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Anchor Tests German Bight

Test set-up and results

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Title
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Client	Project	Reference	Pages
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Summary
This report describes anchor dropping and dragging tests that have been performed at three locations in the German Bight. Multiple parties (BAW, BSH, Deltares, TenneT, WSV) were involved in the preparation, execution, data collection and interpretation of the tests. Data and partial interpretation thereof, as provided by the various parties are presented in this report.

Aim of the tests was to provide insight in the depth to which ships' anchors can endanger (buried) cables.

Across all three sites measured penetration depths ranged from 0.19 m to 0.69 m for the 8.5 t AC-14 anchor and from 0.26 m to 0.88 m for the 11.5 t Hall anchor.

Accounting for measurement uncertainties, it was concluded that for none of the anchors more than 1.0 m penetration below the seabed could be detected due to anchor dropping and/or anchor dragging.

Key Reference
Report: „Untersuchung des Eindringverhaltens von Schiffsankern mittels Ankerzugversuchen" BAW-Hamburg, BAW-Nr. A395 502 10088, 28 August 2013

Version	Date	Author	Initials	Review	Initials	Approval	Initials
0.4	July 2013	Dirk Luger		Haike van Lottum		Harm Aantjes	
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(*) Version 1.1 contains updated numbers for the VTG area and is now fully compatible with the BAW report of August 28, 2013

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final

Contents

1 Introduction

1.1 Short history and parties involved

In November 2012 TenneT (TenneT Offshore GmbH) initiated, in consultation and cooperation with the BSH (Bundesamt für Seeschifffahrt und Hydrographie) and the WSV (Wasser- und Schifffahrtsverwaltung des Bundes) the execution of a series of anchor drop- and drag tests.

The purpose of the tests is to provide insight in the depth to which ships' anchors can endanger (buried) cables like the ones that are used for the shore connections of wind-energy parks in the German Bight.

Deltares of Delft, the Netherlands, was approached by TenneT (through Primo Marine, a consultant of TenneT) and asked to attend preparation meetings for this testing program and to provide scientific consultancy services regarding the preparation of an extensive anchor dragging test program at various locations in the German Bight.

Meanwhile the BAW (Bundesanstalt für die Wasserbau) was engaged through the WSV to provide scientific support and review on their behalf. It may be pointed out that the position of the BAW in Germany is, in many ways, similar to the position that Deltares has in the Netherlands. Both are non-commercial national institutes, committed to provide scientific and objective specialist consultancy services to their government as well as third parties.

During the preparation BSH supported the test program by providing geological expertise and in finding locations of the best testing areas in addition to the main area of concern for TenneT, which was the ship separation zone (VTG, Verkehrs Trennungs Gebiet) North of Norderney.

The BSH contributed directly to the tests by making the vessel Wega available as a platform for undertaking sediment sonar and side scan sonar surveys. The Wega served also as basis for supporting staff: geologists of BSH and TenneT as well as a specialist from the BAW were on board during the tests.

1.2 Build up of this report

This report aims first of all to provide all factual data that became available during preparation and execution of the anchor tests. The goal of the testing programme is:

to provide insight in the depth to which ships' anchors can endanger (buried) cables

After this introduction and summary Chapter 2 provides an overview of the factual data that were obtained and are provided in the various annexes to this report. Chapter 3 describes the test procedure. Main part is Chapter 4, which lists the test locations, soil data, pulling tests and pulling test results. This chapter also provides background data like the position of the ship during dropping and pulling, the analysis of the anchor dropping speed and the catenary angles associated with the pulling forces at the three different testing areas.

A summary combining data from both vessels and some statistic parameters of the test results are presented in Chapter 5.
Chapter 6 closes with an interpretative discussion of the test results.

1.3 Summary

In three areas North of Norderney a total of 17 anchor drops were performed. An 8.5 t AC-14 anchor and an 11.5 t Hall anchor were used for these tests. All drops were followed with at least one anchor pulling/dragging phase. The anchor pulls were continued to break-out failure or to a maximum pull load. The maximum pull load was set to a limit of 800 kN as a safety precaution.

1.3.1 Testing areas

From North to South the following testing areas were selected (Ref Figure 1.1):

- The BSH-North area. Selected by the BSH, an area with relative loose, fine, sands, approximately 45 km North of Norderney.
- The BSH-South area. Also located by BSH, an area with relatively dense sand, approximately 30 km North of Norderney
- The VTG area. Proposed by TenneT, the Southerly (Eastbound) shipping lane, approximately 15 km North of Norderney, where a thin sand layer overlies overconsolidated, stiff, clay.

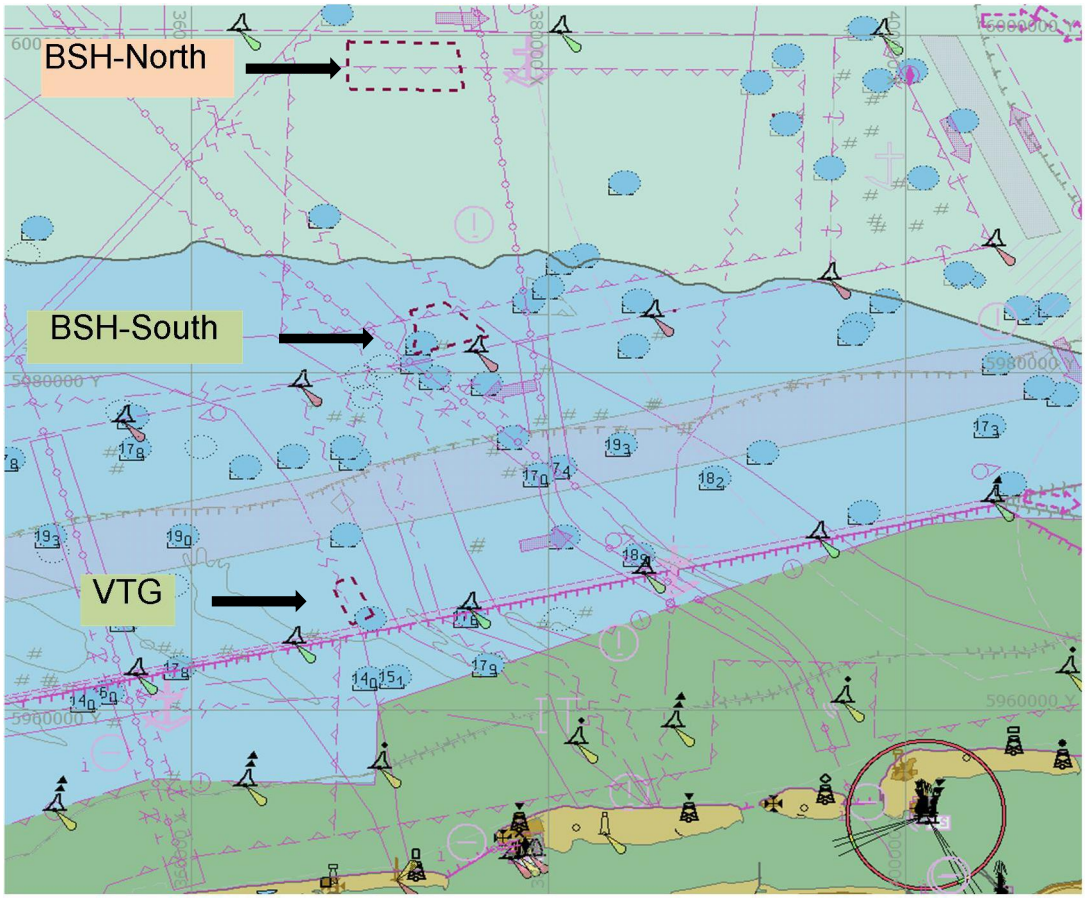


Figure 1.1 Location of the testing areas

1.3.2 Vessels involved and their tasks

Table 1.1 below summarizes the various vessels that were mobilised for this project.

Table 1.1 Vessels involved in the execution of the anchor tests

Vessel	Type	Provided by	Tasks
Esvagt Connector	Offshore Support Vessel	TenneT	Anchor handling, -dropping and -pulling
MV Guardian	Survey Vessel	TenneT	ROV-deployment (video / sonar) and multibeam surveying
VWFS Wega	Survey Vessel	BSH	Sidescan sonar and sediment sonar surveying
MV Karen	Guard Vessel	TenneT	Safeguarding operations during work in the VTG-zone

1.3.3 Video observation results (Guardian)

The video observations from the ROV gave the following information:

Penetration after dropping

After dropping the anchors to the seabed, with a velocity in the range of typically 2 to 4 m/s, none of the anchors showed significant penetration: In the BSH-North testing area the deepest penetration after dropping occurred, which did not exceed 0.25 m for the AC-14 anchor or 0.45 m for the Hall anchor.

Penetration by dragging

Video surveying established that after dragging the anchors the anchors' shank remained largely above the seabed level at all test locations. The same was (therefore) true for the crown. In harder soils occasional instability and lifting of the crown from the seabed or rotation of the anchor was observed.

1.3.4 Sediment sonar observation results (Wega, BAW report, "key reference")

BAW reports that over all three testing areas the maximum penetration depth of the AC-14 anchor ranged from 0.19 m to 0.69 m below the seabed, while the maximum penetration depth of the Hall anchor ranged from 0.26 m to 0.88 m.

When accounting for the potential inaccuracies of up to 0.11 m that are involved with the measurement and its interpretation it is concluded that the 8.5 t AC-14 did not penetrate beyond a depth of 0.8 m below the seabed and 11.5 t Hall anchor did not penetrate beyond a depth of 1.0 m below the seabed. This occurred in the BSH-North area, where in general the largest penetrations were observed.

In the VTG area the maximum observed penetration was 0.67 m for both the Hall-anchor and the AC-14 anchor. Accounting for the potential inaccuracies it is concluded that none of the anchors exceeded a penetration of 0.8 m in the VTG testing area.

2 Available data

Most of the data that are used and have become available during these tests are, for completeness, fully reproduced in the Annexes to this report. This chapter gives a brief overview of the data that are contained therein.

Other sources of information are references and 3rd parties reports that are not fully reproduced. The list of references is given in paragraph 2.2 of this Chapter.

2.1 Overview of data in Annexes

Annex A provides the geometry and weight information of the anchor tackle and the anchors. These data are relevant for the calculation of the catenary shape and thereby the angle of anchor pulling relative to the horizontal.

Annex B gives the deck-plan and side view of the Esvagt Connector, together with the estimated position of the load cell. The position of the load cell and the height of the stern roller on the Esvagt Connector are also input data which are required to determine the length of chain and wire between the vessel and the anchor and the shape that the catenary will take for different pulling forces and water depths.

Annex C gives the interpreted and the raw data from the GPS logging system of the Esvagt Connector.

Annex D gives the recorded pulling forces for all tests, both in numerical and in graphical format.

Annex E contains two Event Logs. One is the log kept by the Deltares' observers on board the Esvagt Connector. The other is the log kept on board the Guardian.

Annex F contains a selected series of video and sonar illustrations as well as photographs, that give an impression of the performed tests and illustrate the use that is made of video and sonar data acquisition by the ROV operated from the Guardian.

2.2 References

Key reference:

Untersuchung des Eindringverhaltens von Schiffsankern mittels Ankerzugversuchen. BAW-Hamburg, BAW-Nr. A395 502 10088, 28 August 2013

Other references:

[1] Vryhof Anchor Manual 2010 (http://www.vryhof.nl)

[2] Website of Saxto-Marine (anchor tackle weights) (http://www.saxtonmarine.co.uk/anchor_chain_cable_swivel.html)

[3] By E-mail from Elena Scheiber (BSH) to Dr. Anja Drews (TenneT) on 4 July 2013, Cc to: Maria Lambers-Huesmann; Manfred Zeiler
Subject: „Ankerzugversuch - Beschreibung der Gebiete“

[4] 2011 Marine Survey Programme For Cable Routing & Site Investigations, Results Report Volume 2 – Survey 07 “Proposed Cable Route from DolWin2 to DolWin Beta” No C11025, by Osiris projects, for TenneT Offshore GmbH, February 2012.

[5] Requirements concerning mooring, anchoring and towing, International Association of Classification Societies, Revision 3, July 2007.

[6] “BorWin3-Kabel, Schiffs- und Navigationssicherheitsanalyse”, Germanischer Lloyd, report SO-ER 2011.054A, Version 0.1/2011-11-23

3 Anchor trial procedure

The anchor test procedure consists of a series of actions, in which various vessels were involved. The basic procedure was similar in all three areas where tests were performed. This chapter describes the general procedure followed during the anchor pulling tests. Table 3.1 gives an overview of the most important phases of each test.

Table 3.1 Main steps, actions and involved vessels in an anchor test

Phase no.	Task description	Vessel
1	• Perform side scan sonar (SSS) and sediment echo sounder survey (SES) of trial area along east-west-east lines with 50 m spacing. • Confirmation of the anchor drop location.	Wega
2	• Position above selected test site, heading against the current • Place the anchor on stern roller • Lower the anchor slowly into water to a level ten meters above the seabed • Drop the anchor by releasing the winch • Apply winch brake after approximately 15 m chain pay-out • Move vessel approximately 25 meters ahead while paying-out chain/wire.	Connector
3	• Launch ROV and locate the anchor • Perform visual inspection of anchor position and orientation of anchor in relation to planned pulling direction. • Report this to Esvagt Connector.	Guardian
4	• Move Esvagt Connector ahead while paying out all chain plus approximately 100 m wire. • (If anchor was not correctly aligned pull slowly forward until ROV video confirmation of correct position is obtained. in insufficient visibility situations, the ROV sonar image was used to confirm anchor alignment) • Install the load cell (end of cable secured by clamps on deck) • Pull-in wire and position load cell closer to the winch ([1])	Connector
5	• Start applying pulling force on the anchor. • Read load cell and record (manually) during the test • Stop of pulling test if anchor breaks out or when 800 kN pulling force is reached ([2])	Connector
6	• Locate the anchor with the ROV and inspect the anchors position. • Optionally: Return to Phase 5 for 2nd or 3rd pull.	Guardian
7	• Remove the load cell • Recover the anchor to the deck	Connector
8	• Perform multi beam bathymetric survey	Guardian
9	• Repeat SSS and SES survey	Wega
10	• Relocate to next trial location	Connector Guardian Wega

([1]), ([2]) see notes on next page.

Notes to table 3.1:

(1) Original plan was to keep the load cell close to the stern of the Esvagt Connector during pulling. During the first test this led to repetitive impacts of the load cell on the deck. In order to avoid damage to the load cell the wire was pulled in, which positioned the load cell further forward and higher above the deck.

(2) In practice the tests were stopped if 800 KN was steadily reached. The load was often irregular and with an average load below 800 kN some peak readings were significantly higher before the test was stopped.

All tests were pulled into (against) the tidal current to enable the ROV to approach and observe the anchor against the current for the best visibility conditions. The tests were performed in three test areas. The tests in the most southerly area, the ship-traffic zone or VTG, were adapted to ensure safe nautical conditions.

The adaptions involved were:

- During work in the VTG area a guard-vessel, the MV Karen, was mobilised at some distance further up the traffic zone. The MV Karen provided regular (half-hourly) notice to ships in the area that tests were under way and that a safe margin should be kept when passing the Esvagt Connector and Guardian. When deemed necessary the MV Karen initiated one-on-one communication with approaching vessels.
- All pulling tests in the VGT were done in the same direction as the general shipping traffic in that area. The requirement of pulling against the tide meant therefore that testing was suspended during the period that the tidal flow was directed Eastwards, in line with the direction of the ship traffic.

Throughout the tests an event-log was kept to be able to match, as good as possible, the anchor position and the position of the Esvagt Connector position with the recorded pulling force. Since, apart from the automatic GPS recording, all logging records were kept manually the precise matching of these positions with the pulling force has a limited accuracy.

4 Overview anchor tests

4.1 Planned test positions

The anchor tests were performed in three different areas, indicated as: the BSH-North, the BSH-South and the VTG area. Key data, as taken from the anchor testing plan are shown in the figure and tables below.

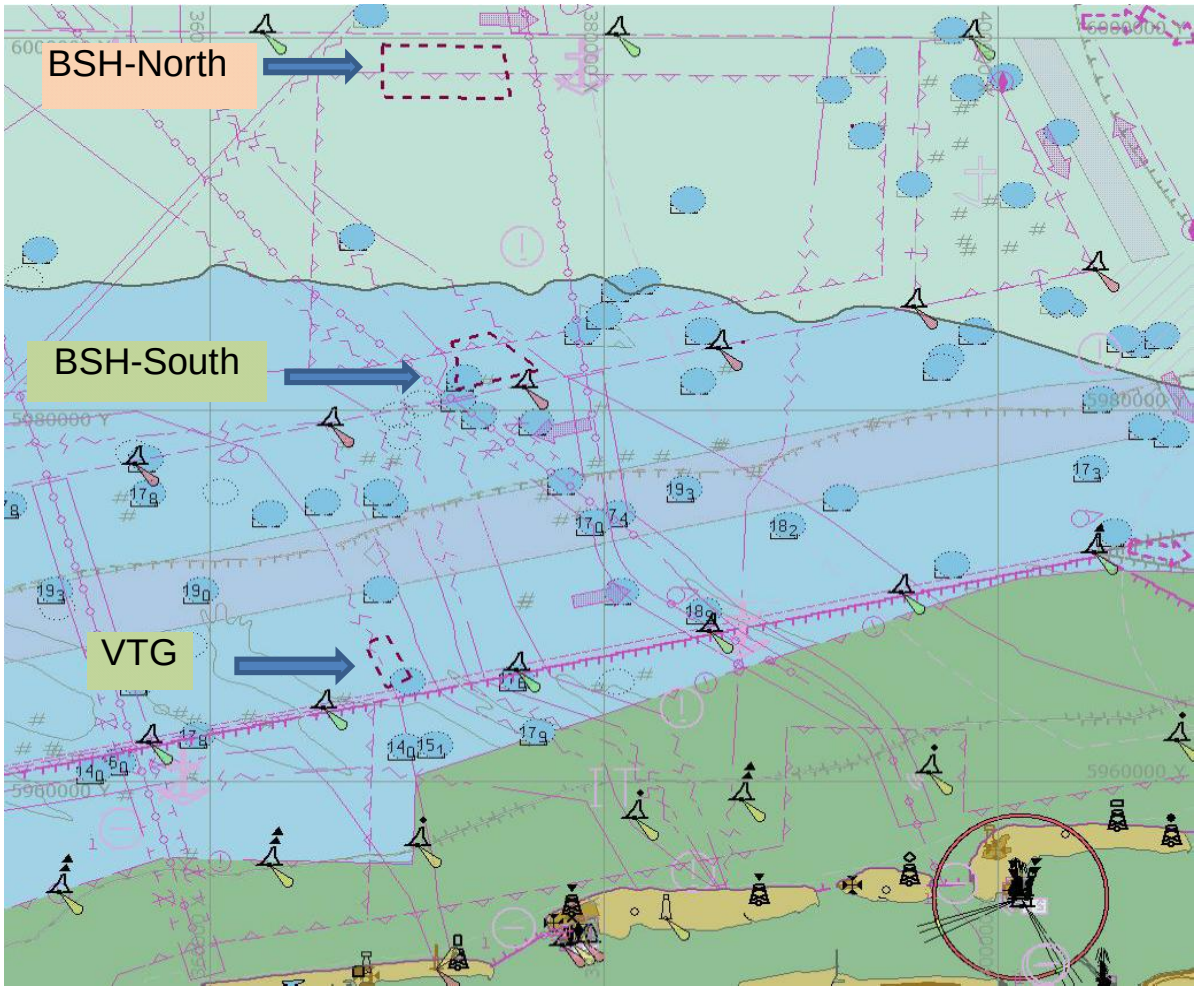


Figure 4.1 Position of the test areas north of the islands Juist and Norderney

For each of the areas a smaller survey area was defined, in which the actual tests were to take place. Within this survey area anchor test locations were selected,

Within each area six locations were designated as anchor drop locations from which the anchor would be dragged against the tidal flow.

The anchor drop locations are indicates by letter and number: The letters used are N, S and V and stand for the BSH-North area, the BSH-South area and the VTG area respectively.
The subsequent number indicates the test position within that area.

Table 4.1 Survey perimeter of the BSH-North test area

WGS 84		UTM (32)	
Latitude	Longitude	Easting	Northing
54 6.756023 N	007 3.246693 E	372800	5997800
54 7.187185 N	007 3.226489 E	372800	5998600
54 7.199019 N	007 3.960450 E	373600	5998600
54 6.767853 N	007 3.980527 E	373600	5997800

Table 4.2 Planned anchor drop positions in the BSH-North area

Position	WGS 84		UTM (32)	
	Latitude	Longitude	Easting	Northing
N1	54 7.112268	007 3.597245	373200	5998450
N2	54 7.058373	007 3.599763	373200	5998350
N3	54 7.004477	007 3.602281	373200	5998250
N4	54 6.950582	007 3.604798	373200	5998150
N5	54 6.896686	007 3.607316	373200	5998050
N6	54 6.842791	007 3.609833	373200	5997950

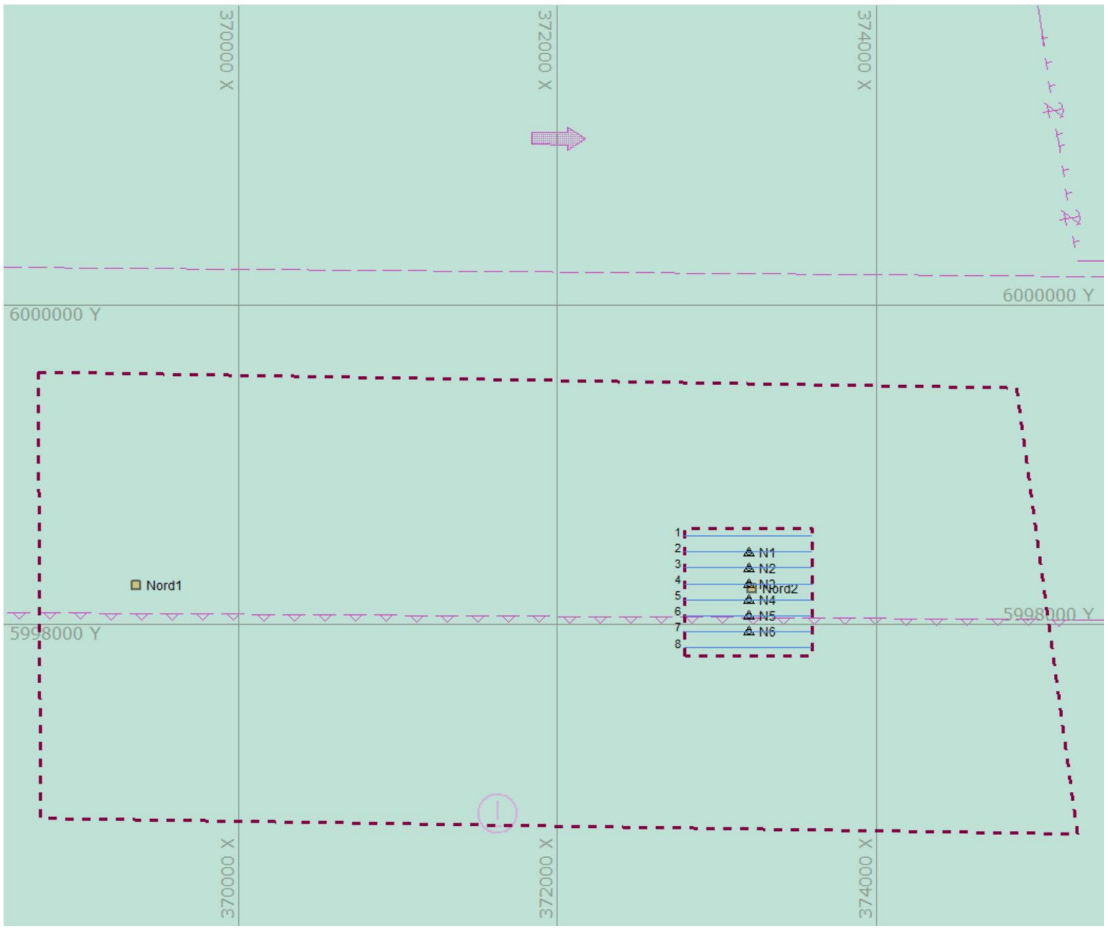


Figure 4.2 Planned anchor drop positions and potential anchor drag tracks in the BSH-North area.

Table 4.3 Survey perimeter of the BSH-South test area

WGS 84		UTM (32)	
Latitude	Longitude	Easting	Northing
53 58.096371 N	007 4.748367 E	374000.00	5981700.00
53 58.527551 N	007 4.728529 E	374000.00	5982500.00
53 58.539211 N	007 5.459961 E	374800.00	5982500.00
53 58.108029 N	007 5.479674 E	374800.00	5981700.00

Table 4.4 Planned anchor drop positions in the BSH-south area

Position	WGS 84		UTM (32)	
	Latitude	Longitude	Easting	Northing
S1	53 58.452544N	007 5.097953E	374400.00	5982350.00
S2	53 58.398646N	007 5.100425E	374400.00	5982250.00
S3	53 58.344749N	007 5.102897E	374400.00	5982150.00
S4	53 58.290851N	007 5.105369E	374400.00	5982050.00
S5	53 58.236953N	007 5.107841E	374400.00	5981950.00
S6	53 58.183056N	007 5.110312E	374400.00	5981850.00

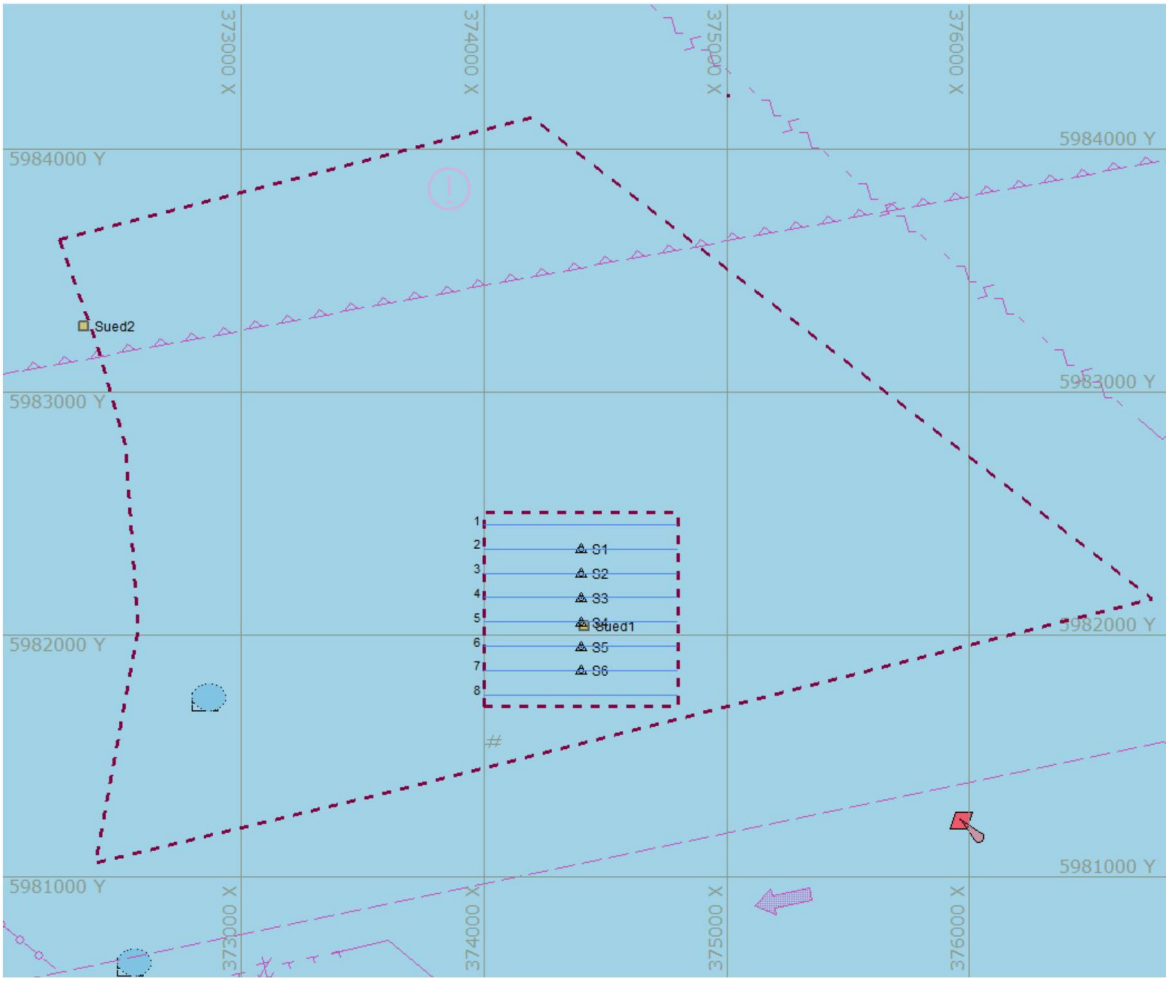


Figure 4.3 Planned anchor drop positions and potential anchor drag tracks in the BSH-South area.

Table 4.5 Survey perimeter of the VTG tests area

WGS 84		UTM (32)	
Latitude	Longitude	Easting	Northing
53 50.364856 N	006 59.652096 E	368023.50	5967520.48
53 50.657149 N	007 01.550676 E	370120.36	5968003.98
53 49.771758 N	007 01.961078 E	370524.79	5966350.00
53 49.479584 N	007 00.063111 E	368427.93	5965866.51

Table 4.6 Planned anchor drop positions in the VTG test area.

Position	WGS 84		UTM (32)	
	Latitude	Longitude	Easting	Northing
V1	53 50.180252 N	007 0.694296 E	369156.67	5967146.06
V2	53 50.133234 N	007 0.738919 E	369203.16	5967057.52
V3	53 50.086216 N	007 0.783531 E	369249.64	5966968.98
V4	53 50.039203 N	007 0.828151 E	369296.13	5966880.45
V5	53 49.992184 N	007 0.872769 E	369342.62	5966791.91
V6	53 49.947707 N	007 0.914183 E	369385.73	5966708.18

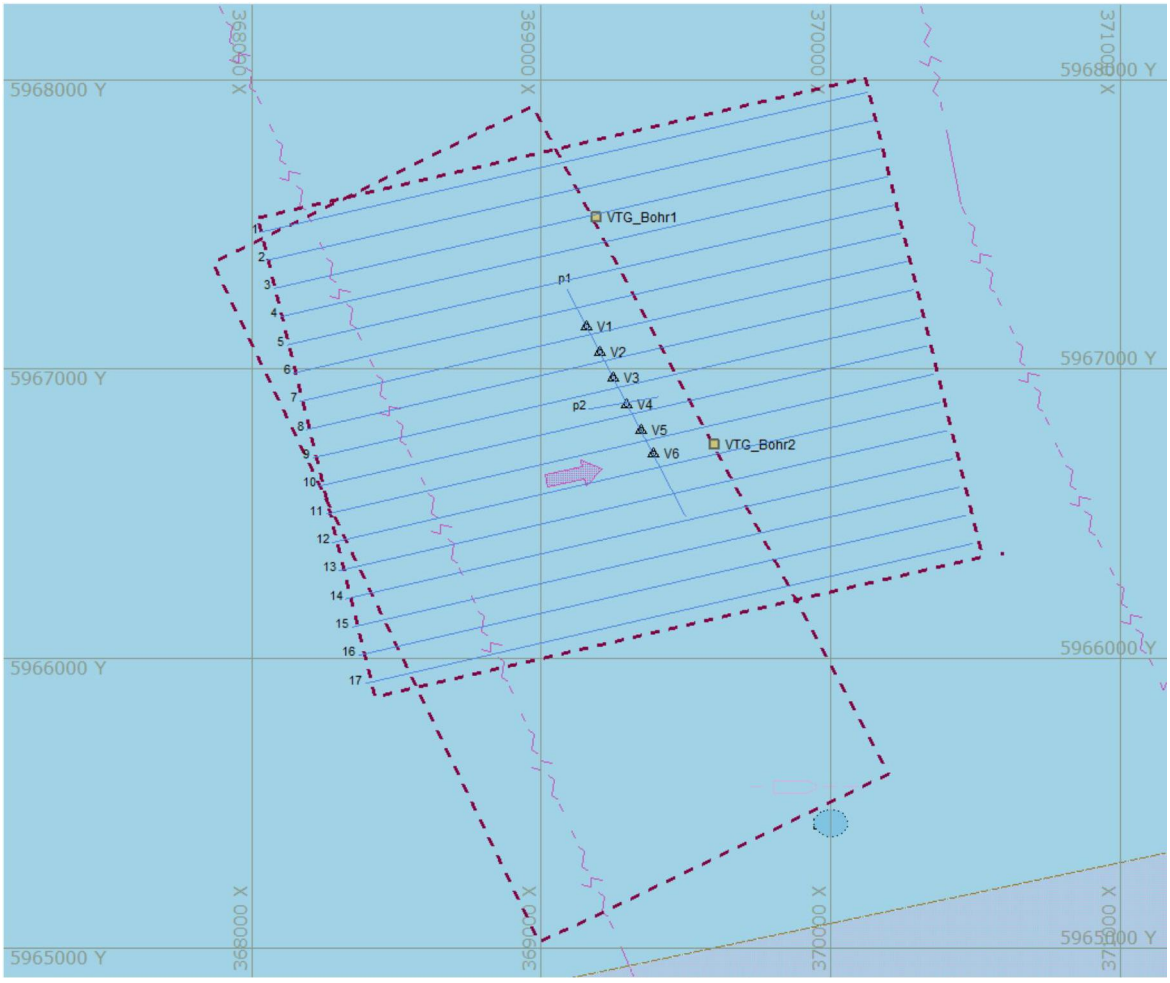


Figure 4.4 Planned anchor drop positions and potential anchor drag tracks in the VTG area.

All test positions were assigned well before the start of the testing program. In the BSH-North area and the BSH-South area these positions remained unchanged. In the VTG area a survey was performed as soon as the Wega was mobilised in order to optimise the test locations in that area in such a way that the tests could reflect the effect of the stiff clay underlying the top layer of sand. This was done in such a way that the existing cables passing nearby were kept at a safe distance.

4.2 Actual test positions

GPS data are available as ASCII files that contain the GPS log of the Esvagt Connector, and are in this report reproduced in Annex C. The GPS files were used to record the track of the Esvagt Connector during as well as between tests.

Note that the stern roller of the Esvagt Connector is NOT in the GPS log position. The position of the stern roller can be derived from the GPS coordinates using:

- the orientation of the vessel (column 7 in the ASCII GPS log) and
- the distance between GPS antenna and stern (derived to be approximately 36.3 meter).

The following figures give an overview of the anchor drop positions as derived from the GPS system and the position of the ship during the actual anchor pulling as follows:

- The blue marks indicate the position of the stern of the Esvagt Connector at the time that the event log recorded an anchor drop. That time is (in UTC+2) displayed under the anchor drop positions. The test name (e.g. N1-AC14) is indicated above the blue mark.
- The red lines gives the stern positions of the vessel during the period or periods that were marked as an anchor pulling period (during which pulling forces were recorded).
- The direction of the pull is indicated by the arrow. In case of multiple, subsequent pulls, multiple arrows are shown.

It must be noted that this recording of the anchor drop position and the position of the stern during the pulling test have a limited degree of accuracy. The accurate anchor drop position is found from the multibeam recordings of the Guardian and/or the post-test surveys by the Wega. However, the direction of pulling during the test is relevant, as some of the anchor tracks show. During some tests the pulling direction changed slowly from the initial direction. Anchor tracks changing direction, imprints of earlier chain positions on the seabed and the final position of the anchor chain as seen in the multibeam surveys give evidence of these variations.

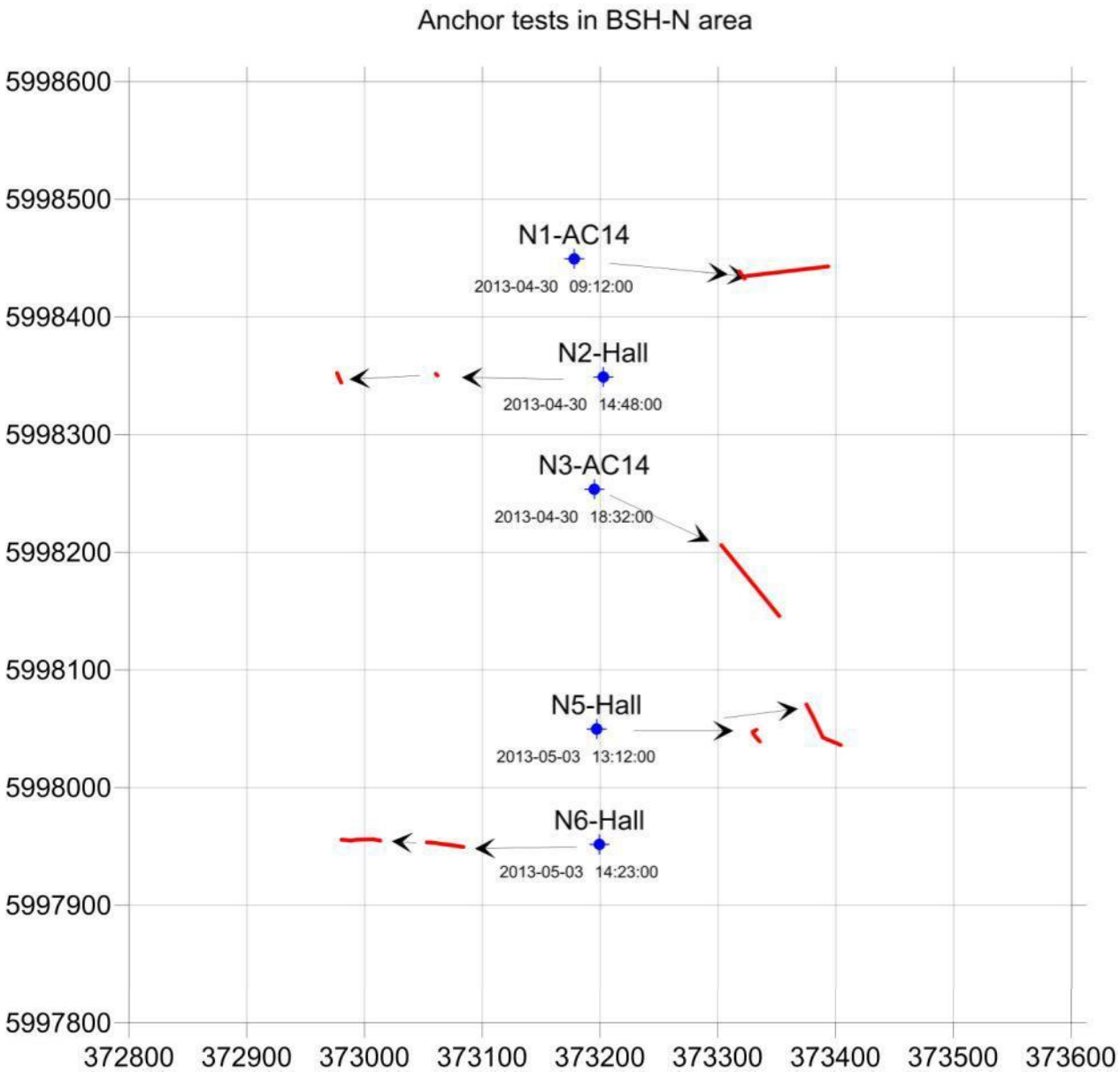


Figure 4.5 Layout of anchor tests in the BSH-North area

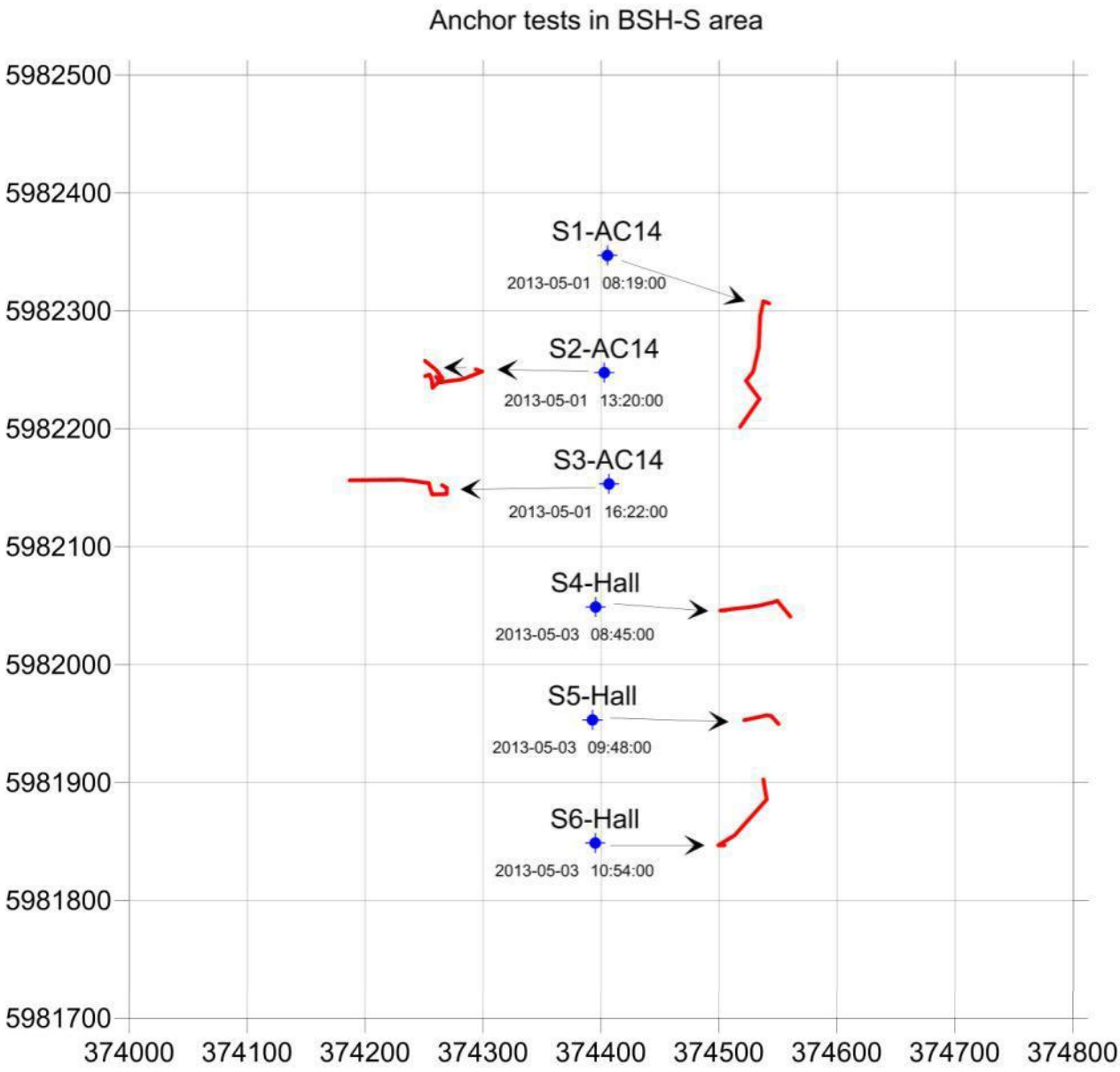


Figure 4.6 Layout of anchor tests in the BSH-South area

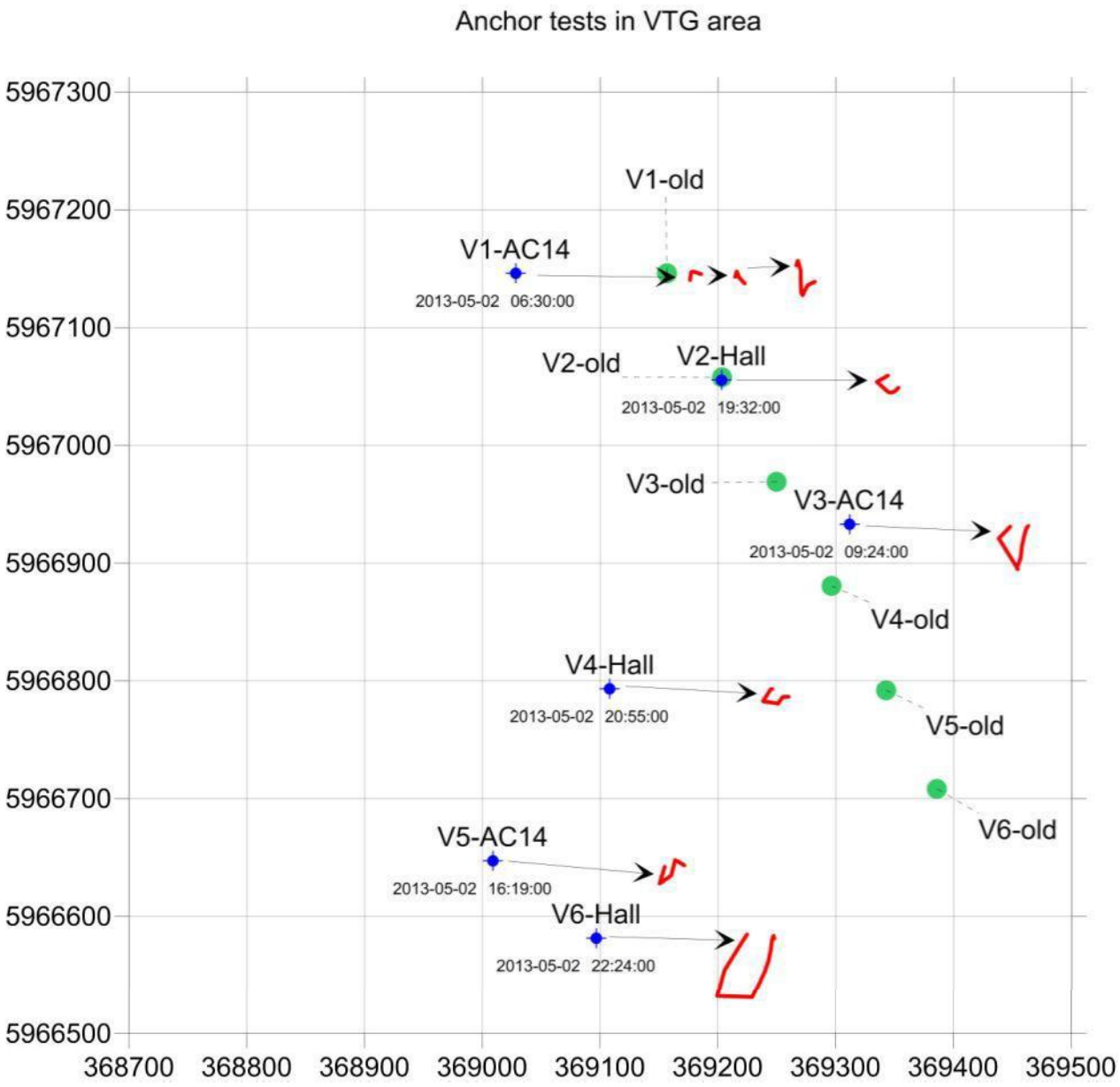


Figure 4.7 Layout of anchor tests in the VTG area

The above figure (Figure 4.7) clearly shows the result of the extra survey and subbottom profiling that was performed in the VTG area when one compares these positions with the planned positions as shown here as green dots (V1-old,…, V6-old). On basis of that survey, the anchor drop (and start of pull) locations were adapted, in order to maximise the interaction of the anchor with the overconsolidated stiff clay layers that were known to be present below the top sand layer in this area.

4.3 Soil conditions

For the interpretation of the anchor tests and the use of the test results at other places than those tested, the soil conditions at the various test locations are of importance and are therefore reported: The penetration depth of an anchor depends on the soil conditions at the site. In soft muds a dropping anchor may penetrate to some depth, while at a site with sandy top layer a higher resistance against large deformations is expected.
Layering, and more in general heterogeneous soil conditions, tends to lead to less stable anchor behaviour with reduced penetration during dragging.

For the sites BSH-North and BSH-South the site investigation data are not freely available (3rd party ownership). These data are accessible for the BSH and thanks to the BSH an interpretation of the soil data was provided by e-mail [ref. 3].
The data for the VTG were owned by TenneT and were directly used to describe the test site.

4.3.1 Geotechnical description of the BSH-North area

The BSH-North area is situated between the Northern shipping separation area (VTG „Deutsche Bucht – Westliche Ansteuerung“) and the South of the shipping separation area located Windpark-Clusters 3.
The first 3 m of sediment in he BSH-North area consists of loose to very loosely packed, partly silt fine to medium sands. Locally coarse sands or fine gravel may be present.
In Table 4.7 the packing densities of the first 3 m of sediment are summarised. These packing densities were derived from the results of cone penetration tests.

Table 4.7 BSH-North - Packing densities derived from CPT testing

Packing density of top 3 m of sediment in BSH-North area					
0.5 m	**1 m**	**1.5 m**	**2.0 m**	**2.5 m**	**2.8 - 2.9 m**
Very loose	Very loose	Very loose	Very loose	Very loose	Very loose
Very loose	Very loose	Loose	Very loose	Very loose	Very loose
Very loose	Very loose	Very loose	Very loose	Very loose	Very loose
Very loose	Very loose	Very loose	Very loose	Very loose	Very loose
Very loose	Very loose	Very loose	Very loose	Very loose	Very loose
Very loose	Very loose	Very loose	Very loose	Very loose	Very loose
Very loose	Very loose	Very loose	Very loose	Very loose	Very loose

4.3.2 Geotechnical description of the BSH-South area

The BSH-South area is situated between the Southern shipping separation area (VTG „Terschelling - Deutsche Bucht“) and the Windpark-Clusters 3.

The first 3 m of sediments in the BSH-South area consist mainly of silty fine to medium sands. Occasionally also coarse sands and clayey zones are encountered.
The sediments in the first 1 to 1.5 m are in general loose to medium-dense. From approximately 1.5 m down, with increasing depth below the surface, the packing densities increase to mainly medium dense to dense. Locally also very dense material was encountered.
In Table 4.8 the packing densities of the first 3 m of sediment are summarised. These packing densities were derived from the results of cone penetration tests (cone resistance q_c).

Table 4.8 BSH-South - Packing densities derived from CPT testing

Packing density of top 3 m of sediment in BSH-South area					
0.5 m	**1 m**	**1.5 m**	**2.0 m**	**2.5 m**	**2.8 - 2.9 m**
Medium dense	Medium dense	Dense	Dense	Dense	Dense
Loose	Medium dense	Medium dense	Dense	Very dense	Very dense
Very loose	Loose	Medium dense	Dense	Dense	Very dense
Medium dense	(Medium) dense	Medium dense	Medium dense	Medium dense	-
Loose	Medium dense	Dense	Dense	Dense	-
Medium dense	Medium dense	Dense	Dense	Dense	Dense

4.3.3 Geotechnical description of the VTG area

At the seabed in the VTG test area first a loose sand layer in the order of 1 m thickness is found. Under this layer cohesive sediments (clays and/or silts) and locally peats are encountered. Geophysical surveys along the eastern boundary of the area (Fugro OSAE 2013) revealed several channel structures.

Geotechnical site investigations (small soil borings and cone penetration tests), also east of the testing area, indicated high shear strengths in this underlying formation (Table 4.9). Soil borings are described in ref [4], “2011 Marine Survey Programme for Cable Routing & Site Investigations”.

Table 4.9 Results of geotechnical borings in the vicinity of the VTG area

Boring	Thickness sand layer [m]	Underlying layer type	Consistency	Shear strength [kPa]
VC-S07-16	1.40	Clay	Firm	52-54
VC A07	2.00	Clay	Stiff	135-150
VC-S07-17	0.85	Clay	Firm - Stiff	40-60

(Note: During the definition of the testing program efforts were made to locate a geotechnical equivalent area, which would have made it possible to avoid testing in the shipping lane (VTG) itself. This search for an alternative location remained unsuccessful.

4.4 Chronological overview of tests

The different tests were assigned a test-code that consists of a letter and a number followed by the anchor type used in the test.

Table 4.10 gives, in chronological order, an overview of the performed anchor tests. At five locations more than one anchor pull was performed after the anchor dropping: Two pulls in test N1-AC14, N2-Hall, N5-Hall and N6-Hall and three pulls in test V1-AC14.

