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MIRAI “Cruise Report”

MR17-06

Geological and geophysical investigations for understanding subduction-zone earthquake and mega Tsunami: Paleoseismology in slope to trench

Shimokita-oki and Hokkaido-oki Pacific
Oct. 5th, 2017-Oct.14th, 2017
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

MR17-06 Cruise Report Contents

1. Cruise Information

Cruise ID: MR17-06

Name of vessel: R/V MIRAI

Chief scientist [Affiliation]: Toshiya Kanamatsu [CEAT JAMSTEC]

Representative of the Science Party [Affiliation]: Toshiya Kanamatsu [CEAT JAMSTEC]]

Proposal representative [affiliation]: Shuichi Kodaira [CEAT JAMSTEC]

Title: Geological and geophysical investigations for understanding subduction-zone earthquake and mega Tsunami: Paleoseismology in slope to trench

Cruise period: Oct. 5th, 2017-Oct.14th, 2017

Ports of departure / arrival: Hachinohe/Hachinohe

Research area: Off Shimkita, Off Hidaka, and Off Kushiro (**Figure 1**)

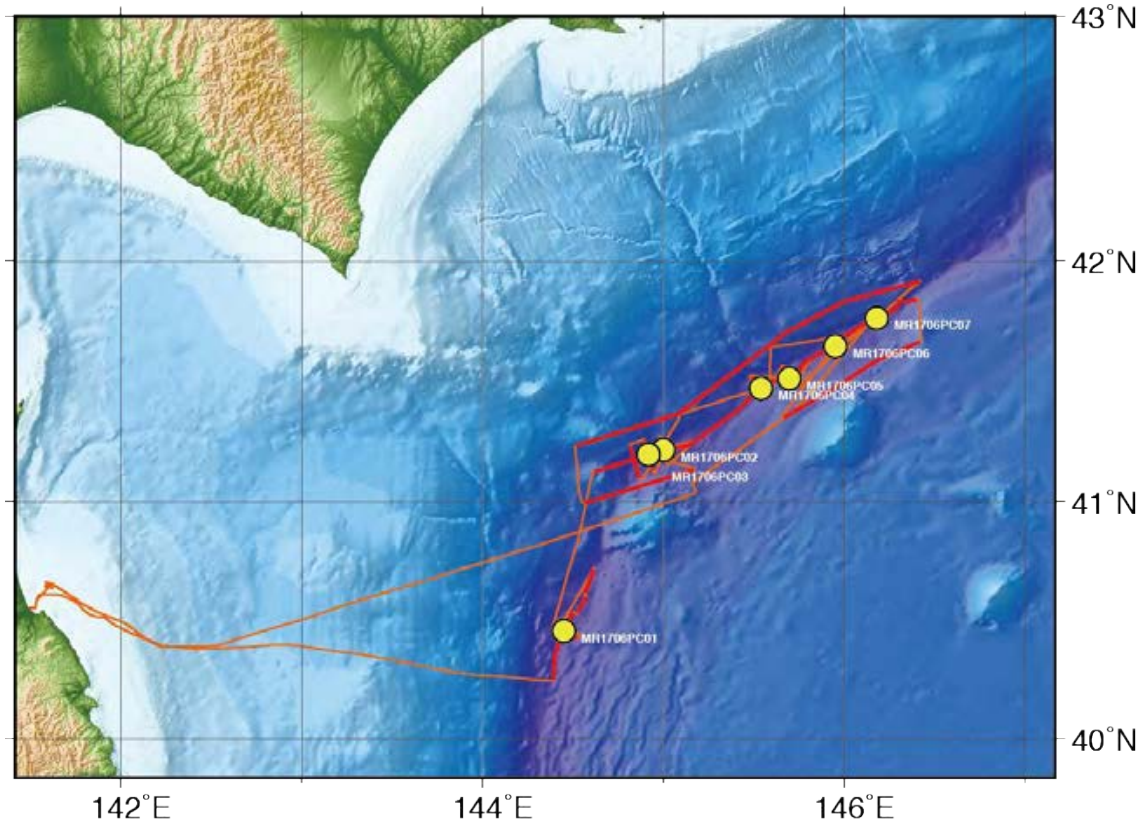


Figure 1. MR17-06 research area: Brown line: ship track, Red line: SBP and MBES Lines. Yellow circle: coring point.

2. Participant list

Scientific party	
Toshiya Kanamatsu	CEAT, JAMSTEC
Ken Ikehara	Geological Survey of Japan, AIST
Ryo Ohyama	Nippon Marine Enterprise
Soichiro Sueyoshi	Nippon Marine Enterprise
Yusuke Sato	Marine Works Japan Ltd
Yuji Fuwa	Marine Works Japan Ltd
Mika Yamaguchi	Marine Works Japan Ltd
Yohei Katayama	Marine Works Japan Ltd
RV Mirai Ship Crew	
Haruhiko Inoue	Master
Takaaki Shishikura	Chief Officer
Akihisa Tsuji	1st Officer
Yuki Furukawa	2nd Officer
Akihiro Nunome	3rd Officer
Shintaro Kan	Jr. 3rd Officer
Shuichi Hashide	Chief Engineer
Jun Takahashi	1st Engineer
Shohei Miyazaki	3rd Engineer
Hiroki Tanaka	2nd Engineer
Masanori Murakami	Chief Radio Operator
Yosuke Kuwahara	Boatswain
Kazuyoshi Kudo	Quarter Master
Tsuyoshi Sato	Quarter Master
Tsuyoshi Monzawa	Quarter Master
Masashige Okada	Quarter Master
Hideaki Tamotsu	Quarter Master
Saikan Hirai	Quarter Master
Masaya Tanikawa	Quarter Master
Shohei Uehara	Quarter Master
Hideyuki Okubo	Sailor
Yoshihiro Sugimoto	No.1 Oiler
Daisuke Taniguchi	Oiler
Keisuke Yoshida	Oiler
Shintaro Abe	Oiler
Kazuya Ando	Assistant Oiler
Tatsunari Onoue	Chief Steward
Tamotsu Uemura	Steward
Sakae Hoshikuma	Steward
Masanao Kunita	Steward
Mizuki Nakano	Steward

3 Cruise Log

Date	Remarks
4th Oct	
	Embarkation
5th Oct	
09:00	Leaving Hattaro E pier, Hachinohe port
10:00-10:30	Briefing for safety and onboard life
13:15-	Fire drill
15:00-15:30	Research meeting
20:10-	Starting of SBP and MBES surveys
	Line SM01
	Line SM02,
	Line SM03
	Line JPTN10x
6th Oct	
09:00	Starting of Piston coring PC01
11:56	Piston corer at bottom
14:51-	Starting of SBP and MBES surveys
	Line SM04 (cross of PC01)
	Line HKew1
7th Oct	
09:00	Starting of Piston coring PC02
11:36	Piston corer at bottom
14:44-	Starting of SBP and MBES surveys
	Line HKns2
	Line HKns3
	Line HKew2
	Line HKew2
8th Oct	
09:00	Starting of Piston coring PC03
11:43	Piston corer at bottom
15:23-	Starting of SBP and MBES surveys
	Line KU1
	Line Additional (KUN1)
9th Oct	
09:00	Starting of Piston coring PC04 start
11:43	Piston corer at bottom
14:16-	Starting of SBP and MBES surveys
	Line KU2

10th Oct	
09:00	Starting of Piston coring at PC05
11:36-	Starting of SBP and MBES surveys
	Line P4cross
	Line P5cross
	Line MN1
	Line KUS1
11th Oct	
09:00	Starting of Piston coring PC06
11:41	Piston corer at bottom
14:27-	Starting of SBP and MBES surveys
	Line KUN1
12th Oct	
09:00	Starting of Piston coring PC07
11:39	Piston corer at bottom
14:27-	Starting of SBP and MBES surveys
	Line PC07cross
	Line KUS2
13th Oct	
09:00	Transit to Hachinohe
14th Oct	
09:00	Arrival to Hachinohe (end of cruise)

4. Objectives

In order to understand the timing and frequency of past large earthquake in the Kuril trench, and compare their records to those of Japan Trench, geological survey to seek past earthquake record in marine sequence was conducted. Detailed site surveys and sediment sampling using piston coring were carried out (**Figure 1**). We carried out piston coring operations over 7,000-m water depth, MBES and SBP surveys, shipboard MSCL measurements, visual description, and sub-sampling for post-cruise researches on obtained samples during the cruise.

5. Instruments and Operations

5-1. Multi-beam Echo-sounder System and Sub-bottom profiler

The SeaBeam3012 Multi beam Echo sounder system (MBES), and Bathy 2010 subbottom profiler (SBP) equipped with RV MIRAI were used to collect bathymetric and sub-bottom data in the study area. General specifications of the systems are summarized below.

MBES:	Frequency	12kHz
	Depth range	50～11,000m
	Swath width	Max150°(90° at Water depth 11000m)
	Max beam number	301beams
	Beam width	2°×1.6°
SBP:	Frequency	3.5 kHz
	Beam width	20°
	Depth range	10～12,000m

5-2. Temperature profile

The sound velocity profile of the local water column, which was used for calibration of depth data for the bathymetry, was estimated from a temperature profile based on in-situ Expendable Bathythermograph (XBT) measurement and Expendable Conductivity Bathythermograph (XCTD). (**Table 5-2-1**). Temperature depth profile is shown in **Figures. 5-2-1, and 5-2-2.**

Table 5-2-1. Positions of XBT and XCTD measurements.

Num	Date	time	Lat.	Long.	Probe Type	Max depth (m)
1147	2017/10/5	10:34:21	40-15.3522'N	144-14.0303'E	T-5	1830
1148	2017/10/7	04:51:38	41-12.4832'N	145-00.5491'E	XCTD-2	2000

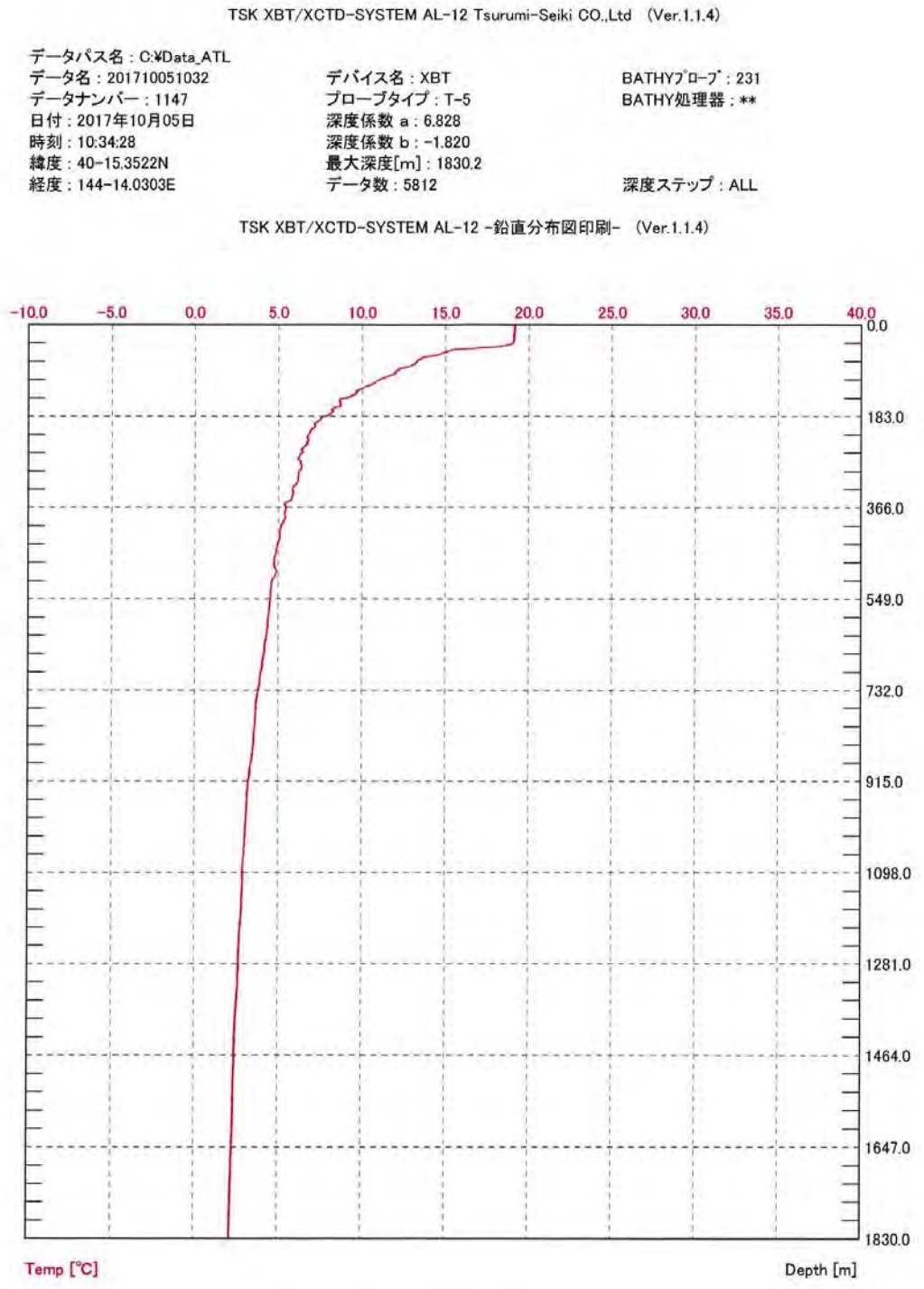


Figure 5-2-1. Temperature profile obtained by XBT measurement on 2017/10/05.

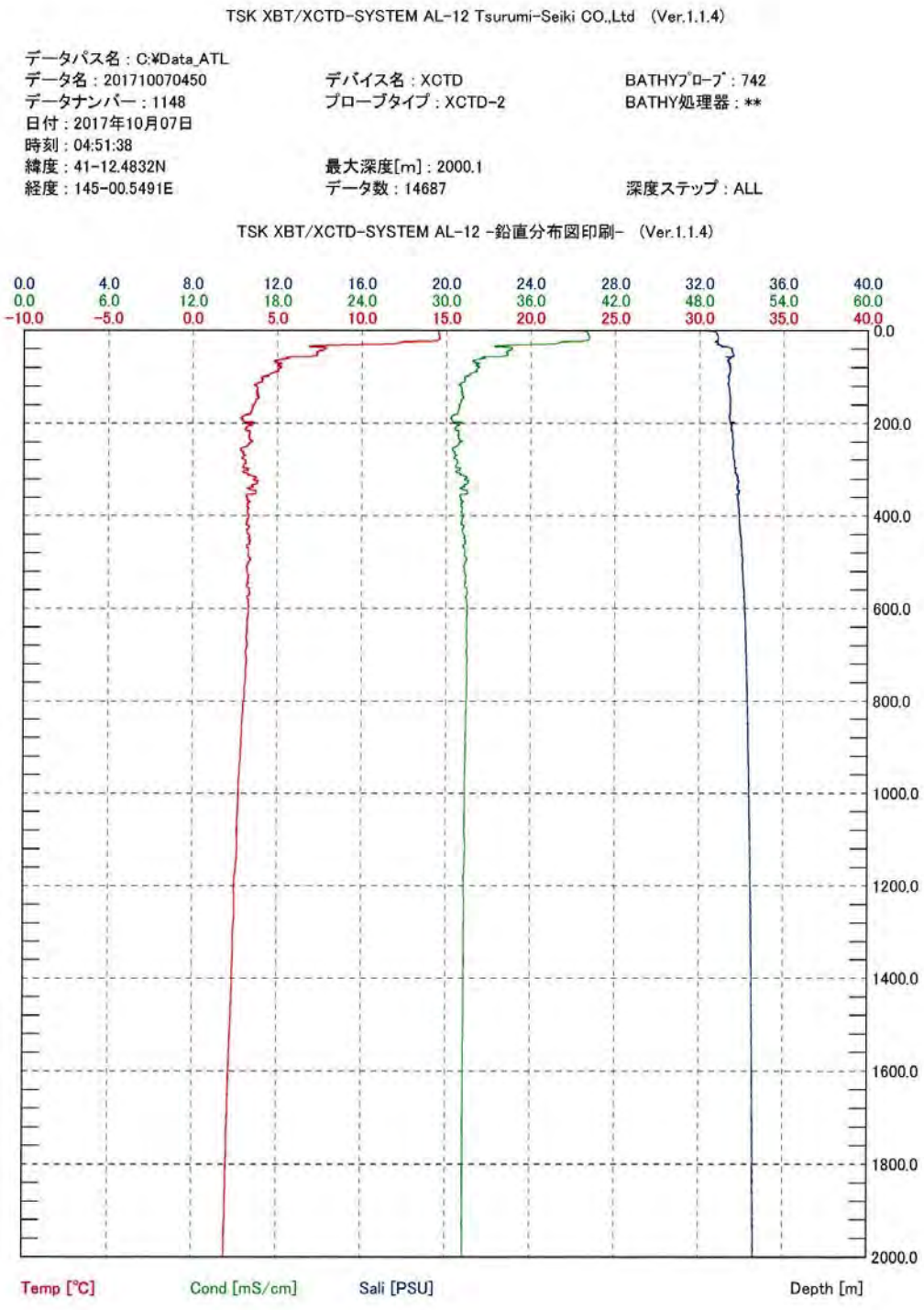


Figure 5-2-2. Temperature, conductivity, and salinity profiles obtained by XCTD measurement on 2017/10/07.

5-3. Piston corer system

5-3-1. Piston corer system (**Figure 5-3-1**)

A piston corer system consists of 0.59 ton weight, 6 m or 8 m long stainless steel barrels trigger which works as the balance and a pilot core sampler. In addition, the polyvinyl chloride (PVC) liner tube is inside of the stainless steel barrel. The inner diameter (I.D.) of liner tube is 75 mm. The total weight of the system is approximately 0.7 ton. The piston is composing of two O-rings (size: P63). For a pilot core sampler, we used a "74 mm diameter long-type pilot corer". Pilot corer consists of 112 kg weight, 70 cm long alminum barrel and polycarbonate liner tube. The I.D. of polycarbonate liner tube is 74 mm. The transponder (SI2-1KP, Kaiyo Denshi co. Ltd.; maximum depth 10,000 m) was attached to the winch wire above or over 50 m from the PC to monitor the PC position.

5-3-2. K-value

K-value means the hardness barometer of the seafloor sediment. K-value = pure pull out load / (outer diameter of outer pipe * penetration length). Because of winding power of the winch, we were requested to choose pipe length with referring "K-value".

5-3-3. Winch operation

In the beginning of operation of the PC, a speed of wire out was set to 0.5 m/s, and then increased lowering speed up to 1.0 m/s gradually. Wire out was stopped at a depth about 100 m above the seafloor for about 3 minutes to stabilize some pendulum motion of the system. After the wire tension was stable, the wire out was restarted at a speed of 0.3 m/s, and we carefully watched a tension meter to observe reaching of the PC to seafloor. When the corer reached to seafloor, wire tension abruptly decreased by the loss of the corer weight. Wire out was stopped immediately when the corer hit to seafloor. Winding of the wire was started at a speed of 0.3 m/s until the tension gauge indicates that the corers were lifted off seafloor. After leaving of the PC from seafloor, winch wire was wound at the maximum speed.

5-4. Shipboard core flow

Before core physical property measurements, cores were equilibrated with room temperature (~20°C). After temperature equilibration, whole-round core sections were processed in the whole-round multisensor core logger (Geoteck Multi-Sensor Core Logge: MSCL) to measure gamma ray attenuation (GRA) density, magnetic susceptibility, natural gamma radiation, *P*-wave (compressional) velocity, and electrical resistivity. The whole-round core sections were horizontally split half as working and archive halves with the core splitter and nylon wires. Images of archive sections were obtained by MSCL-I. After measurements, core treatments were followed as described in a chart (**Figure 5-4-1**)

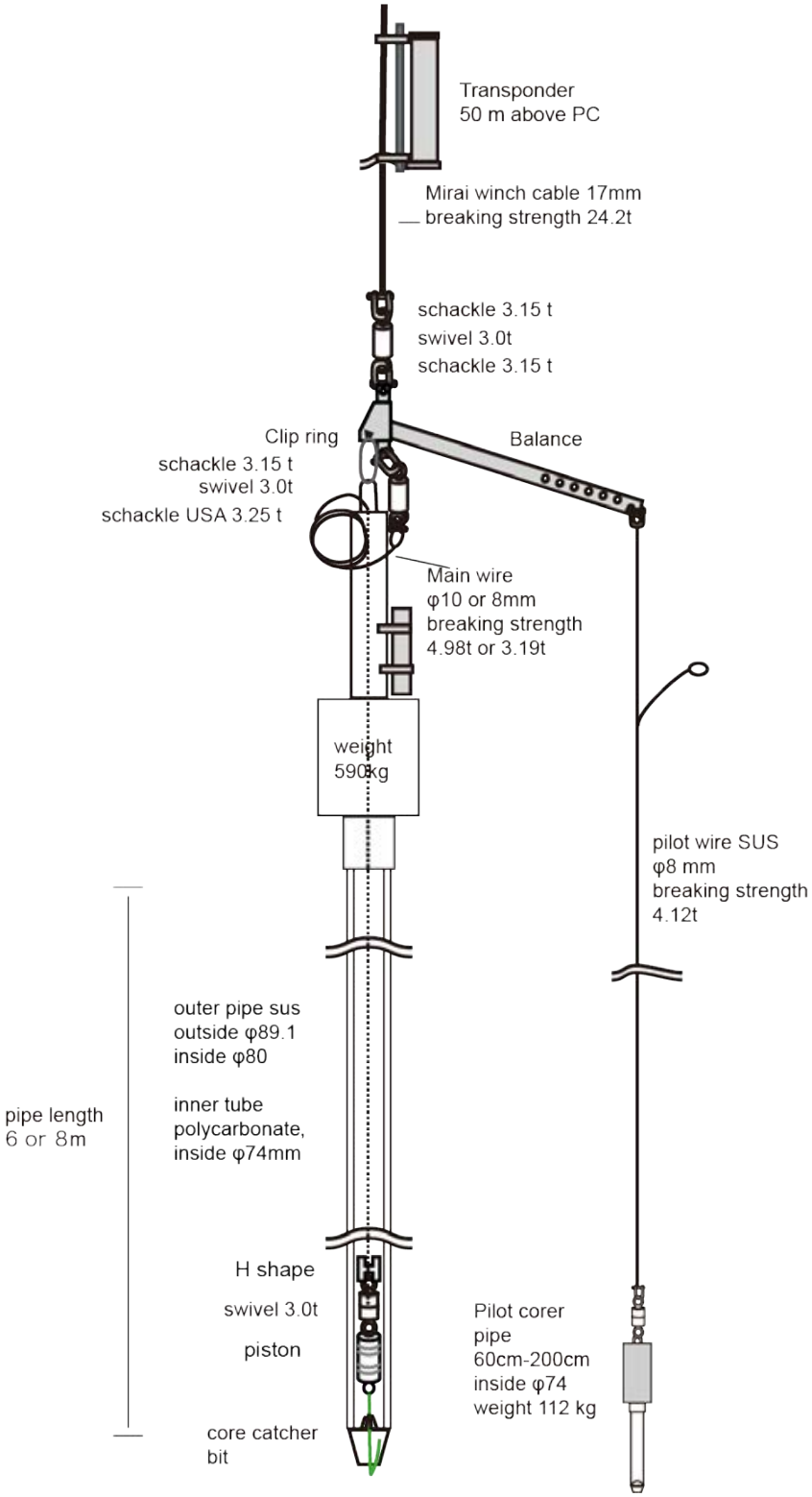


Fig. 5-3-1: Specifications of piston-corer system used for MR17-06.

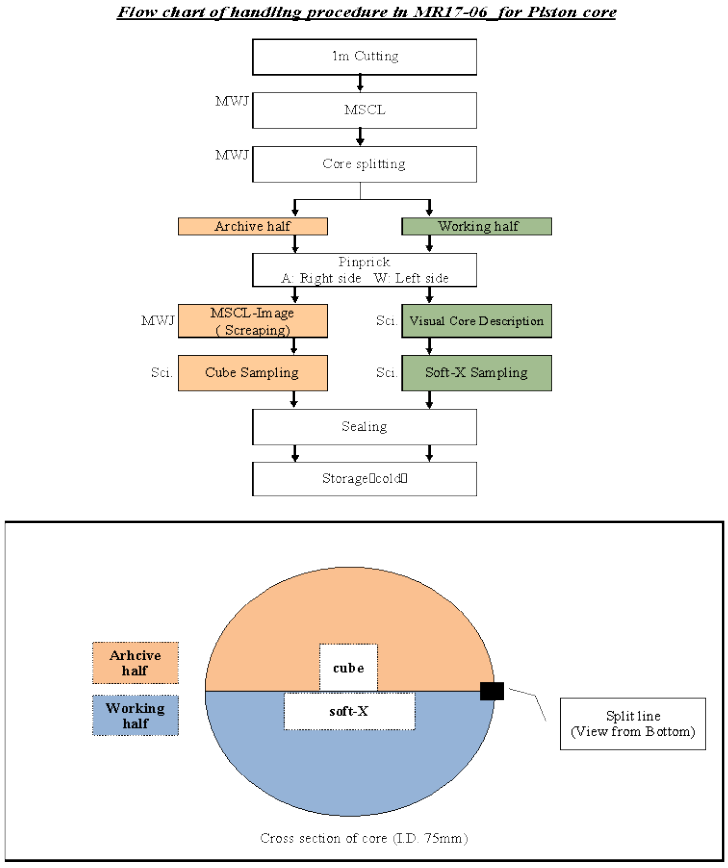


Figure 5-4-1. Shipboard core flow for MR17-06

6. Preliminary results

6-1. MBES and SBP survey data

MBES and SBP surveys were conducted to seek sedimentary basin along trench axes, the northernmost of Japan Trench and Kuril trench shown in **Figure 6-1-1-1**. The mapping was conducted off Shimokita-Oki, off Tokachi, and off Kushiro. Close up maps are shown in **Figures 6-1-2, 6-1-3, and 6-1-4**).

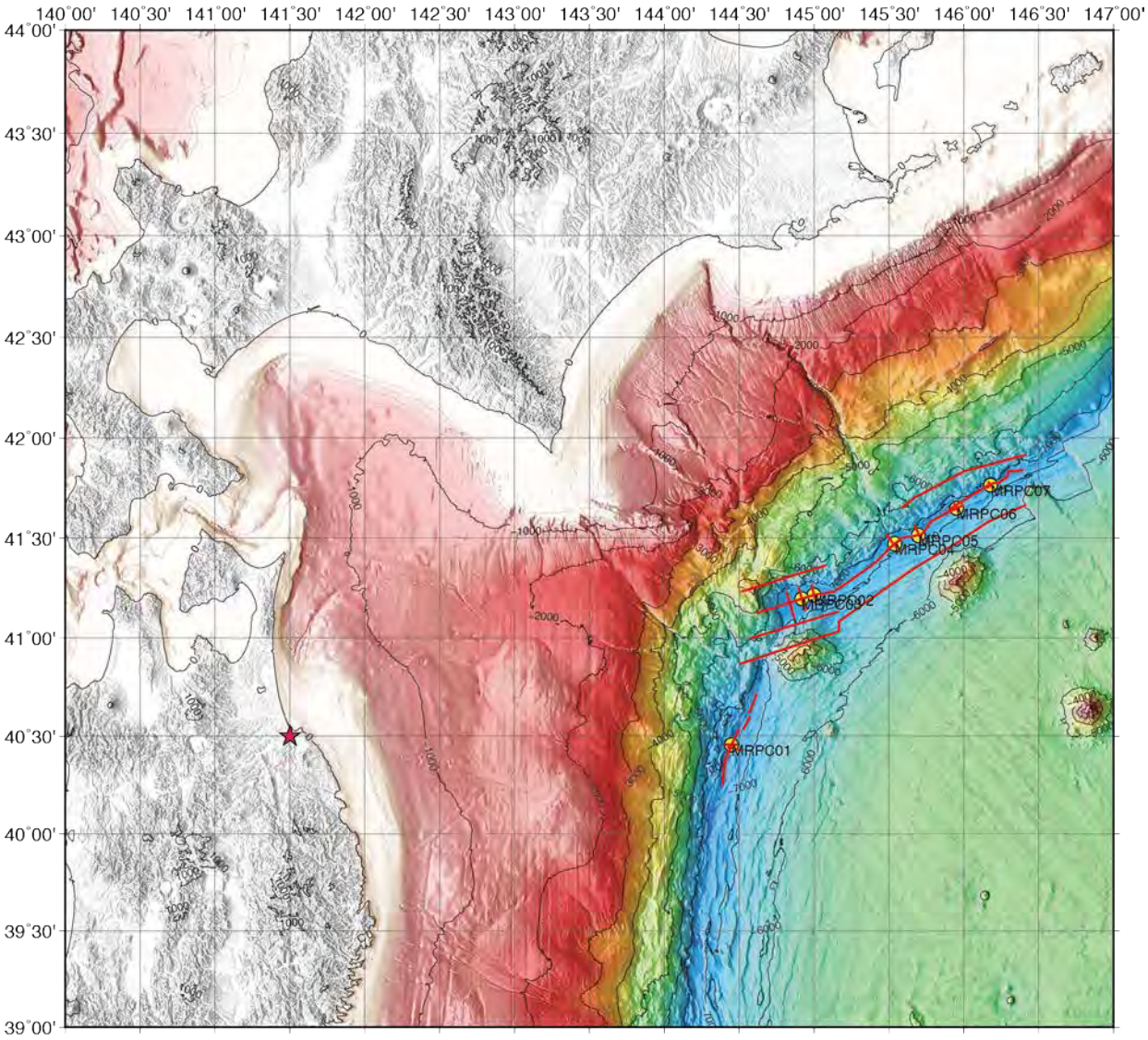


Figure 6-1-1. Survey lines of MBES and SBP (Red lines). Red star symbol: Hachinohe. Yellow circle symbol: Piston coring sites.

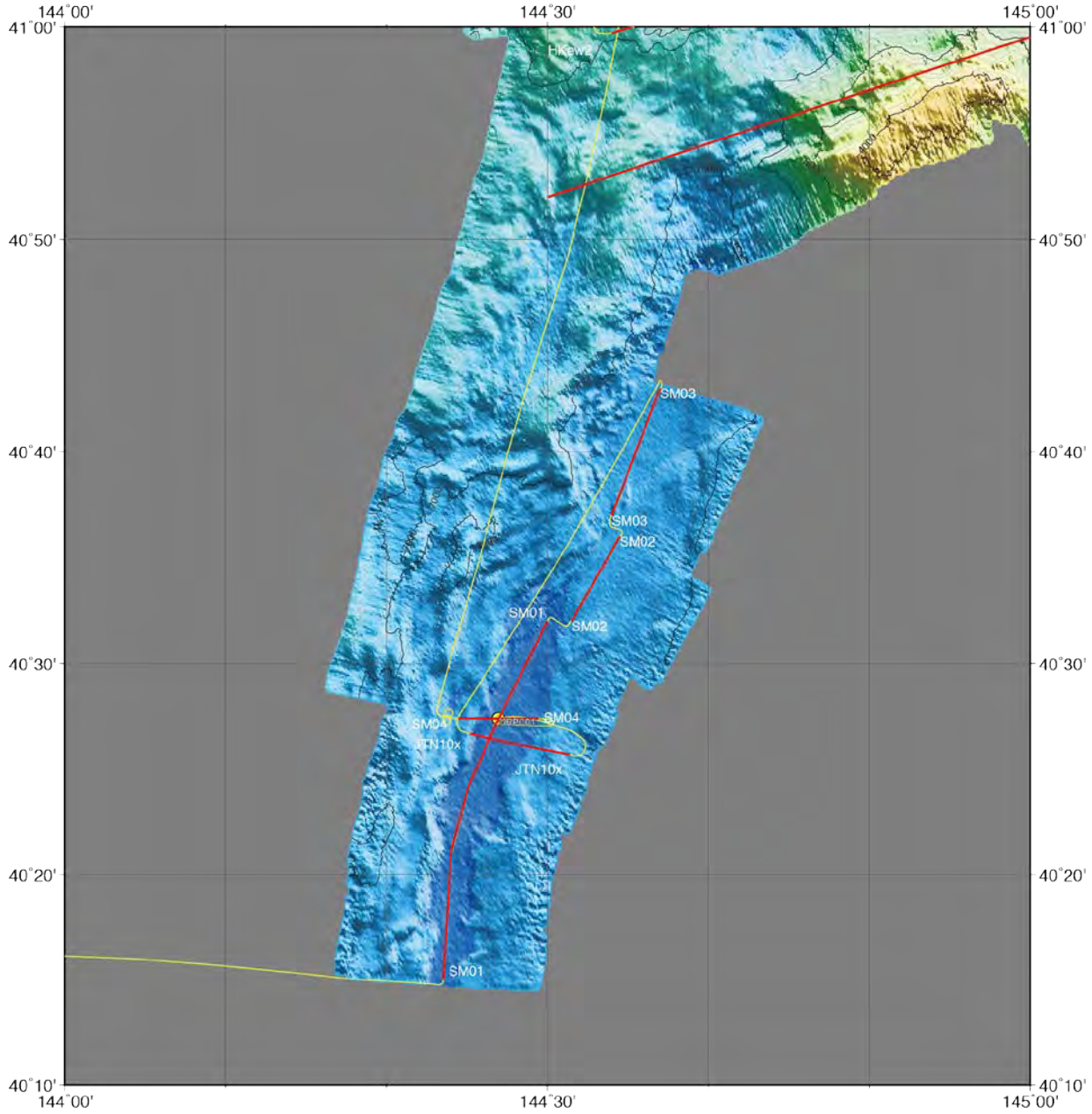


Figure 6-1-2. Off Shimokita survey area. Mapped areas with MBES and SBP (Red lines). Yellow circle symbol: Piston coring sites.

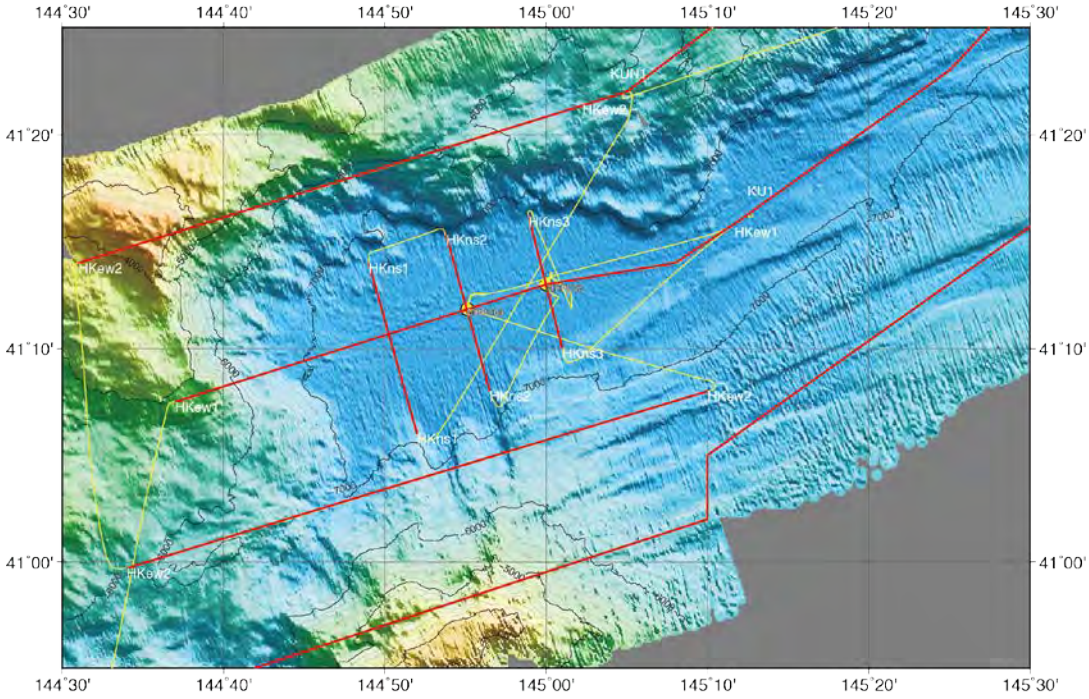


Figure 6-1-3. Off Hidaka survey area. Mapped areas with MBES and SBP (Red lines). Yellow circle symbol: Piston coring sites.

