; trace of cobbles, maximum size 125 mm; moist, dark brown to gray; strong reaction with HCI.
Ba Su	DLE COMPLETION: ackfilled hole with auger cuttings and Inface material.	10	78	14	85	1	NP N	1 9	NA .	SM				-	1090.	.8	12.5 to 13.5 ft. <u>Poorty Graded Sand, SP:</u> About 90% ine to coarse (predominantity medium), subrounded sand, crumbles with hammer blow; about 5% non-plastic fines with rapid dilatancy and no dry
De	EPTH OF WATER: <u>ate Depth to Water</u> /22/01 5.9 ft.	-			_		_			<u> </u>	1090.0						strength; about 5% fine, subrounded to subangular, pravel, crumbles with moderate hammer blow; naximum size, 20 mm; wet; dark brown to gray; soft; race organics; strong reaction with HCI.
														(Gl	P)s	1 9	3.5 to 15.8 ft. <u>Poorty Graded Gravel with Silt and</u> and. (GP-GM)s: About 70% fine and coarse predominantly coarse) subrounded to subroquier
															1088.3	3 C 3 h to	and, gravel; about 20% fine to coarse (predominantly oarse), subrounded to subangular sand, crumbles with ammer blow; about 10% fines with low plasticity, sugness, and dry strength, and ragid dilatancy trace
														SP	1087.3	g	r coopies, maximum size 125 mm; wet; dark brown to ray; strong reaction with HC1.
		4	100													1	5.8 to 17.5 ft. <u>No Recovery</u> 7.5 to 21.0 ft. <u>Poorty Graded Gravel with Silt and</u>
		15												(GP	-GM)s)(L ha co ha to	and, cor-canis; About 70% fine and coarse redominantly coarse), subrounded to subangular, ard, gravel; about 20% fine to coarse (predominantly parse), subrounded to subangular sand, crumbles with ammer blow; about 10% fines with low plasticity, updness, and dry strength, and rengt dilection, wet
															1085.0		The brown to gray; strong and reput diabaticy, wet, <u>Laboratory Data Interval:</u> 20.0 to 22.5 ft.
			NR														
~	COMMENTS: FA = 6-5/8" id x 10-1/2" od Mobile hollow				- <u></u>		_				L	p	atur	m =	83/88	<u></u>	
	ADC = 5-foot split barrel continuous dry NA = Not Available NP = Nonplastic NR = No Recovery	stem coring	night a J syste	iuger m	S							Č	hem	nen nistr	v Lab un	der a	erformed by the USACE Los Angeles District. ses were performed by the Navy Environmental USACE contract. A summary of the sediment intained in Appendix A.

			G	ΈO	LO	GIC	CLO	OG	OF DRI	LLH	IOL	EI	NO. ME	0H-08-01 SHEET 2 OF 4
FEATURE: MATILIJA DAM ECOSYSTEM LOCATION: Upstream of Matilija reservoir BEGUN: 8/21/01 FINISHED: 8/23/01 DEPTH AND ELEVATION OF WATER LEV AND DATE MEASURED: 5.9 (1094.9	in delta	area	N FE	ASIBI	ILITY	STU	DY	PI Ci T(ROJECT: VI OORDINATE DTAL DEPTH EPTH TO BE	ENTUR S: N: : 64.8	A RIV 2,003,	(ER F .020.5	PROJECT 5 E 6,166,2	STATE: CALIFORNIA
NOTES	DEPTH	% CORE RECOVERY	% FINES	% SAND	% GRAVEL		,	% MOISTURE	CONTENT LAB CLASSIFICATION	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
		60 60 et	17	66	17 [.]	NP N	NP N	NA S	(SM)g 1078	3	Qr	((((((((((((((((()))))))	(GP-GM)s 1079, (SP-SM) <u>CL/ML</u>) <u>71078,</u> 1078, SP-SM) <u>1073,3</u> P-SM) 1071,3	(SP-SM): 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 HCI; organic material present.

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 matenal.

OMMENTS:

MATILIJA DRILHOLE MATILIJA GPJ MATILIJA GDT 7/3/02 10:35:56 AM

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

90

NP = Nonplastic NR = No Recovery

Datum = 83/88

SM

1068.3

1066.8

1068.3

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	
A	

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY LOCATION: Upstream of Matilija reservoir in delta area BEGUN: 8/21/01 FINISHED: 8/23/01

DEPTH AND ELEVATION OF WATER LEVEL

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

PROJECT: VENTURA RIVER PROJECT COORDINATES: N 2,003,020.5 E 6,166,296.2 TOTAL DEPTH: 64.8 DEPTH TO BEDROCK: Not Encountered

SHEET 3 OF 4 STATE: CALIFORNIA GROUND ELEVATION: 1100.8 ANGLE FROM HORIZONTAL: 90 AZIMUTH HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm

		Τ.	1		IΔF	IOP/	170	PV I	DATA		S	1.		REVIEWED BY: Joel Sturm
NOTES	DEPTH		% FINES	% SAND	% GRAVEL		· · · · ·		CLASSIFICATION	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
	35		38	61	1		α. NP	NA	SM	ਰ <u>63.3</u>	10		CL/ML)106 SM (CL/ML)1064 SM 1063	 35.9 to 36.1 ft. Silty Clav, (CL/ML): About 90% fines with low to medium plasticity, low toughness and dry strength, and no to slow dilatancy; about 10% fine sam maximum size, fine sand; soft; moist; dark gray and brown; trace of organic material; strong reaction with HCI. 36.1 to 37.5 ft. Silty Sand, SM: 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% fines dry arength, and tapid dilatancy; about 10% fines mith no to low plasticity, toughness, and dry strength, and rapid dilatancy; about 10% fines and coarse, subangular, hard gravel; maximum size, 50 mm; wet; soft; dark gray to black; strong reaction with HCI; roots, bark and other organic material present. 37.5 to 40.8 ft. Silty Sand, SM: About 75% fine to coarse (predominantly medium), subrounded to subarse (predominantly medium).
	40	82										((S	1060.0 CL/ML) _{1059.6} M	 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 gravei; maximum size, 75 mm; wet; soft; dark gray to black; strong reaction with HCI; roots, bark and other organic material present. 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 HCI. 41.2 to 42.5 ft. <u>Silty Sand, SM:</u> About 75% fine to coarse (predominantly medium), subrounded to subangular sand; about 10% fine and coarse, subrounded to subangular sand; about 10% fine and coarse, subrounded to subangular sand; about 10% fine and coarse, subrounded to subangular sand; about 10% fine and coarse.
	45	100 5	52 48	a	NF	NP	NA	S(N	AL)			SM	1056.8 L/ML) 1056.3	 soft; dark gray to black; strong reaction with HCI; roots, bark and other organic material present. 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 HCI; roots, bark and other organic material present. <u>Laboratory Data Interval:</u> 42.5 to 47.5 ft. 44.0 to 44.5 ft. <u>Silty Clay, (CL/ML)</u>: About 90% fines with now 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 HCI. 44.5 to 47.5 ft. <u>Silty Sand, SM:</u> About 70% fine and medium plasticity. Solut 70% fine and medium plasticity.
		00 43	57	0	NP	NP	NA	SM	1053.3			SM (CL/I SM	<u>1053.3</u> <u>1051.4</u> ML) <u>1050.6</u>	 medium sand (predominantly jmf; 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 HCI; roots, bark and other organic material present. 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 HCI. <u>Laboratory Data Interval:</u> 47.5 to 52.5 ft.

NA = Not Available NP = Nonplastic NR = No Recovery

MATILIJA GPJ MATILIJA GDT 7/3/02 10:35:56 AM

MATILIJA DRILLHOLE

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.

FEATURE: MATILIJA DAM ECOSYSTEJ LOCATION: Upstream of Matilija reservoir BEGUN: 8/21/01 FINISHED: 8/23/01 DEPTH AND ELEVATION OF WATER LEV AND DATE MEASURED: 5.9 (1094.9	∙in deita /EL	area	G ON FE	EASIB	LO	GIC ′ STU	DY	PI Ci TC	ROJEC DORDIN DTAL DI	T: VE NATES EPTH:	NTURA : N 2 64.8	,003,	/ER ,020.	NO. MD PROJECT .5 E 6,166,2 countered	STATE: CALIFORNIA
NOTES	DEPTH	% CORE RECOVERV	% FINES	% SAND	% GRAVEL	BOR LIWIT GINGIT	_	_	CUNIENI LAB CLASSIFICATION		ELEVATION	I UNIULY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
	-	.100	43	57	o	NP	NP	NA	SM	1048	13				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 HCI.
	55	100										Q	hrs	SM 1045.5 (CL/ML)	 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 HCI. 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 HCI. 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 HCI.
	60-	100	48	49	5	34	8	NA	SM	1041.1			«	1043.3 SM 1042.6 CL/ML) 1041.8 SW)g 1041.1	Laboratory Data Interval; 57.5 to 59.7 ft. 58.2 to 59.0 ft. Silty Clay, (CL/ML); 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 HCI. 59.0 to 59.7 ft. Well Graded Sand with Gravel, (SWbg: 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 55% nonplastic fines with no dry strength, and rapid dilatancy; wet; strong reaction with HCI.
	4														- 59.7 to 64.8 ft. Quaternary Alluvium (Qal)

MATILIA DRILLHOLE MATILIJA GPJ MATILIJA GDT 7/3/02 10:35:56 AM

OMMENTS:

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

92

Datum = 83/88

COBBLES AND BOULDERS

1038.0

Qai

BOTTOM OF HOLE

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.

59.7 to 64.8 ft. <u>Cobbles and Boulders</u>: Recovered pieces of broken core ranging in length from ½ inch to 8 inches of hard sandstone; interpreted as pre-Reservoir Alluvium (QaI); strong reaction with HCl.