Table 4.10 Chronological overview of anchor tests

Date	GMT+2	Testcode	Pull	Start E	Start N
2013-04-30	09:12:00	N1-AC14	N1A N1B	373177.9	5998449.3
2013-04-30	14:48:00	N2-Hall	N2A N2B	373202.5	5998349.1
2013-04-30	18:32:00	N3-AC14	N3	373195.0	5998253.6
2013-05-01	08:19:00	S1-AC14	S1	374405.1	5982347.1
2013-05-01	13:20:00	S2-AC14	S2	374402.6	5982247.5
2013-05-01	16:22:00	S3-AC14	S3	374406.4	5982153.1
2013-05-02	06:30:00	V1-AC14	V1A V1B V1C	369028.0	5967145.8
2013-05-02	09:24:00	V3-AC14	V3	369311.5	5966932.9
2013-05-02	16:19:00	V5-AC14	V5	369008.7	5966646.9
2013-05-02	19:32:00	V2-Hall	V2	369203.0	5967055.4
2013-05-02	20:55:00	V4-Hall	V4	369108.0	5966793.1
2013-05-02	22:24:00	V6-Hall	V6	369096.6	5966581.4
2013-05-03	08:45:00	S4-Hall	S4	374395.1	5982049.0
2013-05-03	09:48:00	S5-Hall	S5	374392.6	5981953.2
2013-05-03	10:54:00	S6-Hall	S6	374394.8	5981848.7
2013-05-03	13:12:00	N5-Hall	N5A N5B	373196.8	5998049.8
2013-05-03	14:23:00	N6-Hall	N6A N6B	373199.3	5997951.8

4.5 Overview of test results

In the following paragraphs for each test first the bathymetry, as obtained by the Guardians' multibeam system is shown, together with the position of the stern of the Esvagt Connector during all pulls (one, two or three pulls), with the pulling direction indicated with an arrow.

For the first four tests that were performed (i.e. test N1-AC14, N2-Hall, N3-Hall and S1-AC14) no multibeam surveys were made from the Guardian and only post-test survey data from the Wega are available. All survey data from the Wega are described and interpreted in the BAW report which is a key reference to this report and presumed to be available to all users/readers of this report.

In the subsequent figure(s) the pulling force versus time as recorded on the Esvagt Connector, is plotted. This may involve one, two or three plots, depending on the number of pulls.

Finally the log entry is added, in which the conclusion of the test, as observed/interpreted on site, is described.

4.5.1 Test BSH-N N1A & N1B AC14

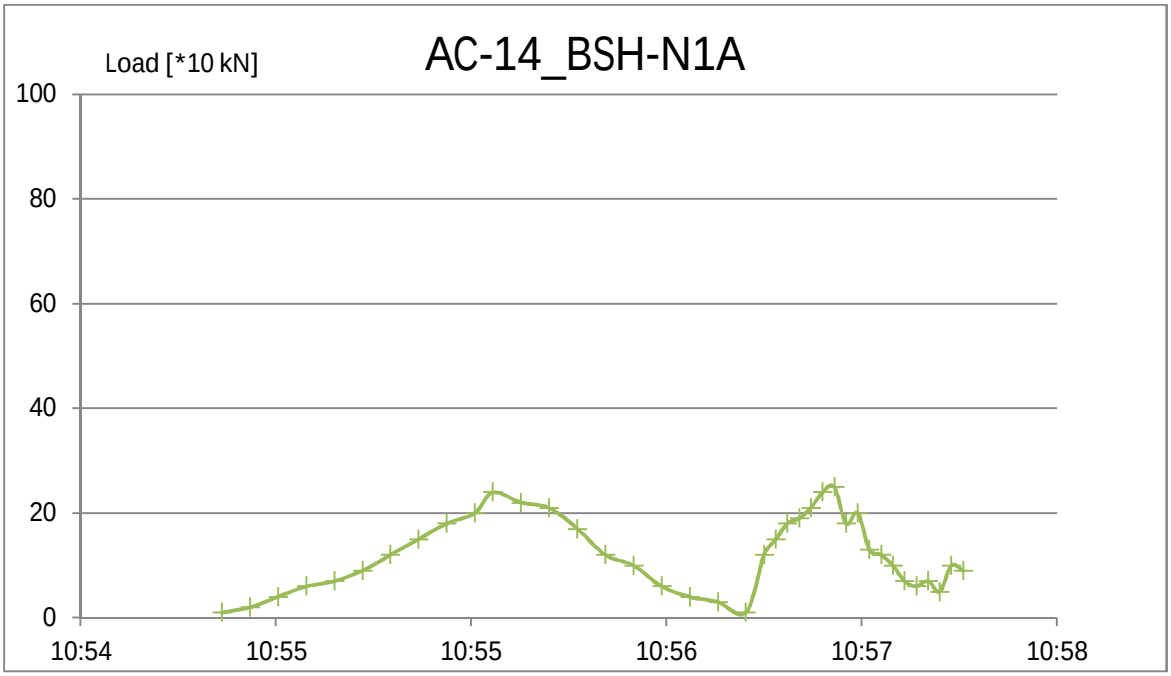


Figure 4.8 Time Load Curve for test N1A-AC14

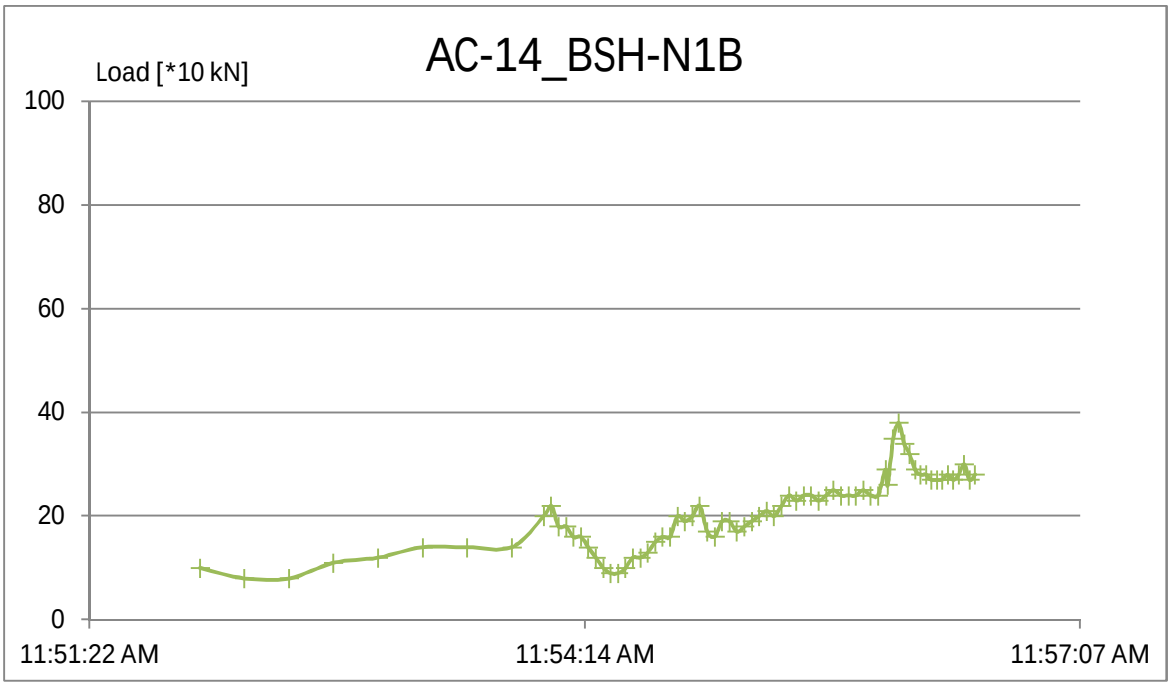


Figure 4.9 Time Load Curve for test N1B-AC14

Log entry:

April 30 11:55	Connector finished anchor pull at a 250m path. Maximum achieved pulling force = 62T, after anchor having broken out several times around 40+T.	Connector

4.5.2 Test BSH-N N2A & N2B Hall

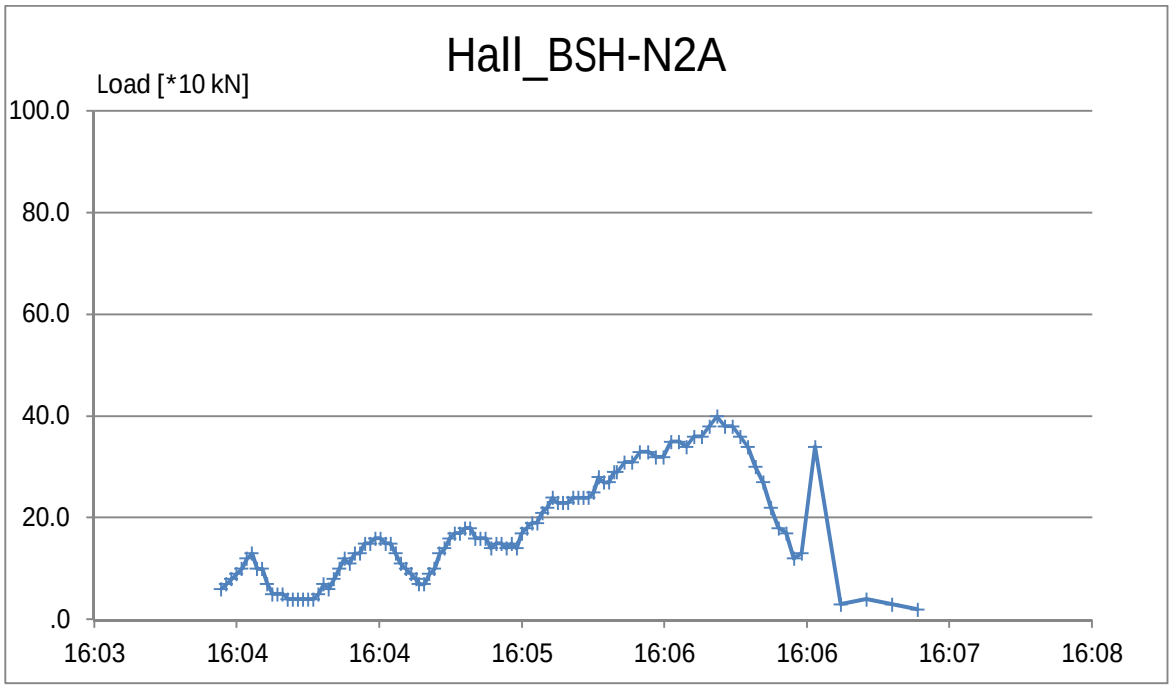


Figure 4.10 Time Load Curve for test N2A-Hall

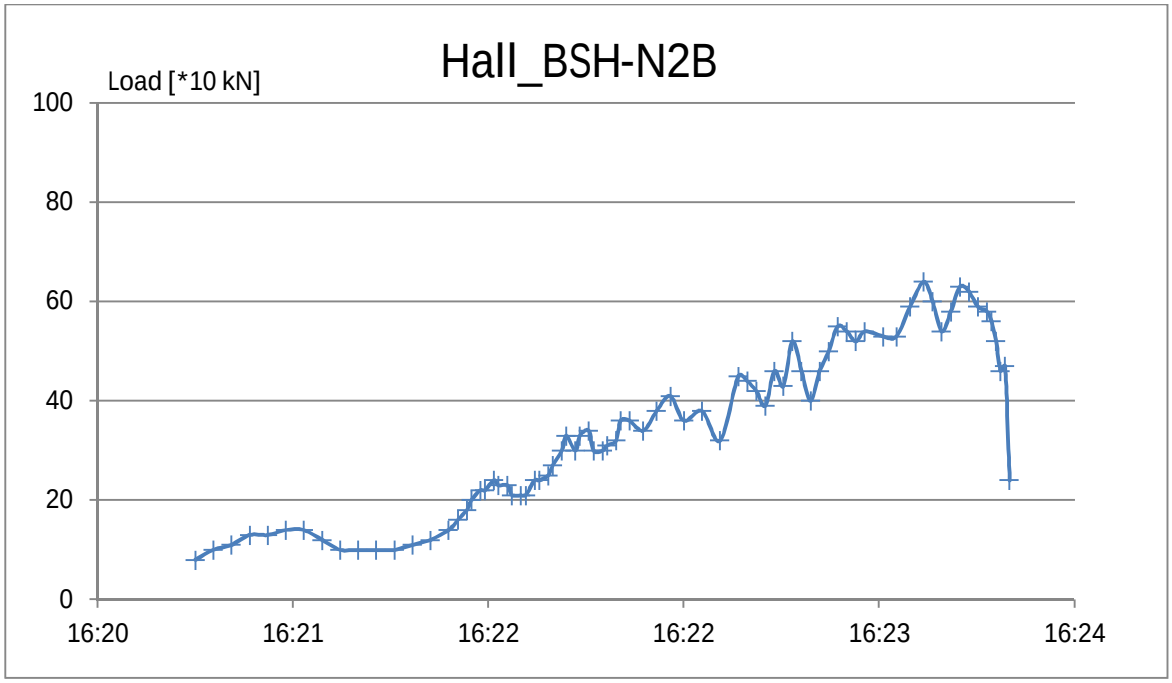


Figure 4.11 Time Load Curve for test N2B-Hall

Log entry:

April 30 16:33	Hall anchor pull completed, at maximum force of 64T, accompanied by break-outs, recovering ROV for Wega survey	Guardian / Connector

4.5.3 Test BSH-N N3 AC14

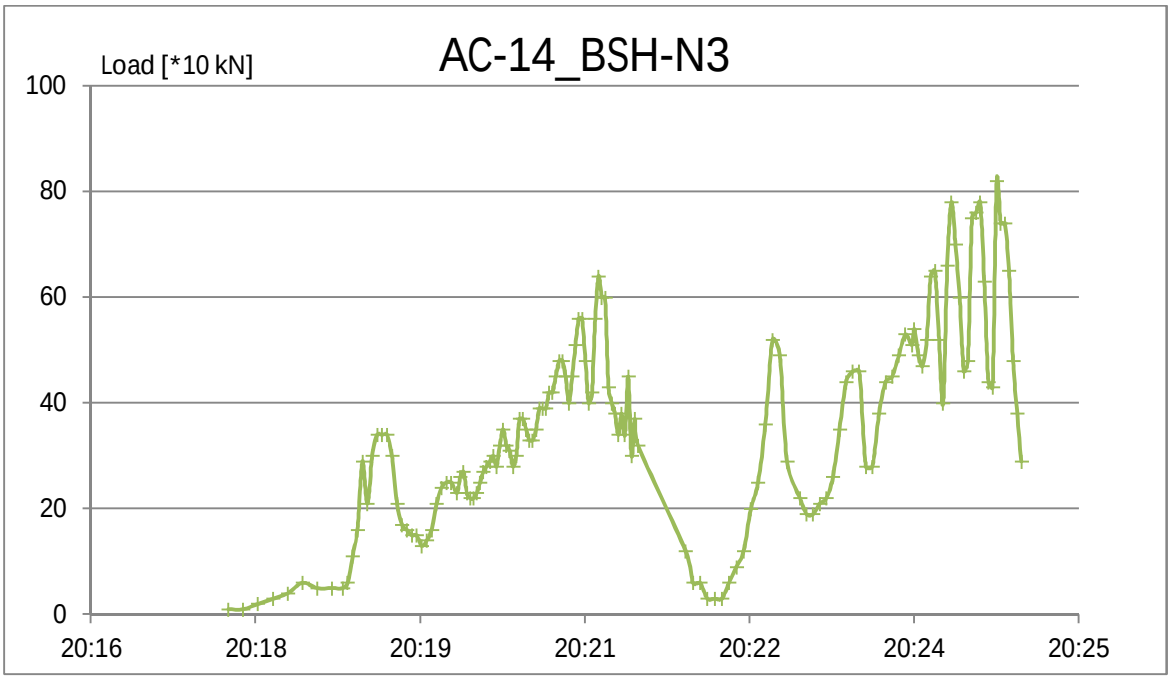


Figure 4.12 Time Load Curve for test N3-AC14

Log entry:

April 30 20:25	Anchor pull completed, maximum achieved pulling force = 82T - no break-out	Connector

4.5.4 Test BSH-N N5A & N5B Hall

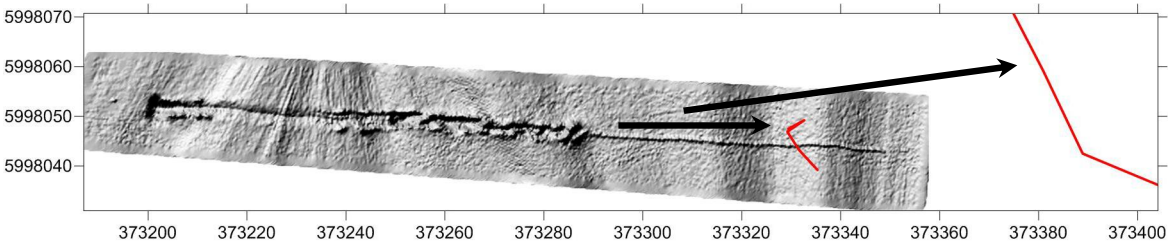


Figure 4.13 Seabed shape after pulling N5-Hall

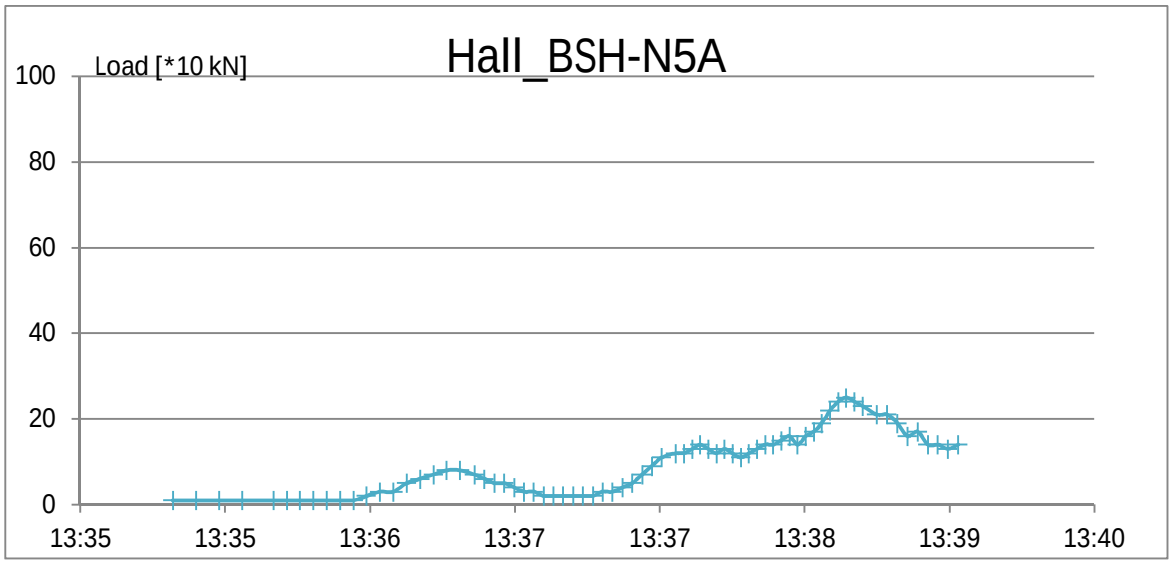


Figure 4.14 Time Load Curve for test N5A-Hall

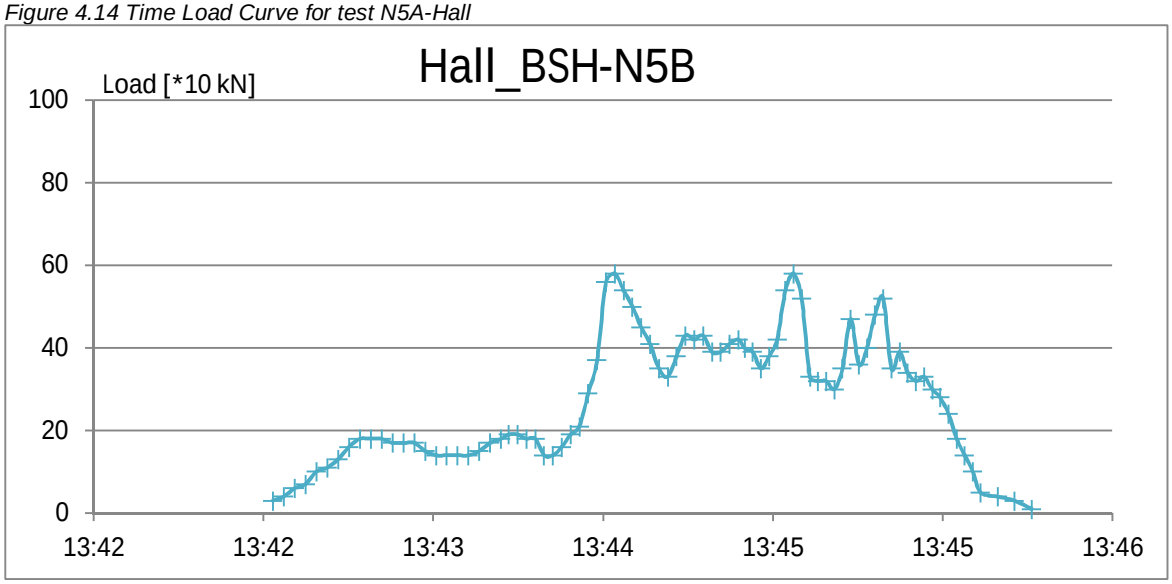


Figure 4.15 Time Load Curves for test N5B-Hall

Log entry:

May 3 13:46	Break out at max pull = 57T, disconnecting load cell	Connector

4.5.5 Test BSH-N N6A & N6B Hall

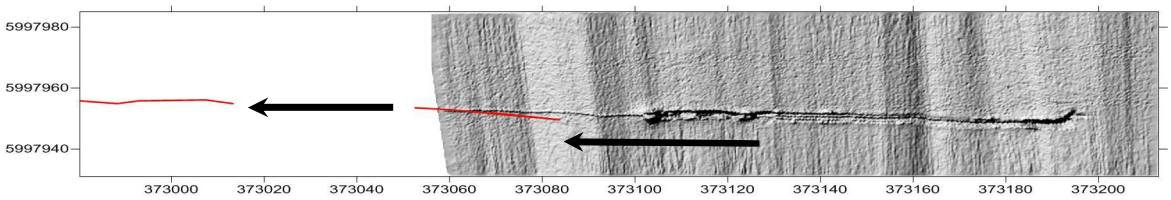


Figure 4.16 Seabed shape after pulling N6-Hall

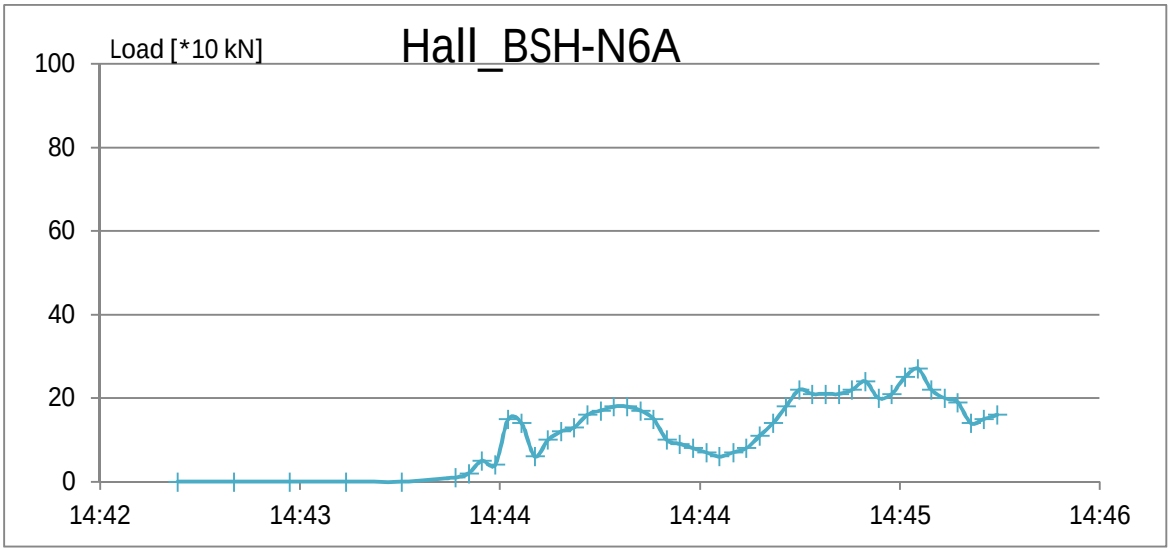


Figure 4.17 Time Load Curve for test N6A-Hall

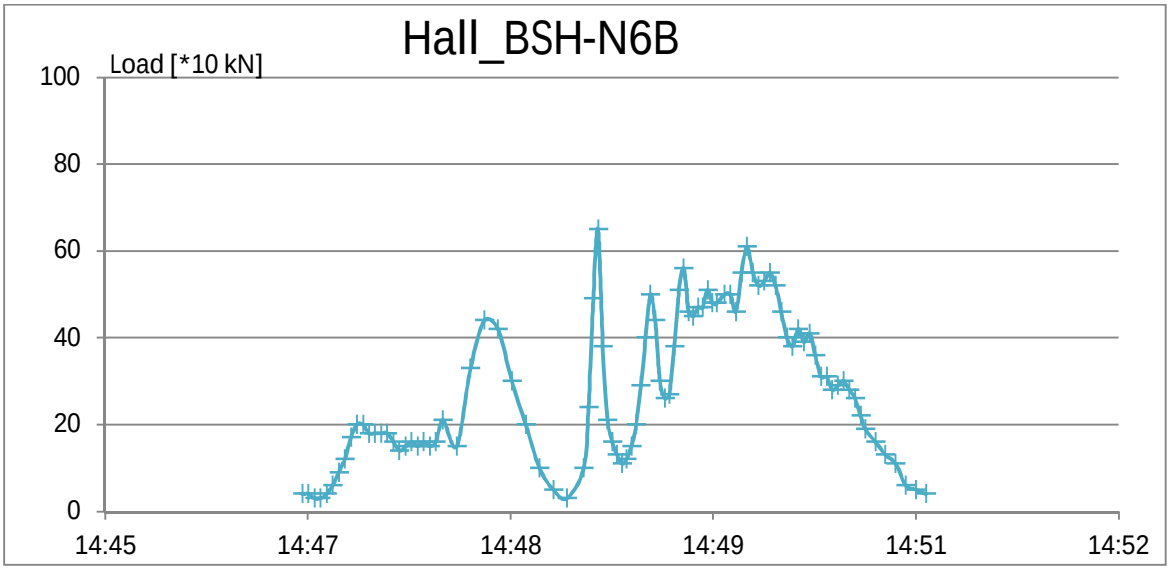


Figure 4.18 Time Load Curve for test N6B-Hall

Log entry:

May 3 14:53	Break-out at max pull = 60T, disconnecting load cell	Connector

4.5.6 Test BSH-S S1 AC14

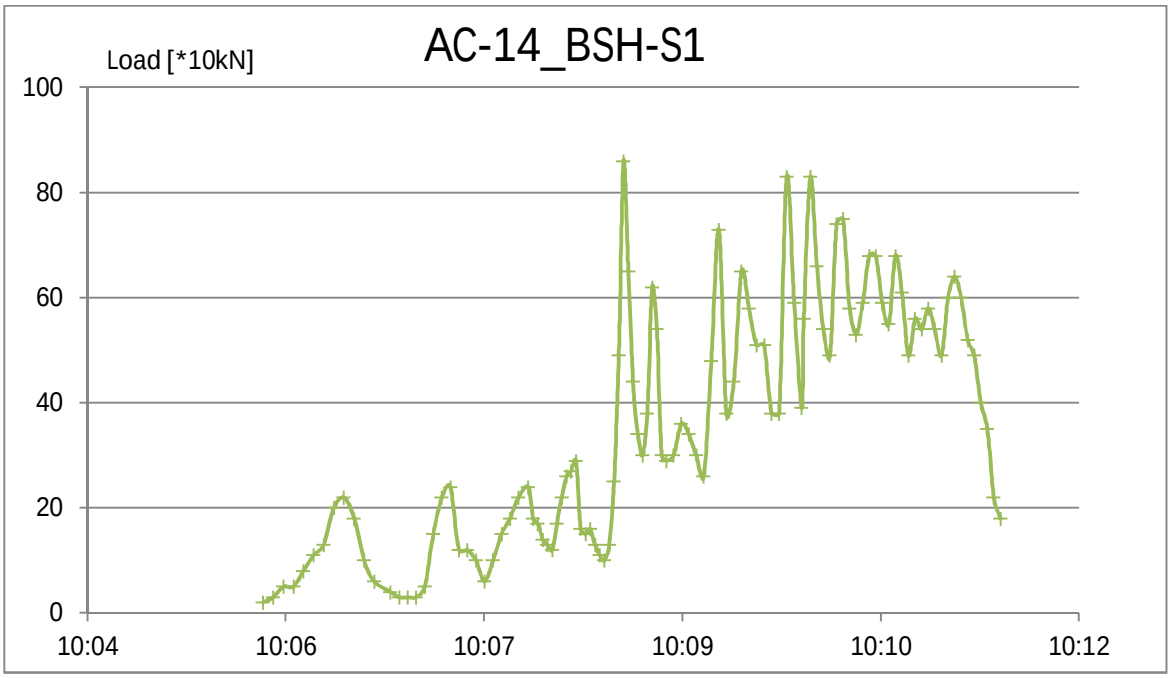


Figure 4.19 Time Load Curve for test S1-AC14

Log entry:

10:15	1st pull completed, max force = spike at 85T but eventual break out at 65T	Connector

4.5.7 Test BSH-S S2 AC14

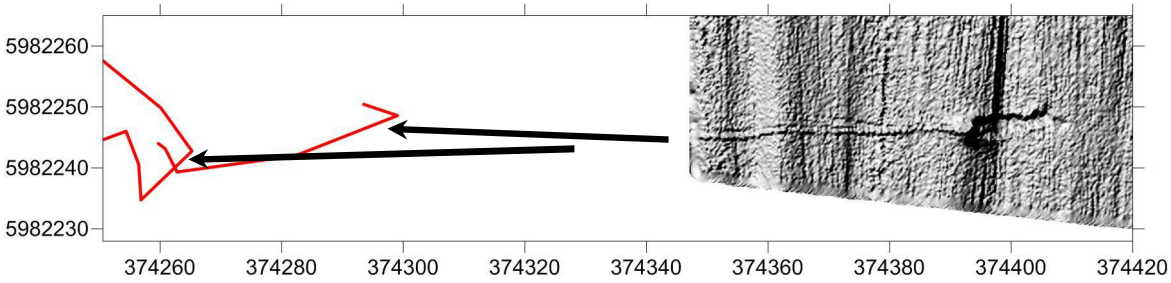


Figure 4.20 Seabed shape after pulling S2-AC14

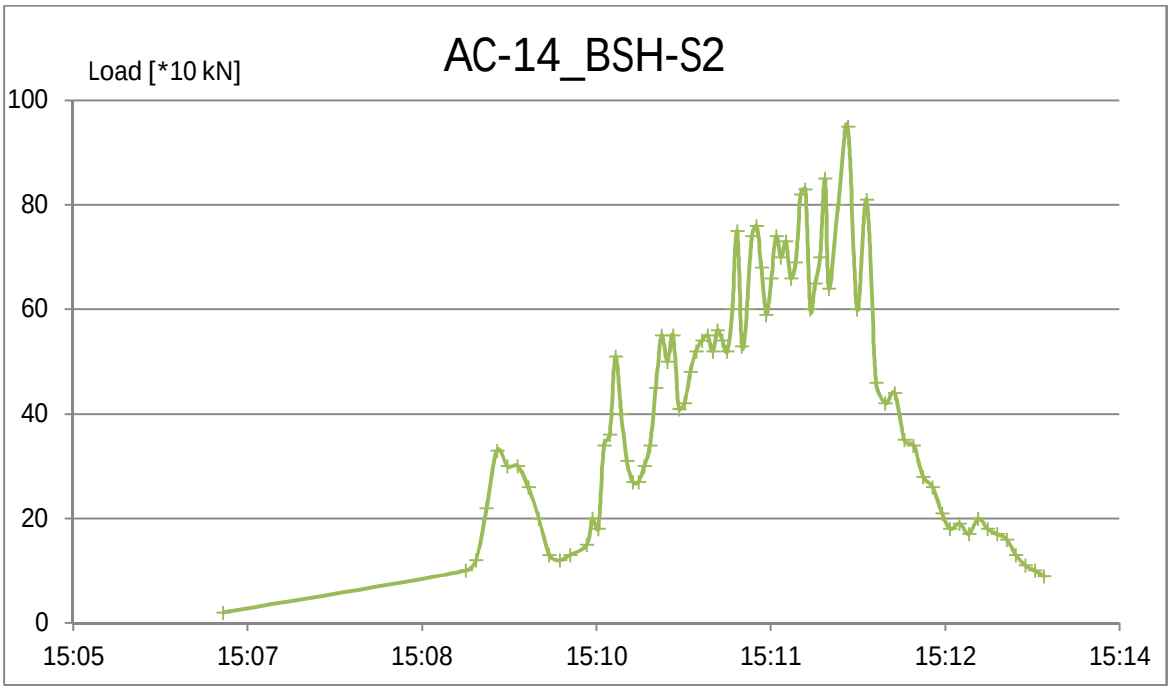


Figure 4.21 Time Load Curve for test S2-AC14

Log entry:

May 1 15:15	Pull completed, max. pulling force = 95T, anchor did not break out	Connector

4.5.8 Test BSH-S S3 AC14

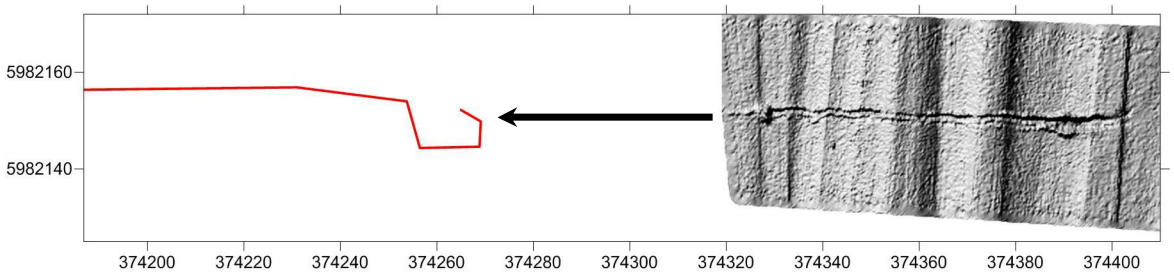


Figure 4.22 Seabed shape after pulling S3-AC14

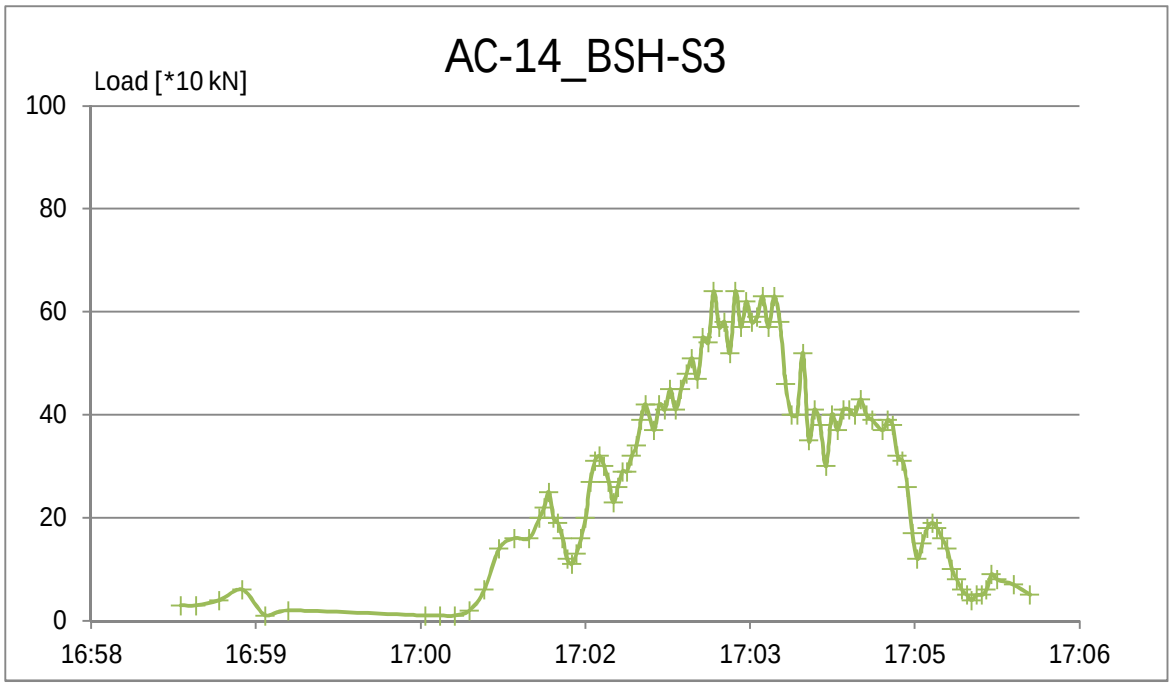


Figure 4.23 Time Load Curve for test S3-AC14

Log entry:

May 1 17:06	Pull completed, max. pulling force = 64T, anchor starts skidding	Connector

4.5.9 Test BSH-S S4 Hall

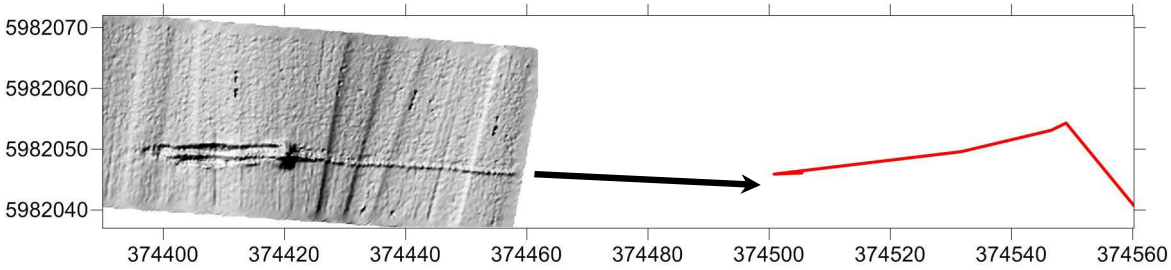


Figure 4.24 Seabed shape after pulling S4-Hall

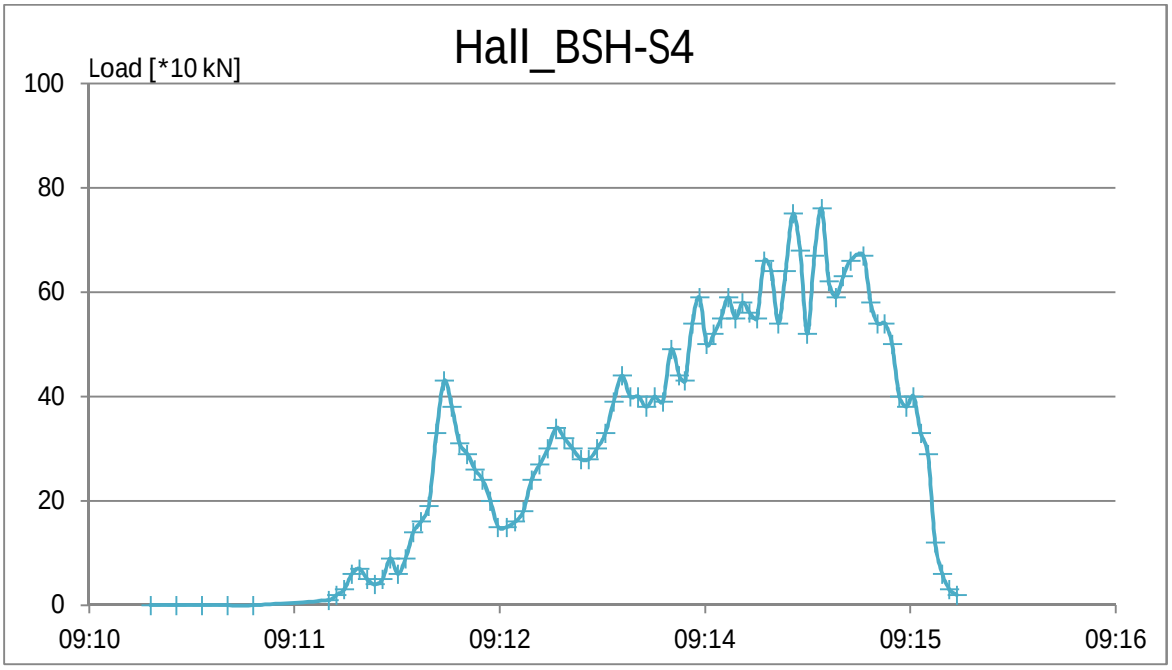


Figure 4.25 Time Load Curve for test S4-Hall

Log entry:

May 3 9:17	Anchor break-out at 76T, disconnecting load cell, ROV survey on final anchor position, anchor base flat on seabed, recover ROV	Connector

4.5.10 Test BSH-S S5 Hall

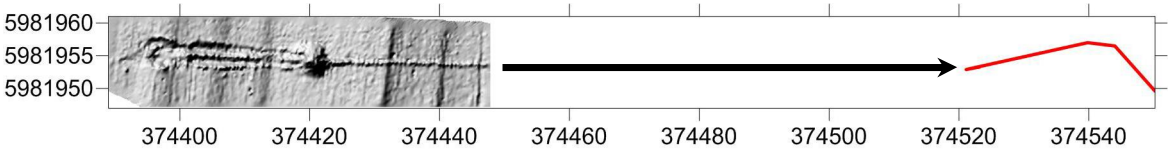


Figure 4.26 Seabed shape after pulling S5-Hall

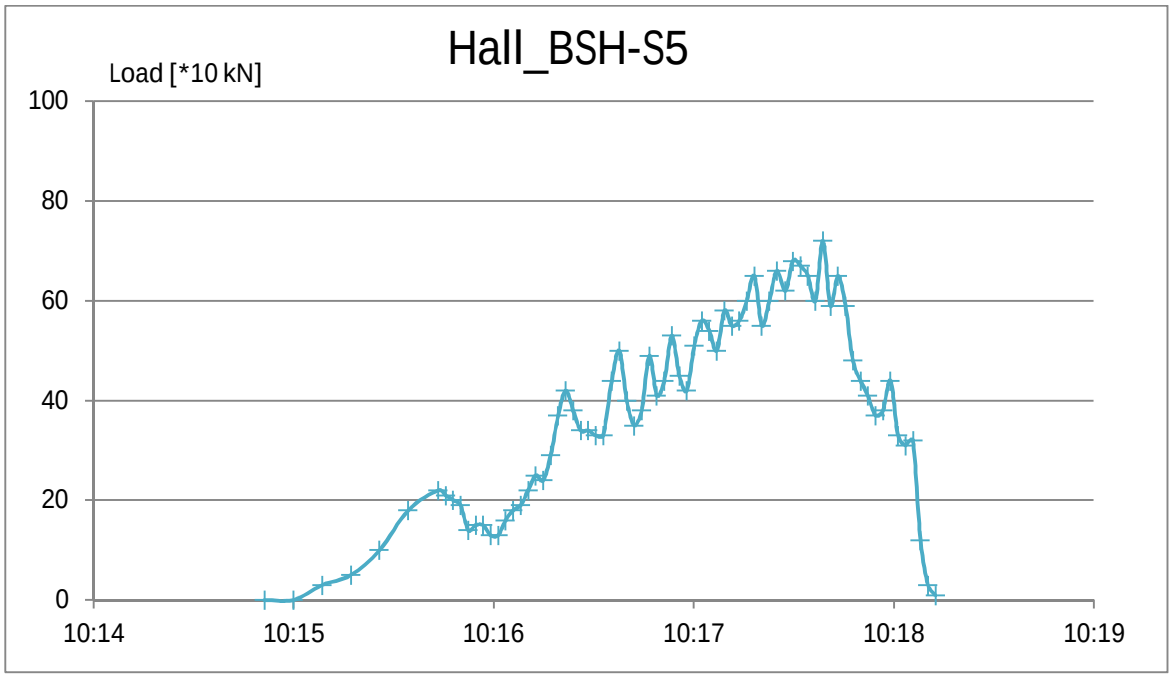


Figure 4.27 Time Load Curve for test S5-Hall

Log entry:

May 3 10:25	Break-out at 72T, disconnecting load cell, ROV survey on final anchor position, anchor base broken out of seabed, recover ROV	Connector

4.5.11 Test BSH-S S6 Hall

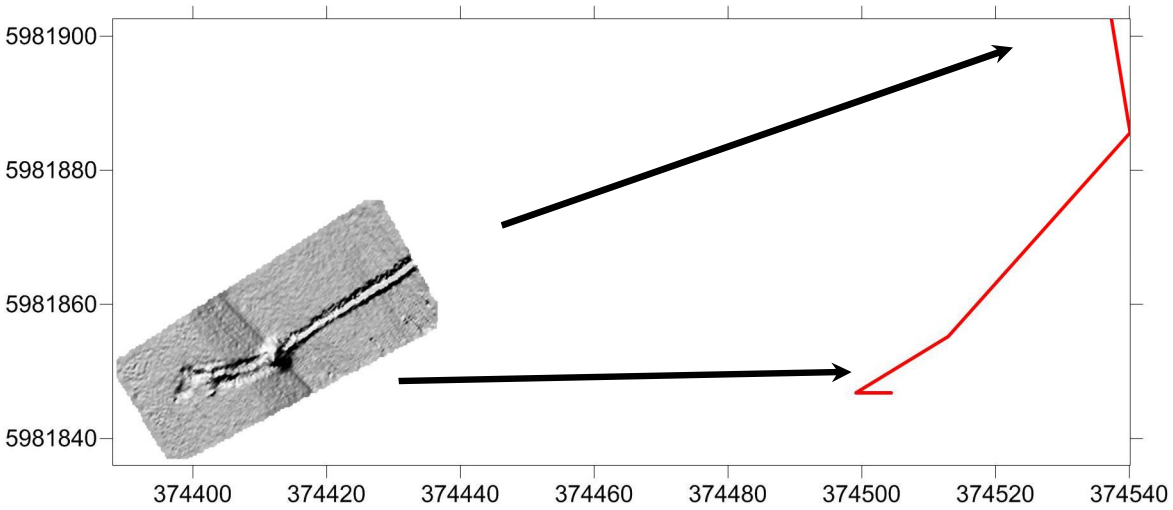


Figure 4.28 Seabed shape after pulling S6-Hall

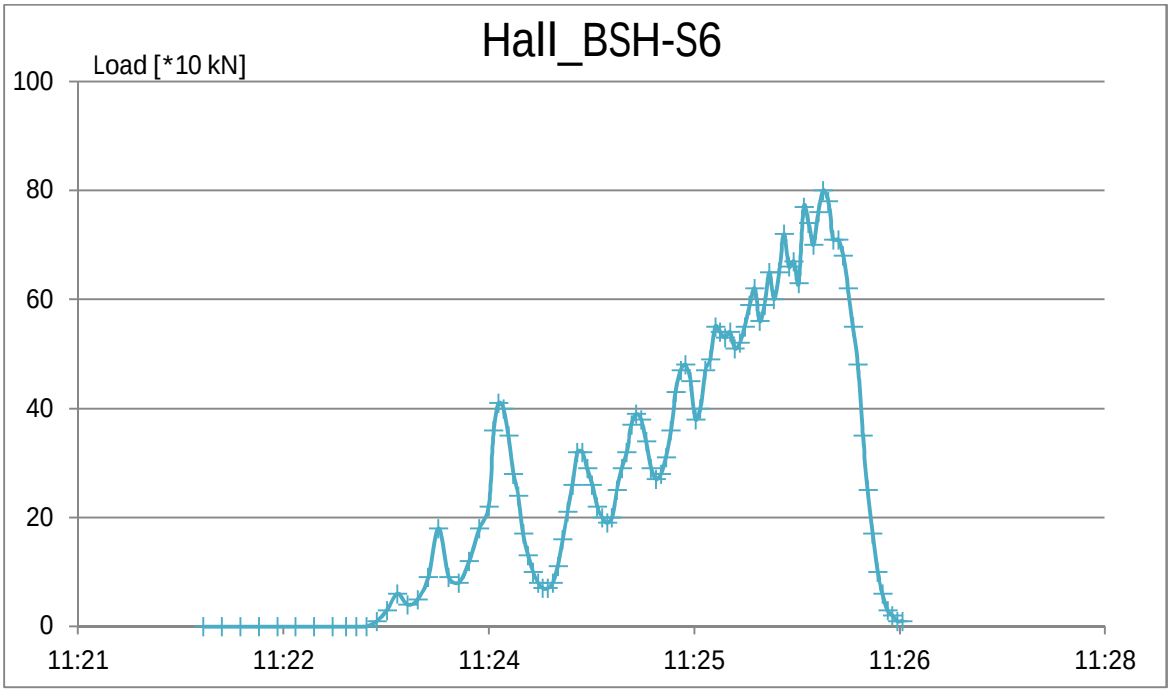


Figure 4.29 Time Load Curve for test S6-Hall

Log entry:

May 3 11:28	max pull = 80T, disconnecting load cell (max. pull - no break-out)	Connector

4.5.12 Test VTG V1A & V1B AC14

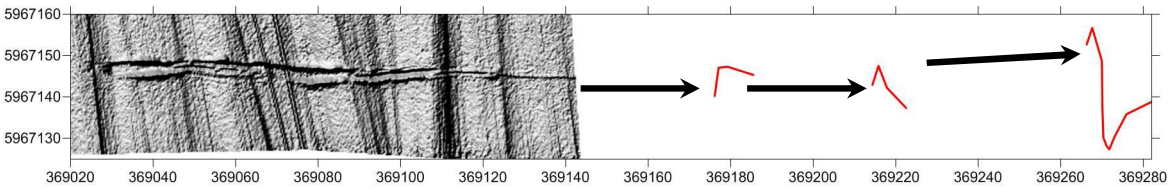
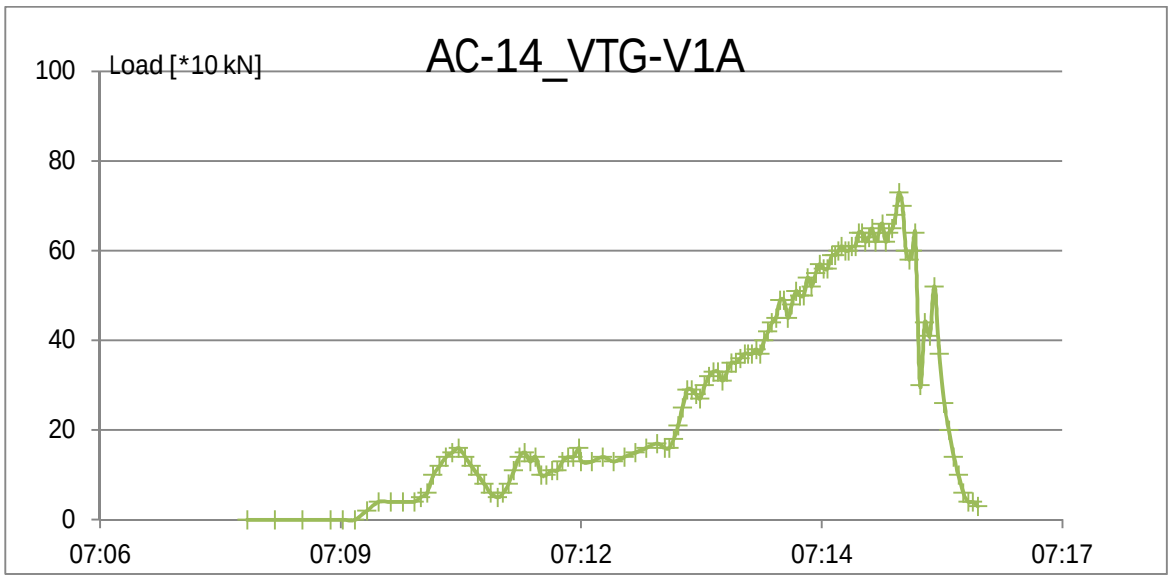
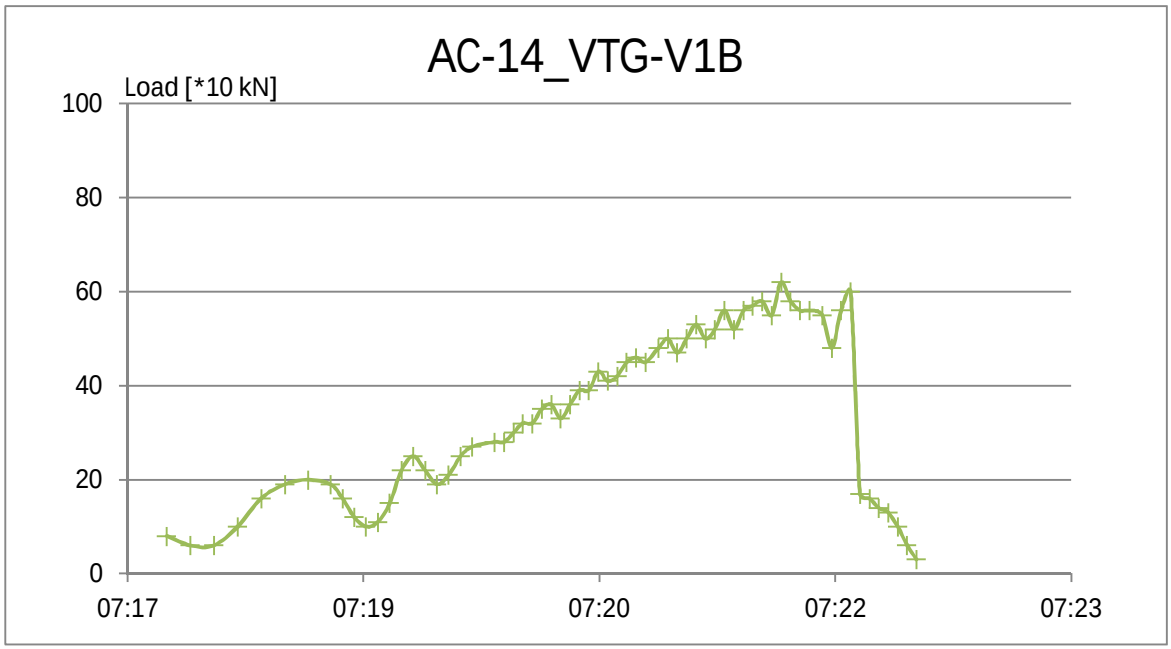