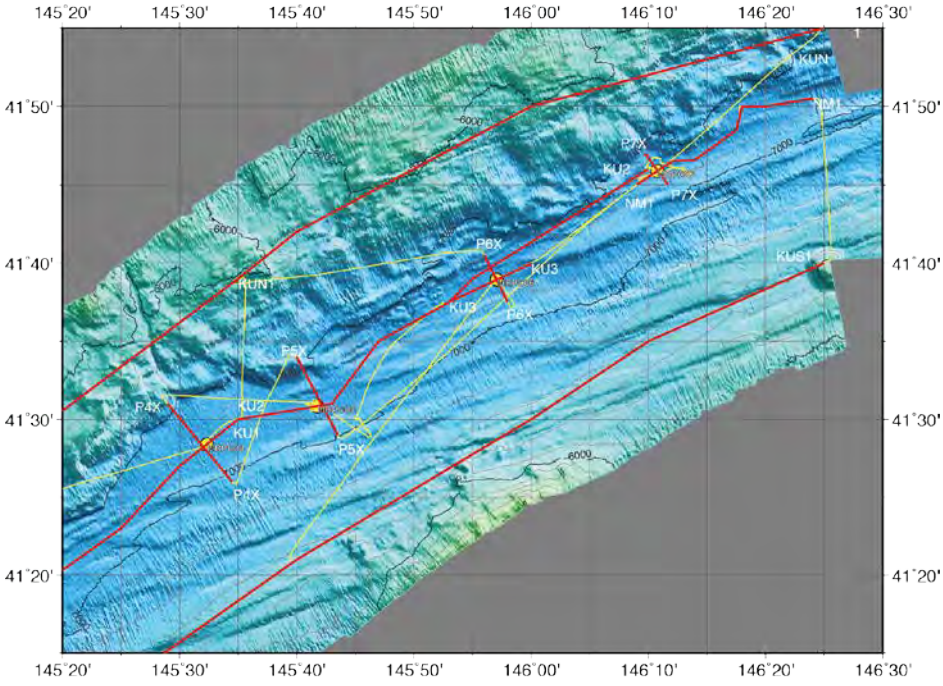


Figure 6-1-4. Off Kushiro survey area. Mapped areas with MBES and SBP (Red lines). Yellow circle symbol: Piston coring sites.

6-2. SBP survey

SBP images obtained are shown in the following figures. Refer **Figures. 6-1-2** to **6-1-4** for the locations of survey lines

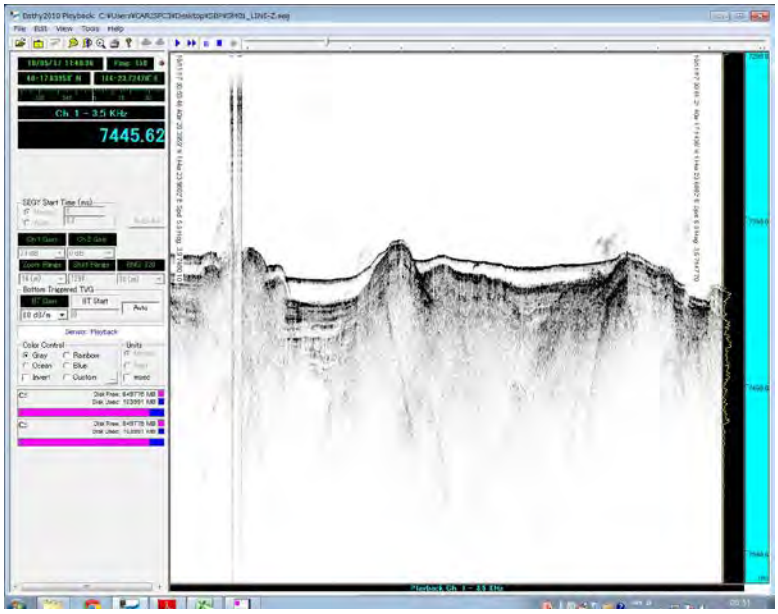


Figure 6-2-1: SBP image of Line SM01 (reference map **Fig. 6-1-2**)

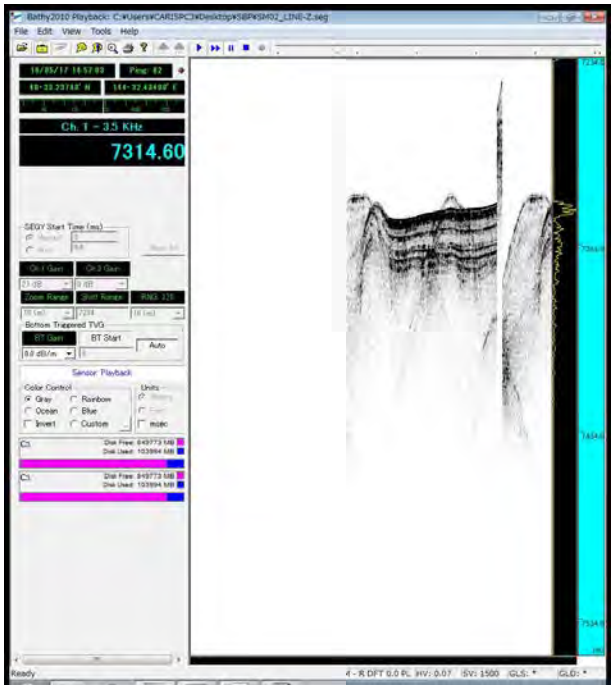


Figure 6-2-2: SBP image of Line SM02 (reference map **Fig. 6-1-2**)

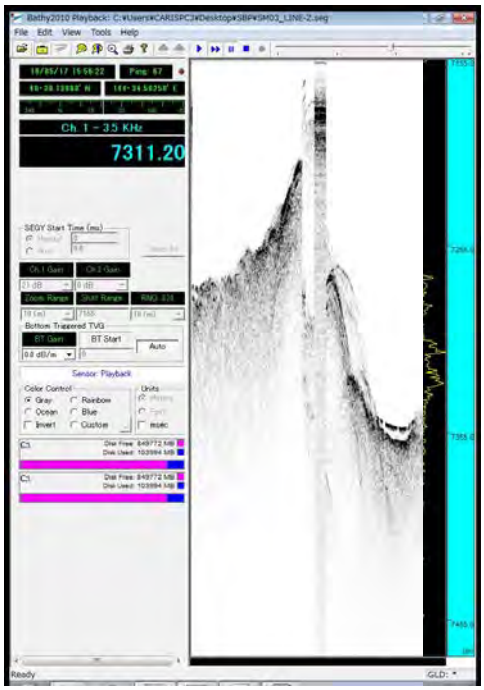


Figure 6-2-3: SBP image of Line SM03 (reference map **Fig. 6-1-2**)

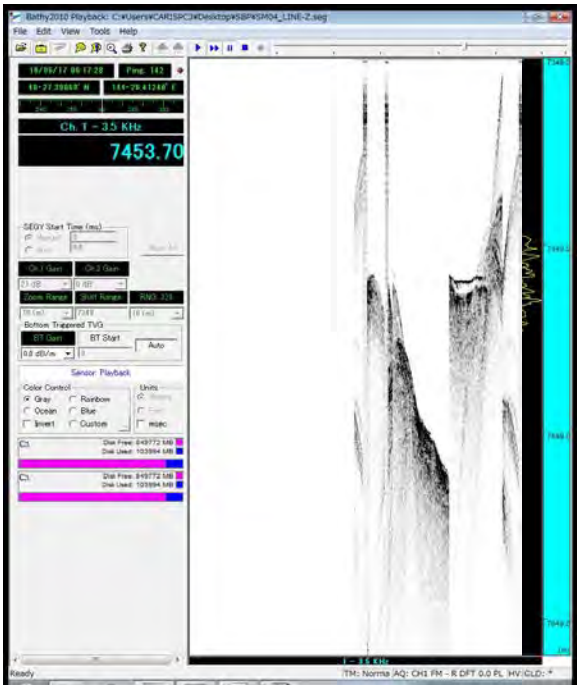


Figure 6-2-4: SBP image of Line SM04 (reference map **Fig. 6-1-2**)

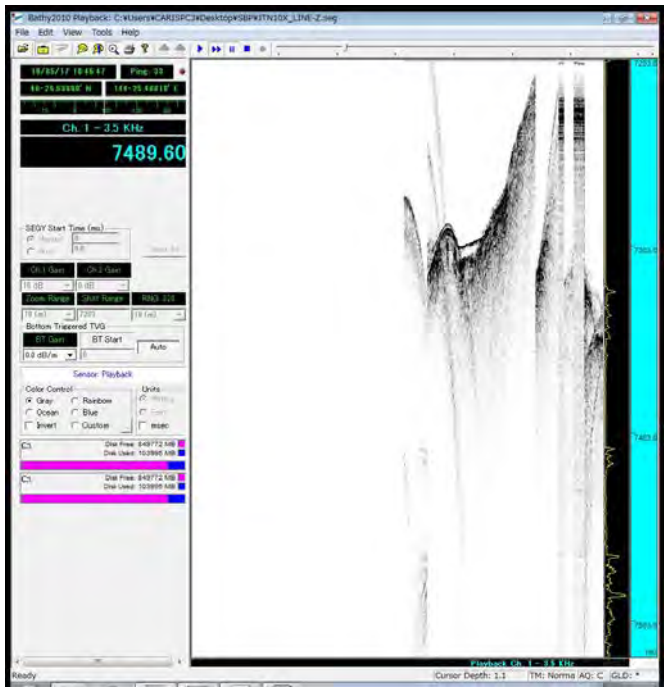


Figure 6-2-5: SBP image of Line JPT10X (reference map **Fig. 6-1-2**)

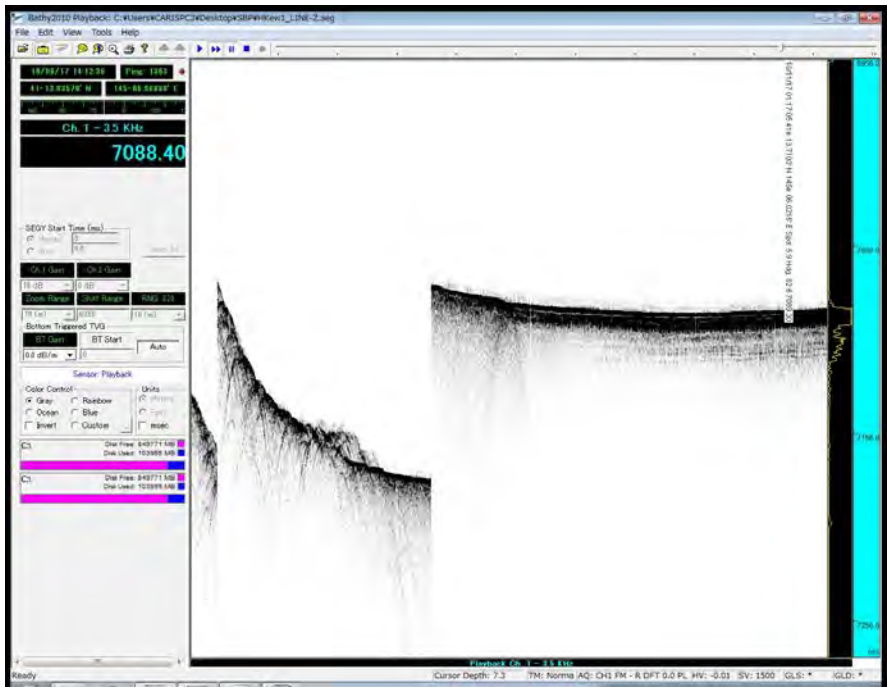


Figure 6-2-6: SBP image of Line HKew1 (reference map **Fig. 6-1-3**)

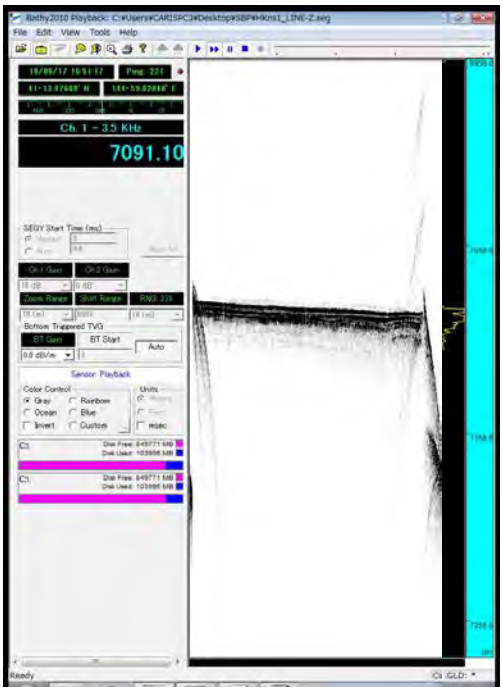


Figure 6-2-7: SBP image of Line HKns1 (reference map **Fig. 6-1-3**)

Figure 6-2-8: SBP image of Line HKns2 (reference map **Fig. 6-1-3**)

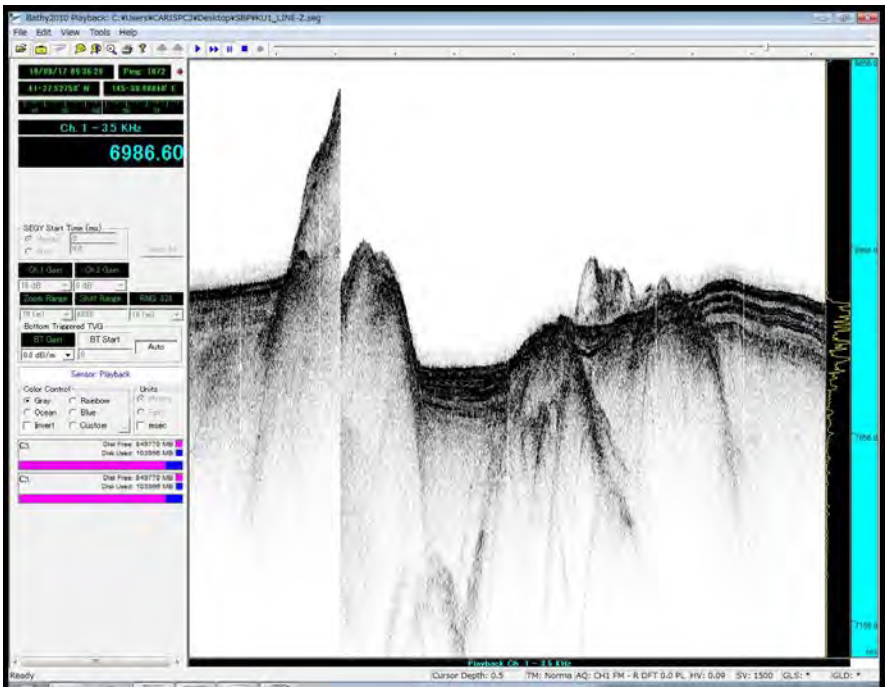


Figure 6-2-9: SBP image of Line KU1-1 (reference map **Figs. 6-1-3 and 4**)

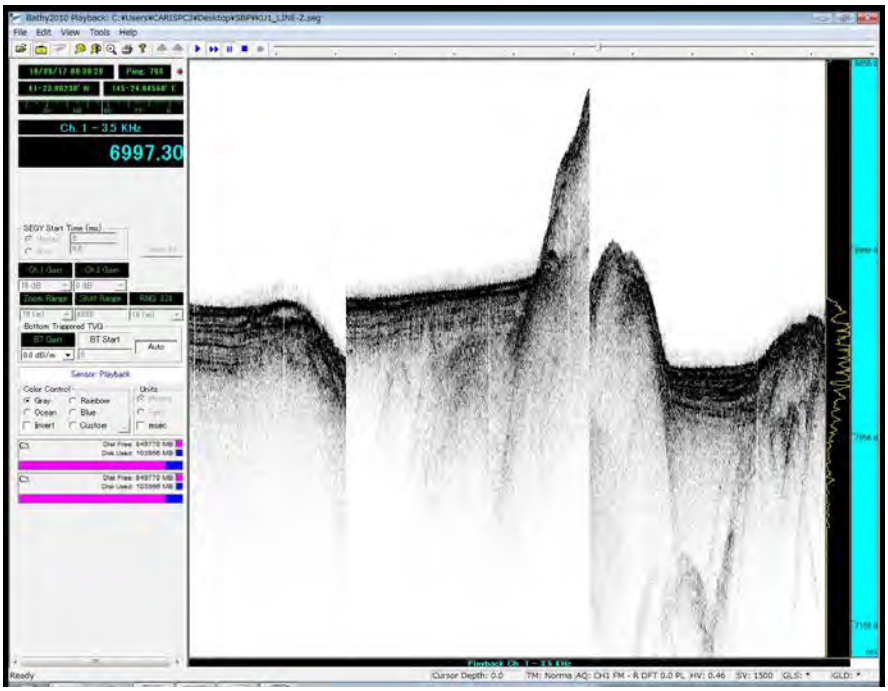


Figure 6-2-10: SBP image of Line KU1-2 (reference map **Fig. 6-1-3**)

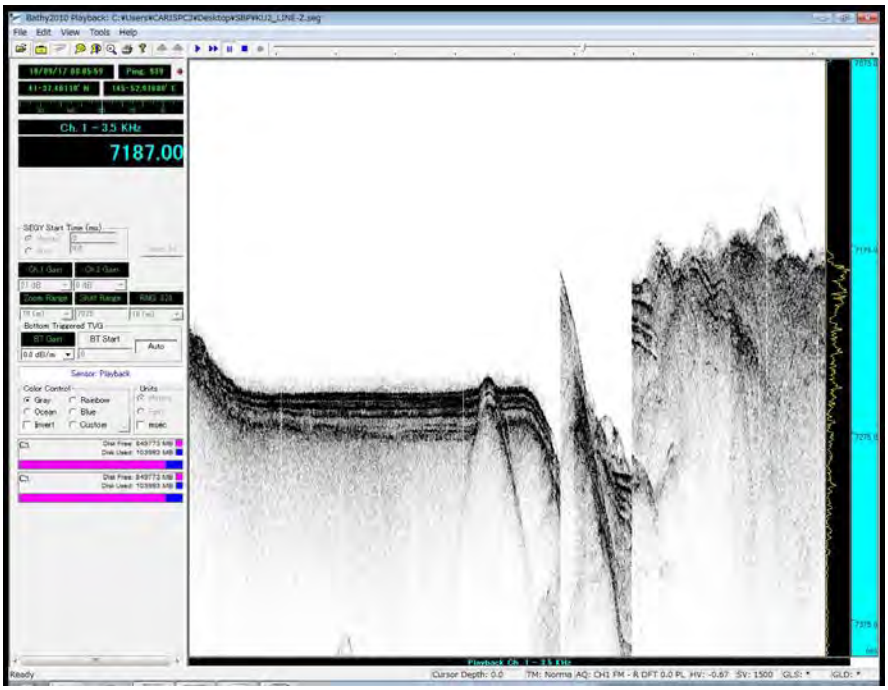


Figure 6-2-11: SBP image of Line KU2-1 (reference map **Fig. 6-1-3**)

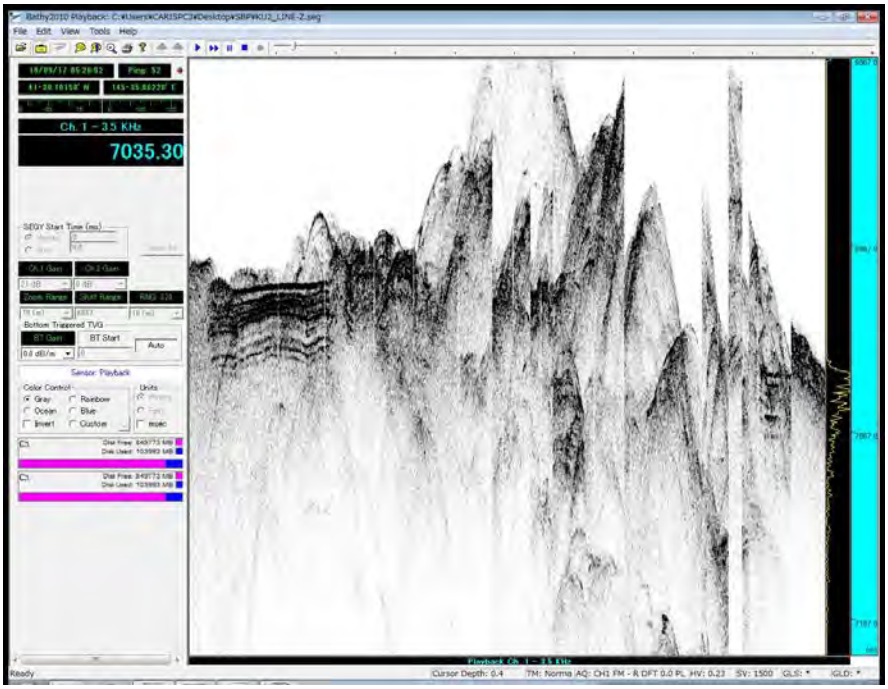


Figure 6-2-12: SBP image of Line KU2-2 (reference map **Fig. 6-1-3**)

Figure 6-2-13: SBP image of Line KU3 (reference map **Fig. 6-1-3**)

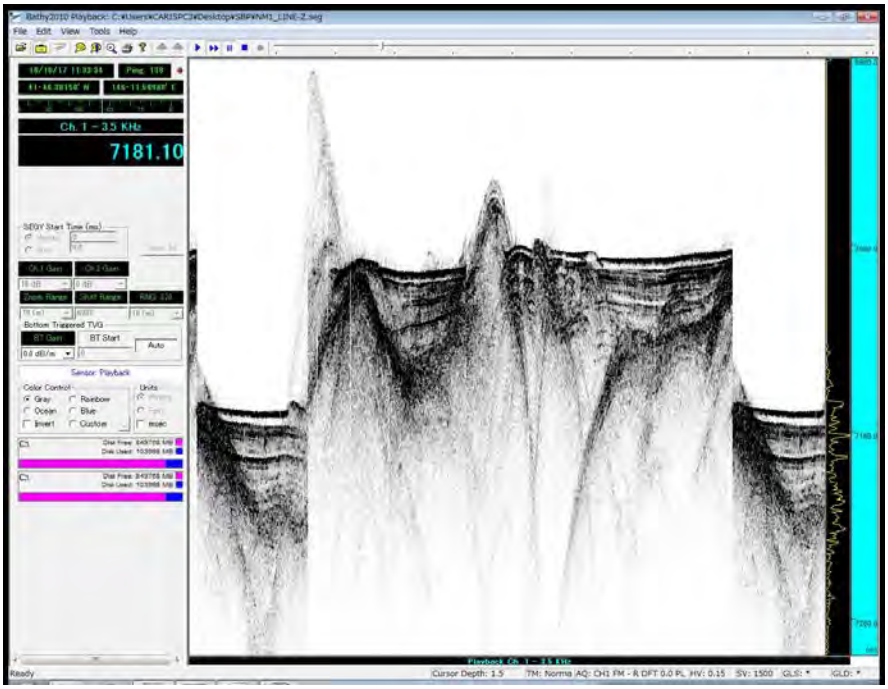


Figure 6-2-14: SBP image of Line NM1 (reference map **Fig. 6-1-3**)

6-3. PC operation

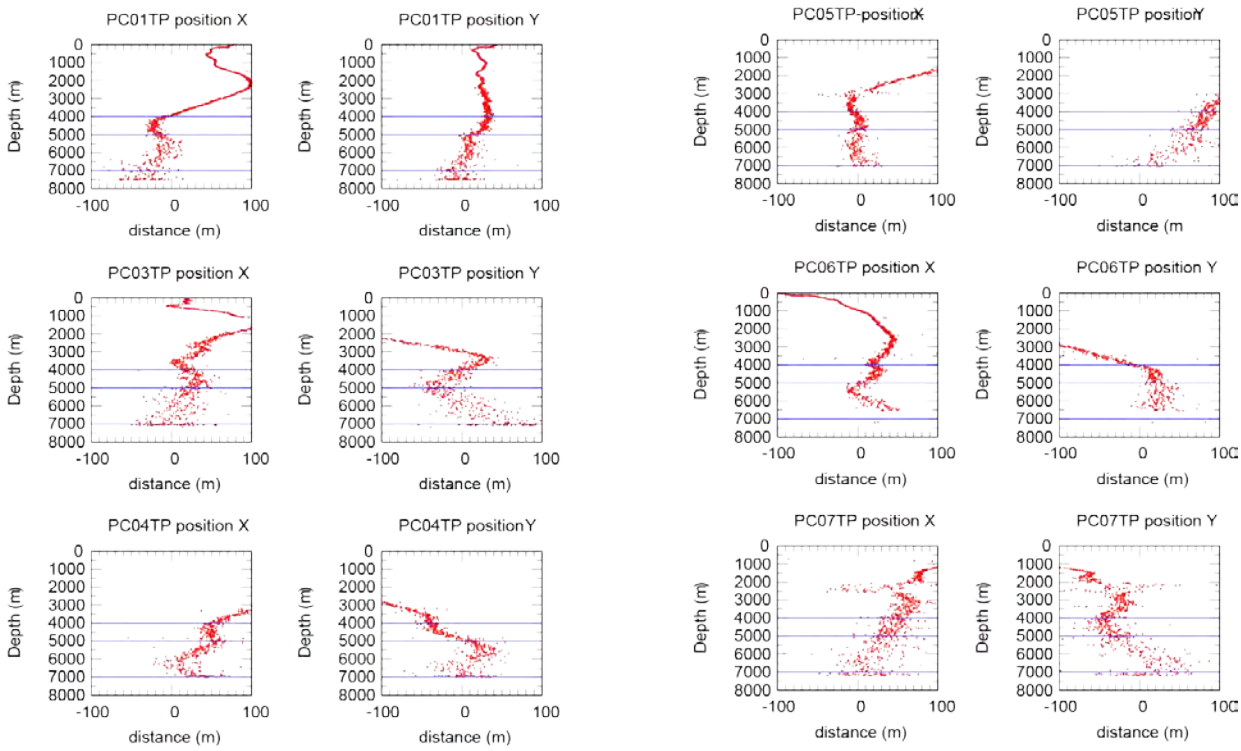
The records of coring operations are summarized in **Table 6-3-1**. Graphical tension records of wire winch during the operations are attached to the APPENDIX. Coring positions were measured by a transponder "OKI SB-1018 (S/N 08209)". K values are calculated to estimate strength barometer of the sea bed sediment, which is expressed by the following formula: *K value = pure pull out load / (outer diameter of outer pipe* x *penetration length)*.

Transponder records to track PC position were shown in **Figs. 6-3-1.** The origin of coordination system in each figure is target position of coring. Generally uncertainness in transponder position increase with increased depth. But because the different pattern, for example PC03 and PC06, it is expected that scattering is not only caused from depth increasing. Probably it is also due to sea condition. However it is recognized that the scattering of position stay within a few to several-ten m.

Table 6-3-1. Summary of PC operation during MR17-06.

Date (UTC)	Core ID	Location	Water depth (m)	Position			Core Length/Pipe		Winch wire Tension Max(ton)	K
				Latitude	Longitude	type	PC	PL		
20171006	PC01	Off Shimokita	7,590	40-27.3412'N	144-26.9300'E	TP	5.60 /6	0.75	8.6	0.08
20171007	PC02	Off Tokachi	7,191	41-12.9577'N	145-00.0234'E	Ship	2.57 /6	0.53	8.3	0.28
20171008	PC03	Off Tokachi	7,174	41-11.8574'N	144-55.0722'E	TP	1.34 /6	0.00	8.3	0.32
20171009	PC04	Off Tokachi	7,078	41-28.4127'N	145-32.3657'E	TP	5.22 /6	0.64	8.0	0.31
20171010	PC05	Off Kushiro	7,137	41-30.8306'N	145-41.7600'E	TP	5.29 /6	0.58	8.1	0.15
20171011	PC06	Off Kushiro	7,291	41-38.9515'N	145-57.0817'E	TP	7.13 /8	0.56	8.7	0.11
20171012	PC07	Off Kushiro	7,269	41-45.8597'N	146-10.7994'E	TP	7.63 /8	0.76	8.5	0.09

K: the strength barometer of the sea floor sediment (K value = pure pull out load / (outer diameter of outer pipe * penetration length)).
TP: transponder



Figs. 6-3-1. X, and Y position records of transponder during operations.

6-4. Lithology of piston cores

Sediment lithology of the obtained piston cores are summarized as **Figs. 6-4-1** and **6-4-2**. Core length of each core section on the visual description sheet is summarized in **Table 6-4-1**. We use the core length from **Table 6-4-1** for the core summary in this section. Detailed visual description is available in Appendix. Based on the lithological characteristics, three major depositional areas are recognized; the northernmost Japan Trench (St. PC01), the westernmost Kuril Trench (Sts. PC02 and PC03), and the Kuril Trench (Sts. PC04-07). Sediment lithology of each area are summarized as below.

The northernmost Japan Trench

We obtained a piston core with a pilot gravity core from a small basin at the northernmost Japan Trench. There are some mini-basins in an elongated trench basin. Core GeoB 21817-1 was collected during the R/V Sonne SO251a cruise from the nearby deepest basin floor. Thick acoustically transparent layers were observed in the SBP profiles.

PC01 & PL01: Total 560.1 cm long piston core with 74.5 cm long pilot gravity core was obtained. Major lithology of the piston core was massive silty clay - medium-fine silt with medium-coarse silt patches. Upward fining grading structure was recognized. No clear signal of bioturbation was another characteristics of the massive mud. The uppermost 114.3 cm was composed of bioturbated diatomaceous silty clay. Boundary of the lower massive mud was clear but bioturbated. Sediment lithology of the pilot core was the same as the uppermost main piston core, but with a 2.5 cm thick surface oxidized layer.

The westernmost Kuril Trench

Two piston cores were recovered from a basin at the westernmost Kuril Trench. Significant gullyed and steep slope of the western end of the Kuril Trench suggested the slope failures of a sea mount and sediment supply by the failures to the basin. Hyperbolic acoustic reflection from the slope support the idea of the slope failure. Acoustic facies changes from hyperbolic to single and prolonged at the foot-of-slope, and further to weakly stratified at the basin floor. These changes in the acoustic facies suggest that the surface sediments become finer eastward.

PC02 & PL02: A piston core (257.1 cm long) with a pilot gravity core (52.5 cm) was collected from the eastern part of the westernmost trench basin. Major lithology of the piston core was massive mud (coarse silt-clay) with well-sorted coarse silt beds at the lower part. Massive mud shows the upward fining grading structure. Three massive mud beds were observed. Bioturbated silty clay occurred among the massive mud beds. A coarse-silt sized volcanic ash layer was intercalated in the bioturbated silty clay. Major lithology of the pilot gravity core was alternation of bioturbated silty clay and diatom ooze. Uppermost 1.8 cm was oxidized. Two volcanic ash layers were intercalated in the alternation. Massive mud occurred at the base of core.

PC03: Only a piston core with 134.1 cm in length was recovered from the western part of the same trench basin. No pilot gravity core was recovered. Three massive graded beds are major component of this core. Bioturbated silty clay occurred among the beds. Each bed composed of upper fine mud and lower coarse silt and sand. Granules were attached at the core catcher at the core recovery.

The Kuril Trench

Four cores were obtained from the Kuril Trench floor. At the western part, the trench floor composed of several terraces cut by a steep slope. There are some small basins at the eastern part. Well stratified acoustic facies is characteristics of the trench floor except of slopes separated the terraces and basins. A or a few acoustically transparent layers were observed in the SBP profiles.

PC04 & PL04: A main piston core with 521.9 cm long and a pilot gravity core with 64.1 cm long was obtained from a terrace near the mouth of Kushiro Submarine Canyon. Major lithology of both cores was alternation of bioturabted silty clay and diatom ooze (diatom ooze dominated). A few volcanic ash layers in the main piston core and a volcanic ash layer in the pilot core were observed. A 88.8 cm thick upward fining bed was intercalated at 209.3-298.1 cm interval. Sediments at the uppermost 1.1 cm of the pilot core was oxidized.

PC05 & PL05: A 529.3 cm long piston core with a 58 cm long pilot gravity core was recovered from a terrace at east of the mouth of Kushiro Submarine Canyon. Major lithology of both cores was alternation of bioturbated silty clay and diatom ooze (silty clay dominated). A volcanic ash layer was recognized both in main piston and pilot gravity cores near the core top. At 66.3-204.8 cm interval, a upward fining graded bed from basal very fine sand to upper massive silty clay was occurred. Basal coarse part was parallel laminated. The uppermost 2 cm sediments in the pilot core showed brownish color suggesting the surface oxidation.

PC06 & PL06: A piston core (713.3 cm long) with a pilot gravity core (56.3 cm long) was collected from a terrace near the eastern end of an elongated trench basin. Major lithology of both cores was bioturbated silty clay. Two volcanic ash layers were intercalated both in the piston and pilot cores near the core top. A volcanic ash spot was also found in the lower part of the piston core. A thick upward fining bed was found at 77.4-248.8 cm interval. In detail, this bed composed of two units; upper (77.4-222.3 cm) and lower (222.3-248.8 cm) units. Upper unit composed of thick massive mud (silt-medium-fine silt) with basal laminated coarse-medium silt, but lower unit composed of massive medium-fine silt with massive medium-coarse silt at base. Another thin coarse silt layer with upper massive silt was found at 625.6-630.4 cm interval. Brownish colored oxidized sediments found at the uppermost 3.3 cm in the pilot core.

PC07 & PL07: A 762.9 cm long piston and a 75.5 cm long pilot gravity core was obtained from a small trench basin. Major lithology of the main piston core was massive mud with some coarse grained (medium-coarse silt) patches and basal medium silt bed. Basal medium silt bed had faint lamination. The other part of piston core was composed of bioturbated silty clay. No volcanic ash layer was observed in the main piston core. Major lithology of the pilot gravity core was bioturbated silty clay with three volcanic ash layer intercalation. Surface oxidized layer was filmed at top.

