Hole No. WB094

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 2 SHEETS

1. PROJECT: VIRGINIA STATE SAND INVENTORY
2. LOCATION (Coordinates or Station): S_1 41295.80 ; S_2 27196.30
3. DRILLING AGENCY: Virginia Institute of Marine Science
4. HOLE NO. (As shown on drawing title and file number): WB094 — Willoughby Bank
5. NAME OF DRILLER: Robert A. Gammisch
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. Water Depth = 29.0 ft.
8. Core Penetration = N/A
9. Core Recovery = 18.0 ft.
10. SIZE AND TYPE OF BIT:
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Marine, Inc.
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14.
15. Lat. 36°58.22' Long. 76°03.88'
16. DATE HOLE: STARTED 10-20-81 COMPLETED 2-82
17. ELEVATION TOP OF HOLE:
18. TOTAL CORE RECOVERY FOR BORING %
19. SIGNATURE OF INSPECTOR:

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-29.0	0		TOP			
-30.0	1					
			WB094-04 SM 5Y4/2 Fine grain silty sand Micaceous Shell fragments			
-31.0	2					
-32.0	3		WB094-05 SP 5Y5/2 Medium to coarse silty sand Clay balls Micaceous			WB094-CP3
-33.0	4					
-34.0	5		WB094-06 SM 5Y4/2 Fine grain silty sand Micaceous Shell fragments			
-35.0	6					
B' / B						
-36.0	7					
-37.0	8		WB094-01 SM 5Y4/2 Medium to coarse sand, silty sand and gravel Micaceous Shell fragments Slight Fe staining Slight H_2S			WB094-CP1
-38.0	9					
			WB094-02 SP 5Y5/3 Medium to coarse sand Fe staining Clay balls			
-39.0	10					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT | HOLE NO.

Hole No. WB094

DRILLING LOG	DIVISION	INSTALLATION	SHEET 2 OF 2 SHEETS

1. PROJECT: VIRGINIA STATE SAND INVENTORY
2. LOCATION (Coordinates or Station): S_1 41295.80 ; S_2 27196.30
3. DRILLING AGENCY: Virginia Institute of Marine Science
4. HOLE NO. (As shown on drawing title and file number): WB094 — Willoughby Bank
5. NAME OF DRILLER: Robert A. Gammisch
6. DIRECTION OF HOLE: ☑ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. Water Depth = 29.0 ft.
8. Core Penetration = N/A
9. Core Recovery = 18.0 ft.
10. SIZE AND TYPE OF BIT:
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MSL
12. MANUFACTURER'S DESIGNATION OF DRILL: Alpine Marine, Inc.
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: ; UNDISTURBED:
14. TOTAL NUMBER CORE BOXES:
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 10-20-81 ; COMPLETED 2-82
17. ELEVATION TOP OF HOLE:
18. TOTAL CORE RECOVERY FOR BORING: %
19. SIGNATURE OF INSPECTOR:

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			WB094-02 SP 5Y5/3			WB094-CP1
A' -40.0	11					
A						
-41.0	12					
-42.0	13					
			WB094-03 SW 2.5Y7/4 Well graded sands Clay balls thruout Small areas with very coarse sand and gravel Slight Fe staining			WB094-CP2
-43.0	14					
-44.0	15					
-45.0	16					
-46.0	17					
-47.0	18		BOTTOM			
	19					
	20					

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE. PROJECT HOLE NO.

VIBRATORY CORE SA E LOG

R 1625 Bailey Lane Virginia Beach, VA 23451

nt: C of E

Location: THimble SHOAL Channel

...ription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
	0	13:56.00	Ø	Ø
...ck	1	56.02	0.02	0.02
...ty	2	56.03	0.03	0.01
...e sand	3	56.04	0.04	0.01
	4	56.06	0.06	0.02
...arse	5	56.08	0.08	0.02
...rown	6	56.10	0.10	0.02
...sand	7	56.12	0.12	0.02
	8	56.15	0.15	0.03
	9	56.20	0.20	0.05
	10	56.30	0.30	0.10
	11	56.60	0.60	0.30
	12	57.00	1.00	0.40
	13	14:00.00	4.00	3.00
	14	14:02.5	6.50	2.50
	15	14:05.00	9.00	5.00
	16			
	17			
	18			
	19			
	20			

...ample & Condition:

Support Vessel:

Positioning Method:

Positioning Information:

238,480 N. 2,711,943 E. (actual posit.)

