STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES

Alaska Geologic Materials Center *Data Report No. 407*

No. 407

URS Corp. (Alaska), 2012, Drilling procedures, sample descriptions, boring logs, borehole locations, and archive inventory for 32 near-shore marine sediment Vibracore samples, West Dock Causeway, Prudhoe Bay, Alaska

Received August, 2012

All data reports may be downloaded free of charge from the DGGS website.

ALASKA PIPELINE PROJECT (APP)
VIBRACORE FIELD METHODS AND BORING LOGS
PRUDHOE BAY, ALASKA

VIBRACORE SAMPLING

Sixteen sediment cores were collected using a vibracore sampling device from July 23 to July 27, 2011 in an area east of West Dock in Prudhoe Bay, Alaska (see Map No. APP-11-007-001). The vibracore device uses a vibrating head to drive a core tube or sample barrel into unconsolidated water-saturated sediments. The attached core tube is driven into sediment by the force of gravity, enhanced by vibration energy. The core tube was constructed of 3.5-inch aluminum vibracore barrel lined with a single-use flexible Lexan liner in which the sediment sample is recovered. A core catcher attached to the end of the barrel was used to hold the undisturbed sediment inside the barrel when withdrawn from the seafloor sediments.

During sampling, a 10-foot core tube was driven below the mudline to a depth of -16 feet Mean Lower Low Water or until the desired penetration was achieved. After sample collection, the aluminum vibracore barrel, lined with a flexible Lexan liner, was brought onboard the vessel. Once onboard, the flexible Lexan liner was removed from the aluminum vibracore barrel, taking care to minimize the disturbance and agitation of the overlying water and sediment sample and placed in a tray. The flexible liner was then cut open with a decontaminated knife and clipped back with binder clips to accommodate processing for material type classification and sub-sample collection for grain size and chemical analyte analysis.

Vibracoring Procedures

Vibracoring procedures used in the field are described as follows.

- Field notes were recorded on appropriate APP field forms as necessary throughout the sampling process to ensure thorough and accurate recordkeeping.
- The sampling vessel was maneuvered to each predetermined sampling location according to the positioning procedures and minimum water depth restrictions.
- A three-point anchor system was deployed and vessel power was used to maintain position, record, and monitor position throughout core acquisition. Location coordinates for each core are provided in Table 1.
- The decontaminated core tube, catcher, and cutter heads were assembled using care to not cross-contaminate with potentially contaminated surfaces. This equipment was re-used for subsequent core collection.
- A ruled tape was attached to the vibracore in half-foot increments to measure penetration depth.
- The vibracore (with core tube, core liner, valve, core catcher, and cutter head in place) was guided overboard until it was clear of the vessel.

- The vibracore was lowered through the water column slowly to avoid creating a bow wake or overturning of the instrument. The tip of the core was lowered until it rested on the sediment or to the depth recorded by the fathometer, depending on the consistency of the sediment. The vibracore depth in the water column was recorded as the assumed mudline reference.
- The vibracore device was turned on and lowered to the target penetration depth. If the targeted penetration depth was met, work proceeded to the next step; if refusal was met, the vibracore was retrieved, gross decontamination was performed (i.e., rinsing with water and brushing off visible sediment), and a re-attempt was made at new location offset approximately 5 feet from the original.
- The vibracore device was turned off and the time, penetration depth, and any other observations were recorded.
- The winch operator was signaled to retrieve the vibracore device and raise it slowly at a constant rate to keep the instrument upright and not dislodge any sediment from within the core barrel.
- The vibracore device was guided onboard the vessel and placed on the work vessel deck, using care to avoid jostling that might disturb the integrity of the core. Once onboard, the flexible Lexan liner was removed from the aluminum vibracore barrel. Care was taken to remove overlying water within the flexible Lexan liner to minimize the disturbance and agitation of the overlying water and to prevent surface sediment from "pouring" out. A table and tray or equivalent was used to hold the core for logging and processing.
- Once in the tray, the flexible liner was cut open with a decontaminated knife and clipped back with binder clips to accommodate material type classification and sub-sample collection.
- The core was examined to determine the following:
    - The presence of overlying water and intact sediment surface, before removal of overlying water within in the flexible Lexan liner;
    - Percent of the core recovered; and
    - If the core sediment appeared intact without obstructions or blockage during sampling.
- If poor sediment recovery was experienced due to debris, the depth, location, and type of debris were recorded, if possible.
- If core was deemed acceptable, it was logged and sub-sampled for various analyses. Logging was conducted in accordance with the key provided in Figure B-1 below. Vibracore logs are provided in Figures B-2 through B-17.
- Pocket penetrometer and torvane measurements were performed if enough remaining cohesive sediments existed after sub-sampling.
- Subsections were cut, capped, and labeled to clearly indicate how the subsections were sequenced for reconstruction during processing.

Compaction Correction for Core Sub-Sampling

Compaction corrections were applied to the cores during logging and processing to determine the most accurate depths for sub-sampling. The compaction correction is the length of sample recovery divided by the length of core penetration. Typically, sampling-induced compaction of the sediments caused the recovery to be less than the total penetration. During logging and processing, the sample length was determined by dividing the actual recovery depth by the compaction correction factor. There is no way of determining the actual recovery on a foot-by-foot basis, so a uniform recovery factor was applied to the entire core. For all sub-sampling (physical, chemical, and archived samples) a uniform recovery factor was applied to the entire sediment core to ensure the accurate collection of the target sample depth ranges (e.g., 0 to 1 foot and 4 to 5 feet).

Pocket Penetrometer and Torvane

The pocket penetrometer (PP) and torvane (TV) procedures provide quick approximate tests of the consistency (undrained shear strength) of a cohesive sediment sample. The pocket penetrometer device consists of a calibrated spring mechanism which measures penetration resistance of a 0.25-inch-diameter steel tip over a given distance. The penetration resistance is correlated to the unconfined compressive strength of the sediment, which is typically twice the undrained shear strength of a saturated, cohesive soil.

The torvane device consists of a 1-inch-diameter plate with eight equally spaced and radially arranged 0.25-inch vanes. The vanes are pressed into the sediment and the device is rotated. The vanes force a shear failure to take place over the area of plate face. The resistance at failure, as measured by a calibrated spring, correlates to the undrained shear strength of the sample tested.

Pocket penetrometer and torvane field measurements were conducted on remaining cohesive sediments that have not been sub-sampled or archived. Results of the pocket penetrometer and torvane tests are recorded on the attached vibracore logs.

Key to Exploration Logs

Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods based on modified ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits and probes is estimated based on visual observation and is presented parenthetically on the logs.

SAND or GRAVEL Density	Standard Penetration Resistance (N) In Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) In Blows/Foot	Approximate Shear Strength In TSF
Very loose	0 to 4	Very soft	0 to 2	<0.125
Loose	4 to 10	Soft	2 to 4	0.125 to 0.25
Medium dense	10 to 30	Medium stiff	4 to 8	0.25 to 0.5
Dense	30 to 50	Stiff	8 to 15	0.5 to 1.0
Very dense	>50	Very stiff	15 to 30	1.0 to 2.0
		Hard	>30	>2.0

Sampling Test Symbols

- 1.5" I.D. Split Spoon
- Grab (Jar)
- 3.0" I.D. Split Spoon
- Shelby Tube (Pushed)
- Bag
- Cuttings
- Core Run

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, likely below optimum
Moist	Likely near optimum moisture content
Wet	Much perceptible moisture, likely above optimum

Minor Constituents

Minor Constituents	Estimated Percentage
Trace	<5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Laboratory Test Symbols

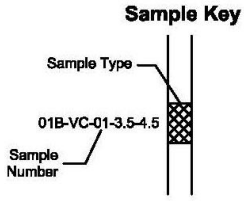
GS	Grain Size Classification
CN	Consolidation
UU	Unconsolidated Undrained Triaxial
CU	Consolidated Undrained Triaxial
CD	Consolidated Drained Triaxial
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits Water Content in Percent Liquid Limit Natural Plastic Limit
PID	Photoionization Detector Reading
CA	Chemical Analysis
PHY	Physical Analysis
DT	In Situ Density in PCF
OT	Tests by Others

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE			GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE			SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