FEATURE: MATILUA DAM ECONVERSE	ADCET		C.	EO	LO	GIC	:LC	DG (OF DF	ULL	H	OLE	NO.	MDH	1-09-01 SHEET 1 OF
FEATURE: MATILIJA DAM ECOSYSTEM LOCATION: Upstream of Matilija reservoir BEGUN: 8/25/01 FINISHED: 8/27/01 DEPTH AND ELEVATION OF WATER LEV AND DATE MEASURED: 7.1 (1093.5	vel.	2169		ASIBI		STUC	C T	OORI OTAL	ECT: VEN DINATES: DEPTH: I TO BEDR	N 2. 68.8	.003,	,112.7	E 6,166	3,456.5	STATE: CALIFORNIA WATER ELEVATION: 1100.6 ANGLE FROM HORIZONTAL: 90 AZIMUTH HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm
	DEPTH	% CORE RECOVERY	% FINES	% SAND	% GRAVEL		_	% MOISTURE	CTASSIFICATION	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT	SYMBOL VISUAL CLASSIFICATION	EI EVA TION	
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 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 barrei 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. DRILLED BY: PN-Regional Drill Crew; C. Whisnant, Driller; D. Steinke, Helper. DRILLING CONDITIONS AND DRILLER'S COMMENTS: 0.0 to 64.5 ft: fast and smooth 8 5 to 68.8 ft : clow and pruch	5-	FAPB											(SP/GF	"	0.0 to 64.5 ft. Quaternary Reservoir Sediments (Qrs) 0.0 to 7.7 ft. Poorly Graded Sand with Gravel, (SP/GP): About 45% fine to coarse, subrounded to subrounded to subangular gravel; about 5% subrounded to subangular gravel; about 5% subrounded to subangular gravel; about 5% subrounded, hard cobles; maximum size, 80 mm; about 5% nonplastic fines with no dry strength and rapid dilatancy; dry; tan; strong reaction with HCI. 7.7 to 12.7 ft. Poorty 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 sand; about 10% fines with low toughness and plasticity, low dry strength, and rapid dilatancy; about 10% 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 sand; about 10% fines with low toughness and plasticity. Jow dry strength, and rapid dilatancy; about 50% fine to coarse (predominantly medium), subrounded sand; crumbles with hammer blow; about 50% fine to 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 HCI.
64.5 to 68.8 ft.: slow and rough Refusal with augers at 64.5 ft. CAVING CONDITIONS: 32.7 to 64.5 ft.: about 3.0 ft. of slough. ASING RECORD: Casing Size Casing Depth Interval Drilled -1/4" FA 0.0 - 64.5 ft. 0.0 - 64.5 ft. -1/4" FA 64.5 ft. 64.5 - 68.8 ft. HOLE COMPLETION: Caschilled hole with auger cuttings and urface material. HEPTH OF WATER: Cate Depth to Water 8/27/01 7.1 ft.	10-	84 2	20 7	73 7	, N	P	P N	A. SI				⊻ Qrs	(SP-SM)	F	Laboratory Data Interval: 12.7 to 17.7 ft. 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 dilantancy; 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 HCI. 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 HCI. Laboratory Data Interval: 22.7 to 31.7 ft. Sandy Silty Clay, s(CL/ML): About 60% fines with medium toughness, plasticity and dry strength, and slow to rapid dilatency about 40% fine
	15- 5	i4 14	56	30	NP	NP	NA	(SM	1087. //)g	9		(5	10 SP/GP)	<u>ет, 9</u> 	sand; maximum size, fine sand; wet; solt gray; trace of organic material; strong reaction with HCI. 31.7 to 33.4 ft. <u>Poorty Graded Sand with Silt</u> , (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 HCI. <u>Laboratory Data Interval:</u> 32.7 to 37.7 ft. 33.4 to 34.0 ft. <u>Peat, PT:</u> About 90% organic matter of bark, roots, and wood fibers, looked like mulch; about 0% nonplastic fines with low dry strength and no illatancy; wet; black; spongy consistency; organic odor. 4.0 to 36.0 ft. Sity Sand, SM: About 70% fine and reading maximum size, medium sand; about 30% nes with low toughness, plasticity and dry strength, nd rapid dilatancy; wet; dark gray; trace of organic naterial; strong reaction with HCI.
COMMENTS: FA = 4-1/4" id x 8-1/2" od Mobile hollow ste FADC = 5-foot split barrel continuous dry c FAPB = Flight Auger Pilot Bit NA = Not Available NP = Nonplastic NR = No Recovery	em fligi coring s	nt auge system	ers	<u></u>	<u></u>	÷	<u>,</u>	<u>.</u>	····	<u> </u>	<u> </u>	Ma Sec Chi	emistry L	sting w xicity a .ab und	as performed by the USACE Los Angeles District, nalyses were performed by the Navy Environmental er a USACE contract. A summary of the sediment is contained in Appendix A.

	FEATURE: MATHLIA DAM ECOSYSTEM		GE	OLO	GIC	LO	GO	F DRIL	Lŀ	IOL	ENO. M	DH-09-01 SHEET 2 OF 4
	FEATURE: MATILIJA DAM ECOSYSTEM LOCATION: Upstream of Matilija reservoir	in delta area	ON FEAS	BILLITY	STUD	Y PR CC		T: VENTU	RA R	UVER F	PROJECT 7 E 6,166,45	STATE: CALIFORNIA
	BEGUN: 8/25/01 FINISHED: 8/27/01 DEPTH AND ELEVATION OF WATER LEV							EPTH: 68.		J. (12.)	C 0,100,45	3.5 WATER ELEVATION: 1100.6 ANGLE FROM HORIZONTAL: 90 AZIMUTH:
	AND DATE MEASURED: 7.1 (1093.					DE	РТН ТС	O BEDROC	:K: 1	Not End	countered	HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm
				LAE	BORA	TOR	RY DA	TA	T	ES	z	//
$\overline{}$	NOTES	DEPTH			MIT	2	쀭	žoj		GFOLOGICY SAMPLES	SYMBOL VISUAL CLASSIFICATION	CLASSIFICATION AND
		HI %		% SAND % GRAVEL	DLI	E X	ITEN I			1 S S		
		DEPTH	% FINES	% GF	LIQUID LIMIT	PLAS	% MOISTURE CONTENT LAB	CLASS	ELEVATION	DXICI	CLAS	
								<u></u>		<u> </u>		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 HCI.
		<i>20</i>									(SW-SM)	37.1 to 37.7 ft. <u>Poorty Graded Sand with Silt and</u> <u>Gravel, (SP-SM)g;</u> About 70% fine sand; about 20% coarse, hard, subrounded to subangular gravel; maximum size, 70 mm; about 10% one president of a
							4					no to low dry strength, and rapid dilatancy; wet; black; strong reaction with HCI.
												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.
							_				107	<u>Laboratory Data Interval:</u> - 37.7 to 42.7 fL
		_										40.0 to 40.1 ft. <u>Sitty Clay with Sand, (CL/ML)s:</u> 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.
		25— 80 -	59 41	0	NP N	PNA	A s(M	L)				40.1 to 42.6 ft. <u>Poorty Graded Sand with Silt.</u> (<u>SP-SM</u> : 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 HCI.
					-			1072,9		Qrs	SM	42.6 to 42.7 ft. <u>Silty Clay with Sand, (CL/ML)s:</u> 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. <u>Slity Sand, SM:</u> 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 HCI.
		30-										Laboratory Data Interval: 42.7 to 47.0 ft.
5:08 AM		-									1069.4	 43.9 to 44.2 ft. <u>Silty Clay with Sand. (CL/ML)s:</u> 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 HCI.
01 7/3/02 11:0											s(CL/ML) 1068.9 SP-SM)	44.2 to 46.5 ft. <u>Silty Sand, SM:</u> 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
IJA.GE		-								ľ	ar-3M)	- 45.5 to 46.9 ft. Silty Clay with Sand (Ct (M) San Abays
GPJ MATH										F	1067.2 PT 1068.6	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.
MATILIA_WATER_DIRLHOLE_MATILIA.GPJ_MATILIA.GDT_7/3/02_11:05:08_AM	3	5 90 45	55	0 NP	NP	NA	SM			s	м	46.9 to 48.2 ft. <u>Silty Sand. SM</u> : About 65% fine sand; maximum size, fine sand; about 35% fines with no to low toughness, plasticity and dry strength, and rapid dilatancy; wet; soft; dark gray; spongy organic material present; strong reaction with HCI.
DRu	OMMENTS: FA = 4-1/4" id x 8-1/2" od Mobile hollow ste					1					1054.6	
WATER	FADC = 5-foot split barrel continuous dry c FADC = 5-foot split barrel continuous dry c FAPB = Flight Auger Pilot Bit NA = Not Available	en night auge oring system	ərs							Ma Se		g was performed by the USACE Los Angeles District. y analyses were performed by the Navy Environmental
TILLIA	NP = Nonplastic NR = No Recovery										ernistry Lao I	Inder a USACE contract. A summary of the sediment
WA												

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

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

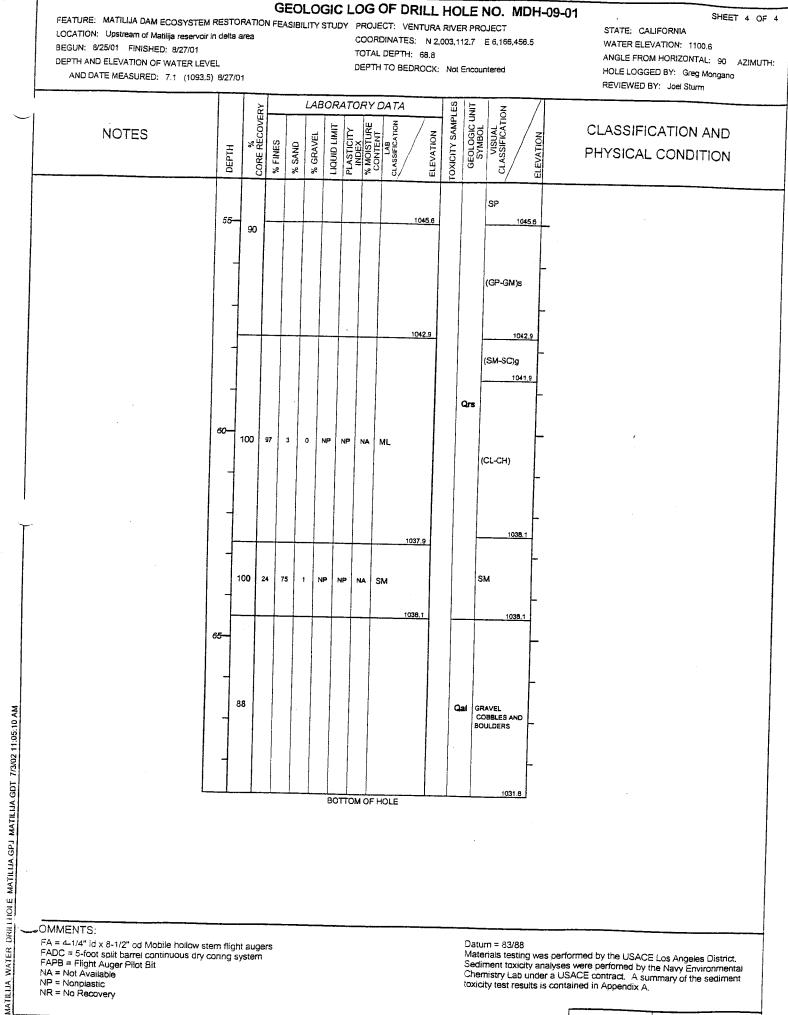
LOCATION: Upstream of Matilija reservoir in delta area