Figure 4.30 Seabed shape after pulling V1-AC14





Log entry:

May 2 7:26	max pull = 64T, stopped (break-outs at 73T, 62T, 50T)	Connector

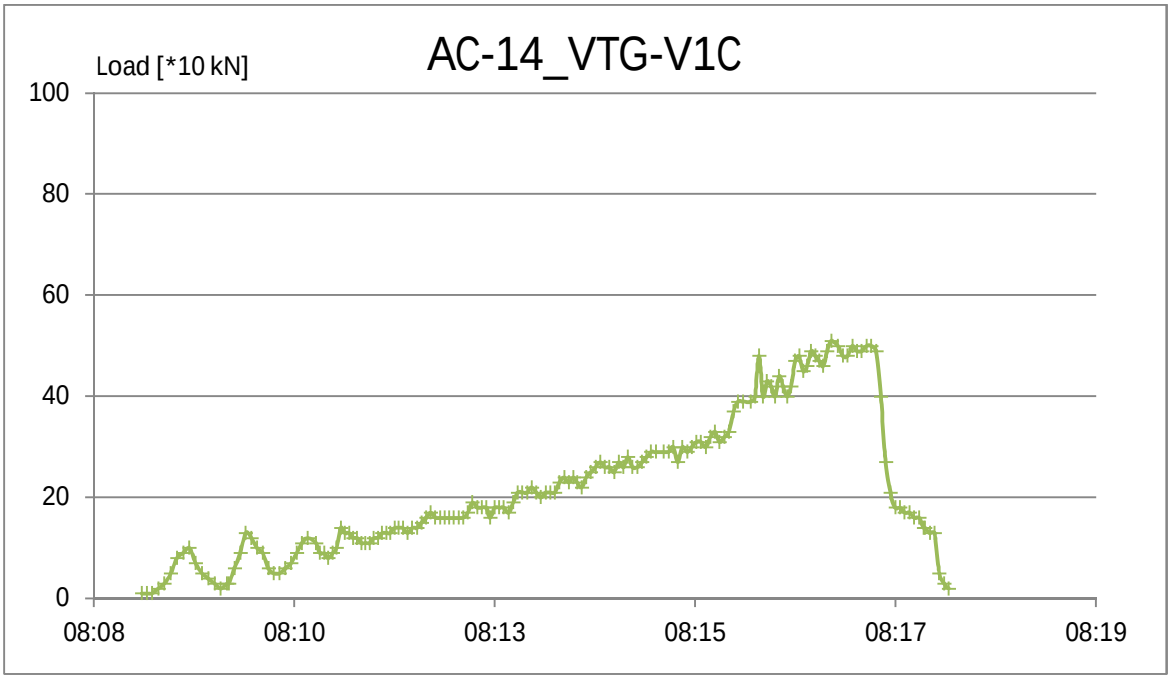


Figure 4.31 Time Load Curve for test V1-AC14

Log entry:

May 2 8:08	Pulling another 35m towards V1 Point (break-out at 50T)	Guardian

4.5.13 Test VTG V2 Hall

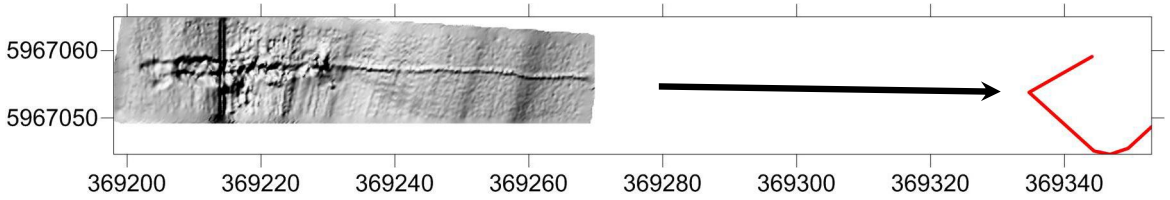


Figure 4.32 Seabed shape after pulling V2-Hall

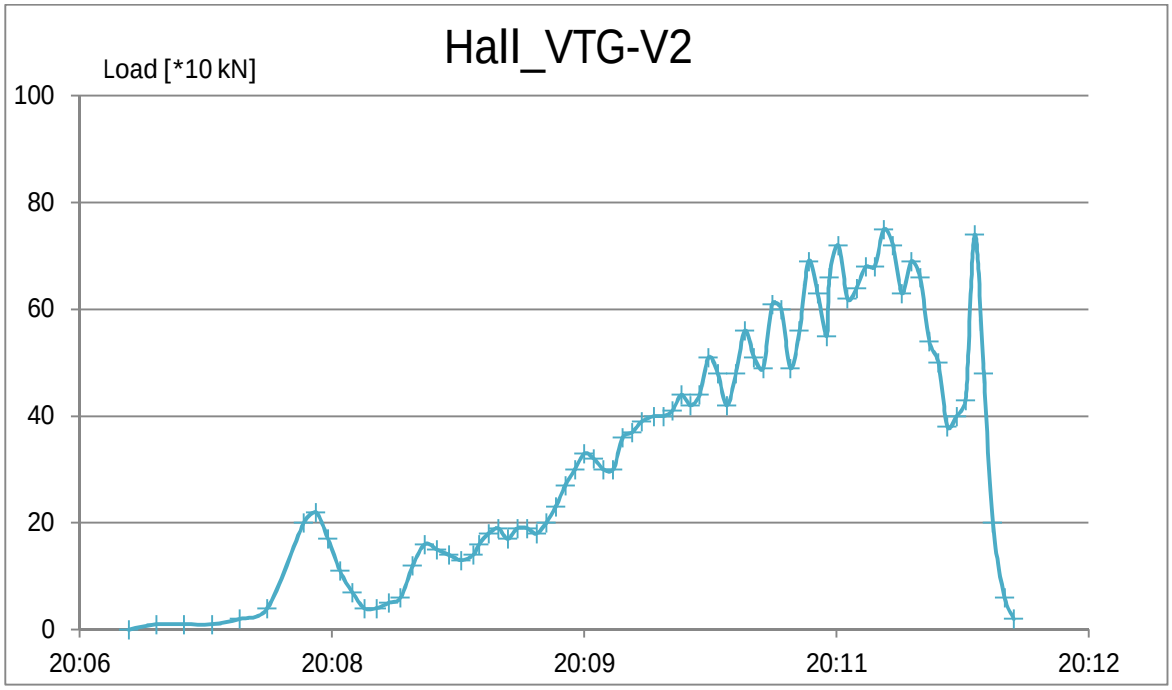


Figure 4.33 Time Load Curve for test V2-Hall

Log entry:

May 2 20:14	Stopped pulling after anchor break-out, max force = 75T	Connector

4.5.14 Test VTG V3 AC14

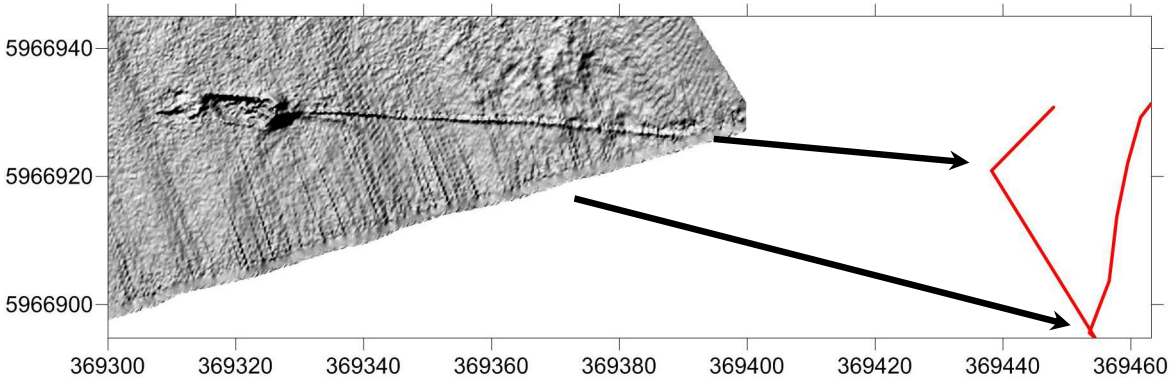


Figure 4.34 Seabed shape after pulling V3-AC14

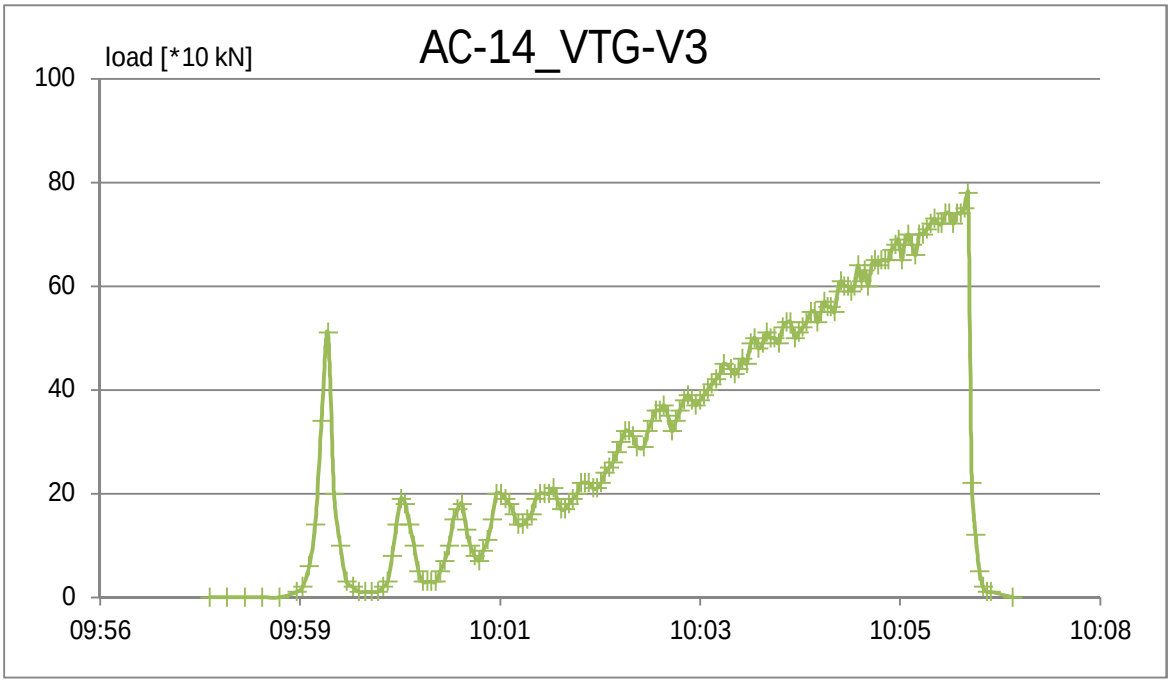


Figure 4.35 Time Load Curve for test V3-AC14

Log entry:

May 2 10:07	Stopped pulling, max force = 78T - no break-out	Connector

4.5.15 Test VTG V4 Hall

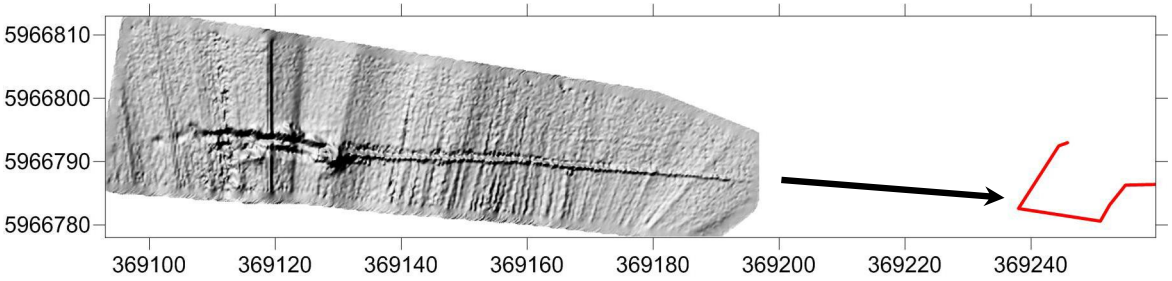


Figure 4.36 Seabed shape after pulling V4-Hall

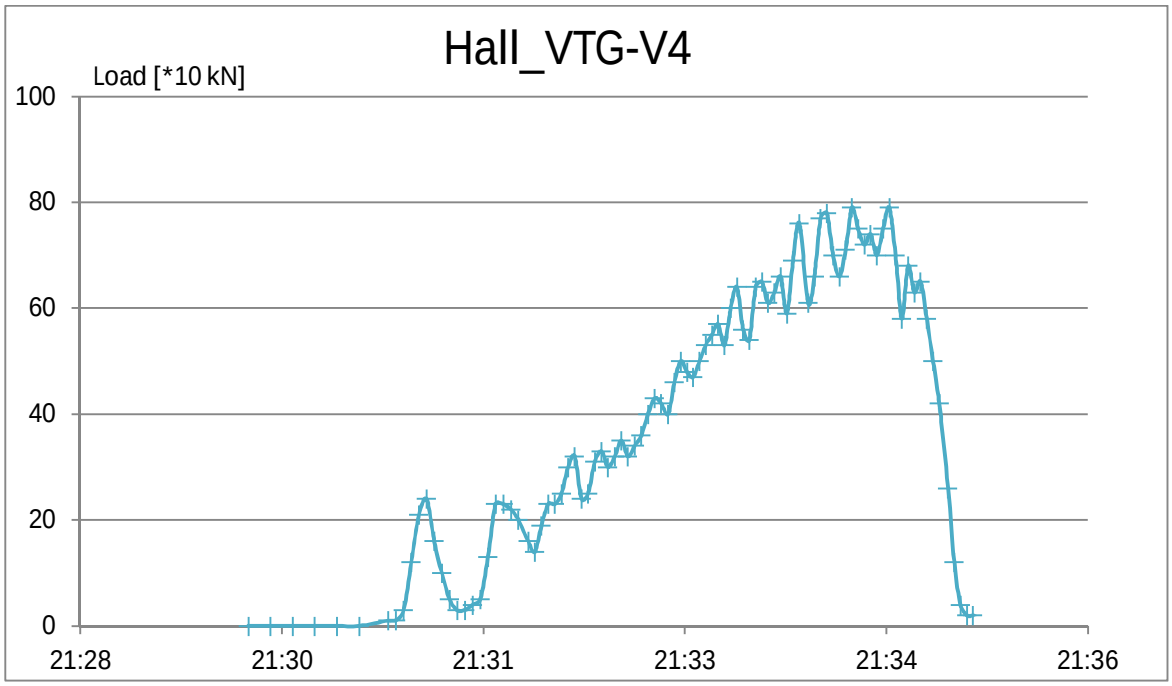


Figure 4.37 Time Load Curve for test V4-Hall

Log entry:

May 2 21:36	Stopped pulling after anchor break-out, max force = 79T	Connector

4.5.16 Test VTG V5 AC14

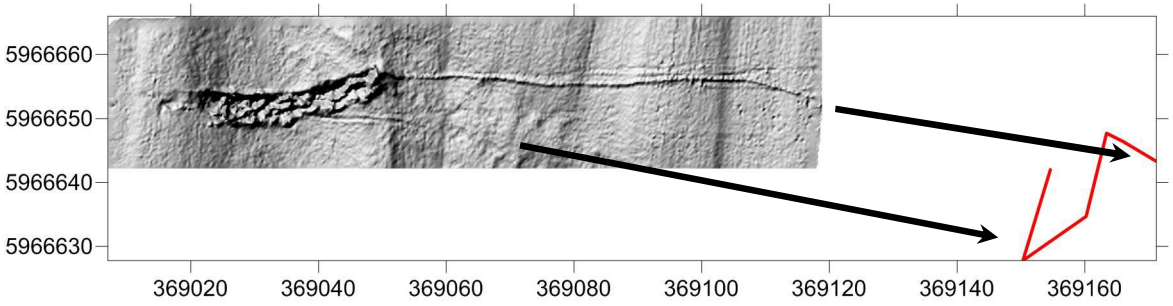


Figure 4.38 Seabed shape after pulling V5-AC14

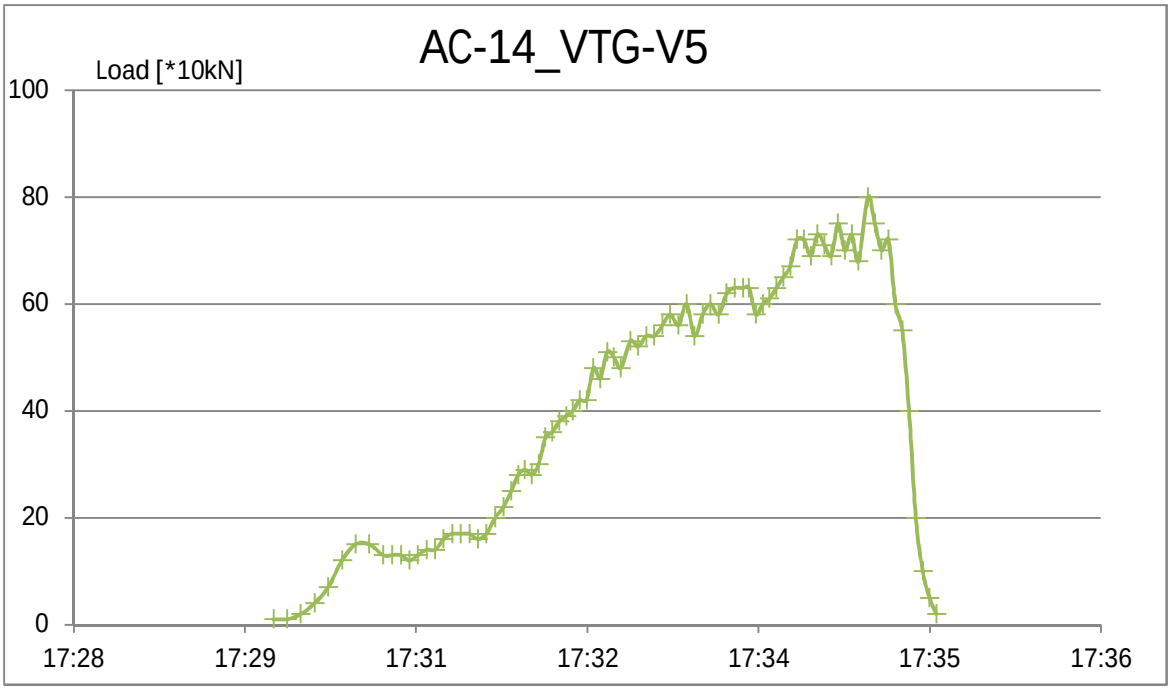


Figure 4.39 Time Load Curve for test V5-AC14

Log entry:

May 2 17:37	Stopped pulling, max force = 80T (anchor dragging at 80t)	Connector

4.5.17 Test VTG V6 Hall

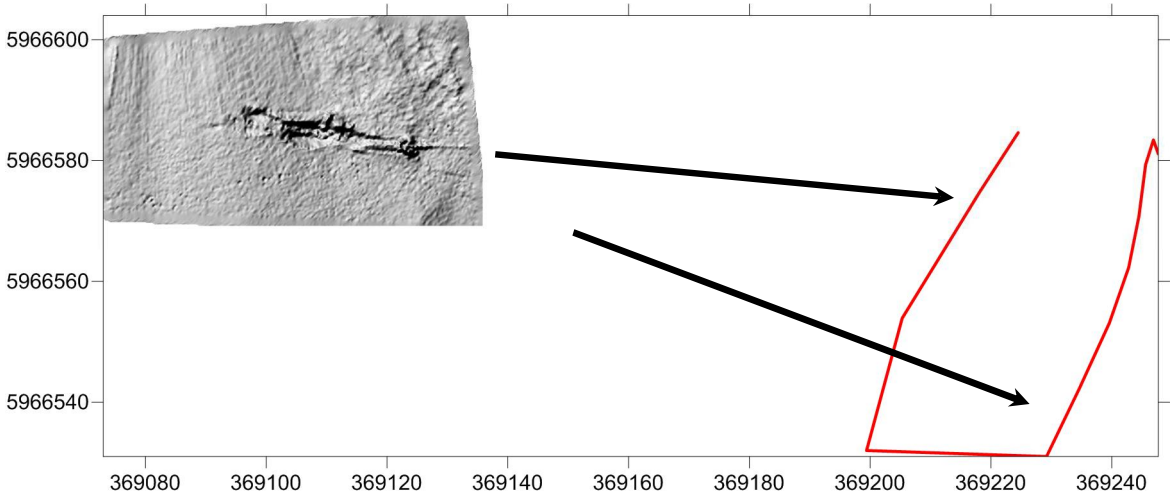


Figure 4.40 Seabed shape after pulling V6-Hall

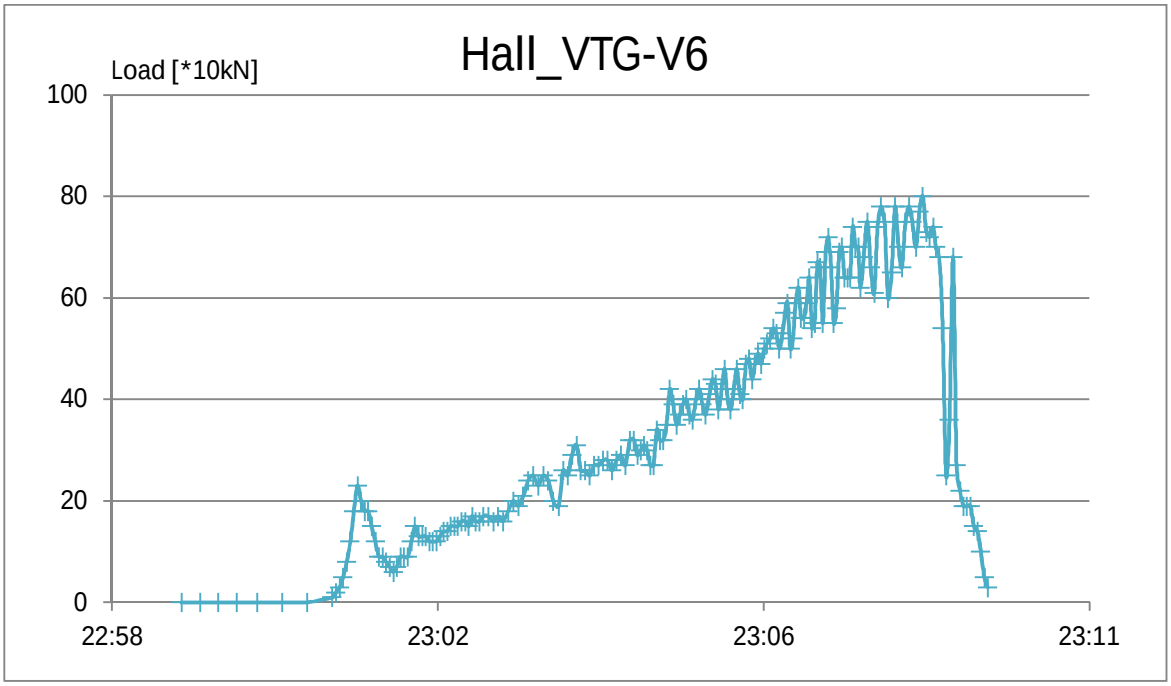


Figure 4.41 Time Load Curve for test V6-Hall

Log entry:

May 2 23:10	Stopped pulling after anchor break-out, max force = 80T	Connector

4.6 Position of the Esvagt Connector during the anchor trials

On board the Esvagt Connector a position logging system was operational throughout the testing period. This system uses a GPS receiver and records a series of ship position, ship orientation and ship speeds and direction data.
The data were initially recorded every eight minutes or when a certain distance was travelled. The latter implies that the logging interval was not regular, but that at some moments and extra logging entry was generated.

After the first day of testing the recording interval was adjusted to a one minute interval. All basic data are given in Annex C. From these data (which are representative for the position of the GPS receiver of the Esvagt Connector) the position of the stern of the vessel was calculated using the heading (orientation) of the vessel and the distance between the GPS antenna and the stern roller, from which the anchor was launched. This distance was derived to be 36.3 m.

4.7 Dropping speed

Before each series of anchor dragging tests an anchor dropping test was performed when the anchor was put on the seabed. In each anchor dropping test the anchor was suspended (hanging from the stern of the Esvagt Connector) in the water approximately 10 meters above the seabed. The anchor was dropped by releasing the brake of the winch. When the anchor was anticipated to be on the seafloor the brake of the winch was engaged again.

4.7.1 Analysis of dropping speed

The dropping speed has been analyzed by use of the video recordings. In these videos recognizable marks on the chain and on the deck of the Esvagt connector are identified (e.g. the connecting shackle between the two chains and the crossbeams on the deck, see Figure 4.42). Since the locations of the marks on deck are known (see Annex B) the distance between marks can be determined. By observing the displacement of the marks on the chain relative to the marks on deck during time, the velocity of the chain, and thereby the dropping speed of the anchor, can be determined. In the analyses of the dropping speed the initial acceleration in the first 2-3 meters is not taken into account, which could lead to lower dropping speeds.

Figure 4.42 Video still of dropping of anchor V3-AC-14

Analyses of 3 dropping tests (S4-Hall, V3-AC14 and S5-Hall) are giving different dropping speeds. The observed dropping speeds are between 2.5 – 4.5 m/s. There are at least two factors that cause variations of the dropping speed. One factor is the amount of chain hanging in the water. The more chain is suspended from the stern, the more force is available to accelerate chain, cable and which on board the vessel, resulting in a higher dropping speed. The second factor is the manual release of the winch brake. High braking loads upon stopping were noticeable (by sound and movement of the chain) and may have led to some caution by the winch-brake operator.

4.7.2 Dropping speed and water pressure sensors

During part of the later tests the anchors were equipped with autonomous pressures sensors that were provided by the BAW. The dropping speeds determined from the video recording are significantly higher than the speeds that could be derived from the measured water pressure increase with time. Most probably the cause of this is an incomplete saturation of the filter in front of the transducer. Air enclosed in the filter dampens the speed of response of the transducer and thereby reduces the apparent dropping speed. Since the pore pressure transducers could not fully be relied upon (too slow responses) they have not been further interpreted in this study and their results were not included in the BAW report.

4.8 Pulling direction relative to horizontal (catenary analysis)

4.8.1 Catenary analysis

In order to get insight in the pulling direction on the anchor for specific water depths and pulling forces, multiple catenary analyses are made. These analyses considered a range of different pulling forces and different water depths, namely:

- Pulling force 0 – 1000 kN
- Water depth 35 m (Location BSH-North)

- Water depth 28 m (Location BSH-South)
- Water depth 23 m (Location VTG)

The principles and background data for the catenary analyses are presented in the datasheet for the anchor and chain-cable-loadcell in Annex A. The performed analysis was based on the composition of the chain and cable used during the tests. The following components were present:

- Anchor fore runner (enlarged shackles and swivel between anchor and chain, length 4 m)
- 2 connecting anchor shackles (total length 2 x 0.4 m)
- 2 lengths of chain (total length 2 x 27 m)
- 100 meter of cable

An amount of approximately 20 m of the total 100 m cable was present on the deck of the Esvagt connector between the load cell and the roller on the stern. This gives an effective length of the cable of 80 m used for the catenary analyses. From the drawing of the deck plan (Annex B) 1.2 meter freeboard can be determined. This gives 79 m cable submerged and 1 meter above sea-level.

In Figure 4.43 the results of the catenary analyses are shown. In situations where the pulling forces are small a part of the chain lying on the seabed and the pulling direction on the anchor is parallel to the seabed. The primary (left) vertical-axis in Figure 4.43 shows the length of the chain on the seabed as a function of the tension in the cable at the stern of the Esvagt Connector. When the pulling force exceeds a certain level no chain is present on the seafloor anymore and the pulling direction on the anchor is inclined. The secondary y-axis of the graphs shows the pulling angle against the tension in the catenary.

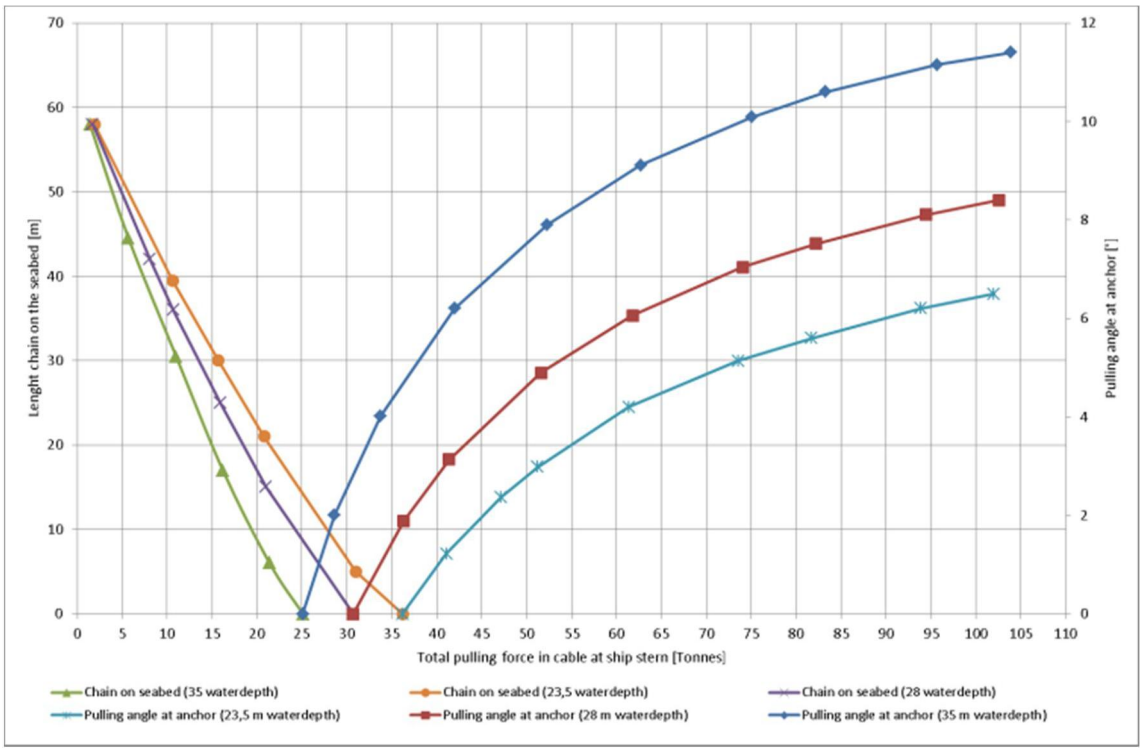


Figure 4.43 Length of chain lying on the seabed and pulling angle at the anchor against bollard pull

The left part of the graphs shows that for pulling forces less than 250 kN part of the chain is on the seabed for all three water depths. At higher pulling forces and larger water depths a smaller length of the chain is lying on the seafloor.
The right hand side of the graph (secondary y-axis) shows that in larger water depths the pulling direction at the anchor is inclined earlier, at lower pulling forces. This also leads to larger inclinations of the pulling forces at the anchor for larger water depths for the same pulling forces.

4.8.2 Catenary analysis results

Table 4.11 gives an overview of the performed anchor tests with the maximum tension in the cable in kN and the maximum inclination of the pulling force at the anchor during each of the tests.

Table 4.11 Maximum loads and maximum chain inclinations at the anchor.

Date	Anchor	Location	Max. load [kN]	Max. chain inclination [degrees]
2013-04-30	AC14	BSH-N1A	250	0.0
		BSH-N1B	620	9.0
	Hall	BSH-N2A	400	5.6
		BSH-N2B	640	9.2
	AC14	BSH-N3	820	10.5
2013-05-01	AC14	BSH-S1	860	7.7
	AC14	BSH-S2	950	8.1
	AC14	BSH-S3	640	6.3
2013-05-02	AC14	VTG-V1A	730	5.2
		VTG-V1B	620	4.2
		VTG-V1C	510	3.0
	AC14	VTG-V3	780	5.4
	AC14	VTG-V5	800	5.5
	Hall	VTG-V2	750	5.3
	Hall	VTG-V4	790	5.5
	Hall	VTG-V6	800	5.5
2013-05-03	Hall	BSH-S4	760	7.1
	Hall	BSH-S5	720	6.8
	Hall	BSH-S6	800	7.4
	Hall	BSH-N5A	250	0.0
		BSH-N5B	580	8.6
	Hall	BSH-N6A	270	1.2
		BSH-N6B	650	9.3

The pulling angle decreased with decreasing water depth. In the BSH-North area it went up to 10.5 degrees (for F-pull = 820 kN), in the BSH-South area it reached 8.1 degrees (for F-pull = 950 kN) and in the VTG area it reached 5.5 degrees (for F-pull = 800 kN).

Note that this chapter only aims to present factual data. The possible effect of the inclined load on the anchor penetration depth is an interpretative issue. This is discussed in paragraph 6.3, where an adjustment of the measured penetration depth is proposed.

5 Overview of test results – data from all vessels

In Table 5.1 the key data of all tests are summarized, combining the force read-outs on the Esvagt Connector, the track lengths as recorded by the Guardian and the Wega and the penetration depths as interpreted by BAW from the sediment sonar on board the Wega.

Table 5.1 Key data from all tests – all vessels (sorted by: 1- anchor type, 2- test location)

Anchor type	Location	Dragging length [m]	Maximum pulling force [kN]	Maximum penetration depth [m]
AC14	N1	67	620	0.65
	N3	57	820	0.69
	S1	63	860	0.31
	S2	20	950	0.28
	S3	102	640	0.34
	V1	107	730	0.33
	V3	20	780	0.19
	V5	31	800	0.67
Hall	N2	92	640	0.70
	N5	87	580	0.88
	N6	92	650	0.78
	S4	23	760	0.28
	S5	27	720	0.28
	S6	22	800	0.26
	V2	27	750	0.34
	V4	24	790	0.34
	V6	26	800	0.67

Note that the correlation between maximum pulling force and maximum penetration depth below the original seabed is distorted because of the fact that it is not just the penetration below the original seabed that determines the holding capacity. Apart from the seabed properties it is noticed that the anchor flukes push forward a substantial amount of sediment. Remains of this heap of sediment can be observed on the bathymetric surveys as well as on the sediment sonar results. They have not been studied so far, since the primary goal of the tests was to determine the penetration of the anchor into the seabed.

The table below is derived from Table 5.1 by taking together the results per test area and per anchor type. Noteworthy is the, on average, longer dragging distance of the AC14. While the longest dragging distance was realized with the Hall anchor in the BSH-North area, it can be seen that not reaching the limiting pull force of 800 kN is the reason for this.

Table 5.2 Total dragging length per test area, maximum force and average maximum force

Anchor type	Test area	Total dragging length [m]	Maximum force [kN]	Average max. force [kN]
AC14	N	124	820	720
	S	185	950	817
	V	158	800	770
Hall	N	271	650	623
	S	72	800	760
	V	77	800	780

For each anchor pull the depth of influence (depth of penetration) has been derived at a number profiles across the anchor track, as explained in the BAW report. Per anchor and per test site these data have been summarized in Table 5.3. The table presents the maximum penetration, the average penetration and the standard deviation of the measured penetration, along with the number of observations (n) upon which the statistics are based.

From the test results a systematic difference in penetration depth between the different test areas is observed. The largest penetration depth is found in the BSH-North area, where loose sediments are encountered. The smallest penetration depths are found in the BSH-South area, where a top layer of relatively dense sand is present. The penetration depths in the VTG zone fall between these two.

Table 5.3 Summarised penetration data per anchor and per testing area

Anchor type	Area	Maximum penetration [m]	Average penetration [m]	Standard deviation [m]	Number of profiles (n) [-]
AC14	N	0.69	0.432	0.166	22
	S	0.34	0.202	0.070	22
	V	0.67	0.274	0.145	19
Hall	N	0.88	0.380	0.249	31
	S	0.28	0.173	0.061	15
	V	0.67	0.303	0.168	13

6 Interpretative discussion of test results

Chapters 1 to 5 of this report focus as much as possible on reporting of factual data: what was measured and how were the measurements realized. Test set-up, vessels used, parties involved, test locations, soil conditions, pulling forces, penetrations depths, etc. are described.

In this chapter some further considerations are added, based on information and reasoning that is not directly derived from the tests, but is aimed to help in the proper interpretation of the tests. The tests are put in perspective of what we know about anchors and anchoring events.

6.1 Anchor behavior in different phases

What did the anchors really do while being dropped and dragged? The data that are available consist of the force recordings and the ship position data from the Esvagt Connector, the sonar, multibeam and video recordings of the Guardian and the pre- and post side scan sonar and sediment sonar surveys as performed by the Wega.

6.1.1 Anchor dropping results

The video recordings indicate that for all three sites that were tested the anchor remained largely on top of the seabed after being dropped. At the BSH-North site, which has a very loose top-layer, the largest penetration is expected. Indeed the video data that were retrieved show the fluke of the AC-14 loose above the seabed at location N-1, which indicates that the crown of the AC-14 is somewhat penetrated. Also the Hall anchor at N-2 was found on top of the seabed after dropping, but of this anchor only the front end of the shank came into view and the edge of the crown may very well have penetrated into the seabed. For both videos taken at BSH-North the visibility was relatively poor and it was not possible to get a complete view of any of these anchors.

For the other sites (BSH-South and the VTG-area) the anchors' penetration after dropping is much less. On several videos the anchor can be seen to be in touch with the seabed only with the edge of the crown, the tips of the flukes and the top of the shank. It can be safely concluded that in all but the loosest sands the penetration of the anchor is small (estimated to be less than approximately 0.1-0.2 m). Part of the penetration as observed may have developed even after the impact, after dissipation of negative pore pressures reduced the resistance of the seabed.

6.1.2 Anchor dragging results

Videos show that the anchors did built up holding resistance by penetration of the flukes into the seabed and building up a mass of sediment in front of flukes and crown.
This mass of sediment is in a continuous state of so-called passive failure and is being pushed forward and upward (at an angle that theoretically would be around 20-30 degrees with the horizontal plane).

While initially the flukes penetrate and move downward, the resistance of the crown and the increasing contact force between shank and sediment restricts further rotation of the shank. There is evidence of a counter-rotation, whereby the crown rises again somewhat and the front of the shank is lower than the back end of the shank. This is consistent with the observation from the videos that the back of the crown remains visible at (almost?) all times.

When the sediment behaves in a brittle way (overconsolidated stiff clay but also dense dilative sand under undrained conditions) and when seabed reaction forces are acting towards the tips of the flukes rather than the center of the flukes, the anchors tend to be less stable. The video recording of test VTG01-AC14 is a good example of this behavior.

The penetration depth of the anchors has been checked by sediment sonar surveys across the anchor tracks. These surveys revealed a transition in the sediment from a loose state to a dense state. The depth where this transition was found was compared to the depth (level) of the original seabed. When accounting for potential error in the detection of this transition, it was concluded that for a transition depth of 0.88 m the maximum error could be as much as 0.12 m. Consequently a depth of influence (where the transition was found) of up to 1.0 m (for all areas) and up to 0.8 m for the VTG-area was reported.

With regard to the interpretation of "maximum influence depth" as "maximum penetration depth" some other considerations apply than the error assessment mentioned above. The projection (frontal view) the flukes of the anchor has a kind of "W"-shape. One should consider whether the reflection of the "transition zone" coincides with the level of the fluke tips or a level that is slightly above these tips. This is an unconservative aspect in the use of the “maximum influence depth” as measure for the “maximum penetration depth”.

Another issue is the actual geometry of the anchors. If the shank is lying on top of the seabed the distance that the fluke tips are below the seabed would amount to 1.0 m for the 8.5 t AC14 and 1.2 m for the 11.5 t Hall anchor. The visual (video) observation that the shank of the anchor attains an inclined position with the front end at the seabed and the back end (crown) riding up the passive soil mass explains (at least a partly) that “maximum influence depths” are found that are smaller than the geometrical offsets of 1.0 m and 1.2 m for AC-14 and Hall respectively.

6.2 Realism of the tests – analysis of pulling forces

An important question is how well these tests reflect realistic anchoring events. The observed pulling forces on board the Esvagt Connector give an important indication:
The results of the pulling tests comply with (and exceed) the expected holding capacity of these types of anchors. This is expected, since rated capacities will have been chosen with some conservatism:

- For a Hall-anchor a holding capacity of 4-6 times its mass-weight is quoted, which would mean 470 kN to 690 kN for the 11.5 t Hall anchor. During the tests the maximum forces on the Hall ranged from 580 kN to 800 kN.
- For an HHP anchor like the AC-14 a holding capacity of 8-11 times its mass-weight is quoted, which would mean 680 to 935 kN for the 8.5 t AC-14. During the tests the maximum forces on the AC-14 ranged from 620 kN to 950 kN.

On basis of the registered pulling force it can be concluded that the tests reflect realistic anchoring events.

6.3 Realism of the tests – catenary analysis

This paragraph considers the pulling angle that is applied on the top of the shank during dragging. This angle depends amongst others to length of chain that is paid-out by a vessel before the setting and loading of an anchor. Since a fixed length of chain and cable was used

throughout the tests the ratio between the length of chain plus cable and water depth (the so-called “scope”) varies.
The approximate length:waterdepth ratio varied from 4:1 at the BSH-North site and 5:1 at the BSH-South site to 6:1 in the VTG-area (i.e. the scope ranged from 4 to 6).

To achieve the maximum holding capacity of an anchor the pulling force should be horizontal. It is well known, that the longer the length of chain that is paid out, the higher the holding capacity of the chain and anchor system is, if only because a large length of chain lying on the seabed provides a friction resistance by itself, before even loading the anchor.

There are few formal guidelines about the scope that must be applied when bringing out an anchor. While some would consider a scope of 4 on the tight side, a scope of 6 as applied in the VTG area is commonly considered more than acceptable.

As reported in Table 4.11, the direction of the force that was applied on the anchor was seldom purely horizontal. When pulling forces of 25 kN to 35 kN were exceeded the force on the anchor also had a vertical component. Figure 4.43 shows the development of the direction of the pulling force on the anchor as a function of the cable tension on deck (the force measured in the load cell on deck of the Esvagt Connector). Since the chain and cable length used during the tests was similar at all three testing areas one finds that for deeper test areas the deviation from the horizontal is larger than for shallower test areas.

6.3.1 No apparent influence on holding capacity

The first assessment of the influence of the upward component of the pulling forces is based on the expected holding capacities of the anchors (reference [1]). The recorded holding capacities are in line with the values that are expected for these anchors. Assuming that holding capacity and penetration depth are correlated, it is concluded that the deviation from the horizontal did not have a significant influence on the anchor and its penetration depth.

6.3.2 Other ways to assess catenary influence

Using the expected holding capacity as a reference is appropriate, but can only be used to demonstrate that the inclined pulling did not have a large effect on the anchor behavior.
Since expected holding capacities are only known as relatively wide ranges of plausible values these provide no hard evidence that the inclined pulling did not have an effect on the anchor behavior and penetration depth.

In order to truly calculate and quantify the effect of the inclined pulling a model is required that describes the interaction effects of all parts of the anchor with the subsoil. Such a model would predict holding force as well as orientation and position of the anchor during digging-in.

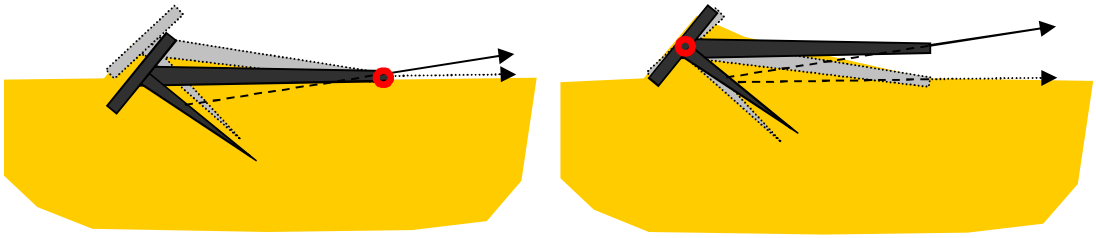
At this moment no appropriate analytical or numerical anchor model is available and 3D-large strain finite element analyses are beyond the scope of the interpretation of the executed tests. For now a simple model will be used to provide an answer to this question.

6.3.3 Rotation models

The most simple models predict that the anchor is oriented in the direction of the pulling force. Depending on the reference point that is taken, different correction factors would follow for the effect of the load inclination on the tests.

For the explanation we refer to Figure 6.1. Two models are considered. In model A the anchor rotates around the shackle. In model B the anchor rotates around the crown. The

rotation of the anchor is taken equal to the rotation (inclination) of the pulling force that acts on the anchor.



A: Rotation around shackle B: Rotation around crown

Figure 6.1 Rotation models for the assessment of catenary influence

In Figure 6.1 the black anchor, drawn in front, denotes the rotated anchor that is pulled with a vertical component in the pulling force. The grey anchor in the background denotes the anchor that is pulled horizontally and has not rotated.

If Model A is valid, the tests are conservative and actual penetration values as measured would have to be reduced to reflect best estimate values for horizontal pulling. This is not plausible and model A has must therefore be rejected.

When Model B is considered, one sees that the anchor which is pulled with an inclined chain (the black anchor) has a shallower penetration than the anchor that is pulled horizontally. Model B therefore provides a first, simple, approach to add a quantitative catenary effect to the measured values.

In Table 6.1 the maximum chain inclination (α) is shown for all tests, together with the adjustment (Δ) that follows for the penetration depth. Note that due to the difference in fluke angle and fluke length the adjustment for the Hall anchor and the AC-14 are different for the same value of α: e.g. for a value of α of 5.5 degrees the adjustments are Δ=0.14 m for the Hall anchor and Δ=0.16 m for the AC-14.

Table 6.1 Recorded penetrations corrected for catenary effect according to Model B (Rotation around crown)

Site	Anchor	α [degr]	Δ [m]	BE Measured [m]	BE Adjusted [m]	UB Reported [m]	UB Adjusted [m]
N1B	AC14	9.0	0.27	0.65	0.92	0.77	1.04
N3	AC14	10.5	0.31	0.69	1.00	0.81	1.12
S1	AC14	7.7	0.23	0.31	0.54	0.43	0.66
S2	AC14	8.1	0.24	0.28	0.52	0.40	0.64
S3	AC14	6.3	0.18	0.34	0.52	0.46	0.64
V1A	AC14	5.2	0.15	0.33	0.48	0.45	0.60
V3	AC14	5.4	0.16	0.19	0.35	0.31	0.47
V5	AC14	5.5	0.16	0.67	0.83	0.79	0.95
N2B	Hall	9.2	0.24	0.70	0.94	0.82	1.06
N5B	Hall	8.6	0.22	0.88	1.10	1.00	1.22
N6B	Hall	9.3	0.24	0.78	1.02	0.90	1.14
S4	Hall	7.1	0.18	0.28	0.46	0.40	0.58
S5	Hall	6.8	0.17	0.28	0.45	0.40	0.57
S6	Hall	7.4	0.19	0.26	0.45	0.38	0.57
V2	Hall	5.3	0.13	0.34	0.47	0.46	0.59
V4	Hall	5.5	0.14	0.34	0.48	0.46	0.60
V6	Hall	5.5	0.14	0.67	0.81	0.79	0.93

6.4 Extrapolation to other ship and anchor sizes

The anchors that were used in the tests (an 8.5 t AC14 anchor and an 11.5 t Hall anchor) are considered to be representative for the design vessel, the so-called “Bemessungsschiff”, a 294 m long container-vessel of 80000 DWT.

This is based on an overview that was produced for TenneT by the Germanischer Lloyd in their report SO-ER 2011.054A of 2011-11-23 (Ref [6]), see Figure 6.2.

The median anchor mass for all ships in the 75000 DWT to 85000 DWT range was approximately 10.5 t, while the average anchor mass of that group was 12.7 t. The difference between median and average can be explained by the fact that based upon the so-called Equipment Number the (minimum) anchor capacity of a ship is determined: It is up to the owner whether he equips the vessel with extra anchor capacity above the minimum. Further scatter is caused by the fact that in stead of a normal anchor of a certain weight also a HHP anchor of 75% of that weight may be used.

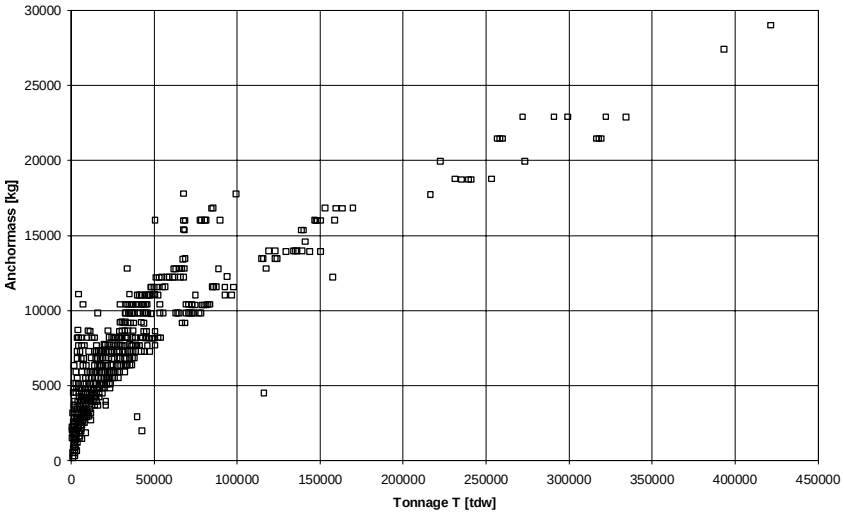


Figure 6.2 Anchor mass vs Tonnage (GL)

The anchor mass that is required for a vessel is proportional to the Equipment Number (see e.g. ref. [5]). This number is the sum of three components: An underwater exposed area of the ship, which is taken as displacement to the power (2/3), the frontal (wind exposed) area of the ship and the lateral (wind exposed) area of the ship. As long as the vessels' shape does not change, but just the tonnage it follows that all three components are proportional to tonnage to the power (2/3).