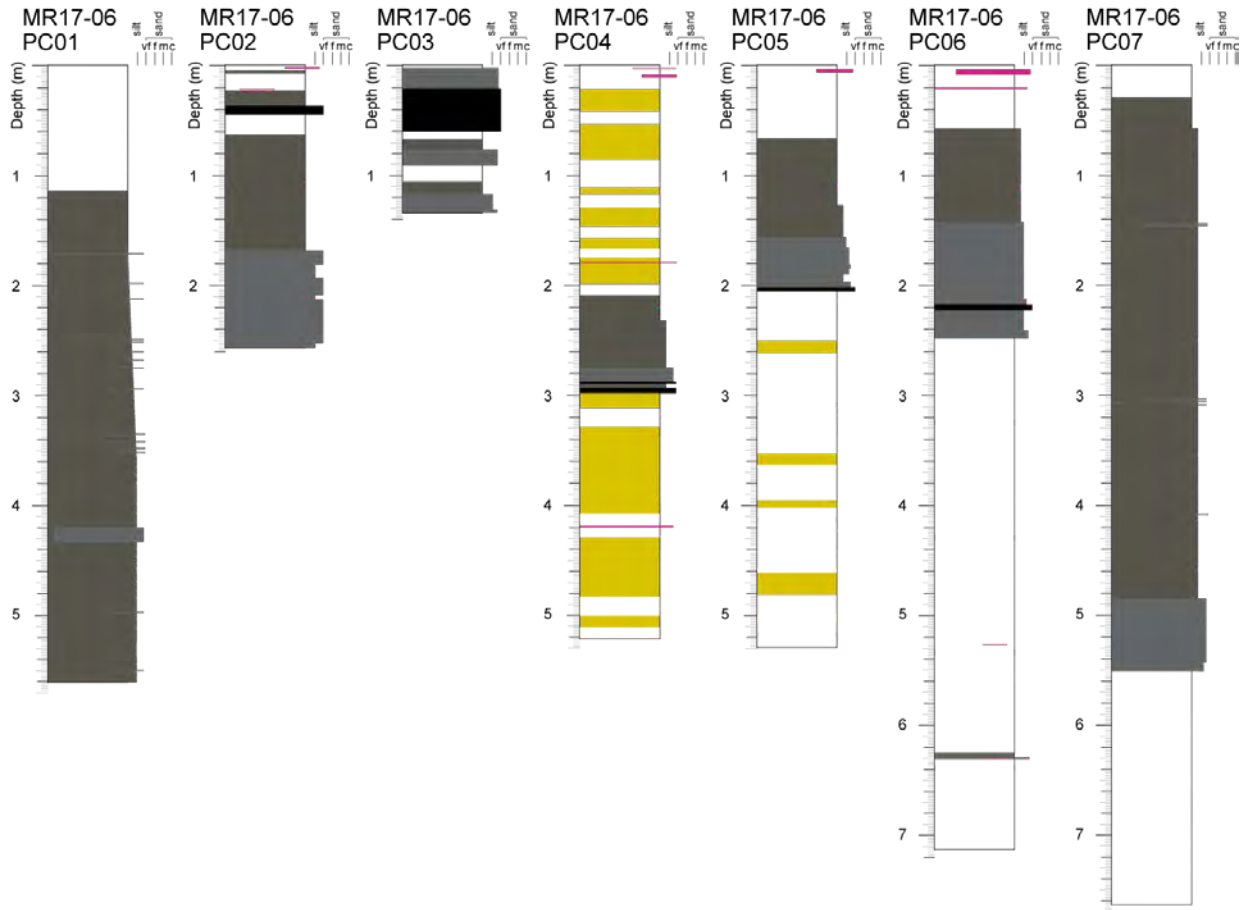


Fig. 6-4-1. Columnar section of each piston core (White: silty clay, Yellow: diatom ooze, Gray: massive mud, Black: sand, Red: volcanic ash)

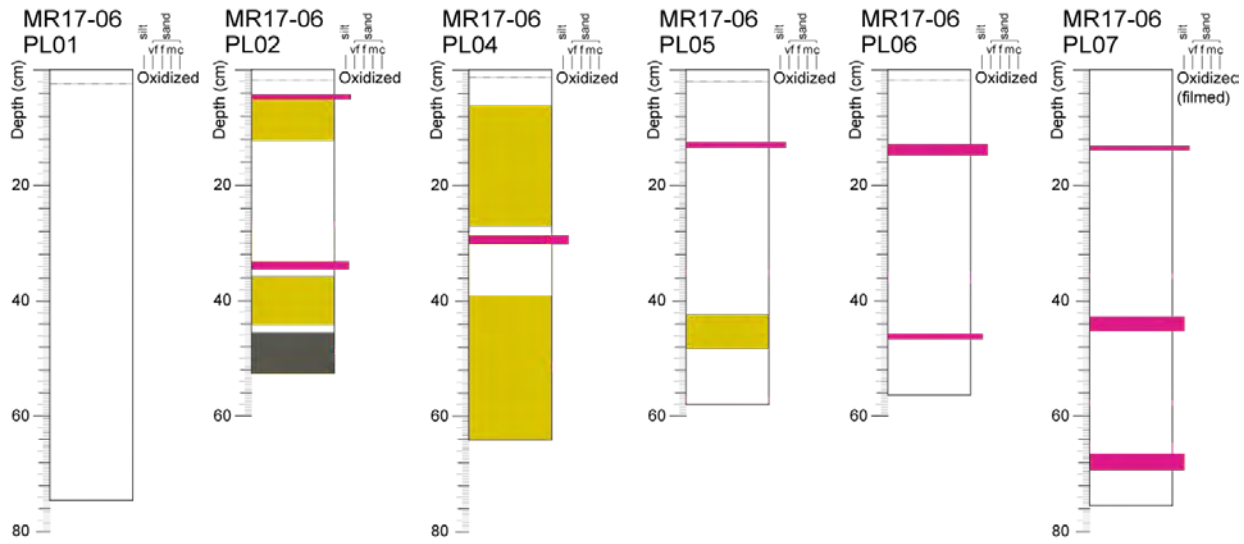


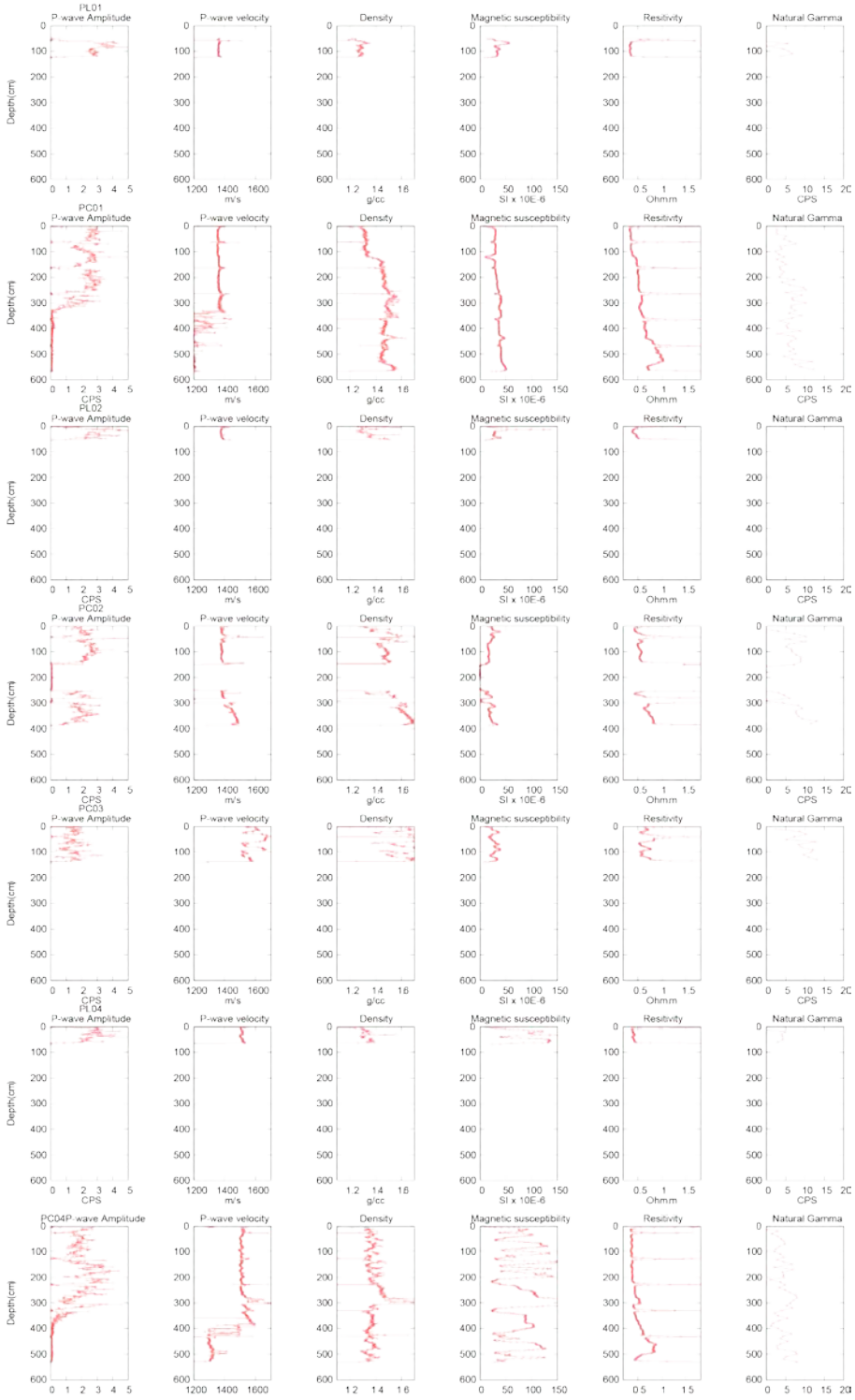
Fig. 6-4-2. Columnar section of each pilot core (White: silty clay, Yellow: diatom ooze, Gray: massive mud, Red: volcanic ash)

Table 6-4-1. Core length of each core section

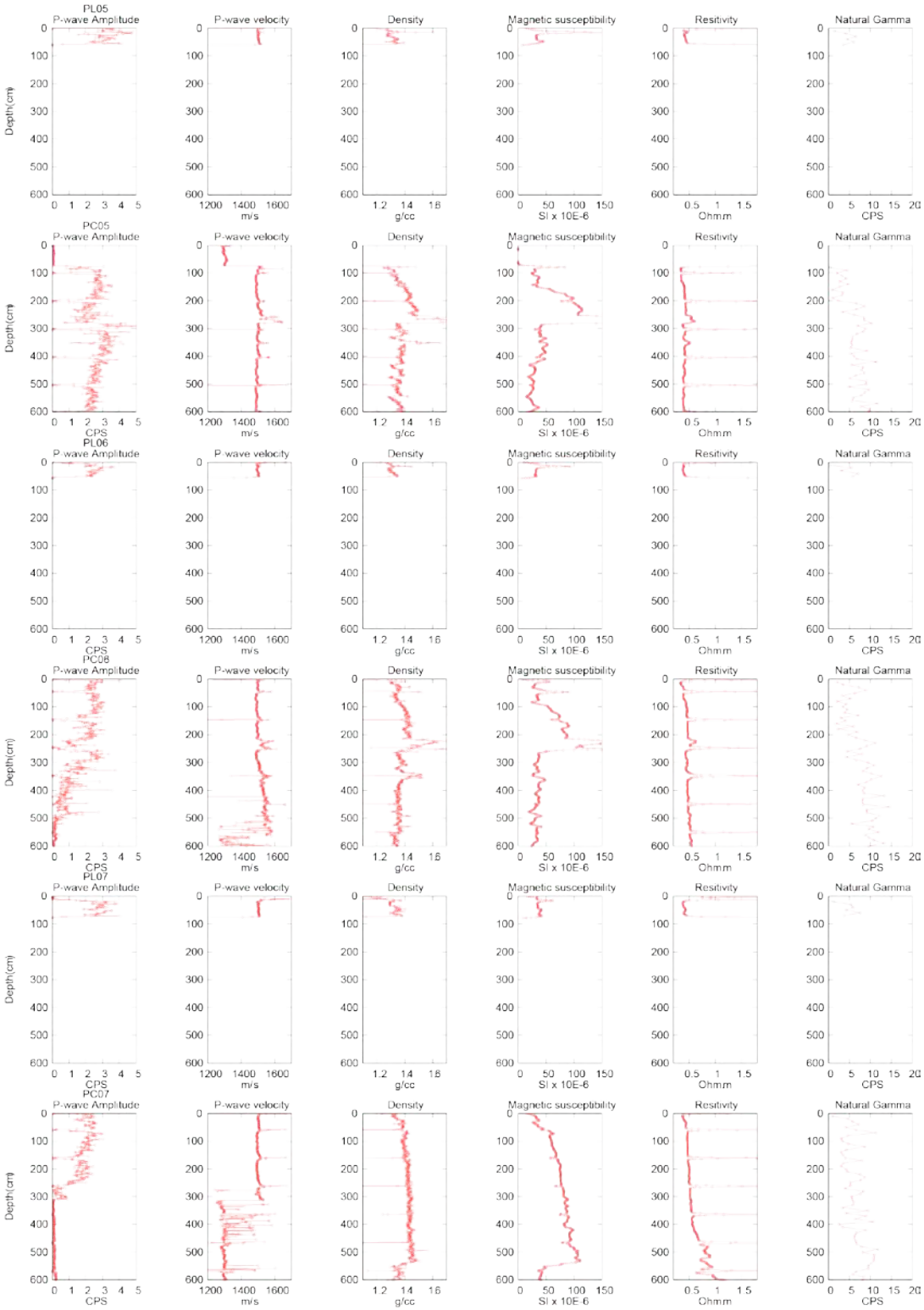
Core	Sec. 1	Sec. 2	Sec. 3	Sec. 4	Sec. 5	Sec. 6	Sec. 7	Sec. 8	CC	Total (cm)
PC01	59.9	99.2	101	100	100.7	99.3				560.1
PL01	9.5	65								74.5
PC02		41.8	100.7	4.3	21.8	88.5				257.1
PL02		52.5								52.5
PC03					37.4	96.7				134.1
PL03										0
PC04	21.7	99.6	100.8	100.4	100.2	99.2				521.9
PL04		64.1								64.1
PC05	25.8	101	100.3	99.7	100	98			4.5	529.3
PL05		58								58
PC06	41.9	100.4	100	100.4	100.5	99.4	100.2	70.5		713.3
PL06		56.3								56.3
PC07	57.7	100.4	101	101.1	100.8	101.2	100	99	1.7	762.9
PL07	9.7	65.8								75.5

6-5. MSCL.measurements

Physical properties measured by MSCL for cores are shown in following figures (**Figures 6-5-1 and 6-5-2**). Generally P-wave amplitude in the lower is close to zero, indicating P-wave velocity in those interval is invalid. Spike of high density and magnetic susceptibility are corresponds to the sandy layer. Resistivity show gradual increase with increased depth.



Figures 6-5-1. Physical properties of PC01-PC04.



Figures 6-5-2. Physical properties of PC04-PC07.

7. Acknowledgement

We gratefully recognize the efforts of Mirai Captain Inoue and his crews during the cruise. We thank all the support from staffs in JAMSTEC. Especially thanks to Mr. Omae in the Research Fleet Department for his considerable efforts.

8. Notice on Using

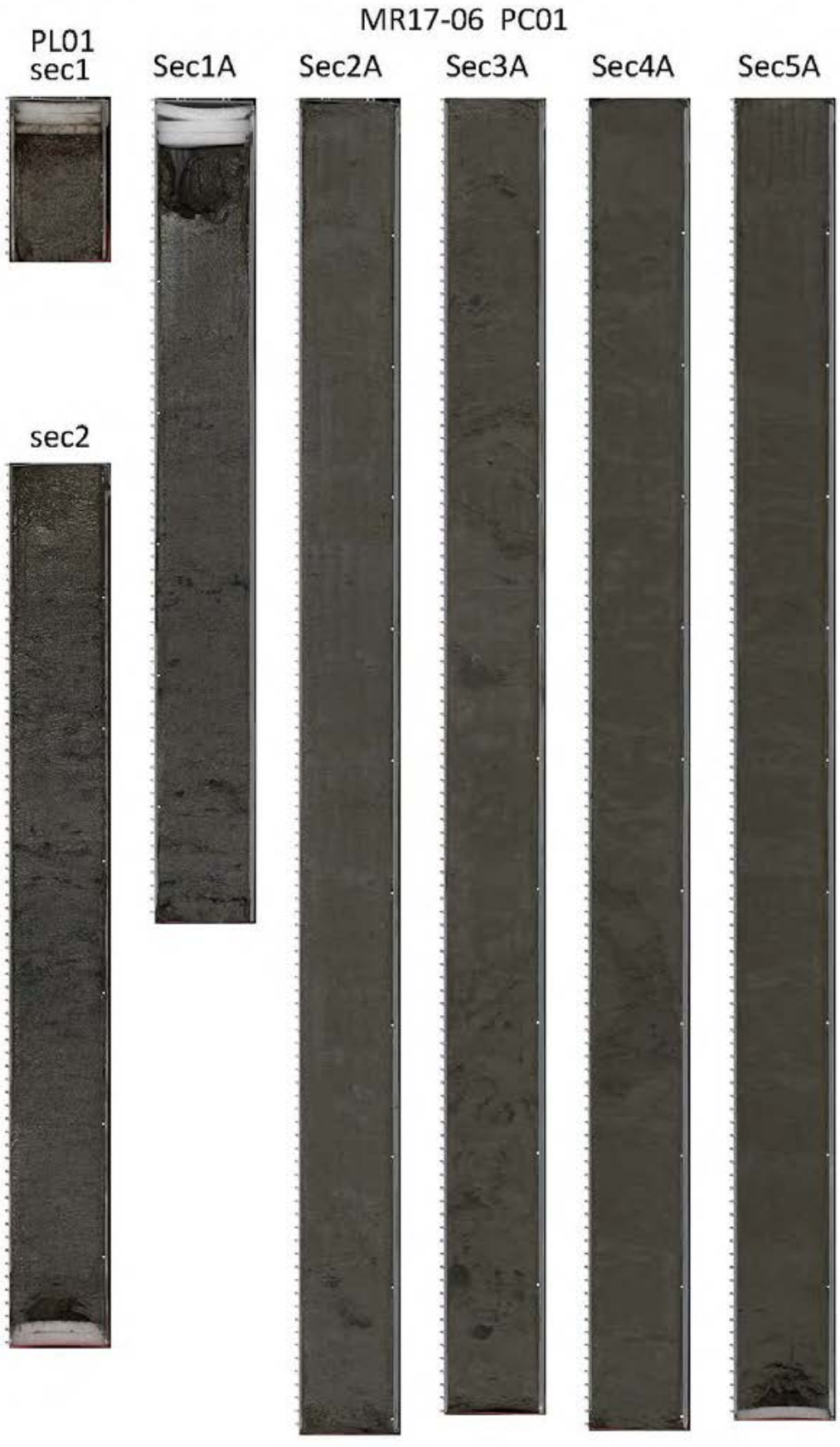
Notice on using: Insert the following notice to users regarding the data and samples obtained.

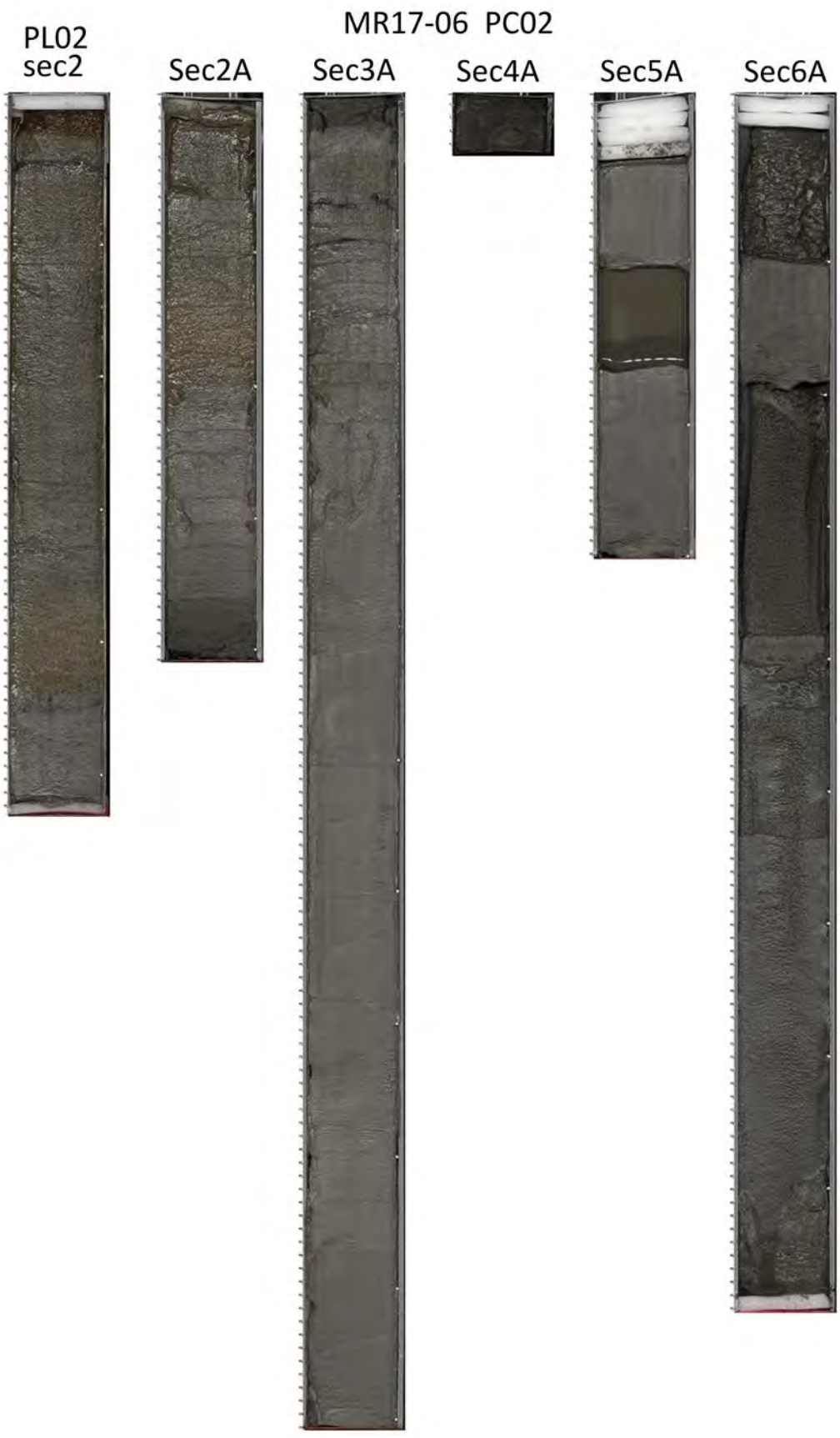
This cruise report is a preliminary documentation as of the end of the cruise.
This report may not be corrected even if changes on contents (i.e. taxonomic classifications) may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed. If you are going to use or refer to the data written on this report, please ask the Chief Scientist for latest information.
Users of data or results on this cruise report are requested to submit their results to the Data Management Group of JAMSTEC.

APPENDIX

Core Photo

(scale: beside of each section)