Sample Key



KEY SHEET 1288412-VC.GPJ HC_CORP.GDT 10/31/11

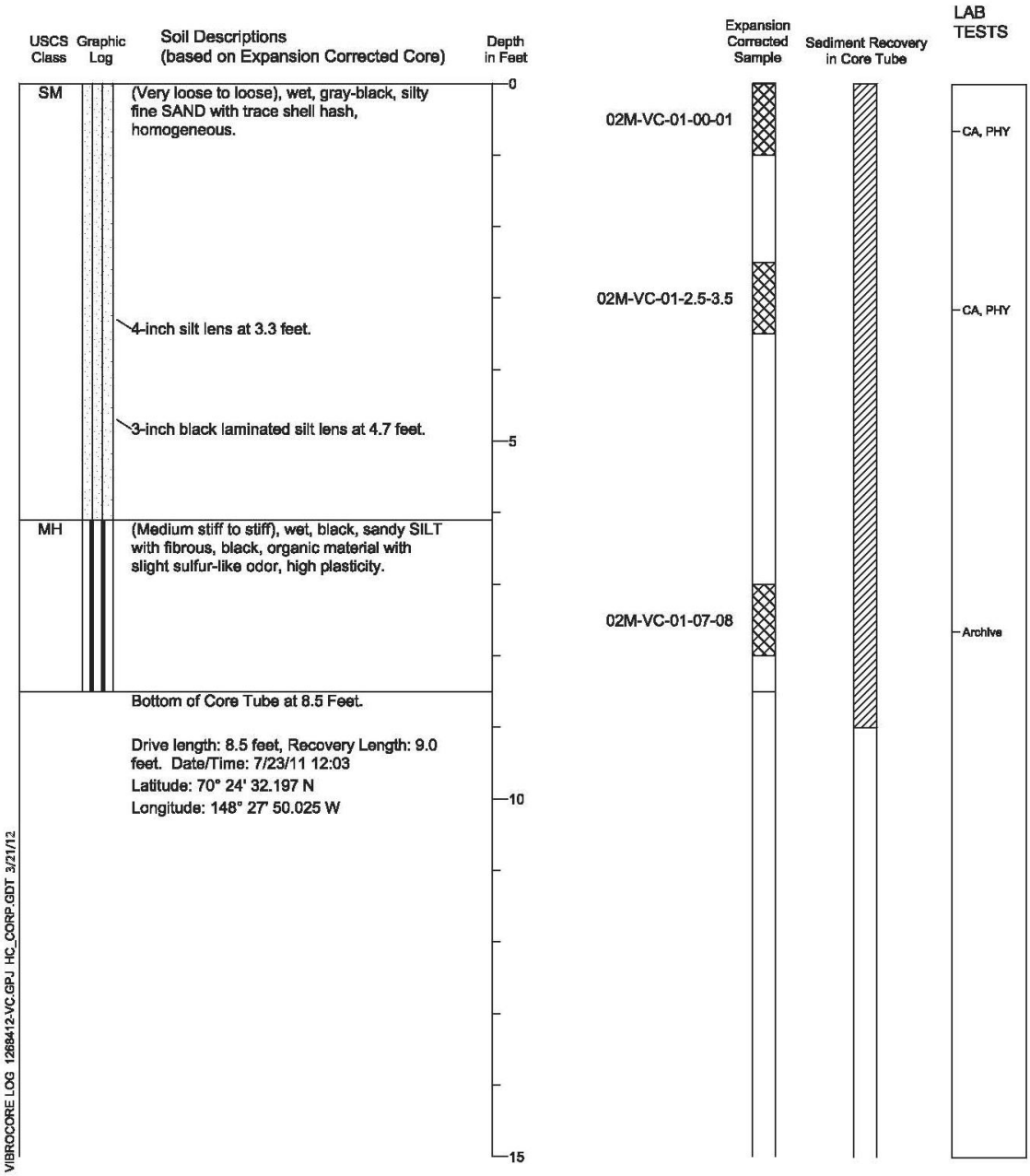
7/11

Figure B-1

Vibracore Log 02M-VC-01

Location: Feature ID: M45PB022
Water Depth in Feet: 7.8 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Expansion corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
6. Soil thickness to -16 feet MLLW: 8.2 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

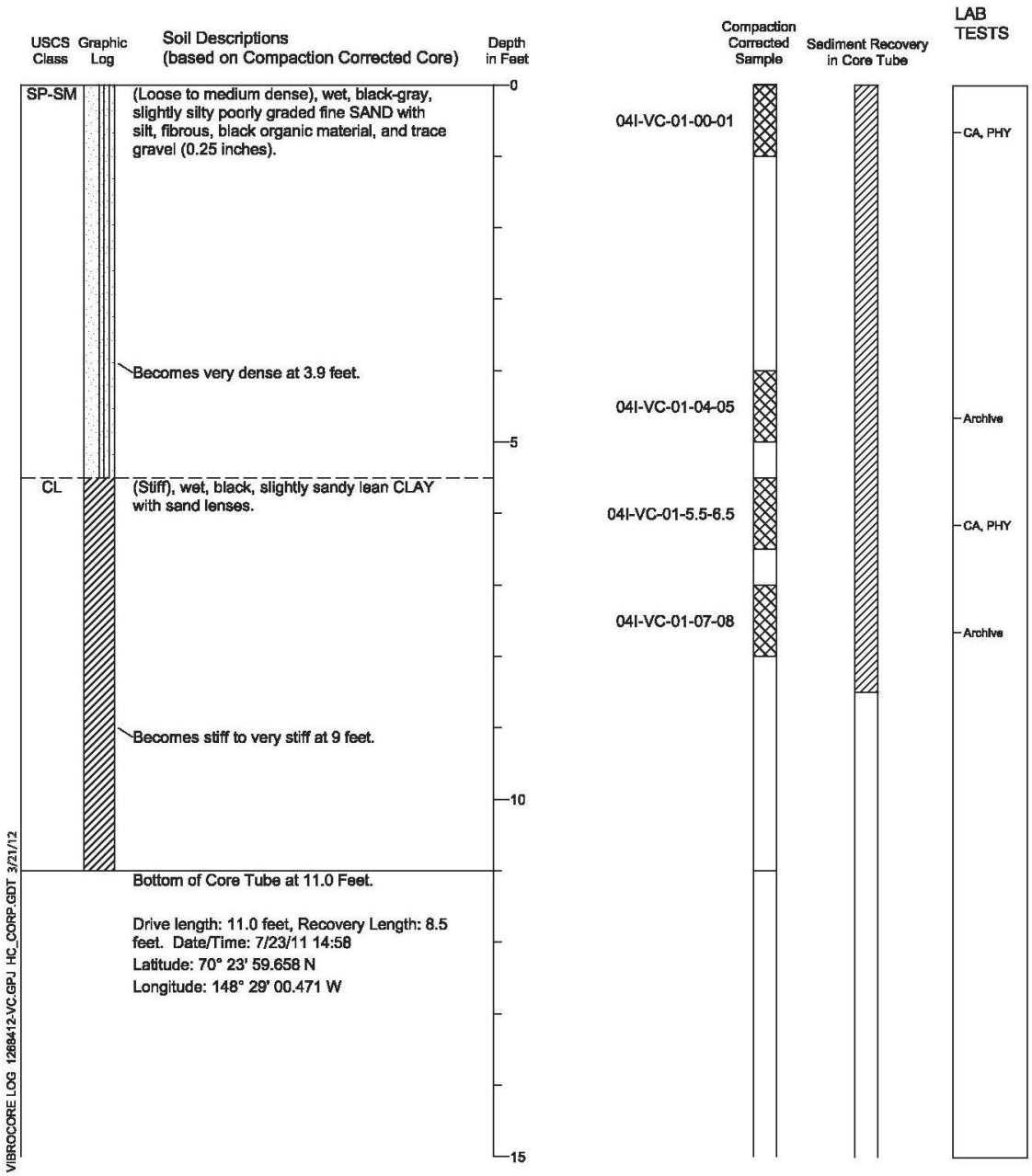
7/11

Figure B-2

Vibracore Log 04I-VC-01

Location: Feature ID: M45PB023
Water Depth in Feet: 4.9 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
6. Soil thickness to -16 feet MLLW: 11.1 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

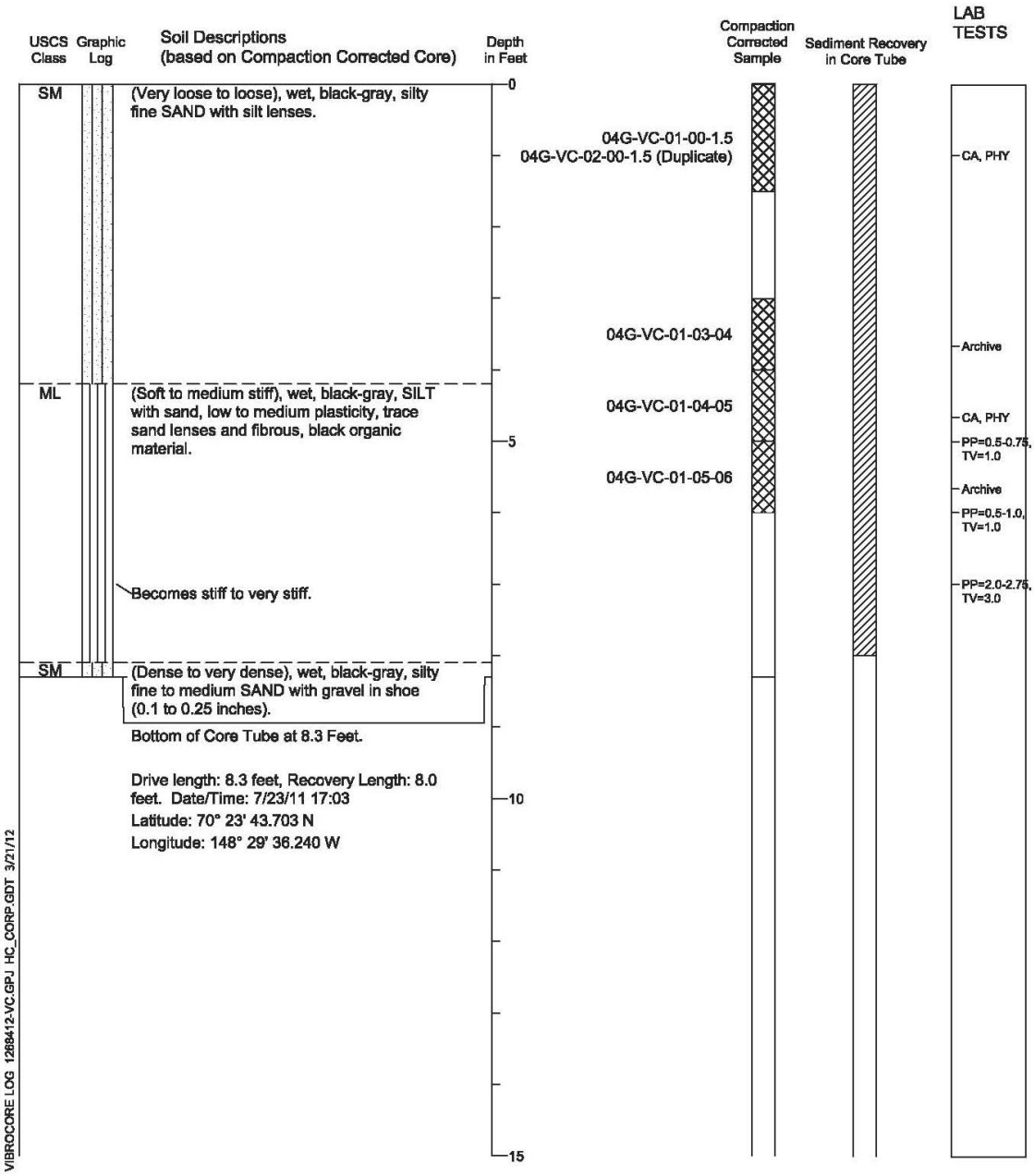
7/11

Figure B-3

Vibracore Log 04G-VC-01

Location: Feature ID: M45PB024
Water Depth in Feet: 4.3 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Soil thickness to -16 feet MLLW: 11.7 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