Depth of Water: 50.8' Est.Current:

Wind: Sea: Swell:

Length of Barrel: 20' Diam.Core: 3.0"

Depth of Penetration: 14.5' Length Recovered: 13.5'

Remarks:

1st attempt

Operator: Mr Clarke Client Rep: Leonard Jones

Length Retained: 8.5'

Shipped To:

Type Analysis:

Date: 9 Sept '89 Time: 1405

Site 89 TSVC#4 Core # 89 TSVC#4 RUN 1

VIBRATORY CORE SAMPLE LOG

R 1625 Bailey Lane Virginia Beach, VA 23451

nt: CoE

Location: Thimble Shoal Channel

ription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
	0	14:36.30	Ø	
	1			
	2			
tted	3			
	4	jetting		
	5			
	6			
	7			
	8			
	9	14:39.00	2.70	0.00
e/coarse	10	14:39.50	3.20	0.50
eon	11	40.50	4.20	1.00
Land	12	42.00	5.70	0.50
	13	42.30	6.00	0.30
	14	43.00	6.70	0.70
	15	44.00	7.70	1.00
	16	46.50	9.20	1.50
k	17	49.50	12.20	3.00
	18	50.50	13.20	1.00
and	19	53.50	16.20	3.00
	20	14:55.00	18.70	5.00

Sample & Condition: shelly material packed in bit

Support Vessel:

Positioning Method: Motorola Miniranger III

Positioning Information:

at marker buoy

238,480 N. 2,711,943 E. (actual posit.)

Depth of Water: 50.8 F. Est.Current:

Wind: Sea: Swell:

Length of Barrel: 20' Diam.Core: 3.0"

Depth of Penetration: 18.5' Length Recovered: 10.0'

Remarks:

2nd run

jetted to 8', vibrated to 18.5'

Operator: M L Clarke Client Rep: Leonard Jones

Length Retained: 10' + bit sample

Shipped To: Great Bridge

Type Analysis:

Date: 9 Sept. 1989 Time: 1455

Site # 89TSVC#4 Core # 89TSVC#4 2nd RUN

VIBRATORY CORE S/ LE LOG

R 1625 Bailey Lane Virginia Beach, VA 23451

nt: C of E

Location: Thimble Shoal Channel

ription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
	0			
lack 1 ty sand	1			
	2			
	3			
e/coarse	4			
	5			
rown sand	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
dk gey silt	14			
	15			
	16			
	17			
	18			
	19			
	20			

Sample & Condition:

Support Vessel:

Positioning Method:

Positioning Information: Taken SW of Planned site.

238,173 N. 2,712,813 E. (actual position)

Depth of Water: 51.2 F. Est. Current:

Wind: Sea: Swell:

Length of Barrel: 20' Diam. Core: 3.0"

Depth of Penetration: 7 Length Recovered: 14.0'

Remarks:

penetration recorder was disconnected during driving

no penetration record

Operator: Mr Clarke Client Rep: Leonard Jones

Length Retained: Ø

Shipped To:

Type Analysis:

Date: 9 Sept. '89 Time: 1612

Site # 89 TSVC #10 Core #

VIBRATORY CORE SAMPLE LOG

R 1625 Bailey Lane Virginia Beach, VA 23451

nt: C of E

Location: Thimble Shoal Channel

ription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
			MIN.	MIN.
	0	16:36.00	Ø	START
lack ilty Sand	1	36.02	0.02	0.02
	2	36.05	0.05	0.03
	3	36.08	0.08	0.03
ine/coarse	4	36.10	0.10	0.02
rown Sand	5	36.20	0.20	0.10
	6	36.35	0.35	0.15
	7	36.50	0.50	0.15
	8	36.70	0.70	0.20
	9	36.90	0.90	0.20
	10	37.20	1.20	0.30
	11	37.50	1.50	0.30
	12	37.80	1.80	0.30
	13	38.50	2.50	0.70
ack ayey ilt	14	40.00	4.00	1.50
	15	41.20	5.20	1.20
	16	44.00	8.00	2.80
	17	16:47.00	11.00	3.00
	18			
	19			
	20			

Support Vessel:

Positioning Method:

Positioning Information:

238,173 N. 2,712,813 E. (actual posit.)