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

MATILIJA WATER DRULHOLE MATILIJA GPJ MATILIJA GDT 7/3/02 11:05:09 AM

DEPTH AND ELEVATION OF WATER LEVEL AND DATE MEASURED: 7.1 (1093.5) 8/27/01 COORDINATES: N 2,003,112.7 E 6,166,456.5 TOTAL DEPTH: 68.8 DEPTH TO BEDROCK: Not Encountered SHEET 3 OF 4 STATE: CALIFORNIA WATER ELEVATION: 1100.6 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Greg Mongano

 DATE MEASURED:	7.1 (1093.	5) 8/27	701												HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm
				ž		LA	BOR	_		DATA		LES	NIT	3	
 NOTES		DEPTH	%	CORE RECOVE % FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY	MOISTURE	CONTENT LAB CLASSIFICATION	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT	STMBOL VISUAL CLASSIFICATION ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
			-											s(CL/ML) 1063.5 (SP-SM)g	48.2 to 48.4 ft. <u>Peat, PT:</u> About 90% organic matter of bark, roots, and wood fibers, looked like mulch; 5% non plastic fines with low dry strength and no dilatancy; about 5% fine sand; wet; black; spongy consistency; organic odor.
			-								1062.9			1082.9 SM	48.4 to 52.7 ft. <u>Silty Sand, SM</u> : About 65% fine sammaximum size, fine sand; about 35% fines with no to low toughness, plasticity and dry strength, and rapic dilatancy; trace of fine, hard, subrounded to subang gravel; maximum size, 20 mm; wet; soft; dark gray; black laminations of organic material up to 5 mm thin, from 51.8 to 52.7 ft; strong reaction with HCI.
		40-	100	36	63	1	NP	NP	NA	SM				(CL/ML)s 	52.7 to 55.0 ft. <u>Poorty Graded Sand, SP:</u> 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.
		-												(SP-SM)	Laboratory Data Interval: 52.7 to 55.0 th 55.0 to 57.7 ft. Poorty Graded Gravel with Silt and
											1057.9			(CL/ML)s 1058.0	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; trad of fine and coarse, hard, gravel; maximum size, 25 m
														(CC/ML)S1058.4	wet, uark gray to black; strong reaction with HCI. 57.7 to 58.7 ft. <u>Clavey Sand with Slit and Gravel.</u> (<u>SM-SC)g:</u> About 60% fine to coarse (predominantly, medium), subrounded sand; about 25% fines with medium toughness and plasticity, bind do: strongth as the strongth strongth action.
		45	84	53	42	5	NP	NP	NA	s(ML)			215		slow dilatancy; about 15% fine and coarse, hard, subrounded to subangular, gravel; maximum size, 65 mm; wet; gray and brown; strong reaction with HCI. <u>Laboratory Data Interval;</u> 57.7 to 62.7 ft.
										1	053.6		×	1054.0 CL/ML)s	58.7 to 62.5 ft. Lean to Fat Clay, (CL-CH): About 95% fines with medium to high toughness and plastici high dry strength, and no dilatancy; about 5% fine san maximum size, fine sand; moist; firm to hard; gray; strong reaction with HC1.
		-											s P	1052.4 c 2T 1052.2 s	62.5 to 64.5 ft. <u>Silty Sand, SM:</u> About 85% fine to coarse, subrounded sand; about 15% fines with no to ow toughness, plasticity and dry strength, and rapid dilatancy; trace of fine and coarse, hard, subrounded t subangular gravel; maximum size, 40 mm; wet; soft; gray to dark brown; strong reaction with HCI.
		1												-	Laboratory Data Interval: 62.7 to 64.5 ft.
	ļ	50-	56											-	64.5 to 68.8 ft. Quaternary Alluvium (Qal) 4.5 to 68.8 ft. <u>Gravel, Cobbles and Boulders;</u>
													SI	н И	ecovered pieces of broken core ranging in length from a inch to 5 inches of hard sandstone; interpreted as re-Reservoir Alluvium (Qal); strong reaction with HCl.
														1047.9	
		4		1 79	9 0		NF		A SN				SP	· ·	



FA = 4-1/4" id x 8-1/2" od Mobile hollow stem flight augers FADC = 5-foot split barrel continuous dry conng system FAPB = Flight Auger Pilot Bit

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.

All M GRO PURF Deter sedin DRILL Centra BRILL Centra 54.3 tc face di i.d. and DRILL PN-Re D. Stei DRILL COMM 0.0 to 5 54.3 to Refusa CAVINC None ASINC CAVINC	LOCATION: Upstream of Matilija reservo BEGUN: 8/28/01 FINISHED: 9/4/01 DEPTH AND ELEVATION OF WATER LE AND DATE MEASURED: 4.3 (1097 NOTES MEASUREMENTS ARE IN FEET FROM DUND SURFACE. POSE OF HOLE: emine gradation and toxicity of ments impounded behind Matilija Dam. ATION: ream of Matilija reservoir in delta area. L RIG: ral Mining Equipment (CME 75)	EVEL 7.1) 8/28	8/01	CORE RECOVERY	% FINES		1	T	_	TOP	CO TO DEI	ORD	DEPTH	5: N 58.	2,00: 1 K: N	3,245	PROJECT 5.6 £ 6, 166, 059 Incountered	STATE: CALIFORNIA GROUND ELEVATION: 1101.4 ANGLE FROM HORIZONTAL: 90 AZI HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm
PURF Deter sedin LOCA Upstn DRILL Centra DRILL Centra DRILL Centra data tace di i.d. and DRILL PN-Re D. Stei DRILLI COMM 0.0 to 5 54.3 to Refusa CAVINO None ASINO CAVINO	MEASUREMENTS ARE IN FEET FROM DUND SURFACE. POSE OF HOLE: Immine gradation and toxicity of ments impounded behind Matilija Dam. ATION: ream of Matilija reservoir in delta area.	и		% CORE RECOVERY	INES		1	T	_		RY	DAT						
PURF Deter sedin LOCA Upstn DRILL Centra DRILL Centra DRILL Centra data tace di i.d. and DRILL PN-Re D. Stei DRILLI COMM 0.0 to 5 54.3 to Refusa CAVINO None ASINO CAVINO	MEASUREMENTS ARE IN FEET FROM DUND SURFACE. POSE OF HOLE: Immine gradation and toxicity of ments impounded behind Matilija Dam. ATION: ream of Matilija reservoir in delta area.	и		CORE RECOV	INES		_	1	. 1						LES	LIN	NO /	1
PURF Deter sedin LOCA Upstn DRILL Centra DRILL Centra DRILL Centra data tace di i.d. and DRILL PN-Re D. Stei DRILLI COMM 0.0 to 5 54.3 to Refusa CAVINO None ASINO CAVINO	JUND SURFACE. POSE OF HOLE: Immine gradation and toxicity of ments impounded behind Matilija Dam. ATION: ream of Matilija reservoir in delta area. L RIG:	и		Ö	Ē	SAND	% GRAVEL	GLAVEL	LIQUID LIMIT	LASTICITY INDEX	MOISTURE	LAB CLASSIFICATION		ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	a I MBOL VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
PURF Deter sedin LOCA Upsth DRILL Centra DRILL Gotta 54.3 tc face di i.d. and DRILL PN-Re D. Stei DRILLI COMM 0.0 to 5 54.3 to Refusa CAVINC None ASINC CASINC	POSE OF HOLE: emine gradation and toxicity of ments impounded behind Matilija Dam. ATION: ream of Matilija reservoir in delta area.				~	%		-	-		%	<u>ರ</u> /	/		2		<u> </u>	0.0 to 54.3 ft.
DRILL <u>0.0 to</u> 8-1/2 i with 3- coring <u>54.3 to</u> face di i.d. and DRILL PN-Re D. Stei DRILLI COMM. 0.0 to 5 54.3 to Refusa CAVINO None ASINO 4-1/4" F				NR													(SP/GP)c	Out of 54.3 m. Quaternary Reservoir Sediments (Qrs) Quaternary Reservoir Sediments (Qrs) O.0 to 4.5 ft. Poorly Graded Sand with Gravel and <u>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 HCI.
DRILLI PN-Re D. Stei DRILLI COMM. 0.0 to 5 54.3 to Refusa CAVINC None ASINC CAVINC CAVINC None	LING & SAMPLING METHODS: <u>54.3 ft.</u> Drilled with 4-1/4-inch i.d. by inch o.d. hollow stem flight augers and <u>3-1/2 inch i.d. by 5-foot split barrel dry</u> g system (FADC). <u>to 58.1 ft.</u> Core drilling using a HWD-4 <u>discharce diamond bit with a 3.0 inch</u>															Ţ	1098.9	 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 HCI. <u>Laboratory Data Interval:</u> 4.5 to 7.8 ft.
COMM 0.0 to 5 54.3 to Refusa CAVINO None ASINO 4-1/4" F 4-1/4" F	nd 3.9 inch o.d. system. ED BY: egional Drill Crew; C. Whisnant, Driller, inke, Helper		45	5	61	37	2	NP	N		- AL	s(ML))				SM	- 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.
None ASINC <u>Casing</u> 4-1/4" F 4-1/4" F	ING CONDITIONS AND DRILLER'S IENTS: 54.3 ft.: fast and smooth 58.1 ft.: slow al with augers at 59.3 ft.	-											1093.(1094.5 (ML)s 1093.6	7.8 to 11.3 ft. <u>Silty Sand, SM</u> : About 65% fine to coarse (predominantly fine) sand; about 35% fines with iow 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>-asing</u> 4-1/4" F 4-1/4" F	IG CONDITIONS:																Ē	Laboratory Data Interval: 7.8 to 12.8 ft
Backfille		10	100) 3:	2	85	3	NP	NP	NA	s	м			Q		SM _	11.3 to 12.8 ft. <u>Poorty Graded Sand with Silt.</u> (<u>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.
	OF WATER:															(5		12.8 to 13.3 ft. <u>Silty Sand</u> , <u>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 HCI.
													1088.6					Laboratory Data Interval: 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 HCI.
		15	86	56	44	• 0	0 N	NP	NP	NA	s(N	ИL)				s(I		16.1 to 17.8 ft. <u>Silty Sand, SM</u> : About 75% fine sand; maximum size, fine sand; about 25% fines with low oughness, plasticity, and dry strength, and rapid lilatancy; wet; gray; strong reaction with HCI.
												1	1083.6			SN		7.8 to 22.9 ft. <u>Poorty Graded Sand with Silt.</u> SP-SM): About 90% fine to coarse (predominantiy ne), subrounded sand; crumbles with hammer blow; bout 10% nonplastic fines with no dry strength, and apid dilatancy; trace of fine, hard, subrounded gravel; naximum size, 20 mm; wet; dark gray to black; trace of rganic material; strong reaction with HCI.
																	-	Laboratory Data Interval: 22.8 to 27.8 ft.
FA =	MENTS: = 4-1/4" id x 8-1/2" od Mobile hollow s DC = 5-foot split barrel continuous dry	tem fliç coring	ght a syst	uger	rs	1	<u> </u>								Dat		= 83/88	erformed by the USACE Los Angeles District.