MR17-06 PC01
PL01
sec1
Sec1A
Sec2A
Sec3A
Sec4A
Sec5A
sec2

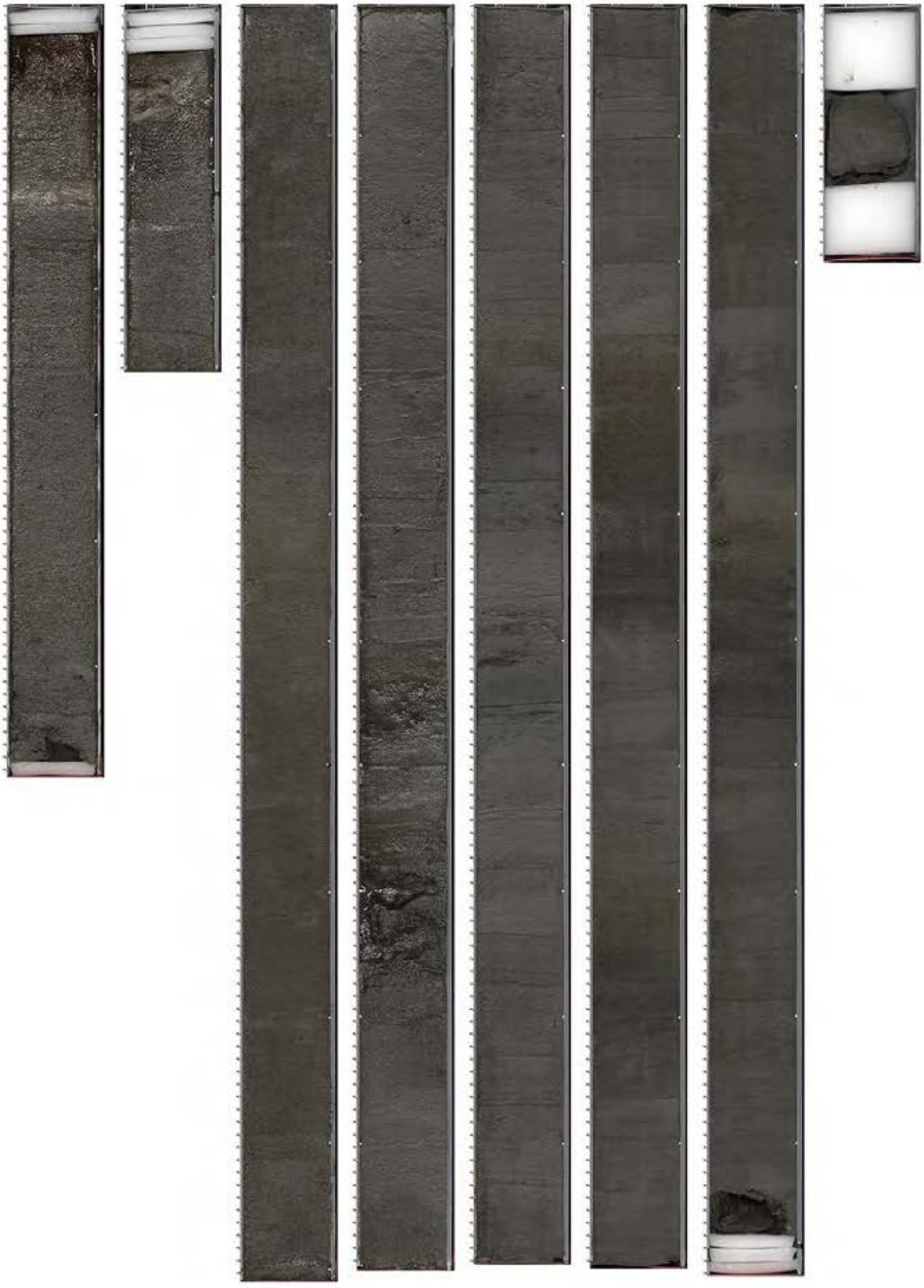

MR17-06 PC02
PL02
sec2
Sec2A
Sec3A
Sec4A
Sec5A
Sec6A

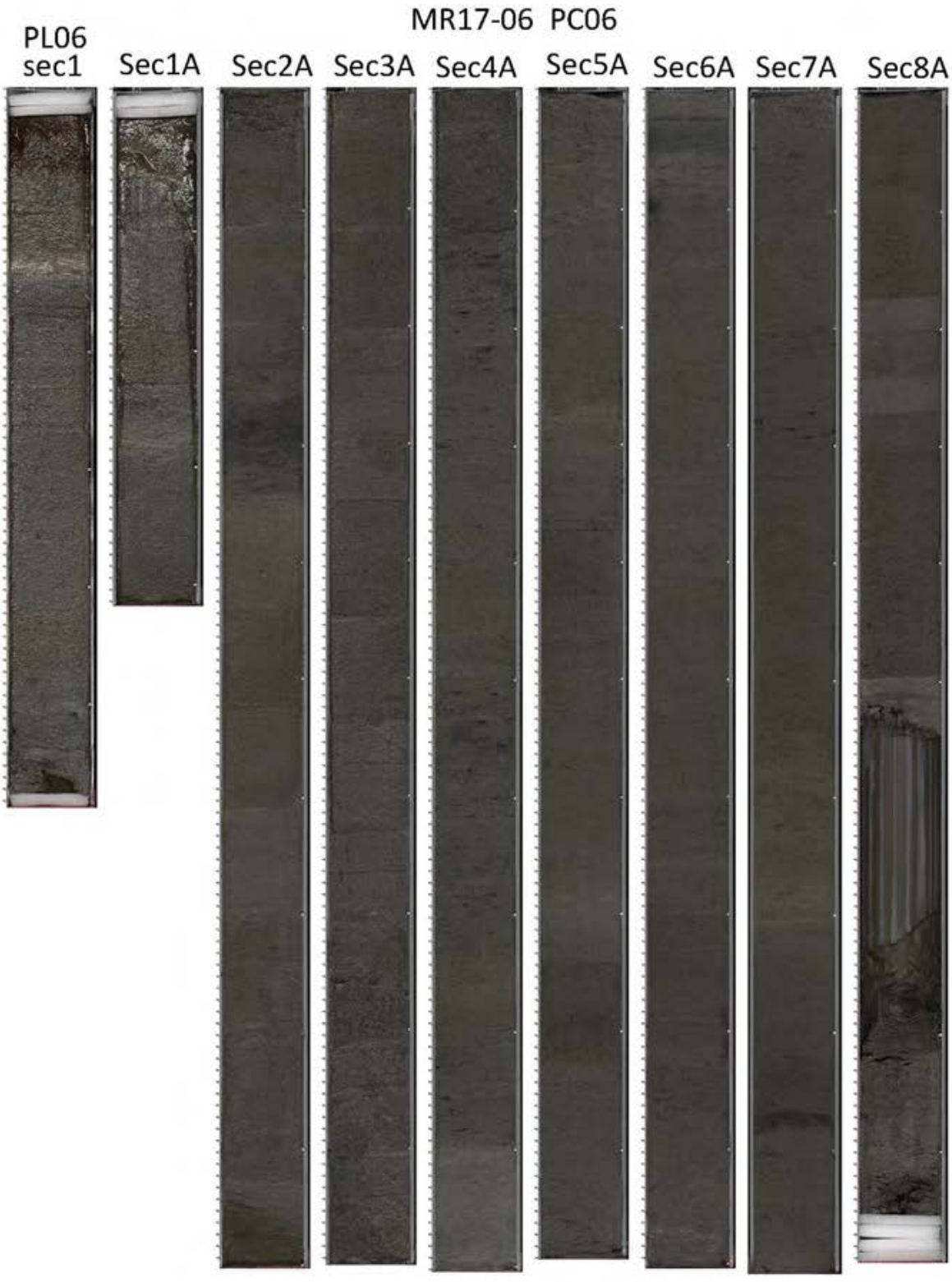
MR17-06 PC03

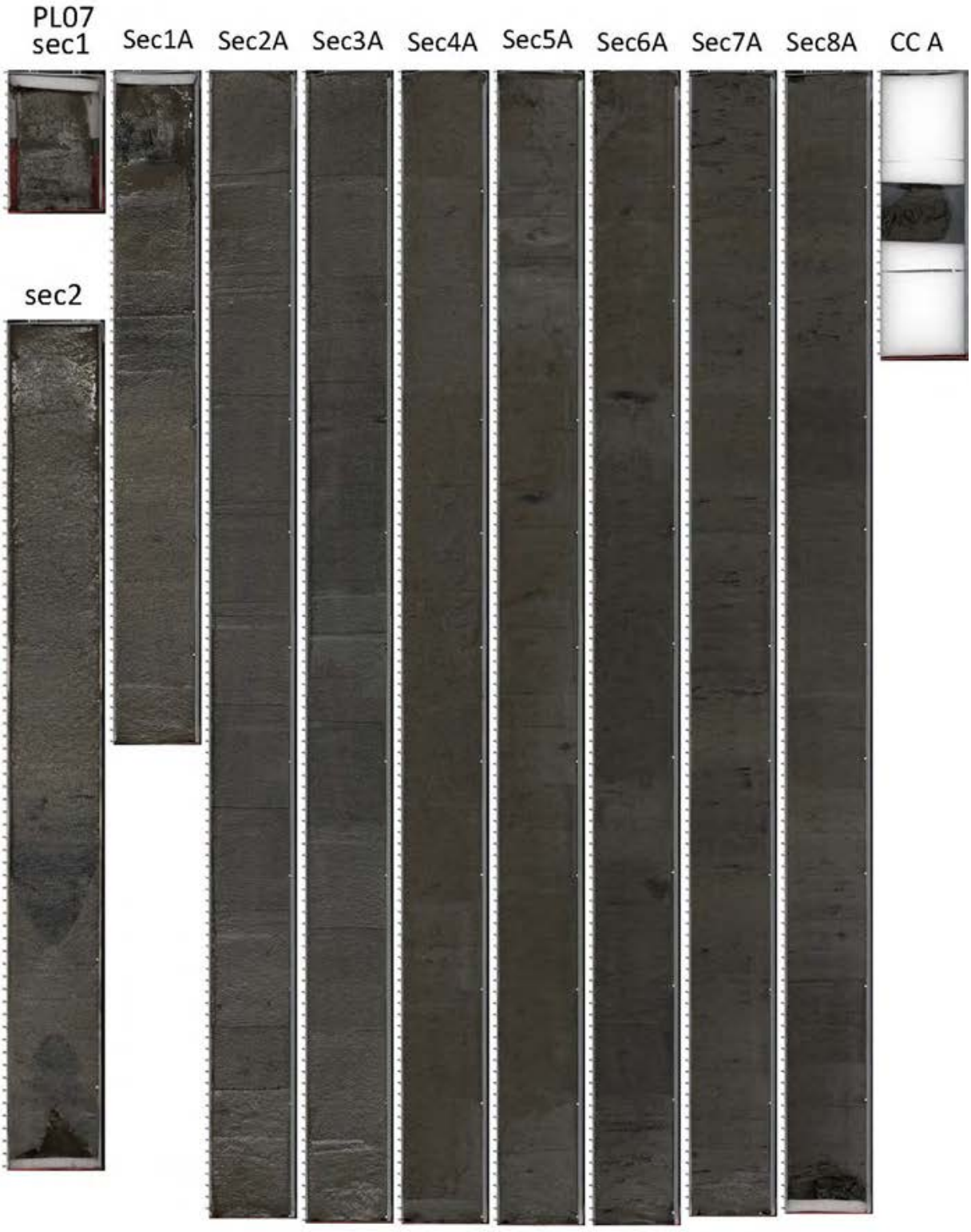
Sec5A Sec6A

MR17-06 PC04

MR17-06 PC05

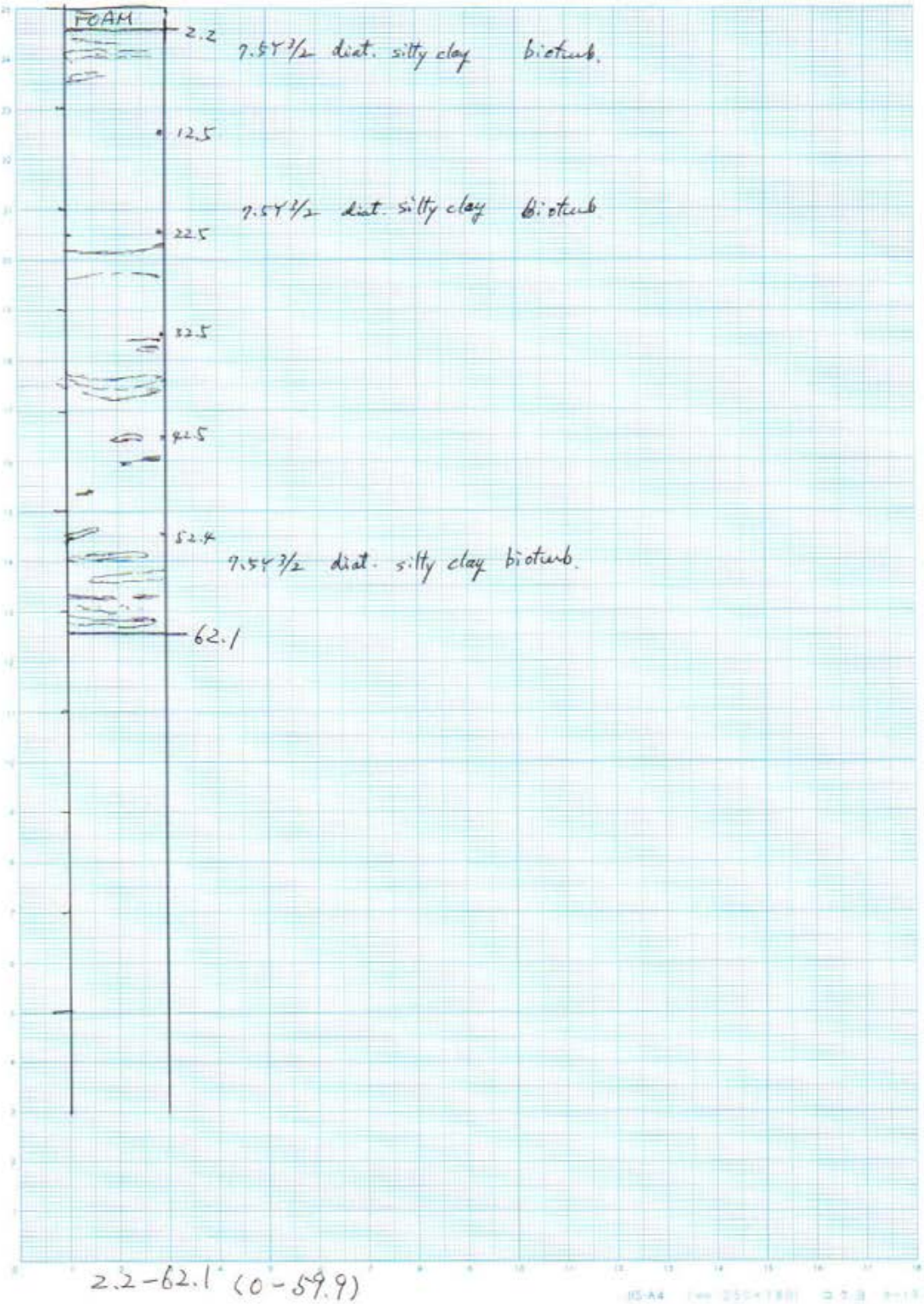



MR17-06 PC06
PL06 sec1
Sec1A
Sec2A
Sec3A
Sec4A
Sec5A
Sec6A
Sec7A
Sec8A


PL07
sec1
Sec1A
Sec2A
Sec3A
Sec4A
Sec5A
Sec6A
Sec7A
Sec8A
CC A
sec2

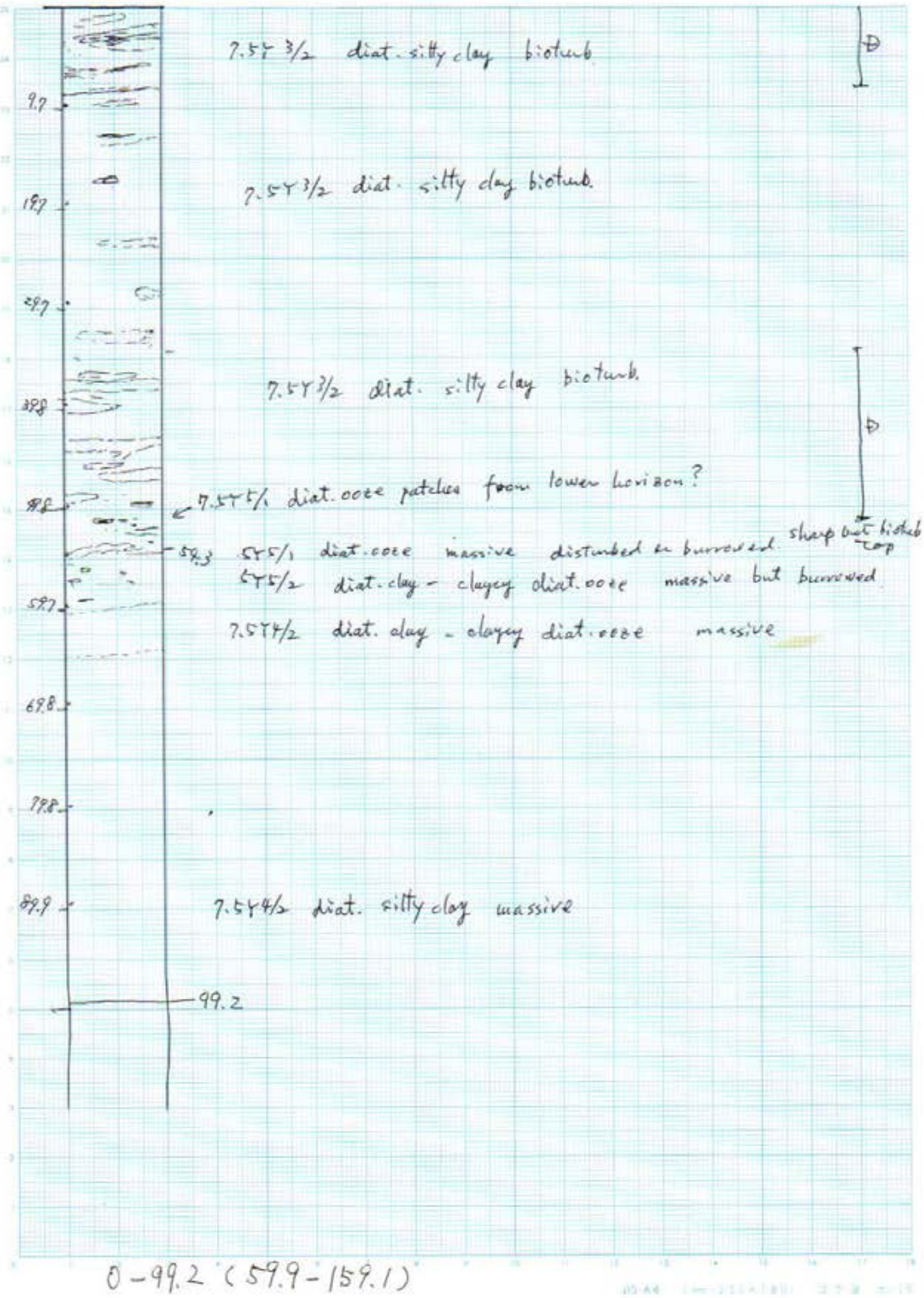
Visual Core Description

MR17-06 PC01 1W



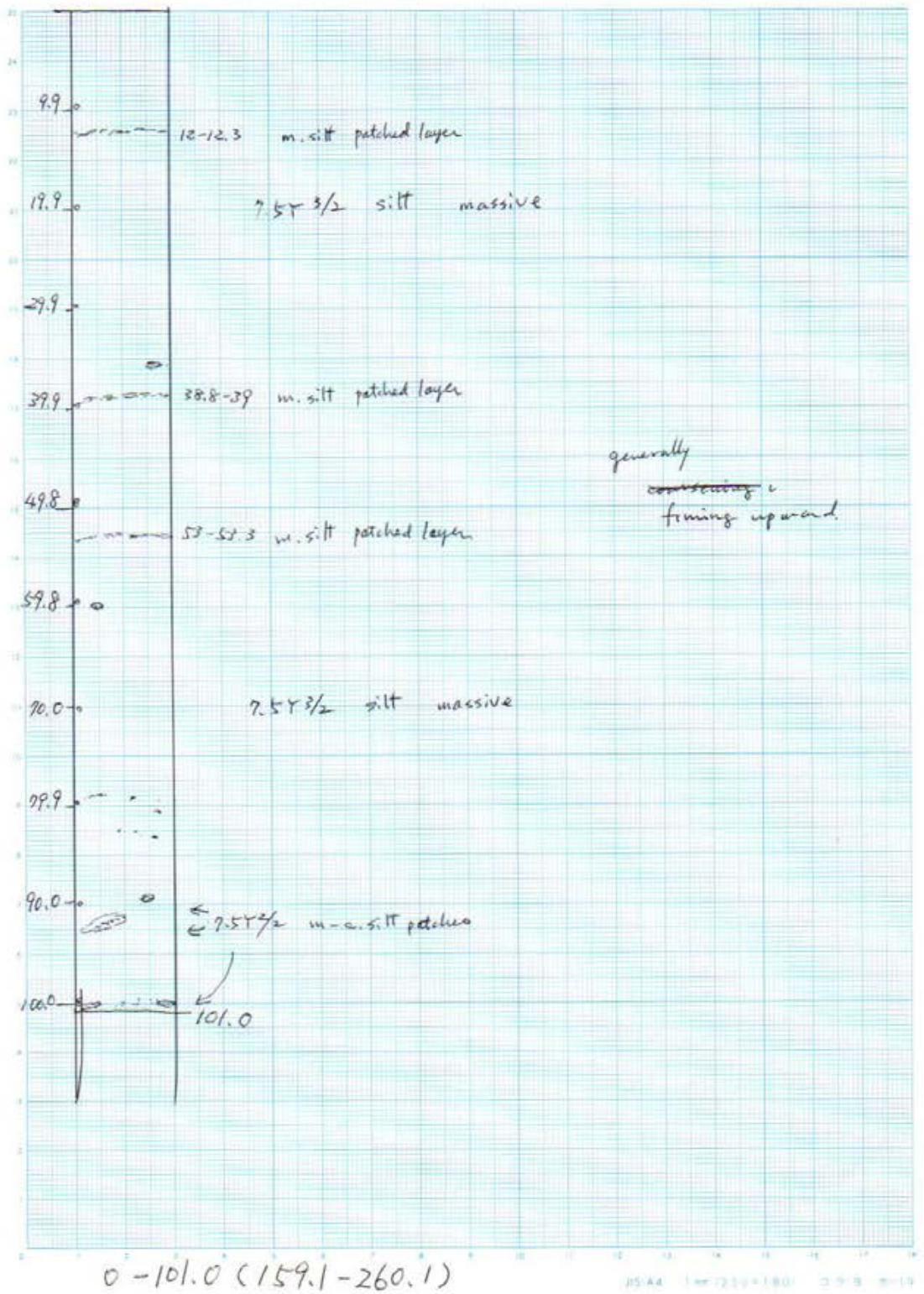
2.2-62.1 (0-59.9)

MR17-06 PC01 2W



0-99.2 (59.9-159.1)

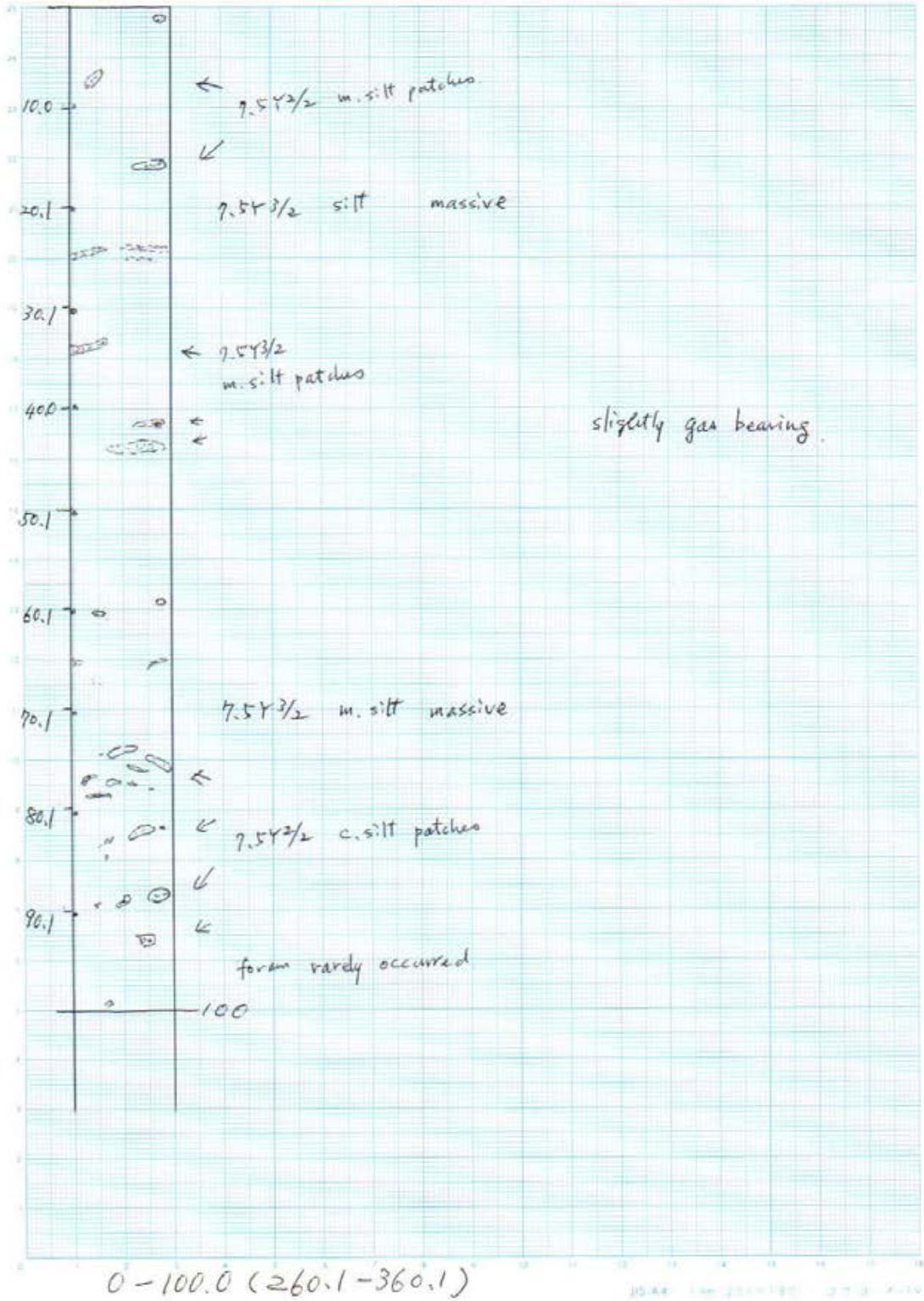
MR17-06 PC01 3W



generally
~~coarsening~~ ↓
fining upward

0 - 101.0 (159.1 - 260.1)

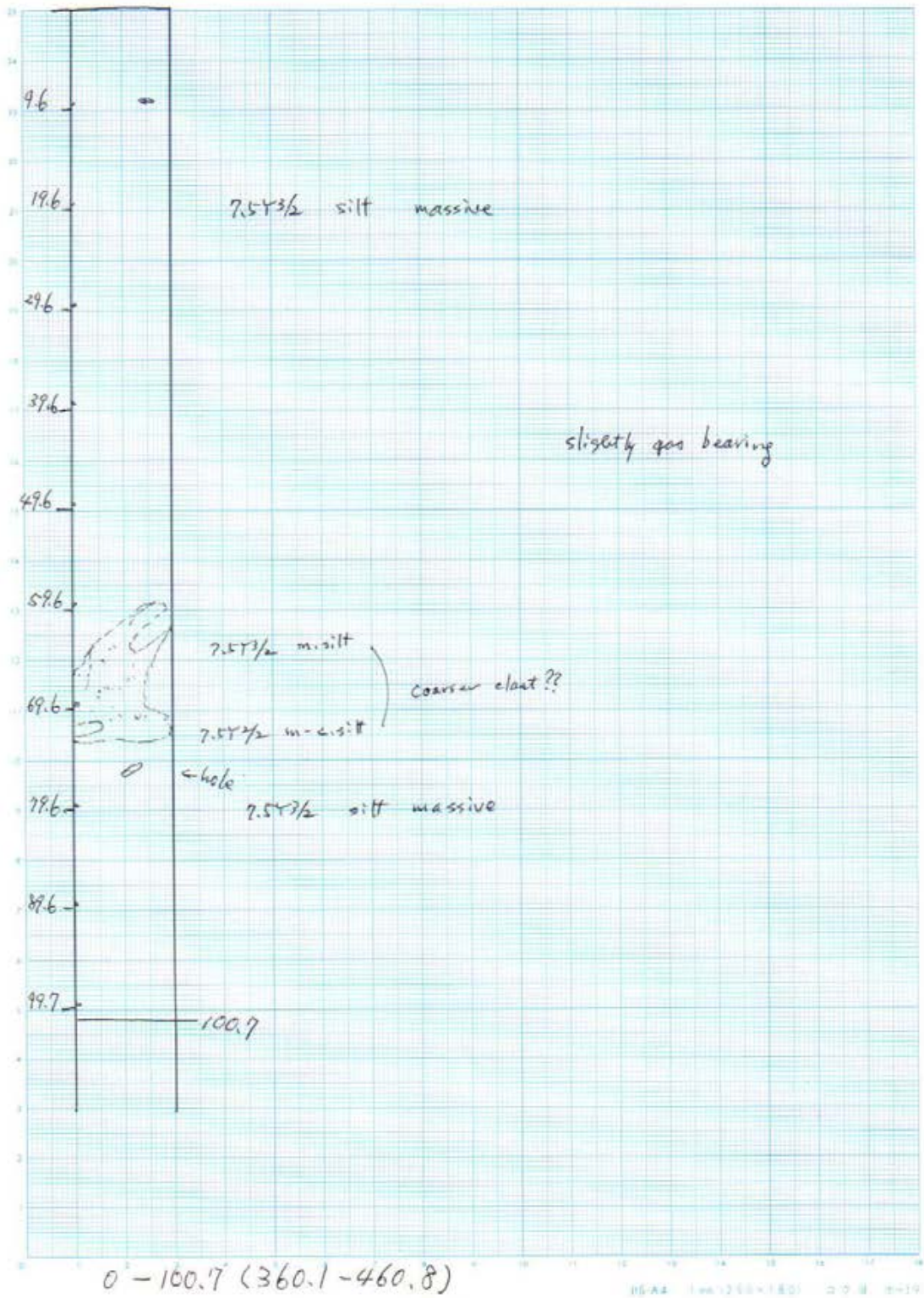
MR17-06 PC01 4W



slightly gas bearing.

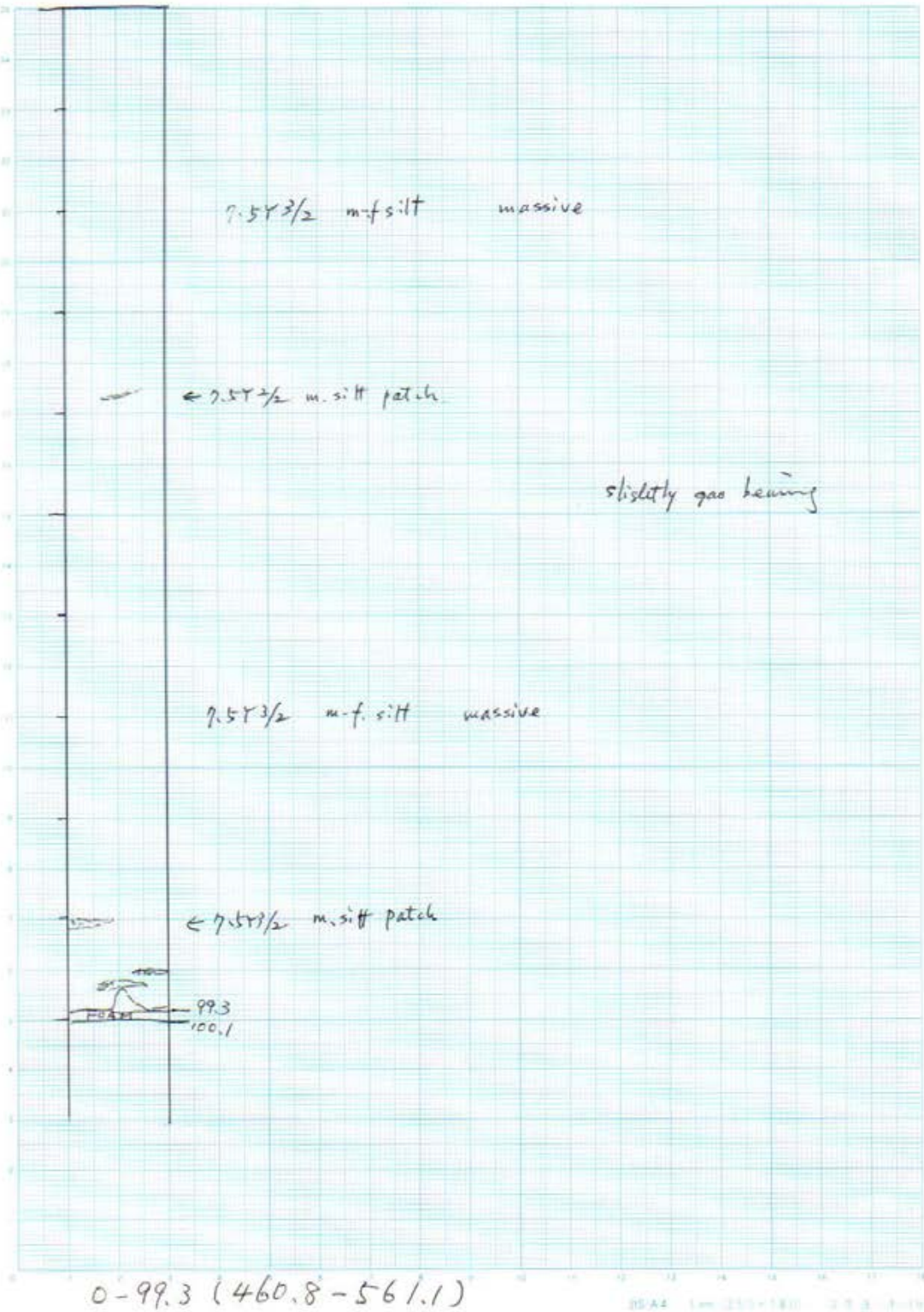
0 - 100.0 (260.1 - 360.1)

MR17-06 PC01 SW



0 – 100.7 (360.1 – 460.8)

MR17-06 PC01 6W



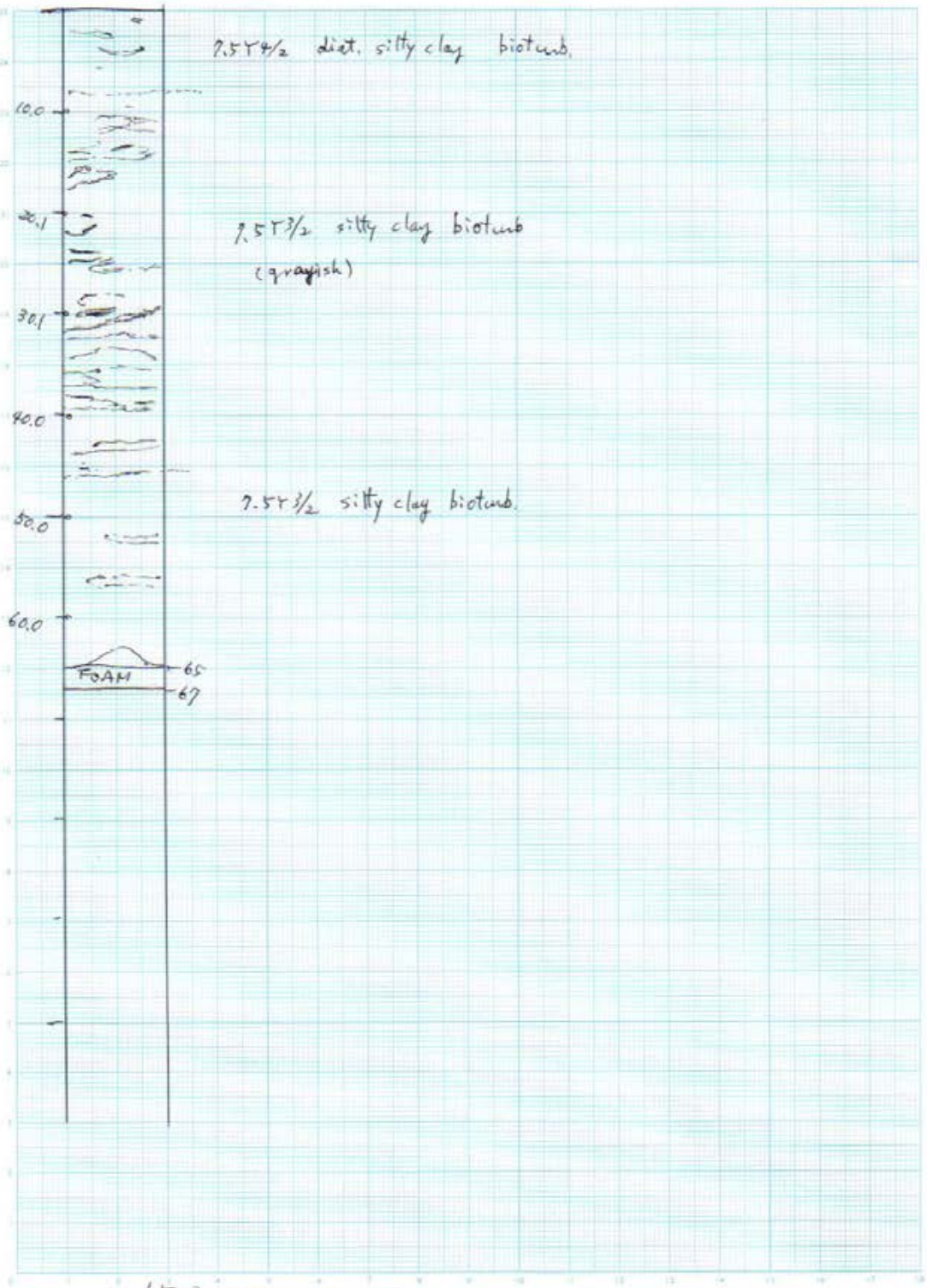
0-99.3 (460.8-561.1)

MR17-06 PL01 1W

10YR 2/2 silty clay diatomaceous bioturb. oxidized
5Y 3/2 silty clay bioturb.
7.5Y 3/2 silty clay bioturb?

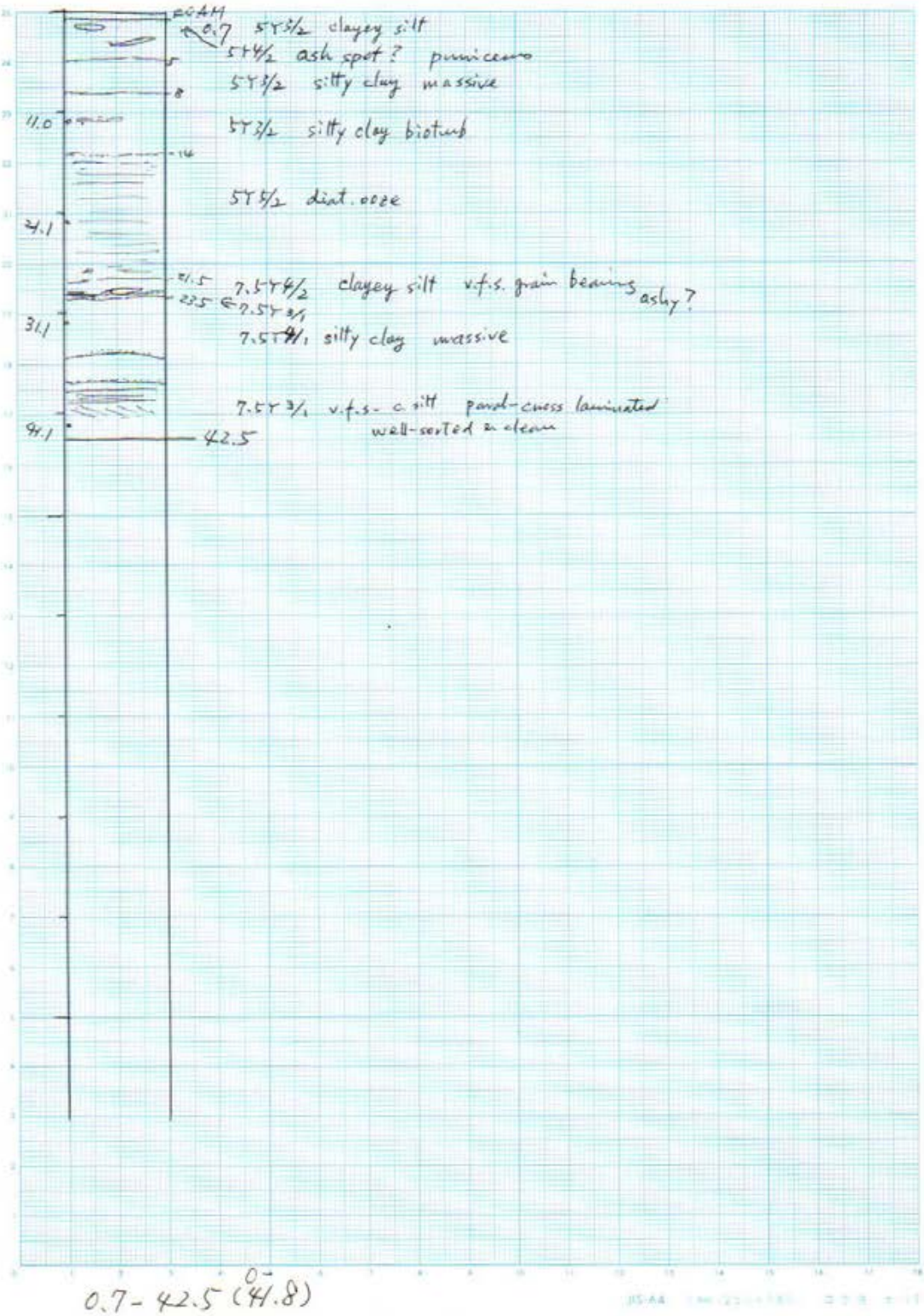
2.5-12 (0-9.5)

MR17-06 PL01 2W



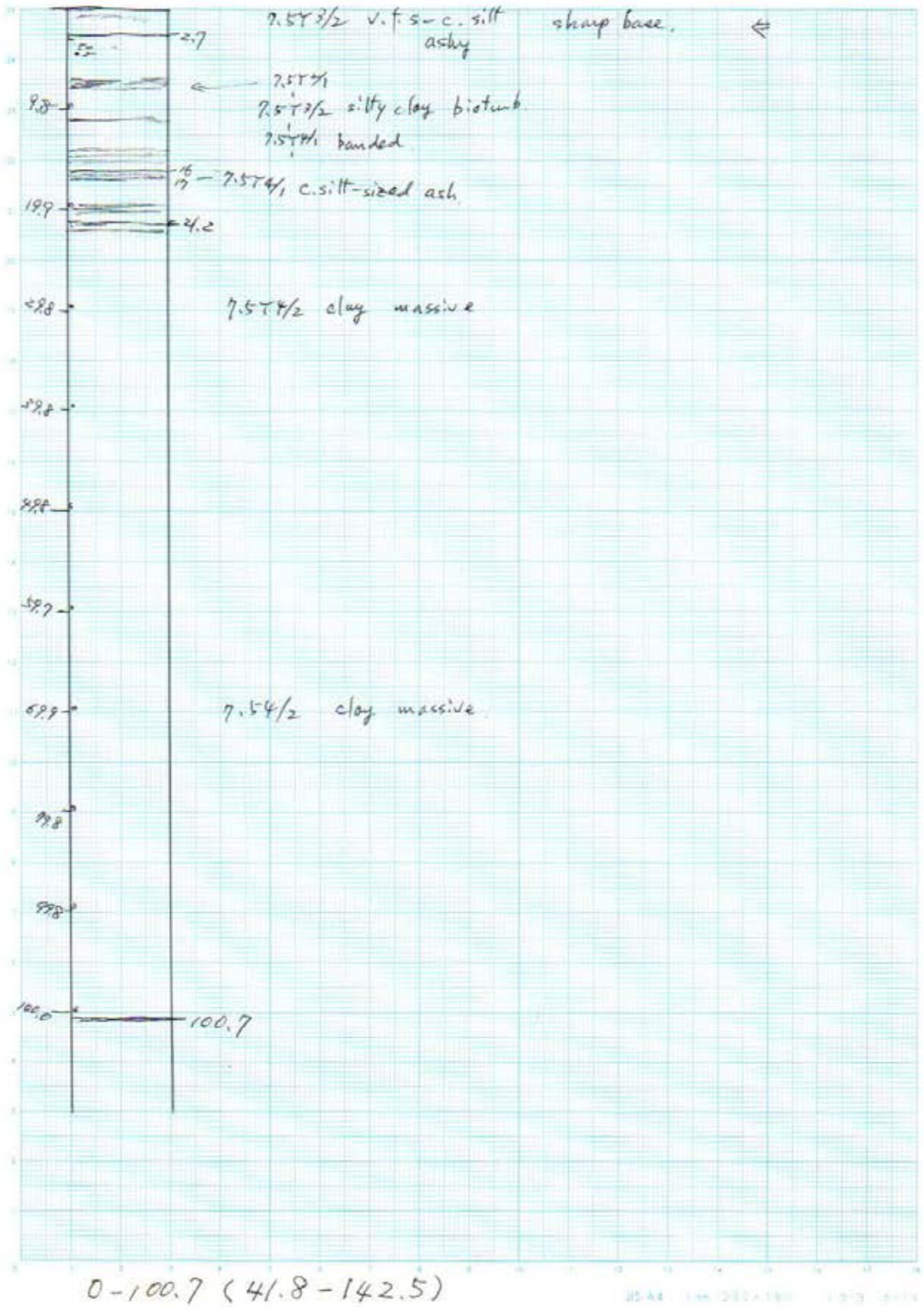
0-65.0 (9.5-74.5)

MR17-06 PC02 2W



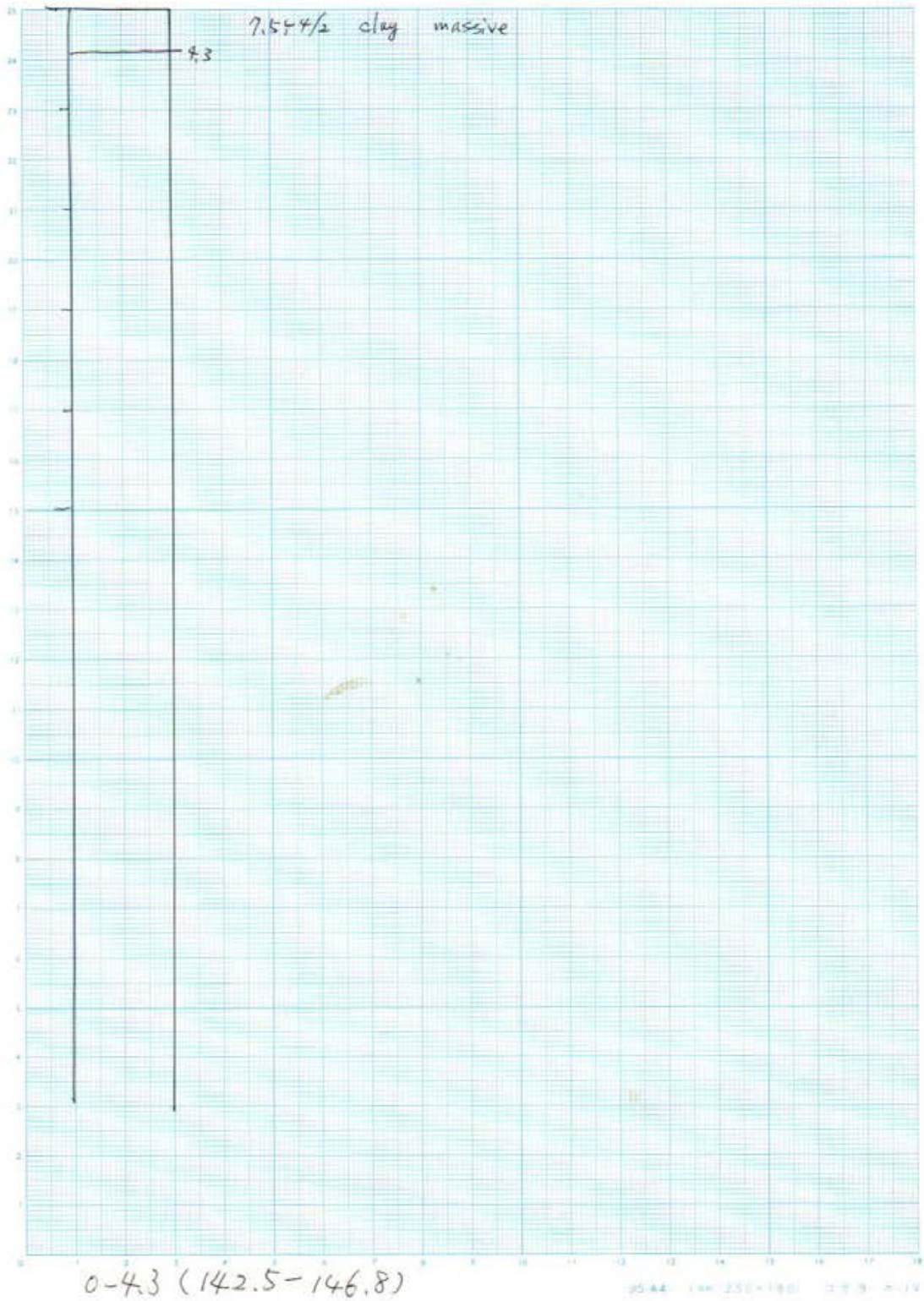
0.7 - 42.5 (41.8)