Depth of Water: 51.2' F. Est.Current:

Wind: Sea: Swell:

Length of Barrel: 20' Diam.Core: 3.0"

Depth of Penetration: 16.8' Length Recovered: 16.8'

Remarks:

2nd attempt
recorder working

Operator: M L Clark Client Rep: Leonard Jones

Length Retained: 16.8'

Shipped To:

Type Analysis:

Sample & Condition:
pebble, pack with material

Date: 9 Sept '89 Time: 1647

Site # 89TSVC#10 Core #

VIBRATORY CORE MPLE LOG

AR 1625 Bailey Lane Virginia Beach, VA 23451

ent: C of E

Location: Thimble Shoal Channel

cription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
			MIN.	MIN.
	0	11:44.20	Ø	START
ack ilty and	1	44.22	0.02	0.02
	2	44.24	0.04	0.02
	3	44.26	0.06	0.02
	4	44.28	0.08	0.02
	5	44.31	0.11	0.03
	6	44.35	0.15	0.04
	7	44.38	0.18	0.03
	8	44.50	0.30	0.12
own ese/fine nd	9	44.75	0.55	0.25
	10	45.20	1.00	0.45
	11	46.00	1.80	0.80
	12	46.30	2.10	0.30
	13	46.80	2.60	0.50
	14	47.40	3.20	0.60
	15	49.00	4.80	1.60
silt; gravel	16	51.50	7.30	2.50
	17	11:55.00	10.80	3.80
	18			
	19			
	20			

Sample & Condition: Dented - Gravel in B.T

Support Vessel:

Positioning Method:

Positioning Information:

238,008 N. 2,714,004 E. (actual position)

Depth of Water: 49.4' E. Est.Current:

Wind: Sea: Swell:

Length of Barrel: 20.0' Diam.Core: 3.0"

Depth of Penetration: 16.5' Length Recovered: 15.6'

Remarks: Refused - no advance 5 minutes

Geared in B.T

Operator: Mike Clark Client Rep: Jerry Swear

Length Retained: 15.6' + B.T Sample

Shipped To:

Type Analysis:

Date: 10 Sept. 1989 Time: 1155

Site # 89TSVC# 11 Core #

VIBRATORY CORE SAMPLE LOG

AR 1625 Bailey Lane Virginia Beach, VA 23451

ent: C of E

Location: Thimble Shoal Channel

cription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
			MIN.	MIN.
	0	10:47.10	Ø	START
	1	47.12	0.02	0.02
	2	47.15	0.05	0.03
	3	47.20	0.10	0.05
	4	47.23	0.13	0.03
	5	47.27	0.17	0.04
	6	47.30	0.20	0.03
	7	47.35	0.25	0.05
	8	47.40	0.30	0.05
	9	47.45	0.35	0.05
	10	47.55	0.45	0.10
	11	47.85	0.75	0.30
	12	48.70	1.60	0.85
	13	49.55	2.45	0.85
	14	50.70	3.60	1.15
	15	51.40	4.30	0.70
	16	52.05	4.95	0.65
	17	53.45	6.35	1.40
	18	54.00	6.90	0.55
	19	54.50	7.40	1.00
	20			

e/Coarse
own
and

ck
ty Sand

Sample & Condition:

Support Vessel:

Positioning Method:

Positioning Information:

237,730 N. 2,715,006 E. (actual point)

Depth of Water: 45.1' F. Est.Current:

Wind: Sea: Swell:

Length of Barrel: 20' Diam.Core: 3.0"

Depth of Penetration: 18.5 Length Recovered: 17.3

Remarks:

Operator: M L Clarke Client Rep: Jerry Swan

Length Retained: 17.3'

Shipped To:

Type Analysis:

Date: 10 Sept '89 Time: 1055

Site # 89 TSVC-18 Core #

VIBRATORY CORE SAMPLE LOG

AR 1625 Bailey Lane Virginia Beach, VA 23451

ent: C of E

Location: Thimble Shoal Channel

Support Vessel:

Positioning Method:

Positioning Information:

237,471 N. 2,716,149 E. (actual posit.)