FEATURE MATILUA DAM FORMUT				G	ΕO	LO	GIC	: LC	G	OF DR		HOL	E	NO. MD	H-10-01 SHEET 2 OF 3
FEATURE: MATILIJA DAM ECOSYSTE LOCATION: Upstream of Matilija reserve BEGUN: 8/28/01 FINISHED: 9/4/01 DEPTH AND ELEVATION OF WATER LI AND DATE MEASURED: 4.3 (109)	oir in de EVEL	eita ai	rea	NFE	ASIBI	ILITY	STU	Y	CC TC	ROJECT: N DORDINATI DTAL DEPT EPTH TO BI	ES: N H: 58.	2.003 1	,245	.6 E 6,166,05	STATE: CALIFORNIA
			37	Γ		LAE	BOR,	470	RY	DATA		ES	Ħ	z	71
NOTES		DEPTH	% CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE	CLASSIFICATION	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOI	VISUAL	CLASSIFICATION AND PHYSICAL CONDITION
			72											(SP-SM)	22.9 to 23.1 ft. <u>Silty Sand, SM</u> : About 60% fine and medium sand; about 40% fines with low to medium toughness and plasticity, medium dry strength, and rapid dilatancy; trace of fine, subrounded gravel; maximum size, 15 mm; wet; gray; strong reaction with HCI.
														1078.5 SM 1078.3	
	25	- 1	00	22	77	1	NP	NP	NA	SM				(SP-SM)	26.0 to 27.8 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 and coarse, hard, subrounded to subangular gravel; maximum size, 65 mm; wet; black; organic material throughout interval; strong reaction with HCI.
														1075.4 SM	27.8 to 28.7 ft. Silty Sand, SM: About 55% fine to coarse (predominantly medium), subrounded to subangular sand; about 35% fines with low to medium toughness and plasticity, medium dry strength, and rapid dilatancy; about, 10% fine, subrounded to subangular gravel; maximum size, 20 mm; wet; black; strong reaction with HCI.
										107	3.6			1073.8 SM 1072.7	28.7 to 30.0 ft. <u>Silt with Sarid</u> , (ML)s: About 75% fines with medium toughness, plasticity and dry strength, and rapid dilatancy; about 25% fine sand; maximum size, fine sand; wet; soft to firm; gray to black; organic material present; strong reaction with HCl.
	30-	92	2									Qr	5-	ML)s 1071.4 (ML)	 30.0 to 30.8 ft. <u>Sandy Silt. s(ML):</u> About 60% fines with medium toughness, plasticity, and dry strength, and rapid dilatancy; about 40% fine sand; maximum size, fine sand; wet; soft; gray to black; organic material present; strong reaction with HCI.
	-													<u>1070.6</u> ML)s	30.8 to 32.8 ft. <u>Silt with Sand. (ML)s</u> : About 75% fines with medium toughness, plasticity and dry strength, and rapid dilatancy; about 25% fine sand; maximum size, fine sand; wet; soft to firm; gray to black; organic material present; strong reaction with HCI.
	-													1068.8	32.8 to 34.8 ft. <u>Weil Graded Gravel with Silt and</u> <u>Sand. (GW-GM)s:</u> About 70% fine and coarse, hard, subrounded to subangular, gravel; maximum size, 75 mm; about 20% fine to coarse (predominantly medium), sand; about 10% fines with no to low plasticity, toughness, and dry strength, and rapid dilatancy; wet; gray; strong reaction with HCI.
															Laboratory Data Interval: 32.8 to 37.8 ft.
	35	46	9	65	5 28	I NF) NF	NA	(S	\$P-SM)g			(51	<u>1086.6</u> 	 34.8 to 38.0 ft. <u>Well Graded Sand with Gravel</u>, (SW)g; About 80% fine to coarse, subrounded to subangular sand; about 15% 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 to black; trace of organic material; strong reaction with HCI.

MATILIA DRULHOLE ***TILIJA.GPJ MATILIJA GDT 7/3/02 10:35:56 AM

COMMENTS:

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FA = 4-1/4" id x 8-1/2" od Mobile hollow stem flight augers FADC = 5-foot split barrel continuous dry coring system

84

10 85 5 NP NP NA

NA = Not Available NP = Nonplastic

NR = No Recovery

Datum = 83/88

SM

SM

1063.4

1062.9

1061

1063.6

SW-SM

Datum = 63/66 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.

Laboratory Data Interval: 37.8 to 40.8 ft.

38.0 to 38.5 ft. <u>Silty Sand, SM:</u> About 75% fine to coarse (predominantly fine) sand; about 20% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; about 5% fine, hard, subrounded to subangular gravel; maximum size, fine gravel; wet; gray; strong reaction with HCl.

SHEET 2 OF 3 DRILL HOLE MDH-10-01

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

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY LOCATION: Upstream of Matilija reservoir in delta area BEGUN: 8/28/01 FINISHED: 9/4/01

DEPTH AND ELEVATION OF WATER LEVEL

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

PROJECT: VENTURA RIVER PROJECT COORDINATES: N 2,003,245.6 E 6,166,059.3 TOTAL DEPTH: 58.1 DEPTH TO BEDROCK: Not Encountered

84 84 84 SM SM File Strength, and rapid dilatancy; about 5 fine, subrounded to subangular, hard, gravel; maximur size, 20 mm; wet; gray; strong reaction with HCl. 40.8 to 41.4 ft. <u>Silt with Sand. (ML)s:</u> About 75% fines with low to medium toughness, plasticity and dry strength, and slow dilatancy; about 25% fine sort			RY			LAE	BOR	RATO	ORY	DATA		ES	E	z		
4 1000 64 1000 64 1000 64 1000 64 1000 65 1000 66 1000 67 1000 68 1000 69 1000 60 1000 60 1000 60 1000 60 1000 60 1000 60 1000 60 1000 60 1000<	NOTES	DEPTH	CORE RECOVE	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY	% MOISTURE	CONTENT LAB CLASSIFICATION	FIEVATION	TOXICITY SAMPL	GEOLOGIC UN	J I MBUL VISUAL CLASSIFICATIO	ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION
	50		84 100 18 1	1 8	%		JP I	NP IP	NA	SP-SM 104 (SP-SM)9 104	1060.8		Qrs (SM (ML)s SM SM SP 10 SM SM SP 10 SP 10 SP 1047 SP 1047 SP 1047 SP 1047 SP 1047 SP 1047 SP		 38.5 to 40.8 ft. <u>Silty Sand, SM:</u> About 80% fine to coarse (predominantly fine) sand: about 15% nonplast 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. 40.8 to 41.4 ft. <u>Silt with Sand, (ML)s:</u> About 75% fines with how 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. 41.4 to 42.8 ft. <u>Silty Sand, SM:</u> 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. 42.8 to 44.0 ft. <u>Poorty Graded Sand, SP:</u> 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. 44.0 to 48.6 ft. <u>Silty Sand, SM:</u> About 80% fine to coarse (predominantly fine) sand; about 20% non plastic fines with no to tow dry strength, and rapid dilatancy; wet, dark gray; strong reaction with HCl. 44.0 to 48.6 ft. <u>Silty Sand, SM:</u> About 80% fine to coarse (predominantly fine) sand; about 20% non plastic fines with no to tow dry strength, and rapid dilatancy; trace of fine, subrounded, hard, gravei; maximum size, 20 mm; wet; gray; organic material present; strong reaction with HCl. 45.6 to 47.8 ft. <u>Sandy Silt, s(ML);</u> About 70% fines sand; maximum size, fine sand; wet soft gray to black; organic material present; strong reaction with HCl. 47.8 to 52.8 ft. <u>Poorty Graded Sand, SP:</u> About 95% fine sond; dilatancy; about 70% fine sand; maximum size, fine sand; wet soft gray to black; organic material present; strong reaction with HCl. 47.8 to 52.8 ft. <u>Poorty Graded Sand, SP:</u> About 95% fine to coarse (predom

OMMENTS:

MATILIJA DRILLI IOI E MATILIJA.GPJ MATILIJA GDT 7/3/02 10:35:56 AM

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

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY LOCATION: Upstream of Matilija reservoir in delta area