Literature and our own observations of anchor behavior in other investigations (prototype scale tests as well as scaled 1-g and centrifuge tests) suggest that the penetration depth of an anchor is proportional to the length dimension of the anchor, i.e. proportional to the volume or mass to the power (1/3). As a consequence the effect of a change in the vessels DWT would remain limited:
The penetration depth would be proportional to the DWT to the power (2/9).

Looking at other ships one finds that the latest Maersk "triple E"-class is around 165,000 DWT and a ship like the Marco Polo is around 188,000 DWT. Using the extrapolation described above one finds that the expected (standard) anchor masses for these ships are around 20.5 ton and 22.5 ton respectively. The maximum measured penetration depth for all anchor tests in this testing program was 1.0 m (Hall anchor, case 3 hereunder) and therefore the maximum expected penetration depth for the "Triple-E" class and Marco Polo would be around 1.20 m and 1.25 m respectively.

However, considering the scatter that can be seen in figure Figure 6.2, and knowing that ships are not always equipped with the "minimum" anchor, it is maybe more appropriate to limit the extrapolation to anchor sizes, rather than ship sizes. Therefore the data of Figure 6.2 have been extrapolated using the following four cases as starting point:

Case 1:

The governing penetration depth, as determined with sediment sonar, in the VTG area is 0.67 m for the 8.5 t anchor (= best estimate 0.55 m + 0.12 m error).

Case 2:

The governing penetration depth, as determined with sediment sonar, in the BSH-South area is 0.46 m for the 8.5 t anchor (= best estimate 0.34 m + 0.12 m error).

Case 3:

The governing penetration depth, as determined with sediment sonar, in the BSH-North area is 1.00 m for the 11.5 t anchor (= best estimate 0.88 m + 0.12 m error).

Case 4:

The governing penetration depth overall, as derived from the anchor geometry (fluke tip to shank distance), assuming a horizontal shank position on top of the seabed, is 1.2 m for the 11.5 t anchor. (Conservative estimate compared to sediment sonar results.)

Note that overall a maximum error range of 0.12 m in the penetration depth as determined with the sediment sonar has been accounted for.

Table 6.2 Probability of anchor mass in GL database and extrapolated penetration depths for various cases

Case / Area	Penetration depth	Anchor mass	75% 10.5 t	90% 14 t	95% 17 t	≈100% 29 t
Case 1 - VTG	0.79 m	8.5 t	0.85 m	0.95 m	1.00 m	1.20 m
Case 2 - BSH-South	0.46 m	8.5 t	0.50 m	0.55 m	0.60 m	0.70 m
Case 3 - BSH-North	1.00 m	11.5 t	0.95 m	1.05 m	1.10 m	1.35 m
Case 4 - “Geometry”	1.20 m	11.5 t	1.15 m	1.30 m	1.35 m	1.65 m

In order to avoid the impression of too precise extrapolation results the values in the table above are rounded to the nearest multiple of 0.05 m.

6.4.1 Catenary effect added to anchor size extrapolation

For Cases 1 to 3 the catenary correction as outlined in paragraph 6.2 can be added as well.

Table 6.3 Prob. of anchor mass and extrapolated penetration depths corrected for catenary effect (**)

Case / Area	Penetration depth(*)	Anchor mass	75% 10.5 t	90% 14 t	95% 17 t	≈100% 29 t
Case 1 - VTG	0.95 m	8.5 t	1.00 m	1.10 m	1.20 m	1.45 m
Case 2 - BSH-South	0.66 m	8.5 t	0.70 m	0.80 m	0.85 m	1.00 m
Case 3 - BSH-North	1.22 m	11.5 t	1.20 m	1.30 m	1.40 m	1.65 m

(*) Corrected value according to Table 6.1

(**) Extrapolated values are rounded to nearest multiple of 0.05 m.

6.5 Extrapolation to other soil types

The tests have been done at three locations, all with a sandy top layer, but with different densities. These varied from very loose to loose (BSH-North area) to sand underlain with stiff clay (VTG-area), to medium dense to dense sand in the BSH-South area. The three areas were selected to be representative of soil conditions in the German Bight.

The penetrations that were recorded in the three areas showed a good correlation with the density of the sand and decreased from BSH-North to VTG to BSH-South. This suggests that the tests are a reliable basis for the assessment of penetration depth of anchors in sandy, non-cohesive, subsoil and may be extrapolated to silts and (fine) gravels. Extrapolation to coarse (very permeable) gravels may be possible, but is not justified without further study, because of the role that the permeability may have in the interaction between anchor and seabed.

Extrapolation to cohesive materials (on the one hand soft muds or normally consolidated clays and on the other hand over consolidated stiff clays and glacial tills) is not possible, because of the different behavior that these materials have compared to the sands that were tested. (Note that the VTG area can not be considered as “clay”-site because of the sandy top layer that was the main layer with which the anchors interacted. Only on one occasion clay was detected on the flukes after retrieving the anchor. If there was interaction between the stiff clay and the anchor, this mostly concerned only the tips of the flukes.)

6.6 Reliability of the results

In the previous paragraph a maximum penetration depth is quoted of 1.0 m in the BSH-North area, “with conservative account for possible errors”.

In paragraph 5.2.1 of the BAW report the measurement and interpretation errors that are associated with the way that the penetration depths were determined are discussed. The reproducibility of the level of the undisturbed seabed and the deepest influence point was determined to be circa ± 0.02-0.03 m.

To determine the depth of influence of the anchor the wave velocities in the seawater and in the sediment that backfilled in the anchor-track are estimated. In case the anchor track is fully backfilled and the sand-infill is (again) fully consolidated (densified) the maximum error is calculated to be not more than 0.08 m. Since for smaller depths of influence and for less dense backfill this error component must be smaller, the BAW conclusion that a maximum error of circa 0.11 m should be accounted for is conservative.

This confirms the statement in the BAW report that the maximum penetration depth nowhere exceeded more than 1.0 m, while in the VTG area no more than 0.80 was observed. (In the BSH-South area no penetration depth deeper than 0.35 m could be determined.)

It should be kept in mind that this is more a deterministic than a probabilistic approach. The best estimates for the greatest depth of influence remain 0.88 m for BSH-North, 0.34 m for BSH-South and 0.67 m for the VTG area. The best estimates for the average penetration depth of the anchors over the complete length of pull amounts to 0.40 m, 0.19 m and 0.29 m for the BSH-North, the BSH-South and the VTG-area respectively.

If the test data are used in a probabilistic analysis, where dragging lengths of anchors over the seabed are an important parameter, the fact that on average the anchor is at a smaller than its maximum penetration depth, must be taken into account.

6.7 Vessel speed during anchor dropping and dragging

The anchor dropping and dragging events that would endanger a cable are more likely to be emergency or accidental anchoring events than a planned anchoring, since in the latter case the chance that cables would not be avoided is very small. During emergency or accidental dropping events the vessel is, in many cases, still moving when the anchor is dropped.

The penetration of the anchors upon impact was relatively small: It was observed that after dropping the anchor always fell on its side and the shank of the anchor remained above or on top of the seabed. Penetration is then limited by the geometry of the crown of the anchor, which extends 0.25 below the shank for the AC-14 and 0.45m below the shank for the Hall

anchor. The small penetrations are no surprise: The penetration upon impact involves undrained deformation of the seabed and unless the sediments are extremely loose negative pore pressures develop upon impact due to dilation of the sand. These negative pore pressures increase the resistance to a large extent.

Dilation and negative pore pressures also play a role when the anchor is dragged at higher speeds, like in emergency or accidental anchor events. The effect is that the anchor encounters higher resistance against penetration and often uneven loads on the flukes, which de-stabilize the anchor. In general the penetration depth of an anchor that is moving at a larger speed will therefore be smaller than the penetration depth of an anchor that is dragged or set at low speed (in drained conditions). It should be noted that the speeds at which the offshore pulling tests were performed are considered to be only partially drained. For very low pulling speeds increased penetration is expected to occur. The effect of this phenomenon is to a large extent compensated by the fact that very low pulling speeds result in very small dragging distances.

6.8 Overall considerations – Concluding remarks

This paragraph concludes chapter 6, which contains the interpretative part of the report. While chapters 1 to 5 give essential measurement data and background information, this last chapter intended to put the test results in the context of the existing understanding of anchoring events.

When making use of the data presented here it is advised to keep the following aspects in mind:

- The tests are first of all representative for the two anchors that were tested on the three locations in which the tests were performed. The tests may be extrapolated to other anchor sizes and other sites, provided there is sufficient similarity in soil conditions.

- Anchor dropping proved to be not a governing factor and is a localized event anyway.

- The tests represent situations where anchors were dragged through the soil. Because of that they are representative of the final stage of an emergency anchoring, which is a “linear” event that covers a certain distance. This in contrast with a stationary anchored ship which is expected to be an event that covers a much smaller distance and has therefore a smaller chance of interaction with a cable or pipeline.

- Faster dragging speeds (first stage of an emergency anchoring event) lead to less penetration.

- It is believed that the catenary length (certainly in the VTG area) is representative for practical (emergency) anchoring events. The adjustment of the penetration depths that is presented in Table 6.1 and Table 6.3 may therefore be considered appropriate for normal anchoring events, but superfluous (i.e. too conservative) for emergency anchoring events.

- When looking at penetration depths for larger anchors it must be realized that only some 3% of all anchors falls in the category that is heavier than 25 t. Ninety-five percent of the anchors in the dataset is smaller than 17 t.

In conclusion:

- During the tests the maximum inferred penetration depths for either the AC-14 anchor or the Hall anchor, accounting for the possible error in the sediment sonar interpretation and adjusting with an estimated value for the catenary effects, were:

Table 6.4 Conservative, adjusted, maximum penetration depths as derived from the tests

Area	Penetration depth	Anchor mass and type
VTG	0.95 m	8.5 t AC-14
BSH-South	0.66 m	8.5 t AC-14
BSH-North	1.22 m	11.5 t Hall

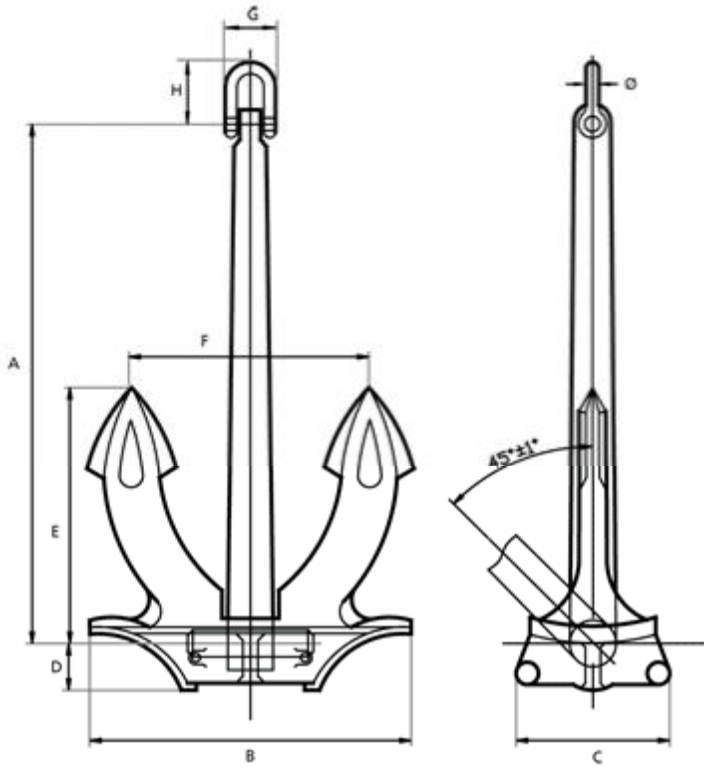
- Most of the data presented here are deterministic. Only limited information about the distribution of anchor masses, anchor types, soil conditions, frequency of emergency anchoring operations, human errors etc. is available. However, in the final evaluation of anchor risk to a buried cable of pipeline a probabilistic approach is the recommended way forward. Just looking at the largest anchors and the corresponding largest penetration depths (e.g. in Table 6.3) leads to too conservative and costly designs.

- The existing models that aim to provide insight in anchor behavior are relatively simple, or fully tuned to offshore anchors as opposed to normal shipping anchors. Proper prediction of anchor instability or rotation, or the effect of the catenary angle is therefore not possible. An anchor dig-in model, the development of which fell outside the scope of this testing campaign, might remedy this and enable a further extrapolation to other anchors and soil types, as well as provide insight in the differences between normal anchoring procedures and emergency anchoring events. Such a model could also help to further refine burial requirements in the sense that local soil properties could be taken into account to arrive at a safe and economic design.

A Geometry data of anchor and chain

Hall Anchor

Photo A.1 11.5 t Hall anchor on deck of Esvagt Connector



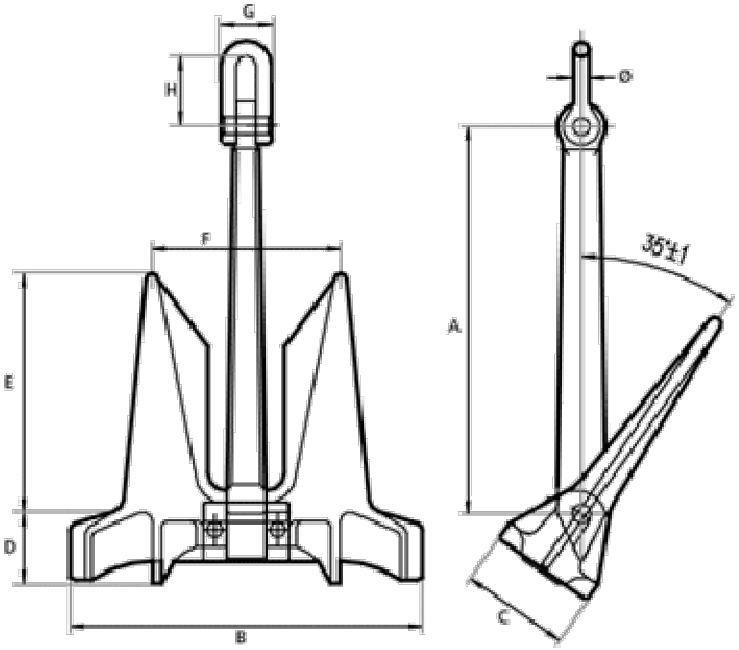
HALL-ANCHOR	
Mass	11700 kg
A	3638 mm
B	2803 mm
C	1297 mm
D	433 mm
E	1970 mm
F	1970 mm
G	437 mm
H	600 mm
Ø	130 mm

Table A.1 Hall anchor dimensions

Figure A.1 Schematic view of Hall anchor

AC-14 anchor

Photo A.2 8.5 t AC-14 anchor on deck of Esvagt Connector



AC-14-ANCHOR	
Mass	8325 kg
A	3221 mm
B	2890 mm
C	893 mm
D	558 mm
E	1961 mm
F	1548 mm
G	400 mm
H	540 mm
Ø	117 mm

Table A.2 AC-14 anchor dimensions

Figure A.2 Schematic view of AC-14 anchor

Anchor forerunner:

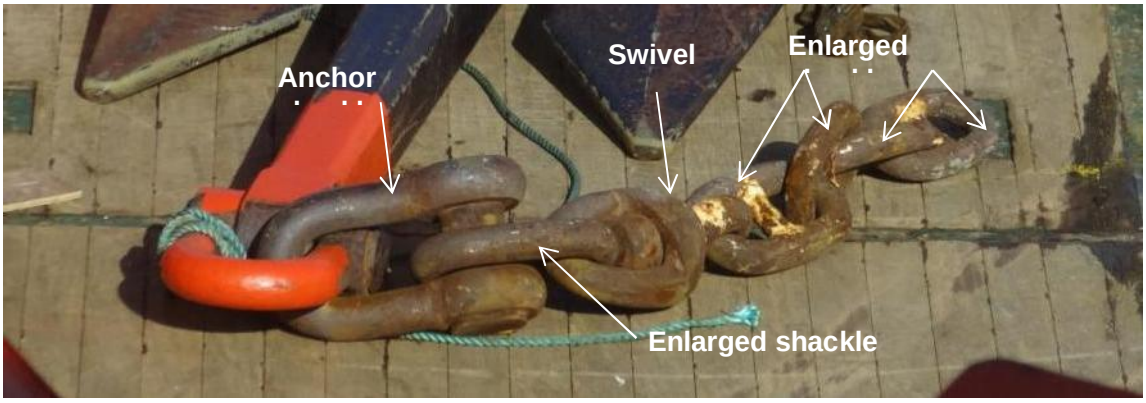


Photo A.3 Shackles, links and swivels in the anchor fore-runner

From the photo it is derived that the used anchor fore-runner comprised the following components:

- Anchor shackle
- Swivel
- Enlarged chain shackles (+10%D of anchor chain shackle)

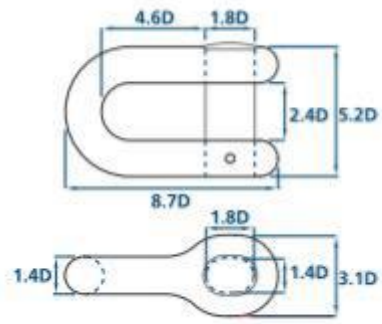
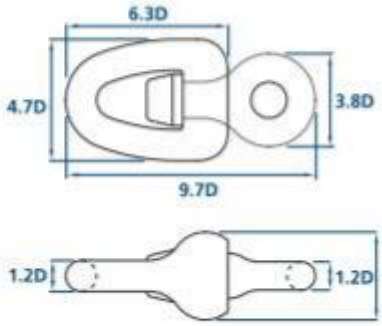
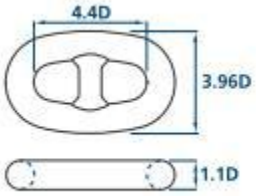
		
Anchor shackle D-type	Swivel	Enlarged chain shackle

Table A.3 Fore-runner element relative dimensions

Element	D [mm]	Mass	Effective weight (Submerged)
Anchor shackle D-type	110	146 kg	1.270 kN
Swivel	110	216 kg	1.870 kN
Enlarged chain shackles	110	270 kg/m	2.360 kN/m
Enlarged chain shackles	90	177 kg/m	1.540 kN/m

Table A.4 Used fore-runner components, size, mass and weight

Length of chain + cable catenary

The complete chain + cable catenary consists of the following components:

- Anchor fore runner
- 2 connecting anchor shackles
- 2 length of chains
- 100 meter of cable (20m on deck, 1 m freeboard and 79 m in water)

An amount of approximately 20 m of the total of 100 m cable length was present on the deck of the Esvagt connector between the load cell and the roller on the stern. This gives an effective length of the cable of 80 m used for the catenary analyses.

From the drawing of the deck-plan (Annex B) it is derived that the top of the stern roller is approximately 1.2 meter above the water level. This leaves at least 1 m of cable above water and less than 79 m of cable submerged.

For the catenary calculations the following lengths and weights are used:

Component	Length used for catenary calculation [m]	Submerged weight [N/m]	Total Weight [kN]
Anchor forerunner	3.2	2360	7.550
2 Connecting anchor shackles	0.8	1340	1.070
Chain	27	1250	33.750
Connecting shackle	0.4	1250	0.500
Chain	27	1250	33.750
Connecting shackle	0.4	1250	0.500
Cable	79	130	10.270
Cable (freeboard)	1	150 (not submerged)	0.150
20 m cable on deck	0	0	0
Total length:	**140.6 m**	**Total weight:**	**87.540**

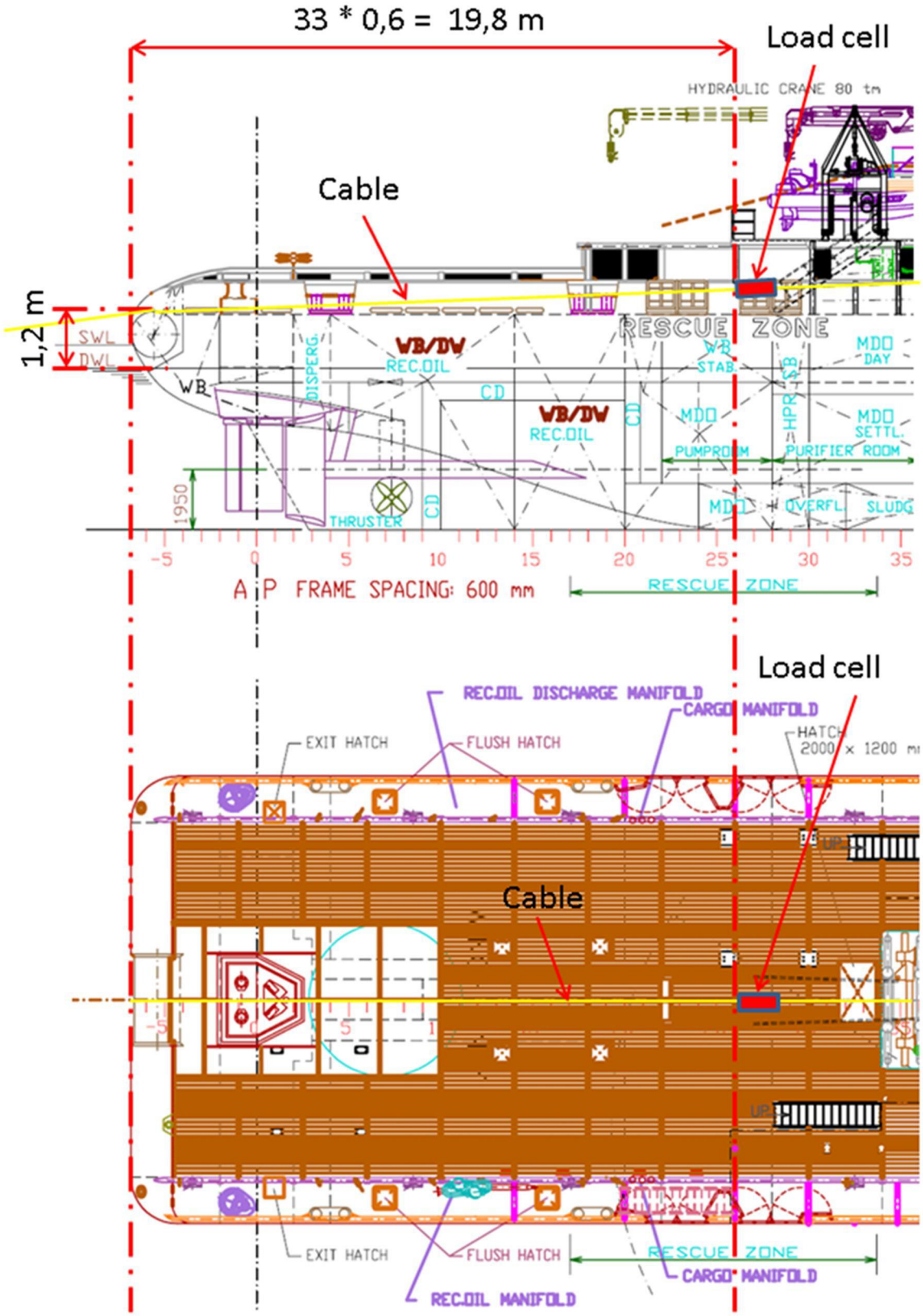
Table A.5 Lengths and weights used for catenary calculations

References:

The following references are used to obtain the used dimensions:

- Vryhof anchor manual 2010
- Website Sotra anchor & Chain, **www.sotra.net**
- Offshore mooring chain &anchor chain, Dai han Anchor Chain MFG. Co., LTD. (Hand-out during OTC 2013).

B Layout of the Esvagt Connector


33 * 0,6 = 19,8 m
Load cell
HYDRAULIC CRANE 80 tm
Cable
1,2 m
SWL
DWL
WB
DISPERG.
WB/DW
REC.OIL
CD
WB/DW
REC.OIL
CD
RESCUE ZONE
WB STAB.
SB
MDO DAY
MDO
HPR
MDO SETTL.
PUMPROOM
PURIFIER ROOM
MDO
OVERFL.
SLUDG
1950
THRUSTER
CD
-5
0
5
10
15
20
25
30
35
A P FRAME SPACING: 600 mm
RESCUE ZONE
Load cell
REC.OIL DISCHARGE MANIFOLD
CARGO MANIFOLD
HATCH
2000 x 1200 m
EXIT HATCH
FLUSH HATCH
UP
Cable
UP
EXIT HATCH
FLUSH HATCH
RESCUE ZONE
CARGO MANIFOLD
REC.OIL MANIFOLD

C GPS data of Esvagt Connector

This Annex contains the position data that were retrieved from the GPS recording unit on board the Esvagt Connector. The Annex contains the data from just before the anchor drop until just after the removal of the load cell. All other data points have been removed from the Annex since they have no direct relation to the tests themselves.

The files are also cleaned in the sense that characters like "N" or "Kn" etcetera are removed. Each row represents one log instant. The first two columns contain date and time (UTC) respectively. It should be noted that the local time was UTC+2. The standard logging interval was 8 minutes during the first day of testing (April 30) and was set to 1 minute logging the following days. On the first day some extra entries can be found in the log, since the system added an extra log entry when some of the position parameters changes more than a set value in the eight minute interval.

Column significance:
Col 1 : Date (d/m/y)
Col 2 : Time (h:m:s)
Col 3 : Heading over Ground (Degrees) (i.e.: the direction in which the GPS reveiver moved)
Col 4 : Speed over Ground (Knots) (i.e.: the speed with which the GPS recveiver moved)
Col 5 : Degrees Latitude (N)
Col 6 : Minutes Latitude
Col 7 : Degrees Longitude (E)
Col 6 : Minutes Longitude
Col 7 : Ships heading (Degrees) (i.e.: Orientation of the vessel)

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
Test N1								
4/30/2013	7:04:00	38	0.10	54	7.1125	7	3.6093	89
4/30/2013	7:12:00	13	0.10	54	7.1121	7	3.6103	90
4/30/2013	7:20:00	197	0.10	54	7.1121	7	3.6102	90
4/30/2013	7:28:00	50	0.00	54	7.1115	7	3.6149	90
4/30/2013	7:36:00	40	0.10	54	7.1123	7	3.6156	90
4/30/2013	7:44:00	245	0.00	54	7.1121	7	3.6142	92
4/30/2013	7:52:00	94	0.00	54	7.1119	7	3.6148	91
4/30/2013	8:00:00	67	0.00	54	7.1123	7	3.6234	92
4/30/2013	8:08:00	285	0.10	54	7.1127	7	3.6801	91
4/30/2013	8:16:00	50	0.10	54	7.1121	7	3.6792	91
4/30/2013	8:24:00	304	0.10	54	7.1129	7	3.6781	91
4/30/2013	8:32:00	88	0.10	54	7.1135	7	3.7454	90
4/30/2013	8:40:00	322	0.10	54	7.1133	7	3.7440	91
4/30/2013	8:48:00	314	0.00	54	7.1135	7	3.7435	90
4/30/2013	8:56:00	218	0.30	54	7.1088	7	3.7389	89
4/30/2013	9:04:00	342	0.10	54	7.1055	7	3.7433	89
4/30/2013	9:12:00	156	0.40	54	7.1156	7	3.7442	89
4/30/2013	9:20:00	197	0.10	54	7.1016	7	3.7438	92

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	**h:m:s**	**degr**	**Kn**	**Degr**	**Min**	**Degr**	**Min**	**Degr**
4/30/2013	9:28:00	184	0.10	54	7.1094	7	3.7443	90
4/30/2013	9:36:00	178	0.30	54	7.1145	7	3.7446	90
4/30/2013	9:44:00	138	0.30	54	7.1074	7	3.7445	92
4/30/2013	9:52:00	147	0.10	54	7.1067	7	3.7446	89
4/30/2013	10:00:00	87	2.00	54	7.1121	7	3.8082	89
4/30/2013	10:08:00	183	0.10	54	7.1049	7	3.8300	91
4/30/2013	10:16:00	93	0.20	54	7.1072	7	3.8295	90
Test N2								
4/30/2013	12:40:00	217	0.10	54	7.0590	7	3.5672	270
4/30/2013	12:48:00	183	0.10	54	7.0574	7	3.5688	270
4/30/2013	12:56:00	150	0.20	54	7.0570	7	3.5500	271
4/30/2013	13:04:00	38	0.20	54	7.0586	7	3.5459	271
4/30/2013	13:12:00	319	0.10	54	7.0592	7	3.5467	271
4/30/2013	13:20:00	241	0.10	54	7.0586	7	3.5468	271
4/30/2013	13:28:00	222	0.10	54	7.0576	7	3.5583	270
4/30/2013	13:36:00	261	0.50	54	7.0580	7	3.5473	271
4/30/2013	13:44:00	93	0.10	54	7.0567	7	3.4383	272
4/30/2013	13:52:00	63	0.10	54	7.0563	7	3.4396	271
4/30/2013	14:00:00	141	0.00	54	7.0567	7	3.4382	270
4/30/2013	14:08:00	270	2.70	54	7.0529	7	3.4005	268
4/30/2013	14:16:00	340	0.10	54	7.0522	7	3.3647	272
4/30/2013	14:24:00	299	0.00	54	7.0572	7	3.3613	274
4/30/2013	14:32:00	67	0.10	54	7.0483	7	3.3496	270
4/30/2013	14:40:00	172	0.10	54	7.0442	7	3.3501	268
4/30/2013	14:48:00	202	0.10	54	7.0565	7	3.3488	270
4/30/2013	14:56:00	342	0.10	54	7.0504	7	3.3491	270
4/30/2013	15:04:00	191	0.40	54	7.0637	7	3.3492	270
4/30/2013	15:12:00	185	0.10	54	7.0602	7	3.3486	270
4/30/2013	15:20:00	341	0.10	54	7.0600	7	3.3488	271
4/30/2013	15:28:00	149	0.10	54	7.0580	7	3.3492	270
4/30/2013	15:36:00	319	0.00	54	7.0594	7	3.3488	270
4/30/2013	15:44:00	66	0.30	54	7.0520	7	3.3452	270
Test N3								
4/30/2013	16:32:00	53	0.10	54	7.0065	7	3.5643	272
4/30/2013	16:40:00	248	0.10	54	7.0070	7	3.5286	270
4/30/2013	16:48:00	89	0.10	54	7.0061	7	3.5274	271
4/30/2013	16:56:00	308	0.10	54	7.0063	7	3.5260	270
4/30/2013	17:04:00	257	0.20	54	7.0070	7	3.5449	270
4/30/2013	17:12:00	130	0.30	54	6.9940	7	3.5593	226
4/30/2013	17:20:00	53	0.20	54	6.9850	7	3.5954	165
4/30/2013	17:28:00	101	0.10	54	6.9973	7	3.6226	112
4/30/2013	17:36:00	265	0.10	54	6.9924	7	3.6505	110
4/30/2013	17:44:00	279	0.00	54	6.9914	7	3.6496	110
4/30/2013	17:52:00	304	0.00	54	6.9916	7	3.6497	111
4/30/2013	18:00:00	125	0.10	54	6.9764	7	3.7266	111
4/30/2013	18:08:00	204	0.10	54	6.9752	7	3.7301	110
4/30/2013	18:16:00	287	0.10	54	6.9758	7	3.7289	111

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
4/30/2013	18:24:00	271	0.10	54	6.9414	7	3.7739	119
4/30/2013	18:32:00	131	0.10	54	6.9346	7	3.7737	114
Test S1								
5/1/2013	6:15:00	35	0.20	53	58.4462	7	5.1338	106
5/1/2013	6:16:00	19	0.10	53	58.4456	7	5.1348	107
5/1/2013	6:17:00	35	0.20	53	58.4464	7	5.1338	105
5/1/2013	6:18:00	69	0.20	53	58.4468	7	5.1349	106
5/1/2013	6:19:00	32	0.10	53	58.4462	7	5.1348	106
5/1/2013	6:20:00	18	0.20	53	58.4458	7	5.1339	106
5/1/2013	6:21:00	30	0.10	53	58.4460	7	5.1336	106
5/1/2013	6:22:00	10	0.10	53	58.4464	7	5.1358	107
5/1/2013	6:23:00	18	0.10	53	58.4442	7	5.1444	106
5/1/2013	6:24:00	34	0.10	53	58.4454	7	5.1420	106
5/1/2013	6:25:00	53	0.10	53	58.4446	7	5.1446	107
5/1/2013	6:26:00	34	0.20	53	58.4452	7	5.1426	105
5/1/2013	6:27:00	16	0.10	53	58.4452	7	5.1439	105
5/1/2013	6:28:00	22	0.20	53	58.4446	7	5.1439	107
5/1/2013	6:29:00	31	0.10	53	58.4439	7	5.1423	108
5/1/2013	6:30:00	98	0.10	53	58.4454	7	5.1428	106
5/1/2013	6:31:00	31	0.00	53	58.4437	7	5.1441	108
5/1/2013	6:32:00	30	0.10	53	58.4450	7	5.1418	106
5/1/2013	6:33:00	53	0.10	53	58.4448	7	5.1438	107
5/1/2013	6:34:00	63	0.00	53	58.4446	7	5.1435	107
5/1/2013	6:35:00	30	0.50	53	58.4452	7	5.1379	107
5/1/2013	6:36:00	99	0.30	53	58.4472	7	5.1325	106
5/1/2013	6:37:00	28	0.30	53	58.4452	7	5.1352	108
5/1/2013	6:38:00	94	0.10	53	58.4466	7	5.1341	108
5/1/2013	6:39:00	12	0.20	53	58.4446	7	5.1409	108
5/1/2013	6:40:00	35	0.00	53	58.4456	7	5.1386	105
5/1/2013	6:41:00	57	0.20	53	58.4460	7	5.1411	106
5/1/2013	6:42:00	23	0.20	53	58.4435	7	5.1457	106
5/1/2013	6:43:00	95	0.10	53	58.4454	7	5.1434	107
5/1/2013	6:44:00	12	0.40	53	58.4431	7	5.1514	107
5/1/2013	6:45:00	26	0.10	53	58.4442	7	5.1489	107
5/1/2013	6:46:00	23	0.20	53	58.4431	7	5.1499	108
5/1/2013	6:47:00	10	0.20	53	58.4458	7	5.1429	106
5/1/2013	6:48:00	30	0.30	53	58.4444	7	5.1466	107
5/1/2013	6:49:00	11	0.20	53	58.4448	7	5.1457	107
5/1/2013	6:50:00	27	0.20	53	58.4433	7	5.1449	107
5/1/2013	6:51:00	52	0.20	53	58.4462	7	5.1449	106
5/1/2013	6:52:00	28	0.20	53	58.4439	7	5.1460	108
5/1/2013	6:53:00	60	0.10	53	58.4456	7	5.1448	107
5/1/2013	6:54:00	33	0.10	53	58.4454	7	5.1451	108
5/1/2013	6:55:00	12	0.10	53	58.4458	7	5.1461	107
5/1/2013	6:56:00	24	0.20	53	58.4446	7	5.1455	106
5/1/2013	6:57:00	22	0.00	53	58.4448	7	5.1441	107
5/1/2013	6:58:00	16	0.10	53	58.4450	7	5.1459	108

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	6:59:00	22	0.10	53	58.4446	7	5.1447	108
5/1/2013	7:00:00	38	0.10	53	58.4448	7	5.1452	107
5/1/2013	7:01:00	19	0.00	53	58.4450	7	5.1462	108
5/1/2013	7:02:00	35	0.20	53	58.4452	7	5.1442	107
5/1/2013	7:03:00	16	0.10	53	58.4442	7	5.1465	107
5/1/2013	7:04:00	34	0.20	53	58.4460	7	5.1434	106
5/1/2013	7:05:00	13	0.20	53	58.4444	7	5.1468	107
5/1/2013	7:06:00	24	0.10	53	58.4439	7	5.1437	108
5/1/2013	7:07:00	10	0.10	53	58.4448	7	5.1457	108
5/1/2013	7:08:00	24	0.10	53	58.4446	7	5.1452	108
5/1/2013	7:09:00	11	0.00	53	58.4446	7	5.1442	107
5/1/2013	7:10:00	13	0.10	53	58.4446	7	5.1460	108
5/1/2013	7:11:00	33	0.10	53	58.4444	7	5.1445	108
5/1/2013	7:12:00	48	0.10	53	58.4448	7	5.1452	107
5/1/2013	7:13:00	17	0.10	53	58.4448	7	5.1458	108
5/1/2013	7:14:00	32	0.10	53	58.4450	7	5.1448	107
5/1/2013	7:15:00	29	0.10	53	58.4450	7	5.1450	107
5/1/2013	7:16:00	18	0.00	53	58.4448	7	5.1448	107
5/1/2013	7:17:00	30	0.10	53	58.4446	7	5.1459	107
5/1/2013	7:18:00	20	0.10	53	58.4444	7	5.1443	108
5/1/2013	7:19:00	22	0.10	53	58.4450	7	5.1457	107
5/1/2013	7:20:00	5	0.10	53	58.4444	7	5.1457	106
5/1/2013	7:21:00	85	0.10	53	58.4450	7	5.1450	107
5/1/2013	7:22:00	82	0.10	53	58.4444	7	5.1459	108
5/1/2013	7:23:00	25	0.00	53	58.4446	7	5.1441	107
5/1/2013	7:24:00	18	0.10	53	58.4439	7	5.1456	108
5/1/2013	7:25:00	20	0.10	53	58.4442	7	5.1445	106
5/1/2013	7:26:00	28	0.00	53	58.4450	7	5.1448	106
5/1/2013	7:27:00	10	0.10	53	58.4444	7	5.1462	108
5/1/2013	7:28:00	12	0.00	53	58.4450	7	5.1451	107
5/1/2013	7:29:00	22	0.10	53	58.4444	7	5.1457	108
5/1/2013	7:30:00	35	0.10	53	58.4454	7	5.1438	107
5/1/2013	7:31:00	18	0.30	53	58.4444	7	5.1465	108
5/1/2013	7:32:00	32	0.20	53	58.4450	7	5.1437	106
5/1/2013	7:33:00	13	0.20	53	58.4448	7	5.1462	107
5/1/2013	7:34:00	26	0.10	53	58.4446	7	5.1445	107
5/1/2013	7:35:00	15	0.10	53	58.4448	7	5.1456	107
5/1/2013	7:36:00	32	0.20	53	58.4452	7	5.1444	106
5/1/2013	7:37:00	58	0.10	53	58.4452	7	5.1463	107
5/1/2013	7:38:00	27	0.10	53	58.4446	7	5.1443	106
5/1/2013	7:39:00	83	0.10	53	58.4460	7	5.1453	106
5/1/2013	7:40:00	25	0.10	53	58.4444	7	5.1457	107
5/1/2013	7:41:00	88	0.30	53	58.4456	7	5.1473	107
5/1/2013	7:42:00	11	1.10	53	58.4411	7	5.1681	107
5/1/2013	7:43:00	10	0.90	53	58.4386	7	5.1908	107
5/1/2013	7:44:00	10	0.80	53	58.4349	7	5.2101	106
5/1/2013	7:45:00	10	0.50	53	58.4319	7	5.2282	108

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	7:46:00	11	0.50	53	58.4300	7	5.2383	107
5/1/2013	7:47:00	19	0.00	53	58.4282	7	5.2494	108
5/1/2013	7:48:00	79	0.30	53	58.4290	7	5.2536	107
5/1/2013	7:49:00	29	0.10	53	58.4261	7	5.2611	106
5/1/2013	7:50:00	34	0.10	53	58.4280	7	5.2578	106
5/1/2013	7:51:00	17	0.10	53	58.4259	7	5.2618	106
5/1/2013	7:52:00	22	0.10	53	58.4269	7	5.2621	108
5/1/2013	7:53:00	13	0.10	53	58.4269	7	5.2625	107
5/1/2013	7:54:00	35	0.30	53	58.4263	7	5.2615	106
5/1/2013	7:55:00	12	0.30	53	58.4271	7	5.2624	107
5/1/2013	7:56:00	32	0.20	53	58.4267	7	5.2622	107
5/1/2013	7:57:00	13	0.10	53	58.4267	7	5.2614	106
5/1/2013	7:58:00	22	0.20	53	58.4263	7	5.2623	107
5/1/2013	7:59:00	20	0.20	53	58.4255	7	5.2616	108
5/1/2013	8:00:00	63	0.10	53	58.4271	7	5.2608	107
5/1/2013	8:01:00	24	0.00	53	58.4267	7	5.2625	106
5/1/2013	8:02:00	34	0.00	53	58.4265	7	5.2613	107
5/1/2013	8:03:00	35	0.10	53	58.4267	7	5.2621	108
5/1/2013	8:04:00	23	0.10	53	58.4259	7	5.2611	107
5/1/2013	8:05:00	21	0.30	53	58.4237	7	5.2545	117
5/1/2013	8:06:00	18	0.70	53	58.4148	7	5.2504	124
5/1/2013	8:07:00	16	0.90	53	58.4021	7	5.2516	118
5/1/2013	8:08:00	18	0.50	53	58.3925	7	5.2490	113
5/1/2013	8:09:00	20	0.70	53	58.3841	7	5.2398	127
5/1/2013	8:10:00	22	0.90	53	58.3720	7	5.2443	143
5/1/2013	8:11:00	20	1.10	53	58.3597	7	5.2312	140
5/1/2013	8:12:00	17	1.60	53	58.3353	7	5.2313	158
5/1/2013	8:13:00	24	0.90	53	58.3339	7	5.2064	162
5/1/2013	8:14:00	28	1.20	53	58.3296	7	5.1796	166
5/1/2013	8:15:00	28	1.10	53	58.3349	7	5.1486	178
5/1/2013	8:16:00	26	0.50	53	58.3372	7	5.1259	189
5/1/2013	8:17:00	12	0.50	53	58.3323	7	5.1323	178
5/1/2013	8:18:00	31	0.30	53	58.3325	7	5.1292	184
5/1/2013	8:19:00	11	0.30	53	58.3329	7	5.1323	182
5/1/2013	8:20:00	11	0.50	53	58.3302	7	5.1411	181
5/1/2013	8:21:00	10	0.50	53	58.3282	7	5.1542	171
5/1/2013	8:22:00	94	0.50	53	58.3280	7	5.1673	166
5/1/2013	8:23:00	90	0.50	53	58.3282	7	5.1837	160
5/1/2013	8:24:00	76	0.50	53	58.3292	7	5.1963	154
5/1/2013	8:25:00	68	0.50	53	58.3317	7	5.2095	149
5/1/2013	8:26:00	62	0.50	53	58.3345	7	5.2219	147
5/1/2013	8:27:00	55	0.60	53	58.3392	7	5.2361	137
5/1/2013	8:28:00	50	0.60	53	58.3450	7	5.2495	131
5/1/2013	8:29:00	42	0.60	53	58.3524	7	5.2624	128
5/1/2013	8:30:00	31	0.50	53	58.3595	7	5.2733	123
5/1/2013	8:31:00	27	0.50	53	58.3673	7	5.2815	124
5/1/2013	8:32:00	35	0.10	53	58.3706	7	5.2829	124

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	8:33:00	22	0.10	53	58.3716	7	5.2841	123
5/1/2013	8:35:00	22	0.20	53	58.3624	7	5.2769	120
5/1/2013	8:36:00	34	0.10	53	58.3626	7	5.2767	119
5/1/2013	8:37:00	29	0.20	53	58.3667	7	5.2789	118
5/1/2013	8:38:00	16	0.00	53	58.3677	7	5.2810	120
5/1/2013	8:39:00	47	0.10	53	58.3690	7	5.2819	120
5/1/2013	8:40:00	0	0.20	53	58.3698	7	5.2821	118
5/1/2013	8:41:00	23	0.10	53	58.3692	7	5.2826	120
5/1/2013	8:42:00	15	0.10	53	58.3704	7	5.2829	119
5/1/2013	8:43:00	22	0.10	53	58.3718	7	5.2849	120
5/1/2013	8:44:00	22	0.00	53	58.3726	7	5.2839	120
5/1/2013	8:45:00	15	0.10	53	58.3726	7	5.2840	119
5/1/2013	8:46:00	28	0.10	53	58.3720	7	5.2843	120
5/1/2013	8:47:00	29	0.10	53	58.3726	7	5.2842	119
5/1/2013	8:48:00	19	0.10	53	58.3730	7	5.2861	119
5/1/2013	8:49:00	23	0.20	53	58.3753	7	5.2874	120
5/1/2013	8:50:00	15	0.10	53	58.3780	7	5.2879	120
5/1/2013	8:51:00	33	0.10	53	58.3808	7	5.2885	120
5/1/2013	8:52:00	21	0.00	53	58.3819	7	5.2895	120
5/1/2013	8:53:00	21	0.10	53	58.3804	7	5.2893	119
5/1/2013	8:54:00	22	0.10	53	58.3786	7	5.2887	119
5/1/2013	8:55:00	19	0.10	53	58.3767	7	5.2883	119
5/1/2013	8:56:00	21	0.20	53	58.3753	7	5.2863	120
5/1/2013	8:57:00	18	0.10	53	58.3741	7	5.2868	119
5/1/2013	8:58:00	5	0.10	53	58.3733	7	5.2857	120
5/1/2013	8:59:00	35	0.10	53	58.3741	7	5.2874	120
5/1/2013	9:00:00	4	0.20	53	58.3767	7	5.2877	121
5/1/2013	9:01:00	40	0.00	53	58.3774	7	5.2884	120
5/1/2013	9:02:00	19	0.10	53	58.3757	7	5.2877	120
5/1/2013	9:03:00	76	0.20	53	58.3753	7	5.2886	119
5/1/2013	9:04:00	8	0.20	53	58.3780	7	5.2886	119
5/1/2013	9:05:00	79	0.10	53	58.3782	7	5.2896	119
5/1/2013	9:06:00	30	0.10	53	58.3786	7	5.2889	119
5/1/2013	9:07:00	11	0.00	53	58.3784	7	5.2893	120
5/1/2013	9:08:00	18	0.00	53	58.3788	7	5.2891	121
5/1/2013	9:09:00	18	0.20	53	58.3790	7	5.2897	120
5/1/2013	9:10:00	24	0.00	53	58.3796	7	5.2898	119
5/1/2013	9:11:00	30	0.00	53	58.3796	7	5.2900	120
5/1/2013	9:12:00	26	0.10	53	58.3792	7	5.2894	120
5/1/2013	9:13:00	84	0.00	53	58.3792	7	5.2907	120
5/1/2013	9:14:00	5	0.10	53	58.3796	7	5.2906	119
5/1/2013	9:15:00	76	0.10	53	58.3796	7	5.2908	120
5/1/2013	9:16:00	19	0.00	53	58.3794	7	5.2913	120
5/1/2013	9:17:00	14	0.10	53	58.3794	7	5.2914	120
5/1/2013	9:18:00	73	0.00	53	58.3792	7	5.2912	120
5/1/2013	9:19:00	72	0.00	53	58.3798	7	5.2909	120
5/1/2013	9:20:00	30	0.10	53	58.3806	7	5.2911	119

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	9:21:00	21	0.10	53	58.3806	7	5.2914	119
5/1/2013	9:22:00	30	0.00	53	58.3815	7	5.2912	121
5/1/2013	9:23:00	33	0.10	53	58.3823	7	5.2924	119
5/1/2013	9:24:00	17	0.00	53	58.3831	7	5.2918	120
5/1/2013	9:25:00	32	0.10	53	58.3841	7	5.2926	119
5/1/2013	9:26:00	17	0.10	53	58.3853	7	5.2927	120
5/1/2013	9:27:00	19	0.40	53	58.3812	7	5.2916	121
5/1/2013	9:28:00	20	0.50	53	58.3741	7	5.2888	121
5/1/2013	9:29:00	17	0.10	53	58.3698	7	5.2859	121
5/1/2013	9:30:00	16	0.20	53	58.3716	7	5.2869	120
5/1/2013	9:31:00	8	0.40	53	58.3765	7	5.2904	119
5/1/2013	9:32:00	12	0.50	53	58.3833	7	5.2940	119
5/1/2013	9:33:00	17	0.30	53	58.3849	7	5.2930	121
5/1/2013	9:34:00	17	0.40	53	58.3800	7	5.2940	121
5/1/2013	9:35:00	19	0.20	53	58.3751	7	5.2909	122
5/1/2013	9:36:00	2	0.10	53	58.3761	7	5.2914	121
5/1/2013	9:37:00	3	0.20	53	58.3792	7	5.2925	119
5/1/2013	9:38:00	20	0.10	53	58.3804	7	5.2932	119
5/1/2013	9:39:00	18	0.30	53	58.3765	7	5.2915	121
5/1/2013	9:40:00	22	0.20	53	58.3714	7	5.2880	120
5/1/2013	9:41:00	44	0.10	53	58.3718	7	5.2883	120
5/1/2013	9:42:00	33	0.20	53	58.3751	7	5.2908	119
5/1/2013	9:43:00	19	0.30	53	58.3794	7	5.2930	119
5/1/2013	9:44:00	12	0.10	53	58.3810	7	5.2942	119
5/1/2013	9:45:00	22	0.00	53	58.3792	7	5.2933	120
5/1/2013	9:46:00	33	0.10	53	58.3800	7	5.2947	120
5/1/2013	9:47:00	19	0.00	53	58.3815	7	5.2953	120
5/1/2013	9:48:00	16	0.30	53	58.3784	7	5.2938	120
5/1/2013	9:49:00	15	0.00	53	58.3751	7	5.2935	121
5/1/2013	9:50:00	30	0.10	53	58.3765	7	5.2937	120
5/1/2013	9:51:00	18	0.10	53	58.3771	7	5.2944	120
5/1/2013	9:52:00	34	0.20	53	58.3796	7	5.2952	120
5/1/2013	9:53:00	20	0.20	53	58.3774	7	5.2952	120
5/1/2013	9:54:00	20	0.40	53	58.3720	7	5.2913	122
5/1/2013	9:55:00	19	0.30	53	58.3673	7	5.2869	122
5/1/2013	9:56:00	62	0.20	53	58.3661	7	5.2855	121
5/1/2013	9:57:00	29	0.30	53	58.3702	7	5.2885	120
5/1/2013	9:58:00	6	0.50	53	58.3774	7	5.2938	118
5/1/2013	9:59:00	35	0.40	53	58.3839	7	5.2984	118
5/1/2013	9:59:00	35	0.40	53	58.3839	7	5.2984	118
5/1/2013	10:00:00	16	0.50	53	58.3911	7	5.3006	117
Test S2								
5/1/2013	11:15:00	35	0.20	53	58.3978	7	5.0709	270
5/1/2013	11:16:00	89	0.00	53	58.3968	7	5.0693	269
5/1/2013	11:17:00	29	0.10	53	58.3978	7	5.0690	270
5/1/2013	11:18:00	11	0.20	53	58.3960	7	5.0709	270
5/1/2013	11:19:00	34	0.10	53	58.3974	7	5.0722	270