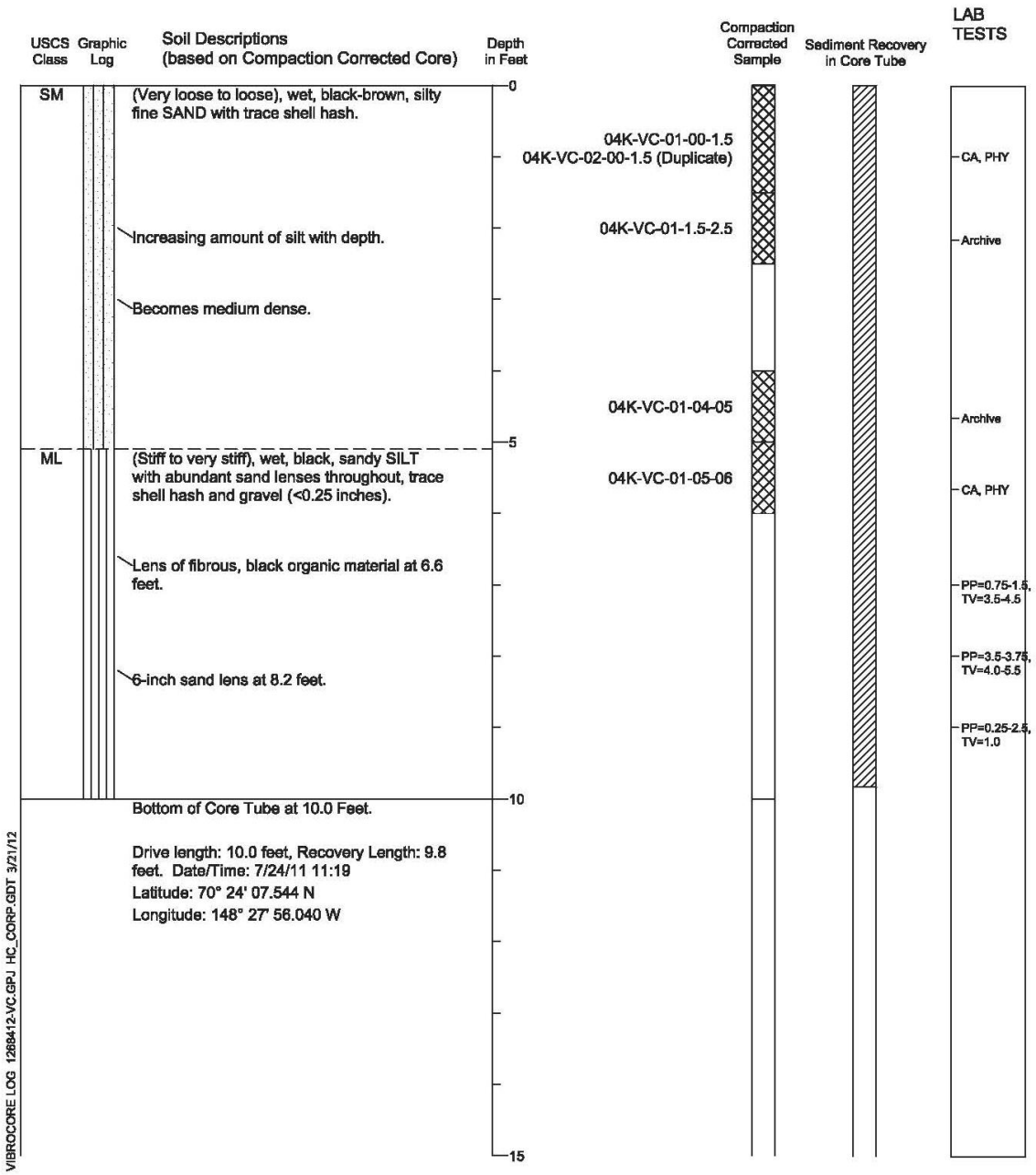
7/11

Figure B-4

Vibracore Log 04K-VC-01

Location: Feature ID: M45BP025
Water Depth in Feet: 5.5 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Soil thickness to -16 feet MLLW: 10.5 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

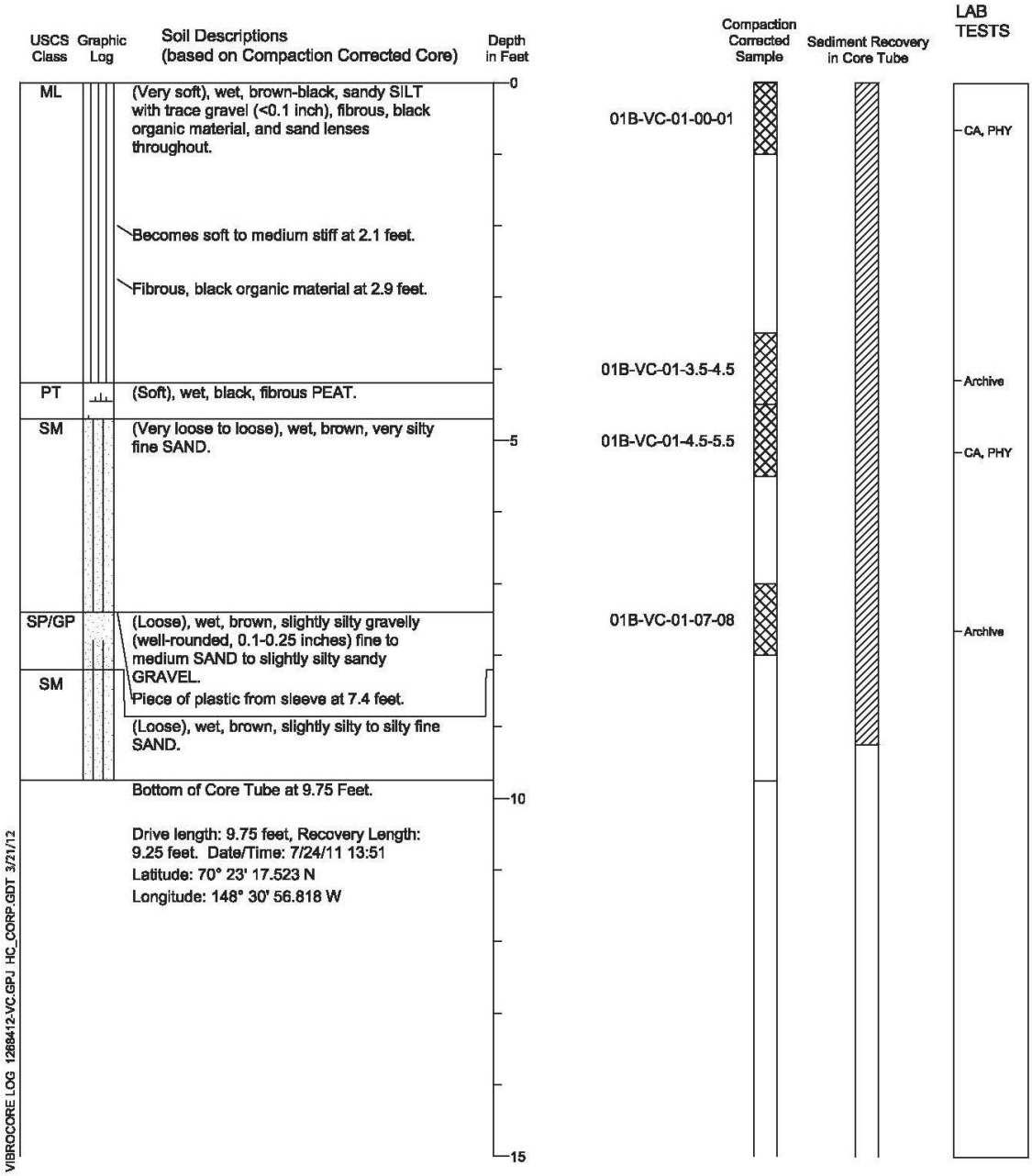
7/11

Figure B-5

Vibracore Log 01B-VC-01

Location: Feature ID: M45PB026
Water Depth in Feet: 5.2 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
6. Soil thickness to -16 feet MLLW: 10.8 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

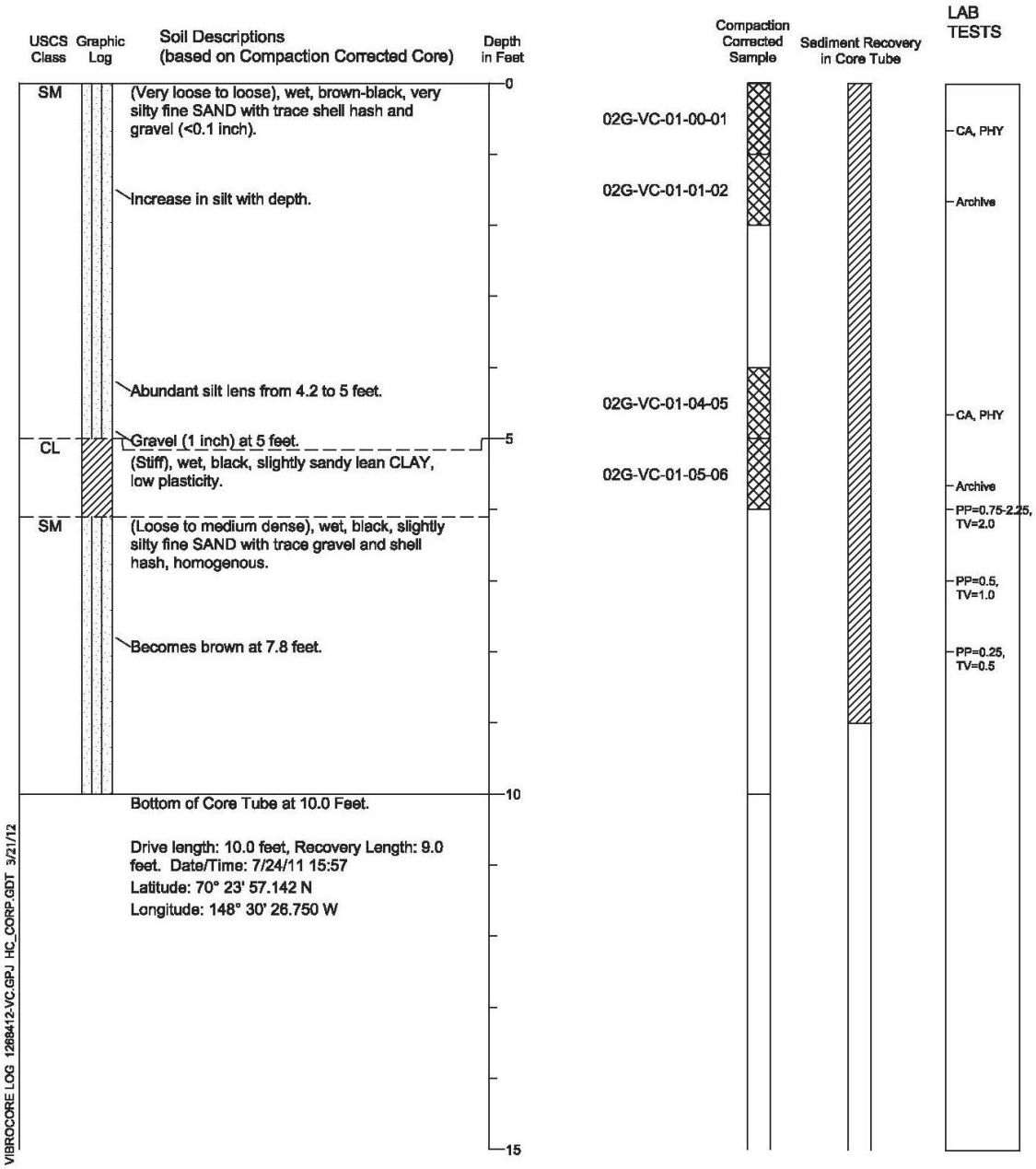
7/11

Figure B-6

Vibracore Log 02G-VC-01

Location: Feature ID: M45PB027
Water Depth in Feet: 4.9 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Soil thickness to -16 feet MLLW: 11.1 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