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

AM

56 10:35:

7/3/02 1

TILLUA GPJ MATILUA GDT

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DRILLHOLE

MATH UA

PROJECT: VENTURA RIVER PROJECT COORDINATES: N 2,003,509.5 E 6,165,690.2 TOTAL DEPTH: 50.5

SHEET 1 OF 3 STATE: CALIFORNIA GROUND ELEVATION: 1104.1 ANGLE FROM HORIZONTAL: 90 AZIMUTH:

DEPTH AND ELEVATION OF WATER LE AND DATE MEASURED: 4.8 (1099)		8/01						_	DE	РТН Т	O BED	ROC	K:	Not E	ncountered	ANGLE FROM HORIZONTAL: 90 AZI HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm
NOTES		DEPTH	% CORE RECOVERY	% FINES	% SAND	% GRAVEL	_	-	MOISTURE AC	CLASSIFICATION	1	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT	STMBUL VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
All MEASUREMENTS ARE IN FEET FROM GROUND SURFACE. PURPOSE OF HOLE: Determine gradation and toxicity of		-											<u> </u>			0.0 to 45.5 ft. Quaternary Reservoir Sediments (Qrs) 0.0 to 4.7 ft. <u>Poorly Graded Sand with Gravel and</u>
sediments impounded behind Matilija Dam. LOCATION: Upstream of Matilija reservoir in delta area. DRILL RIG:			1R										i		(SP/GP)c	<u>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.
Central Mining Equipment (CME 75) 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 barrei dry	н н	5												Ţ	1099.4	 4.7 to 8.0 ft. <u>Slity Sand with Gravel</u>, (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 damaged amount price and coarse.
coring system (FADC). <u>31.6 to 35.7 ft.</u> Core drilling using a HWD-4 face discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system. <u>35.7 to 45.5 ft.</u> 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		3	0	32	47	21	NP	NP	NA	(SM)g					(SM)g	brown; organic material present; strong reaction with HCI. Laboratory Data Interval: 4.7 to 8.0 ft. 8.0 to 9.5 ft. Well Graded Gravel with Sand, (GW)s:
coring system (FADC). <u>45.5 to 50.5 ft.</u> : 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:											1098.1				(GW)s	 Subargular, 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;
PN-Regional Drill Crew; C. Whisnant, driller; D. Steinke, helper ORILLING CONDITIONS AND DRILLER'S DMMENTS: 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.	10	90		12 1	4	14	1P	NP	NA	(SW-S					(SM)g 1092.0 (ML/SM) 1091.4	Laboratory Data Interval: 8.0 to 13.0 ft. 9.5 to 12.1 ft. <u>Silty Sand with Gravel, (SM)g</u> : 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 HCI.
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 nitially mistaken as Qal. 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	15-	100	•	3 7.	\$ 1	8 N	PN	iP	NA (SW-SM	<u>1091.1</u> V)g		ľ	Ĵrs	(GP-GM)s 1087.9	12.1 to 12.7 ft. <u>Silty Sand. (ML/SM):</u> 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 HCI. 12.7 to 16.2 ft. <u>Poorty Graded Gravel with Silt and</u> <u>Sand. (GP-GMIs:</u> About 50% fine and coarse
MDH-118-01. CAVING CONDITIONS: 23.0 to 28.0 ft.: 0.8 ft. of slough 31.2 to 31.6 ft.: 0.7 ft. of slough	-														ѕм	(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 HCI.
CASING RECORD: Casing Size Casing Depth Interval Drilled 56/8" FA 0.0 - 31.6 ft. 0.0 - 31.6 ft. 56/8" FA 31.6 ft. 31.6 - 35.7 ft. 56/8" FA 35.7 - 45.5 ft. 35.7 - 45.5 ft. 55/8" FA 45.5 45.5 - 50.5 ft. IOLE COMPLETION: Backfilled hole with auger cuttings and urface material.	20	66												(1096,1	Laboratory Data Interval: 13.0 to 16.2 ft. 16.2 to 18.0 ft. Sility 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 HCI. 18.0 to 22.8 ft. Well Graded Gravel with Sand, (GWJsc: About 60% fine and coarse, hard, subrounded to subangular, gravel; about 35% fine to
DEPTH OF WATER: Date Depth to Water 9/08/01 4.8 ft.														¢	ML)s- <u>F 1081.3</u>	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.
	 25		25	74	1	NP	NP	N	A SM		<u>079.6</u>			s	1079.6	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.
		100	<u> </u>										 	si	u = 83/88	

COMMENTS

EA = 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 LO	RILL HOLE NO.
FEATURE:	MATILLIA DAM ECOSYSTEM DESTORATION TO A SHOW TO A	VENTURA RIVER PROJ
	Instream of Matiliis receptoir is delte and	 VENTORA RIVER PROJ

LOCATION: Upstream of Matilija 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

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

MDH-11-01

SHEET 2 OF 3

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

			RY			LAE	BOR	_		DATA		LES	LIN	z /	1
NOTES		DEPTH	CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT		% MOISTURE	LAB LAB CLASSIFICATION	ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
		-												1077.1 (ML/CL)s 1076.4 SM 1076.1	23.0 to 24.5 ft. <u>Silty Sand, SM:</u> About 75% fine sand; about 25% fines with low toughness, plasticity, and dr strength, and rapid dilatancy; trace of fine and coarse subrounded gravel; maximum size, 25 mm; wet; gray; strong reaction with HCI.
															Laboratory Data Interval; 23.0 to 24.5 ft.
		30-	80	92	8	0	42	16	NA	ML	073.8			(ML)s	24.5 to 27.0 ft. <u>Silty Sand, SM:</u> 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 H0
			00	13	86	1	NP	NP	NA	SM	072.9			SM 1072.6	27.0 to 27.7 ft. Silty Clay with Sand, (ML/CL)s: About 85% fines with medium touchase election
		-		6	38	56	NP	NP	NA	(GW-GM)s			(GW-GM)sc	dry strength, and slow dilatancy; about 15% fine sand maximum size, fine sand; wet; soft to firm; gray; trace organic material; strong reaction with HCI.
											071.1			1071.1	27.7 to 28.0 ft. <u>Silty Sand, SM</u> : About 60% fine sand; maximum size, fine sand; about 40% fines with low toughness and plasticity, low to medium dry strength, and matical dilucity.
		35-		12	79	9	NP	NP	NA	SW-SM				SM	28.0 to 30.5 ft. <u>Silt with Sand. (ML)s</u> : About 80% fines with low to medium to unpress plasticity and deal
		4	90 -								068.6		Qrs	1068.6	strength, and slow dilatancy; about 20% fine sand; maximum size, fine sand; wet; soft to firm; gray; trace organic material; strong reaction with HCI.
		4											((GW-GM)s	Laboratory Data Interval: 28.0 to 30.3 ft.
		+												1085.1	30.5 to 31.5 ft. <u>Silty Sand, SM:</u> About 75% fine to coarse (predominantity fine)sand; about 25% non plasti fines with no dry strength, and rapid dilatancy; trace of fine, subrounded gravel; maximum size, 15 mm; wet; gray; strong reaction with HCI.
		40-											s	SM	Laboratory Data Interval: 30.3 to 31.2 ft.
			100										0	1063.4 ML)s 1062.8	31.5 to 33.0 ft. <u>Silty Gravel with Sand. (GW-GM)sc.</u> About 40% fine and coarse, hard, subrounded to subanguiar, gravel; about 30% fine to coarse sand;
		4											s	M	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.
													-	1081.1	Laboratory Data Interval: 31.5 to 33.0 ft.
	4	15-1	NR											F	33.0 to 35.5 ft. <u>Silty Sand, SM:</u> About 70% fine to coarse (predominantly coarse), subrounded to subangular sand; about 20% nonplastic fines with no
		+					1							-	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 HCI.
		4												-	Laboratory Data Interval: 33.0 to 35.5 ft.
·		_	ю									Q		DBBLES	35.5 to 39.0 ft. <u>Well Graded Gravel with Sitt and</u> <u>Sand. (GW-GM)s</u> : 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
	50	0					во	TTON	A OF I	HOLE				1053.6	size, 100 mm; wet; gray; strong reaction with HCl. 39.0 to 40.7 ft. <u>Silty Sand, SM:</u> About 65% fine sand; about 35% fines with low tourspress, planticity, and dou
															strength, and rapid dilatancy; trace of fine, hard, subrounded gravel; maximum size, 10 mm; wet; gray; race of organic matenal; strong reaction with HCI.

NA = Not Available

MATILIJA_DRILLHOLE MATILIJA.GPJ MATILIJA.GDT 7/3/02 10:35:56 AM

NP = Nonplastic NR = No Recovery

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

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY LOCATION: Upstream of Matilija 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 SHEET 3 OF 3

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

		Ϋ́		LABC	RATORY DATA		LES	τ,	z	7
NOTES	DEP1H	CORE RECOVE	SAN	GRAVEL	LIQUID LIMIT PLASTICITY INDEX % MOISTURE CONTENT CLASSIFICATION	ELEVATION	TOXICITY SAMP	GEOLOGIC UN SYMBOL	VISUAL CLASSIFICATIC	ELEVATION

CLASSIFICATION AND PHYSICAL CONDITION

40.7 to 41.3 ft. <u>Silt with Sand, (ML)s:</u> 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; gray; trace of organic material; strong reaction with HCI.

41.3 to 43.0 ft. <u>Silty Sand, SM:</u> 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 HCI.

43.0 to 45.5 ft. No Recovery

45.5 to 50.5 ft. Quaternary Alluvium (Qal)

45.5 to 50.5 ft. <u>Gravel, Cobbles and Boulders:</u> Recovered pieces of broken core ranging in length from ½ inch to 5-inches of hard sandstone: interpreted as pre-Reservoir Alluvium (Qal); strong reaction with HCI.

MATILIJA

OMMENTS: 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.