MR17-06 PC02 3W



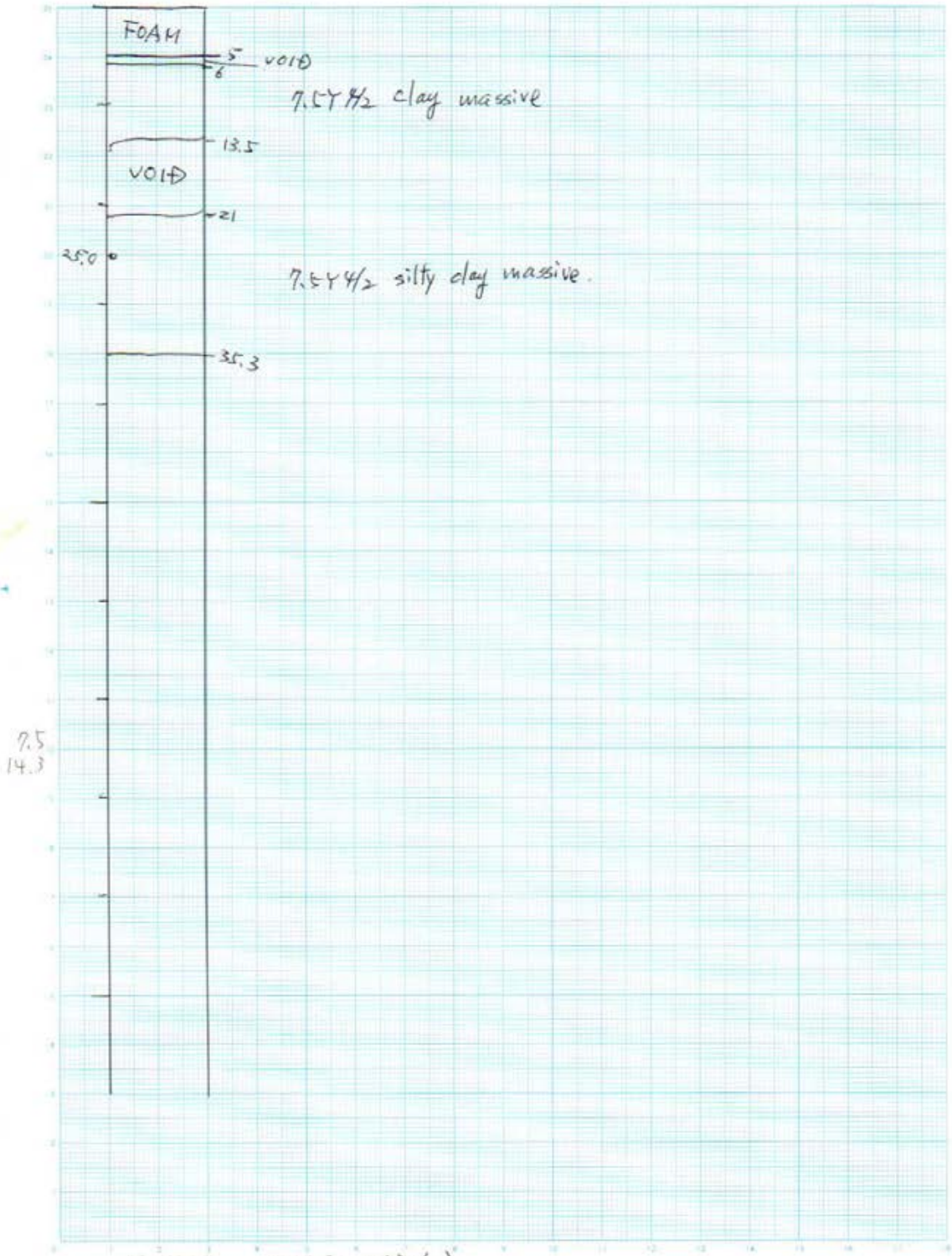
0-100.7 (41.8-142.5)

MR17-06 PCO2 4W



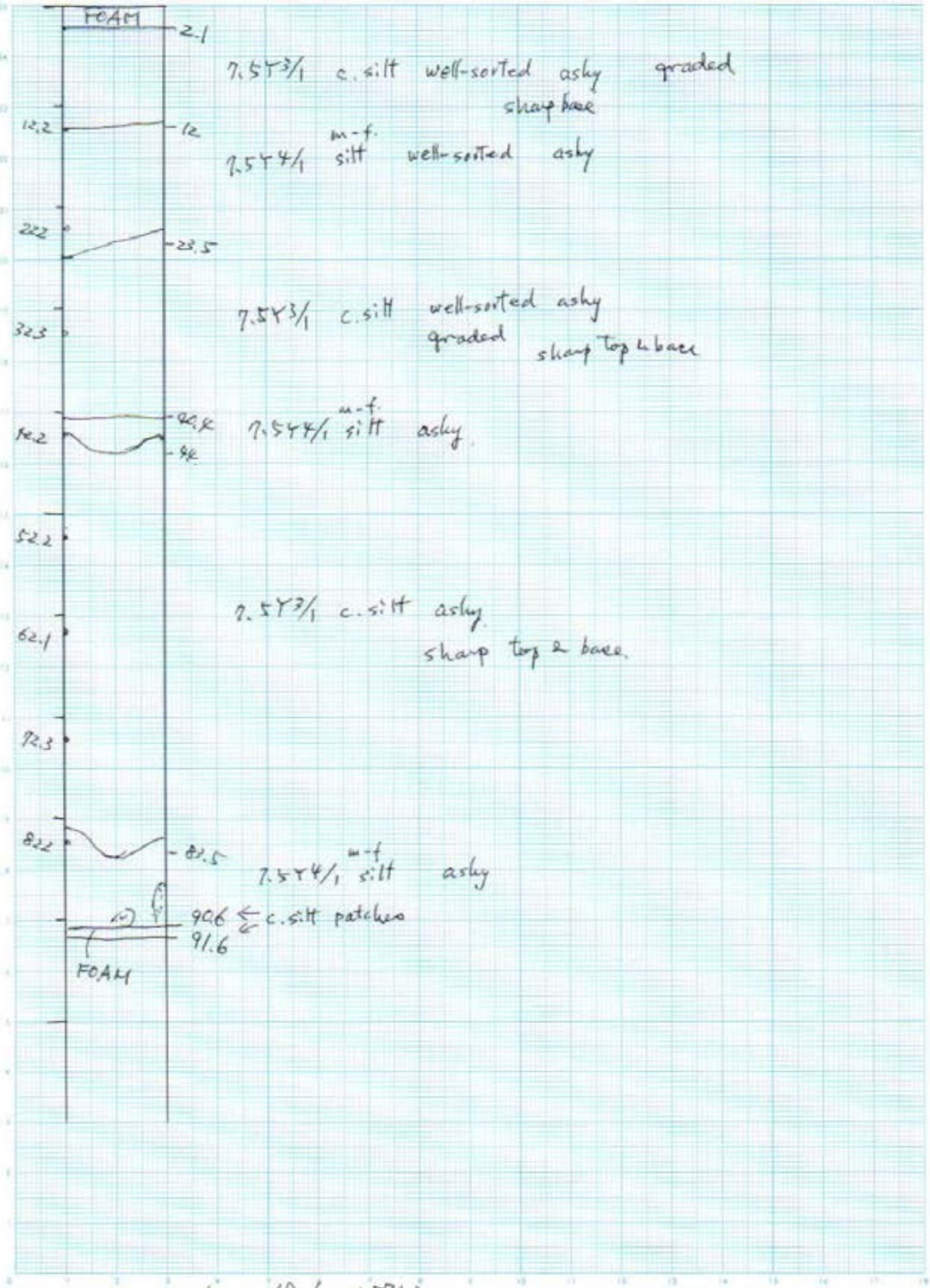
0-43 (142.5-146.8)

MR17-06 PC02 5W



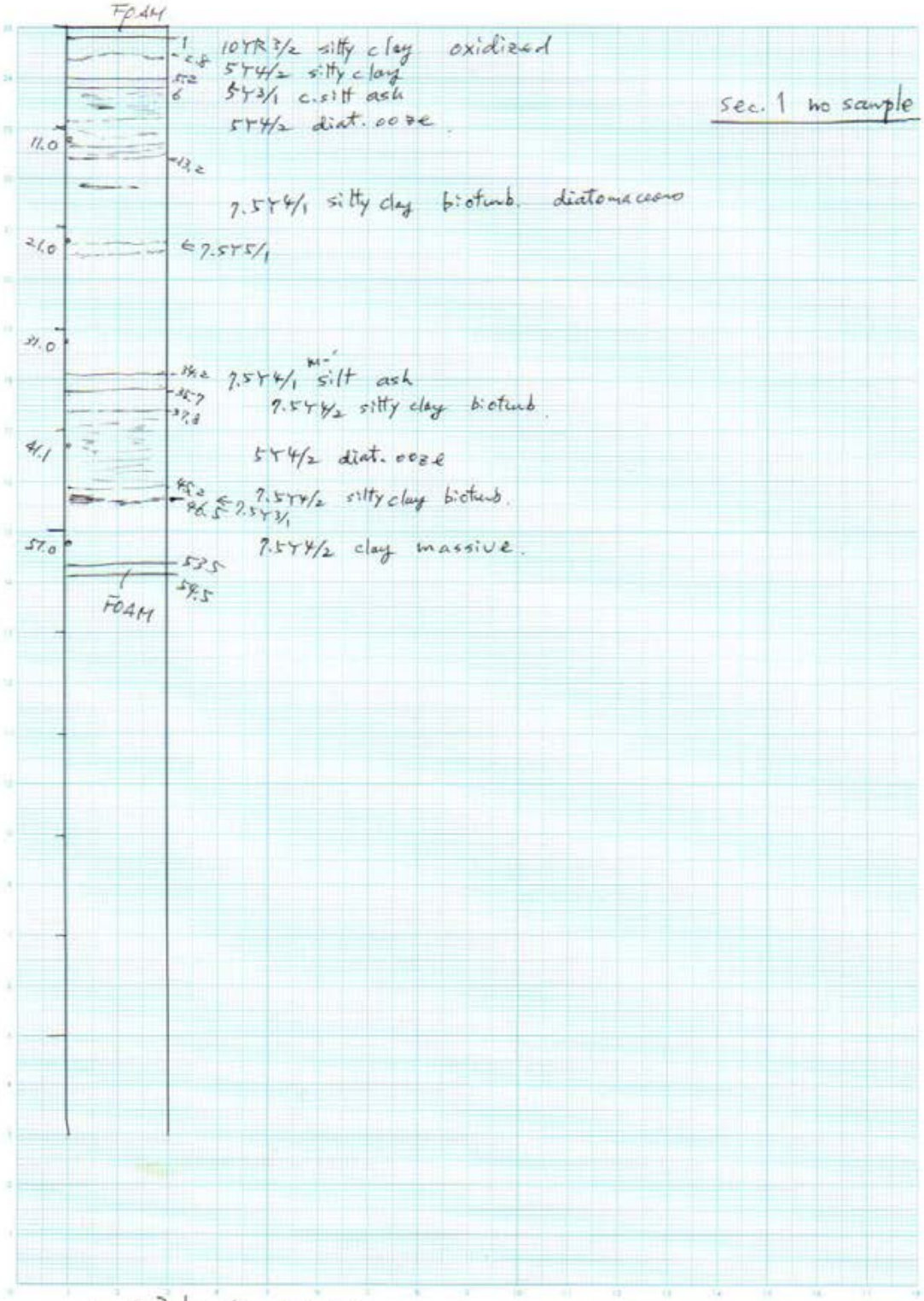
6-35.3 (146.8-168.6)
(21.8)

MR17-06 PC02 6W



2.1 - 90.6 (168.6 - 257.1)
(88.5)

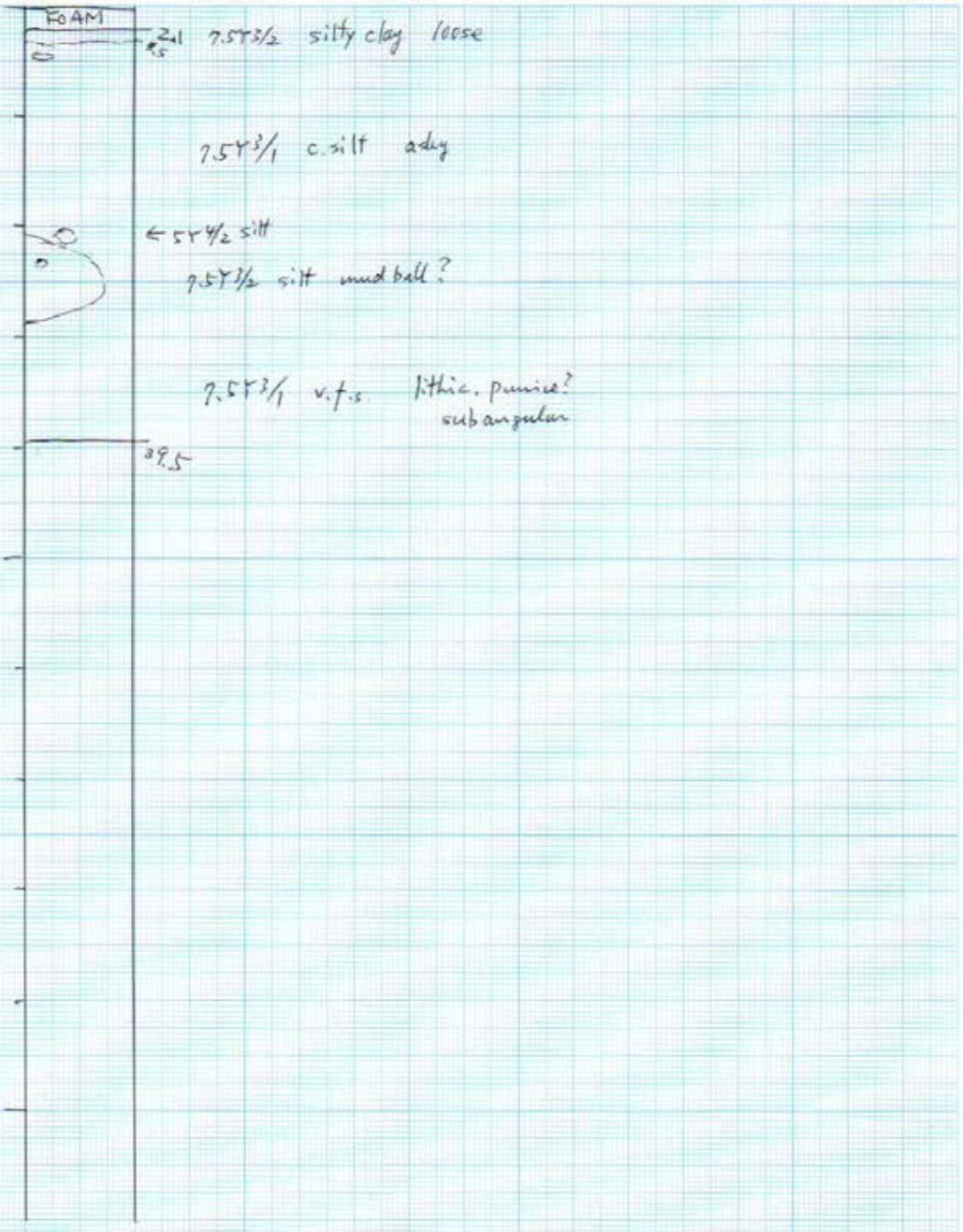
MR17-06 PL02 2W



Sec. 1 no sample

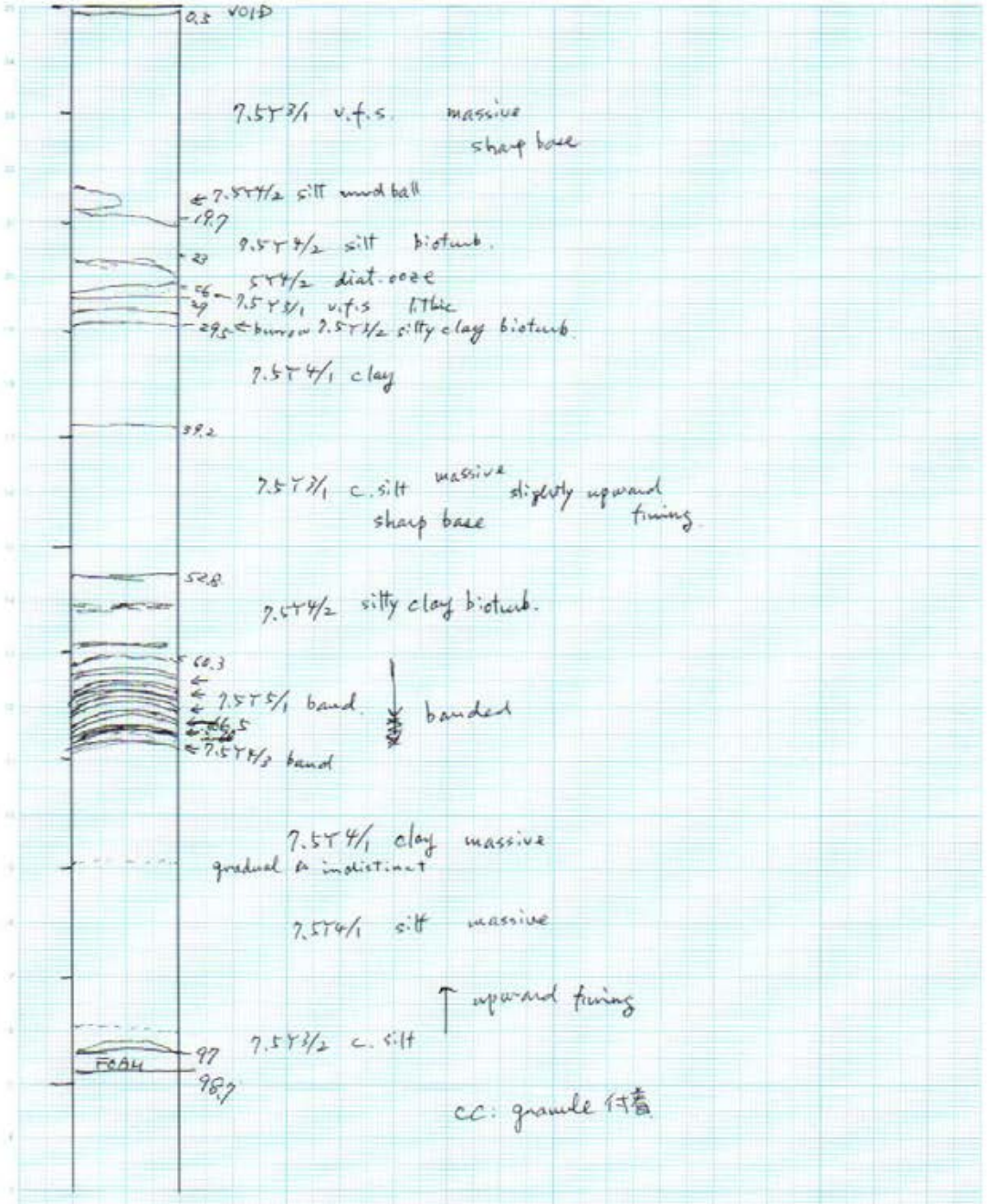
1-53.5 (0-52.5)

MR17-06 PC03 5W



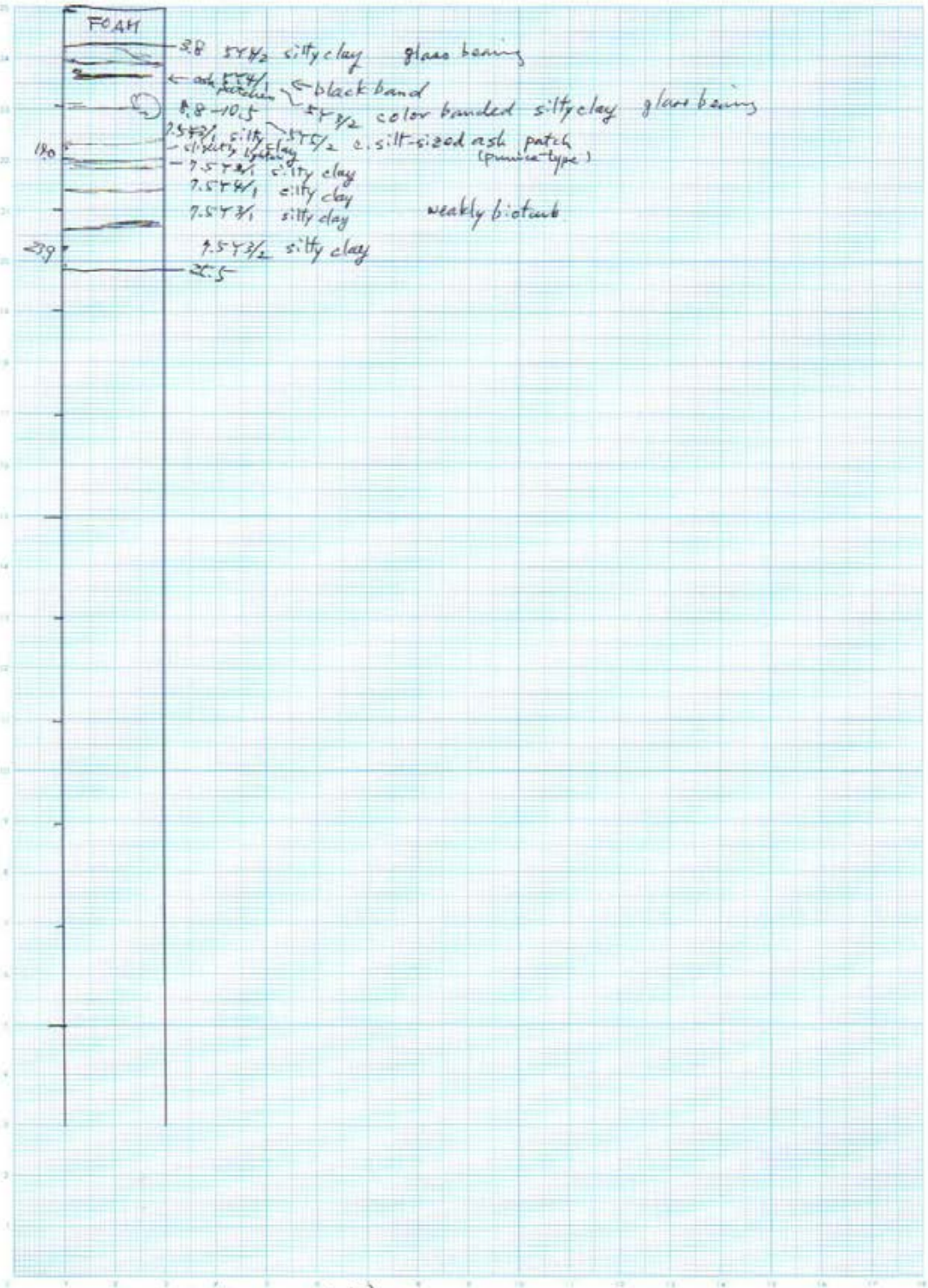
2.1 - 39.5 (0 - 37.4)

MR 17-06 PC03 6W



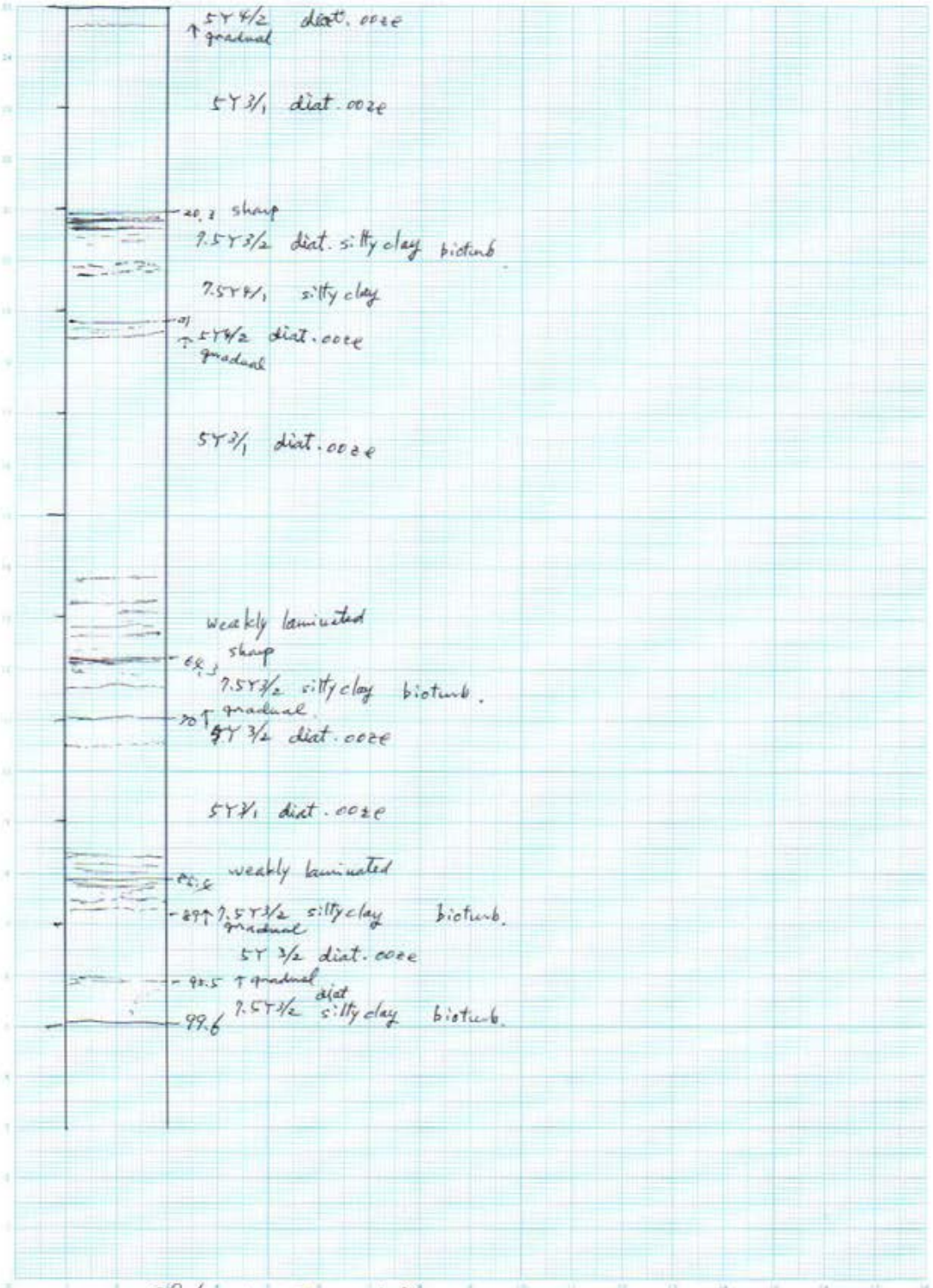
0.3-97 (37.4-134.1)

MR17-06 PC04 1W



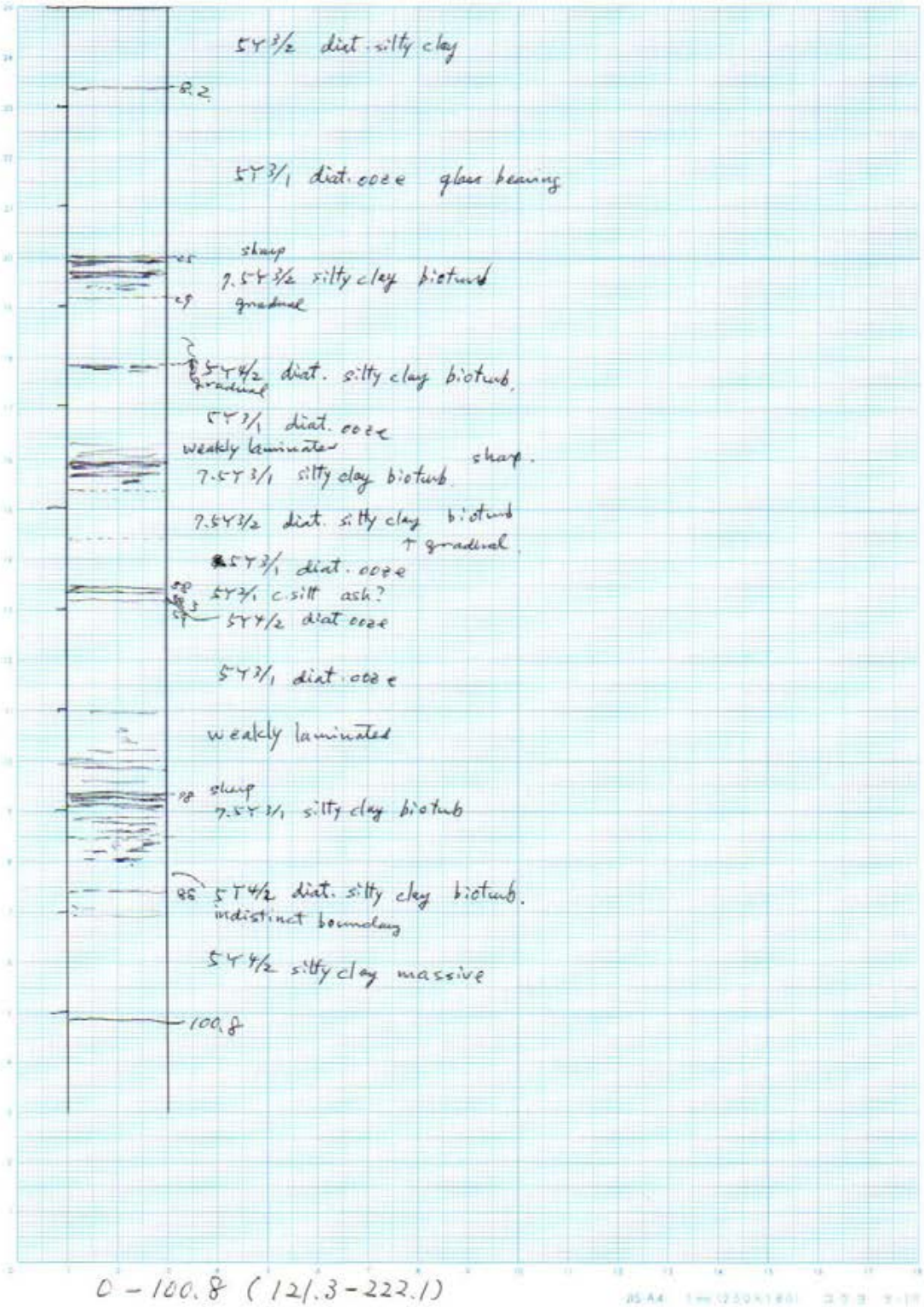
3.8-25.5 (0-21.7)
(21.7)

MR17-06 PC04 2W



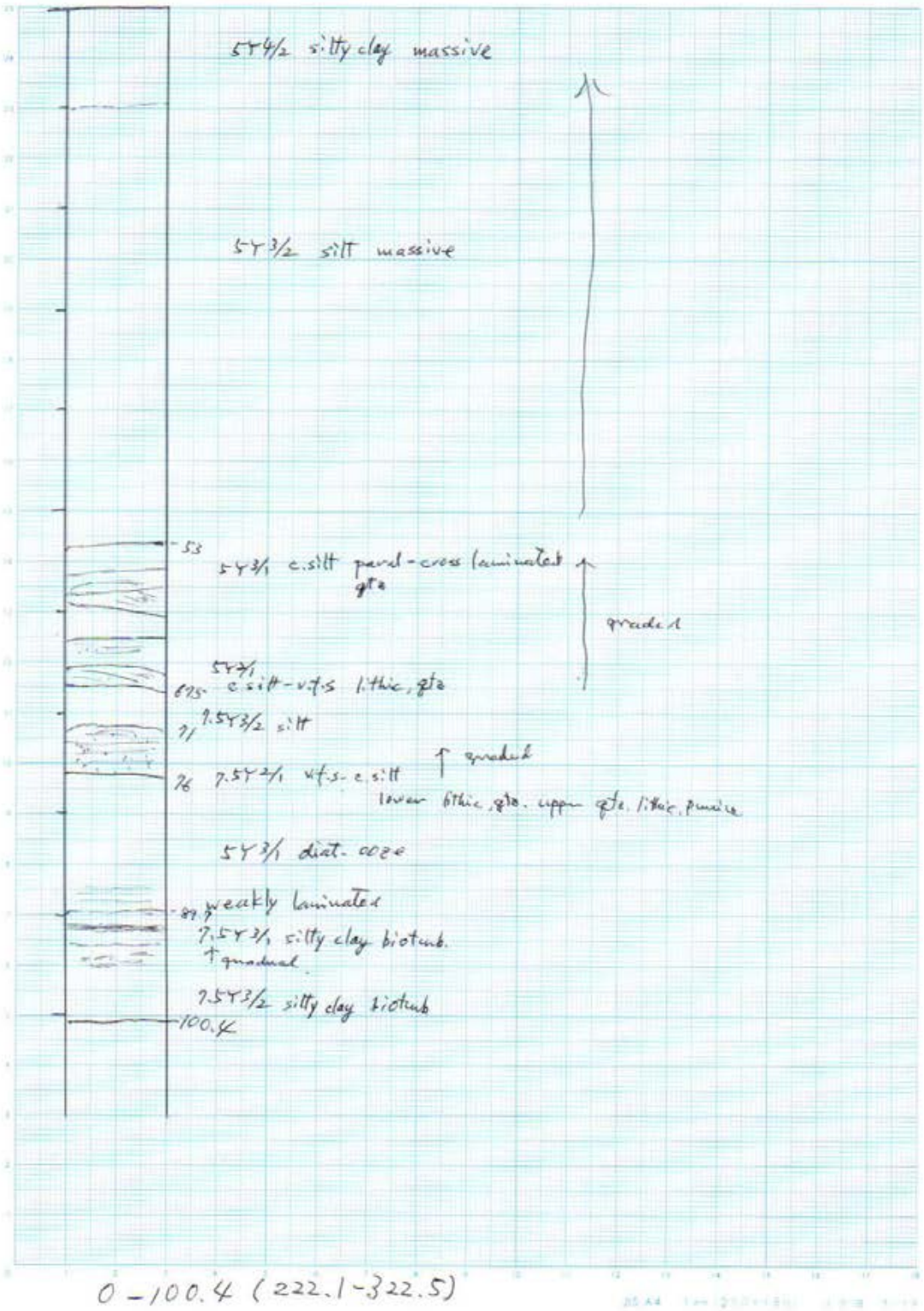
0 - 99.6 (21.7 - 121.3)