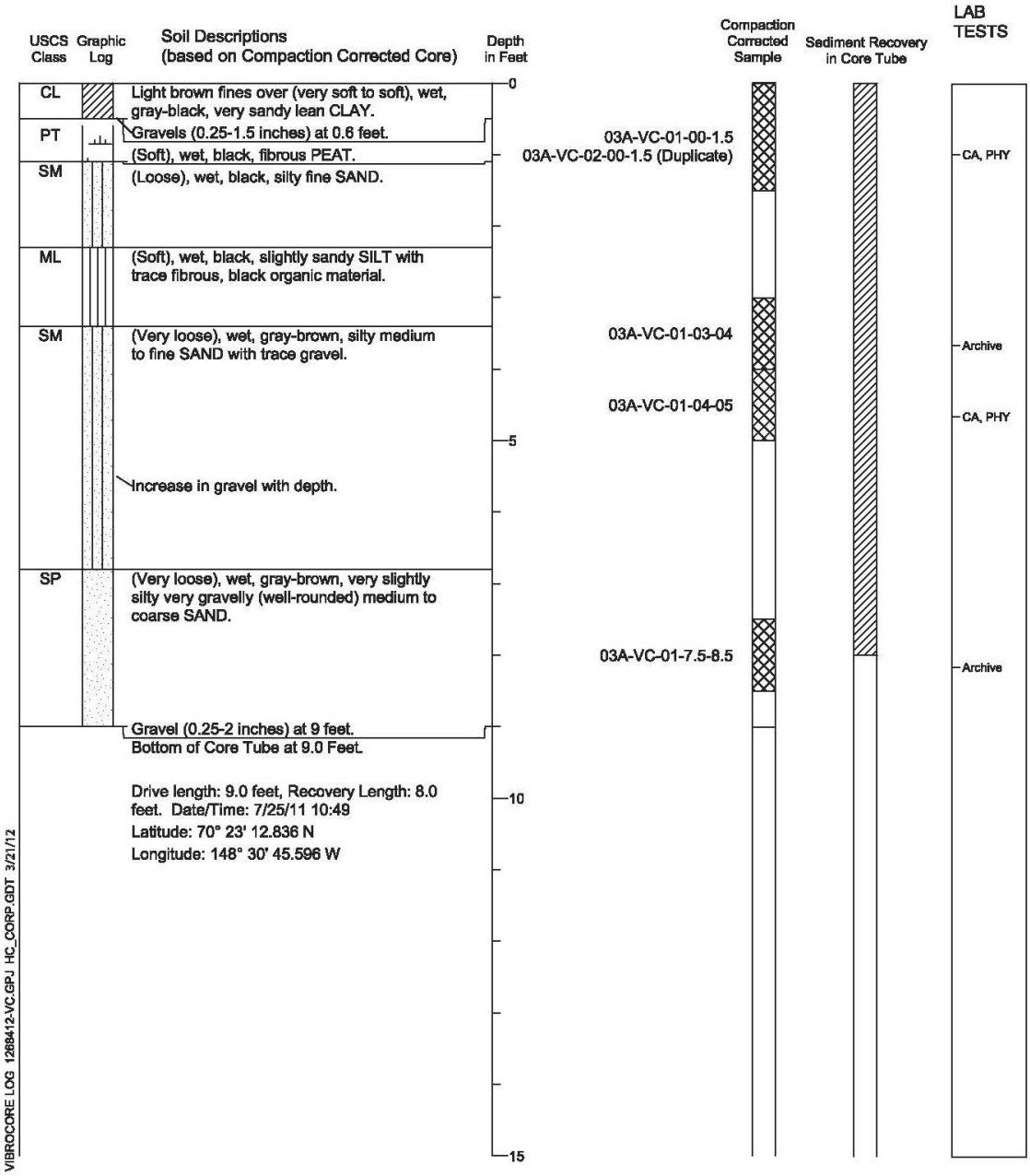
7/11

Figure B-7

Vibracore Log 03A-VC-01

Location: Feature ID: M45PB028
Water Depth in Feet: 8.5 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
6. Soil thickness to -16 feet MLLW: 7.5 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

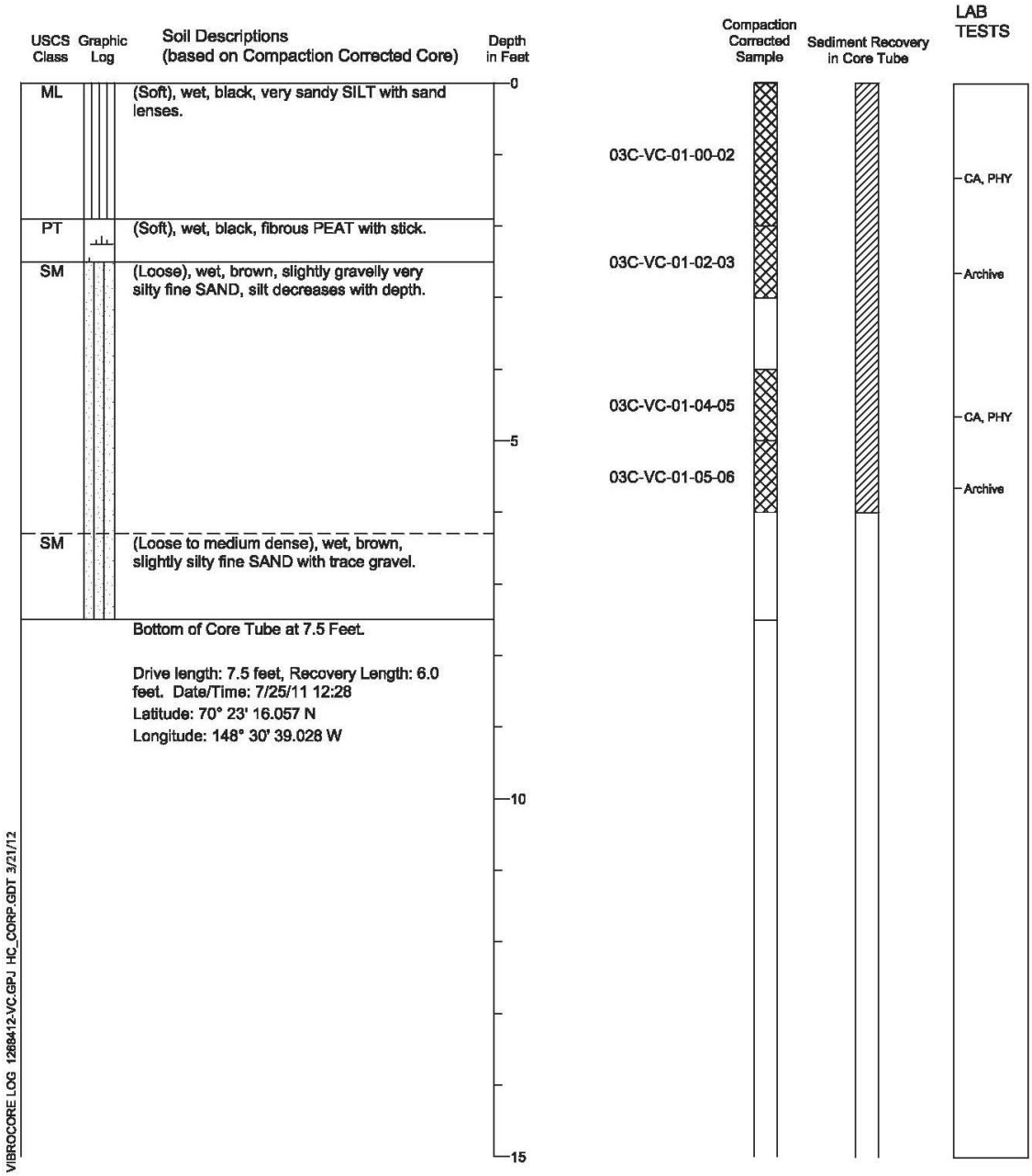
7/11

Figure B-8

Vibracore Log 03C-VC-01

Location: Feature ID: M45PB029
Water Depth in Feet: 7.3 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
6. Outer aluminum tube was bent during drilling. PHY = Physical Analysis
7. Soil thickness to -16 feet MLLW: 8.7 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