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	11:20:00	22	0.10	53	58.3968	7	5.0697	270
5/1/2013	11:21:00	17	0.10	53	58.3972	7	5.0710	270
5/1/2013	11:22:00	57	0.10	53	58.3970	7	5.0711	271
5/1/2013	11:23:00	29	0.10	53	58.3968	7	5.0713	270
5/1/2013	11:24:00	14	0.10	53	58.3968	7	5.0718	271
5/1/2013	11:25:00	21	0.00	53	58.3962	7	5.0734	270
5/1/2013	11:26:00	28	0.00	53	58.3970	7	5.0709	270
5/1/2013	11:27:00	27	0.40	53	58.3972	7	5.0668	270
5/1/2013	11:28:00	49	0.40	53	58.3978	7	5.0620	271
5/1/2013	11:29:00	28	0.10	53	58.3970	7	5.0630	270
5/1/2013	11:30:00	17	0.30	53	58.3964	7	5.0610	270
5/1/2013	11:31:00	32	0.20	53	58.3970	7	5.0629	271
5/1/2013	11:32:00	22	0.10	53	58.3966	7	5.0611	269
5/1/2013	11:33:00	18	0.00	53	58.3968	7	5.0624	268
5/1/2013	11:34:00	35	0.20	53	58.3968	7	5.0632	269
5/1/2013	11:35:00	19	0.20	53	58.3966	7	5.0618	270
5/1/2013	11:36:00	18	0.10	53	58.3972	7	5.0624	270
5/1/2013	11:37:00	35	0.20	53	58.3974	7	5.0626	270
5/1/2013	11:38:00	92	0.00	53	58.3968	7	5.0614	268
5/1/2013	11:39:00	18	0.10	53	58.3964	7	5.0626	269
5/1/2013	11:40:00	22	0.00	53	58.3966	7	5.0618	269
5/1/2013	11:41:00	59	0.10	53	58.3976	7	5.0630	271
5/1/2013	11:42:00	27	0.00	53	58.3964	7	5.0620	270
5/1/2013	11:43:00	30	0.00	53	58.3974	7	5.0628	269
5/1/2013	11:44:00	17	0.30	53	58.3966	7	5.0613	270
5/1/2013	11:45:00	21	0.20	53	58.3972	7	5.0635	270
5/1/2013	11:46:00	22	0.20	53	58.3964	7	5.0623	270
5/1/2013	11:47:00	15	0.10	53	58.3964	7	5.0620	268
5/1/2013	11:48:00	35	0.20	53	58.3983	7	5.0626	269
5/1/2013	11:49:00	23	0.00	53	58.3970	7	5.0607	269
5/1/2013	11:50:00	99	0.10	53	58.3980	7	5.0631	269
5/1/2013	11:51:00	18	0.30	53	58.3962	7	5.0609	270
5/1/2013	11:52:00	41	0.20	53	58.3970	7	5.0638	269
5/1/2013	11:53:00	20	0.20	53	58.3962	7	5.0618	271
5/1/2013	11:54:00	12	0.00	53	58.3978	7	5.0609	270
5/1/2013	11:55:00	13	0.10	53	58.3968	7	5.0617	270
5/1/2013	11:56:00	32	0.00	53	58.3970	7	5.0624	270
5/1/2013	11:57:00	34	0.20	53	58.3974	7	5.0622	270
5/1/2013	11:58:00	86	0.00	53	58.3962	7	5.0622	269
5/1/2013	11:59:00	18	0.30	53	58.3968	7	5.0614	272
5/1/2013	12:00:00	52	0.10	53	58.3964	7	5.0643	268
5/1/2013	12:01:00	26	0.20	53	58.3970	7	5.0607	270
5/1/2013	12:02:00	93	0.20	53	58.3968	7	5.0625	270
5/1/2013	12:03:00	32	0.10	53	58.3974	7	5.0629	270
5/1/2013	12:04:00	27	0.60	53	58.3968	7	5.0478	269
5/1/2013	12:05:00	26	0.60	53	58.3968	7	5.0320	270
5/1/2013	12:06:00	27	0.50	53	58.3980	7	5.0199	271

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	12:07:00	27	0.40	53	58.3983	7	5.0081	270
5/1/2013	12:08:00	27	0.30	53	58.3983	7	5.0045	270
5/1/2013	12:09:00	27	0.30	53	58.3974	7	4.9932	269
5/1/2013	12:10:00	26	0.50	53	58.3968	7	4.9803	271
5/1/2013	12:11:00	25	0.50	53	58.3966	7	4.9681	270
5/1/2013	12:12:00	26	0.50	53	58.3972	7	4.9566	270
5/1/2013	12:13:00	26	0.60	53	58.3966	7	4.9463	271
5/1/2013	12:14:00	10	0.10	53	58.3972	7	4.9460	270
5/1/2013	12:15:00	31	0.20	53	58.3974	7	4.9478	272
5/1/2013	12:16:00	13	0.20	53	58.3964	7	4.9467	271
5/1/2013	12:17:00	20	0.30	53	58.3966	7	4.9473	271
5/1/2013	12:18:00	19	0.10	53	58.3970	7	4.9458	271
5/1/2013	12:19:00	17	0.10	53	58.3966	7	4.9471	269
5/1/2013	12:20:00	33	0.20	53	58.3978	7	4.9477	271
5/1/2013	12:21:00	40	0.10	53	58.3978	7	4.9464	270
5/1/2013	12:22:00	25	0.00	53	58.3966	7	4.9479	270
5/1/2013	12:23:00	31	0.10	53	58.3978	7	4.9467	271
5/1/2013	12:24:00	14	0.10	53	58.3968	7	4.9465	270
5/1/2013	12:25:00	16	0.40	53	58.3966	7	4.9475	270
5/1/2013	12:26:00	32	0.10	53	58.3976	7	4.9488	270
5/1/2013	12:27:00	19	0.10	53	58.3972	7	4.9461	271
5/1/2013	12:28:00	15	0.10	53	58.3972	7	4.9482	270
5/1/2013	12:29:00	18	0.20	53	58.3962	7	4.9467	271
5/1/2013	12:30:00	30	0.10	53	58.3972	7	4.9485	269
5/1/2013	12:31:00	89	0.20	53	58.3970	7	4.9491	270
5/1/2013	12:32:00	24	0.20	53	58.3972	7	4.9515	270
5/1/2013	12:33:00	95	0.70	53	58.3966	7	4.9618	271
5/1/2013	12:34:00	28	0.50	53	58.3970	7	4.9611	270
5/1/2013	12:35:00	10	0.30	53	58.3980	7	4.9610	272
5/1/2013	12:36:00	11	0.10	53	58.3968	7	4.9698	270
5/1/2013	12:37:00	12	0.40	53	58.3952	7	4.9750	268
5/1/2013	12:38:00	25	1.00	53	58.3921	7	4.9598	270
5/1/2013	12:39:00	29	0.30	53	58.3907	7	4.9420	271
5/1/2013	12:40:00	24	0.10	53	58.3917	7	4.9402	268
5/1/2013	12:41:00	32	0.00	53	58.3925	7	4.9391	269
5/1/2013	12:42:00	13	0.20	53	58.3923	7	4.9410	270
5/1/2013	12:43:00	19	0.10	53	58.3909	7	4.9416	270
5/1/2013	12:44:00	13	0.10	53	58.3896	7	4.9444	270
5/1/2013	12:45:00	12	0.30	53	58.3870	7	4.9474	269
5/1/2013	12:46:00	14	0.20	53	58.3819	7	4.9541	270
5/1/2013	12:47:00	21	0.30	53	58.3804	7	4.9543	274
5/1/2013	12:48:00	12	0.00	53	58.3790	7	4.9533	270
5/1/2013	12:49:00	41	0.20	53	58.3798	7	4.9546	272
5/1/2013	12:50:00	25	0.10	53	58.3810	7	4.9551	269
5/1/2013	12:51:00	30	0.70	53	58.3847	7	4.9438	273
5/1/2013	12:52:00	0	0.10	53	58.3862	7	4.9355	270
5/1/2013	12:53:00	34	0.30	53	58.3901	7	4.9345	270

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	12:54:00	33	0.20	53	58.3942	7	4.9326	269
5/1/2013	12:55:00	35	0.20	53	58.3964	7	4.9313	270
5/1/2013	12:56:00	22	0.10	53	58.3983	7	4.9320	271
5/1/2013	12:57:00	14	0.10	53	58.3983	7	4.9331	271
5/1/2013	12:58:00	77	0.00	53	58.4001	7	4.9340	271
5/1/2013	12:59:00	24	0.10	53	58.4003	7	4.9336	270
5/1/2013	13:00:00	21	0.20	53	58.4001	7	4.9314	270
5/1/2013	13:01:00	18	0.30	53	58.3964	7	4.9303	270
5/1/2013	13:02:00	62	0.10	53	58.3948	7	4.9302	271
5/1/2013	13:03:00	28	0.20	53	58.3964	7	4.9319	270
5/1/2013	13:04:00	20	0.30	53	58.3997	7	4.9349	270
5/1/2013	13:05:00	12	0.30	53	58.4038	7	4.9368	269
5/1/2013	13:06:00	19	0.20	53	58.4026	7	4.9366	269
5/1/2013	13:07:00	27	0.20	53	58.4007	7	4.9304	272
5/1/2013	13:08:00	19	0.30	53	58.3960	7	4.9393	270
5/1/2013	13:09:00	13	0.40	53	58.3919	7	4.9442	269
5/1/2013	13:10:00	26	0.30	53	58.3878	7	4.9367	270
5/1/2013	13:11:00	30	0.40	53	58.3913	7	4.9362	271
5/1/2013	13:12:00	32	0.30	53	58.3935	7	4.9342	269
5/1/2013	13:13:00	24	0.00	53	58.3927	7	4.9308	269
5/1/2013	13:14:00	18	0.20	53	58.3917	7	4.9312	268
5/1/2013	13:15:00	12	0.10	53	58.3894	7	4.9326	269
Test S3								
5/1/2013	14:15:00	33	0.10	53	58.3671	7	5.0495	286
5/1/2013	14:16:00	24	0.30	53	58.3649	7	5.0405	275
5/1/2013	14:17:00	12	0.40	53	58.3591	7	5.0419	269
5/1/2013	14:18:00	12	0.40	53	58.3546	7	5.0506	270
5/1/2013	14:19:00	97	0.30	53	58.3501	7	5.0598	270
5/1/2013	14:20:00	13	0.30	53	58.3460	7	5.0687	269
5/1/2013	14:21:00	26	0.20	53	58.3462	7	5.0712	271
5/1/2013	14:22:00	23	0.20	53	58.3460	7	5.0755	270
5/1/2013	14:23:00	76	0.10	53	58.3450	7	5.0721	271
5/1/2013	14:24:00	26	0.10	53	58.3456	7	5.0742	269
5/1/2013	14:25:00	31	0.20	53	58.3454	7	5.0733	269
5/1/2013	14:26:00	91	0.10	53	58.3456	7	5.0822	270
5/1/2013	14:27:00	26	0.80	53	58.3448	7	5.0665	270
5/1/2013	14:28:00	25	0.20	53	58.3444	7	5.0631	270
5/1/2013	14:29:00	48	0.10	53	58.3450	7	5.0527	269
5/1/2013	14:30:00	20	0.20	53	58.3442	7	5.0565	270
5/1/2013	14:31:00	38	0.20	53	58.3456	7	5.0542	271
5/1/2013	14:32:00	18	0.20	53	58.3440	7	5.0545	270
5/1/2013	14:33:00	24	0.10	53	58.3448	7	5.0547	270
5/1/2013	14:34:00	49	0.10	53	58.3450	7	5.0530	270
5/1/2013	14:35:00	27	0.00	53	58.3454	7	5.0542	270
5/1/2013	14:36:00	26	0.40	53	58.3448	7	5.0495	269
5/1/2013	14:37:00	26	0.30	53	58.3448	7	5.0415	271
5/1/2013	14:38:00	26	0.20	53	58.3446	7	5.0353	270

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	14:39:00	27	0.60	53	58.3442	7	5.0229	269
5/1/2013	14:40:00	27	0.30	53	58.3448	7	5.0125	270
5/1/2013	14:41:00	25	0.50	53	58.3446	7	5.0017	268
5/1/2013	14:42:00	28	0.20	53	58.3444	7	4.9948	271
5/1/2013	14:43:00	26	0.40	53	58.3442	7	4.9863	269
5/1/2013	14:44:00	25	0.40	53	58.3440	7	4.9751	270
5/1/2013	14:45:00	29	0.40	53	58.3448	7	4.9645	269
5/1/2013	14:46:00	25	0.40	53	58.3427	7	4.9514	268
5/1/2013	14:47:00	27	0.20	53	58.3442	7	4.9463	271
5/1/2013	14:48:00	21	0.10	53	58.3431	7	4.9399	270
5/1/2013	14:49:00	30	0.10	53	58.3437	7	4.9417	271
5/1/2013	14:50:00	15	0.10	53	58.3431	7	4.9411	270
5/1/2013	14:51:00	13	0.10	53	58.3429	7	4.9429	271
5/1/2013	14:52:00	32	0.20	53	58.3442	7	4.9417	272
5/1/2013	14:53:00	18	0.20	53	58.3433	7	4.9408	269
5/1/2013	14:54:00	7	0.20	53	58.3435	7	4.9430	271
5/1/2013	14:55:00	98	0.10	53	58.3433	7	4.9413	270
5/1/2013	14:56:00	30	0.10	53	58.3440	7	4.9413	269
5/1/2013	14:57:00	26	0.00	53	58.3435	7	4.9412	270
5/1/2013	14:58:00	45	0.20	53	58.3429	7	4.9431	271
5/1/2013	14:59:00	93	0.50	53	58.3437	7	4.9466	269
5/1/2013	15:00:00	27	0.40	53	58.3431	7	4.9462	269
5/1/2013	15:01:00	10	0.20	53	58.3429	7	4.9500	272
5/1/2013	15:02:00	24	0.60	53	58.3394	7	4.9499	270
5/1/2013	15:03:00	31	0.40	53	58.3401	7	4.9386	273
5/1/2013	15:04:00	34	0.50	53	58.3456	7	4.9359	274
5/1/2013	15:05:00	27	2.00	53	58.3458	7	4.9149	271
5/1/2013	15:06:00	13	0.20	53	58.3442	7	4.8746	269
5/1/2013	15:07:00	28	0.10	53	58.3431	7	4.8749	270
5/1/2013	15:08:00	10	0.10	53	58.3425	7	4.8755	269
5/1/2013	15:09:00	11	0.10	53	58.3405	7	4.8764	270
5/1/2013	15:10:00	25	0.10	53	58.3403	7	4.8756	272
5/1/2013	15:11:00	34	0.10	53	58.3427	7	4.8758	272
5/1/2013	15:12:00	11	0.10	53	58.3433	7	4.8759	269
5/1/2013	15:13:00	19	0.20	53	58.3411	7	4.8755	270
5/1/2013	15:14:00	13	0.10	53	58.3392	7	4.8762	270
5/1/2013	15:15:00	26	0.00	53	58.3376	7	4.8763	271
5/1/2013	15:16:00	30	0.10	53	58.3403	7	4.8763	271
5/1/2013	15:17:00	37	0.00	53	58.3407	7	4.8759	269
5/1/2013	15:18:00	33	0.10	53	58.3403	7	4.8763	270
5/1/2013	15:19:00	30	0.10	53	58.3409	7	4.8760	271
5/1/2013	15:20:00	24	0.10	53	58.3421	7	4.8755	269
5/1/2013	15:21:00	16	0.00	53	58.3413	7	4.8763	270
5/1/2013	15:22:00	18	0.20	53	58.3392	7	4.8762	270
5/1/2013	15:23:00	35	0.00	53	58.3386	7	4.8767	271
5/1/2013	15:24:00	25	0.50	53	58.3370	7	4.8633	271
5/1/2013	15:25:00	25	0.40	53	58.3347	7	4.8641	271

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/1/2013	15:26:00	16	0.10	53	58.3327	7	4.8656	270
5/1/2013	15:27:00	35	0.50	53	58.3370	7	4.8639	273
5/1/2013	15:28:00	0	0.10	53	58.3415	7	4.8635	271
5/1/2013	15:29:00	94	0.10	53	58.3419	7	4.8632	271
5/1/2013	15:30:00	35	0.30	53	58.3460	7	4.8631	272
Test V1								
5/2/2013	4:15:00	264	0.40	53	50.1778	7	0.6694	90
5/2/2013	4:16:00	265	0.40	53	50.1778	7	0.6588	90
5/2/2013	4:17:00	281	0.40	53	50.1778	7	0.6476	90
5/2/2013	4:18:00	251	0.40	53	50.1778	7	0.6377	91
5/2/2013	4:19:00	263	0.40	53	50.1770	7	0.6262	90
5/2/2013	4:20:00	269	0.40	53	50.1768	7	0.6142	90
5/2/2013	4:21:00	144	0.00	53	50.1766	7	0.6072	90
5/2/2013	4:22:00	83	0.10	53	50.1774	7	0.6116	90
5/2/2013	4:23:00	269	0.10	53	50.1774	7	0.6106	90
5/2/2013	4:24:00	324	0.10	53	50.1770	7	0.6090	90
5/2/2013	4:25:00	302	0.00	53	50.1803	7	0.6078	91
5/2/2013	4:26:00	151	0.10	53	50.1793	7	0.6099	90
5/2/2013	4:27:00	230	0.10	53	50.1774	7	0.6091	91
5/2/2013	4:28:00	5	0.20	53	50.1797	7	0.6078	89
5/2/2013	4:29:00	169	0.20	53	50.1803	7	0.6105	91
5/2/2013	4:30:00	211	0.10	53	50.1787	7	0.6101	90
5/2/2013	4:31:00	337	0.10	53	50.1785	7	0.6077	90
5/2/2013	4:32:00	80	0.50	53	50.1805	7	0.6184	90
5/2/2013	4:33:00	181	0.20	53	50.1789	7	0.6174	90
5/2/2013	4:34:00	72	0.60	53	50.1795	7	0.6278	90
5/2/2013	4:35:00	95	0.20	53	50.1801	7	0.6412	91
5/2/2013	4:36:00	256	0.10	53	50.1797	7	0.6383	89
5/2/2013	4:37:00	78	0.10	53	50.1801	7	0.6398	90
5/2/2013	4:38:00	194	0.10	53	50.1797	7	0.6402	90
5/2/2013	4:39:00	356	0.10	53	50.1801	7	0.6392	89
5/2/2013	4:40:00	77	0.00	53	50.1801	7	0.6400	90
5/2/2013	4:41:00	87	0.40	53	50.1803	7	0.6431	90
5/2/2013	4:42:00	89	0.50	53	50.1803	7	0.6583	90
5/2/2013	4:43:00	102	0.30	53	50.1801	7	0.6659	90
5/2/2013	4:44:00	86	0.40	53	50.1805	7	0.6767	90
5/2/2013	4:45:00	78	0.40	53	50.1811	7	0.6866	90
5/2/2013	4:46:00	86	0.50	53	50.1813	7	0.6994	90
5/2/2013	4:47:00	151	0.10	53	50.1807	7	0.7044	90
5/2/2013	4:48:00	79	0.50	53	50.1801	7	0.7139	90
5/2/2013	4:49:00	249	0.10	53	50.1807	7	0.7143	91
5/2/2013	4:50:00	222	0.00	53	50.1799	7	0.7144	91
5/2/2013	4:51:00	32	0.00	53	50.1805	7	0.7138	90
5/2/2013	4:52:00	115	0.00	53	50.1811	7	0.7154	90
5/2/2013	4:53:00	219	0.00	53	50.1805	7	0.7153	90
5/2/2013	4:54:00	17	0.00	53	50.1805	7	0.7146	90
5/2/2013	4:55:00	333	0.10	53	50.1807	7	0.7145	90

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	4:56:00	7	0.00	53	50.1807	7	0.7145	90
5/2/2013	4:57:00	310	0.10	53	50.1809	7	0.7144	90
5/2/2013	4:58:00	122	0.10	53	50.1805	7	0.7143	90
5/2/2013	4:59:00	290	0.10	53	50.1809	7	0.7146	90
5/2/2013	5:00:00	195	0.00	53	50.1801	7	0.7139	90
5/2/2013	5:01:00	282	0.00	53	50.1805	7	0.7144	90
5/2/2013	5:02:00	256	0.00	53	50.1809	7	0.7144	90
5/2/2013	5:03:00	280	0.10	53	50.1805	7	0.7134	90
5/2/2013	5:04:00	32	0.00	53	50.1809	7	0.7128	90
5/2/2013	5:05:00	196	0.10	53	50.1809	7	0.7131	90
5/2/2013	5:06:00	238	0.00	53	50.1803	7	0.7127	91
5/2/2013	5:07:00	32	0.10	53	50.1811	7	0.7122	90
5/2/2013	5:08:00	164	0.10	53	50.1807	7	0.7141	91
5/2/2013	5:09:00	211	0.40	53	50.1770	7	0.7095	99
5/2/2013	5:10:00	119	0.70	53	50.1709	7	0.7161	96
5/2/2013	5:11:00	89	0.80	53	50.1680	7	0.7386	89
5/2/2013	5:12:00	12	0.50	53	50.1725	7	0.7445	87
5/2/2013	5:13:00	3	0.40	53	50.1793	7	0.7451	86
5/2/2013	5:14:00	29	0.10	53	50.1830	7	0.7458	86
5/2/2013	5:15:00	121	0.20	53	50.1828	7	0.7479	87
5/2/2013	5:16:00	85	0.30	53	50.1815	7	0.7536	88
5/2/2013	5:17:00	86	1.80	53	50.1813	7	0.7798	87
5/2/2013	5:18:00	241	0.20	53	50.1803	7	0.7800	89
5/2/2013	5:20:00	110	0.10	53	50.1838	7	0.7811	86
5/2/2013	5:21:00	154	0.30	53	50.1803	7	0.7832	88
5/2/2013	5:22:00	109	0.30	53	50.1774	7	0.7876	89
5/2/2013	5:23:00	89	2.30	53	50.1785	7	0.8200	89
5/2/2013	5:24:00	308	0.40	53	50.1805	7	0.8253	93
5/2/2013	5:25:00	199	0.20	53	50.1844	7	0.8204	94
5/2/2013	5:26:00	177	0.60	53	50.1744	7	0.8207	93
5/2/2013	5:27:00	52	0.10	53	50.1717	7	0.8230	91
5/2/2013	5:28:00	46	0.20	53	50.1725	7	0.8270	91
5/2/2013	5:29:00	313	0.00	53	50.1750	7	0.8287	90
5/2/2013	5:30:00	354	0.60	53	50.1815	7	0.8268	90
5/2/2013	5:31:00	350	0.60	53	50.1914	7	0.8247	90
5/2/2013	5:32:00	300	0.10	53	50.1963	7	0.8211	91
5/2/2013	5:33:00	164	0.20	53	50.1942	7	0.8205	90
5/2/2013	5:34:00	149	0.50	53	50.1889	7	0.8254	90
5/2/2013	5:35:00	181	0.70	53	50.1809	7	0.8294	92
5/2/2013	5:36:00	270	0.10	53	50.1783	7	0.8270	89
5/2/2013	5:37:00	19	0.10	53	50.1774	7	0.8271	89
5/2/2013	5:38:00	192	0.10	53	50.1772	7	0.8280	90
5/2/2013	5:39:00	354	0.10	53	50.1781	7	0.8281	89
5/2/2013	5:40:00	11	0.10	53	50.1799	7	0.8281	89
5/2/2013	5:41:00	195	0.00	53	50.1801	7	0.8280	89
5/2/2013	5:42:00	180	0.00	53	50.1805	7	0.8278	89
5/2/2013	5:43:00	187	0.10	53	50.1799	7	0.8276	90

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	5:44:00	180	0.30	53	50.1776	7	0.8278	90
5/2/2013	5:45:00	353	0.20	53	50.1766	7	0.8270	88
5/2/2013	5:46:00	149	0.10	53	50.1781	7	0.8277	91
5/2/2013	5:47:00	226	0.00	53	50.1762	7	0.8276	90
5/2/2013	5:48:00	23	0.00	53	50.1768	7	0.8271	90
5/2/2013	5:49:00	18	0.10	53	50.1776	7	0.8279	90
5/2/2013	5:50:00	1	0.10	53	50.1787	7	0.8275	89
5/2/2013	5:51:00	1	0.00	53	50.1795	7	0.8282	90
5/2/2013	5:52:00	3	0.10	53	50.1797	7	0.8277	90
5/2/2013	5:53:00	356	0.00	53	50.1799	7	0.8279	89
5/2/2013	5:54:00	327	0.00	53	50.1805	7	0.8272	89
5/2/2013	5:55:00	56	0.10	53	50.1815	7	0.8273	89
5/2/2013	5:56:00	329	0.10	53	50.1821	7	0.8279	89
5/2/2013	5:57:00	294	0.10	53	50.1828	7	0.8268	90
5/2/2013	5:58:00	33	0.10	53	50.1830	7	0.8267	89
5/2/2013	5:59:00	297	0.00	53	50.1838	7	0.8281	89
5/2/2013	6:00:00	326	0.00	53	50.1842	7	0.8269	90
5/2/2013	6:01:00	87	0.00	53	50.1840	7	0.8274	89
5/2/2013	6:02:00	277	0.10	53	50.1840	7	0.8275	89
5/2/2013	6:03:00	334	0.00	53	50.1842	7	0.8268	89
5/2/2013	6:04:00	90	0.00	53	50.1840	7	0.8277	89
5/2/2013	6:05:00	247	0.00	53	50.1842	7	0.8275	90
5/2/2013	6:06:00	129	0.00	53	50.1838	7	0.8273	89
5/2/2013	6:07:00	149	0.10	53	50.1834	7	0.8281	89
5/2/2013	6:08:00	5	0.10	53	50.1840	7	0.8278	89
5/2/2013	6:09:00	341	0.10	53	50.1860	7	0.8271	90
5/2/2013	6:10:00	57	0.20	53	50.1885	7	0.8282	89
5/2/2013	6:11:00	148	0.30	53	50.1846	7	0.8305	88
5/2/2013	6:12:00	174	0.30	53	50.1785	7	0.8309	88
5/2/2013	6:13:00	168	0.10	53	50.1746	7	0.8313	88
5/2/2013	6:14:00	154	0.10	53	50.1735	7	0.8321	88
5/2/2013	6:15:00	93	0.00	53	50.1731	7	0.8327	88
5/2/2013	6:16:00	24	0.10	53	50.1748	7	0.8338	88
5/2/2013	6:17:00	30	0.20	53	50.1774	7	0.8363	89
5/2/2013	6:18:00	81	0.40	53	50.1791	7	0.8418	89
5/2/2013	6:19:00	107	0.10	53	50.1799	7	0.8798	89
5/2/2013	6:20:00	325	0.30	53	50.1821	7	0.8726	91
5/2/2013	6:21:00	258	0.30	53	50.1844	7	0.8663	92
5/2/2013	6:22:00	323	0.20	53	50.1828	7	0.8610	91
5/2/2013	6:23:00	221	0.20	53	50.1848	7	0.8575	92
5/2/2013	6:24:00	347	0.30	53	50.1854	7	0.8546	90
5/2/2013	6:25:00	257	0.00	53	50.1889	7	0.8524	91
5/2/2013	6:26:00	169	0.30	53	50.1856	7	0.8525	91
5/2/2013	6:27:00	163	0.50	53	50.1787	7	0.8558	90
5/2/2013	6:28:00	83	0.10	53	50.1727	7	0.8599	88
5/2/2013	6:29:00	10	0.40	53	50.1758	7	0.8620	89
5/2/2013	6:30:00	90	0.40	53	50.1807	7	0.8662	91

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
Test V3								
5/2/2013	7:15:00	81	0.50	53	50.0662	7	0.8023	90
5/2/2013	7:16:00	80	0.60	53	50.0682	7	0.8203	92
5/2/2013	7:17:00	84	0.50	53	50.0682	7	0.8343	90
5/2/2013	7:18:00	95	0.40	53	50.0688	7	0.8455	90
5/2/2013	7:19:00	93	0.40	53	50.0686	7	0.8555	90
5/2/2013	7:20:00	88	0.40	53	50.0686	7	0.8653	90
5/2/2013	7:21:00	201	0.00	53	50.0684	7	0.8742	91
5/2/2013	7:22:00	245	0.10	53	50.0670	7	0.8691	89
5/2/2013	7:23:00	58	0.20	53	50.0678	7	0.8727	91
5/2/2013	7:24:00	203	0.20	53	50.0682	7	0.8739	90
5/2/2013	7:25:00	184	0.10	53	50.0660	7	0.8720	90
5/2/2013	7:26:00	66	0.60	53	50.0678	7	0.8799	91
5/2/2013	7:27:00	92	0.40	53	50.0684	7	0.8966	90
5/2/2013	7:28:00	196	0.00	53	50.0680	7	0.8994	90
5/2/2013	7:29:00	98	0.10	53	50.0676	7	0.8997	90
5/2/2013	7:30:00	213	0.10	53	50.0674	7	0.9017	90
5/2/2013	7:31:00	278	0.00	53	50.0668	7	0.8989	90
5/2/2013	7:32:00	58	0.20	53	50.0674	7	0.9010	91
5/2/2013	7:33:00	264	0.10	53	50.0676	7	0.9014	90
5/2/2013	7:34:00	350	0.00	53	50.0674	7	0.8997	90
5/2/2013	7:35:00	76	0.10	53	50.0672	7	0.9015	91
5/2/2013	7:36:00	287	0.10	53	50.0672	7	0.9013	89
5/2/2013	7:37:00	23	0.10	53	50.0674	7	0.8998	91
5/2/2013	7:38:00	102	0.10	53	50.0678	7	0.9023	91
5/2/2013	7:39:00	64	0.10	53	50.0672	7	0.9021	90
5/2/2013	7:40:00	87	0.80	53	50.0680	7	0.9198	91
5/2/2013	7:41:00	91	0.10	53	50.0688	7	0.9271	90
5/2/2013	7:42:00	98	0.20	53	50.0684	7	0.9331	91
5/2/2013	7:43:00	150	0.10	53	50.0674	7	0.9398	90
5/2/2013	7:44:00	88	0.80	53	50.0670	7	0.9471	91
5/2/2013	7:45:00	94	0.30	53	50.0678	7	0.9586	91
5/2/2013	7:46:00	84	0.60	53	50.0684	7	0.9825	91
5/2/2013	7:47:00	80	0.50	53	50.0692	7	0.9993	91
5/2/2013	7:48:00	87	0.10	53	50.0690	7	1.0121	92
5/2/2013	7:49:00	259	0.20	53	50.0688	7	1.0031	89
5/2/2013	7:50:00	76	0.20	53	50.0699	7	1.0053	91
5/2/2013	7:51:00	250	0.20	53	50.0692	7	1.0058	90
5/2/2013	7:52:00	312	0.10	53	50.0688	7	1.0012	90
5/2/2013	7:53:00	104	0.20	53	50.0697	7	1.0036	91
5/2/2013	7:54:00	275	0.20	53	50.0690	7	1.0029	90
5/2/2013	7:55:00	142	0.00	53	50.0686	7	1.0004	91
5/2/2013	7:56:00	99	0.10	53	50.0690	7	1.0038	90
5/2/2013	7:57:00	262	0.20	53	50.0690	7	1.0019	90
5/2/2013	7:58:00	213	0.40	53	50.0674	7	0.9982	95
5/2/2013	7:59:00	199	0.60	53	50.0582	7	0.9887	106
5/2/2013	8:00:00	175	0.20	53	50.0481	7	1.0051	95

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	8:01:00	292	0.20	53	50.0502	7	1.0043	90
5/2/2013	8:02:00	23	0.30	53	50.0553	7	1.0068	88
5/2/2013	8:03:00	3	0.30	53	50.0608	7	1.0077	88
5/2/2013	8:04:00	4	0.30	53	50.0656	7	1.0090	87
5/2/2013	8:05:00	23	0.20	53	50.0695	7	1.0106	87
5/2/2013	8:06:00	86	0.10	53	50.0707	7	1.0121	87
5/2/2013	8:07:00	155	0.40	53	50.0686	7	1.0154	90
5/2/2013	8:08:00	209	0.90	53	50.0574	7	1.0090	95
5/2/2013	8:09:00	246	0.00	53	50.0516	7	1.0055	88
5/2/2013	8:10:00	20	0.30	53	50.0541	7	1.0075	89
5/2/2013	8:11:00	39	0.20	53	50.0572	7	1.0116	90
5/2/2013	8:12:00	344	0.20	53	50.0606	7	1.0128	90
5/2/2013	8:13:00	143	0.00	53	50.0619	7	1.0130	90
5/2/2013	8:14:00	182	0.20	53	50.0602	7	1.0127	90
5/2/2013	8:15:00	183	0.20	53	50.0574	7	1.0125	90
5/2/2013	8:16:00	210	0.10	53	50.0553	7	1.0111	89
5/2/2013	8:17:00	66	0.00	53	50.0555	7	1.0112	89
5/2/2013	8:18:00	172	0.00	53	50.0561	7	1.0115	90
5/2/2013	8:19:00	12	0.20	53	50.0582	7	1.0119	89
5/2/2013	8:20:00	4	0.30	53	50.0619	7	1.0131	89
5/2/2013	8:21:00	348	0.40	53	50.0674	7	1.0127	90
5/2/2013	8:22:00	350	0.20	53	50.0697	7	1.0109	89
5/2/2013	8:23:00	153	0.20	53	50.0680	7	1.0130	91
5/2/2013	8:24:00	183	0.20	53	50.0635	7	1.0142	88
5/2/2013	8:25:00	118	0.30	53	50.0611	7	1.0184	88
5/2/2013	8:26:00	264	0.20	53	50.0596	7	1.0212	92
5/2/2013	8:27:00	327	0.40	53	50.0635	7	1.0146	91
5/2/2013	8:28:00	242	0.30	53	50.0637	7	1.0066	91
5/2/2013	8:29:00	286	0.20	53	50.0617	7	0.9994	90
5/2/2013	8:30:00	337	0.40	53	50.0664	7	0.9941	91
Test V5								
5/2/2013	14:15:00	253	0.10	53	49.9086	7	0.6066	90
5/2/2013	14:16:00	356	0.10	53	49.9098	7	0.6049	88
5/2/2013	14:17:00	122	0.10	53	49.9098	7	0.6064	90
5/2/2013	14:18:00	306	0.10	53	49.9094	7	0.6069	88
5/2/2013	14:19:00	335	0.10	53	49.9102	7	0.6053	88
5/2/2013	14:20:00	90	0.50	53	49.9113	7	0.6099	89
5/2/2013	14:21:00	98	0.30	53	49.9104	7	0.6234	90
5/2/2013	14:22:00	243	0.10	53	49.9098	7	0.6247	88
5/2/2013	14:23:00	288	0.10	53	49.9106	7	0.6226	88
5/2/2013	14:24:00	73	0.10	53	49.9117	7	0.6244	90
5/2/2013	14:25:00	202	0.10	53	49.9104	7	0.6246	91
5/2/2013	14:26:00	4	0.10	53	49.9104	7	0.6243	88
5/2/2013	14:27:00	138	0.00	53	49.9115	7	0.6246	90
5/2/2013	14:28:00	196	0.10	53	49.9106	7	0.6260	91
5/2/2013	14:29:00	316	0.10	53	49.9104	7	0.6241	88
5/2/2013	14:30:00	63	0.10	53	49.9119	7	0.6254	89

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	14:31:00	230	0.10	53	49.9106	7	0.6255	90
5/2/2013	14:32:00	12	0.00	53	49.9106	7	0.6240	89
5/2/2013	14:33:00	102	0.10	53	49.9121	7	0.6264	90
5/2/2013	14:34:00	210	0.10	53	49.9106	7	0.6261	90
5/2/2013	14:35:00	358	0.10	53	49.9102	7	0.6251	89
5/2/2013	14:36:00	72	0.00	53	49.9113	7	0.6254	91
5/2/2013	14:37:00	220	0.10	53	49.9111	7	0.6253	90
5/2/2013	14:38:00	62	0.00	53	49.9104	7	0.6249	90
5/2/2013	14:39:00	276	0.00	53	49.9117	7	0.6253	90
5/2/2013	14:40:00	349	0.00	53	49.9109	7	0.6257	90
5/2/2013	14:41:00	291	0.00	53	49.9111	7	0.6248	89
5/2/2013	14:42:00	352	0.00	53	49.9106	7	0.6248	89
5/2/2013	14:43:00	150	0.10	53	49.9119	7	0.6258	90
5/2/2013	14:44:00	210	0.10	53	49.9109	7	0.6262	91
5/2/2013	14:45:00	14	0.10	53	49.9104	7	0.6246	89
5/2/2013	14:46:00	96	0.10	53	49.9119	7	0.6257	91
5/2/2013	14:47:00	206	0.10	53	49.9104	7	0.6263	90
5/2/2013	14:48:00	340	0.10	53	49.9102	7	0.6249	89
5/2/2013	14:49:00	7	0.00	53	49.9119	7	0.6260	91
5/2/2013	14:50:00	190	0.10	53	49.9102	7	0.6268	91
5/2/2013	14:51:00	358	0.20	53	49.9102	7	0.6250	89
5/2/2013	14:52:00	147	0.10	53	49.9121	7	0.6263	90
5/2/2013	14:53:00	268	0.10	53	49.9102	7	0.6269	90
5/2/2013	14:54:00	13	0.10	53	49.9109	7	0.6249	90
5/2/2013	14:55:00	7	0.10	53	49.9115	7	0.6255	91
5/2/2013	14:56:00	177	0.00	53	49.9104	7	0.6245	90
5/2/2013	14:57:00	327	0.10	53	49.9115	7	0.6249	90
5/2/2013	14:58:00	98	0.00	53	49.9111	7	0.6257	91
5/2/2013	14:59:00	125	0.00	53	49.9106	7	0.6247	90
5/2/2013	15:00:00	335	0.10	53	49.9111	7	0.6249	89
5/2/2013	15:01:00	117	0.10	53	49.9115	7	0.6256	91
5/2/2013	15:02:00	237	0.10	53	49.9104	7	0.6242	90
5/2/2013	15:03:00	351	0.10	53	49.9111	7	0.6243	90
5/2/2013	15:04:00	218	0.10	53	49.9113	7	0.6238	91
5/2/2013	15:05:00	94	0.40	53	49.9106	7	0.6285	91
5/2/2013	15:06:00	301	0.10	53	49.9117	7	0.6304	90
5/2/2013	15:07:00	76	0.00	53	49.9109	7	0.6355	92
5/2/2013	15:08:00	91	0.60	53	49.9109	7	0.6450	91
5/2/2013	15:09:00	111	0.10	53	49.9113	7	0.6586	91
5/2/2013	15:10:00	85	0.50	53	49.9104	7	0.6671	91
5/2/2013	15:11:00	64	0.20	53	49.9119	7	0.6757	90
5/2/2013	15:12:00	86	0.40	53	49.9119	7	0.6861	91
5/2/2013	15:13:00	90	0.40	53	49.9121	7	0.6981	91
5/2/2013	15:14:00	89	0.40	53	49.9125	7	0.7084	90
5/2/2013	15:15:00	89	0.40	53	49.9123	7	0.7200	91
5/2/2013	15:16:00	75	0.40	53	49.9131	7	0.7312	91
5/2/2013	15:17:00	97	0.40	53	49.9121	7	0.7433	92

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	15:18:00	28	0.10	53	49.9129	7	0.7518	91
5/2/2013	15:19:00	57	0.10	53	49.9131	7	0.7511	91
5/2/2013	15:20:00	215	0.10	53	49.9129	7	0.7519	91
5/2/2013	15:21:00	273	0.00	53	49.9123	7	0.7511	90
5/2/2013	15:22:00	14	0.10	53	49.9133	7	0.7513	90
5/2/2013	15:23:00	242	0.10	53	49.9131	7	0.7521	90
5/2/2013	15:24:00	37	0.00	53	49.9129	7	0.7517	91
5/2/2013	15:25:00	183	0.00	53	49.9129	7	0.7514	91
5/2/2013	15:26:00	268	0.40	53	49.9131	7	0.7495	91
5/2/2013	15:27:00	196	0.10	53	49.9129	7	0.7433	90
5/2/2013	15:28:00	300	0.10	53	49.9129	7	0.7410	89
5/2/2013	15:29:00	258	0.10	53	49.9150	7	0.7382	91
5/2/2013	15:30:00	193	0.60	53	49.9084	7	0.7384	92
5/2/2013	15:31:00	125	0.20	53	49.9000	7	0.7348	94
5/2/2013	15:32:00	11	0.60	53	49.9059	7	0.7436	88
5/2/2013	15:33:00	16	0.30	53	49.9133	7	0.7462	87
5/2/2013	15:34:00	156	0.30	53	49.9109	7	0.7487	92
5/2/2013	15:35:00	71	0.30	53	49.9100	7	0.7535	90
5/2/2013	15:36:00	76	0.70	53	49.9125	7	0.7708	89
5/2/2013	15:37:00	59	0.60	53	49.9162	7	0.7703	88
5/2/2013	15:38:00	44	0.50	53	49.9227	7	0.7681	87
5/2/2013	15:39:00	151	0.20	53	49.9219	7	0.7675	91
5/2/2013	15:40:00	188	0.30	53	49.9154	7	0.7690	92
5/2/2013	15:41:00	266	0.10	53	49.9154	7	0.7694	90
5/2/2013	15:42:00	190	0.30	53	49.9121	7	0.7696	92
5/2/2013	15:43:00	14	0.10	53	49.9096	7	0.7700	90
5/2/2013	15:44:00	73	0.70	53	49.9127	7	0.7845	89
5/2/2013	15:45:00	2	0.40	53	49.9174	7	0.7766	89
Test V2								
5/2/2013	17:30:00	335	0.10	53	50.1324	7	0.7710	90
5/2/2013	17:31:00	155	0.20	53	50.1334	7	0.7726	91
5/2/2013	17:32:00	267	0.00	53	50.1326	7	0.7719	90
5/2/2013	17:33:00	52	0.20	53	50.1336	7	0.7726	90
5/2/2013	17:34:00	91	0.60	53	50.1336	7	0.7879	90
5/2/2013	17:35:00	81	0.20	53	50.1330	7	0.7961	90
5/2/2013	17:36:00	143	0.10	53	50.1342	7	0.7997	89
5/2/2013	17:37:00	283	0.10	53	50.1328	7	0.7994	90
5/2/2013	17:38:00	46	0.10	53	50.1334	7	0.7982	90
5/2/2013	17:39:00	16	0.10	53	50.1336	7	0.7998	90
5/2/2013	17:40:00	203	0.10	53	50.1330	7	0.7999	90
5/2/2013	17:41:00	7	0.10	53	50.1340	7	0.7996	90
5/2/2013	17:42:00	92	0.10	53	50.1330	7	0.8006	90
5/2/2013	17:43:00	269	0.10	53	50.1328	7	0.8042	90
5/2/2013	17:44:00	99	0.10	53	50.1330	7	0.8095	91
5/2/2013	17:45:00	136	0.10	53	50.1326	7	0.8120	90
5/2/2013	17:46:00	70	0.40	53	50.1332	7	0.8203	91
5/2/2013	17:47:00	296	0.00	53	50.1334	7	0.8222	89

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	17:48:00	85	0.20	53	50.1332	7	0.8249	90
5/2/2013	17:49:00	45	0.10	53	50.1334	7	0.8268	90
5/2/2013	17:50:00	42	0.10	53	50.1334	7	0.8290	90
5/2/2013	17:51:00	271	0.10	53	50.1340	7	0.8327	89
5/2/2013	17:52:00	87	1.30	53	50.1344	7	0.8464	91
5/2/2013	17:53:00	95	0.20	53	50.1350	7	0.8550	90
5/2/2013	17:54:00	87	0.40	53	50.1350	7	0.8679	90
5/2/2013	17:55:00	79	0.60	53	50.1352	7	0.8768	90
5/2/2013	17:56:00	83	0.50	53	50.1358	7	0.8916	89
5/2/2013	17:57:00	86	0.30	53	50.1363	7	0.9004	89
5/2/2013	17:58:00	96	0.40	53	50.1358	7	0.9080	91
5/2/2013	17:59:00	348	0.10	53	50.1354	7	0.9089	90
5/2/2013	18:00:00	74	0.10	53	50.1363	7	0.9086	90
5/2/2013	18:01:00	325	0.00	53	50.1360	7	0.9089	90
5/2/2013	18:02:00	156	0.00	53	50.1356	7	0.9093	89
5/2/2013	18:03:00	1	0.10	53	50.1358	7	0.9080	89
5/2/2013	18:04:00	335	0.00	53	50.1367	7	0.9099	90
5/2/2013	18:05:00	221	0.00	53	50.1360	7	0.9083	90
5/2/2013	18:06:00	268	0.60	53	50.1358	7	0.9015	90
5/2/2013	18:07:00	12	0.10	53	50.1367	7	0.9004	90
5/2/2013	18:08:00	173	0.30	53	50.1334	7	0.8920	91
5/2/2013	18:09:00	265	0.20	53	50.1295	7	0.9010	89
5/2/2013	18:10:00	43	0.10	53	50.1293	7	0.9032	89
5/2/2013	18:11:00	50	0.10	53	50.1291	7	0.9057	91
5/2/2013	18:12:00	52	0.20	53	50.1309	7	0.9088	91
5/2/2013	18:13:00	296	0.70	53	50.1350	7	0.9141	92
5/2/2013	18:14:00	314	0.20	53	50.1395	7	0.9048	92
5/2/2013	18:15:00	31	0.20	53	50.1403	7	0.9038	88
5/2/2013	18:16:00	93	0.50	53	50.1420	7	0.9144	90
Test V4								
5/2/2013	18:45:00	77	1.10	53	49.9826	7	0.5507	88
5/2/2013	18:46:00	81	1.00	53	49.9867	7	0.5773	88
5/2/2013	18:47:00	85	1.40	53	49.9891	7	0.6120	88
5/2/2013	18:48:00	84	1.00	53	49.9918	7	0.6480	89
5/2/2013	18:49:00	104	0.50	53	49.9922	7	0.6707	90
5/2/2013	18:50:00	277	0.40	53	49.9893	7	0.6697	88
5/2/2013	18:51:00	52	0.10	53	49.9897	7	0.6679	89
5/2/2013	18:52:00	81	0.60	53	49.9910	7	0.6784	88
5/2/2013	18:53:00	88	0.30	53	49.9912	7	0.6914	89
5/2/2013	18:54:00	203	0.00	53	49.9910	7	0.6969	89
5/2/2013	18:55:00	258	0.30	53	49.9891	7	0.6921	92
5/2/2013	18:56:00	43	0.30	53	49.9904	7	0.6927	91
5/2/2013	18:57:00	84	0.60	53	49.9908	7	0.7081	91
5/2/2013	18:58:00	77	0.30	53	49.9910	7	0.7200	92
5/2/2013	18:59:00	232	0.10	53	49.9906	7	0.7212	91
5/2/2013	19:00:00	220	0.00	53	49.9899	7	0.7199	91
5/2/2013	19:01:00	108	0.10	53	49.9904	7	0.7211	91

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	19:02:00	282	0.00	53	49.9912	7	0.7209	91
5/2/2013	19:03:00	159	0.00	53	49.9904	7	0.7213	91
5/2/2013	19:04:00	358	0.10	53	49.9906	7	0.7213	91
5/2/2013	19:05:00	209	0.10	53	49.9908	7	0.7214	91
5/2/2013	19:06:00	229	0.00	53	49.9906	7	0.7212	90
5/2/2013	19:07:00	22	0.00	53	49.9906	7	0.7214	92
5/2/2013	19:08:00	15	0.00	53	49.9910	7	0.7220	92
5/2/2013	19:09:00	191	0.10	53	49.9904	7	0.7220	91
5/2/2013	19:10:00	86	0.60	53	49.9902	7	0.7289	91
5/2/2013	19:11:00	101	0.10	53	49.9902	7	0.7349	92
5/2/2013	19:12:00	72	0.40	53	49.9906	7	0.7420	92
5/2/2013	19:13:00	247	0.20	53	49.9902	7	0.7412	91
5/2/2013	19:14:00	85	0.30	53	49.9906	7	0.7500	91
5/2/2013	19:15:00	79	0.70	53	49.9906	7	0.7534	91
5/2/2013	19:16:00	81	0.10	53	49.9910	7	0.7534	91
5/2/2013	19:17:00	260	0.20	53	49.9899	7	0.7559	90
5/2/2013	19:18:00	88	0.80	53	49.9902	7	0.7739	92
5/2/2013	19:19:00	63	0.20	53	49.9904	7	0.7769	90
5/2/2013	19:20:00	93	0.70	53	49.9908	7	0.7969	91
5/2/2013	19:21:00	78	0.30	53	49.9910	7	0.8035	90
5/2/2013	19:22:00	90	0.30	53	49.9908	7	0.8158	91
5/2/2013	19:23:00	303	0.20	53	49.9918	7	0.8171	91
5/2/2013	19:24:00	336	0.10	53	49.9914	7	0.8177	90
5/2/2013	19:25:00	54	0.10	53	49.9916	7	0.8181	90
5/2/2013	19:26:00	309	0.10	53	49.9908	7	0.8178	90
5/2/2013	19:27:00	100	0.10	53	49.9916	7	0.8185	90
5/2/2013	19:28:00	190	0.10	53	49.9914	7	0.8180	91
5/2/2013	19:29:00	98	0.00	53	49.9918	7	0.8176	90
5/2/2013	19:30:00	246	0.20	53	49.9912	7	0.8164	91
5/2/2013	19:31:00	180	0.30	53	49.9861	7	0.8108	90
5/2/2013	19:32:00	96	0.30	53	49.9859	7	0.8226	88
5/2/2013	19:33:00	56	0.10	53	49.9873	7	0.8239	88
5/2/2013	19:34:00	41	0.10	53	49.9887	7	0.8262	89
5/2/2013	19:35:00	112	0.30	53	49.9881	7	0.8306	91
5/2/2013	19:36:00	244	0.20	53	49.9871	7	0.8373	89
5/2/2013	19:37:00	232	0.60	53	49.9824	7	0.8333	92
5/2/2013	19:38:00	259	0.30	53	49.9785	7	0.8206	89
5/2/2013	19:39:00	341	0.20	53	49.9797	7	0.8158	90
5/2/2013	19:40:00	105	0.50	53	49.9807	7	0.8233	91
5/2/2013	19:41:00	72	0.30	53	49.9820	7	0.8388	90
5/2/2013	19:42:00	80	0.60	53	49.9854	7	0.8455	90
5/2/2013	19:43:00	275	0.60	53	49.9856	7	0.8385	92
5/2/2013	19:44:00	297	0.80	53	49.9893	7	0.8194	92
5/2/2013	19:45:00	312	0.80	53	49.9969	7	0.8019	92
Test V6								
5/2/2013	20:15:00	153	0.20	53	49.8588	7	0.6363	105
5/2/2013	20:16:00	78	0.10	53	49.8566	7	0.6432	97

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	20:17:00	43	0.40	53	49.8611	7	0.6435	90
5/2/2013	20:18:00	74	0.60	53	49.8643	7	0.6593	90
5/2/2013	20:19:00	42	0.40	53	49.8658	7	0.6684	90
5/2/2013	20:20:00	64	0.50	53	49.8699	7	0.6780	90
5/2/2013	20:21:00	93	0.20	53	49.8723	7	0.6856	90
5/2/2013	20:22:00	343	0.40	53	49.8770	7	0.6830	89
5/2/2013	20:23:00	155	0.20	53	49.8764	7	0.6879	91
5/2/2013	20:24:00	284	0.10	53	49.8752	7	0.6871	91
5/2/2013	20:25:00	61	0.30	53	49.8783	7	0.6875	90
5/2/2013	20:26:00	106	0.40	53	49.8773	7	0.7012	90
5/2/2013	20:27:00	65	0.30	53	49.8768	7	0.7128	90
5/2/2013	20:28:00	196	0.10	53	49.8775	7	0.7139	89
5/2/2013	20:29:00	354	0.10	53	49.8775	7	0.7134	89
5/2/2013	20:30:00	42	0.00	53	49.8777	7	0.7140	90
5/2/2013	20:31:00	336	0.10	53	49.8777	7	0.7137	90
5/2/2013	20:32:00	57	0.00	53	49.8777	7	0.7146	91
5/2/2013	20:33:00	295	0.00	53	49.8777	7	0.7140	90
5/2/2013	20:34:00	332	0.10	53	49.8779	7	0.7141	89
5/2/2013	20:35:00	310	0.00	53	49.8773	7	0.7147	90
5/2/2013	20:36:00	80	0.30	53	49.8781	7	0.7157	90
5/2/2013	20:37:00	72	0.40	53	49.8781	7	0.7285	90
5/2/2013	20:38:00	266	0.20	53	49.8777	7	0.7286	89
5/2/2013	20:39:00	164	0.10	53	49.8781	7	0.7360	91
5/2/2013	20:40:00	78	0.20	53	49.8779	7	0.7363	90
5/2/2013	20:41:00	114	0.20	53	49.8779	7	0.7410	90
5/2/2013	20:42:00	67	0.40	53	49.8781	7	0.7438	90
5/2/2013	20:43:00	87	0.60	53	49.8795	7	0.7605	90
5/2/2013	20:44:00	89	0.30	53	49.8789	7	0.7713	89
5/2/2013	20:45:00	71	0.40	53	49.8795	7	0.7793	89
5/2/2013	20:46:00	91	0.40	53	49.8797	7	0.7942	90
5/2/2013	20:47:00	67	0.30	53	49.8803	7	0.8049	90
5/2/2013	20:48:00	129	0.10	53	49.8803	7	0.8042	90
5/2/2013	20:49:00	299	0.00	53	49.8793	7	0.8044	90
5/2/2013	20:50:00	88	0.10	53	49.8801	7	0.8043	89
5/2/2013	20:51:00	21	0.00	53	49.8799	7	0.8051	89
5/2/2013	20:52:00	336	0.10	53	49.8795	7	0.8035	90
5/2/2013	20:53:00	109	0.10	53	49.8803	7	0.8047	89
5/2/2013	20:54:00	263	0.10	53	49.8791	7	0.8041	89
5/2/2013	20:55:00	84	0.10	53	49.8799	7	0.8034	90
5/2/2013	20:56:00	241	0.10	53	49.8795	7	0.8049	89
5/2/2013	20:57:00	17	0.10	53	49.8803	7	0.8033	90
5/2/2013	20:58:00	202	0.40	53	49.8785	7	0.8036	92
5/2/2013	20:59:00	203	0.80	53	49.8691	7	0.7973	104
5/2/2013	21:00:00	214	0.80	53	49.8566	7	0.7857	107
5/2/2013	21:01:00	123	0.30	53	49.8494	7	0.7820	93
5/2/2013	21:02:00	84	1.10	53	49.8500	7	0.8092	91
5/2/2013	21:03:00	16	0.50	53	49.8568	7	0.8138	89