MR17-06 PC04 3W



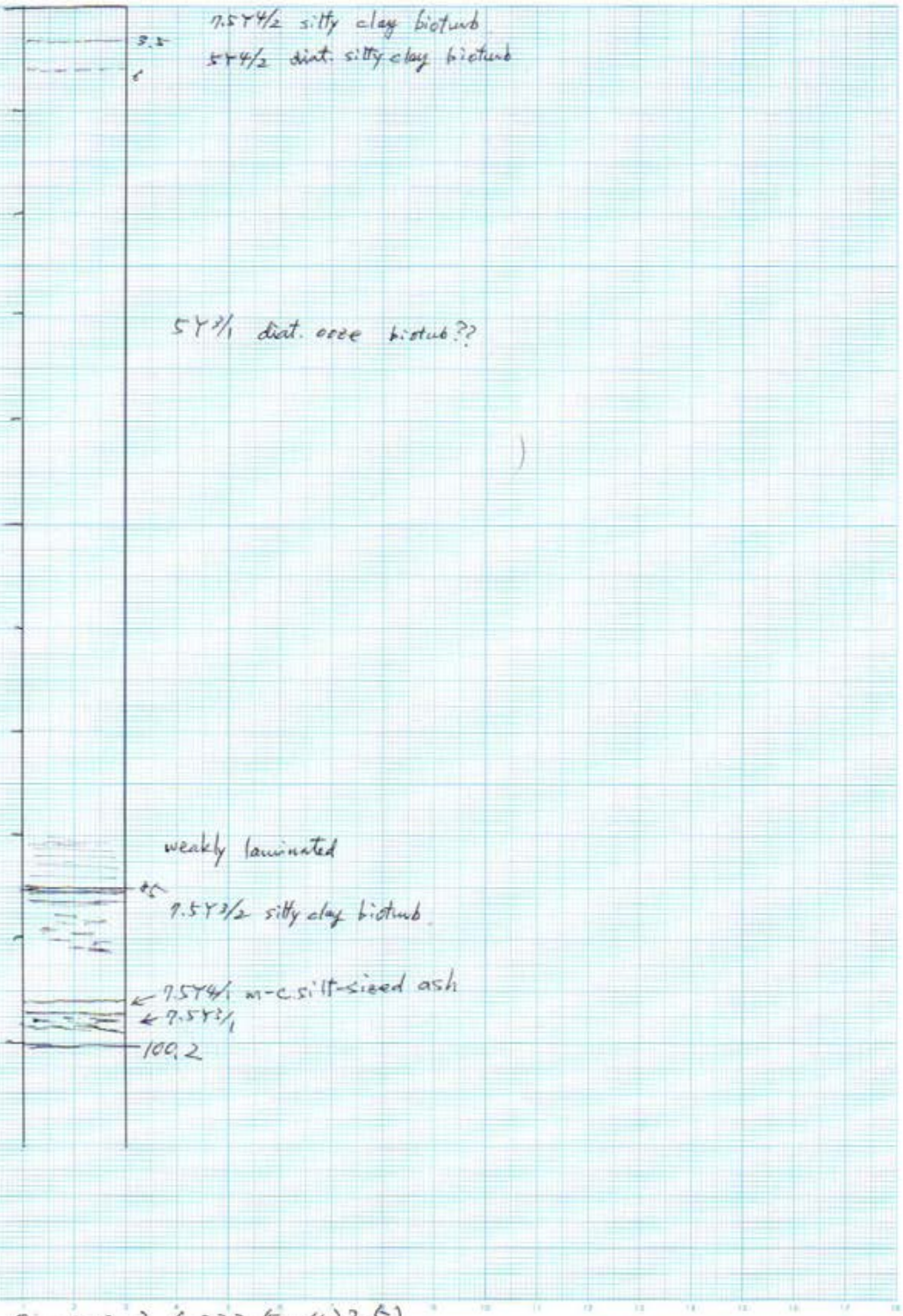
0 – 100.8 (121.3 – 222.1)

MR17-06 PC 04 4W



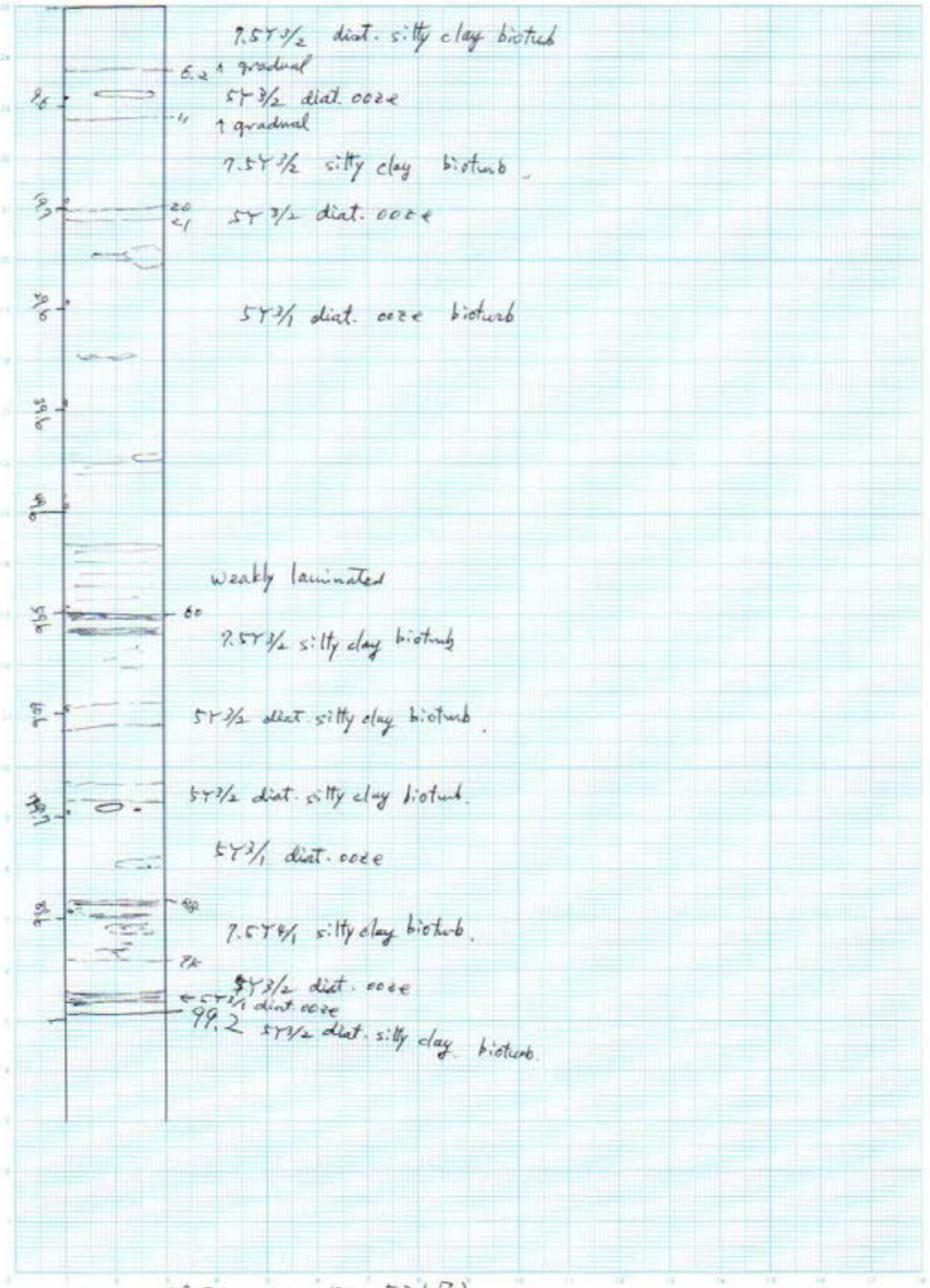
0 - 100.4 (222.1 - 322.5)

MR 17-06 PC04 5W



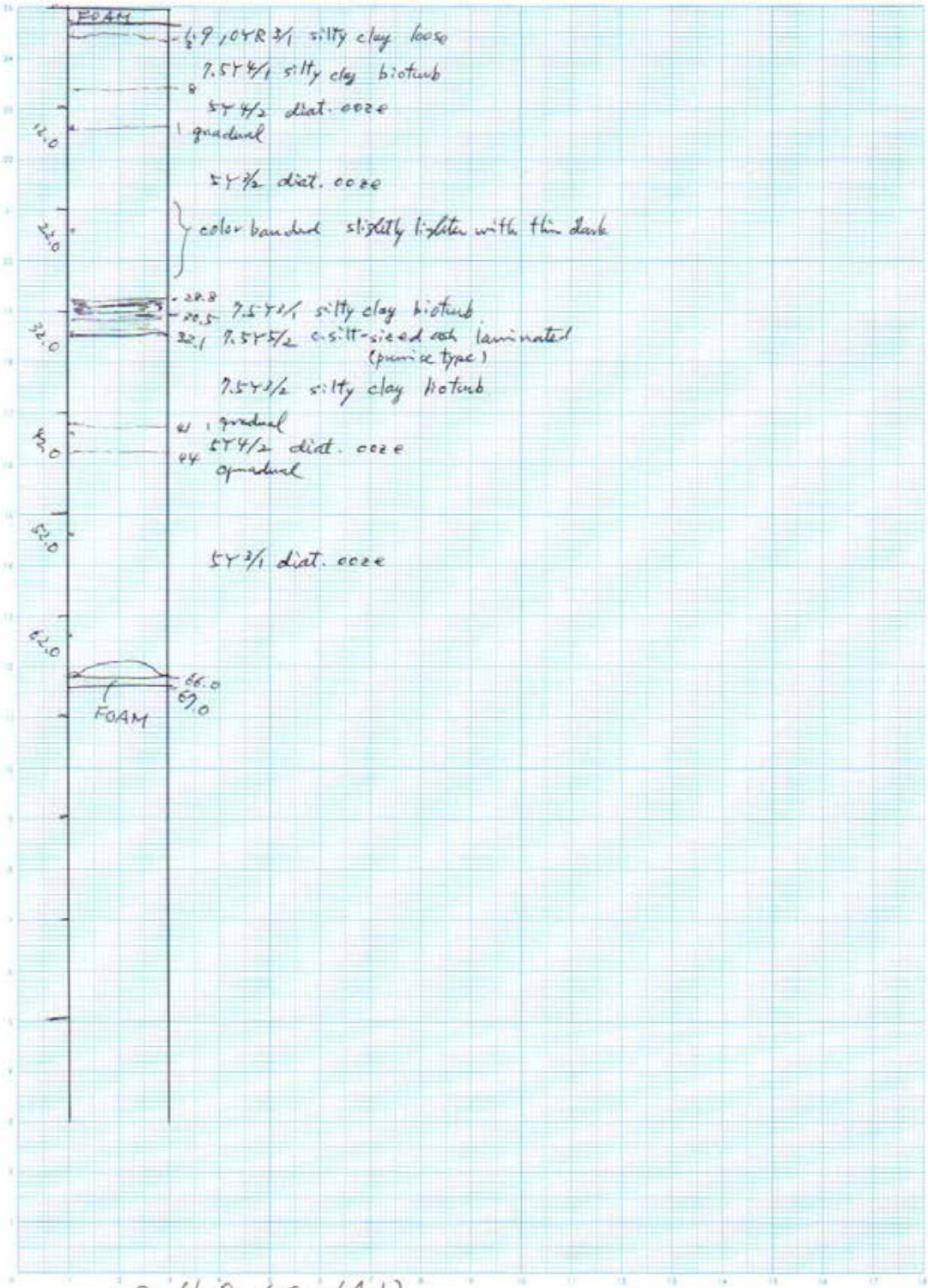
0 - 100.2 (322.5 - 422.5)

MR17-06 PC04 6W



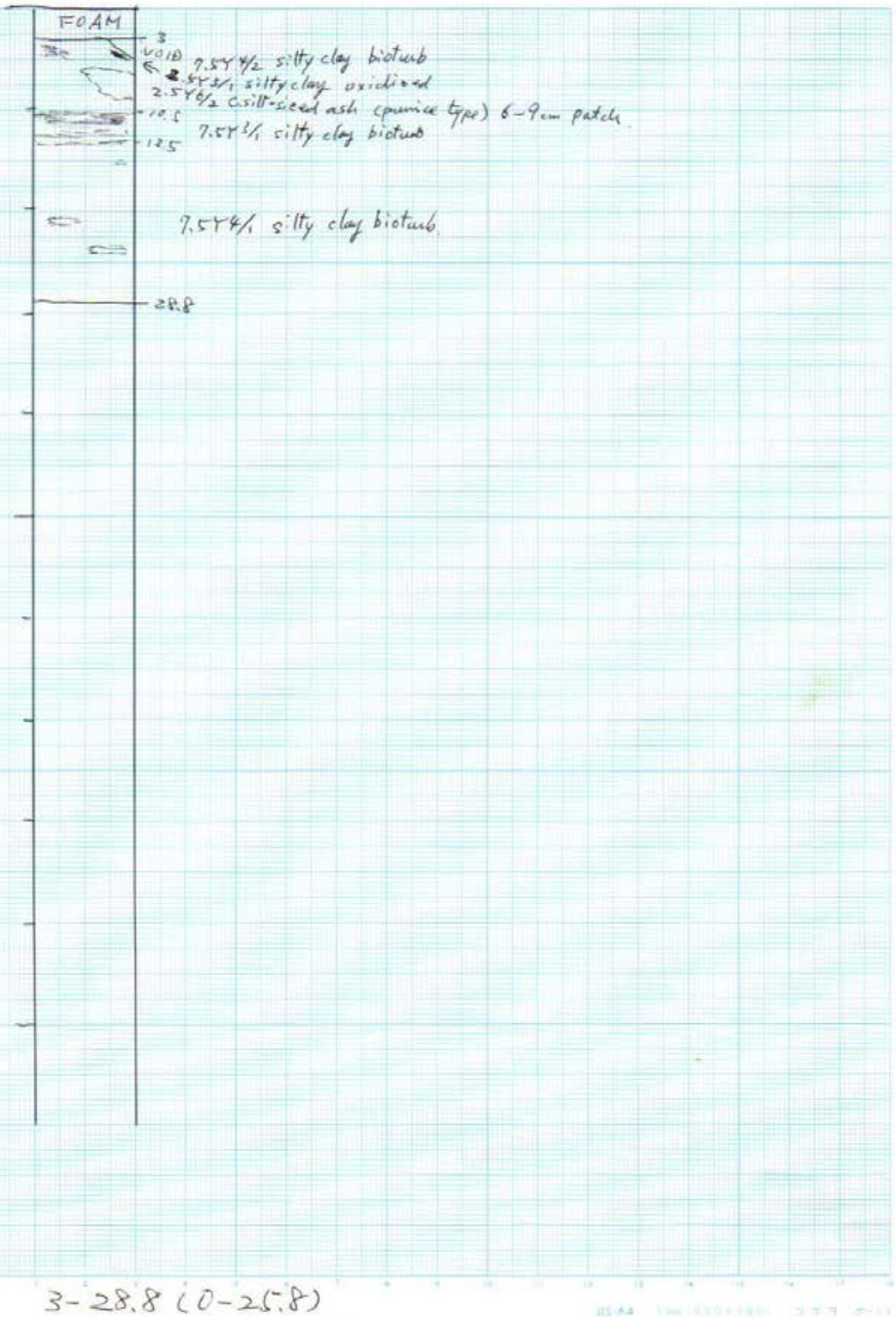
0 - 99.2 (422.5 - 521.7)

MR17-06 PL04 2W



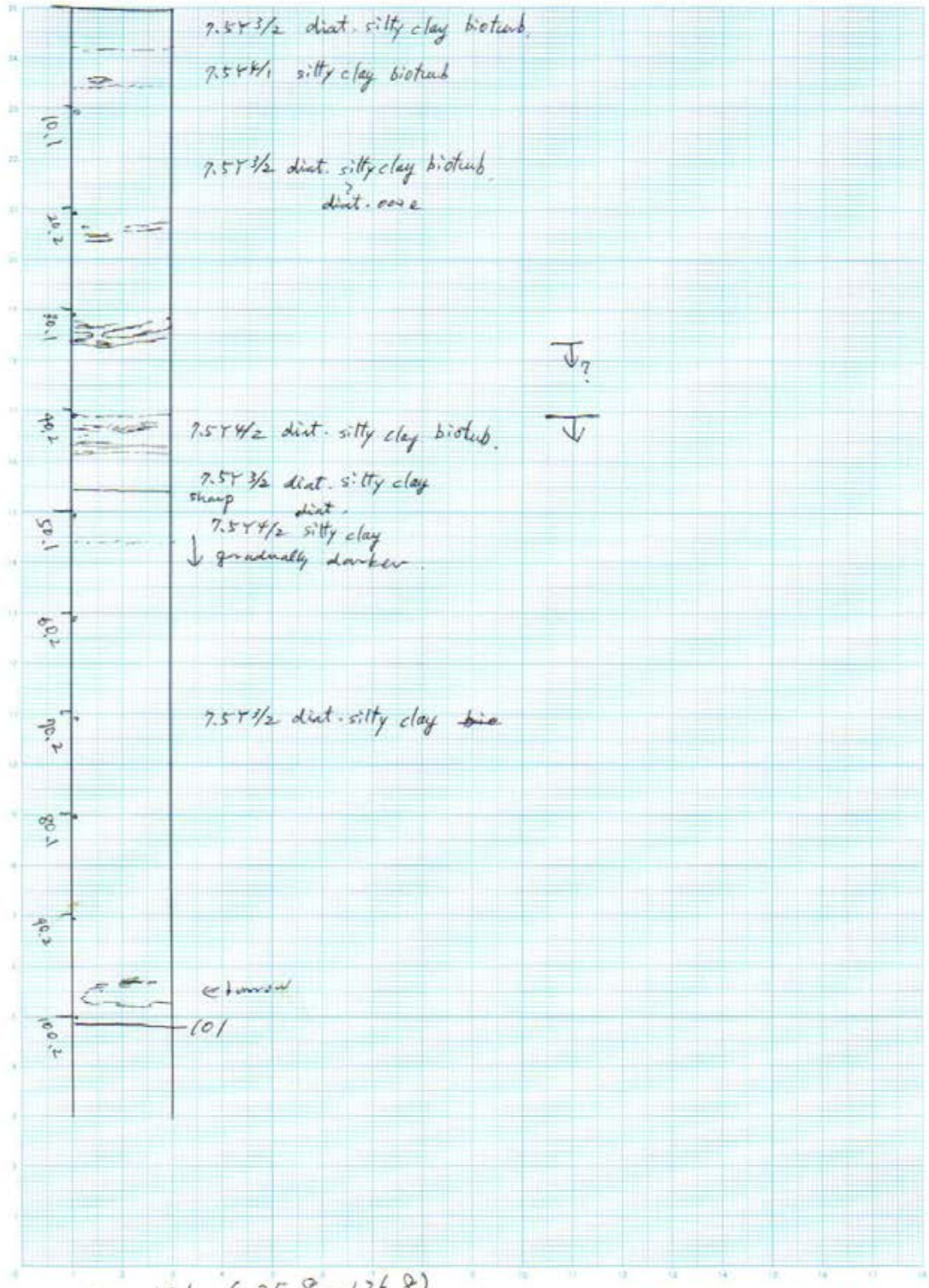
1.9-66.0 (0-64.1)

MR17-06 PC05 1W



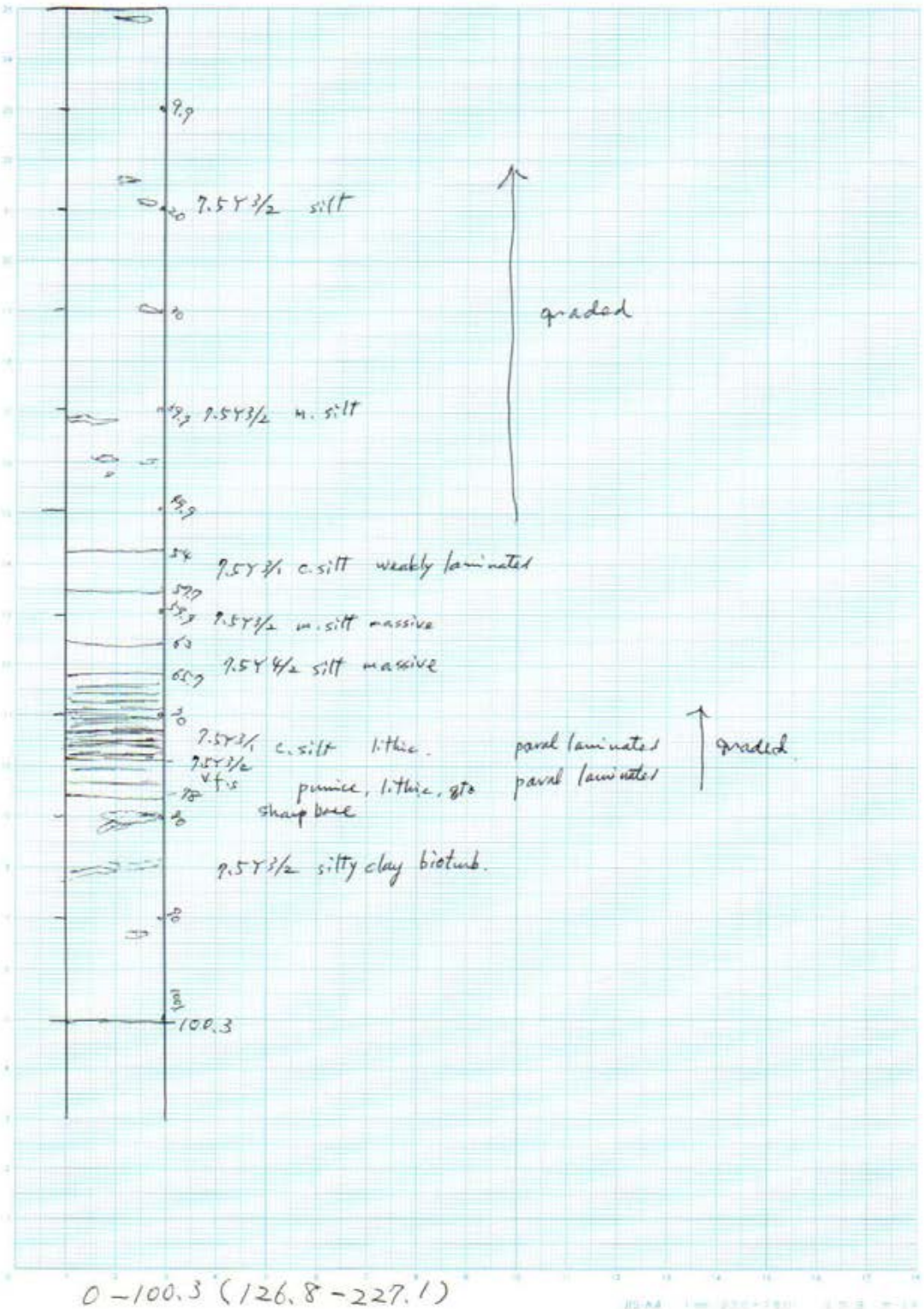
3-28.8 (0-25.8)

MR17-06 PC05 2W



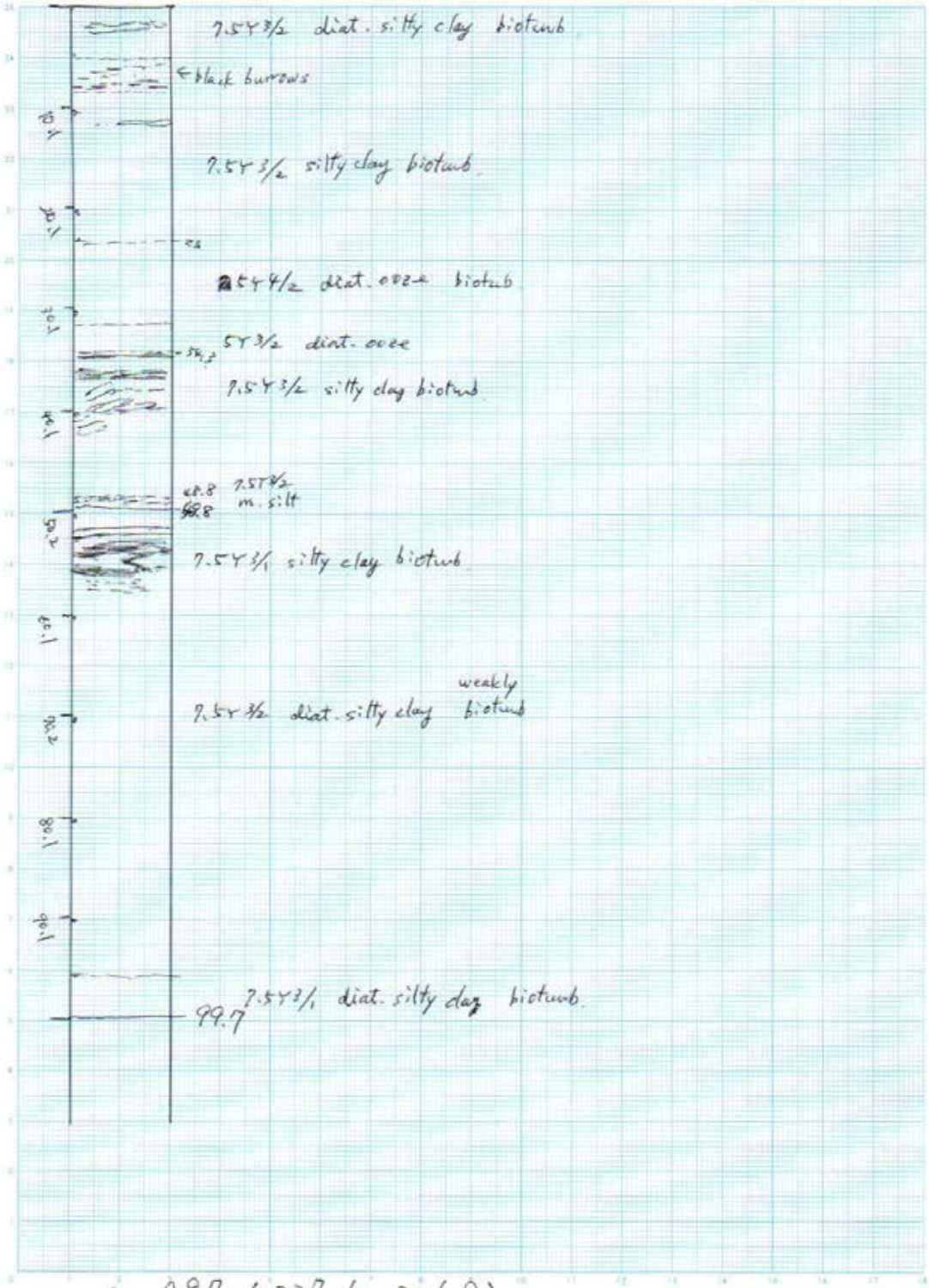
0 - 101 (25.8 - 126.8)

MR17-06 PC05 3W



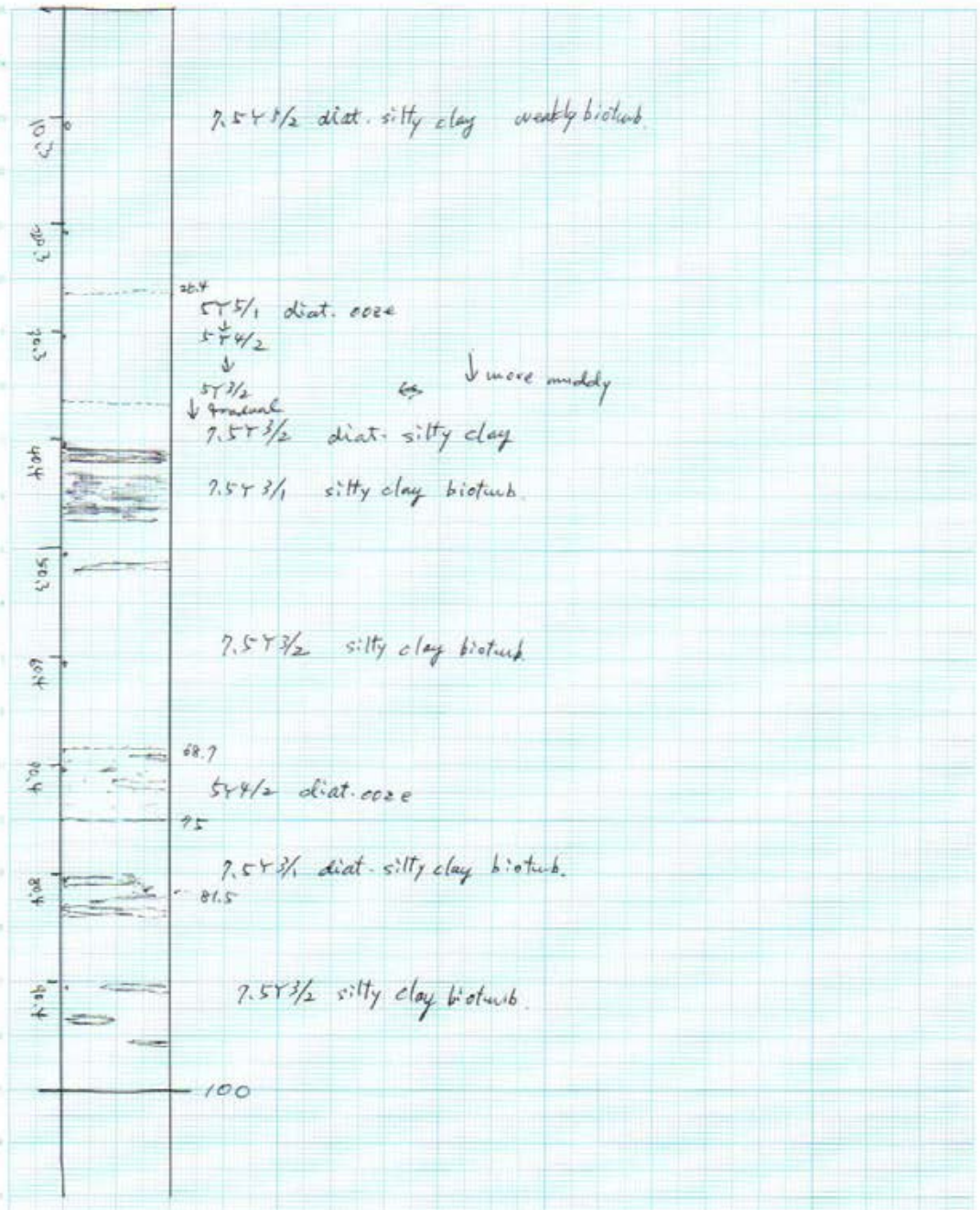
0 – 100.3 (126.8 – 227.1)

MR17-06 PC05 4W



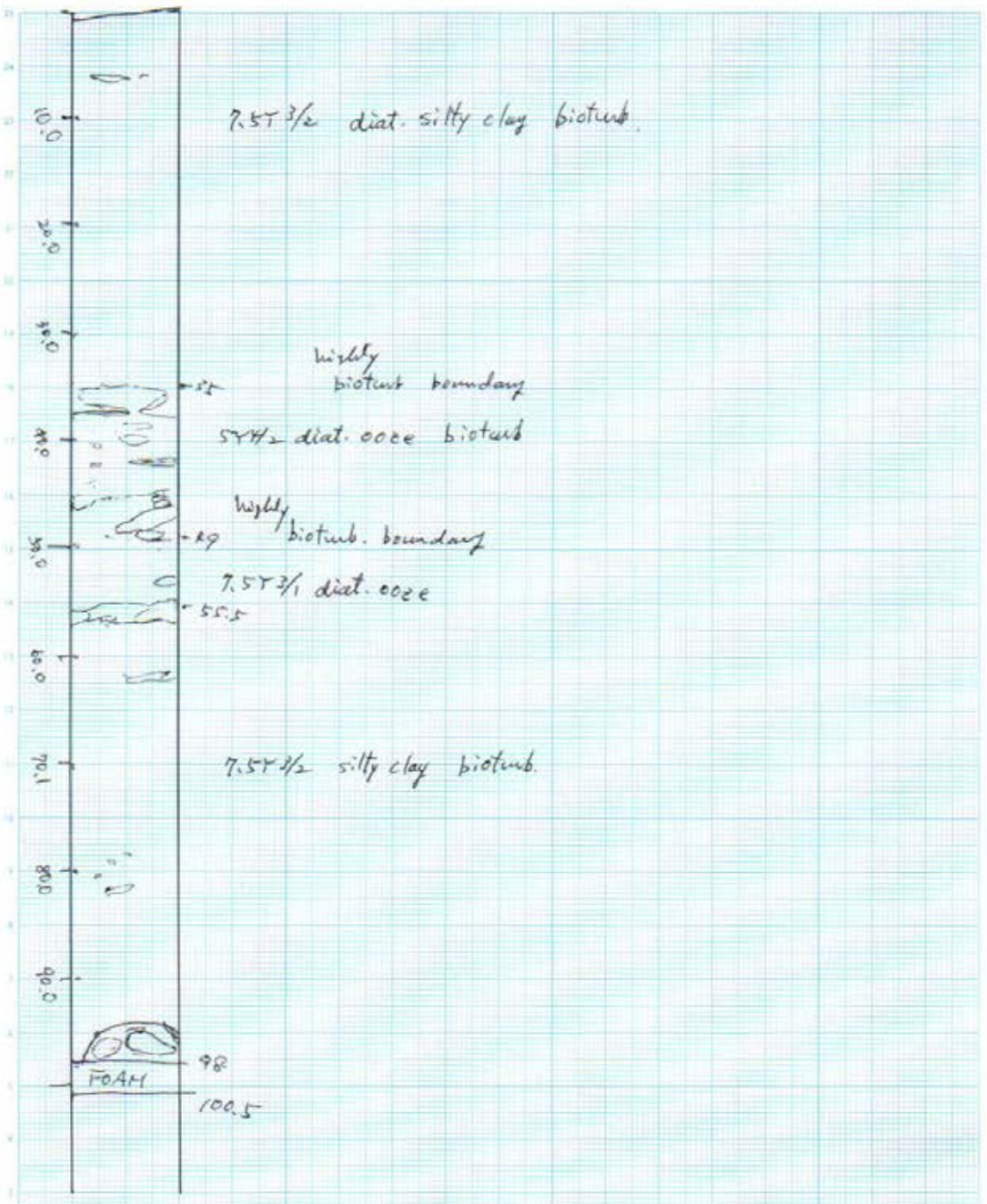
0 - 99.7 (227.1 - 326.8)

MR17-06 PC05 5W



0 - 100 (326.8 - 426.8)