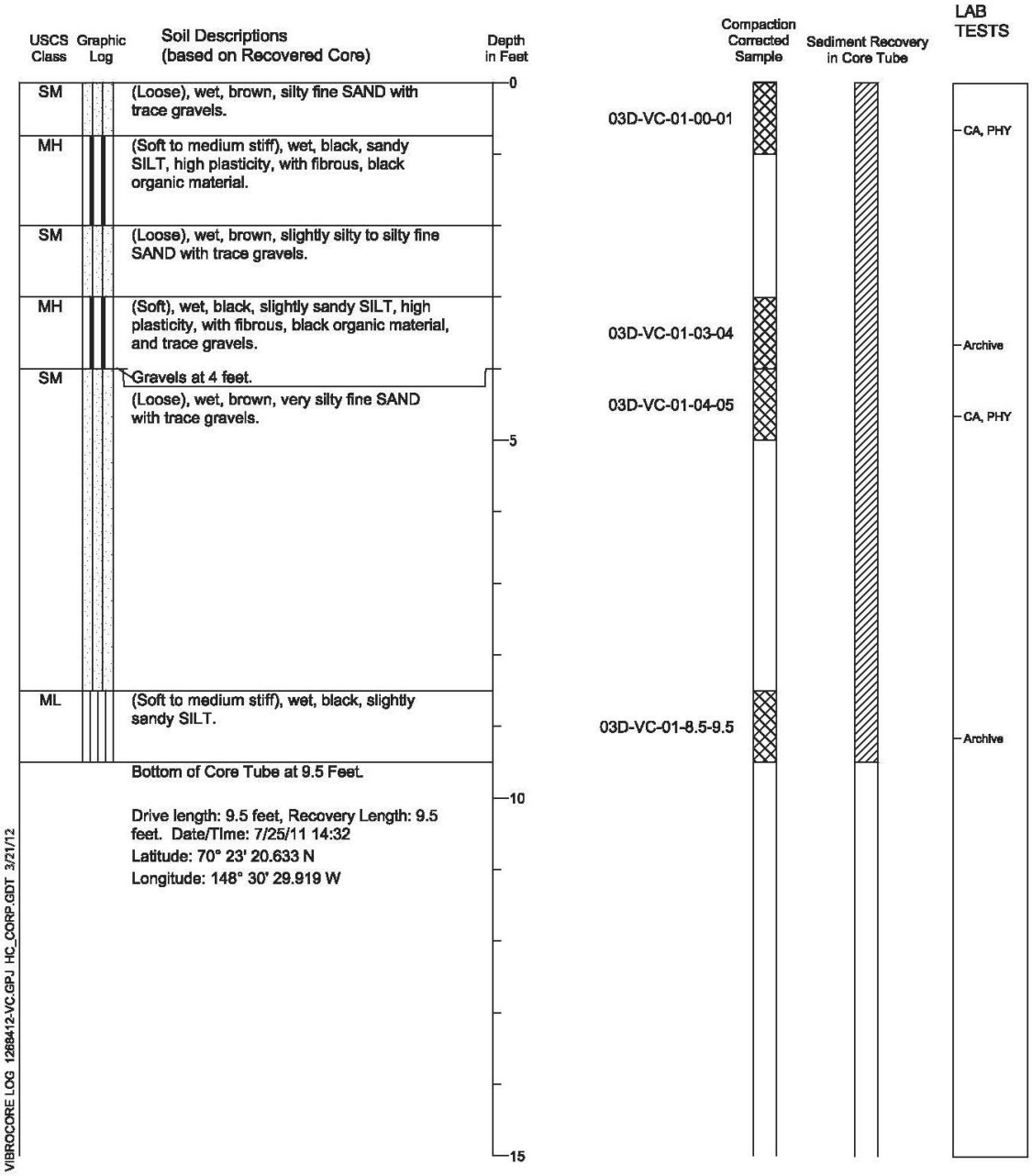
7/11

Figure B-9

Vibracore Log 03D-VC-01

Location: Feature ID: M45PB030
Water Depth in Feet: 6.0 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
5. Soil thickness to -16 feet MLLW: 10.0 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

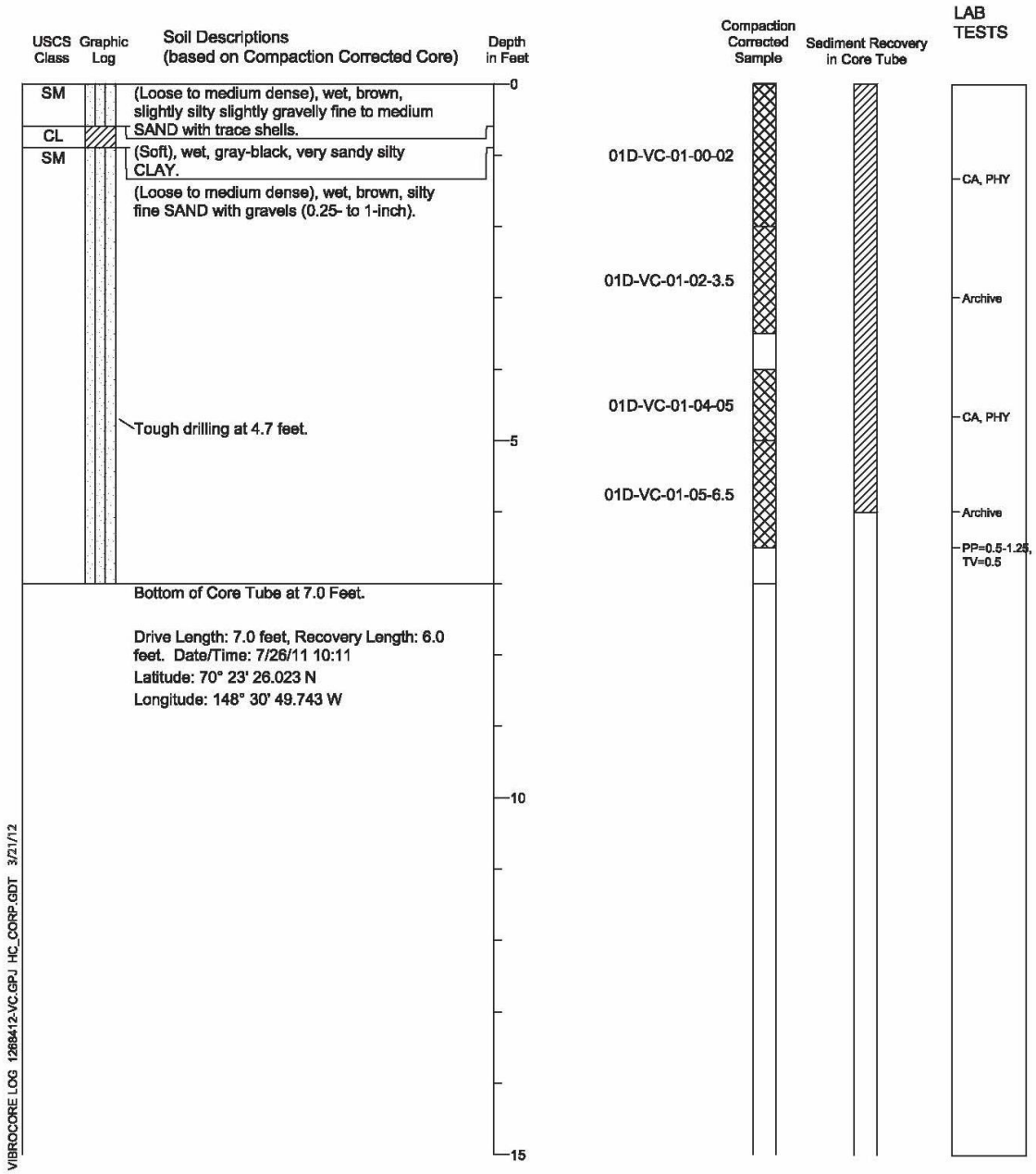
7/11

Figure B-10

Vibracore Log 01D-VC-01

Location: Feature ID: M45PB031
Water Depth in Feet: 5.8 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Soil thickness to -16 feet MLLW: 10.2 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

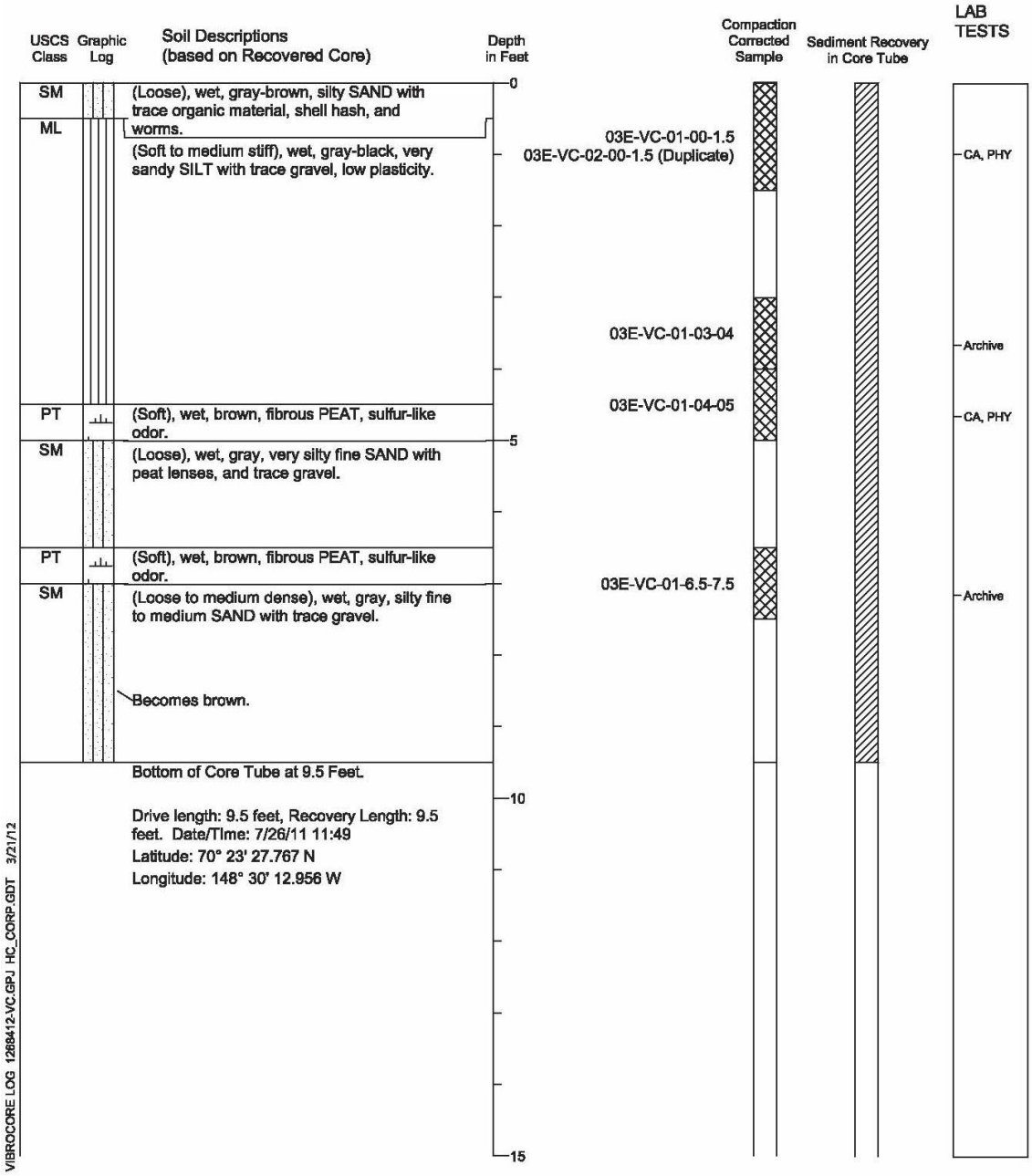
7/11

Figure B-11

Vibracore Log 03E-VC-01

Location: Feature ID: M45PB032
Water Depth in Feet: 5.4 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
5. Soil thickness to -16 feet MLLW: 10.6 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