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/2/2013	21:04:00	23	0.30	53	49.8631	7	0.8181	88
5/2/2013	21:05:00	13	0.20	53	49.8674	7	0.8208	90
5/2/2013	21:06:00	12	0.30	53	49.8727	7	0.8221	88
5/2/2013	21:07:00	6	0.30	53	49.8773	7	0.8229	88
5/2/2013	21:08:00	42	0.10	53	49.8799	7	0.8239	87
5/2/2013	21:09:00	162	0.20	53	49.8783	7	0.8247	88
5/2/2013	21:10:00	89	1.50	53	49.8762	7	0.8363	88
5/2/2013	21:11:00	179	0.10	53	49.8752	7	0.8356	89
5/2/2013	21:12:00	23	0.20	53	49.8775	7	0.8371	89
5/2/2013	21:13:00	88	0.40	53	49.8791	7	0.8437	89
5/2/2013	21:14:00	347	0.30	53	49.8809	7	0.8433	91
5/2/2013	21:15:00	183	0.50	53	49.8828	7	0.8422	94
Test S4								
5/3/2013	6:30:00	318	0.10	53	58.2897	7	5.1334	92
5/3/2013	6:31:00	347	0.10	53	58.2901	7	5.1343	92
5/3/2013	6:32:00	216	0.10	53	58.2894	7	5.1347	93
5/3/2013	6:33:00	79	0.00	53	58.2892	7	5.1336	91
5/3/2013	6:34:00	137	0.10	53	58.2890	7	5.1335	91
5/3/2013	6:35:00	125	0.00	53	58.2894	7	5.1335	92
5/3/2013	6:36:00	112	0.00	53	58.2886	7	5.1331	92
5/3/2013	6:37:00	35	0.10	53	58.2903	7	5.1347	92
5/3/2013	6:38:00	230	0.00	53	58.2897	7	5.1342	92
5/3/2013	6:39:00	243	0.10	53	58.2892	7	5.1339	93
5/3/2013	6:40:00	120	0.00	53	58.2899	7	5.1347	92
5/3/2013	6:41:00	212	0.10	53	58.2903	7	5.1339	93
5/3/2013	6:42:00	196	0.10	53	58.2899	7	5.1347	91
5/3/2013	6:43:00	219	0.10	53	58.2892	7	5.1345	93
5/3/2013	6:44:00	174	0.10	53	58.2897	7	5.1341	92
5/3/2013	6:45:00	307	0.00	53	58.2901	7	5.1341	92
5/3/2013	6:46:00	99	0.40	53	58.2897	7	5.1431	92
5/3/2013	6:47:00	104	0.50	53	58.2901	7	5.1563	92
5/3/2013	6:48:00	81	0.30	53	58.2903	7	5.1672	92
5/3/2013	6:49:00	125	0.10	53	58.2901	7	5.1684	92
5/3/2013	6:50:00	41	0.00	53	58.2903	7	5.1709	92
5/3/2013	6:51:00	178	0.10	53	58.2894	7	5.1698	94
5/3/2013	6:52:00	178	0.20	53	58.2890	7	5.1705	93
5/3/2013	6:53:00	14	0.10	53	58.2903	7	5.1704	92
5/3/2013	6:54:00	130	0.00	53	58.2901	7	5.1705	93
5/3/2013	6:55:00	170	0.00	53	58.2901	7	5.1712	92
5/3/2013	6:56:00	231	0.00	53	58.2901	7	5.1706	92
5/3/2013	6:57:00	11	0.00	53	58.2903	7	5.1714	91
5/3/2013	6:58:00	91	0.30	53	58.2899	7	5.1735	92
5/3/2013	6:59:00	82	0.40	53	58.2905	7	5.1892	91
5/3/2013	7:00:00	106	0.30	53	58.2897	7	5.1974	92
5/3/2013	7:01:00	83	0.40	53	58.2897	7	5.2075	93
5/3/2013	7:02:00	98	0.50	53	58.2901	7	5.2203	92
5/3/2013	7:03:00	91	0.40	53	58.2905	7	5.2314	92

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/3/2013	7:04:00	114	0.10	53	58.2899	7	5.2347	92
5/3/2013	7:05:00	350	0.10	53	58.2905	7	5.2342	92
5/3/2013	7:06:00	152	0.10	53	58.2905	7	5.2350	93
5/3/2013	7:07:00	98	0.00	53	58.2905	7	5.2352	93
5/3/2013	7:08:00	207	0.00	53	58.2901	7	5.2348	93
5/3/2013	7:09:00	270	0.00	53	58.2907	7	5.2347	92
5/3/2013	7:10:00	193	0.10	53	58.2901	7	5.2348	92
5/3/2013	7:11:00	20	0.00	53	58.2905	7	5.2350	91
5/3/2013	7:12:00	241	0.10	53	58.2917	7	5.2307	87
5/3/2013	7:13:00	93	1.50	53	58.2938	7	5.2589	88
5/3/2013	7:14:00	3	0.20	53	58.2966	7	5.2723	86
5/3/2013	7:15:00	163	0.30	53	58.2956	7	5.2747	91
Test S5								
5/3/2013	7:45:00	26	0.10	53	58.2390	7	5.1388	90
5/3/2013	7:46:00	255	0.20	53	58.2384	7	5.1325	90
5/3/2013	7:47:00	44	0.10	53	58.2388	7	5.1345	91
5/3/2013	7:48:00	301	0.10	53	58.2388	7	5.1342	91
5/3/2013	7:49:00	119	0.10	53	58.2382	7	5.1354	90
5/3/2013	7:50:00	79	0.40	53	58.2392	7	5.1456	90
5/3/2013	7:51:00	87	0.50	53	58.2392	7	5.1588	91
5/3/2013	7:52:00	226	0.10	53	58.2386	7	5.1599	91
5/3/2013	7:53:00	168	0.10	53	58.2390	7	5.1616	92
5/3/2013	7:54:00	184	0.10	53	58.2388	7	5.1610	91
5/3/2013	7:55:00	239	0.00	53	58.2386	7	5.1607	92
5/3/2013	7:56:00	100	0.00	53	58.2390	7	5.1617	91
5/3/2013	7:57:00	122	0.10	53	58.2390	7	5.1615	90
5/3/2013	7:58:00	95	0.40	53	58.2390	7	5.1710	92
5/3/2013	7:59:00	91	0.40	53	58.2397	7	5.1814	91
5/3/2013	8:00:00	105	0.30	53	58.2399	7	5.1878	91
5/3/2013	8:01:00	228	0.20	53	58.2395	7	5.1919	91
5/3/2013	8:02:00	82	0.20	53	58.2395	7	5.1946	91
5/3/2013	8:03:00	45	0.10	53	58.2397	7	5.1951	91
5/3/2013	8:04:00	161	0.10	53	58.2395	7	5.1979	91
5/3/2013	8:05:00	82	1.10	53	58.2407	7	5.2123	89
5/3/2013	8:06:00	79	0.00	53	58.2405	7	5.2249	91
5/3/2013	8:07:00	90	0.70	53	58.2401	7	5.2365	92
5/3/2013	8:08:00	95	0.30	53	58.2405	7	5.2480	91
5/3/2013	8:09:00	249	0.10	53	58.2405	7	5.2545	91
5/3/2013	8:10:00	181	0.00	53	58.2407	7	5.2545	91
5/3/2013	8:11:00	162	0.10	53	58.2405	7	5.2540	91
5/3/2013	8:12:00	9	0.10	53	58.2411	7	5.2538	91
5/3/2013	8:13:00	66	0.10	53	58.2409	7	5.2546	91
5/3/2013	8:14:00	163	0.20	53	58.2407	7	5.2541	91
5/3/2013	8:15:00	350	0.00	53	58.2411	7	5.2536	90
5/3/2013	8:16:00	93	0.20	53	58.2419	7	5.2516	87
5/3/2013	8:17:00	348	0.20	53	58.2440	7	5.2686	88
5/3/2013	8:18:00	166	0.50	53	58.2421	7	5.2725	93

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/3/2013	8:19:00	99	0.50	53	58.2388	7	5.2784	92
5/3/2013	8:20:00	285	0.30	53	58.2411	7	5.2800	89
5/3/2013	8:21:00	73	0.40	53	58.2425	7	5.2844	89
5/3/2013	8:22:00	55	0.20	53	58.2442	7	5.2955	90
5/3/2013	8:23:00	301	0.30	53	58.2468	7	5.2898	91
5/3/2013	8:24:00	292	0.20	53	58.2466	7	5.2832	90
5/3/2013	8:25:00	356	0.00	53	58.2470	7	5.2816	89
5/3/2013	8:26:00	221	0.10	53	58.2456	7	5.2804	90
5/3/2013	8:27:00	29	0.00	53	58.2460	7	5.2806	89
5/3/2013	8:28:00	117	0.10	53	58.2468	7	5.2818	91
5/3/2013	8:29:00	345	0.10	53	58.2474	7	5.2807	90
5/3/2013	8:30:00	105	0.00	53	58.2481	7	5.2809	90
Test S6								
5/3/2013	8:45:00	189	0.60	53	58.1913	7	5.1450	91
5/3/2013	8:46:00	221	0.40	53	58.1845	7	5.1415	87
5/3/2013	8:47:00	51	0.60	53	58.1882	7	5.1326	88
5/3/2013	8:48:00	107	0.30	53	58.1888	7	5.1305	86
5/3/2013	8:49:00	211	0.10	53	58.1868	7	5.1333	86
5/3/2013	8:50:00	85	0.60	53	58.1841	7	5.1384	85
5/3/2013	8:51:00	196	0.30	53	58.1831	7	5.1426	88
5/3/2013	8:52:00	255	0.40	53	58.1817	7	5.1388	91
5/3/2013	8:53:00	90	0.20	53	58.1819	7	5.1389	92
5/3/2013	8:54:00	313	0.00	53	58.1825	7	5.1388	91
5/3/2013	8:55:00	111	0.30	53	58.1817	7	5.1405	92
5/3/2013	8:56:00	81	0.30	53	58.1833	7	5.1536	91
5/3/2013	8:57:00	96	0.40	53	58.1831	7	5.1642	90
5/3/2013	8:58:00	296	0.00	53	58.1823	7	5.1689	91
5/3/2013	8:59:00	303	0.10	53	58.1827	7	5.1689	91
5/3/2013	9:00:00	190	0.10	53	58.1823	7	5.1694	92
5/3/2013	9:01:00	188	0.10	53	58.1825	7	5.1694	91
5/3/2013	9:02:00	33	0.00	53	58.1821	7	5.1702	91
5/3/2013	9:03:00	4	0.10	53	58.1827	7	5.1700	91
5/3/2013	9:04:00	10	0.10	53	58.1827	7	5.1705	91
5/3/2013	9:05:00	318	0.00	53	58.1825	7	5.1702	92
5/3/2013	9:06:00	169	0.10	53	58.1821	7	5.1705	91
5/3/2013	9:07:00	151	0.10	53	58.1823	7	5.1707	91
5/3/2013	9:08:00	82	0.00	53	58.1823	7	5.1708	91
5/3/2013	9:09:00	26	0.00	53	58.1823	7	5.1706	91
5/3/2013	9:10:00	165	0.10	53	58.1821	7	5.1708	92
5/3/2013	9:11:00	100	0.60	53	58.1823	7	5.1843	91
5/3/2013	9:12:00	92	0.30	53	58.1823	7	5.1943	91
5/3/2013	9:13:00	76	0.40	53	58.1827	7	5.2068	90
5/3/2013	9:14:00	116	0.30	53	58.1823	7	5.2165	92
5/3/2013	9:15:00	104	0.40	53	58.1827	7	5.2286	92
5/3/2013	9:16:00	95	0.30	53	58.1827	7	5.2389	92
5/3/2013	9:17:00	58	0.10	53	58.1835	7	5.2387	91
5/3/2013	9:18:00	217	0.00	53	58.1825	7	5.2390	91

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/3/2013	9:19:00	292	0.00	53	58.1825	7	5.2393	91
5/3/2013	9:20:00	125	0.10	53	58.1827	7	5.2390	91
5/3/2013	9:21:00	286	0.00	53	58.1831	7	5.2393	91
5/3/2013	9:22:00	355	0.20	53	58.1831	7	5.2390	91
5/3/2013	9:23:00	307	0.30	53	58.1854	7	5.2339	84
5/3/2013	9:24:00	48	1.30	53	58.1944	7	5.2445	71
5/3/2013	9:25:00	312	0.60	53	58.2099	7	5.2693	75
5/3/2013	9:26:00	347	0.60	53	58.2200	7	5.2658	72
5/3/2013	9:27:00	355	0.70	53	58.2302	7	5.2610	66
5/3/2013	9:28:00	312	0.90	53	58.2399	7	5.2477	60
5/3/2013	9:29:00	321	0.80	53	58.2513	7	5.2338	56
5/3/2013	9:30:00	321	1.10	53	58.2638	7	5.2158	46
Test N5								
5/3/2013	11:00:00	39	0.30	54	6.8981	7	3.5878	88
5/3/2013	11:01:00	86	0.20	54	6.8984	7	3.5871	90
5/3/2013	11:02:00	97	0.40	54	6.8979	7	3.5986	90
5/3/2013	11:03:00	94	0.50	54	6.8979	7	3.6106	91
5/3/2013	11:04:00	110	0.40	54	6.8969	7	3.6226	90
5/3/2013	11:05:00	98	0.40	54	6.8963	7	3.6331	90
5/3/2013	11:06:00	3	0.10	54	6.8967	7	3.6354	90
5/3/2013	11:07:00	192	0.10	54	6.8965	7	3.6351	90
5/3/2013	11:08:00	326	0.00	54	6.8967	7	3.6367	90
5/3/2013	11:09:00	252	0.10	54	6.8965	7	3.6359	91
5/3/2013	11:10:00	105	0.10	54	6.8961	7	3.6367	91
5/3/2013	11:11:00	279	0.00	54	6.8969	7	3.6368	90
5/3/2013	11:12:00	165	0.10	54	6.8967	7	3.6377	91
5/3/2013	11:13:00	92	0.40	54	6.8967	7	3.6453	91
5/3/2013	11:14:00	106	0.30	54	6.8973	7	3.6559	91
5/3/2013	11:15:00	98	0.10	54	6.8971	7	3.6557	91
5/3/2013	11:16:00	94	0.50	54	6.8967	7	3.6679	91
5/3/2013	11:17:00	73	0.40	54	6.8979	7	3.6807	91
5/3/2013	11:18:00	93	0.50	54	6.8977	7	3.6899	90
5/3/2013	11:19:00	95	0.20	54	6.8969	7	3.6999	92
5/3/2013	11:20:00	76	0.50	54	6.8975	7	3.7127	90
5/3/2013	11:20:34	76	0.50	54	6.8975	7	3.7188	91
5/3/2013	11:21:00	77	0.50	54	6.8973	7	3.7245	91
5/3/2013	11:22:00	92	0.30	54	6.8973	7	3.7343	91
5/3/2013	11:23:00	77	0.50	54	6.8975	7	3.7465	91
5/3/2013	11:24:00	79	0.40	54	6.8979	7	3.7572	91
5/3/2013	11:25:00	259	0.20	54	6.8977	7	3.7641	90
5/3/2013	11:26:00	84	0.10	54	6.8979	7	3.7646	91
5/3/2013	11:27:00	198	0.10	54	6.8979	7	3.7652	92
5/3/2013	11:28:00	59	0.00	54	6.8984	7	3.7647	91
5/3/2013	11:29:00	6	0.10	54	6.8986	7	3.7648	90
5/3/2013	11:30:00	173	0.10	54	6.8979	7	3.7653	91
5/3/2013	11:31:00	212	0.10	54	6.8984	7	3.7656	92
5/3/2013	11:32:00	103	0.00	54	6.8988	7	3.7659	91

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/3/2013	11:33:00	102	0.00	54	6.8981	7	3.7658	91
5/3/2013	11:34:00	196	0.10	54	6.8977	7	3.7652	91
5/3/2013	11:35:00	256	0.40	54	6.8977	7	3.7594	90
5/3/2013	11:36:00	354	0.10	54	6.8990	7	3.7623	89
5/3/2013	11:37:00	129	0.20	54	6.8984	7	3.7591	87
5/3/2013	11:38:00	239	0.20	54	6.8961	7	3.7615	88
5/3/2013	11:39:00	195	0.20	54	6.8930	7	3.7650	91
5/3/2013	11:40:00	78	2.20	54	6.8961	7	3.7942	85
5/3/2013	11:41:00	333	0.90	54	6.9055	7	3.8005	89
5/3/2013	11:42:00	12	0.30	54	6.9139	7	3.7966	89
5/3/2013	11:43:00	155	0.40	54	6.9109	7	3.8006	90
5/3/2013	11:44:00	145	0.80	54	6.9041	7	3.8064	92
5/3/2013	11:45:00	103	0.80	54	6.8959	7	3.8141	90
5/3/2013	11:46:00	96	1.20	54	6.8920	7	3.8282	92
5/3/2013	11:47:00	280	0.30	54	6.8938	7	3.8405	89
5/3/2013	11:48:00	274	0.40	54	6.8951	7	3.8435	90
5/3/2013	11:49:00	71	0.50	54	6.8941	7	3.8480	88
5/3/2013	11:50:00	269	0.60	54	6.8938	7	3.8566	91
5/3/2013	11:51:00	128	0.30	54	6.8928	7	3.8534	90
5/3/2013	11:52:00	252	0.50	54	6.8908	7	3.8569	91
5/3/2013	11:53:00	78	0.20	54	6.8893	7	3.8565	90
5/3/2013	11:54:00	279	0.10	54	6.8885	7	3.8573	90
5/3/2013	11:55:00	2	0.20	54	6.8910	7	3.8584	90
5/3/2013	11:56:00	266	0.90	54	6.8918	7	3.8442	91
5/3/2013	11:57:00	317	0.30	54	6.8957	7	3.8300	89
5/3/2013	11:58:00	280	1.50	54	6.8965	7	3.8186	89
5/3/2013	11:59:00	254	0.30	54	6.8969	7	3.7956	89
5/3/2013	12:00:00	268	1.30	54	6.8957	7	3.7738	91
Test N6								
5/3/2013	12:15:00	259	0.40	54	6.8406	7	3.6448	269
5/3/2013	12:16:00	279	0.40	54	6.8408	7	3.6336	268
5/3/2013	12:17:00	290	0.40	54	6.8418	7	3.6230	269
5/3/2013	12:18:00	275	0.40	54	6.8418	7	3.6109	271
5/3/2013	12:19:00	268	0.40	54	6.8422	7	3.6000	270
5/3/2013	12:20:00	268	0.40	54	6.8426	7	3.5894	270
5/3/2013	12:21:00	267	0.40	54	6.8428	7	3.5783	270
5/3/2013	12:22:00	248	0.10	54	6.8426	7	3.5783	271
5/3/2013	12:23:00	259	0.00	54	6.8432	7	3.5758	270
5/3/2013	12:24:00	261	0.40	54	6.8430	7	3.5687	271
5/3/2013	12:25:00	272	0.40	54	6.8428	7	3.5569	272
5/3/2013	12:26:00	263	0.40	54	6.8418	7	3.5465	270
5/3/2013	12:27:00	264	0.40	54	6.8418	7	3.5353	270
5/3/2013	12:28:00	267	0.30	54	6.8424	7	3.5282	270
5/3/2013	12:29:00	257	0.20	54	6.8420	7	3.5175	270
5/3/2013	12:30:00	267	0.70	54	6.8416	7	3.5021	270
5/3/2013	12:31:00	270	0.50	54	6.8420	7	3.4906	270
5/3/2013	12:32:00	258	0.40	54	6.8420	7	3.4770	270

Date	UTC	HOG	SOG	Latdeg	Latmin	Longdeg	Longmin	Heading
Y-M-D	h:m:s	degr	Kn	Degr	Min	Degr	Min	Degr
5/3/2013	12:33:00	273	0.50	54	6.8422	7	3.4670	270
5/3/2013	12:34:00	295	0.40	54	6.8418	7	3.4542	270
5/3/2013	12:35:00	198	0.10	54	6.8412	7	3.4443	270
5/3/2013	12:36:00	264	0.20	54	6.8412	7	3.4455	270
5/3/2013	12:37:00	344	0.10	54	6.8420	7	3.4452	271
5/3/2013	12:38:00	2	0.10	54	6.8420	7	3.4456	271
5/3/2013	12:39:00	70	0.10	54	6.8416	7	3.4463	270
5/3/2013	12:40:00	219	0.00	54	6.8412	7	3.4460	270
5/3/2013	12:41:00	316	0.00	54	6.8412	7	3.4459	270
5/3/2013	12:42:00	312	0.10	54	6.8418	7	3.4457	270
5/3/2013	12:43:00	97	0.70	54	6.8414	7	3.4563	270
5/3/2013	12:44:00	142	0.10	54	6.8400	7	3.4699	269
5/3/2013	12:45:00	276	1.10	54	6.8418	7	3.4482	270
5/3/2013	12:46:00	274	0.40	54	6.8420	7	3.4412	270
5/3/2013	12:47:00	269	1.20	54	6.8422	7	3.4050	270
5/3/2013	12:48:00	277	0.50	54	6.8424	7	3.3997	269
5/3/2013	12:49:00	85	0.70	54	6.8424	7	3.3864	270
5/3/2013	12:50:00	275	0.40	54	6.8418	7	3.3822	270
5/3/2013	12:51:00	271	0.80	54	6.8422	7	3.3747	270
5/3/2013	12:52:00	94	0.00	54	6.8420	7	3.3632	270
5/3/2013	12:53:00	54	0.00	54	6.8422	7	3.3642	270
5/3/2013	12:54:00	263	0.60	54	6.8420	7	3.3537	270

D Recorded pulling forces

The following pages contain the numerical records of the pulling forces for all tests. The graphs, as included in chapter 4 of this report, are given as additional reference.

Trial location	BSHN		BSHN		BSHN
Trial	1A		1B		1B
time	(ton)		(ton)		(ton)
10:55:00 AM	1	11:52:00 AM	10	11:56:32 AM	29
10:55:06 AM	2	11:52:16 AM	8	11:56:34 AM	29
10:55:12 AM	4	11:52:31 AM	8	11:56:36 AM	30
10:55:19 AM	6	11:52:47 AM	11	11:56:38 AM	31
10:55:25 AM	7	11:53:02 AM	12	11:56:40 AM	32
10:55:31 AM	9	11:53:18 AM	14	11:56:42 AM	34
10:55:37 AM	12	11:53:33 AM	14	11:56:44 AM	37
10:55:44 AM	15	11:53:49 AM	14	11:56:46 AM	39
10:55:50 AM	18	11:54:00 AM	20	11:56:48 AM	35
10:55:56 AM	20	11:54:03 AM	22	11:56:49 AM	38
10:56:00 AM	24	11:54:05 AM	18	11:56:51 AM	40
10:56:06 AM	22	11:54:08 AM	18	11:56:53 AM	39
10:56:12 AM	21	11:54:10 AM	16	11:56:55 AM	39
10:56:19 AM	17	11:54:13 AM	16	11:56:57 AM	39
10:56:25 AM	12	11:54:16 AM	14	11:56:59 AM	40
10:56:31 AM	10	11:54:18 AM	12	11:57:00 AM	38
10:56:37 AM	6	11:54:21 AM	10	11:57:03 AM	37
10:56:44 AM	4	11:54:23 AM	9	11:57:06 AM	38
10:56:50 AM	3	11:54:26 AM	9	11:57:08 AM	42
10:56:56 AM	1	11:54:29 AM	10	11:57:11 AM	41
10:57:00 AM	12	11:54:31 AM	12	11:57:14 AM	40
10:57:03 AM	15	11:54:34 AM	12	11:57:17 AM	35
10:57:05 AM	18	11:54:36 AM	13	11:57:19 AM	36
10:57:08 AM	19	11:54:39 AM	15	11:57:22 AM	40
10:57:10 AM	21	11:54:41 AM	16	11:57:25 AM	36
10:57:13 AM	24	11:54:44 AM	16	11:57:28 AM	36
10:57:16 AM	25	11:54:47 AM	20	11:57:30 AM	39
10:57:18 AM	18	11:54:49 AM	19	11:57:33 AM	40
10:57:21 AM	20	11:54:52 AM	20	11:57:36 AM	40
10:57:23 AM	13	11:54:54 AM	22	11:57:39 AM	39
10:57:26 AM	12	11:54:57 AM	17	11:57:41 AM	42
10:57:29 AM	10	11:55:00 AM	16	11:57:44 AM	44
10:57:31 AM	7	11:55:02 AM	19	11:57:47 AM	46
10:57:34 AM	6	11:55:05 AM	19	11:57:50 AM	47
10:57:36 AM	7	11:55:07 AM	17	11:57:53 AM	46
10:57:39 AM	5	11:55:10 AM	18	11:57:55 AM	44
10:57:41 AM	10	11:55:13 AM	19	11:57:58 AM	44
10:57:44 AM	9	11:55:15 AM	20	11:58:00 AM	45
		11:55:18 AM	21	11:58:03 AM	48
		11:55:20 AM	20	11:58:06 AM	44
		11:55:23 AM	22	11:58:09 AM	44
		11:55:26 AM	24	11:58:11 AM	45
		11:55:28 AM	23	11:58:14 AM	42
		11:55:31 AM	24	11:58:17 AM	33
		11:55:33 AM	24	11:58:20 AM	36
		11:55:36 AM	23	11:58:23 AM	42
		11:55:38 AM	24	11:58:26 AM	45
		11:55:41 AM	25	11:58:29 AM	41
		11:55:44 AM	24	11:58:31 AM	36
		11:55:46 AM	24	11:58:34 AM	40
		11:55:49 AM	24	11:58:37 AM	42
		11:55:51 AM	25	11:58:40 AM	51
		11:55:54 AM	24	11:58:43 AM	49
		11:55:57 AM	24	11:58:46 AM	40
		11:55:59 AM	29	11:58:48 AM	37
		11:56:00 AM	26	11:58:51 AM	51
		11:56:02 AM	35	11:58:54 AM	61
		11:56:04 AM	38	11:58:57 AM	62
		11:56:06 AM	34	11:59:00 AM	40
		11:56:08 AM	32	11:59:03 AM	41
		11:56:10 AM	29	11:59:06 AM	40
		11:56:11 AM	28	11:59:09 AM	47
		11:56:13 AM	28	11:59:11 AM	40
		11:56:15 AM	27	11:59:14 AM	46
		11:56:17 AM	27	11:59:17 AM	47
		11:56:19 AM	27	11:59:20 AM	45
		11:56:21 AM	28	11:59:23 AM	44
		11:56:23 AM	27	11:59:26 AM	35
		11:56:25 AM	28	11:59:29 AM	44
		11:56:27 AM	30	11:59:31 AM	48
		11:56:29 AM	27	11:59:34 AM	50
		11:56:30 AM	28	11:59:37 AM	52
				11:59:40 AM	48
				11:59:43 AM	48
				11:59:46 AM	42
				11:59:48 AM	44

Pulling force [ton]
Time: GMT+2

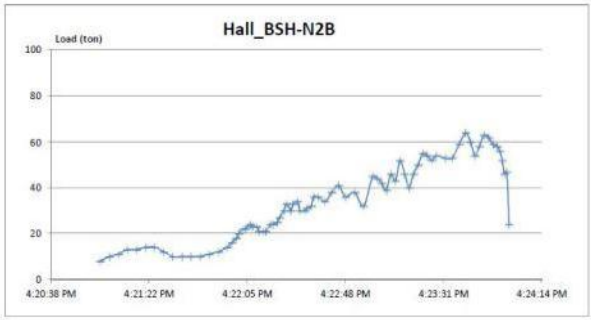
Date: April 30
Position: BSH-N1
Anchor: AC-14

Trial location	BSHN
Trial	2A
time	(ton)
4:00:00 PM	1.8
4:04:00 PM	6
4:04:02 PM	7
4:04:03 PM	8
4:04:05 PM	9
4:04:06 PM	10
4:04:08 PM	12
4:04:09 PM	13
4:04:11 PM	10
4:04:12 PM	10
4:04:14 PM	7
4:04:16 PM	5
4:04:17 PM	5
4:04:19 PM	5
4:04:20 PM	4
4:04:22 PM	4
4:04:23 PM	4
4:04:25 PM	4
4:04:26 PM	4
4:04:28 PM	4
4:04:30 PM	5
4:04:31 PM	7
4:04:33 PM	6
4:04:34 PM	8
4:04:36 PM	10
4:04:37 PM	12
4:04:39 PM	11
4:04:40 PM	13
4:04:42 PM	13
4:04:44 PM	15
4:04:45 PM	15
4:04:47 PM	16
4:04:48 PM	16
4:04:50 PM	15
4:04:51 PM	15
4:04:53 PM	13
4:04:54 PM	11
4:04:56 PM	10
4:04:58 PM	9
4:04:59 PM	8
4:05:00 PM	7
4:05:02 PM	7
4:05:03 PM	9
4:05:05 PM	10
4:05:06 PM	13
4:05:08 PM	14
4:05:09 PM	16
4:05:11 PM	17
4:05:12 PM	17
4:05:14 PM	18
4:05:16 PM	18
4:05:17 PM	16
4:05:19 PM	16
4:05:20 PM	16
4:05:22 PM	14
4:05:23 PM	15
4:05:25 PM	15
4:05:26 PM	14
4:05:28 PM	15
4:05:30 PM	14
4:05:31 PM	17
4:05:33 PM	18
4:05:34 PM	19
4:05:36 PM	19
4:05:37 PM	21
4:05:39 PM	22
4:05:40 PM	24
4:05:42 PM	23
4:05:44 PM	23
4:05:45 PM	23
4:05:47 PM	24
4:05:48 PM	24
4:05:50 PM	24
4:05:51 PM	24
4:05:53 PM	25
4:05:54 PM	28
4:05:56 PM	27
4:05:58 PM	27
4:05:59 PM	29
4:06:00 PM	29
4:06:02 PM	31
4:06:05 PM	31
4:06:07 PM	33
4:06:09 PM	33
4:06:12 PM	32
4:06:14 PM	32
4:06:16 PM	35
4:06:19 PM	35
4:06:21 PM	34
4:06:23 PM	36
4:06:26 PM	36
4:06:28 PM	38
4:06:30 PM	40
4:06:33 PM	38
4:06:35 PM	38
4:06:37 PM	36
4:06:40 PM	34
4:06:42 PM	30
4:06:44 PM	27
4:06:47 PM	22
4:06:49 PM	18
4:06:51 PM	17
4:06:54 PM	12
4:06:56 PM	13
4:07:00 PM	34
4:07:08 PM	3
4:07:16 PM	4
4:07:23 PM	3
4:07:31 PM	2
4:07:39 PM	4

Trial location	BSHN
Trial	2B
time	(ton)
4:21:00 PM	8
4:21:04 PM	10
4:21:08 PM	11
4:21:12 PM	13
4:21:16 PM	13
4:21:20 PM	14
4:21:24 PM	14
4:21:28 PM	12
4:21:32 PM	10
4:21:36 PM	10
4:21:40 PM	10
4:21:44 PM	10
4:21:48 PM	11
4:21:52 PM	12
4:21:56 PM	14
4:21:58 PM	16
4:22:00 PM	18
4:22:01 PM	20
4:22:03 PM	22
4:22:04 PM	22
4:22:06 PM	24
4:22:07 PM	23
4:22:09 PM	23
4:22:10 PM	21
4:22:12 PM	21
4:22:13 PM	21
4:22:15 PM	24
4:22:16 PM	24
4:22:18 PM	25
4:22:19 PM	27
4:22:21 PM	30
4:22:22 PM	33
4:22:24 PM	30
4:22:25 PM	33
4:22:27 PM	34
4:22:28 PM	30
4:22:30 PM	30
4:22:31 PM	31
4:22:33 PM	32
4:22:34 PM	36
4:22:36 PM	36
4:22:39 PM	34
4:22:42 PM	38
4:22:45 PM	41
4:22:48 PM	36
4:22:52 PM	38
4:22:56 PM	32
4:23:00 PM	45
4:23:02 PM	44
4:23:04 PM	42
4:23:06 PM	39
4:23:08 PM	46
4:23:10 PM	43
4:23:12 PM	52
4:23:14 PM	46
4:23:16 PM	40
4:23:18 PM	46
4:23:20 PM	50
4:23:22 PM	55
4:23:24 PM	54
4:23:26 PM	52
4:23:28 PM	54
4:23:32 PM	53
4:23:35 PM	53
4:23:38 PM	59
4:23:41 PM	64
4:23:43 PM	60
4:23:45 PM	54
4:23:47 PM	58
4:23:49 PM	63
4:23:51 PM	62
4:23:53 PM	59
4:23:55 PM	58
4:23:56 PM	56
4:23:57 PM	52
4:23:58 PM	46
4:23:59 PM	47
4:24:00 PM	24

Pulling force [ton]
Time: GMT+2

Date: April 30
Position: BSH-N2
Anchor: Hall

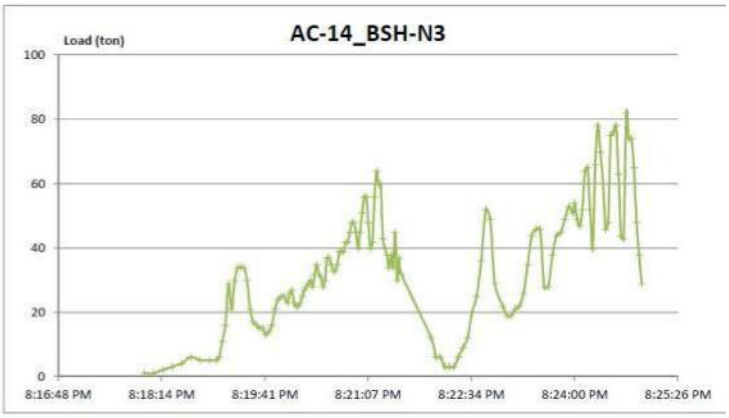


Trial location Trial time	BSHN 3 (ton)	Trial location Trial time	BSHN 3 (ton)
8:16:00 PM	1	8:21:14 PM	64
8:18:00 PM	1	8:21:16 PM	60
8:18:08 PM	1	8:21:18 PM	60
8:18:16 PM	2	8:21:19 PM	43
8:18:23 PM	3	8:21:21 PM	40
8:18:31 PM	4	8:21:23 PM	38
8:18:39 PM	6	8:21:25 PM	34
8:18:47 PM	5	8:21:26 PM	38
8:18:54 PM	5	8:21:28 PM	34
8:19:00 PM	5	8:21:30 PM	45
8:19:03 PM	6	8:21:32 PM	30
8:19:05 PM	11	8:21:33 PM	37
8:19:08 PM	16	8:21:35 PM	32
8:19:10 PM	29	8:22:00 PM	12
8:19:13 PM	21	8:22:04 PM	6
8:19:16 PM	30	8:22:08 PM	6
8:19:18 PM	34	8:22:11 PM	3
8:19:21 PM	34	8:22:15 PM	3
8:19:23 PM	34	8:22:19 PM	3
8:19:26 PM	30	8:22:23 PM	6
8:19:29 PM	21	8:22:27 PM	9
8:19:31 PM	17	8:22:30 PM	12
8:19:34 PM	16	8:22:34 PM	20
8:19:36 PM	15	8:22:38 PM	25
8:19:39 PM	15	8:22:42 PM	36
8:19:41 PM	13	8:22:46 PM	52
8:19:44 PM	14	8:22:49 PM	49
8:19:47 PM	16	8:22:53 PM	29
8:19:49 PM	21	8:23:00 PM	22
8:19:52 PM	24	8:23:03 PM	19
8:19:54 PM	25	8:23:07 PM	19
8:19:57 PM	25	8:23:10 PM	21
8:20:00 PM	23	8:23:14 PM	22
8:20:02 PM	26	8:23:17 PM	26
8:20:03 PM	27	8:23:21 PM	35
8:20:05 PM	23	8:23:24 PM	44
8:20:07 PM	22	8:23:28 PM	46
8:20:09 PM	22	8:23:31 PM	46
8:20:10 PM	23	8:23:35 PM	28
8:20:12 PM	25	8:23:38 PM	28
8:20:14 PM	27	8:23:41 PM	38
8:20:16 PM	28	8:23:45 PM	44
8:20:17 PM	29	8:23:48 PM	45
8:20:19 PM	30	8:23:52 PM	49
8:20:21 PM	28	8:23:55 PM	53
8:20:22 PM	32	8:23:59 PM	51
8:20:24 PM	35	8:24:00 PM	54
8:20:26 PM	32	8:24:02 PM	49
8:20:28 PM	31	8:24:04 PM	47
8:20:29 PM	28	8:24:06 PM	52
8:20:31 PM	30	8:24:09 PM	64
8:20:33 PM	37	8:24:11 PM	65
8:20:35 PM	37	8:24:13 PM	52
8:20:36 PM	35	8:24:15 PM	40
8:20:38 PM	33	8:24:17 PM	66
8:20:40 PM	33	8:24:19 PM	78
8:20:41 PM	35	8:24:22 PM	70
8:20:43 PM	39	8:24:24 PM	60
8:20:45 PM	39	8:24:26 PM	46
8:20:47 PM	39	8:24:28 PM	48
8:20:48 PM	42	8:24:30 PM	75
8:20:50 PM	42	8:24:32 PM	76
8:20:52 PM	45	8:24:35 PM	78
8:20:54 PM	48	8:24:37 PM	63
8:20:55 PM	48	8:24:39 PM	44
8:20:57 PM	45	8:24:41 PM	43
8:20:59 PM	40	8:24:43 PM	82
8:21:00 PM	45	8:24:45 PM	74
8:21:02 PM	51	8:24:48 PM	74
8:21:04 PM	56	8:24:50 PM	65
8:21:06 PM	56	8:24:52 PM	48
8:21:07 PM	48	8:24:54 PM	38
8:21:09 PM	40	8:24:56 PM	29
8:21:11 PM	42	8:25:00 PM	STOP
8:21:13 PM	56		

Pulling force [ton]

Time: GMT+2

Date: April 30
Position: BSH-N3
Anchor: AC-14

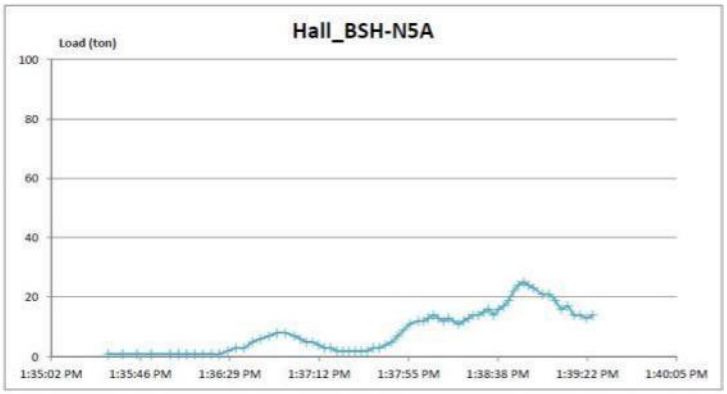


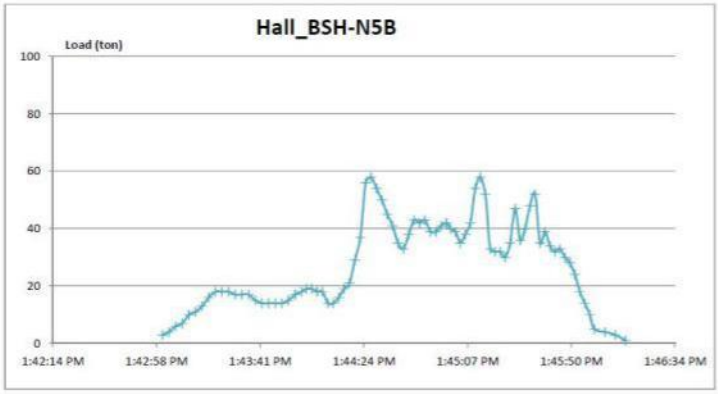
Trial location Trial time	BSH-N 5A (ton)	Trial location Trial time	BSH-N 5B (ton)
1:35:30 PM	1	1:43:00 PM	3
1:35:37 PM	1	1:43:03 PM	4
1:35:44 PM	1	1:43:06 PM	6
1:35:51 PM	1	1:43:08 PM	7
1:36:00 PM	1	1:43:11 PM	10
1:36:04 PM	1	1:43:14 PM	11
1:36:08 PM	1	1:43:17 PM	13
1:36:12 PM	1	1:43:19 PM	16
1:36:16 PM	1	1:43:22 PM	18
1:36:20 PM	1	1:43:25 PM	18
1:36:24 PM	1	1:43:28 PM	18
1:36:28 PM	2	1:43:30 PM	17
1:36:32 PM	3	1:43:33 PM	17
1:36:36 PM	3	1:43:36 PM	17
1:36:40 PM	5	1:43:39 PM	15
1:36:44 PM	6	1:43:41 PM	14
1:36:48 PM	7	1:43:44 PM	14
1:36:52 PM	8	1:43:47 PM	14
1:36:56 PM	8	1:43:50 PM	14
1:37:00 PM	7	1:43:53 PM	15
1:37:03 PM	6	1:43:55 PM	17
1:37:06 PM	5	1:43:58 PM	18
1:37:09 PM	5	1:44:00 PM	19
1:37:12 PM	4	1:44:02 PM	19
1:37:15 PM	3	1:44:04 PM	18
1:37:18 PM	3	1:44:07 PM	18
1:37:21 PM	2	1:44:09 PM	14
1:37:24 PM	2	1:44:11 PM	14
1:37:26 PM	2	1:44:13 PM	16
1:37:29 PM	2	1:44:16 PM	19
1:37:32 PM	2	1:44:18 PM	21
1:37:35 PM	2	1:44:20 PM	29
1:37:38 PM	3	1:44:22 PM	37
1:37:41 PM	3	1:44:25 PM	56
1:37:44 PM	4	1:44:27 PM	58
1:37:47 PM	5	1:44:29 PM	54
1:37:50 PM	7	1:44:31 PM	50
1:37:53 PM	9	1:44:34 PM	45
1:37:56 PM	11	1:44:36 PM	41
1:38:00 PM	12	1:44:38 PM	35
1:38:02 PM	12	1:44:40 PM	33
1:38:05 PM	13	1:44:43 PM	38
1:38:07 PM	14	1:44:45 PM	43
1:38:10 PM	13	1:44:47 PM	42
1:38:12 PM	12	1:44:49 PM	43
1:38:15 PM	13	1:44:52 PM	39
1:38:17 PM	12	1:44:54 PM	39
1:38:19 PM	11	1:44:56 PM	41
1:38:22 PM	12	1:44:58 PM	42
1:38:24 PM	13	1:45:00 PM	40
1:38:27 PM	14	1:45:02 PM	39
1:38:29 PM	14	1:45:04 PM	35
1:38:31 PM	15	1:45:06 PM	38
1:38:34 PM	16	1:45:08 PM	42
1:38:36 PM	14	1:45:10 PM	54
1:38:39 PM	16	1:45:12 PM	58
1:38:41 PM	17	1:45:15 PM	52
1:38:44 PM	19	1:45:17 PM	33
1:38:46 PM	22	1:45:19 PM	32
1:38:48 PM	24	1:45:21 PM	32
1:38:51 PM	25	1:45:23 PM	30
1:38:53 PM	24	1:45:25 PM	35
1:38:56 PM	23	1:45:27 PM	47
1:39:00 PM	21	1:45:29 PM	36
1:39:03 PM	21	1:45:31 PM	40
1:39:06 PM	19	1:45:33 PM	48
1:39:09 PM	16	1:45:35 PM	52
1:39:12 PM	17	1:45:37 PM	35
1:39:15 PM	14	1:45:39 PM	39
1:39:18 PM	14	1:45:41 PM	34
1:39:21 PM	13	1:45:44 PM	32
1:39:24 PM	14	1:45:46 PM	33
		1:45:48 PM	30
		1:45:50 PM	28
		1:45:52 PM	24
		1:45:54 PM	18
		1:45:56 PM	14
		1:45:58 PM	10
		1:46:00 PM	5
		1:46:04 PM	4
		1:46:09 PM	3
		1:46:13 PM	1

Pulling force [ton]

Time: GMT+2

Date: May 3
Position: BSH-N5
Anchor: Hall



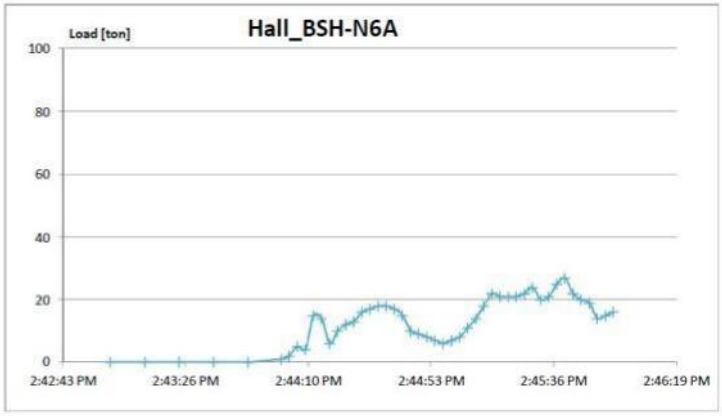


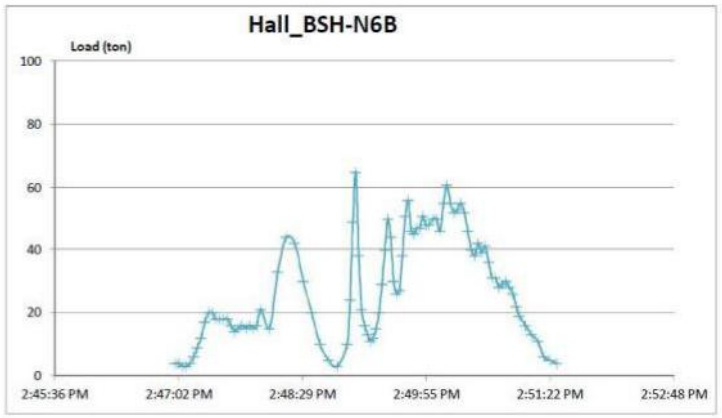
Trial location Trial time	BSH-N 6A (ton)	Trial location Trial time	BSH-N 6B (ton)
2:43:00 PM	0	2:47:00 PM	4
2:43:12 PM	0	2:47:03 PM	4
2:43:24 PM	0	2:47:05 PM	3
2:43:36 PM	0	2:47:08 PM	3
2:43:48 PM	0	2:47:10 PM	4
2:44:00 PM	1	2:47:13 PM	6
2:44:03 PM	2	2:47:16 PM	9
2:44:06 PM	5	2:47:18 PM	12
2:44:09 PM	4	2:47:21 PM	17
2:44:11 PM	15	2:47:23 PM	20
2:44:14 PM	14	2:47:26 PM	20
2:44:17 PM	6	2:47:29 PM	18
2:44:20 PM	10	2:47:31 PM	18
2:44:23 PM	12	2:47:34 PM	18
2:44:26 PM	13	2:47:36 PM	18
2:44:29 PM	16	2:47:39 PM	16
2:44:31 PM	17	2:47:41 PM	14
2:44:34 PM	18	2:47:44 PM	15
2:44:37 PM	18	2:47:47 PM	16
2:44:40 PM	17	2:47:49 PM	15
2:44:43 PM	15	2:47:52 PM	16
2:44:46 PM	10	2:47:54 PM	15
2:44:48 PM	9	2:47:57 PM	16
2:44:51 PM	8	2:48:00 PM	21
2:44:54 PM	7	2:48:06 PM	15
2:44:57 PM	6	2:48:12 PM	33
2:45:00 PM	7	2:48:18 PM	44
2:45:03 PM	8	2:48:24 PM	42
2:45:06 PM	11	2:48:29 PM	30
2:45:09 PM	14	2:48:35 PM	20
2:45:11 PM	18	2:48:41 PM	10
2:45:14 PM	22	2:48:47 PM	5
2:45:17 PM	21	2:48:53 PM	3
2:45:20 PM	21	2:49:00 PM	10
2:45:23 PM	21	2:49:02 PM	24
2:45:26 PM	22	2:49:04 PM	49
2:45:29 PM	24	2:49:06 PM	65
2:45:31 PM	20	2:49:08 PM	38
2:45:34 PM	21	2:49:10 PM	21
2:45:37 PM	25	2:49:12 PM	16
2:45:40 PM	27	2:49:14 PM	13
2:45:43 PM	22	2:49:16 PM	11
2:45:46 PM	20	2:49:18 PM	12
2:45:48 PM	19	2:49:20 PM	15
2:45:51 PM	14	2:49:22 PM	20
2:45:54 PM	15	2:49:24 PM	29
2:45:57 PM	16	2:49:26 PM	40
		2:49:28 PM	50
		2:49:30 PM	44
		2:49:32 PM	30
		2:49:35 PM	26
		2:49:37 PM	27
		2:49:39 PM	38
		2:49:41 PM	51
		2:49:43 PM	56
		2:49:45 PM	46
		2:49:47 PM	45
		2:49:49 PM	47
		2:49:51 PM	47
		2:49:53 PM	51
		2:49:55 PM	48
		2:49:57 PM	48
		2:50:00 PM	50
		2:50:02 PM	50
		2:50:05 PM	46
		2:50:07 PM	55
		2:50:10 PM	61
		2:50:12 PM	55
		2:50:15 PM	52
		2:50:17 PM	53
		2:50:19 PM	55
		2:50:22 PM	52
		2:50:24 PM	46

Pulling force [ton]

Time: GMT+2

Date: May 3
Position: BSH-N6
Anchor: Hall



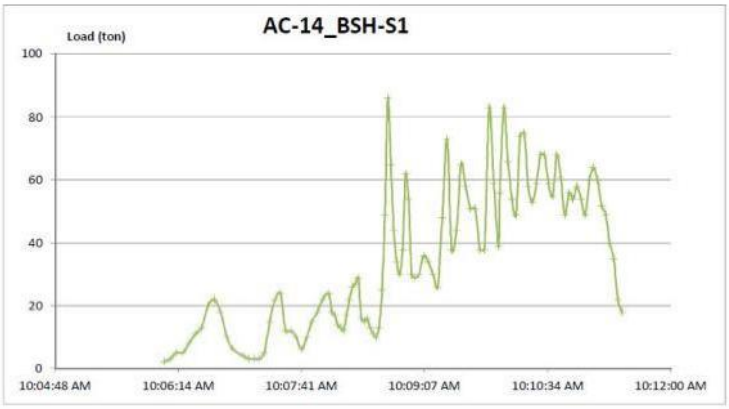


Trial location Trial time	BSH-N 6B (ton)
2:50:27 PM	40
2:50:29 PM	38
2:50:31 PM	42
2:50:34 PM	39
2:50:36 PM	41
2:50:39 PM	36
2:50:41 PM	31
2:50:44 PM	31
2:50:46 PM	28
2:50:48 PM	29
2:50:51 PM	30
2:50:53 PM	28
2:50:56 PM	26
2:50:58 PM	22
2:51:00 PM	19
2:51:04 PM	16
2:51:09 PM	13
2:51:13 PM	11
2:51:17 PM	6
2:51:22 PM	5
2:51:26 PM	4