Depth of Water: 51.8' F. Est.Current:

Wind: Sea: Swell:

Length of Barrel: 20' Diam.Core: 3.0"

Depth of Penetration: 16.5' Length Recovered: 17.7'

Remarks:

refusal at 16.5'

Operator: Mr Clark Client Rep: Jerry Swean

Length Retained: 17.7'

Shipped To:

Type Analysis:

Date: 10 September 1989 Time: 0845

Site #89TSVC-19 Core #

Description	Depth ft.	Time for Penetration Real	Elapsed MIN.	Per ft. MIN.
	0	8:31.80	Ø	START
loose silty sand	1	31.81	0.01	0.01
	2	31.82	0.02	0.01
	3	31.83	0.03	0.01
	4	31.84	0.04	0.01
	5	31.85	0.05	0.01
fine/coarse	6	32.10	0.30	0.25
	7	32.90	1.10	0.80
brown	8	33.30	1.50	0.40
Sand	9	33.75	1.95	0.45
	10	34.05	2.25	0.30
	11	34.50	2.70	0.45
	12	35.60	3.80	1.10
	13	37.25	5.45	1.65
	14	39.70	7.90	2.45
	15	42.00	10.20	2.30
black layer silt	16	43.50	11.70	1.50
	17	45.00	13.20	3.00
	18			
	19			
	20			

Sample & Condition:

VIBRATORY CORE SAMPLE LOG

AR 1625 Bailey Lane Virginia Beach, VA 23451

ent: C of Eng.

Location: Thimble Shoal Channel

cription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
			MIN.	MIN.
	0	15:16.55	Ø	START
	1	16.57	0.02	0.02
	2	16.59	0.04	0.02
ve & Silt:	3	16.62	0.07	0.03
nd &	4	16.66	0.11	0.04
	5	16.70	0.15	0.04
	6	16.73	0.18	0.03
	7	16.76	0.21	0.03
	8	16.80	0.25	0.04
	9	16.85	0.30	0.05
nd	10	16.90	0.35	0.05
Dark	11	17.00	0.45	0.10
	12	17.20	0.65	0.20
	13	17.30	0.75	0.10
	14	18.00	1.45	0.70
	15			
	16			
	17			
	18			
	19			
	20			

Sample & Condition:

Support Vessel:

Positioning Method:

Positioning Information:

239,112 N. 2,708,871 E (actual post.)

Depth of Water: 47.0' F. Est. Current:

Wind: Sea: Swell:

Length of Barrel: 20.0' Diam. Core: 3.0"

Depth of Penetration: 14.0 Length Recovered: 11.8

Remarks: Refusal at 14.0
Run # 1

Operator: Chuck McCoy Client Rep: Leonard Jones

Length Retained: 11.8

Shipped To:

Type Analysis:

Date: 2 OCT. 1989 Time: 1525

Site # 89TSVC-54 Core #

VIBRATORY CORE SA[illegible]E LOG

R 1625 Bailey Lane Virginia Beach, VA 23451

nt: C of Engr

Location: Thimble Shoal Channel

Support Vessel:

Positioning Method:

Positioning Information:

239,555 N. 2,708,896 E.
(actual position)

ription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
			MIN.	MIN.
	0	13:38.00	Ø	START
silt	1	13:41.00	3.00	3.00
	2	44.00	6.00	3.00
	3	50.00	12.00	6.00
	4	55.00	17.00	5.00
	5	59.00	21.00	4.00
and	6	14:02.50	24.50	3.50
	7	04.50	26.50	2.00
	8	06.80	28.80	2.30
	9	07.80	29.80	1.00
	10	08.40	30.40	0.60
	11	08.55	30.55	0.15
	12	08.90	30.90	0.35
	13	08.92	30.92	0.02
	14	08.95	30.95	0.03
	15	08.98	30.98	0.03
	16	09.00	31.00	0.02
	17	09.02	31.02	0.02
	18	09.04	31.04	0.02
	19	09.06	31.06	0.04
	20			

Sample & Condition:

Depth of Water: 39.8'F. Est.Current:

Wind: Sea: Swell:

Length of Barrel: 20.0' Diam.Core: 3.0"

Depth of Penetration: 19.5 Length Recovered: 15.8

Remarks:

Operator: Chuck McCy Client Rep: Leonard Jones

Length Retained: 15.8

Shipped To:

Type Analysis:

Date: 2 Oct. 1989 Time: 1410

Site # 89TSVC-55 Core #

VIBRATORY CORE SAMPLE LOG

AR 1625 Bailey Lane Virginia Beach, VA 23451

ent: Norfolk Corps

Location: Thimble Shoal Channel

cription	Depth ft.	Time for Penetration Real	Elapsed	Per ft.
			MIN.	MIN.
	0	13:20.50	Ø	START
BLACK SAND	1	20.51	0.01	0.01
	2	20.52	0.02	0.01
	3	20.53	0.03	0.01
	4	20.54	0.04	0.01
	5	20.55	0.05	0.01
	6	20.60	0.10	0.05
	7	20.65	0.15	0.05
ROWN SAND	8	20.70	0.20	0.05
	9	21.30	0.80	0.60
	10	21.55	1.05	0.25
	11	22.20	1.70	0.65
	12	22.80	2.30	0.60
	13	24.15	3.65	1.35
AY REEN LAY ILT	14	24.80	4.30	0.65
	15	25.00	4.50	0.20
	16	26.50	6.00	1.50
sample)	17			
	18			
	19			
	20			

Sample & Condition:

Support Vessel:

Positioning Method:

Positioning Information:

239,166 N. , 2,709,699 E (actual position)

Depth of Water: 44.9 ft. Est. Current:

Wind: Sea: Swell:

Length of Barrel: 20 ft. Diam. Core: 3.0 in

Depth of Penetration: 16 ft. Length Recovered: 14.0 ft

Remarks: Refusal, no advance in 3 minutes, in packed silt layer

Operator: M L Clarke Client Rep: Leonard Jones

Length Retained: 14.0 ft. + bit sample

Shipped To:

Type Analysis:

Date: 29 Oct 88 Time: 1330

Site # 89 TSVC-56 Core #

LOCATION OF OLD CORES FROM THE
VIRGINIA DEPARTMENT OF TRANSPORTATION
TAKEN ALONG THIMBLE SHOAL CHANNEL

CORE	DEPTH	LATITUDE	LONGITUDE
TS 1	30 ft	37 00.07	76 13.83
TS 2	34 ft	37 00.12	76 12.45
TS 3	45 ft	36 59.55	76 11.34
TS 4	28 ft	36 59.43	76 10.05
TS 5	34 ft	36 58.90	76 09.03
TS 6	36 ft	36 58.97	76 07.82
TS 7	30 ft	36 58.22	76 06.40
TS 8	37 ft	36 58.20	76 05.20
TS 9	39 ft	36 57.70	76 04.70
TS 10	39 ft	36 57.60	76 04.15
TS 11	41 ft	36 57.40	76 03.53
TS 12	40 ft	36 58.06	76 04.60
TS 13	42 ft	36 57.58	76 02.60
TS 14	41 ft	36 57.68	76 03.13
TS 15	51 ft	36 57.54	76 03.50
TS 16	50 ft	36 57.40	76 02.85
TS 17	44 ft	36 57.23	76 02.70
TS 18	45 ft	36 57.95	76 04.10
TS 19	46 ft	36 57.07	76 02.15
TS 20	42 ft	36 57.98	76 05.25

Core	Depth Interval	Description	Sample No.
TS-12	0 - 5.5	gray sand with shell fragments	53456
	5.5 - 6.5	gray sand	
	6.5 - 8.5	gray & tan coarse sand	53457
	8.5 - 11.5	gray sand	53458
	11.5 - 20	gray "marine" silt	
TS-13	0 - 7.8	tan sand	53459
	7.8 - 14.8	tan sand	53460
	14.8 - 20	gray "marine" silt	
TS -14	0 - 3	gray & tan sand	53461
	3 - 6	tan coarse sand	53462
	6 - 8.5	gray & tan sand	53463
	8.5 - 21	gray "marine" silt	
TS-15	0 - 7	tan sand	53464
	7 - 10	tan & brown sand	53465
	10 - 20.5	gray "marine" silt	
TS-16	0 - 1.5	gray sand	53466
	1.5 - 3	tan coarse sand	53467
	3 - 5	tan sand	53468
	5 - 13	tan sand	53469
	13 - 15	tan sand with gravel	53470
	15 - 20	gray "marine" silt	
TS-17	0 - 7.5	tan and gray coarse sand	53471
	7.5 - 13.5	light tan coarse sand	53472
	13.5 - 19.5	light tan coarse sand	53473
TS-18	0 - 16	gray "marine"silt	
	16 - 17	tan sand with shells	
TS-19	0 - 20	gray marine silt	
TS-20	0 - 3	gray sand	53474
	3 - 7	tan coarse sand	53475
	7 - 13	tan coarse sand with some gravel	53476
	13 - ?	tan coarse sand (?)	53477

Descriptions taken from VDOT hand written log