MR17-06 PC05 6W

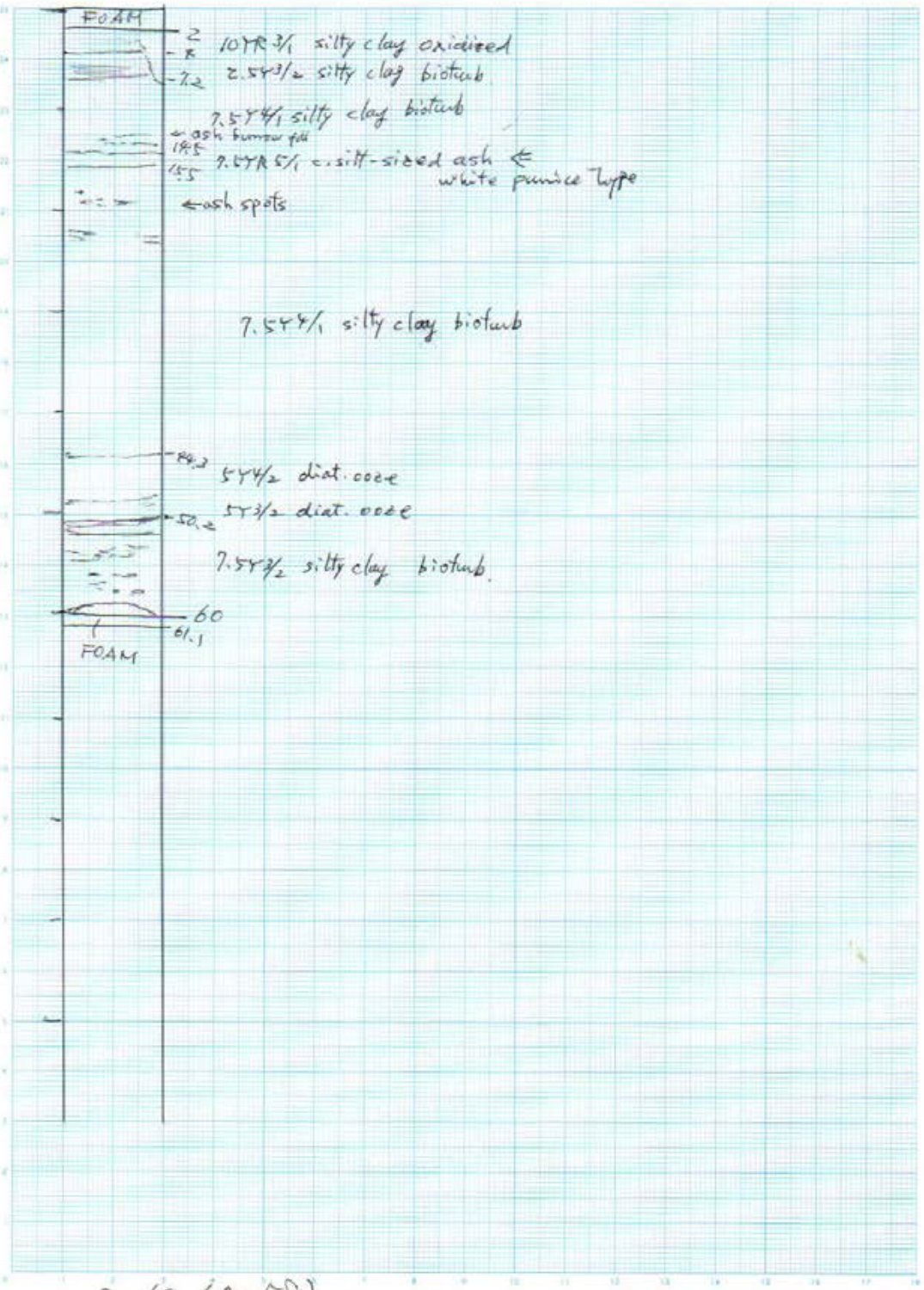


0-98 (426.8-524.8)

MR17-06 PC05 CC W

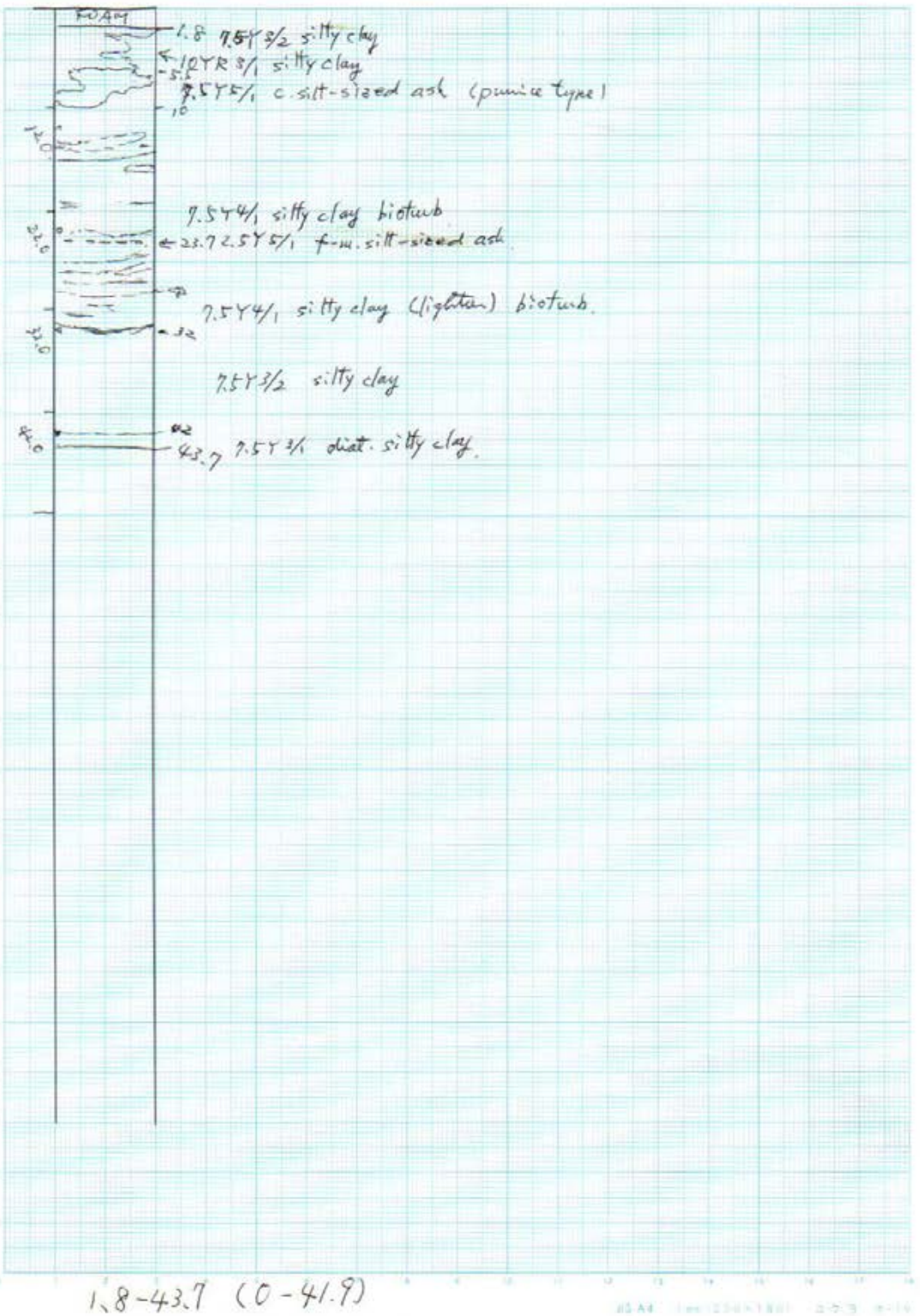
6-14 (524.8 - 529.8)
(8) (8-3cm)

MR17-06 PL05 2W



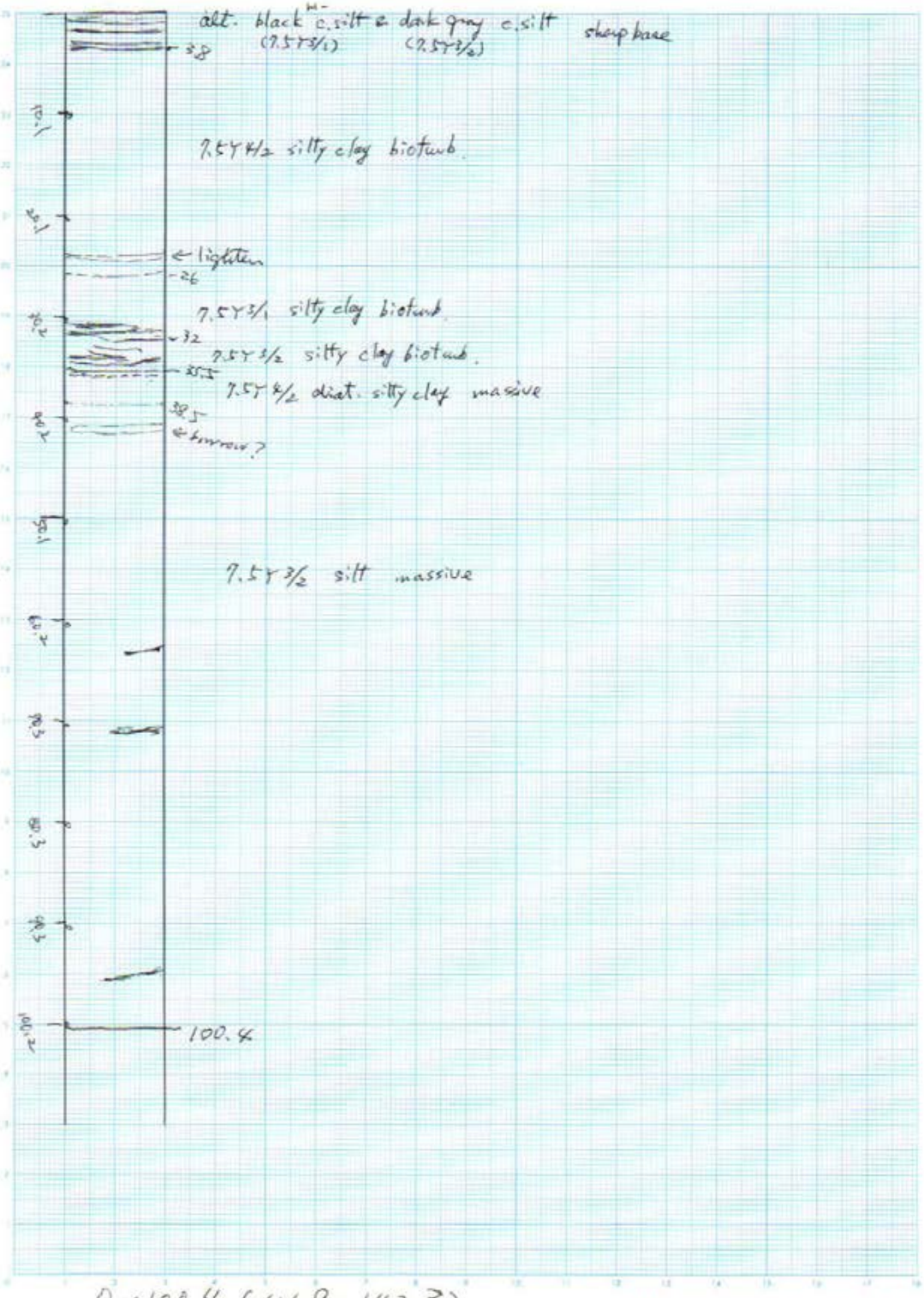
2-60 (0-58)

MR17-06 PC06 1W



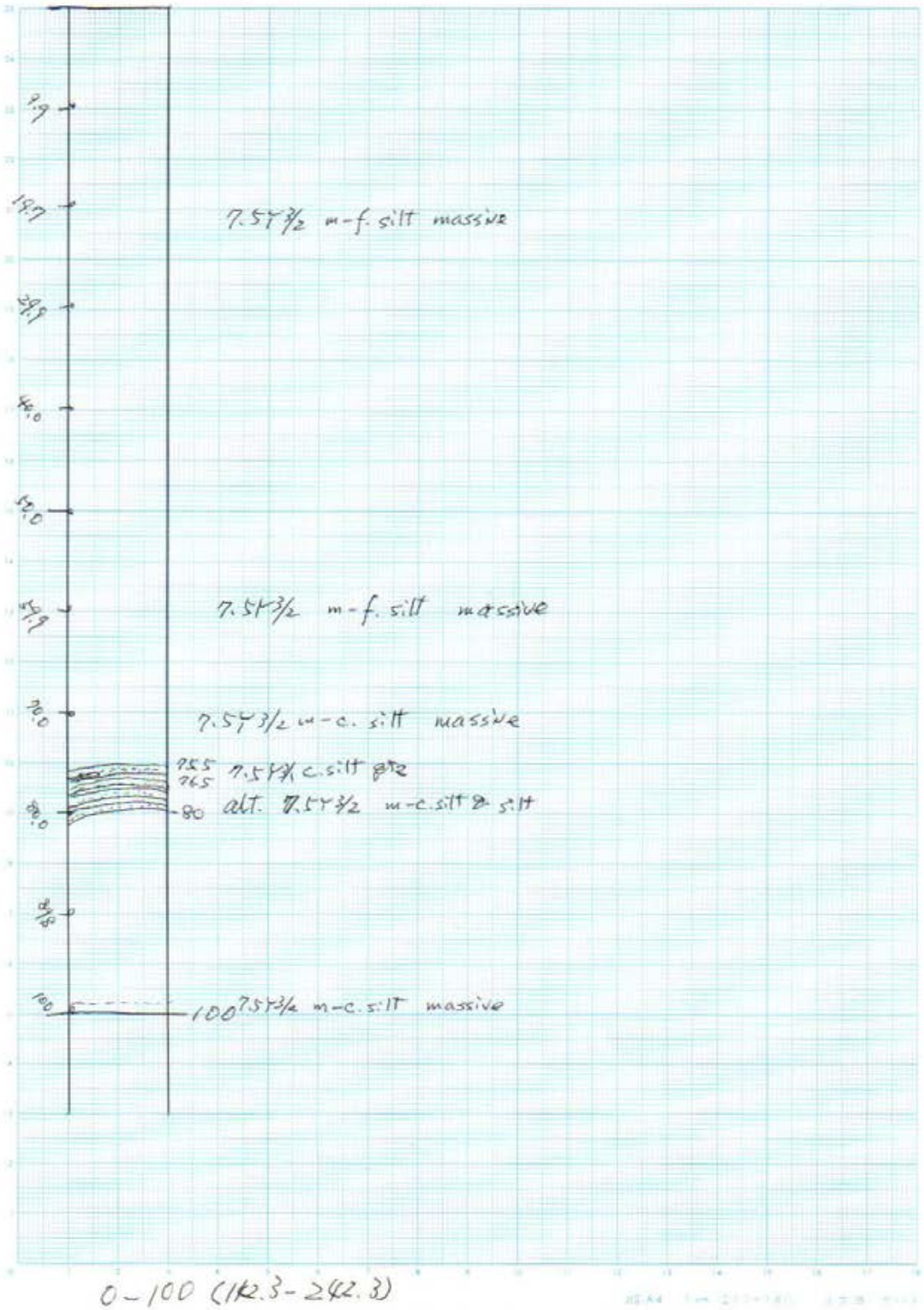
1.8-43.7 (0-41.9)

MR17-06 PC06 2W



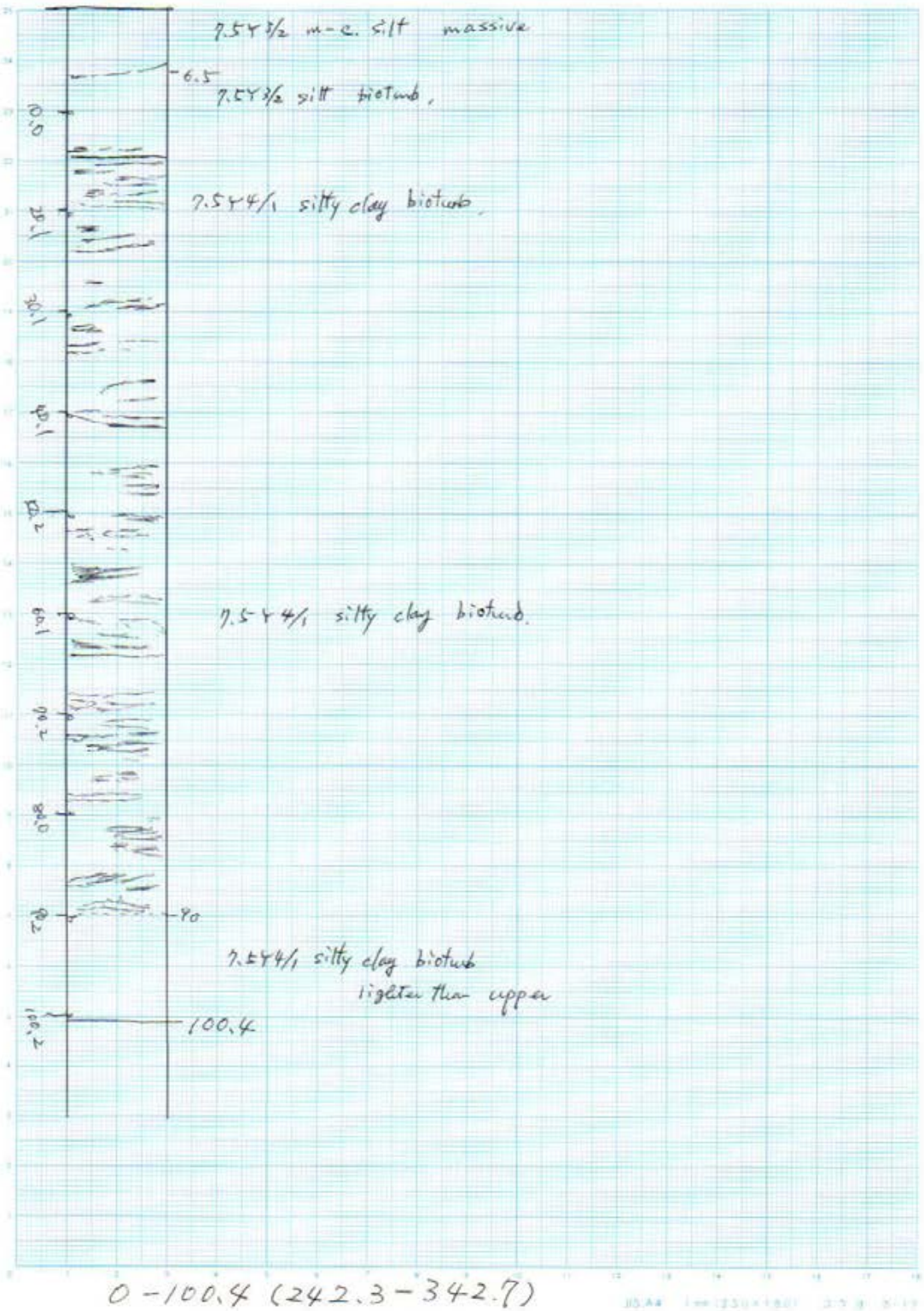
0-100.4 (41.9-142.3)

MR17-06 PC06 3W



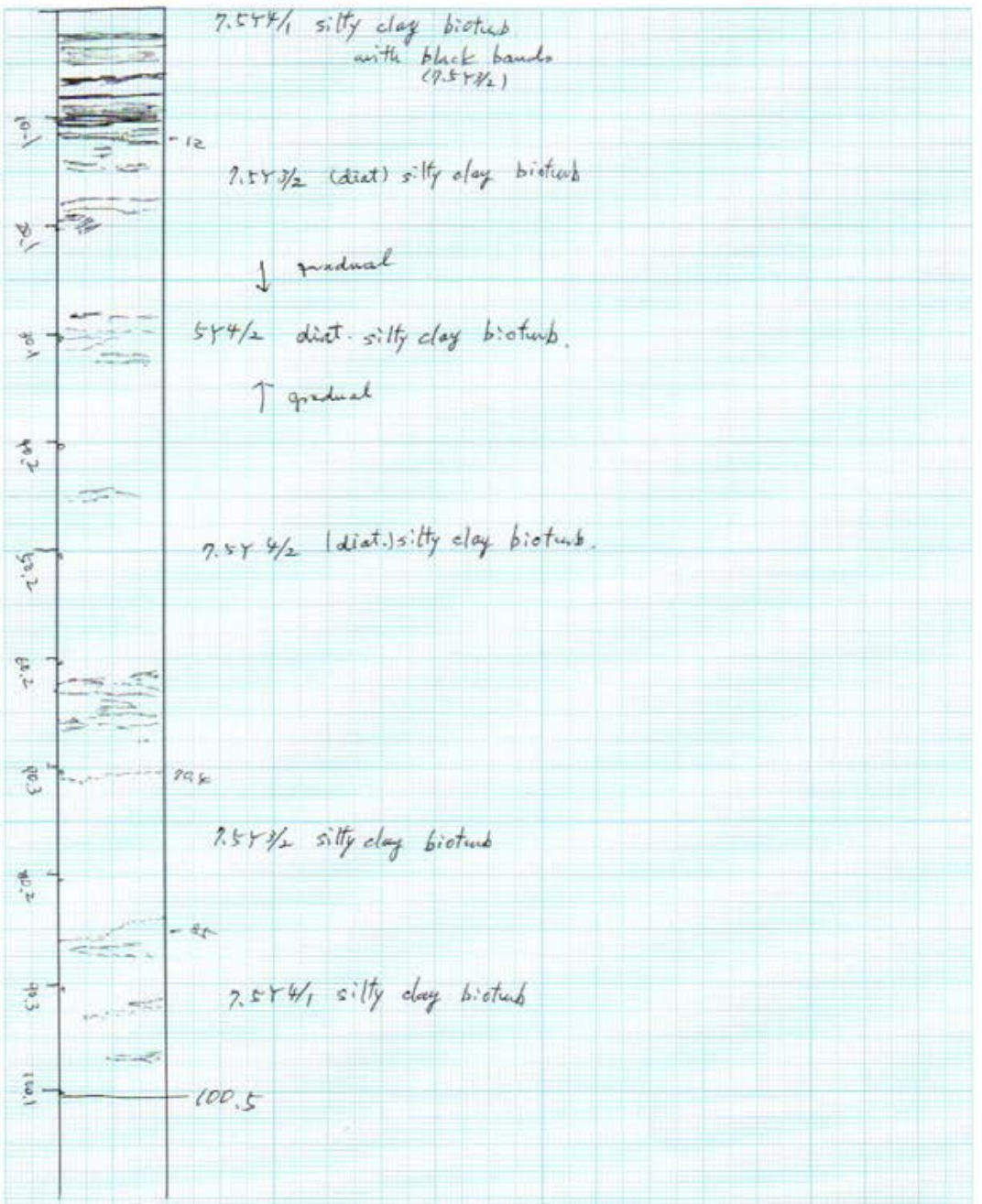
0-100 (1k2.3-2k2.3)

MR17-06 PC06 4W



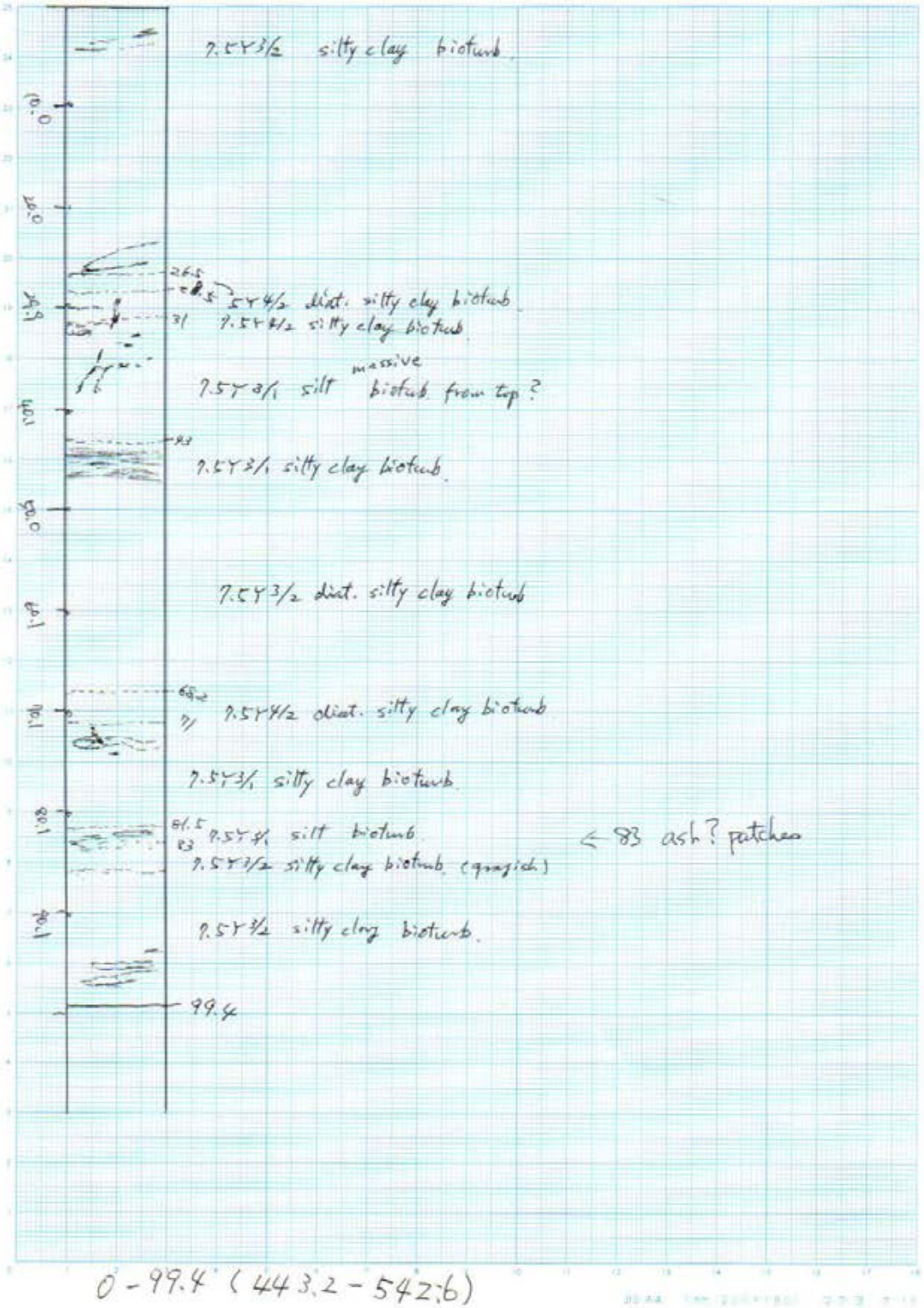
0 - 100.4 (242.3 - 342.7)

MR#17-06 PC06 5W



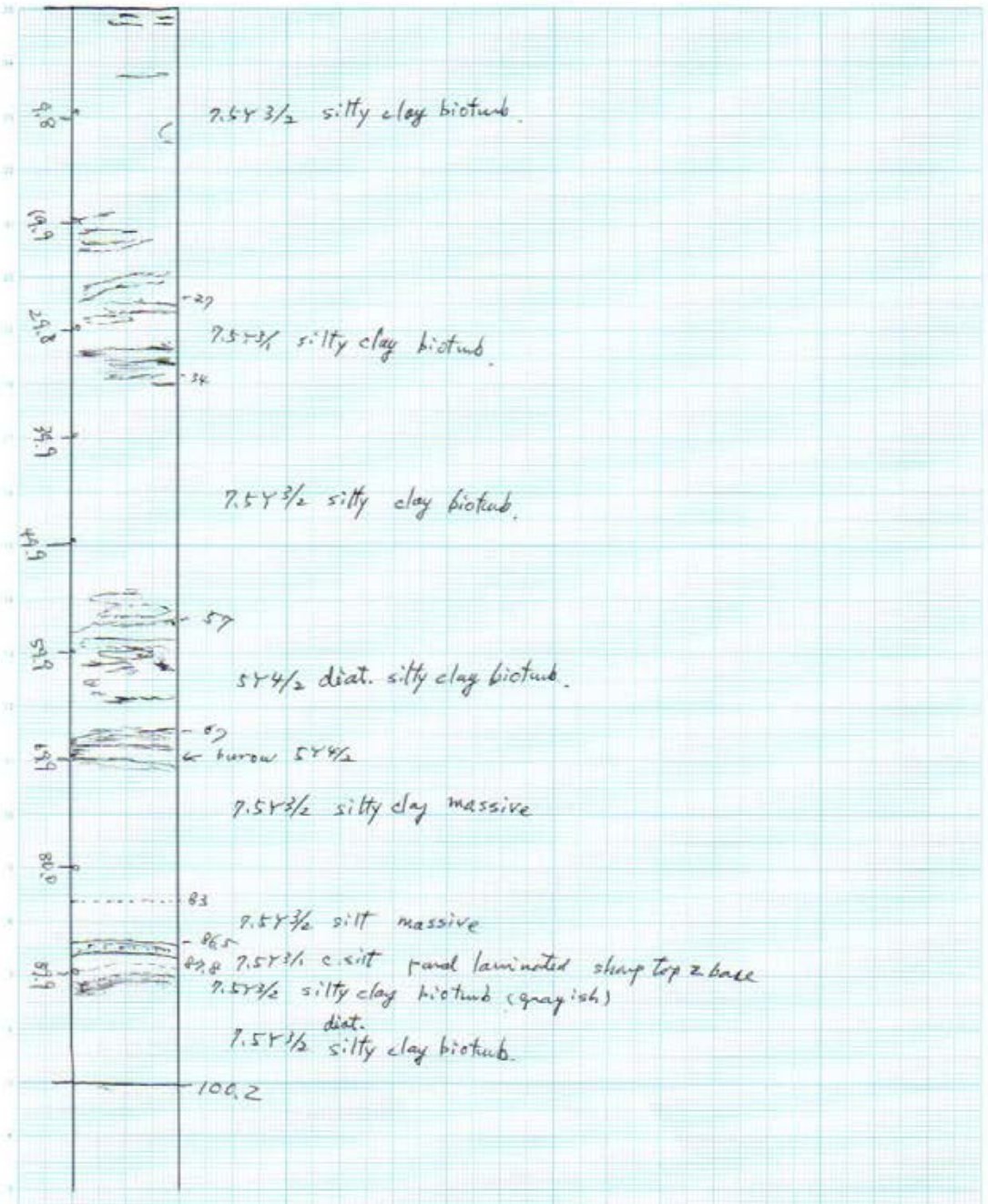
0-100.5 (342.7-443.2)

MR17-06 PC06 6W



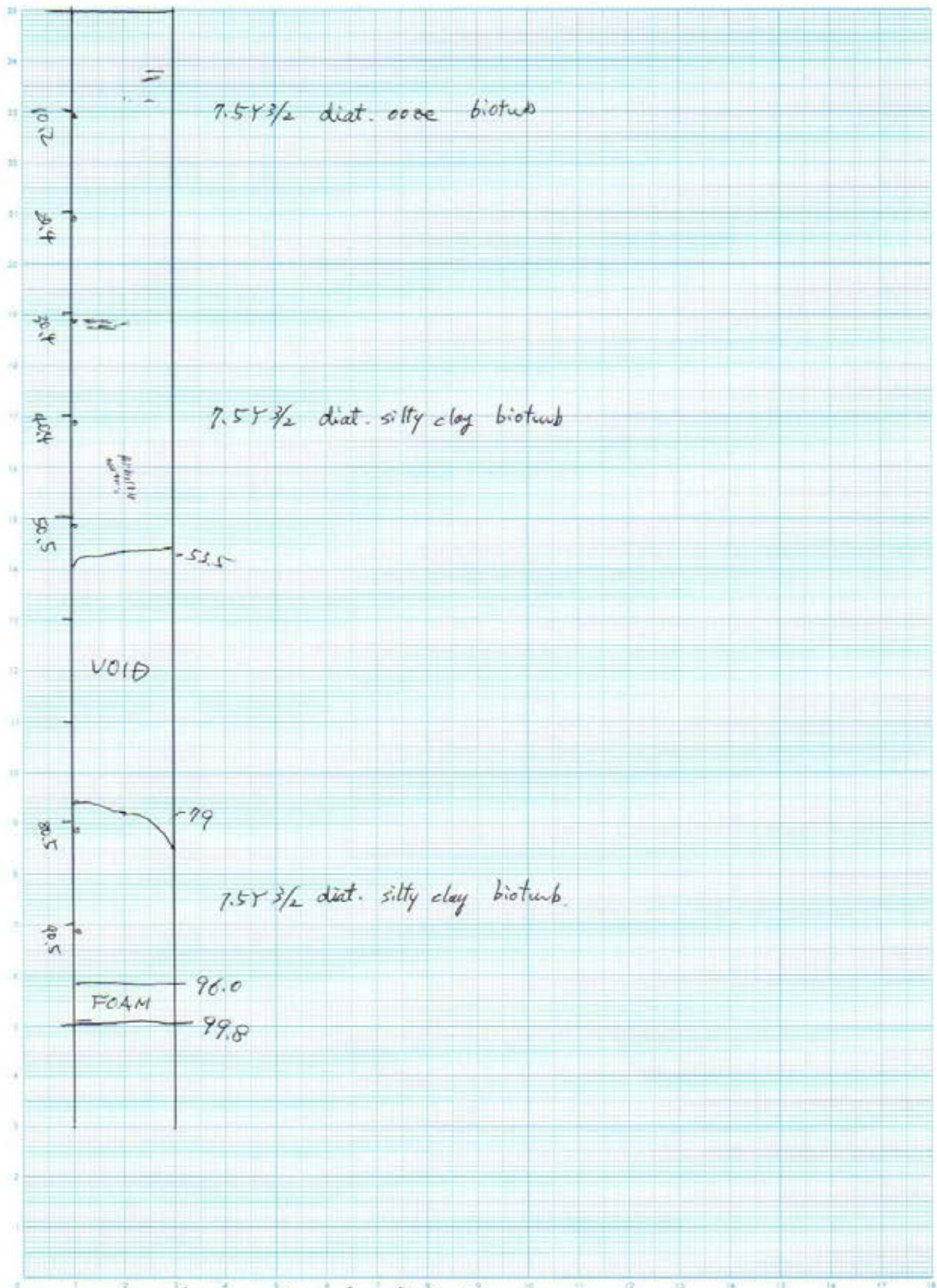
0 - 99.4 (443.2 - 542.6)

MR17-06 PC06 7w



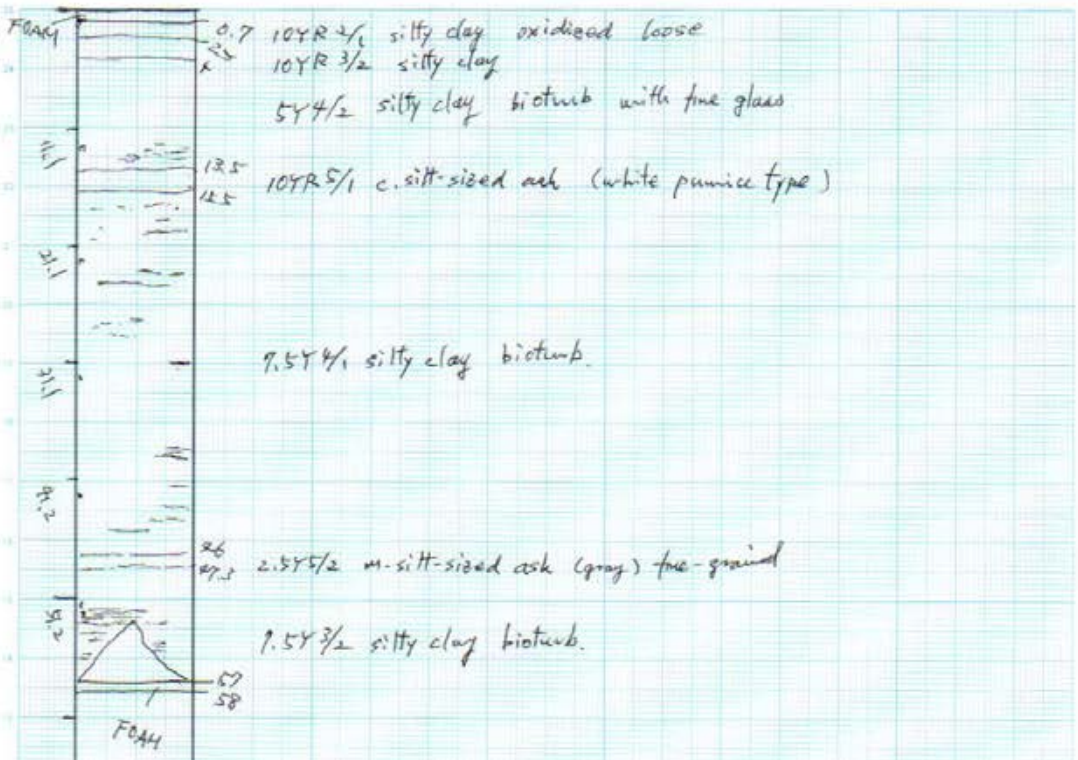
0 - 100.2 (542.6 - 642.8)