Trial location	BSHS	Trial location	BSHS
Trial	1	Trial	1
time	(ton)	time	(ton)
10:04:00 AM	0.8	10:08:52 AM	38
10:05:00 AM	0.8	10:08:54 AM	62
10:06:00 AM	0.8	10:08:56 AM	54
10:06:04 AM	2	10:08:58 AM	30
10:06:09 AM	3	10:09:00 AM	29
10:06:13 AM	5	10:09:03 AM	30
10:06:18 AM	5	10:09:07 AM	36
10:06:22 AM	8	10:09:10 AM	34
10:06:26 AM	11	10:09:13 AM	30
10:06:31 AM	13	10:09:16 AM	26
10:06:35 AM	20	10:09:20 AM	48
10:06:40 AM	22	10:09:23 AM	73
10:06:44 AM	18	10:09:26 AM	38
10:06:48 AM	10	10:09:30 AM	44
10:06:53 AM	6	10:09:33 AM	65
10:07:00 AM	4	10:09:36 AM	58
10:07:04 AM	3	10:09:39 AM	51
10:07:07 AM	3	10:09:43 AM	51
10:07:11 AM	3	10:09:46 AM	38
10:07:15 AM	5	10:09:49 AM	38
10:07:19 AM	15	10:09:53 AM	83
10:07:22 AM	22	10:09:56 AM	59
10:07:26 AM	24	10:09:59 AM	39
10:07:30 AM	12	10:10:00 AM	56
10:07:33 AM	12	10:10:03 AM	83
10:07:37 AM	10	10:10:06 AM	66
10:07:41 AM	6	10:10:09 AM	54
10:07:45 AM	10	10:10:11 AM	49
10:07:48 AM	15	10:10:14 AM	74
10:07:52 AM	18	10:10:17 AM	75
10:07:56 AM	22	10:10:20 AM	58
10:08:00 AM	24	10:10:23 AM	53
10:08:02 AM	18	10:10:26 AM	59
10:08:04 AM	17	10:10:29 AM	68
10:08:06 AM	14	10:10:31 AM	68
10:08:08 AM	13	10:10:34 AM	59
10:08:10 AM	12	10:10:37 AM	55
10:08:12 AM	17	10:10:40 AM	68
10:08:15 AM	22	10:10:43 AM	61
10:08:17 AM	26	10:10:46 AM	49
10:08:19 AM	27	10:10:48 AM	56
10:08:21 AM	29	10:10:51 AM	54
10:08:23 AM	16	10:10:54 AM	58
10:08:25 AM	15	10:10:57 AM	54
10:08:27 AM	16	10:11:00 AM	49
10:08:29 AM	13	10:11:03 AM	60
10:08:31 AM	11	10:11:06 AM	64
10:08:33 AM	10	10:11:09 AM	60
10:08:35 AM	13	10:11:11 AM	52
10:08:37 AM	25	10:11:14 AM	49
10:08:39 AM	49	10:11:17 AM	40
10:08:41 AM	86	10:11:20 AM	35
10:08:44 AM	65	10:11:23 AM	22
10:08:46 AM	44	10:11:26 AM	18
10:08:48 AM	34		
10:08:50 AM	30		

Pulling force [ton]
Time: GMT+2

Date: May 1
Position: BSH-S1
Anchor: AC-14

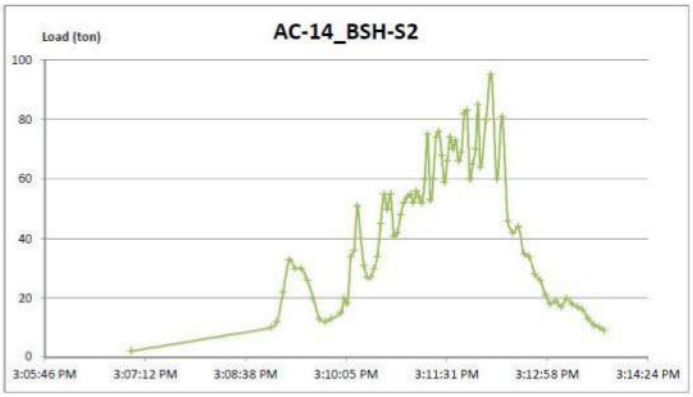


Trial location Trial time	BSHS 2 (ton)	Trial location Trial time	BSHS 2 (ton)
3:07:00 PM	2	3:11:29 PM	59
3:09:00 PM	10	3:11:31 PM	66
3:09:05 PM	12	3:11:34 PM	74
3:09:10 PM	22	3:11:36 PM	70
3:09:16 PM	33	3:11:39 PM	73
3:09:21 PM	30	3:11:41 PM	66
3:09:26 PM	30	3:11:44 PM	69
3:09:31 PM	26	3:11:46 PM	82
3:09:36 PM	20	3:11:48 PM	83
3:09:41 PM	13	3:11:51 PM	60
3:09:47 PM	12	3:11:53 PM	65
3:09:52 PM	13	3:11:56 PM	70
3:10:00 PM	15	3:11:58 PM	85
3:10:03 PM	20	3:12:00 PM	64
3:10:06 PM	18	3:12:05 PM	80
3:10:09 PM	34	3:12:09 PM	95
3:10:11 PM	36	3:12:14 PM	60
3:10:14 PM	51	3:12:19 PM	81
3:10:17 PM	40	3:12:23 PM	46
3:10:20 PM	31	3:12:28 PM	42
3:10:23 PM	27	3:12:33 PM	44
3:10:26 PM	27	3:12:37 PM	35
3:10:29 PM	30	3:12:42 PM	34
3:10:31 PM	34	3:12:47 PM	28
3:10:34 PM	45	3:12:51 PM	26
3:10:37 PM	55	3:12:56 PM	21
3:10:40 PM	50	3:13:00 PM	18
3:10:43 PM	55	3:13:05 PM	19
3:10:46 PM	41	3:13:09 PM	17
3:10:48 PM	42	3:13:14 PM	20
3:10:51 PM	48	3:13:19 PM	18
3:10:54 PM	52	3:13:23 PM	17
3:10:57 PM	54	3:13:28 PM	16
3:11:00 PM	55	3:13:33 PM	13
3:11:02 PM	52	3:13:37 PM	11
3:11:05 PM	56	3:13:42 PM	10
3:11:07 PM	54	3:13:47 PM	9
3:11:10 PM	52		
3:11:12 PM	60		
3:11:15 PM	75		
3:11:17 PM	53		
3:11:19 PM	60		
3:11:22 PM	74		
3:11:24 PM	76		
3:11:27 PM	68		

Pulling force [ton]

Time: GMT+2

Date: May 1
Position: BSH-S2
Anchor: AC-14

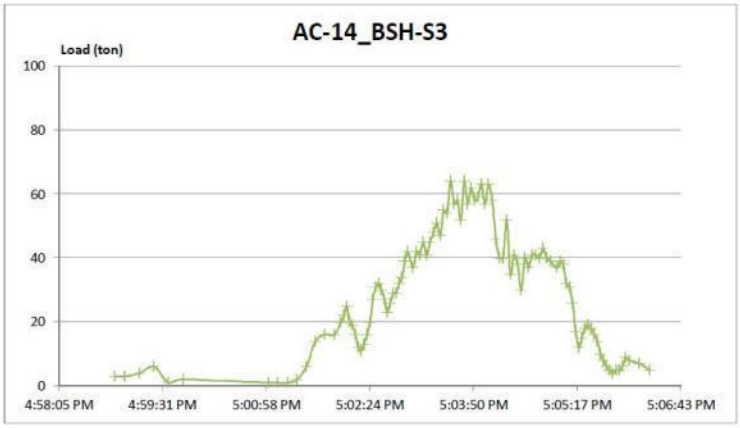


Trial location	BSHS	Trial location	BSHS
Trial	3	Trial	3
time	(ton)	time	(ton)
4:58:00 PM	1	5:03:34 PM	57
4:58:09 PM	2	5:03:37 PM	58
4:58:17 PM	1	5:03:40 PM	52
4:58:26 PM	1.6	5:03:43 PM	64
4:58:35 PM	2	5:03:46 PM	57
4:58:43 PM	2.5	5:03:48 PM	62
4:58:52 PM	3	5:03:51 PM	58
4:59:00 PM	3	5:03:54 PM	59
4:59:12 PM	4	5:03:57 PM	63
4:59:24 PM	6	5:04:00 PM	57
4:59:36 PM	1	5:04:03 PM	63
4:59:48 PM	2	5:04:06 PM	58
5:01:00 PM	1	5:04:09 PM	46
5:01:08 PM	1	5:04:12 PM	40
5:01:16 PM	1	5:04:15 PM	40
5:01:23 PM	2	5:04:18 PM	52
5:01:31 PM	6	5:04:21 PM	35
5:01:39 PM	14	5:04:24 PM	41
5:01:47 PM	16	5:04:27 PM	38
5:01:54 PM	16	5:04:30 PM	30
5:02:00 PM	20	5:04:33 PM	40
5:02:02 PM	22	5:04:36 PM	37
5:02:05 PM	25	5:04:39 PM	41
5:02:07 PM	20	5:04:42 PM	41
5:02:10 PM	19	5:04:45 PM	40
5:02:12 PM	16	5:04:48 PM	43
5:02:15 PM	12	5:04:51 PM	40
5:02:17 PM	11	5:04:54 PM	39
5:02:19 PM	13	5:05:00 PM	37
5:02:22 PM	16	5:05:03 PM	39
5:02:24 PM	20	5:05:05 PM	38
5:02:27 PM	27	5:05:08 PM	32
5:02:29 PM	31	5:05:10 PM	31
5:02:31 PM	32	5:05:13 PM	26
5:02:34 PM	30	5:05:16 PM	17
5:02:36 PM	27	5:05:18 PM	12
5:02:39 PM	23	5:05:21 PM	15
5:02:41 PM	26	5:05:23 PM	18
5:02:44 PM	29	5:05:26 PM	19
5:02:46 PM	29	5:05:29 PM	18
5:02:48 PM	32	5:05:31 PM	16
5:02:51 PM	34	5:05:34 PM	14
5:02:53 PM	39	5:05:36 PM	10
5:02:56 PM	42	5:05:39 PM	8
5:03:00 PM	37	5:05:41 PM	6
5:03:03 PM	42	5:05:44 PM	5
5:03:06 PM	41	5:05:47 PM	4
5:03:09 PM	45	5:05:49 PM	5
5:03:11 PM	41	5:05:52 PM	5
5:03:14 PM	45	5:05:54 PM	6
5:03:17 PM	48	5:05:57 PM	9
5:03:20 PM	51	5:06:00 PM	8
5:03:23 PM	47	5:06:09 PM	7
5:03:26 PM	55	5:06:17 PM	5
5:03:29 PM	54		
5:03:31 PM	64		

Pulling force [ton]

Time: GMT+2

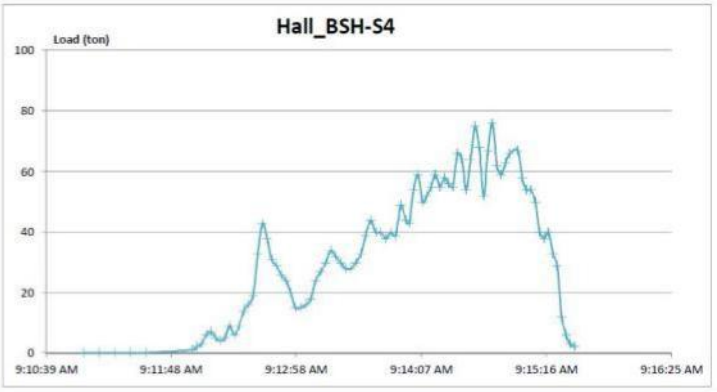
Date: May 1
Position: BSH-S3
Anchor: AC-14



Trial location Trial time	BSHS 4 (ton)	Trial location Trial time	BSHS 4 (ton)
9:11:00 AM	0	9:13:53 AM	39
9:11:09 AM	0	9:13:55 AM	49
9:11:17 AM	0	9:13:58 AM	44
9:11:26 AM	0	9:14:00 AM	43
9:11:35 AM	0	9:14:02 AM	54
9:12:00 AM	1	9:14:05 AM	59
9:12:03 AM	2	9:14:07 AM	50
9:12:05 AM	3	9:14:10 AM	52
9:12:08 AM	6	9:14:12 AM	55
9:12:10 AM	7	9:14:15 AM	59
9:12:13 AM	5	9:14:17 AM	55
9:12:16 AM	4	9:14:19 AM	58
9:12:18 AM	5	9:14:22 AM	56
9:12:21 AM	9	9:14:24 AM	55
9:12:23 AM	6	9:14:27 AM	66
9:12:26 AM	9	9:14:29 AM	64
9:12:29 AM	14	9:14:31 AM	54
9:12:31 AM	16	9:14:34 AM	64
9:12:34 AM	19	9:14:36 AM	75
9:12:36 AM	33	9:14:39 AM	68
9:12:39 AM	43	9:14:41 AM	52
9:12:41 AM	38	9:14:44 AM	67
9:12:44 AM	31	9:14:46 AM	76
9:12:47 AM	29	9:14:48 AM	62
9:12:49 AM	26	9:14:51 AM	59
9:12:52 AM	24	9:14:53 AM	63
9:12:54 AM	20	9:14:56 AM	66
9:12:57 AM	15	9:15:00 AM	67
9:13:00 AM	15	9:15:02 AM	58
9:13:03 AM	16	9:15:05 AM	54
9:13:06 AM	18	9:15:07 AM	54
9:13:08 AM	24	9:15:10 AM	50
9:13:11 AM	27	9:15:12 AM	40
9:13:14 AM	30	9:15:15 AM	38
9:13:17 AM	34	9:15:17 AM	40
9:13:19 AM	32	9:15:19 AM	33
9:13:22 AM	30	9:15:22 AM	29
9:13:25 AM	28	9:15:24 AM	12
9:13:28 AM	28	9:15:27 AM	6
9:13:30 AM	30	9:15:29 AM	3
9:13:33 AM	33	9:15:31 AM	2
9:13:36 AM	39		
9:13:39 AM	44		
9:13:41 AM	40		
9:13:44 AM	40		
9:13:47 AM	38		
9:13:50 AM	40		

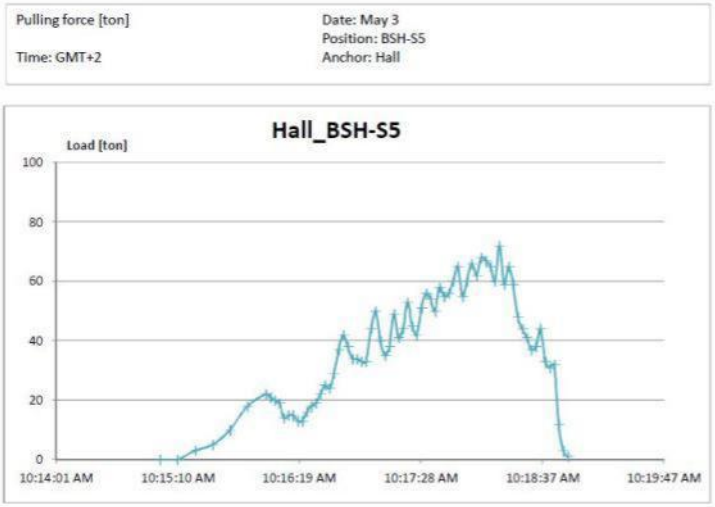
Pulling force [ton]
Time: GMT+2

Date: May 3
Position: BSH-S4
Anchor: Hall



Trial location	BSHS
Trial	5
time	(ton)
10:15:00 AM	0
10:15:10 AM	0
10:15:20 AM	3
10:15:30 AM	5
10:15:40 AM	10
10:15:50 AM	18
10:16:00 AM	22
10:16:03 AM	21
10:16:05 AM	20
10:16:08 AM	19
10:16:10 AM	14
10:16:13 AM	15
10:16:16 AM	15
10:16:18 AM	13
10:16:21 AM	13
10:16:23 AM	16
10:16:26 AM	18
10:16:29 AM	19
10:16:31 AM	22
10:16:34 AM	25
10:16:36 AM	24
10:16:39 AM	29
10:16:41 AM	37
10:16:44 AM	42
10:16:47 AM	38
10:16:49 AM	34
10:16:52 AM	34
10:16:54 AM	33
10:16:57 AM	33
10:17:00 AM	44
10:17:03 AM	50
10:17:05 AM	40
10:17:08 AM	35
10:17:10 AM	38
10:17:13 AM	49
10:17:16 AM	41
10:17:18 AM	44
10:17:21 AM	53
10:17:23 AM	45
10:17:26 AM	42
10:17:29 AM	51
10:17:31 AM	56
10:17:34 AM	54
10:17:36 AM	50
10:17:39 AM	58
10:17:41 AM	55
10:17:44 AM	56

Trial location	BSHS
Trial	5
time	(ton)
10:17:47 AM	60
10:17:49 AM	65
10:17:52 AM	55
10:17:54 AM	60
10:17:57 AM	66
10:18:00 AM	62
10:18:03 AM	68
10:18:05 AM	67
10:18:08 AM	65
10:18:10 AM	60
10:18:13 AM	72
10:18:16 AM	59
10:18:18 AM	65
10:18:21 AM	59
10:18:23 AM	48
10:18:26 AM	44
10:18:29 AM	41
10:18:31 AM	37
10:18:34 AM	38
10:18:36 AM	44
10:18:39 AM	33
10:18:41 AM	31
10:18:44 AM	32
10:18:47 AM	12
10:18:49 AM	3
10:18:52 AM	1

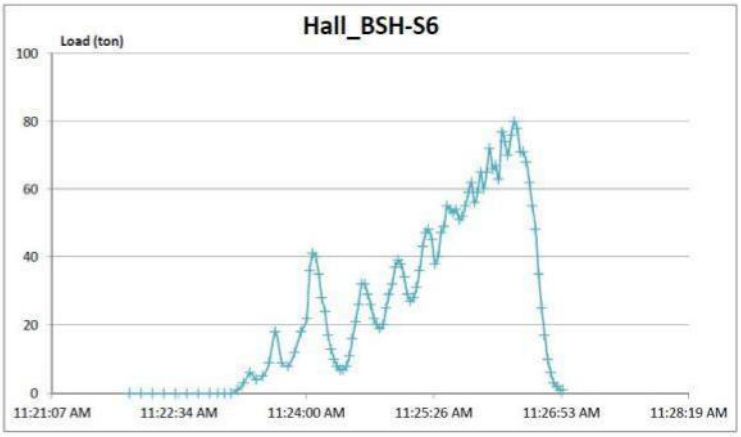


Trial location	BSHS 6	Trial location	BSHS 6
Trial time	(ton)	Trial time	(ton)
11:22:00 AM	0	11:25:06 AM	34
11:22:08 AM	0	11:25:08 AM	29
11:22:16 AM	0	11:25:10 AM	27
11:22:23 AM	0	11:25:12 AM	28
11:22:31 AM	0	11:25:15 AM	31
11:22:39 AM	0	11:25:17 AM	36
11:22:47 AM	0	11:25:19 AM	43
11:22:54 AM	0	11:25:21 AM	47
11:23:00 AM	0	11:25:23 AM	48
11:23:04 AM	0	11:25:25 AM	45
11:23:09 AM	0	11:25:27 AM	38
11:23:13 AM	1	11:25:29 AM	40
11:23:17 AM	3	11:25:31 AM	47
11:23:22 AM	6	11:25:33 AM	49
11:23:26 AM	4	11:25:35 AM	55
11:23:30 AM	5	11:25:37 AM	54
11:23:35 AM	9	11:25:39 AM	53
11:23:39 AM	18	11:25:41 AM	54
11:23:43 AM	9	11:25:44 AM	51
11:23:48 AM	8	11:25:46 AM	52
11:23:52 AM	12	11:25:48 AM	55
11:23:56 AM	18	11:25:50 AM	59
11:24:00 AM	22	11:25:52 AM	62
11:24:02 AM	36	11:25:54 AM	56
11:24:04 AM	41	11:25:56 AM	59
11:24:06 AM	40	11:25:58 AM	65
11:24:08 AM	35	11:26:00 AM	60
11:24:10 AM	28	11:26:02 AM	65
11:24:12 AM	24	11:26:04 AM	72
11:24:15 AM	17	11:26:06 AM	66
11:24:17 AM	13	11:26:08 AM	67
11:24:19 AM	10	11:26:10 AM	63
11:24:21 AM	8	11:26:12 AM	77
11:24:23 AM	7	11:26:15 AM	74
11:24:25 AM	7	11:26:17 AM	70
11:24:27 AM	8	11:26:19 AM	76
11:24:29 AM	11	11:26:21 AM	80
11:24:31 AM	16	11:26:23 AM	78
11:24:33 AM	21	11:26:25 AM	71
11:24:35 AM	26	11:26:27 AM	71
11:24:37 AM	32	11:26:29 AM	68
11:24:39 AM	32	11:26:31 AM	62
11:24:41 AM	29	11:26:33 AM	55
11:24:44 AM	26	11:26:35 AM	48
11:24:46 AM	22	11:26:37 AM	35
11:24:48 AM	20	11:26:39 AM	25
11:24:50 AM	19	11:26:41 AM	17
11:24:52 AM	20	11:26:44 AM	10
11:24:54 AM	25	11:26:46 AM	6
11:24:56 AM	29	11:26:48 AM	3
11:24:58 AM	32	11:26:50 AM	2
11:25:00 AM	37	11:26:52 AM	1
11:25:02 AM	39	11:26:54 AM	1
11:25:04 AM	38		

Pulling force [ton]

Time: GMT+2

Date: May 3
Position: BSH-S6
Anchor: Hall



Trial location	VTG
Trial	1A
time	(ton)
7:08:00 AM	0
7:08:20 AM	0
7:08:40 AM	0
7:09:00 AM	0
7:09:09 AM	0
7:09:17 AM	0
7:09:26 AM	2
7:09:35 AM	4
7:09:43 AM	4
7:09:52 AM	4
7:10:00 AM	4
7:10:05 AM	5
7:10:09 AM	6
7:10:14 AM	10
7:10:18 AM	12
7:10:23 AM	14
7:10:27 AM	15
7:10:32 AM	16
7:10:37 AM	14
7:10:41 AM	12
7:10:46 AM	10
7:10:50 AM	8
7:10:55 AM	6
7:11:00 AM	5
7:11:04 AM	6
7:11:08 AM	8
7:11:12 AM	11
7:11:16 AM	14
7:11:19 AM	15
7:11:23 AM	13
7:11:27 AM	14
7:11:31 AM	10
7:11:35 AM	10
7:11:39 AM	11
7:11:43 AM	11
7:11:47 AM	13
7:11:51 AM	14
7:11:54 AM	14
7:11:58 AM	16
7:12:00 AM	13
7:12:08 AM	13
7:12:16 AM	14
7:12:23 AM	13
7:12:31 AM	14
7:12:39 AM	15
7:12:47 AM	16
7:12:54 AM	17
7:13:00 AM	16
7:13:03 AM	16
7:13:06 AM	18
7:13:10 AM	21
7:13:13 AM	25
7:13:16 AM	29
7:13:19 AM	29
7:13:22 AM	28
7:13:26 AM	27
7:13:29 AM	30
7:13:32 AM	32
7:13:35 AM	33
7:13:38 AM	33
7:13:42 AM	31
7:13:45 AM	33
7:13:48 AM	35
7:13:51 AM	35
7:13:54 AM	36
7:13:58 AM	37
7:14:00 AM	37
7:14:03 AM	37
7:14:06 AM	38
7:14:09 AM	37
7:14:11 AM	40
7:14:14 AM	42
7:14:17 AM	44
7:14:20 AM	45
7:14:23 AM	49
7:14:26 AM	49
7:14:29 AM	45
7:14:31 AM	48
7:14:34 AM	51
7:14:37 AM	50
7:14:40 AM	50
7:14:43 AM	54
7:14:46 AM	52
7:14:48 AM	55
7:14:51 AM	57
7:14:54 AM	56
7:14:57 AM	56
7:15:00 AM	59
7:15:02 AM	59
7:15:05 AM	60
7:15:07 AM	61
7:15:10 AM	60
7:15:12 AM	60
7:15:15 AM	61
7:15:17 AM	61
7:15:19 AM	64
7:15:22 AM	64
7:15:24 AM	62
7:15:27 AM	63
7:15:29 AM	65

Trial location	VTG
Trial	1B
time	(ton)
7:18:00 AM	8
7:18:09 AM	6
7:18:17 AM	6
7:18:26 AM	10
7:18:35 AM	16
7:18:43 AM	19
7:18:52 AM	20
7:19:00 AM	19
7:19:04 AM	16
7:19:09 AM	12
7:19:13 AM	10
7:19:17 AM	11
7:19:22 AM	15
7:19:26 AM	22
7:19:30 AM	25
7:19:35 AM	22
7:19:39 AM	19
7:19:43 AM	21
7:19:48 AM	25
7:19:52 AM	27
7:20:00 AM	28
7:20:03 AM	28
7:20:07 AM	30
7:20:10 AM	32
7:20:14 AM	32
7:20:17 AM	35
7:20:21 AM	36
7:20:24 AM	33
7:20:28 AM	36
7:20:31 AM	39
7:20:35 AM	39
7:20:38 AM	43
7:20:41 AM	41
7:20:45 AM	42
7:20:48 AM	45
7:20:52 AM	46
7:20:55 AM	45
7:21:00 AM	48
7:21:03 AM	50
7:21:07 AM	47
7:21:10 AM	50
7:21:14 AM	53
7:21:17 AM	50
7:21:21 AM	52
7:21:24 AM	56
7:21:28 AM	52
7:21:31 AM	56
7:21:35 AM	57
7:21:38 AM	58
7:21:41 AM	55
7:21:45 AM	62
7:21:48 AM	58
7:21:52 AM	56
7:21:55 AM	56
7:22:00 AM	55
7:22:03 AM	48
7:22:07 AM	56
7:22:10 AM	60
7:22:14 AM	17
7:22:17 AM	16
7:22:21 AM	14
7:22:24 AM	13
7:22:28 AM	10
7:22:31 AM	6
7:22:35 AM	3

lining up

Trial location	VTG
Trial	1A
time	(ton)
7:15:31 AM	62
7:15:34 AM	64
7:15:36 AM	66
7:15:39 AM	62
7:15:41 AM	64
7:15:44 AM	65
7:15:46 AM	68
7:15:48 AM	73
7:15:51 AM	70
7:15:53 AM	60
7:15:56 AM	58
7:15:58 AM	60
7:16:00 AM	64
7:16:03 AM	30
7:16:07 AM	44
7:16:10 AM	41
7:16:14 AM	52
7:16:17 AM	37
7:16:21 AM	26
7:16:24 AM	20
7:16:28 AM	14
7:16:31 AM	10
7:16:35 AM	6
7:16:38 AM	4
7:16:41 AM	4
7:16:45 AM	3

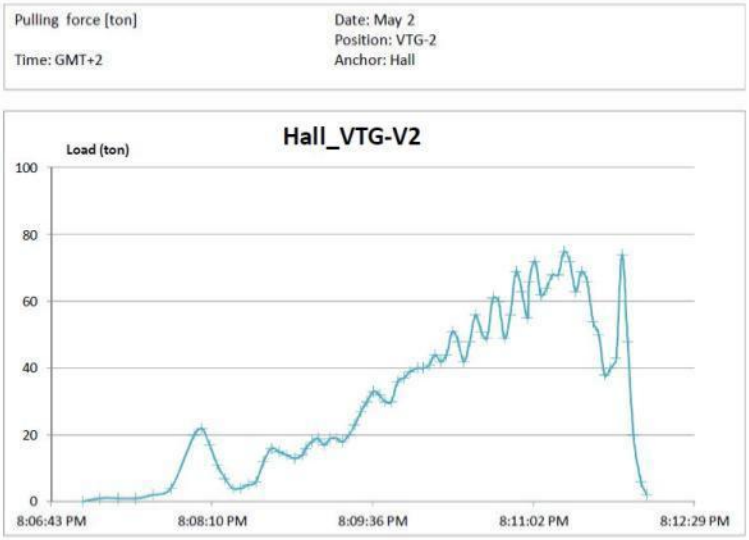
Trial location	VTG
Trial	1C
time	(ton)
8:09:00 AM	1
8:09:03 AM	1
8:09:07 AM	1
8:09:11 AM	2
8:09:16 AM	3
8:09:20 AM	5
8:09:24 AM	8
8:09:29 AM	9
8:09:33 AM	10
8:09:37 AM	7
8:09:41 AM	5
8:09:46 AM	4
8:09:50 AM	3
8:09:54 AM	2
8:09:59 AM	3
8:10:00 AM	3
8:10:04 AM	6
8:10:08 AM	9
8:10:12 AM	13
8:10:16 AM	12
8:10:19 AM	10
8:10:23 AM	9
8:10:27 AM	6
8:10:31 AM	5
8:10:35 AM	5
8:10:39 AM	6
8:10:43 AM	7
8:10:47 AM	9
8:10:51 AM	11
8:10:54 AM	12
8:11:00 AM	11
8:11:03 AM	9
8:11:06 AM	9
8:11:09 AM	8
8:11:11 AM	9
8:11:14 AM	10
8:11:17 AM	14
8:11:20 AM	13
8:11:23 AM	13
8:11:26 AM	12
8:11:29 AM	12
8:11:31 AM	11
8:11:34 AM	11
8:11:37 AM	11
8:11:40 AM	12
8:11:43 AM	12
8:11:46 AM	13
8:11:48 AM	13
8:11:51 AM	13
8:11:54 AM	14
8:11:57 AM	14
8:12:00 AM	14
8:12:03 AM	13
8:12:06 AM	14
8:12:10 AM	14
8:12:13 AM	15
8:12:16 AM	16
8:12:19 AM	17
8:12:22 AM	16
8:12:26 AM	16
8:12:29 AM	16
8:12:32 AM	16
8:12:35 AM	16
8:12:38 AM	16
8:12:42 AM	16
8:12:45 AM	17
8:12:48 AM	19
8:12:51 AM	18
8:12:54 AM	18
8:12:58 AM	18
8:13:00 AM	16
8:13:03 AM	18
8:13:06 AM	18
8:13:10 AM	18
8:13:13 AM	17
8:13:16 AM	19
8:13:19 AM	21
8:13:22 AM	21
8:13:26 AM	21
8:13:29 AM	22
8:13:32 AM	21
8:13:35 AM	20
8:13:38 AM	21
8:13:42 AM	21
8:13:45 AM	21
8:13:48 AM	23
8:13:51 AM	24
8:13:54 AM	23
8:13:58 AM	24
8:14:00 AM	23
8:14:03 AM	22
8:14:06 AM	24
8:14:10 AM	25
8:14:13 AM	26
8:14:16 AM	27
8:14:19 AM	26
8:14:22 AM	26
8:14:26 AM	25
8:14:29 AM	27
8:14:32 AM	26

Trial location	VTG
Trial	1C
time	(ton)
8:14:35 AM	28
8:14:38 AM	26
8:14:42 AM	26
8:14:45 AM	27
8:14:48 AM	28
8:14:51 AM	29
8:14:54 AM	29
8:15:00 AM	29
8:15:03 AM	29
8:15:06 AM	30
8:15:10 AM	27
8:15:13 AM	30
8:15:16 AM	29
8:15:19 AM	30
8:15:22 AM	31
8:15:26 AM	31
8:15:29 AM	30
8:15:32 AM	32
8:15:35 AM	33
8:15:38 AM	31
8:15:42 AM	32
8:15:45 AM	33
8:15:48 AM	37
8:15:51 AM	39
8:15:54 AM	39
8:16:00 AM	39
8:16:03 AM	40
8:16:06 AM	48
8:16:08 AM	40
8:16:11 AM	43
8:16:14 AM	42
8:16:17 AM	40
8:16:19 AM	44
8:16:22 AM	42
8:16:25 AM	40
8:16:28 AM	42
8:16:30 AM	47
8:16:33 AM	48
8:16:36 AM	45
8:16:39 AM	46
8:16:41 AM	49
8:16:44 AM	48
8:16:47 AM	47
8:16:50 AM	46
8:16:53 AM	49
8:16:55 AM	51
8:17:00 AM	50
8:17:03 AM	48
8:17:07 AM	48
8:17:10 AM	50
8:17:13 AM	49
8:17:16 AM	49
8:17:20 AM	50
8:17:23 AM	50
8:17:26 AM	49
8:17:30 AM	40
8:17:33 AM	27
8:17:36 AM	21
8:17:39 AM	18
8:17:43 AM	18
8:17:46 AM	17
8:17:49 AM	17
8:17:53 AM	16
8:17:56 AM	16
8:17:59 AM	14
8:18:00 AM	14
8:18:03 AM	13
8:18:07 AM	13
8:18:10 AM	5
8:18:13 AM	3
8:18:16 AM	2

Pulling force [ton]
Time: GMT+2

Date: May 2
Position: VTG-1
Anchor: AC-14

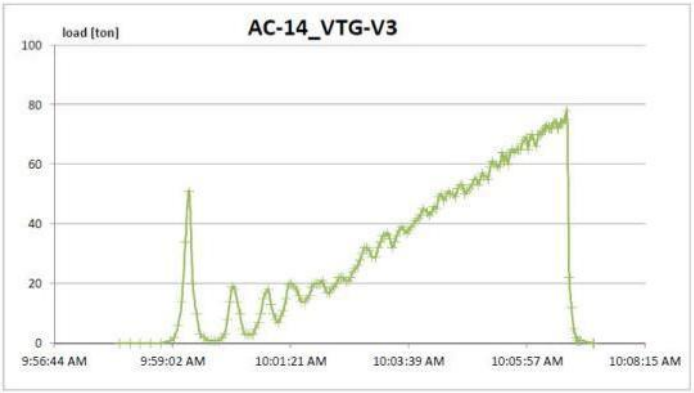
Trial location Trial time	VTG 2 (ton)	Trial location Trial time	VTG 2 (ton)
8:07:00 PM	0	8:10:22 PM	48
8:07:10 PM	1	8:10:25 PM	42
8:07:19 PM	1	8:10:28 PM	48
8:07:29 PM	1	8:10:31 PM	56
8:07:38 PM	2	8:10:34 PM	51
8:07:48 PM	4	8:10:37 PM	49
8:08:00 PM	20	8:10:40 PM	61
8:08:04 PM	22	8:10:44 PM	60
8:08:08 PM	17	8:10:47 PM	49
8:08:12 PM	11	8:10:50 PM	56
8:08:17 PM	7	8:10:53 PM	69
8:08:21 PM	4	8:10:56 PM	63
8:08:25 PM	4	8:10:59 PM	55
8:08:29 PM	5	8:11:00 PM	66
8:08:33 PM	6	8:11:03 PM	72
8:08:37 PM	12	8:11:06 PM	62
8:08:41 PM	16	8:11:09 PM	64
8:08:46 PM	15	8:11:12 PM	68
8:08:50 PM	14	8:11:16 PM	68
8:08:54 PM	13	8:11:19 PM	75
8:08:58 PM	14	8:11:22 PM	72
8:09:00 PM	16	8:11:25 PM	63
8:09:03 PM	18	8:11:28 PM	69
8:09:07 PM	19	8:11:31 PM	66
8:09:10 PM	17	8:11:34 PM	54
8:09:13 PM	19	8:11:37 PM	50
8:09:16 PM	19	8:11:40 PM	38
8:09:20 PM	18	8:11:44 PM	40
8:09:23 PM	20	8:11:47 PM	43
8:09:26 PM	23	8:11:50 PM	74
8:09:30 PM	27	8:11:53 PM	48
8:09:33 PM	30	8:11:56 PM	20
8:09:36 PM	33	8:12:00 PM	6
8:09:39 PM	32	8:12:03 PM	2
8:09:43 PM	30		
8:09:46 PM	30		
8:09:49 PM	36		
8:09:53 PM	37		
8:09:56 PM	39		
8:10:00 PM	40		
8:10:03 PM	40		
8:10:06 PM	41		
8:10:09 PM	44		
8:10:12 PM	42		
8:10:16 PM	44		
8:10:19 PM	51		
8:10:22 PM	48		



Trial location	VTG	Trial location	VTG
Trial	3	Trial	3
time	(ton)	time	(ton)
9:58:00 AM	0	10:03:22 AM	34
9:58:12 AM	0	10:03:25 AM	36
9:58:24 AM	0	10:03:28 AM	38
9:58:36 AM	0	10:03:30 AM	39
9:58:48 AM	0	10:03:33 AM	38
9:59:00 AM	1	10:03:36 AM	37
9:59:04 AM	2	10:03:39 AM	38
9:59:09 AM	6	10:03:41 AM	39
9:59:13 AM	14	10:03:44 AM	40
9:59:17 AM	34	10:03:47 AM	41
9:59:22 AM	51	10:03:50 AM	42
9:59:26 AM	20	10:03:53 AM	43
9:59:30 AM	10	10:03:55 AM	45
9:59:35 AM	3	10:04:00 AM	44
9:59:39 AM	2	10:04:03 AM	43
9:59:43 AM	1	10:04:06 AM	44
9:59:48 AM	1	10:04:08 AM	46
9:59:52 AM	1	10:04:11 AM	45
9:59:56 AM	1	10:04:14 AM	49
10:00:00 AM	2	10:04:17 AM	50
10:00:03 AM	3	10:04:19 AM	48
10:00:06 AM	8	10:04:22 AM	49
10:00:09 AM	14	10:04:25 AM	51
10:00:12 AM	19	10:04:28 AM	50
10:00:15 AM	18	10:04:30 AM	50
10:00:18 AM	14	10:04:33 AM	49
10:00:21 AM	10	10:04:36 AM	52
10:00:24 AM	5	10:04:39 AM	53
10:00:27 AM	3	10:04:41 AM	53
10:00:30 AM	3	10:04:44 AM	50
10:00:33 AM	3	10:04:47 AM	51
10:00:36 AM	3	10:04:50 AM	52
10:00:39 AM	5	10:04:53 AM	53
10:00:42 AM	7	10:04:55 AM	55
10:00:45 AM	10	10:04:58 AM	55
10:00:48 AM	15	10:05:00 AM	53
10:00:51 AM	17	10:05:02 AM	55
10:00:54 AM	18	10:05:05 AM	57
10:00:57 AM	13	10:05:07 AM	56
10:01:00 AM	10	10:05:09 AM	56
10:01:03 AM	8	10:05:12 AM	55
10:01:06 AM	7	10:05:14 AM	59
10:01:09 AM	9	10:05:16 AM	61
10:01:12 AM	11	10:05:19 AM	60
10:01:15 AM	15	10:05:21 AM	60
10:01:18 AM	20	10:05:23 AM	59
10:01:21 AM	20	10:05:26 AM	60
10:01:24 AM	19	10:05:28 AM	64
10:01:27 AM	18	10:05:30 AM	61
10:01:30 AM	16	10:05:33 AM	63
10:01:33 AM	14	10:05:35 AM	60
10:01:36 AM	14	10:05:37 AM	64
10:01:39 AM	15	10:05:40 AM	65
10:01:42 AM	16	10:05:42 AM	64
10:01:45 AM	19	10:05:44 AM	65
10:01:48 AM	20	10:05:47 AM	65
10:01:51 AM	20	10:05:49 AM	65
10:01:54 AM	20	10:05:51 AM	67
10:01:57 AM	21	10:05:54 AM	68
10:02:00 AM	19	10:05:56 AM	69
10:02:03 AM	17	10:05:58 AM	65
10:02:06 AM	17	10:06:00 AM	68
10:02:08 AM	18	10:06:03 AM	70
10:02:11 AM	19	10:06:05 AM	68
10:02:14 AM	20	10:06:08 AM	66
10:02:17 AM	22	10:06:10 AM	70
10:02:19 AM	22	10:06:13 AM	70
10:02:22 AM	22	10:06:16 AM	71
10:02:25 AM	21	10:06:18 AM	72
10:02:28 AM	21	10:06:21 AM	73
10:02:30 AM	22	10:06:23 AM	72
10:02:33 AM	24	10:06:26 AM	72
10:02:36 AM	25	10:06:29 AM	74
10:02:39 AM	26	10:06:31 AM	74
10:02:41 AM	28	10:06:34 AM	72
10:02:44 AM	30	10:06:36 AM	74
10:02:47 AM	32	10:06:39 AM	74
10:02:50 AM	32	10:06:41 AM	75
10:02:53 AM	31	10:06:44 AM	78
10:02:55 AM	29	10:06:47 AM	22
10:03:00 AM	29	10:06:49 AM	12
10:03:03 AM	32	10:06:52 AM	5
10:03:06 AM	34	10:06:54 AM	2
10:03:08 AM	36	10:06:57 AM	1
10:03:11 AM	36	10:07:00 AM	1
10:03:14 AM	37	10:07:15 AM	0
10:03:17 AM	35	10:07:15 AM	0
10:03:19 AM	32	10:07:15 AM	0

Pulling force [ton]
Time: GMT+2

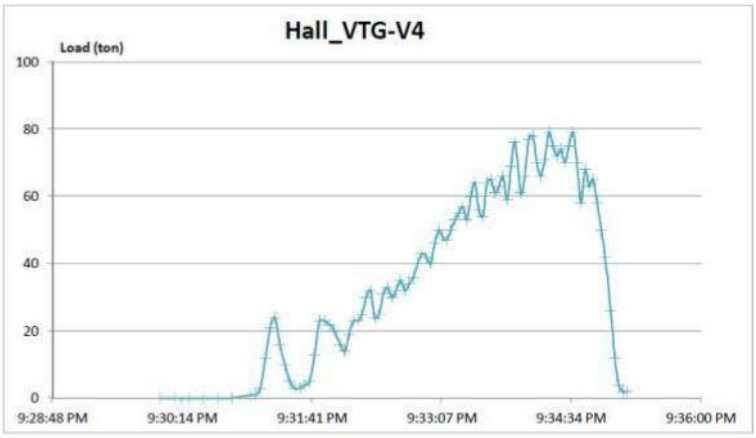
Date: May 2
Position: VTG-3
Anchor: AC-14



Trial location	VTG	Trial location	VTG
Trial time	4 (ton)	Trial time	4 (ton)
9:30:00 PM	0	9:33:13 PM	50
9:30:10 PM	0	9:33:16 PM	53
9:30:19 PM	0	9:33:19 PM	55
9:30:29 PM	0	9:33:21 PM	57
9:30:38 PM	0	9:33:24 PM	53
9:30:48 PM	0	9:33:27 PM	60
9:31:00 PM	1	9:33:29 PM	64
9:31:03 PM	1	9:33:32 PM	56
9:31:07 PM	3	9:33:35 PM	54
9:31:10 PM	12	9:33:37 PM	64
9:31:13 PM	21	9:33:40 PM	65
9:31:16 PM	24	9:33:43 PM	61
9:31:20 PM	16	9:33:46 PM	63
9:31:23 PM	10	9:33:48 PM	66
9:31:26 PM	5	9:33:51 PM	59
9:31:30 PM	3	9:33:54 PM	69
9:31:33 PM	3	9:33:56 PM	76
9:31:36 PM	4	9:34:00 PM	61
9:31:39 PM	5	9:34:03 PM	66
9:31:43 PM	13	9:34:05 PM	77
9:31:46 PM	23	9:34:08 PM	78
9:31:49 PM	23	9:34:11 PM	70
9:31:53 PM	22	9:34:13 PM	66
9:31:56 PM	20	9:34:16 PM	71
9:32:00 PM	16	9:34:19 PM	79
9:32:03 PM	14	9:34:21 PM	75
9:32:06 PM	19	9:34:24 PM	72
9:32:09 PM	23	9:34:27 PM	74
9:32:11 PM	23	9:34:29 PM	70
9:32:14 PM	25	9:34:32 PM	75
9:32:17 PM	30	9:34:35 PM	79
9:32:20 PM	32	9:34:37 PM	70
9:32:23 PM	24	9:34:40 PM	58
9:32:26 PM	25	9:34:43 PM	68
9:32:29 PM	31	9:34:46 PM	63
9:32:31 PM	33	9:34:48 PM	65
9:32:34 PM	30	9:34:51 PM	58
9:32:37 PM	32	9:34:54 PM	50
9:32:40 PM	35	9:34:56 PM	42
9:32:43 PM	32	9:35:00 PM	26
9:32:46 PM	34	9:35:03 PM	12
9:32:48 PM	36	9:35:05 PM	4
9:32:51 PM	40	9:35:08 PM	2
9:32:54 PM	43	9:35:11 PM	2
9:32:57 PM	42		
9:33:00 PM	40		
9:33:03 PM	46		
9:33:05 PM	50		
9:33:08 PM	48		
9:33:11 PM	47		

Pulling force [ton]
Time: GMT+2

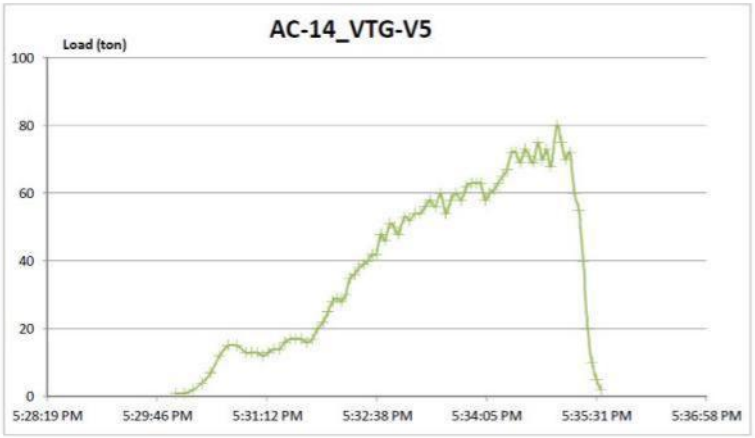
Date: May 2
Position: VTG-4
Anchor: Hall



Trial location Trial time	VTG 5 (ton)	Trial location Trial time	VTG 5 (ton)
5:30:00 PM	1	5:33:24 PM	56
5:30:07 PM	1	5:33:28 PM	60
5:30:14 PM	2	5:33:32 PM	54
5:30:21 PM	4	5:33:37 PM	58
5:30:28 PM	7	5:33:41 PM	60
5:30:35 PM	12	5:33:45 PM	58
5:30:41 PM	15	5:33:49 PM	62
5:30:48 PM	15	5:33:53 PM	63
5:30:55 PM	13	5:33:57 PM	63
5:31:00 PM	13	5:34:00 PM	63
5:31:04 PM	13	5:34:03 PM	58
5:31:09 PM	12	5:34:07 PM	60
5:31:13 PM	13	5:34:10 PM	61
5:31:17 PM	14	5:34:14 PM	63
5:31:22 PM	14	5:34:17 PM	65
5:31:26 PM	16	5:34:21 PM	67
5:31:30 PM	17	5:34:24 PM	72
5:31:35 PM	17	5:34:28 PM	72
5:31:39 PM	17	5:34:31 PM	69
5:31:43 PM	16	5:34:35 PM	73
5:31:48 PM	17	5:34:38 PM	71
5:31:52 PM	20	5:34:41 PM	69
5:31:56 PM	22	5:34:45 PM	75
5:32:00 PM	25	5:34:48 PM	70
5:32:03 PM	28	5:34:52 PM	73
5:32:07 PM	29	5:34:55 PM	68
5:32:10 PM	28	5:35:00 PM	80
5:32:14 PM	30	5:35:03 PM	75
5:32:17 PM	35	5:35:07 PM	70
5:32:21 PM	36	5:35:10 PM	72
5:32:24 PM	38	5:35:14 PM	60
5:32:28 PM	39	5:35:17 PM	55
5:32:31 PM	40	5:35:21 PM	40
5:32:35 PM	42	5:35:24 PM	20
5:32:38 PM	42	5:35:28 PM	10
5:32:41 PM	48	5:35:31 PM	5
5:32:45 PM	46	5:35:35 PM	2
5:32:48 PM	51		
5:32:52 PM	50		
5:32:55 PM	48		
5:33:00 PM	53		
5:33:04 PM	52		
5:33:08 PM	54		
5:33:12 PM	54		
5:33:16 PM	56		
5:33:20 PM	58		

Pulling force [ton]
Time: GMT+2

Date: May 2
Position: VTG-5
Anchor: AC-14

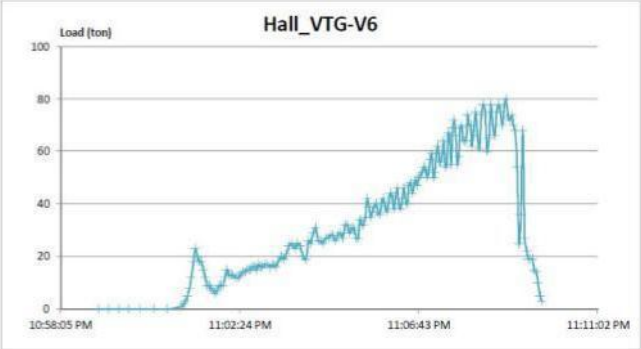


Trial location Trial time	VTG 6 (ton)	Trial location Trial time	VTG 6 (ton)
10:59:00 PM	0	11:05:44 PM	37
10:59:15 PM	0	11:05:47 PM	36
10:59:29 PM	0	11:05:49 PM	40
10:59:44 PM	0	11:05:52 PM	42
11:00:00 PM	0	11:05:54 PM	39
11:00:20 PM	0	11:05:57 PM	37
11:00:40 PM	0	11:06:00 PM	41
11:01:00 PM	1	11:06:02 PM	44
11:01:03 PM	2	11:06:05 PM	43
11:01:06 PM	3	11:06:07 PM	38
11:01:09 PM	5	11:06:10 PM	42
11:01:11 PM	8	11:06:12 PM	46
11:01:14 PM	12	11:06:15 PM	40
11:01:17 PM	18	11:06:17 PM	38
11:01:20 PM	23	11:06:19 PM	42
11:01:23 PM	20	11:06:22 PM	46
11:01:26 PM	18	11:06:24 PM	41
11:01:29 PM	18	11:06:27 PM	40
11:01:31 PM	15	11:06:29 PM	47
11:01:34 PM	12	11:06:31 PM	48
11:01:37 PM	9	11:06:34 PM	44
11:01:40 PM	9	11:06:36 PM	47
11:01:43 PM	8	11:06:39 PM	49
11:01:46 PM	7	11:06:41 PM	47
11:01:48 PM	6	11:06:44 PM	50
11:01:51 PM	7	11:06:46 PM	51
11:01:54 PM	9	11:06:48 PM	52
11:01:57 PM	9	11:06:51 PM	54
11:02:00 PM	9	11:06:53 PM	53
11:02:03 PM	12	11:06:56 PM	50
11:02:06 PM	15	11:06:58 PM	53
11:02:09 PM	13	11:07:00 PM	57
11:02:11 PM	13	11:07:02 PM	59
11:02:14 PM	13	11:07:04 PM	50
11:02:17 PM	12	11:07:06 PM	52
11:02:20 PM	12	11:07:09 PM	59
11:02:23 PM	12	11:07:11 PM	62
11:02:26 PM	13	11:07:13 PM	56
11:02:29 PM	14	11:07:15 PM	56
11:02:31 PM	14	11:07:17 PM	59
11:02:34 PM	15	11:07:19 PM	64
11:02:37 PM	15	11:07:22 PM	54
11:02:40 PM	15	11:07:24 PM	55
11:02:43 PM	16	11:07:26 PM	67
11:02:46 PM	16	11:07:28 PM	66
11:02:48 PM	15	11:07:30 PM	55
11:02:51 PM	17	11:07:32 PM	69
11:02:54 PM	16	11:07:35 PM	72
11:02:57 PM	16	11:07:37 PM	66
11:03:00 PM	17	11:07:39 PM	55
11:03:04 PM	17	11:07:41 PM	58
11:03:08 PM	16	11:07:43 PM	69
11:03:12 PM	17	11:07:45 PM	70
11:03:16 PM	16	11:07:48 PM	64
11:03:20 PM	18	11:07:50 PM	64
11:03:24 PM	20	11:07:52 PM	64
11:03:28 PM	19	11:07:54 PM	74
11:03:32 PM	21	11:07:56 PM	70
11:03:36 PM	24	11:07:58 PM	70
11:03:40 PM	25	11:08:00 PM	62
11:03:44 PM	23	11:08:03 PM	68
11:03:48 PM	25	11:08:06 PM	75
11:03:52 PM	24	11:08:08 PM	66
11:03:56 PM	20	11:08:11 PM	61
11:04:00 PM	19	11:08:14 PM	74
11:04:04 PM	26	11:08:17 PM	78
11:04:07 PM	25	11:08:19 PM	75
11:04:11 PM	29	11:08:22 PM	60
11:04:14 PM	31	11:08:25 PM	65
11:04:18 PM	26	11:08:28 PM	78
11:04:21 PM	26	11:08:30 PM	70
11:04:25 PM	25	11:08:33 PM	66
11:04:28 PM	27	11:08:36 PM	75
11:04:32 PM	27	11:08:39 PM	78
11:04:35 PM	28	11:08:41 PM	75
11:04:39 PM	28	11:08:44 PM	70
11:04:43 PM	26	11:08:47 PM	77
11:04:46 PM	28	11:08:50 PM	80
11:04:50 PM	29	11:08:53 PM	73
11:04:53 PM	27	11:08:55 PM	72
11:04:57 PM	32	11:08:58 PM	74
11:05:00 PM	32	11:09:00 PM	70
11:05:03 PM	29	11:09:03 PM	68
11:05:05 PM	30	11:09:06 PM	54
11:05:08 PM	31	11:09:08 PM	25
11:05:10 PM	30	11:09:11 PM	36
11:05:13 PM	27	11:09:14 PM	68
11:05:16 PM	27	11:09:17 PM	27
11:05:18 PM	34	11:09:19 PM	22
11:05:21 PM	32	11:09:22 PM	19
11:05:23 PM	32	11:09:25 PM	19
11:05:26 PM	35	11:09:28 PM	19
11:05:29 PM	42	11:09:30 PM	15
11:05:31 PM	39	11:09:33 PM	14
11:05:34 PM	35	11:09:36 PM	10
11:05:36 PM	37	11:09:39 PM	5
11:05:39 PM	39	11:09:41 PM	3
11:05:41 PM	40		