SHEET 3 OF 3 DRILL HOLE MDH-11-01

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

FEATURE: MATILIJA 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 SHEET 1 OF 2 STATE: CALIFORNIA GROUND ELEVATION: 1104.3 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm

1			š		LAB	_	_				PLES	LING	NO /	· · · · · · · · · · · · · · · · · · ·
NOTES	DEPTH		% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	LAB CLASSIFICATION	ELEVATION .	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
AII MEASUREMENTS ARE IN FEET FROM GROUND SURFACE.														0.0 to 38.0 ft
PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam. LOCATION: Upstream of Matilija reservoir in delta area. DRILL RIG:		FAPE	3										(SP/GP)c	Ouaternary Reservoir Sediments (Qrs) 0.0 to 4.7 ft. Poorty Graded Sand with Gravel and <u>Cobbles</u> , (SP/GP)c: About 40% fine to coarse, subrounded to subangular sand; about 40% fine a coarse, hard, subrounded to subangular gravel; at 15% subrounded, hard cobbles; imaximum size, 2 mm; about 5% nonplastic fines with no dry strengt rapid dilatancy; dry; tan; strong reaction with HCL.
Central Mining Equipment (CME 75) DRILLING & SAMPLING METHODS: <u>0.0 to 25.9 ft.</u> : 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). <u>25.9 to 30.7 ft.</u> : Core drilling using a HWD-4 face discharge diamond bit with a 2.060 i.d. and 2.980 o.d. system.	5									_		Ţ	1099.6	 4.7 to 8.0 ft. <u>Poorty Graded Gravel with Sand</u>. (GP)sc: About 60% fine and coarse (predominanth coarse), subrounded to subangular, hard, gravel; a 20% fine to coarse sand; about 10% fines with not plasticity, toughness, and dry strength, and rapid dilatancy; about 10% hard, subangular cobbles; maximum size, 450 mm; dry to moist; brown; stron reaction with HCI; wood, bark and other organics.
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 .d. and 3.9 inch o.d. system.		67	7	26	67 N	IP I	NB N	IA (I	GP-GM)s				'GP)sc	Laboratory Data Interval: 4.7 to 8.0 ft. 8.0 to 13.0 ft. <u>No Recovery</u> 13.0 to 21.2 ft. <u>Weil Graded Gravel with Sand,</u> (<u>GWJsc:</u> About 55% fine and coarse, hard, subrounded to subangular gravel; about 30% fine to coarse (predominantly coarse), subrounded sand;
PN-Regional Drill Crew; C. Whisnant, driller; D. Steinke, helper. DRILLING CONDITIONS AND DRILLER'S DMMENTS: J to 41.2 ft.: slow and rough (efusal with augers at 25.9 ft. and 38.0 ft. AVING CONDITIONS:	10-	NR							1096.	3			1096.3	Londone with nammer blow; about 10% hard, subangular cobbles; maximum size, 125 mm; about nonplastic fines with no dry strength and rapid dilata wet; gray; strong reaction with HCI. <u>Laboratory Data Interval:</u> 13.0 to 18.0 ft. 21.2 to 23.0 ft. Sandy Size c/ML by About 550% c
.8 to 13.0 ft.: about 3.0 ft. of slough 0.7 to 33.0 ft.: about 2.5 ft. of slough ASING RECORD: asing Size Casing Depth Interval Drilled -5/8" FA -0.0 - 25.9 ft. -5/8" FA -0.7 - 38.0 ft. -5/8" FA -30.7 - 38.0 ft. -5/8" FA -30.7 - 38.0 ft.		APB										rs		with low to medium toughness and plasticity, medium dry strength, and rapid dilatancy, about 45% fine and medium sand; maximum size, medium sand; wet, so grav to black; trace of organic material; strong reactiv with HCI. <u>Laboratory Data Interval:</u> 21.2 to 22.9 ft. 23.0 to 24.0 ft. <u>Silty Sand, SM:</u> About 75% fine to
OLE COMPLETION: ackfilled hole with auger cuttings and urface material. EPTH OF WATER: ate Depth to Water 10/01 4.4 ft.	15-													Coarse sand; about 15% fines with no to low toughne plasticity, and dry strength, and rapid dilatancy; abou 10% fine, subrounded gravel; maximum size, 20 mm; wet; gray; strong reaction with HCI. Laboratory Data interval; 23.0 to 24.0 ft.
		54	4 4	7 49	NP	NP	NA	(GV	,			(GV		24.0 to 25.4 ft. <u>Poorty Graded Gravel with Sand and</u> <u>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% fil 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>
21	0	0							1086.3					25.9 to 30.7 ft. <u>Poorty Graded Gravel with Cobbles.</u> <u>GP)c:</u> About 70% fine and coarse, subrounded to ingular, hard, gravel; about 30% broken core fragmen hard, mechanically broken sandstone cobbles); trace ne to coarse sand; wet; gray; strong reaction with HC 0.7 to 33.0 ft. <u>No Recovery</u>
-OMMENTS: FA = 6-5/8" od x 10-1/2" od Mobile hollow s FADC = 5-foot split barrel continuous dry co FAPB = Flight Auger Pilot Bit NA = Not Available NP = Nonolastic	tem fli		Jgers								Ma Sec Chi	terials Jimen emisti	v Lab under a	performed by the USACE Los Angeles District. yes were performed by the Navy Environmental USACE contract. A summary of the sediment ontained in Appendix A.

FEATURE: MATILUA DAM ECOSYSTEM		DATIO	G	EOI	LOC	ЭЮ	LO	GO	FDRI	LLF	IOI	E	NO. ME	0H-12-01 SHEET 2 0
FEATURE: MATILIJA DAM ECOSYSTEM F LOCATION: Upstream of Matilija reservoir in BEGUN: 9/10/01 FINISHED: 9/11/01 DEPTH AND ELEVATION OF WATER LEVE AND DATE MEASURED: 4.4 (1099.9)	n delta a	area	IN FEA	SIBIL	LITY S	ITUDY	(PRO. COO TOTA	JECT: VI RDINATE: AL DEPTH	ENTUR S: N: I: 41.2	a Ri' 2,003	VER . 1,771	PROJECT 5 E 6, 165,4 countered	STATE: CALIFORNIA
		RY		,	LAB	ORA	TOR	۲Y D,	4 <i>TA</i>		LES	L,	Z	/
NOTES	DEPTH	% CORE RECOVERY	% FINES	% SAND	% GRAVEL	LIQUID LIMIT	PLASTICITY INDEX	% MOISTURE CONTENT	GLASSIFICATION	ELEVATION	IOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
			64	36	0				5(ML)	B1.4			s(ML)	 Stutto 33.8 ft. <u>Sitty Sand. SM</u>: 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.
		42	12	67	21	NPN	NP N	NA (5	SW-SM)g 108				SM1080.	33.8 to 34.6 ft. <u>Silty Clay with Sand. (ML/CL)s:</u> About 80% fines with medium toughness, plasticity and dry strength, and slow dilatancy: about 20% fine sand.
	25	APB											(GP)sc 1078.	34.6 to 35.2 ft. Cobbles: Recovered mechanics in
														 broken, hard, gray sandstone wedged in cutting shoe; strong reaction with HCI. 35.2 to 38.0 ft. <u>Well Graded Gravel with Sand.</u> (<u>GWhs:</u> 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 domination and a shout
		46									q		GP)¢	Size, 150 min; wet; gray; strong reaction with HCI. 38.0 to 41.2 ft. Quaternary Alluvium (Qal) 38.0 to 41.2 ft. Gravel. Cobbles and Bouldary
	30											-	1073.6	Recovered pieces of broken core ranging in length from % inch to 3-inches of hard sandstone; interpreted as pre-Reservoir Alluvium (Qal); strong reaction with HCl.
		PB												
	- 10	00 ⁹⁸	3 2	0	38	13	NA	ML	1069.7			51 (M	VI <u>1070.5</u> IL/CL)s 1069.7	-
34	5 	_										cc	DBBLES 1069.1	
	_ 65	5										(GI	W)s	
													1066.3	
40-	- 69										Qai	COE AND	AVEL, BBLES JULDERS	
L			<u></u>			зоттс		F HOL					1063.1	

FADC = 5-foot split barel continuous dry coring system FAPB = Flight Auger Pilot Bit NA = Not Available NP = Nonplastic NR = No Recovery

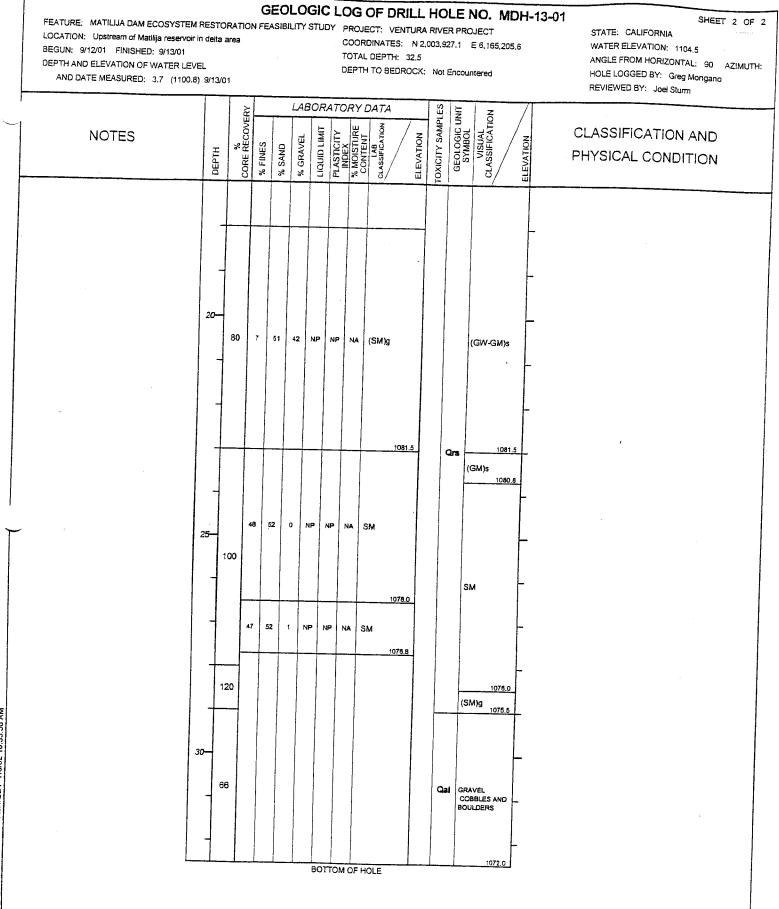
MATILIJA DRULHIOLE MATILIJA.GPJ MATILIJA.GDT 7/3/02 10:35:56 AM

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Internals 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.