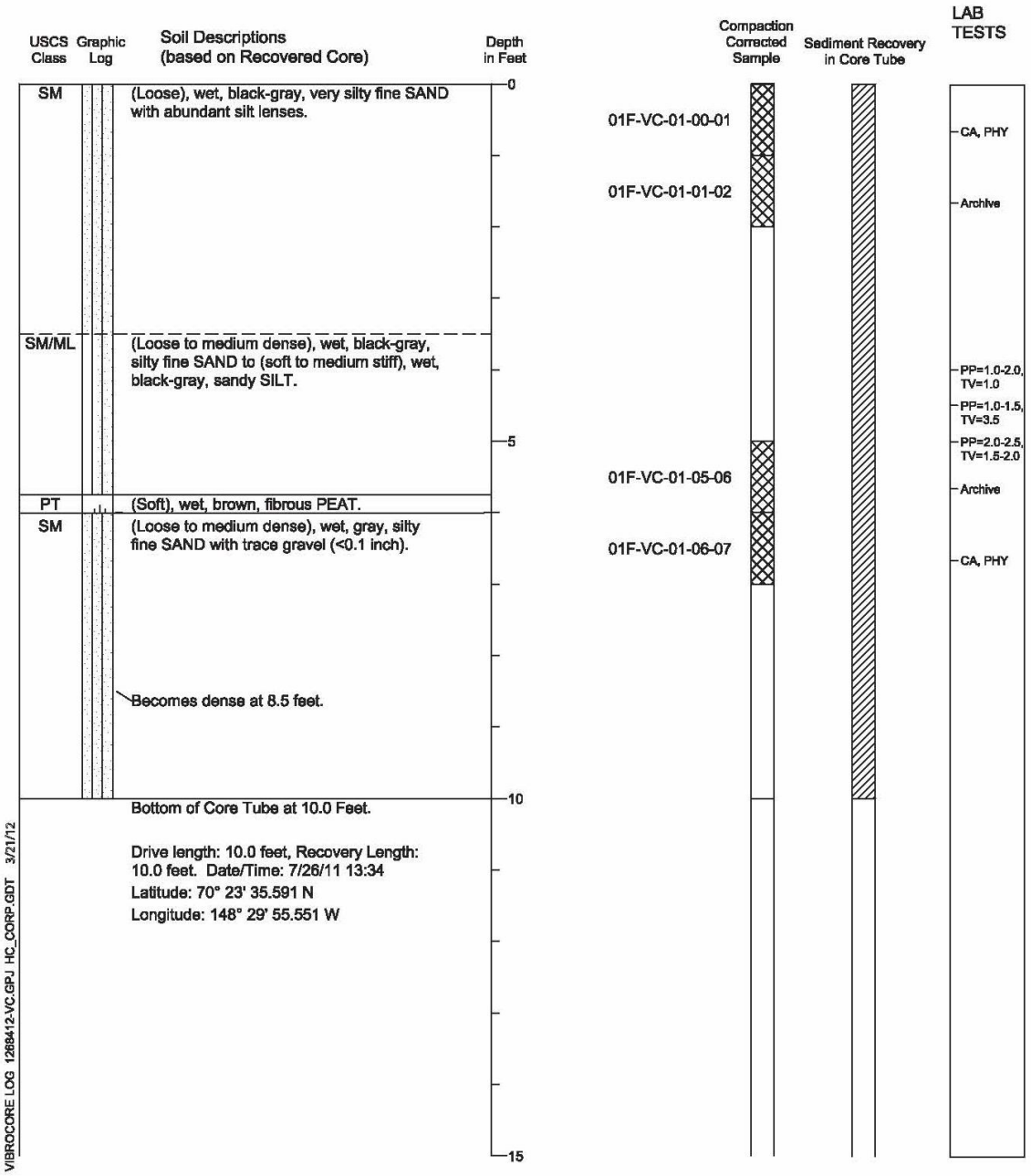
7/11

Figure B-12

Vibracore Log 01F-VC-01

Location: Feature ID: M45PB033
Water Depth in Feet: 4.6 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Soil thickness to -16 feet MLLW: 11.4 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

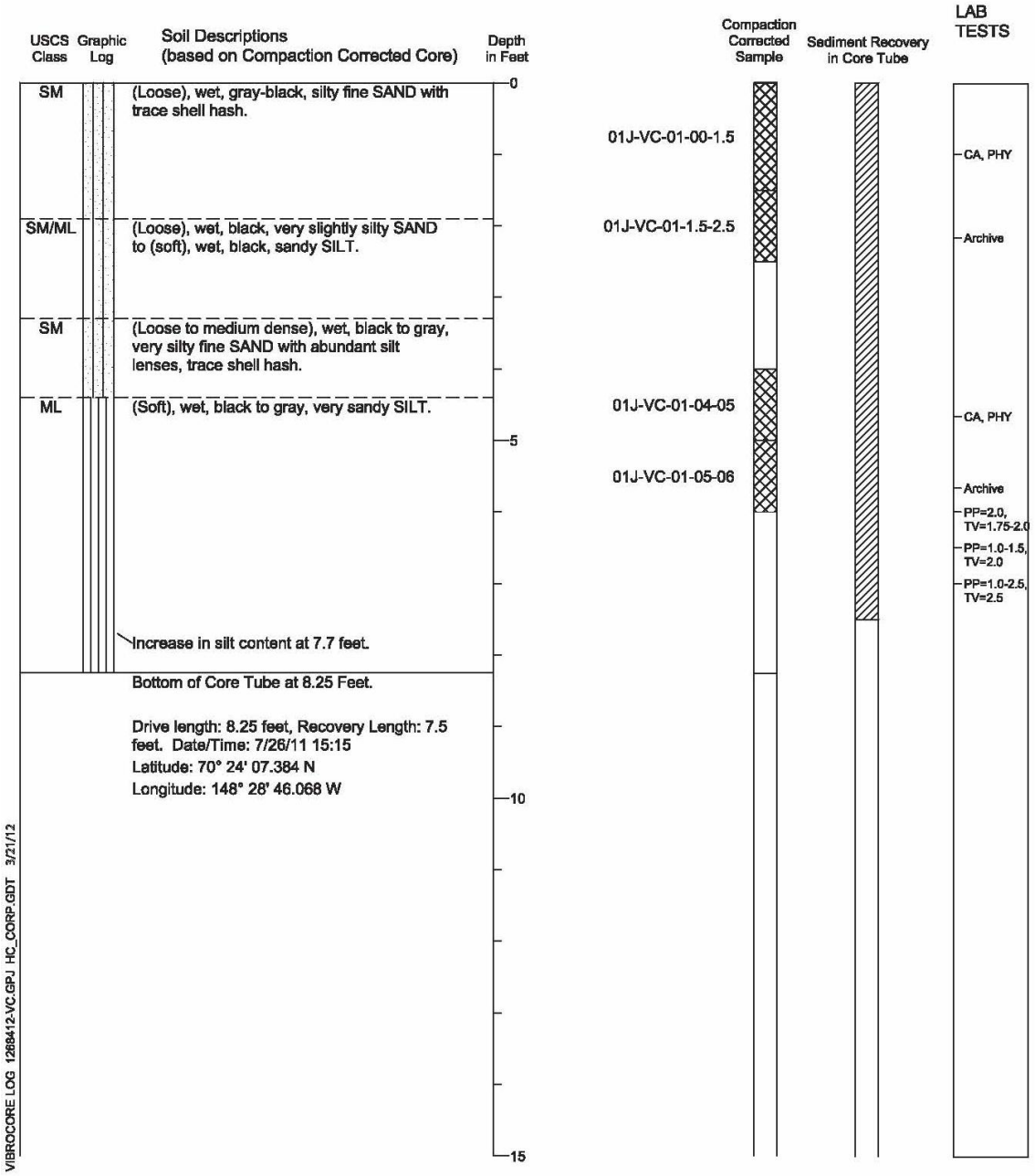
7/11

Figure B-13

Vibracore Log 01J-VC-01

Location: Feature ID: M45PB034
Water Depth in Feet: 7.0 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Soil thickness to -16 feet MLLW: 9.0 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