Pulling force [ton]

Time: GMT+2

Date: May 2
Position: VTG-6
Anchor: Hall



E Event Logs Esvagt Connector and Guardian

1. Event Log as kept on board the Esvagt Connector (By Marien Harkes / Dirk Luger, Deltares)

Date/time	Event
29/4/2013	
11:20	Arrival at Norddeich mole
11:30	Meeting with Guardian and TenneT team. Discussing logistics. Earliest leaving tomorrow at high tide after 02:00 hrs
12:00	Break for lunch
12:40	TenneT requests Deltares to provide full reporting of the tests. Brief discussion on how to set this up. Separation into factual and interpretative reports. Suggested co-authorship with BAW.
12:44	Guardian moving to west side of port
12:45	Searching for hotel to take some rest
13:20	Booked in rooms 214 and 222 of “Hotel am Deich”. Established internet access.
13:50	Met again with TenneT team. Confirmed meeting around 19:00 for dinner. M.Petzold and V. Schwamborn leave for Guardian for coordination meeting (toolbox meeting).
14:25	Short walk to harbour/W-mole.
14:48	Returning to hotel
15:10	In room, checking e-mail, updating journal.
16:00	Resting
19:00	Meeting for dinner
20:15	Back in hotel
30/04/2013	
01:50	Meeting for transfer to harbour
02:10	Parked cars at TenneT office, boarded Guardian
02:15	Guardian casts off / Viewed safety video
04:15	Met with Esvagt Connector (Schluchter Tonne)
04:20	Survival suits taken over, prepared for transfer, luggage and personnel (A. Drews, V. Schwamborn, M.P. Harkes and D. Luger) transferred to Esvagt Connector (EC)
04:30	Assigned cabins, resting
07:35	On bridge, fine weather. Anchor prepared for pull-out to stern roller.
07:40	Breakfast. Wega finishing survey.
30/04/2013	**Location: BSH-N1; trial: 1; Anchor type: AC-14**
09:02	Anchor still on stern roller
09:03	Anchor slowly into the water
09:06	Anchor 10m above seabed
09:08	Anchor dropped

Date/time	Event
09:12	ROV into the water
09:20	ROV still searching
09:25	Anchor seen on ROV video
09:31	Guardian indicates that anchor shank lies away from EC
09:58	Slow ahead, paying out chain/wire. Transition chain/wire going overboard.
10:02	The end of the anchor chain on deck
10:14	Anchor seen on ROV video
10:26	Talking between Mr. Petzold and Mr. Luger about the first trial
10:31	Installation load cell
10:46	Connecting load cell (measurements in Excel, chapter 5)
10:55	Start pulling anchor
11:02	ROV umbilical (too) close to prop Guardian. Decided to complete 1st pull despite lack of ROV coverage.
11:51	Pulled, speed up to 2 knots, force range up to 62 tons (meas. in Excel)
12:00	Completed 250m of pull. Called in Wega for survey. Wega will dispatch dive team to Guardian when survey completed.
12:32	Wega passing close by South of EC for 2nd survey pass.
12:57	Retrieving AC-14, switching to Hall
13:00	Broke cable to load cell
13:00	Start recovering anchor
13:35	Anchor on deck
30/04/2013	**Location: BSH-N2; trial: 2; Anchor type: Hall**
14:15	Anchor (Hall) ready, Guardian re-joins EC
14:48	Anchor slowly into the water
14:52	Anchor dropped (± 13 meter)
14:52	EC some meters ahead, anchor chain free
14:54	Anchor chain completely into the sea
15:00	ROV into water
15:06	ROV on seabed
15:11	Anchor seen on ROV video. Shank lies away from the EC
15:18	EC back-up and taking in wire to set anchor in pulling direction.
15:20	Connector five meters back
15:21	Three meters of anchor chain on deck
15:22	Still anchor on ROV video
15:23	Connector 10 meters ahead
15:29	Anchor pull two more meters
15:30	Anchor pull two more meters + another five meters
15:33	Five meters pay-out
15:34	EC moves 10 m ahead
15:37	ROV searching for anchor
15:38	Pennant wire into the sea
15:46	Start installing load cell
15:47	Anchor seen by ROV video
16:00	Load cell installed / clamps open
16:04	Start pulling anchor, max 40 tons (meas. in Excel)
16:06	At high force (40 tons), anchor suddenly moves up and force drops to 12 tons

Date/time	Event
16:14	ROV is looking for anchor
16:20	Decided to make another (continued) anchor pull
16:21	Start second anchor pulling, max. 64 ton (meas. in Excel)
16:24	STOP
16:45	Decision to switch to AC-14 again
17:45	Dismantling of load cell
17:47	Start recovery anchor
18:05	Anchor on deck
18:22	AC-14 ready to be pulled towards stern roller
18:29	AC-14 ready for drop at position N3
30/04/2013	**Location: BSH-N3; trial: 3; Anchor type: AC-14**
18:32	AC-14 dropped. Chain movement captured on video.
19:02	Decided to rotate EC towards heading 90 degrees, in order to enable launching the ROV downstream from the Guardian.
19:40	Rotation completed , ROV launched
19:47	ROV on seabed
19:50	ROV can not hold position against current
20:00	Clamps-up, ready to mount load cell
Ca. 20:15	Load cell mounted, starting pull for test 3, AC-14
Ca. 20:30	Pull stopped, holding position, maximum of 82 ton (meas. in Excel) Wega called in for survey.
21:12	Survey at BSH N3 completed
21:37	Anchor on deck
01/05/2013	**Location: BSH-S1; trial: 4; Anchor type: AC-14**
08:19	Anchor 10 meters above seabed
08:20	Anchor drop
08:25	ROV into the water
08:28	ROV on seabed
08:30	Anchor seen by ROV video, very good vision
08:33	EC lifting the anchor, to get the anchor in good position EC taking in 25 meters anchor chain
08:35	EC moves five meters ahead. Anchor chain 6 meters up
08:40	EC moves another five meters ahead
08:40	ROV looking for anchor
08:41	EC moves another five meters ahead. Anchor free to move
08:44	EC moves five meters towards the position and pick up some chain
08:53	ROV out of the water (lost position)
08:55	Guardian in good position
08:58	Guardian again into the water
09:00	Load cell not installed, value 0.02 ton
09:07	ROV still looking for the anchor
09:18	ROV again on deck of the Guardian
09:24	Guardian in good position
09:25	ROV again into the water
09:30	ROV on seabed
09:38	Anchor on ROV ideo
09:40	EC moves ahead

Date/time	Event
09:42	Pennant wire into the water
09:49	Installation of the load cell
10:03	Load cell installed
10:04	Start pulling at low speed
10:11	Pull stopped, holding position. Max. of 82 ton (meas. in Excel) approx. 100 meter length of pull
10:15	Wega called in for survey
11:20	Wega arrived from BSH-N, survey starts
11:57	Survey at BSH-S1 completed
12:08	Start removing the load cell
12:37	Anchor on deck
12:40	C. Maushake transfers to Connector with pressure sensors
13:00	C. Maushake returns to Wega
01/05/2013	**Location: BSH-S2; trial: 5; Anchor type: AC-14**
13:20	Anchor 10 meters above seabed
13:25	Anchor drop
13:37	ROV into the water
13:43	ROV at surface
13:54	ROV struggling for a good position
13:59	ROV on deck Guardian
14:00	Guardian to other position
14:01	EC moves ahead
14:03	Pennant wire into the water
14:13	Installation of the load cell
14:17	Load cell zero (by Luger & Harkes)
14:30	Load cell mounted
14:33	Load cell near the winch (approx.. 10 meters)
14:35	Load cell – 20 ton
14:36	Start pulling
14:37	Values -19 to +8 ton
14:41	STOP
14:42	Inspection load cell (wrong connection strain gauges?)
15:00	Telephone call supplier and Jack vd Vegt (Deltares)
15:05	Load cell mounted again
15:07	Start 2 ton
15:09	Anchor pull
15:12	Stop pulling max. 92 ton (meas. in Excel)
15:13	Stop measurements
15:41	ROV into water
15:49	Anchor on ROV video, very good vision
15:55	ROV up
15:58	ROV on deck Guardian
16:00	AC-14 anchor on deck
01/05/2013	**Location: BSH-S3; trial: 6; Anchor type: AC-14**
16:22	Anchor AC-14 into the water, 10 meters above seabed
16:26	AC drop
16:27	EC 5 meters ahead, anchor chain free
16:27	ROV into the water

Date/time	Event
16:28	Pennant wire on deck
16:30	ROV on the seabed
16:32	Anchor on ROV video
16:35	Anchor chain
16:38	EC moves ahead, pennant wire free
16:44	Load cell zero
16:46	Start installation of the load cell
16:57	Load cell mounted
17:00	Start pulling (slowly), max. 64 tons (meas. in Excel)
17:15	Anchor on ROV video
17:20	ROV on deck Guardian
17:26	Start disconnection of the load cell
17:34	Load cell disconnected
17:48	AC-14 on deck
17:50	Mounting water pressures sensors (WPS) on the anchors WPS SN60182 – top Hall anchor WPS SN60185 – bottom Hall anchor distance sensor tip to sensor tip 2850 mm WPS SN60186 – bottom AC-14 WPS SN60190 – top AC-14 distance sensor tip to sensor tip 3110 mm
18:30	Registration of sensor positions and some key anchor data (see below)

Date/time	Event
02/05/2013	**Location: VTG-V1; trial: 7; Anchor type: AC-14**
05:00	Anchor ready to drop
	'Calibration' of the water pressure sensors
05:48	Anchor into the water
05:49	Anchor 20 meters above seabed
05:50	Anchor to 10 meters above seabed
05:50	Anchor 10 meters above seabed
05:51	Anchor to seabed
05:52	Anchor on seabed
05:53	Connector shackle on roller
05:54	Anchor up to 10 m above seabed
05:55	Anchor 10 m above seabed
06:00	Anchor still on 10 m above seabed
06:03	Anchor still on 10 m above seabed
06:06	Anchor up to deck
06:08	Anchor on deck
06:15	EC to another position
06:27	Anchor to 10 m above seabed
06:28	Anchor 10 m above seabed
06:30	Anchor dropped to seabed
06:31	EC 25 meters ahead, anchor chain free
06:32	Pennant wire on deck
06:32	ROV into the water

Date/time	Event
06:33	Pennant wire into the sea
06:37	Anchor on the ROV video
06:38	Sensor (water pressure) on the ROV video
06:39	EC moves ahead (200 meters)
06:41	Load cell – 0.3 ton
06:48	Start installation load cell
07:05	Load cell mounted
07:06	Load cell backwards to the winch
07:08	EC start pulling 1A (slowly), max. 73 tons (meas. in Excel)
07:18	EC start pulling 1B(slowly), max. 62 tons (meas. in Excel)
07:22	ROV on deck Guardian
07:25	Guardian to new position
07:45	ROV into the water
07:51	Anchor on ROV video
07:55	Conversation between Dirk L. and Martin P.
07:58	In this position the water pressure on the bottom of the anchor has to be lower than on the top of the anchor
08:08	EC start pulling 1C (slowly), max. 51 tons (meas. in Excel)
08:25	Start removing the load cell
08:40	Load cell off
08:55	Anchor off the seabed
08:57	Anchor looks very clean
09:00	EC moves to another location
02/05/2013	**Location:VTG-V3; trial: 8; Anchor type: AC-14**
09:18	Anchor ready
09:20	Anchor into the sea
09:22	Anchor 10 meters above seabed
09:24	Anchor drop
09:30	ROV into the water
09;33	EC moves ahead (200 meters)
09:35	ROV on the seabed
09:36	Anchor on ROV video
	Load cell -0.3 ton
09:45	Start installing the load cell
09:50	Anchor on ROV video
09:56	Load cell installed
09:58	EC start pulling 2 (slowly), max. 78 tons (meas. in Excel)
10:12	Lumps of clay on ROV video
10:15	Anchor chain on ROV video
10:21	Start removing the load cell
10:30	Load cell disconnected
10:35	Start lifting the anchor wire and chain
11:00	Anchor on deck EC Taken two samples of soil attached to the anchor Three bags with soil from the fluke (stiff clay) Three bags with soil from the crown (more sandy clay)
02/05/2013	**Location: VTG-V5; trial: 9; Anchor type: AC-14**
16:16	Anchor into the sea

Date/time	Event
16:18	Anchor approx. 10 meter above seabed
16:19	Anchor drop, anchor on seabed
16:30	ROV into the water
16:36	ROV on seabed
16:45	ROV on deck Guardian, problems with position
16:50	Guardian on new position
16:55	ROV into the water
16:58	ROV on seabed
17:00	Anchor on ROV video
17:05	EC moves approx. five meters ahead
17:06	EC moves ahead (approx. 200 meters)
17:20	Start installing load cell
17:25	Load cell mounted
17:30	EC start pulling (slowly), max. 80 tons (meas. in Excel)
17:36	Stop pulling
17:40	Removing the load cell
17:50	Load cell disconnected
17:52	Start lifting the anchor
	Problems with getting the anchor on deck
18:50	Anchor on deck!
18:52	Switch to Hall anchor and go to new position
02/05/2013	**Location: VTG-V2; trial: 10; Anchor type: Hall**
19:26	Hall anchor into the sea
19:29	Anchor to 10 meters above seabed
19:32	Anchor drop (video Luger)
19:32	EC moves 25 meters ahead
19:34	End of anchor chain into the water
19:37	ROV into the water
19:41	Anchor on ROV video
19:41	EC five meters ahead
19:42	EC another five meters ahead
19:45	Nice view of anchor on ROV video
19:50	EC moves ahead (150 meters) with pennant wire free
19:57	Start installing the load cell
20:02	Nice view of the anchor on ROV video
20:04	Load cell mounted and back to the winch
20:07	EC start pulling (slowly), max. 75 tons (meas. in Excel)
20:12	STOP
20:16	Start removing load cell
20:22	Load cell disconnected
20:32	Anchor chain on deck
20:35	Anchor on roller at the stern of he vessel
20:36	EC moves to other position
02/05/2013	**Location: VTG-4; trial: 11; Anchor type: Hall**
20:52	Anchor ready
20:54	Anchor to 10 meters above seabed
20:55	Anchor 10 meters above seabed
20:55	Anchor drop!

Date/time	Event
20:56	EC 20 meters ahead with slack on the wire
20:57	Load cell 0.5
20:58	ROV into the water
21:02	ROV on seabed
21:07	Anchor on ROV video
21:08	EC moves ahead with tension on the wire
21:13	EC stops moving, a little bit slack on the wire
21:16	EC moves ahead (approx. 150 m), anchor wire free
21:20	Start installing the load cell
21:28	Load cell mounted, backwards to the winch
21:29	EC start pulling (slowly), max. 79 tons (meas. in Excel)
21:35	STOP
21:40	Start removing the load cell
21:48	Load cell disconnected
22:01	Anchor on deck
22:02	EC moves to next location
02/05/2013	**Location: VTG-V6; trial: 12; Anchor type: Hall**
22:20	Anchor ready
22:22	Anchor 10 meter above seabed
22:24	Anchor drop
22:25	EC moves 25 meter ahead with slack on the wire
22:27	ROV into the water
22:30	ROV on the seabed
22:34	Anchor on the ROV video
22:35	EC moves ahead with tension on the wire
22:41	EC moves ahead (150 m) with slack on the wire
22:48	ROV out of the water
22:49	Start installing the load cell
22:55	Load cell mounted and back to the winch
22:59	EC start pulling (slowly), max. 80 tons (meas. in Excel)
23:12	Taking load cell off

Date/time	Event
03/05/2013	**Location: BSH-S4; trial: 13; Anchor type: Hall**
08:25	Anchor in position
08:40	Anchor 10 meters above seabed
08:45	Anchor drop (video Dirk L.)
08:45	EC 20 meters ahead with slack on the wire
08:46	Pennant wire on the sea
08:51	ROV into the sea
08:55	ROV on seabed
08:56	Anchor on ROV video
08:57	EC moves ahead (150 meters) with slack on the wire
09:02	Installation of the load cell
09:09	Load cell mounted and backwards to the winch
09:11	EC start pulling (slowly), max. 76 tons (meas. in Excel)
09:16	Start removing the load cell
09:24	Load cell disconnected

Date/time	Event
09:33	Anchor chain on deck
09:36	Anchor on stern roller
09:36	EC moves to another position
03/05/2013	**Location: BSH-S5; trial: 14; Anchor type: Hall**
09:45	Anchor in position
09:47	Anchor 10 meters above seabed
09:48	Anchor drop (video Dirk L.)
09:49	EC 20 meters ahead with slack on the wire
09:50	Pennant wire into the sea
09:50	ROV into the sea
09:53	ROV on seabed
09:55	Anchor on ROV video
10:00	EC moves ahead with tension on the wire
10:04	EC moves ahead (150 meters) with slack on the wire
10:09	Installation of the load cell
10:14	Load cell mounted and backwards to the winch
10:15	EC start pulling (slowly), max. 72 tons (meas. in Excel)
10:20	ROV into the water
10:20	Start removing the load cell
10:23	Anchor on ROV video
10:26	Load cell removed
10:31	Start lifting the anchor
10:39	Anchor on stern roller
10:40	EC moves to another position
03/05/2013	**Location: BSH-S6; trial: 15; Anchor type: Hall**
10:52	Anchor in position
10:53	Anchor 10 meters above seabed
10:54	Anchor drop (video Dirk L.)
10:55	EC 20 meters ahead with slack on the wire
11:09	ROV out of order (info Martin)
11:10	EC moves ahead (150 meters) with slack on the wire
11:15	Installation of the load cell
11:20	Load cell mounted and backwards to the winch
11:22	EC start pulling (slowly), max. 80 tons (meas. in Excel)
11:30	Start removing the load cell
11:37	Load cell removed
11:37	Start lifting the anchor
11:43	Anchor on stern roller
11:45	EC moves to another position (BSHN)
03/05/2013	**Location: BSH-N5; trial: 16; Anchor type: Hall**
12:51	Anchor on stern roller
13:00	EC in position
13:09	Anchor to 10 meters above seabed
13:12	Anchor drop
13:13	EC moves ahead (150 meters); slack on the wire
13:24	Start installation of the load cell
13:30	Load cell mounted and to the winch
13:35	Start pulling, max 25 tons (meas. in Excel)

Date/time	Event
13:43	Second pull, max. 58 tons (meas. in Excel)
03/05/2013	**Location: BSH-N6; trial: 17; Anchor type: Hall**
14:10	Anchor on stern roller
14:22	Anchor to 10 meters above seabed
14:23	Anchor drop
14:24	EC moves ahead (150 meters); slack on the wire
14:34	Start installation of the load cell
14:39	Load cell mounted and to the winch
14:43	Start pulling, max. 65 tons (meas. in Excel)
15:00	A. Drews, V. Schwamborn, M.P. Harkes and D. Luger prepared (survival suits) for transfer.
15:30	Luggage and personnel (4) transferred to Guardian
15:35	Guardian to German mainland
17:30	Arrival at Norddeich
17:45	Departure by car to The Netherlands

2. Event Log as kept on board the Guardian (By Martin Petzold, TenneT)

Monday, 29/04/13		
Time	**Activity**	**Vessel**
10:00	Departing Bremerhaven towards BSH North	Wega
10:00	Drechsler ROV arrives at Norddeich, ROV & USBL Mob ongoing	Guardian
10:30	Departing Esbjerg towards 'Schluchter Ton' for meeting with Guardian	Connector
11:00	TenneT & Deltares personnel arriving	Guardian
16:00	USBL installed - dysfunctional	Guardian
17:00	Fuel bunker	Guardian
18:00	Kick-off meeting TenneT-Drechsler-Marine crew	Guardian

Tuesday, 30/04/13		
Time	**Activity**	**Vessel**
2:00	Tennet & Deltares personnel on board	Guardian
2:40	Departure towards Schluchter ton for meeting with Connector	Guardian
3:00	Decision to meet at Osterems for personnel transfer based on sea conditions	Guardian/Connector
4:45	Personnel transfer Guardian -> Connector completed (2xTenneT, 2xDeltares)	Guardian/Connector
4:50	Transit to worksite BSH North	Guardian/Connector
7:00	Arrival at BSH North	Guardian/Connector
7:50	Initial survey of worksite perimeter	Wega
8:35	Surv ey completed, coordinates as in procedure N1-N6 confirmed valid	Wega
8:40	Positioning for first anchor drop at N1	Connector
9:02	Anchor over the stern	Connector
9:07	Anchor on seabed	Connector

9:12	ROV off deck	Guardian
9:35	ROV surveying anchor	Guardian
10:15	Survey completed, - bad viz - anchor aligned with pulling path, not buried	Guardian
10:30	Paying out anchor wire, rigging up load cell	Connector
10:55	Load cell connected, initiating 1st anchor pull	Connector
10:57	Pulling anchor	Connector
11:03	All stop - suspition of rov tether caught under anchor chain - rov attempts to surface	Guardian/Connector
11:05	Tether not caught underneath anchor but in Port propeller of Guardian, attempting to clear tether	Guardian
11:35	Unable to clear prop of tether, decission made tu utilize diver from Wega, meanwhile having Connector finishing pull on load cell readings	Guardian
11:55	Connector finished anchor pull at a 250m path. Max. achieved pulling force = 62T, after anchor having broken out several times around 40+T.	Connector
12:05	Connector standing by at final anchor position for Wega to conduct survey run over anchor	Connector
12:40	Wega survey completed.	Wega
13:15	Wega alongside Guardian to for transfer of diver	Wega
13:30	Diver in water, attempting to clear Guardian Port propeller of rov tether	Guardian
13:55	ROV tether on Guardian deck, diver departed to Wega - ROV re-term required	Guardian
14:30	Vessels in position @ N2, Hall anchor rigged and setup for drop	Guardian/Connector
14:47	Anchor over the stern	Connector
14:55	Anchor on seabed	Connector
15:00	ROV off deck	Guardian
15:10	ROV surveying anchor	Guardian
15:35	Survey completed, - bad viz - anchor aligned with pulling path, not buried	Guardian
15:37	Paying out anchor wire, rigging up load cell	Connector
16:10	Pulling anchor	Connector
16:33	Hall anchor pull completed, at max force of 64T, accompanied by break-outs, recovering ROV for Wega survey	Guardian/Connector
16:45	Conducting post pull survey	Wega
17:30	Wega Survey completed, preparing for anchor recovery	Connector
18:30	Connector to drop AC14 anchor over stern	Connector
19:40	ROV off deck	Guardian
17:50	ROV unable to hold station due to excessive current, recover rov to deck	Guardian
19:55	Rigging up load cell, conduct pull w/o rov on load cell alone.	Connector
20:10	Guardian to leave worksite for sheltered waters in order to give crew some sleep	Guardian
20:25	Anchor pull completed, max.achieved pulling force = 82T	Connector
20:30	Conducting post pull survey	Wega

Wednesday,01/05/13		
Time	**Activity**	**Vessel**

5:45	Transit to worksite BSH South	Guardian
7:55	Arrival at worksite BSH South, standing by for Connector to drop AC-14 anchor	Guardian
8:00	Guard vessel Karen standing by at worksite and will stay with us until required	Karen
8:07	Connector ready to drop anchor	Connector
8:20	AC-14 on seabed at S1 in BSH South	Connector
8:25	ROV off deck	Guardian
8:50	Surveying anchor after free fall	Guardian
9:05	ROV having difficulties fighting currents, reposition Guardian	Guardian
9:30	ROV back on anchor, anchor slightly askew but aligned with pulling path 105deg, paying out chain & wire for load cell rigging	Connector
10:05	Load cell rigged up, starting anchor pull	Connector
10:15	1st pull completed, max force = spike at 85T but eventual break out at 65T	Connector
10:30	Final anchor position established, pull length approx. 100m; anchor base clearly visible above seabed, recover rov to deck	Guardian
10:35	ROV on deck, standing by for Wega post-pull survey	Connector/Guardian
11:10	Conducting post-pull survey	Wega
12:10	Survey completed, picking up anchor for transfer to 2nd trial position	Wega/Connector
13:00	Personnel transfer Wega -> Connector	
13:15	Vessel repositioned for 2nd AC-14 trial.	Connector
13:22	Anchor on seabed (free fall)	Connector
13:38	ROV off deck	Guardian
13:55	ROV unable to hold position due to current, - recover ROV to deck	Guardian
14:00	Wega transit to VTG worksite for initial survey	Wega
14:00	Paying out anchor line to rig up load cell	Connector
14:25	Verifying anchor drop position via Multi Beam survey: 374407.20E; 5982247.79N (S2)	Guardian
14:30	2nd pull of AC-14 anchor	Connector
14:37	Connector reports difficulties reading out load cell	Connector
15:10	repeating 2nd AC-14 anchor pull	Connector
15:15	Pull completed, max. pulling force = 95T, anchor did not break out	Connector
15:21	Conducting Multi-Beam survey S2: Start position: 374407E; 5982247N End position: 374395E; 5982246N	Guardian
15:35	Launching ROV for visual survey	Guardian
15:55	ROV survey completed, anchor clearly visible on seabed, base and shackle unburied	Guardian
16:05	ROV on deck, Connector recovering anchor	Connector/Guardian
16:06	Anchor recovery	Connector
16:14	Relocating to S3 pulling path	Connector
16:25	AC-14 on seabed at S3 in BSH South	Connector
16:28	ROV off deck,	Guardian
16:31	ROV post drop survey: anchor flat on seabed, alligned correctly, no burial	Guardian
16:35	Laying out anchor chain/wire, to connect load cell	Connector
17:02	3rd pull of AC-14 anchor at BSH South	Connector
17:06	Pull completed, max. pulling force = 64T, anchor starts skidding	Connector
17:18	ROV survey completed, anchor clearly visible on seabed, base and shackle & stock unburied	Guardian

17:22	Recover ROV for Multi-Beam survey	Guardian
17:28	Conducting Multi-Beam survey S3: Start position: 374400E; 5982150N End position: 374328E; 5982151N	Guardian
17:31	Anchor recovery	Connector
18:00	Guardian is leaving worksite BSH South;	Guardian
	Outlook: Connector, Guardian and Karen will meet 0500hrs on 2nd May in trial area 'VTG' for	
	anchor pull trials at V1.	
	Note: V1 coordinates may be revised by seperate mail depending on survey results by Wega	

Thursday, 02/05/2013		
Time	**Activity**	**Vessel**
3:30	Transit to worksite VTG	Guardian
5:00	Arrival at worksite BSH VTG	Connector/Guardian Karen
5:00	Lowering AC-14 anchor 25m offset to V1 drop position	Connector
6:30	AC-14 anchor on seabed,	Connector
6:36	ROV surveying anchor position, anchor aligned and unburied	Guardian
6:40	Laying down chain/wire in order to connect load cell	Connector
7:07	Load cell connected	Connector
7:09		Connector
7:18	pulling another 35m towards V1 Point	Connector
7:26	max pull = 64T, stopped	Connector
7:29	Multibeam survey along pulling path	Guardian
	ROV surveying anchor end position, anchor found upright standing on one fluke	Guardian
8:08	Pulling another 35m towards V1 Point	Guardian
8:20	ROV survey completed, anchor still upright on one fluke	Guardian
8:40	Multibeam survey along pulling path, to final anchor position	Guardian
8:51	Survey completed, recovering anchor	Connector
9:00	Reposition to V3 drop point	Connector
9:22	In position V3 drop point, lowering anchor	Connector
9:25	AC-14 anchor on seabaed at V3 drop point	Connector
9:35	ROV surveying anchor position, anchor flat on seabed, 90deg offset to pulling path	Guardian
9:45	Anchor aligned with pulling path, paying out chain/wire to connect load cell	Connector/Guardian
10:07	Stopped pulling, max force = 78T	Connector
10:09	ROV surveying anchor end position, anchor slightly buried, shackel out of seabed, stock buried, base covered with clay	Guardian
10:20	Recover ROV for Multibeam survey	Guardian
10:28	Conducting Multibeam survey along pulling path	Guardian
10:30	Recover anchor	Connector
10:35	Transit out of VTG, standing by for next low tide	Connector/Guardian Karen
15:55	Transit to worksite VTG, V5 drop position	Connector/Guardian Karen
16:16	In position V5, AC-14 on seabed (free fall)	Connector

17:00	ROV surveying anchor drop position, anchor askew - pulling for alignement with pulling path	
17:05	Anchor aligned with pulling path, paying out chain/wire to connect load cell	Connector/Guardian
17:28	Load cell connected, start to pull AC-14 anchor at V5	Connector
17:37	Stopped pulling, max force = 80T	Connector
17:40	ROV surveying anchor end position,	Guardian
17:45	ROV survey completed, anchor base flat on seabed, covered in clay. Recover ROV to deck	Guardian
17:48	Conducting Multibeam survey along pulling path V5	Guardian
17:55	V5 Mutbeam survey completed, recover AC-14 anchor and swap with Hall anchor	Connector
19:33	Relocated to V2 position, Hall anchor deployed on seabed (free fall)	Connector
19:38	ROV surveying anchor drop position, anchor askew - pulling for alignement with pulling path	Connector/Guardian
19:50	Anchor aligned with pulling path, paying out chain/wire to connect load cell	Connector
20:07	Load cell connected, start to pull Hall anchor at V2	Connector
20:14	Stopped pulling after anchor break-out, max force = 75T	Connector
20:17	ROV survey not possible, due to insufficient power against Connector thruster wash, recover to deck	Guardian
20:22	Conducting Multibeam survey along pulling path V2	Guardian
20:27	V2 Mutbeam survey completed, recover Hall anchor	Connector
20:55	Relocated to V4 position, Hall anchor deployed on seabed (free fall)	Connector
21:04	ROV surveying anchor drop position, anchor askew - pulling for alignement with pulling path	Connector/Guardian
21:15	Anchor aligned with pulling path, paying out chain/wire to connect load cell	Connector
21:29	Load cell connected, start to pull Hall anchor at V4	Connector
21:36	Stopped pulling after anchor break-out, max force = 79T	Connector
21:39	ROV survey not possible, due to insufficient power against Connector thruster wash, recover to deck	Guardian
21:43	Conducting Multibeam survey along pulling path V4	Guardian
21:47	V4 Mutbeam survey completed, recover Hall anchor	Connector
22:22	Relocated to V6 position, Hall anchor deployed on seabed (free fall)	Connector
22:32	ROV surveying anchor drop position, anchor askew - pulling for alignement with pulling path	Connector/Guardian
22:41	Anchor aligned with pulling path, paying out chain/wire to connect load cell	Connector
22:57	Load cell connected, start to pull Hall anchor at V6	Connector
23:10	Stopped pulling after anchor break-out, max force = 80T	Connector
23:12	Conducting Multibeam survey along pulling path V6	Guardian
23:15	V6 Multibeam survey completed, recover Hall anchor	Connector
23:20	Guardian is leaving VTG for sheltered water	Guardian

Friday, 03/05/2013		
Time	**Activity**	**Vessel**
3:30	Transit to worksite BSH South	Guardian
8:40	Arrival at worksite BSH South at position S4, for Hall anchor trials	Connector/Guardian Karen

8:46	at S4, lowering Hall anchor to seabed	Connector
8:47	Hall anchor on seabed,	Connector
8:55	ROV surveying anchor position, anchor aligned and unburied	Guardian
8:56	Laying down chain/wire in order to connect load cell	Connector
9:10	Load cell connected	Connector
9:11	Pulling anchor over S4 line	Connector
9:17	max pull = 76T, disconnecting load cell, ROV survey on final anchor position, anchor base flat on seabed, recover ROV	Connector
9:25	Multibeam survey along pulling path S4	Guardian
9:27	Survey completed, recovering anchor	Connector
9:44	Reposition to S5 drop point	Connector/Guardian
9:45	In position S5 drop point, lowering anchor	Connector
	Hall anchor on seabed,	Connector
9:55	ROV surveying anchor position, anchor askew, aligning anchor	Guardian/Connector
10:04	Anchor aligned with pulling path S5	Guardian/Connector
10:05	Laying down chain/wire in order to connect load cell	Connector
10:15	Load cell connected	Connector
10:16	Pulling anchor over S5 line	Connector
10:25	max pull = 72T, disconnecting load cell, ROV survey on final anchor position, anchor base broken out of seabed, recover ROV	Connector
10:28	Multibeam survey along pulling path S5	Guardian
10:31	Survey completed, recovering anchor	Connector
10:40	Reposition to S6 drop point	Connector/Guardian
10:52	In position S6 drop point, lowering anchor	Connector
10:56	Hall anchor on seabed,	Connector
10:08	ROV not operational - tether broken, repairs expected to take 24hrs min. continue w/o rov on multibeam only	Guardian
10:12	Laying down chain/wire in order to connect load cell	Connector
11:22	Load cell connected	Connector
11:23	Pulling anchor over S6 line	Connector
11:28	max pull = 80T, disconnecting load cell	Connector
11:31	Multibeam survey along pulling path S6	Guardian
11:00	Survey completed, recovering anchor	Connector
11:05	Reposition to N5 drop point at BSH North worksite	Connector/Guardian
13:09	In position N5 drop point, lowering anchor	Connector
13:12	Hall anchor on seabed,	Connector
13:15	Laying down chain/wire in order to connect load cell	Connector
13:18	Multibeam result anchor position: 80deg askew to pulling path,	Guardian
13:35	Load cell connected	Connector
13:36	Pulling anchor over N5 line	Connector
13:46	max pull = 57T, disconnecting load cell	Connector
13:49	Multibeam survey along pulling path N5	Guardian
13:51	Survey completed, recovering anchor	Connector
13:58	Reposition to N6 drop point at BSH North worksite	Connector/Guardian
14:22	In position N6 drop point, lowering anchor	Connector
14:24	Hall anchor on seabed,	Connector
14:25	Laying down chain/wire in order to connect load cell	Connector
14:28	Multibeam result anchor position:	Guardian
14:43	Load cell connected	Connector

14:44	Pulling anchor over N6 line	Connector
14:53	max pull = 60T, disconnecting load cell	Connector
14:55	Multibeam survey along pulling path N6	Guardian
15:57	Survey completed, recovering anchor	Connector
15:25	Personnel Transfer Connector -> Guardian	Connector/Guardian
	Transit to Norddeich	

F Sonar-, video- and photo-illustrations

1. Use of the Sonar

The sonar on the ROV was used to locate the anchor at some distance away from the ROV, in order to be able to steer the ROV towards the anchor, especially in situations where the underwater visibility was poor. The next illustration is a screen-dump of a recorded sonar image, on which the outline of the Hall anchor at location VTG-06 can be seen.

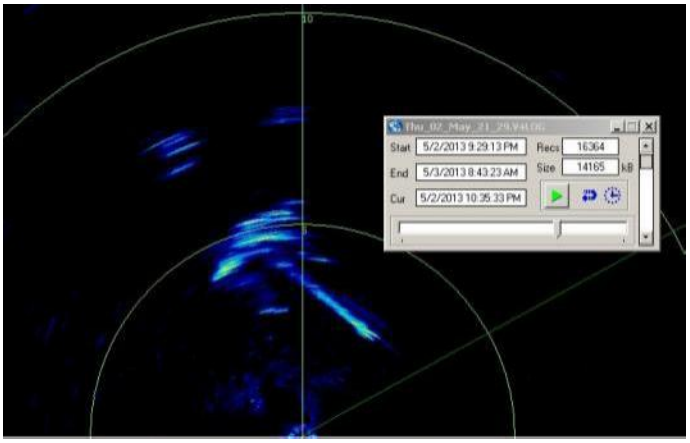


Figure F.1 Partial screendump of sonar image of Hall anchor at location VTG-06

The first visual contract is then made about two minutes later, when the white painted anchor shackles appear on the video, as seen in the figure below.

Figure F.2 Video still of first contact with Hall anchor after dropping at VTG-06

The “speckled” appearance of the video-still is the result of small particles suspended in the water being lit up by the lights on the ROV.

2. Information obtained using the ROV's video

A large amount of video footage was acquired during the ROV-surveys. A large part of the recorded video footage covers the time searching for the anchor and extensive editing reduced all recordings to 24 video-clips, which cover tests N1, N2, S1 (3 clips), S2, S3 (2 clips), S4, S5, V1 (4 clips), V2 (2 clips), V4, V5 (3 clips) and V6 (2 clips). Table F.1 below gives an overview of the clips that were provided from the total records.
Pieces where no anchor was in sight, where the visibility was considered too poor or where little added information could be obtained from the video were left out.

Table F.1 Overview of video clips cut from total recordings

Clip Name	Start time	Duration	Trial phase	Contents
N1_AC14_20130430-1	09h28m10s	0m51s	after anchor drop	Proof of no burial after drop
N2_Hall_20130430-2	15h15m58s	0m24s	after anchor drop	No burial & anchor alignment
S1_AC14_20130501-1	08h32m55s	2m14s	after anchor drop	No burial & anchor alignment
S1_AC14_20130501-2	10u08m51s	2m48s	after anchor drop	Alignment & start of pull
S1_AC14_20130501-3	10u32m36s	2m06s	after pulling	final anchor position post pull
S2_AC14_20130501	15h51m42s	6m05s	after pulling	final anchor position post pull
S3_AC14_20130501-1	15h58m28s	2m11s	after anchor drop	no burial, anchor alignment
S3_AC14_20130501-2	17h04m23s	2m54s	during pulling	anchor grad in
S4_HALL_20130503-1	22h37m39s	1m36s	Post drop	anchor aligned and unburied
S5_HALL_20130503-1	10h18m34s	0m30s	post drop, pulling start	take off, bad viz
VTG01_AC14_20130502-1	06h40m32s	2m47s	after anchor drop	No burial & anchor alignment
VTG01_AC14_20130502-2	07h12m54s	0m40s	pulling start	take off
VTG01_AC14_20130502-3	07h54m40s	2m17s	after 1st pulling	anchor upright on fluke
VTG01_AC14_20130502-4	08h27m37s	1m37s	after 2nd pulling	anchor askew
VTG02_HALL_20130502-1	17h34m17s	2m44s	post drop	flat on seabed, 90° offset. File naming error: should be VTG05_AC14_20130502-1a
VTG02_HALL_20130502-2	19h44m30s	4m44s	post drop alignment	line-up pull
VTG02_HALL_20130502-3	20h11m00s	1m17s	pull	anchor grad in
VTG03_AC14_20130502-1	09h51m11s	1m44s	after alignment	anchor aligned, max. coverage
VTG03_AC14_20130502-2	10h15m22s	3m01s	post pull	anchor covered, clay load on base
VTG04_HALL_20130502-1	21h18m10s	1m42s	post alignment	after line-up pull
VTG05_AC14_20130502-1	17h03m40s	5m21s	post drop	no burial, anchor alignment
VTG05_AC14_20130502-2	17h45m18s	1m17s	pull & post survey	anchor covered in clay
VTG06_HALL_20130502-1	22h37m37s	2m20s	Post drop	anchor misaligned, alignment pull
VTG06_HALL_20130502-2	22h47m36s	1m40s	Post alignment	anchor aligned

The following figures contain video stills that illustrate the kind of information that was retrieved using the ROV.

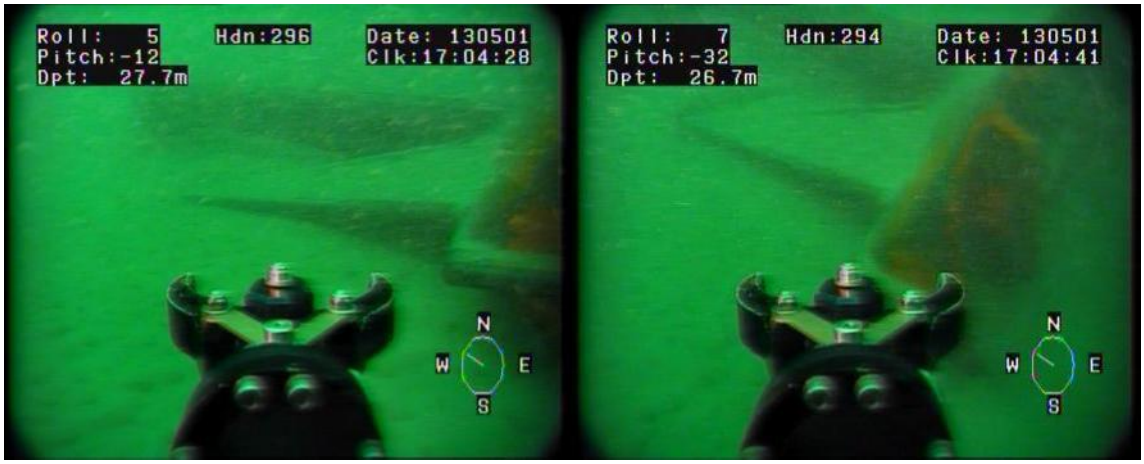


Figure F.3 AC14 at VTG-3 Anchor at rest (left) and tips initial penetration (right)

Figure F.4 AC14 at VTG-3 Anchor dragging with crown on seabed (left) & crown lifting off (right)

Figure F.5 VTG05_AC14_20130502_17h35m29s_Sand flowing over crown during pull.jpg

Figure F.6 VTG05_AC14_20130502_17h36m19s_Clay flake rising from the crown.jpg

Figure F.7 VTG05_AC14_20130502_17h45m36s_Anchor covered by clay fragments.jpg

Figure F.8 VTG01_AC14_20130502_07h56m05s_Anchor upright on fluke.jpg

Figure F.9 VTG01_AC14_20130502_08h28m012_Anchor askew broken out.jpg

3. Photographic impression of the anchor test

Photo F.1 Dsc06522 AC14 on deck

Photo F.2 Dsc06553 Switched from AC14 to Hall.jpg

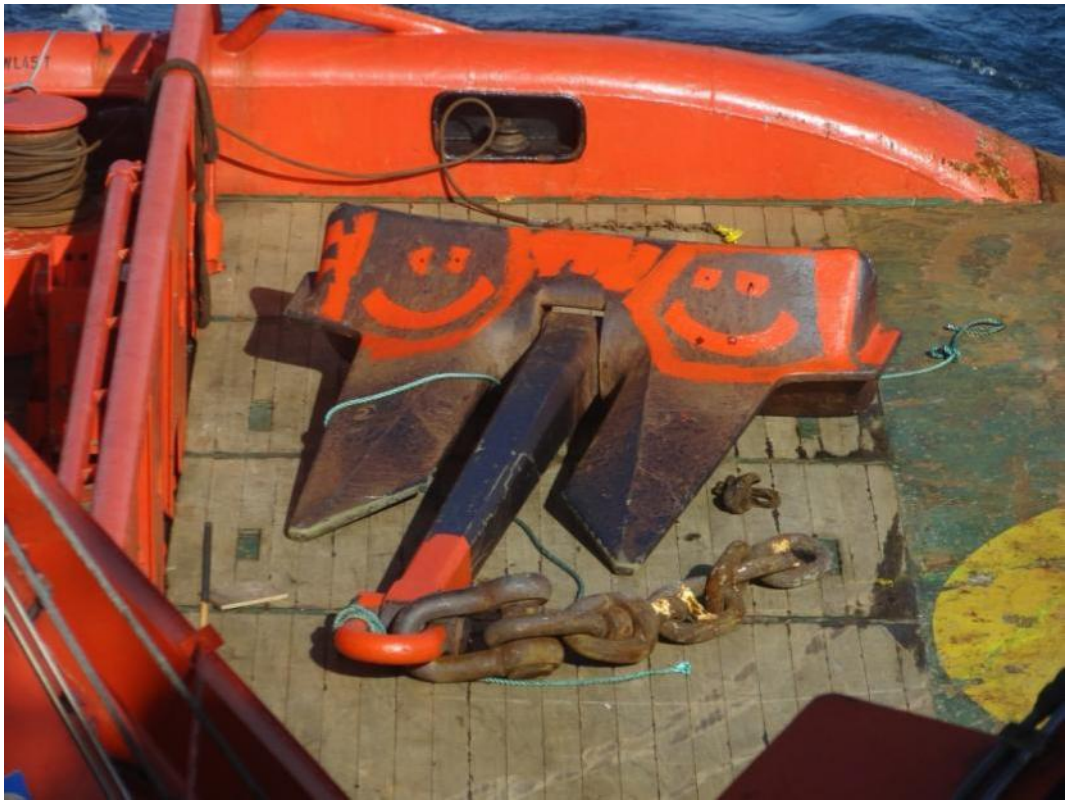


Photo F.3 Dsc06609 AC14 marked for ROV visibility

Photo F.4 Dsc06619 Winch with Cable

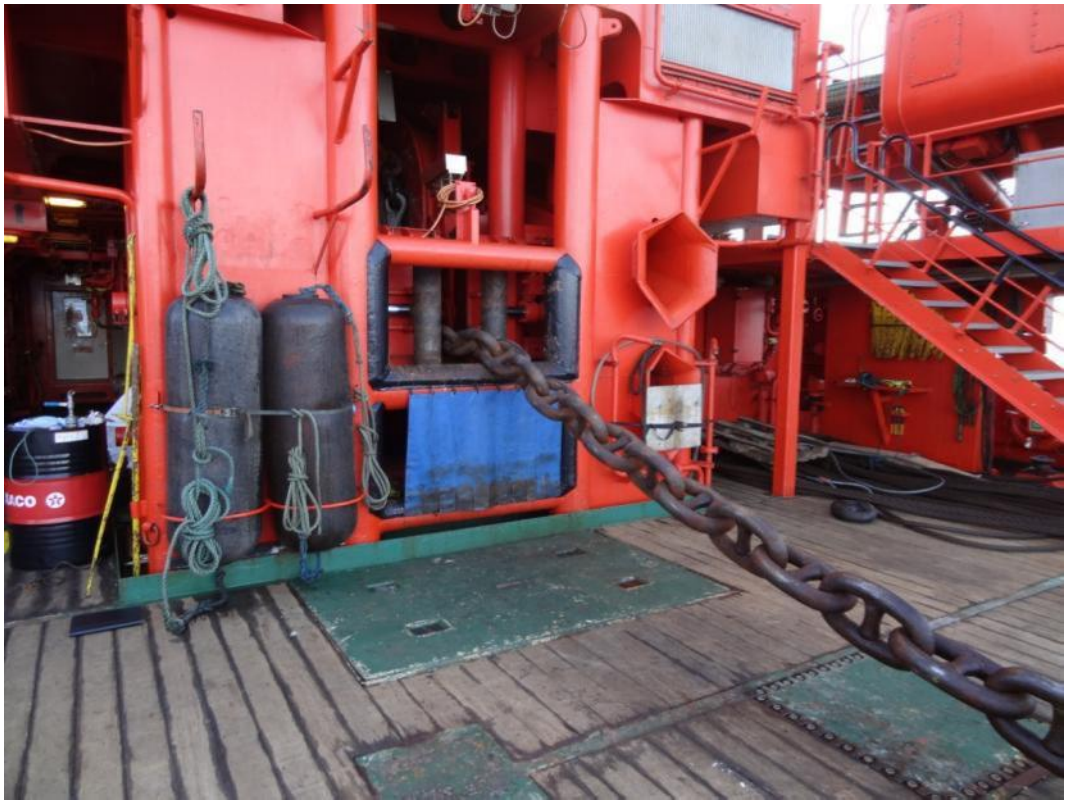


Photo F.5 Dsc06620 Winch with Chain

Photo F.6 Dsc06622 Load Cell ready for deployment

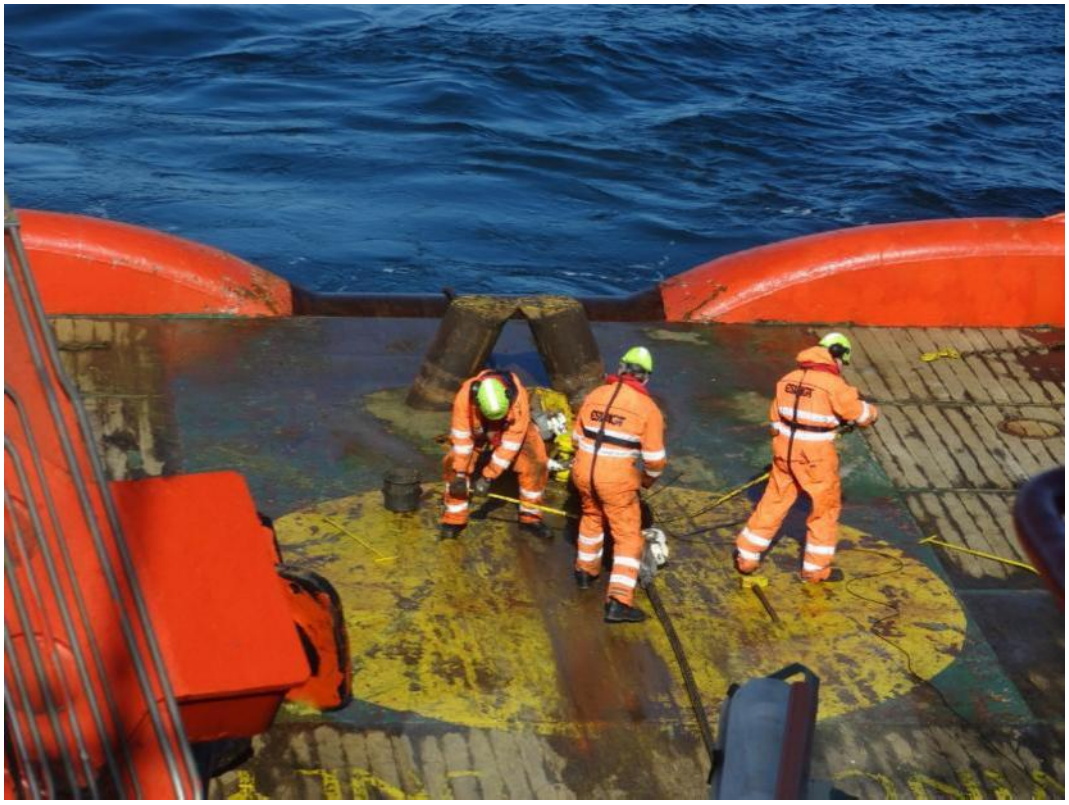


Photo F.7 Dsc06638 Mounting the Load Cell

Photo F.8 Dsc06639 Load Cell Mounted

Photo F.9 Dsc06710 Soil Collected on AC14