	SEATURE MATHING DAVIDE DAVID				Ģ	SEC)Gl	C	LO	G	OF DF	RILL	. H	OL	E	NO.	MD	OH-13-01 SHEET 1 OF
	FEATURE: MATILIJA DAM ECOSYSTE LOCATION: Upstream of Matilija reserve BEGUN: 9/12/01 FINISHED: 9/13/01 DEPTH AND ELEVATION OF WATER LE AND DATE MEASURED: 3.7 (1100	EVEL	ena a	irea	DN FE	EASIE	רדו או	ΥŚΠ	UDY	PF CC TO	ROJE DORI DTAL	ECT: VEN DINATES: DEPTH: TO BEDR	N 2 32.5	a Ri 2.003	VER 3,927	8 PR 7.1	OJECT E 6,16		STATE: CALIFORNIA
			1.3/0	;					-										REVIEWED BY: Joel Sturm
	NOTES ALL MEASUREMENTS ARE IN FEET FRO GROUND SURFACE.		DEPTH	% CORE RECOVERY	% FINES	% SAND	GRAVFI	<u> </u>	_		_	CTAC Crassification	ELEVATION	TOVICITY	I UNIULI SAMPLES	GEOLOGIC UNIT SYMBOI	CLASSIFICATION		CLASSIFICATION AND PHYSICAL CONDITION
	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 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 .d. and 3.9 inch o.d. system. DRILLED BY: PN-Regional Drill Crew; C. Whisnant, Driller; D. Steinke, heiper. DRILLING CONDITIONS AND DRILLER'S COMMENTS: DRILLING CONDITIONS AND DRILLER'S COMMENTS: Jne ASING RECORD: asing Size Casing Depth Interval Drilled .5/8" FA 29.0 ft. 29.0 - 32.5 ft. OLE COMPLETION: ackfilled hole with auger cuttings and urface material. EPTH OF WATER: ate Depth to Water 3/14/01 13.3 ft.			30	48				NP	NA	(S	W-SM)g 1092. 4)g			Qrs	(S	ım = 83		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 ccarse, subrounded sand; about 25% fines with low toughness, plasticity, and dry strength, and rapid dilatancy; about 25% fine and ccarse (predominantly fine), subrounded to subangular, hard, gravel; wet; brown and gray; organic material present; strong reaction with HCI. 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): About 70% fine and ccarse, hard, subrounded gravel; maximum size, 70 mm; about 20% fine to ccarse (predominantly occarse), subrounded and slow dilatancy; wet; brown; organic material present; strong reaction with HCI. Laboratory Data Interval: 18.0 to 23.0 ft. 23.0 to 23.0 ft. 23.0 to 23.7 ft. Silty Gravel with Sand. (GM): About 50% fine and ccarse (predominantly occarse), subrounded gravel; maximum size, 75 mm; about 25% fines with low plasticity, toughness, and dry strength and rapid dilatancy; wet; gray; strong reaction with HCI. Laboratory Data Interval: 23.0 to 25.5 ft. 23.7 to 28.5 ft. Silty Sand. SM; About 60% fine to ccarse end precominantly fore), subrounded sand; about 40% fines with low toughness and plasticity, toughine ss., 150 mm; wet; gray to black; organic material present; strong reaction with HCI. Laboratory Data Interval: 25.0 to 27.7 ft. 23.5 to 27.7 ft. 23.5 to 27.7 ft. 24.5 to 23.0 ft. Silty Sand with Gravel, (
MATILIJA WATE	FADC = 5-foot solit barrel continuous dry FAPB = Flight Auger Pilot Bit NA = Not Available NP = Nonplastic NR = No Recovery	corin	g sy	stem											č	Cher	mistry l	ab ur	y was performed by the USACE Los Angeles District. y analyses were performed by the Navy Environmental inder a USACE contract. A summary of the sediment its is contained in Appendix A.

SHEET 1 OF 2 DRILL HOLE MDH-13-01



JMMENTS:

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

Materials testing was performed by the USACE Los Angeles District.

Datum = 83/88

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

FEATURE: MATILIJA DAM ECOSYSTEM RESTORATION FEASIBILITY STUDY LOCATION: Upstream of Matilija reservoir pond in delta area

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

DEPTH AND ELEVATION OF WATER LEVEL

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

PROJECT: VENTURA RIVER PROJECT COORDINATES: N 2,004,057.0 E 6,164,977.8 TOTAL DEPTH: 25.0 DEPTH TO BEDROCK: Not Encountered

SHEET 1 OF 1 STATE: CALIFORNIA GROUND ELEVATION: 1106.6 ANGLE FROM HORIZONTAL: 90 AZIMUTH: HOLE LOGGED BY: Greg Mongano REVIEWED BY: Joel Sturm

\vdash	, 																REVIEWED BY: Joel Sturm
1				ΞRΥ		,	LA	BOI			Y DAT			lES	TIN	NO	/
	NOTES	DEDTH		CORE RECOVERY	% FINES	% SAND	% GRAVEL		PI ASTICITY	NDEX MOISTINE	CONTENT		ELEVATION	TOXICITY SAMPLES	GEOLOGIC UNIT SYMBOL	VISUAL CLASSIFICATION	CLASSIFICATION AND PHYSICAL CONDITION
A G	LL MEASUREMENTS ARE IN FEET FROM ROUND SURFACE.	л		Ĩ								7					0.0 to 21 5 ft
D se L(URPOSE OF HOLE: etermine gradation and toxicity of adiments impounded behind Matilija Dam. DCATION: DStream of Matilija reservoir in delta area.														¥		Quaternary Reservoir Sediments (Qrs) 0.0 to 10.0 ft. <u>No Recovery</u> : 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
Ce	RILL RIG: entral Mining Equipment (CME 75)		_														hard, subrounded to subangular, boulders; maximum size. 15 inches: drv (surface) to wet comv and hereit
0.0 10 wit co 21 fac	RILLING & SAMPLING METHODS: <u>10 21.5 ft.</u> : Drilled with 6-5/8-inch i.d. by 1/2 inch o.d. hollow stem flight augers and h 5-3/4 inch i.d. by 5-foot split barrel dry ring system (FADC). <u>5 to 25.0 ft.</u> : Core drilling using a HWD-4 te discharge diamond bit with a 3.0 inch and 3.9 inch o.d. system.	5	-FA	PB													trace organics; strong reaction with HCl. 10.0 to 13.5 ft. <u>Well Graded Gravel with Sand,</u> (<u>GWIs:</u> 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,
PN	ILLED BY: -Regional Drill Crew; C. Whisnant, Driller, Steinke, Helper																gray; strong reaction with HCl.
CC	ILLING CONDITIONS AND DRILLER'S MMENTS: I to replace broken spades and bullets on		-														Laboratory Data intervals: 10.0 to 11.9 ft. 11.9 to 13.5 ft.
auq MD).0 ;on	ter head that were damaged while drilling H-13-01. to 25.0 ft.; slow and rough; difficult drilling ditions through cobbles and boulders, drill ocking and augers screeching. usal with augers at 21.5 ft.	10-	10	0	7	42	51	NP	NP	NA	(GW	-GM)s		a	rs		13.5 to 18.0 ft. <u>Well Graded Gravel with Sand.</u> (<u>GW)s:</u> 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,
0.0	VING CONDITIONS: to 10.0 ft.: about 2.1 ft. of slough	-	100) 4	9 3		58	NP	NP	NA	(GW-	<u>1094.</u> GM)s	7		((GW)s	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 HCI.
: <u>as</u> -5/	SING RECORD: <u>ing Size Casing Depth</u> <u>Interval Drilled</u> 8" FA 0.0 - 21.5 ft. 8" FA 21.5 21.5 - 25.0 ft.	_]					_				1093.			-	1093.1	L <u>aboratory Data Interval:</u> 13.5 to 18.0 ft. 18.0 to 21.5 ft.
ac urfi	E COMPLETION: Kfilled hole with auger cuttings and ace material. TH OF WATER:	15	62	4	2	3	73	NP	NP	NA	(GP)s				(0	GW)s	18.0 to 21.5 ft. <u>Silty Sand. SM</u> ; 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 HCI.
ate		-															21.5 to 25.0 ft. Quaternary Alluvium (Qal)
		-										1088.6			-	1088.6	21.5 to 25.0 ft. <u>Gravel, Cobbles and Boulders:</u> Recovered pieces of broken core ranging in length from ½ inch to 5 inches of hard sandstone; interpreted as pre-Reservoir Alluvium (Qal); some silt present; strong
		20-	71	17	80) :	3 N	IP	NP	NA	SM				SM	A _	reaction with HCI.
		4		 								1085.1				1085.1	
		4														F	
			34											Qai	CO	AVEL, BBLES D ULDERS	
	L.,	25			1			80		MO	HOLE			1		1081.6	

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

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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.