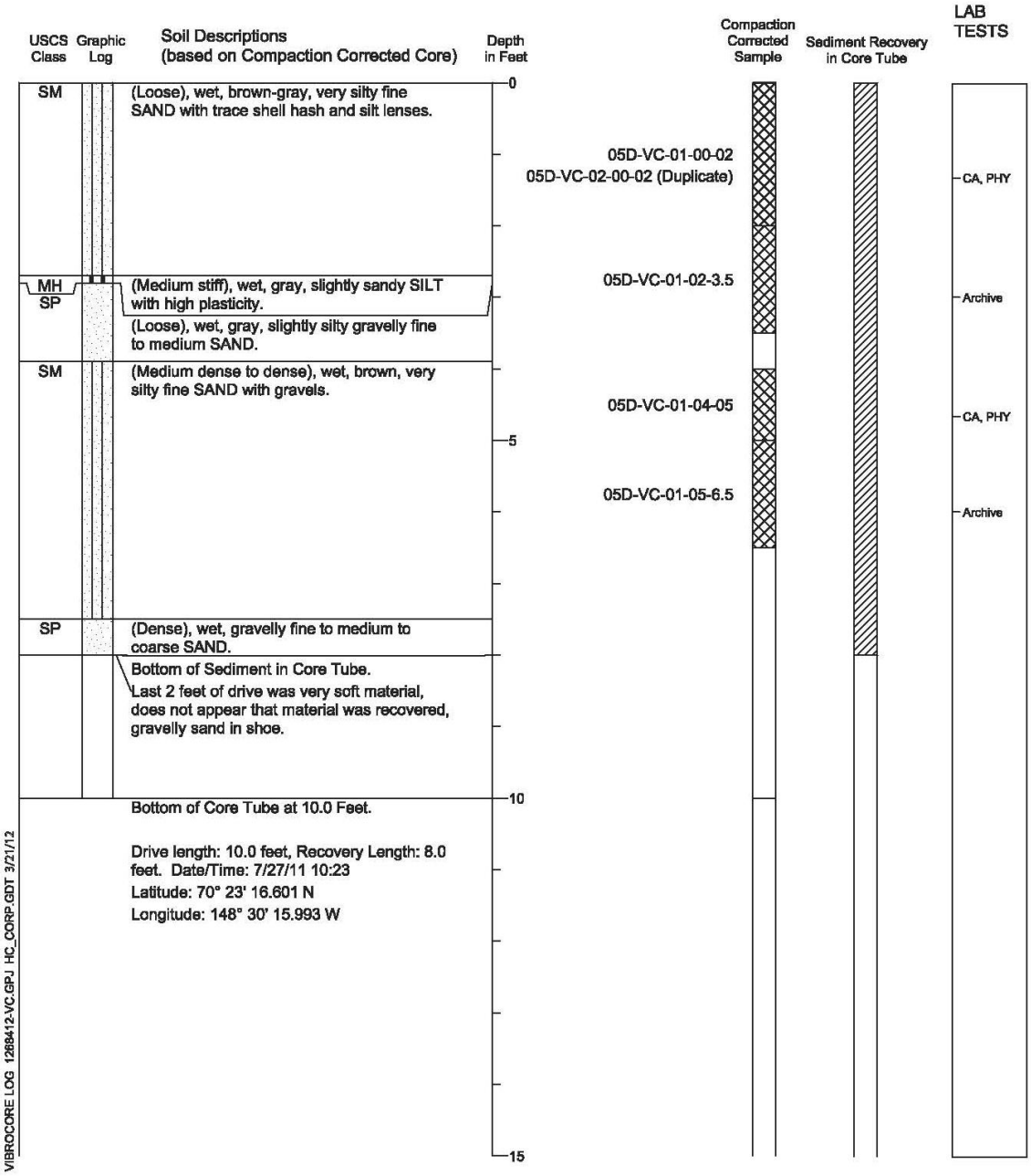
7/11

Figure B-14

Vibracore Log 05D-VC-01

Location: Feature ID: M45PB035
Water Depth in Feet: 4.9 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
6. Soil thickness to -16 feet MLLW: 11.1 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

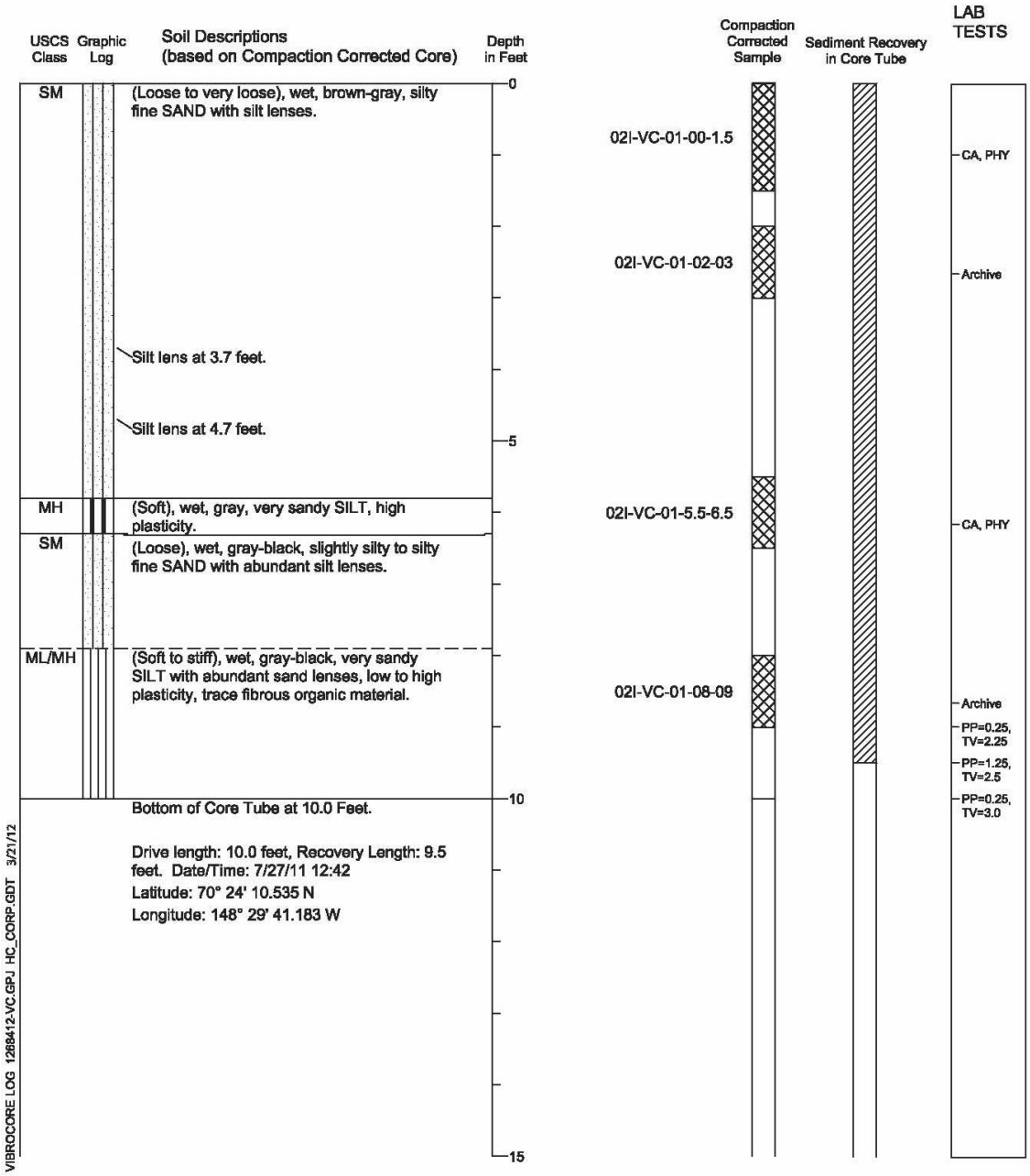
7/11

Figure B-15

Vibracore Log 02I-VC-01

Location: Feature ID: M45PB036
Water Depth in Feet: 4.8 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Soil thickness to -16 feet MLLW: 11.2 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

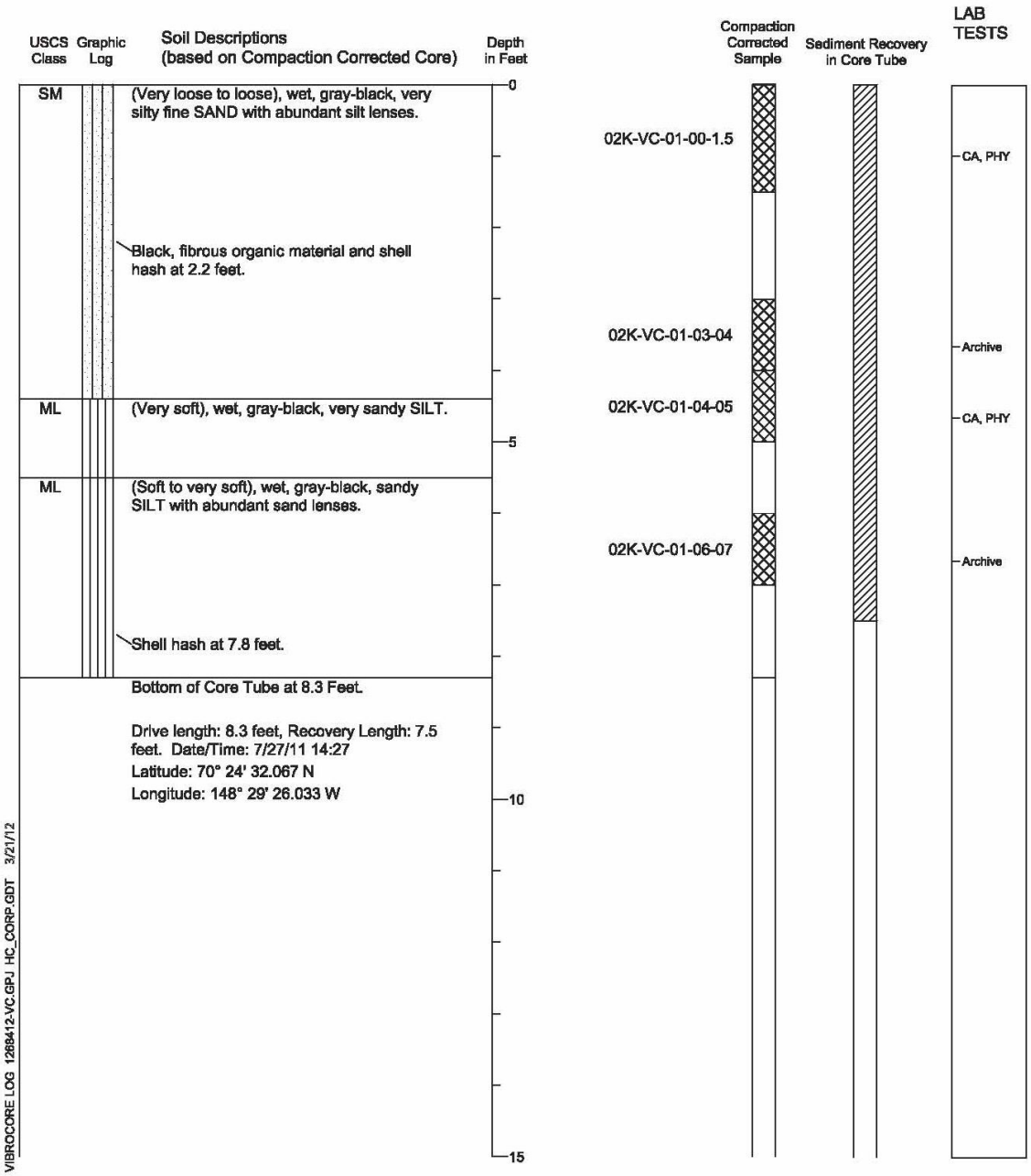
7/11

Figure B-16

Vibracore Log 02K-VC-01

Location: Feature ID: M45PB037
Water Depth in Feet: 8.7 Feet MLLW *

Type of Sample: Vibracore
Core Diameter: 4 inches
Logged By: C. Rust Reviewed By: A. Conrad