FEATURE: MATILIJA 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

GEOLOGIC LOG OF DRILL HOLE NO. MDH-15-01 PROJECT: VENTURA RIVER PROJECT

COORDINATES: N 2,001,671.8 E 616,254.3

DEPTH TO BEDROCK: Not Encountered

TOTAL DEPTH: 91.0

SHEET 1 OF 2

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

REVIEWED BY: Joel Sturm LABORATORY DATA % RECOVERY VISUAL LIND PLASTICITY INDEX % MOISTURE CONTENT GEOLOGIC (SYMBOL LAB CLASSIFICATION CLASSIFICATION AND LIMIT DINDIT *TOXICITY SAMPLES NOTES GRAVEL ELEVATION ELEVATION % FINES SAND DEPTH PHYSICAL CONDITION CORE * * T ALL MEASUREMENTS ARE IN FEET FROM RESERVOIR SURFACE. 0.0 to 12.8 ft. Reservoir Water Water Surface El. 1087.2 ft. 08/25/01 PURPOSE OF HOLE: Determine gradation and toxicity of sediments impounded behind Matilija Dam. 12.8 to 85.0 ft. Quaternary Reservoir Sediment (Qrs) 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; LOCATION: Matilija Reservoir 5 EQUIPMENT MOBILIZATION: maximum size, 20 mm (wood fragments); wet, dark Water The barge, drill rig, and drilling equipment gray, very soft; strong reaction with HCI. were mobilized from Reclamation's PN-Region via trucks. The barge, drill rig, and equipment was then lifted with a crane Laboratory Data Interval: 12.8 to 18.0 ft. from a dam access road, over inaccessible terrain and placed onto the reservoir pond. The crane was a GROVE 120 ton crane with 17.8 to 28.0 ft. Silt. ML: About 95% fines with low to 10 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 Sitly Sand (SM) from 21.0 to 21.2 ft.; gas detector indicated 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 1% methane at the end of the run; strong reaction with 1074.4 HCL company supplying the crane is OST Trucks and Cranes from Ventura, CA (phone number Laboratory Data Interval: 18.0 to 28.0 ft. 800-400-4852) 15 35 83 17 0 NP NP NA (ML)s (ML)s DRILLING BARGE: 28.0 to 29.5 ft. Lean Clay, CL: About 95% fines with The drilling barge has a max, load capacity of approximately 14,000 pounds and is medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; maximum size, fine sand; moist, approximately 14,000 points and 15 in the comprised of three separate segments each having its own floatation cells and weighing between 4200 and 5200 pounds. Two of the 1069.4 gray, soft; strong reaction with HCI. 1069.2 29.5 to 31.4 ft. <u>Silty Sand, SM:</u> About 60% fine sand; about 40% nonplastic fines, rapid dilatancy, low three segments are connected via beams and king. The third segment is attached by s. The fully assembled barge is self 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 20 100 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 97 3 0 38 10 NA ML ML Laboratory Data Interval: 28.0 to 38.0 ft. weighing approximately 30 pounds. 31.4 to 37.3 ft. Lean Clay, CL: About 95% fines with 25 DRILL RIG: 100 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. Ingersoil-Rand, Model A200 DRILLING & SAMPLING METHODS: Drilling depth is measured from the water 1059.2 1059.2 37.3 to 38.0 ft. <u>Poorty 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% surface of the reservoir pond. The water sediment interface in this hole is at a depth of Cl 1057.7 Qrs 12.8 to 18.0 ft.: Due to the presence of a loosely arranged, noncohesive sediment the 30 100 SM methane at the end of the run; strong reaction with HCI. sample was collected using a 3-inch i.d. by 1055.8 3-1/2 o.d. by 5-foot split barrel pushed into the reservoir sediment. 38.0 to 40.2 ft. Slity Sand, SM: About 70% fine sand; about 30% nonplastic fines, rapid dilatancy, low 18.0 to 85.0 ft.; 3-3/4 inch i.d. by 7-1/4 inch 96 4 0 58 28 CL dry strength; trace organics; maximum size, fine sand; NA o.d. flight augers with 3-inch i.d. by 3-1/2 o.d. by 5-foot split barrel continuous dry coring moist, gray, soft; strong reaction with HCI. system (FADC) with a bullet bit. Auger CL Laboratory Data Interval: 38.0 to 48.0 ft. 35 refusal at 85.0 ft. 92 85.0 to 91.0 ft.: Core drilling using a NWD-4 40.2 to 43.0 ft. <u>Silt, ML:</u> About 90% fines with medium plasticity, slow to no dilatancy, high dry face discharge diamond bit with a 3.0 inch i.d. and 3.9 inch o.d. system. 1049.9 strength; about 10% fine sand; trace organics; 1049.2 SP 1049.2 DRILLED BY: maximum size, fine sand; moist, gray, soft; a lens of organics from 40.0 to 40.3 ft.; strong reaction with HCl. PN-Regional Drill Crew: Chris Peterson, driller; Jerry Hanson, helper and Mike SM 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; Edmonson, helper 40 1047.0 100 moist, gray, soft; about 20% 1 to 2 mm diameter methane gas bubbles on the surface of the core from ML 60 40 0 44.0 to 44.2 ft.; strong reaction with HCI. 41 14 1044.2 s(ML) SM 1042.5 45 100 OMMENTS: FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers Datum = 83/88

FADC = 5-foot split barrel continuous dry coring system

NA = Not Available

12.8 ft

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0:35:56

20/2/2

GDT

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MATHUA WATER DRILLIOLE

NP = Nonplastic NR = No Recovery

See Toxicity Sample Intervals

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.

FEATURE: MATILIJA 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

GEOLOGIC LOG OF DRILL HOLE NO. MDH-15-01 PROJECT: VENTURA RIVER PROJECT

SHEET 2 OF 2

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

					7														REVIEWED BY: Joel Sturm
·	1			ÆRΥ	-	- -		T			DAT				UNIT		NOI	7	
	NOTES			ECO/	s		KET.	LIMIT	λuς,	TURE			NO	FS		SUAL	FICAT	/ ಶ	CLASSIFICATION AND
			DEPTH	% CORE RECOVERY	% FINES	SAND	GRAVEL	LIQUID LIMIT	AST	MOIS	LAB LAB		ELEVATION	'TOXICITY SAMPLES	GEOLOGIC 1 SYMBOL	VISUAL		ELEVATION	PHYSICAL CONDITION
	DRILLING CONDITIONS AND DRILLER'S COMMENTS:			ŏ	~	8	%	13		%	6	/	Ē	<u> </u>		<u> </u>	<u>o/</u>	Ē	
	0.0 to 12.8 ft.: water 12.8 to 18.0 ft.: pushed sample barrel		-									1	039 2						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,
	63.0 to 85.0 ft.; sample fell out, out sand		4										0002			ML			gray, soft; strong reaction with HCl.
	back in and retrieved sample continued	1	⊶.	100															Laboratory Data Interval: 48.0 to 58.0 ft.
	drilling with sample catcher to 85.0 ft.; picked up traces of methane at 28.0 ft. and 38.0 ft.																10	35.2	52.0 to 54.7 ft. Silty Sand, SM: About 70% fine
	CAVING CONDITIONS: None		+		93	7	o	39	7	NA	ML								sand; about 30% nonplastic fines, rapid dilatancy, low dry strength; maximum size, fine sand; moist, gray, soft, strong reaction with HCI.
	ESTIMATED DRILLING FLUID RETURN:	55														SM	10	32.5	54.7 to 72.2 ft Silt MI : About 050/ 5-000 11
	None used while the hole was advanced using flight augers. From 85.0 to 91.0 ft. clean reservoir water was used during	30	יך	9 6											Ī			-	medium plasticity, slow dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCl.
	diamond drilling. There was no casing below 35.0 ft. and drilling fluid during diamond		-																Laboratory Data Interval
	drilling could not be monitored. Reservoir water was added to the inside of the flight augers each time the 5 ft. sample barrel was		1									10:	29.2					╞	58.0 to 58.0 ft. 68.0 to 78.0 ft.
	etneved to keep sand from running in.	60		00														E	72.2 to 73.5 ft. <u>Silty Sand, SM:</u> About 55% fine sand; about 45% nonplastic fines, rapid dilatancy, low
1	CASING RECORD: Casing Size Casing Depth Interval Drilled 0-3/4" FA 0.0 - 85.0 ft 0.0 - 85.0 ft] "															╞	dry strength; trace organics; maximum size, fine sand; moist, gray, soft; strong reaction with HCI.
1	-3/4" FA 85.0 ft. 85.0 - 91.0 ft.]_		96	4	0	34	6	NA	ML							E	73.5 to 78.0 ft. Silt, ML: About 95% fines with medium plasticity, no dilatancy, high dry strength; about 5% fine send; there are the sender th
14	IOLE COMPLETION: is the augers were pulled the hole was		-												N	ЛL		F	moist, gray, soft 4 mm lenses of omanics at 74 2 ft and
18	llowed to slough in on itself.	65-	6	3										c	rs			┝	73.0 IC, subig reaction with HCI.
~	<u>e Depth of Water</u> 5/25/01 12.8 ft.	-	-															L	78.0 to 85.0 ft. Lean Clay, CL: About 95% fines with medium plasticity, no dilatancy, high dry strength; about 5% fine sand; trace organics; maximum size, fine sand;
F	OXICITY SAMPLE INTERVALS:	-	<u>†</u> -	╈	+							1019	0.2						moist, gray, soft; lens of Silty Sand (SM) and organics from 81.2 to 81.3 ft.; strong reaction with HCl.
1	2.8 ft. 18.0 ft. 3.0 ft. 28.0 ft. 3.0 ft. 38.0 ft.	7 0	10	,														F	Laboratory Data Interval: 78.0 to 85.0 ft.
4	3.0 ft. 48.0 ft. 3.0 ft. 58.0 ft. 3.0 ft. 68.0 ft.	-	}														1015.		85.0 to 91.0 ft. Quaternary Alluvium (Qal)
6	8.0 ft. 68.0 ft. 8.0 ft. 78.0 ft. 8.0 ft. 85.0 ft.	-		- 9	9 ·		0 3	8	9 N		ΝL				SM	м	1013	٦.	85.0 to 91.0 ft. <u>Poorty Graded Gravel with Cobbles</u> (GP)c: About 55% coarse, hard, subangular gravel;
Ì		- 7 5]																aray, maximum size 300 mm; any sond and all that
		-	100	'											ML	Ļ.			iniling and was not collected in the same barrel
		-										1009.:	2				1009.2	F •	11.4 inch size cobble was present with the gravel; strong reaction with HCl.
		-																T	
		80	100															┝	
		-		99	1	0	47	7	NA	м	IL.				CL			Ľ	
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		<i>ю</i>															996.2	-	
)	.OMMENTS:	-						80T	том	OF H	OLE								
	EA = 3-3/4" id x 7-1/4" od CME hollow ster														Datur				

FA = 3-3/4" id x 7-1/4" od CME hollow stem flight augers FADC = 5-foot spit barrel continuous dry coring system

NA = Not Available NP = Nonplastic NR = No Recovery

MATILUA WATER DRIFTHOLE MATILUA GPJ MATILUA GDT 7/302 10:35:56 AM

* 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.