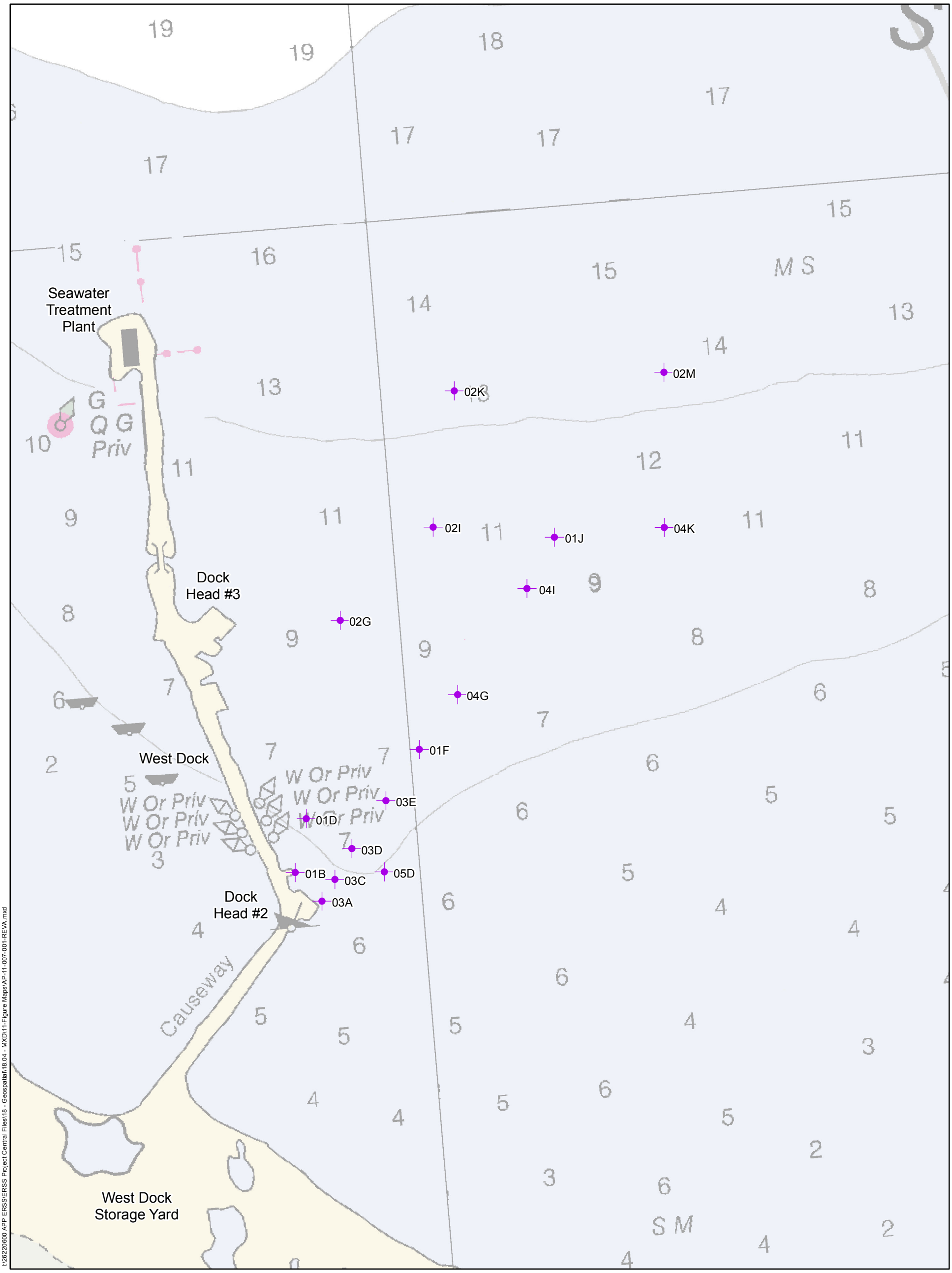


1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. USCS designations are based on visual manual classification (ASTM D 2488) unless otherwise supported by laboratory testing (ASTM D 2487).
4. Compaction corrections were applied to this core for soil descriptions, physical, chemical, and archived subsamples.
5. Remaining sediment was not cohesive enough to conduct geotechnical field measurements.
6. Soil thickness to -16 feet MLLW: 7.3 feet *

* Corrected to reflect observed water levels at NOAA Station ID: 9497645.

7/11

Figure B-17



Summer 2011 Sample Locations

Vibracore

N

Feet
0 1,000 2,000

ALASKA PIPELINE PROJECT

Notes - Prudhoe Bay and Vicinity Nautical Chart (16061_1.KAP), 8th Ed. Jan. 26, 2002. Soundings in feet at Mean Lower Low-Water.

Drawing is conceptual only. Major Road is from Alaska Dept. of Transportation and is derived from GPS data collection. Secondary Road is from Dept. of Natural Resources and derived from varying source data and scale (1:24,000, 1:63,360, and 1:250,000). As such, Major Road should supersede Secondary Road features where coincident. Prudhoe Bay Unit Boundary, Pipeline, Facility, and Native Allotment data are from Dept. of Natural Resources. Potential GTP Site Locations and the Proposed APP Alaska 1-mile Wide Route Corridor were produced by the APP Team. The map projection is in the Albers Alaska projection in units of meters.Produced by APP Team. The information used to create this product is based on the collected data on the date of issue, and is considered reliable only at the scale at which the data was created and the scale at which the map was published.This drawing is prepared solely for the use of the contractual APP Team Partners and the APP Team assumes no liability to any other party for any representations contained in these drawings. This map must be printed at full scale (100%) in order for the scale to remain correct.

DRAWN	CHECK	DESIGN	APPR.
TCS			

TransCanada

Transcanada Alaska Pipeline Project
2011 Vibracore Sample Locations

ExxonMobil

PROJECTION	DATUM	CONTRACTOR NAME	MAP NUMBER	REV.
AK Albers	NAD83	URS ALASKA	AP-11-007-001	A

SCALE	DATE	PROJECT NUMBER	ORIG.PAGE SIZE
1:18,000	26 Jun 2012	26220600	11X17

I:\26220600 APP ERSS\ERSS Project Central Files\18 - Geospatial\18.04 - MXD\11-Figure Maps\AP-11-007-001-REVA.mxd

Table 1. Alaska Pipeline Project (APP) Archived Core Inventory, Prudhoe Bay, Alaska

Vibracore Station ID	Feature ID	Core ID	Depth (ft below seafloor)	Elevation (ft below MLLW)	Date Collected	Coordinates	
						Latitude	Longitude
02M	M45PB022	02M-VC-01-2.5-3.5	2.5 - 3.5	-10.3 to -11.3	7/23/11	70.408950433	-148.463873889
		02M-VC-01-07-08	7 - 8	-14.8 to -15.8			
04I	M45PB023	04I-VC-01-04-05	4 - 5	-8.9 to -9.9	7/23/11	70.399913860	-148.483473948
		04I-VC-01-07-08	7 - 8	-11.9 to -12.9			
04G	M45PB024	04G-VC-01-03-04	3 - 4	-7.3 to -8.3	7/23/11	70.395499102	-148.493357886
		04G-VC-01-05-06	5 - 6	-9.3 to -10.3			
04K	M45PB025	04K-VC-01-1.5-2.5	1.5 - 2.5	-7.0 to -8.0	7/24/11	70.402109243	-148.465502763
		04K-VC-01-04-05	4 - 5	-9.5 to -10.5			
01B	M45PB026	01B-VC-01-3.5-4.5	3.5 - 4.5	-8.7 to -9.7	7/24/11	70.388247909	-148.515717709
		01B-VC-01-07-08	7 - 8	-12.2 to -13.2			
02G	M45PB027	02G-VC-01-01-02	1 - 2	-5.9 to -6.9	7/24/11	70.399196962	-148.507405403
		02G-VC-01-05-06	5 - 6	-9.9 to -10.9			
03A	M45PB028	03A-VC-01-03-04	3 - 4	-11.5 to -12.5	7/25/11	70.386883941	-148.512639826
		03A-VC-01-7.5-8.5	7.5 - 8.5	-16.0 to -17.0			
03C	M45PB029	03C-VC-01-02-03	2 - 3	-9.3 to -10.3	7/25/11	70.387795977	-148.510781078
		03C-VC-01-05-06	5 - 6	-12.3 to -13.3			
03D	M45PB030	03D-VC-01-03-04	3 - 4	-9.0 to -10.0	7/25/11	70.389090898	-148.508332231
		03D-VC-01-8.5-9.5	8.5 - 9.5	-14.5 to -15.5			
01D	M45PB031	01D-VC-01-02-3.5	2 - 3.5	-7.8 to -9.3	7/26/11	70.390577766	-148.513773053
		01D-VC-01-05-6.5	5 - 6.5	-10.8 to -12.3			
03E	M45PB032	03E-VC-01-03-04	3 - 4	-8.4 to -9.4	7/26/11	70.391079677	-148.503524684
		03E-VC-01-6.5-7.5	6.5 - 7.5	-11.9 to -12.9			
01F	M45PB033	01F-VC-01-01-02	1 - 2	-5.6 to -6.6	7/26/11	70.393226358	-148.498762694
		01F-VC-01-06-07	6 - 7	-10.6 to -11.6			
01J	M45PB034	01J-VC-01-1.5-2.5	1.5 - 2.5	-8.5 to -9.5	7/26/11	70.402084825	-148.479494629
		01J-VC-01-05-06	5 - 6	-12.0 to -13.0			
05D	M45PB035	05D-VC-01-02-3.5	2 - 3.5	-6.9 to -8.4	7/27/11	70.387947304	-148.504482971
		05D-VC-01-05-6.5	5 - 6.5	-9.9 to -11.4			
02I	M45PB036	02I-VC-01-02-03	2 - 3	-6.8 to -7.8	7/27/11	70.402969917	-148.494695692
		02I-VC-01-08-09	8 - 9	-12.8 to -13.8			
02K	M45PB037	02K-VC-01-03-04	3 - 4	-11.7 to -12.7	7/27/11	70.408905072	-148.490571717
		02K-VC-01-06-07	6 - 7	-14.7 to -15.7			