MR17-06 PC06 8W



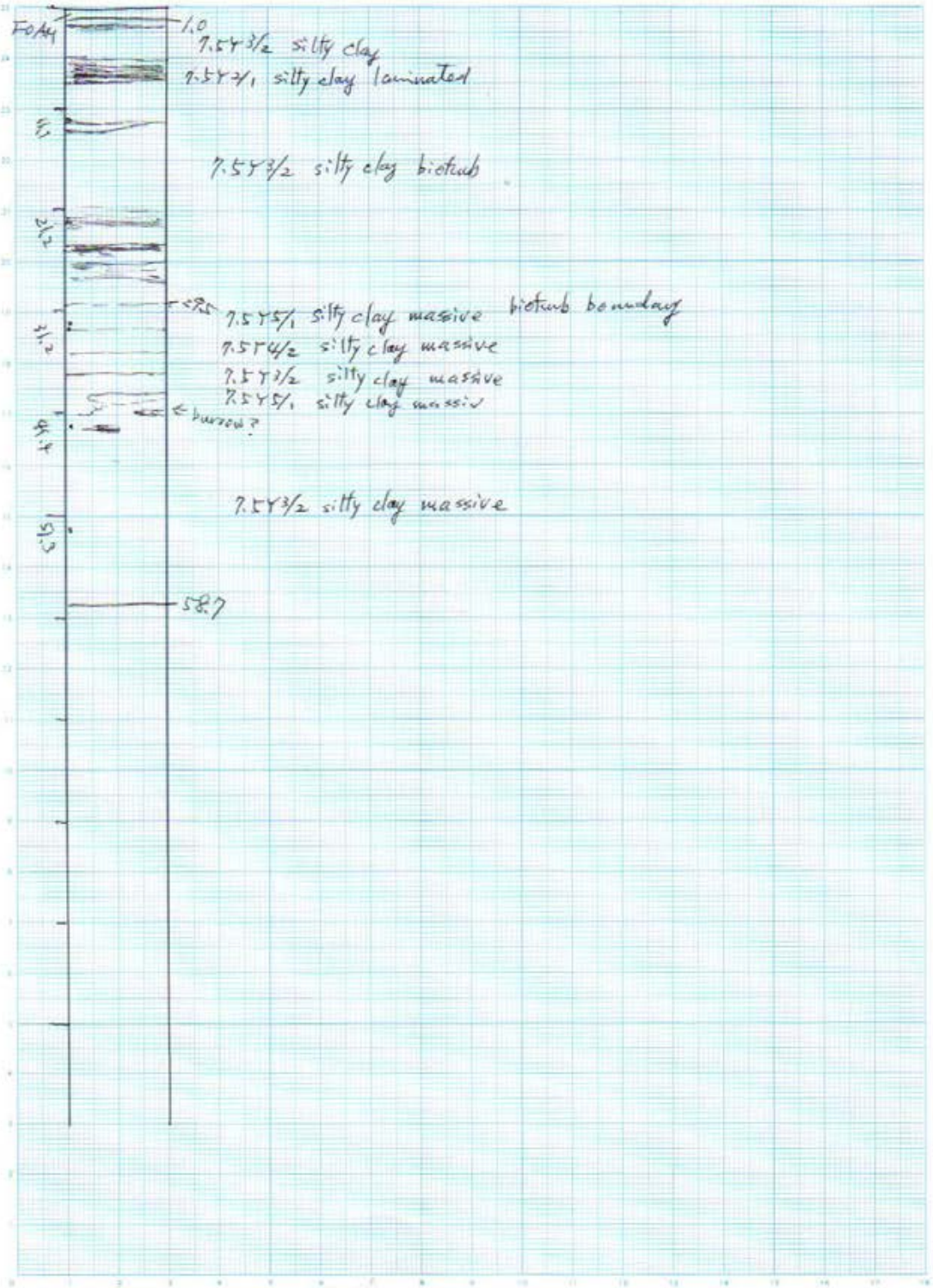
0 - 96.0 (642.8 - 713.3)
(70.5)

MR17-06 PL06 2W



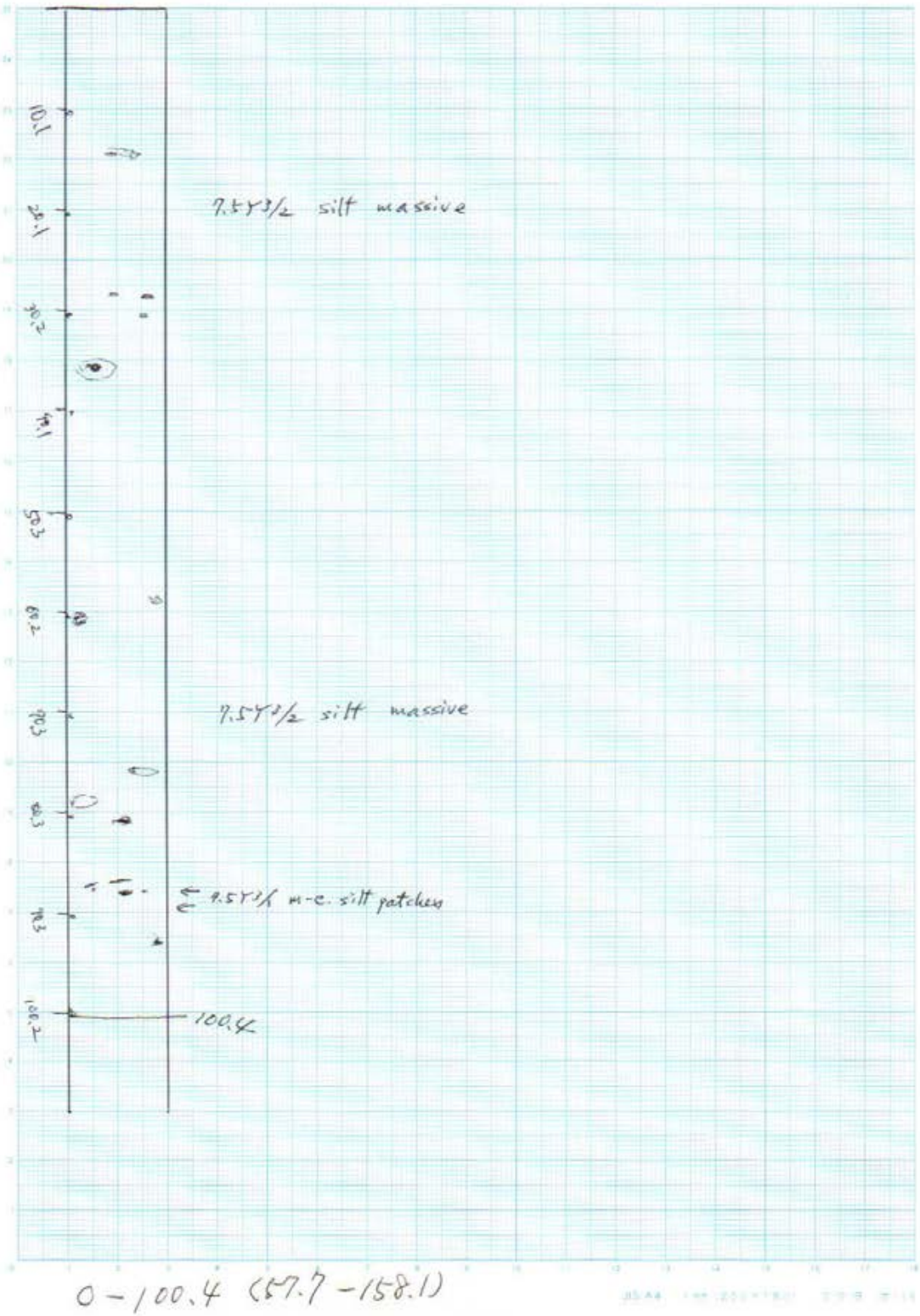
0.7-57 (0-56.3)

MR17-06 PC07 1W



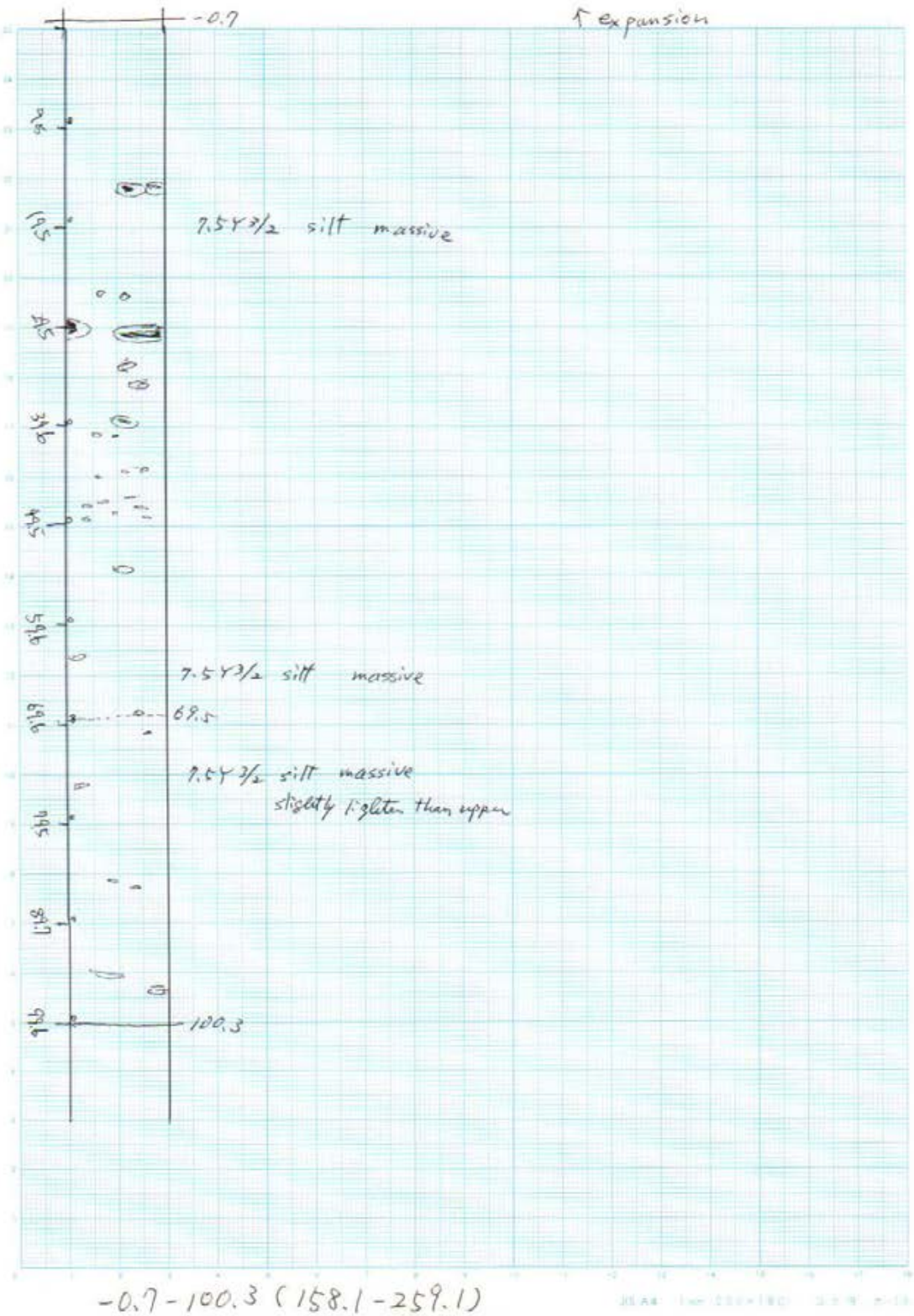
1-58.7 (0-57.7)

MR17-06 PC07 2W



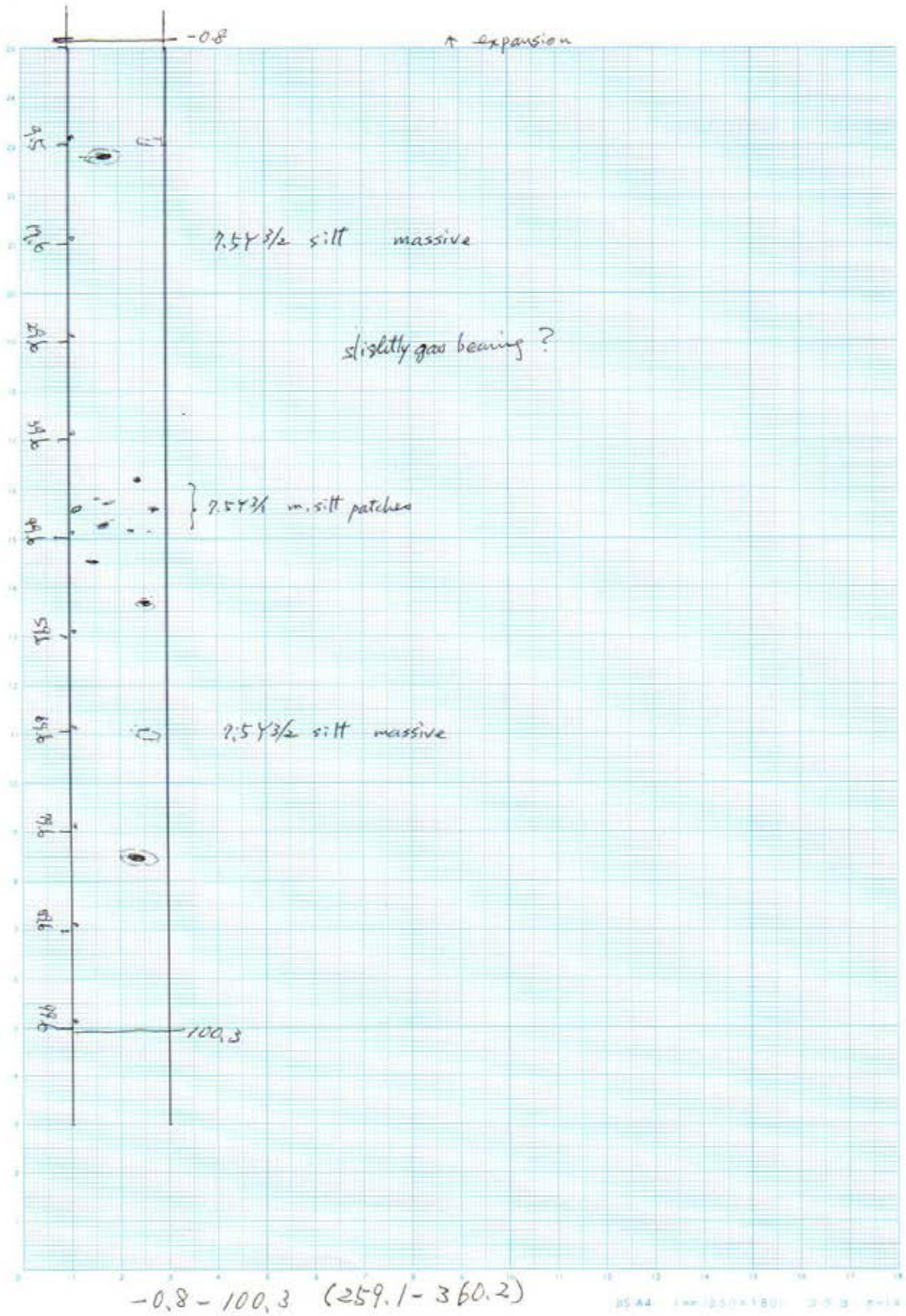
0 - 100.4 (157.7 - 158.1)

MR 17-06 PC07 3W



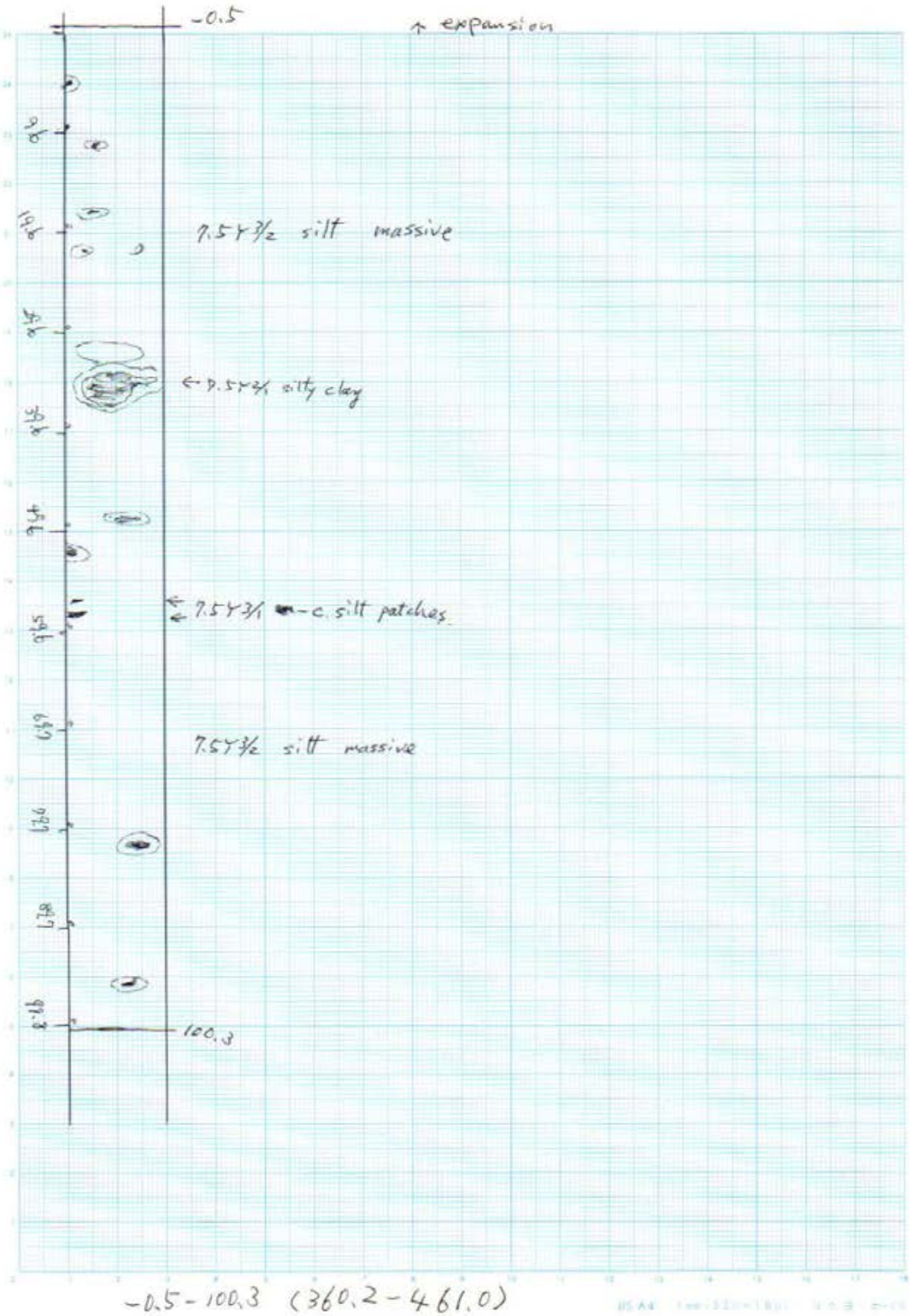
-0.7 - 100.3 (158.1 - 259.1)

MR17-06 PC07 4W



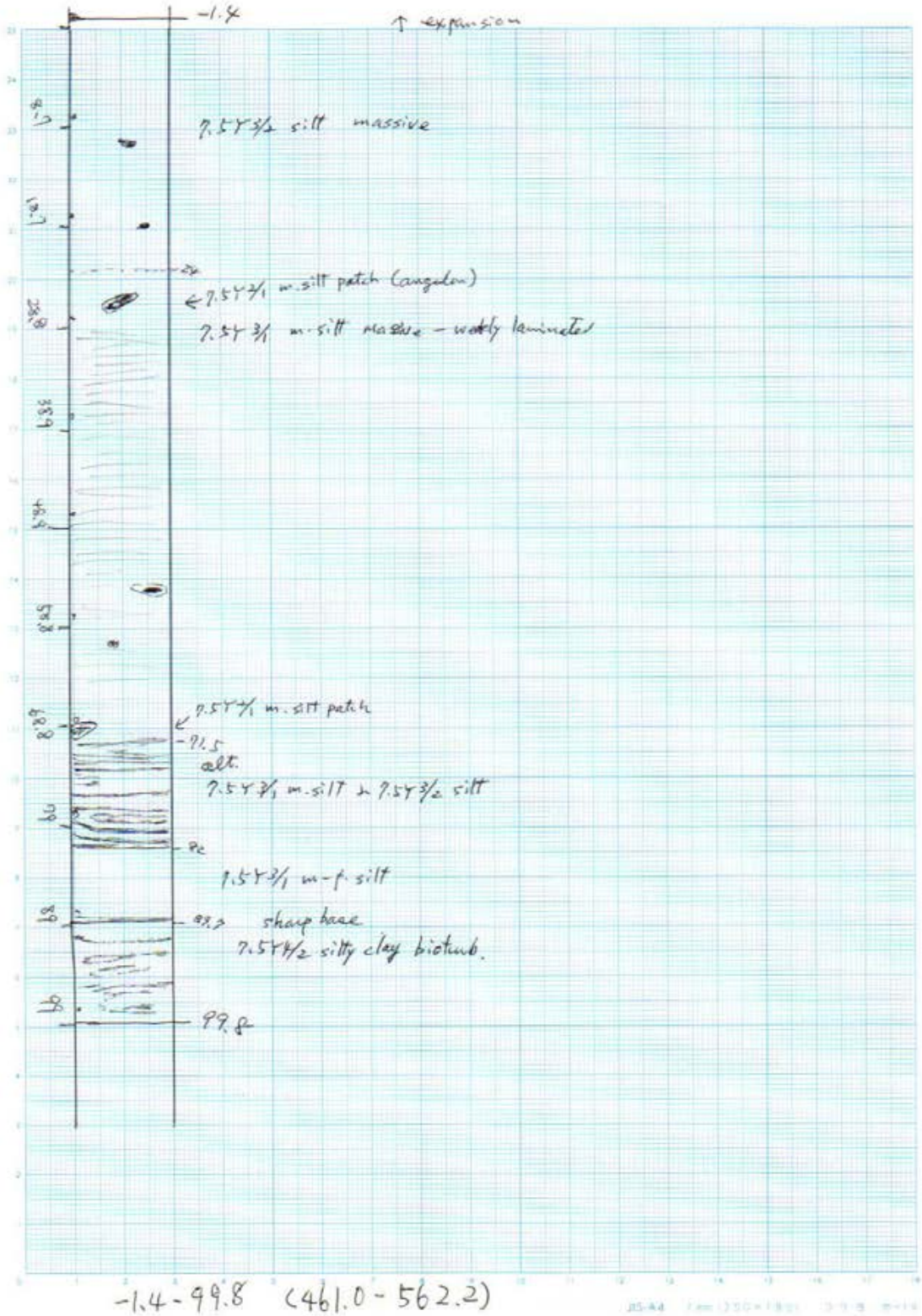
-0.8 - 100.3 (259.1 - 360.2)

MR17-06 PC07 5W



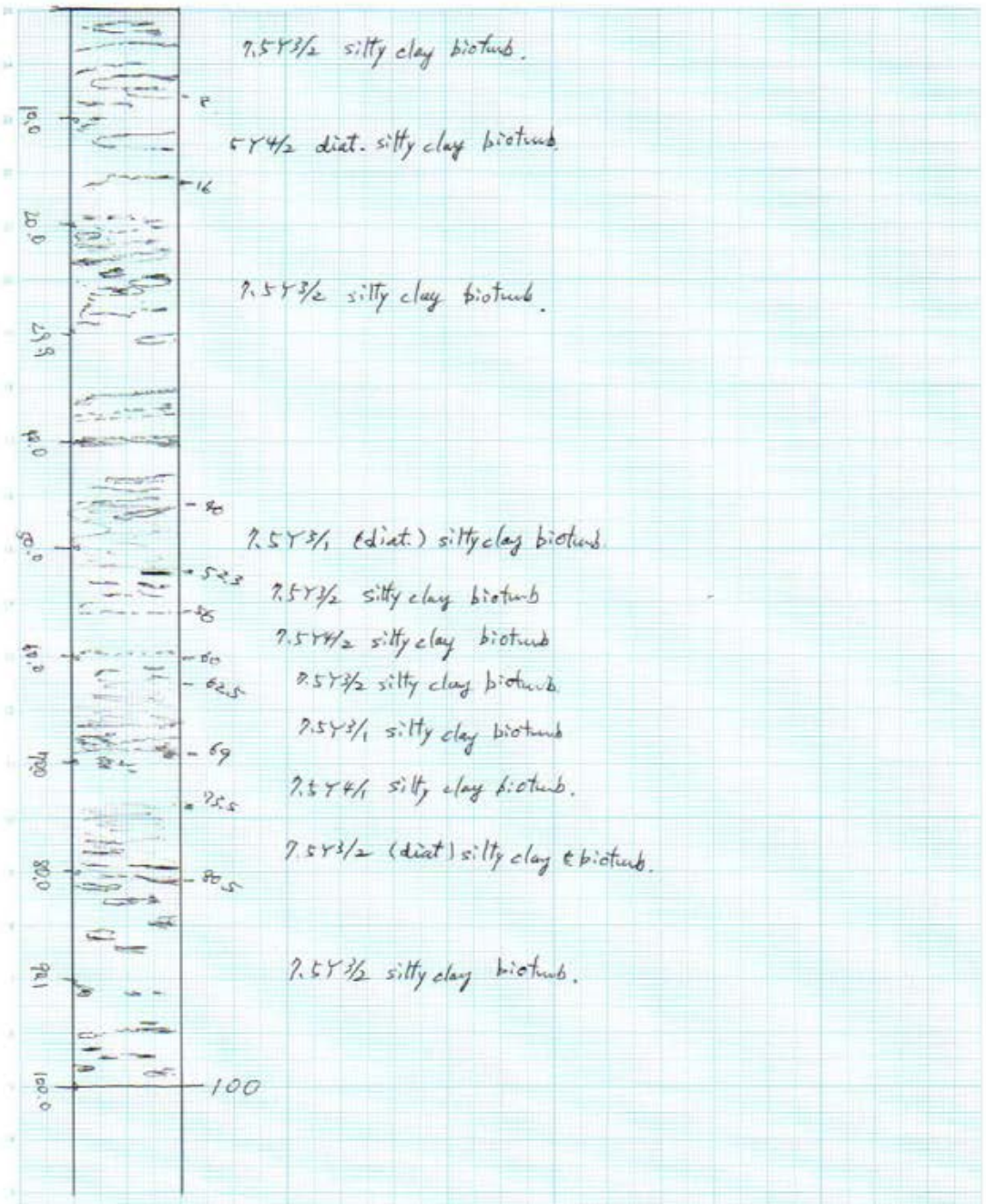
-0.5 - 100.3 (360.2 - 461.0)

MR17-06 PC07 6W



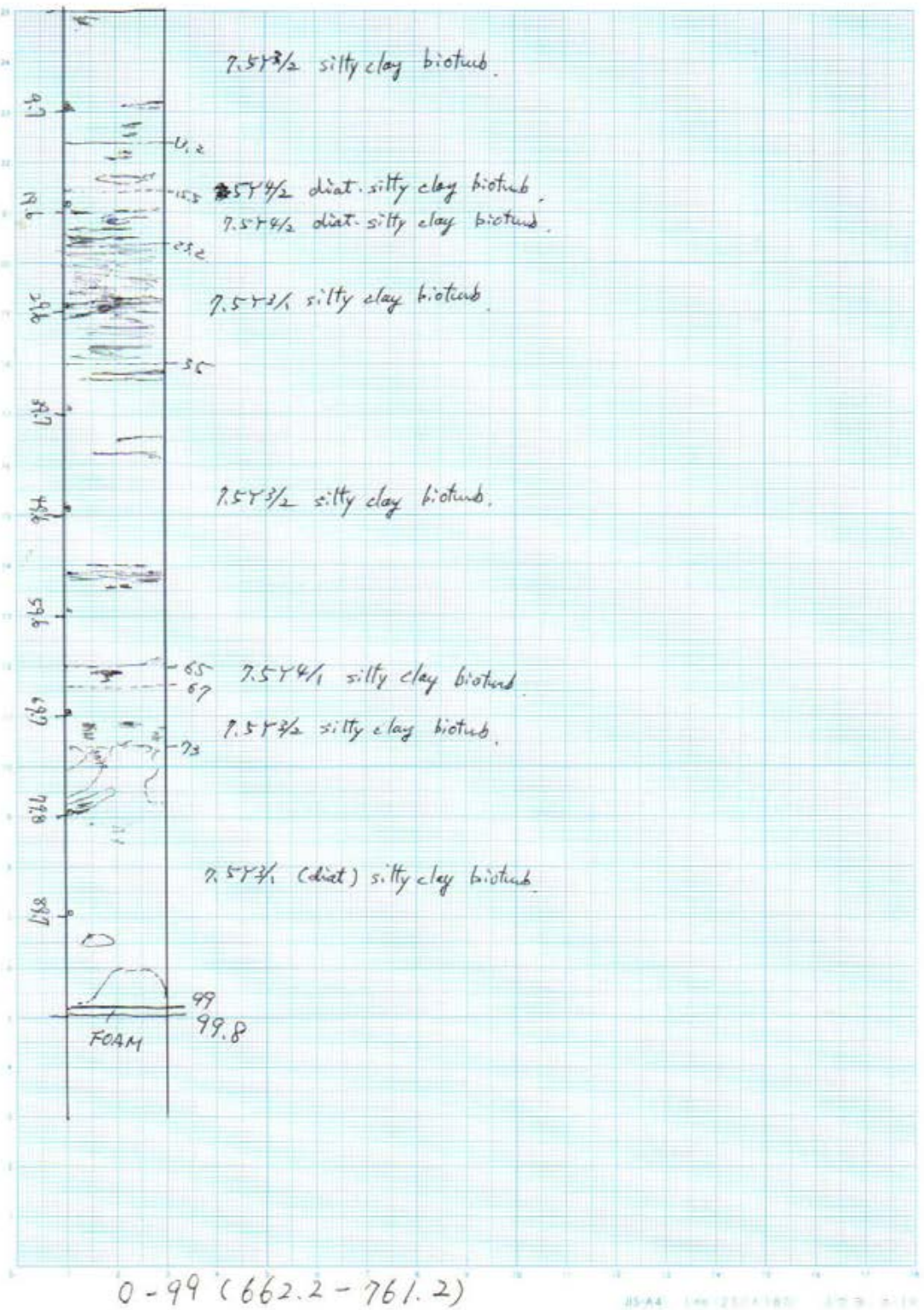
-1.4 - 99.8 (461.0 - 562.2)

MR17-06 PC07 7W



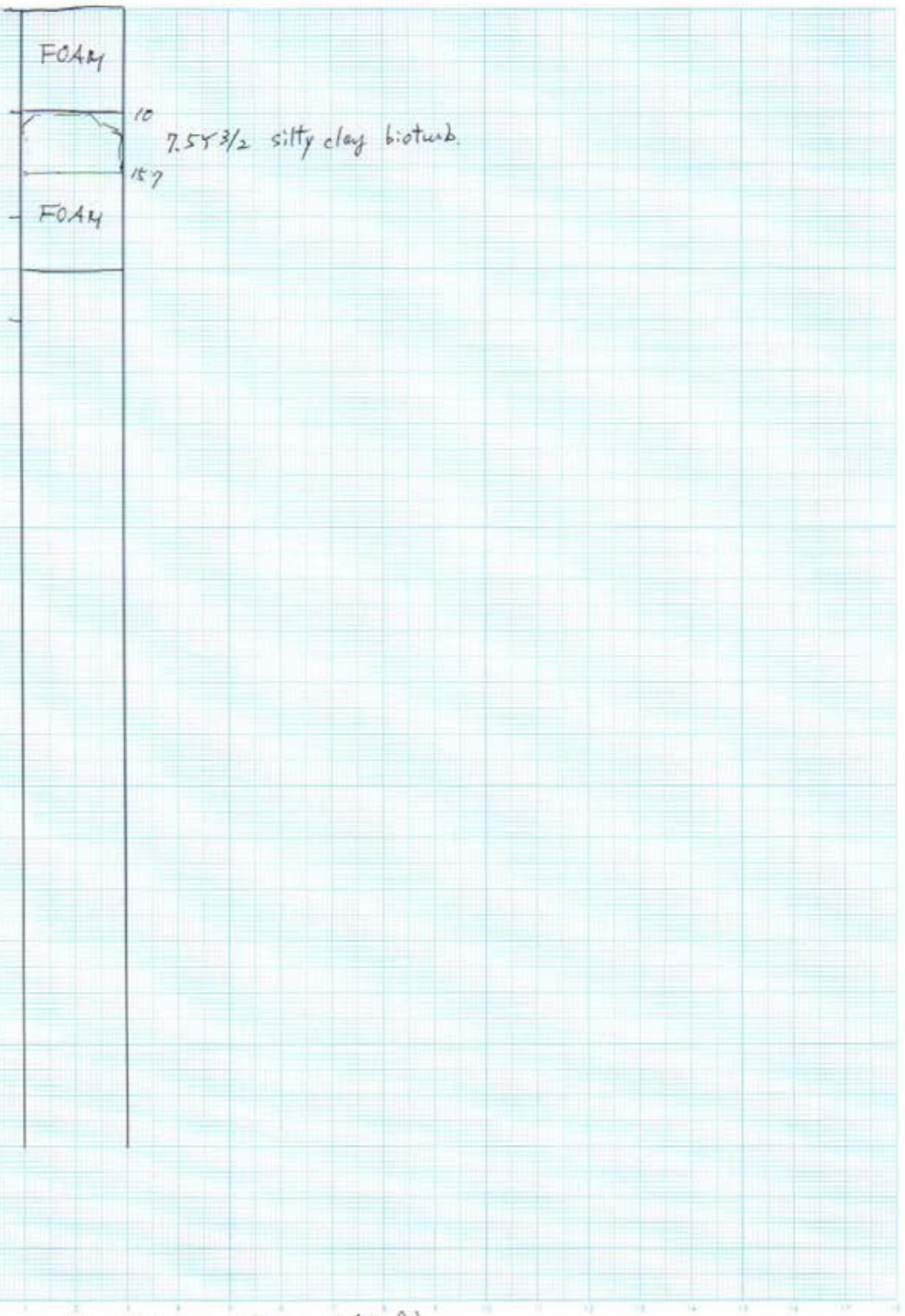
0-100 (562.2-662.2)

MR17-06 PC07 8W



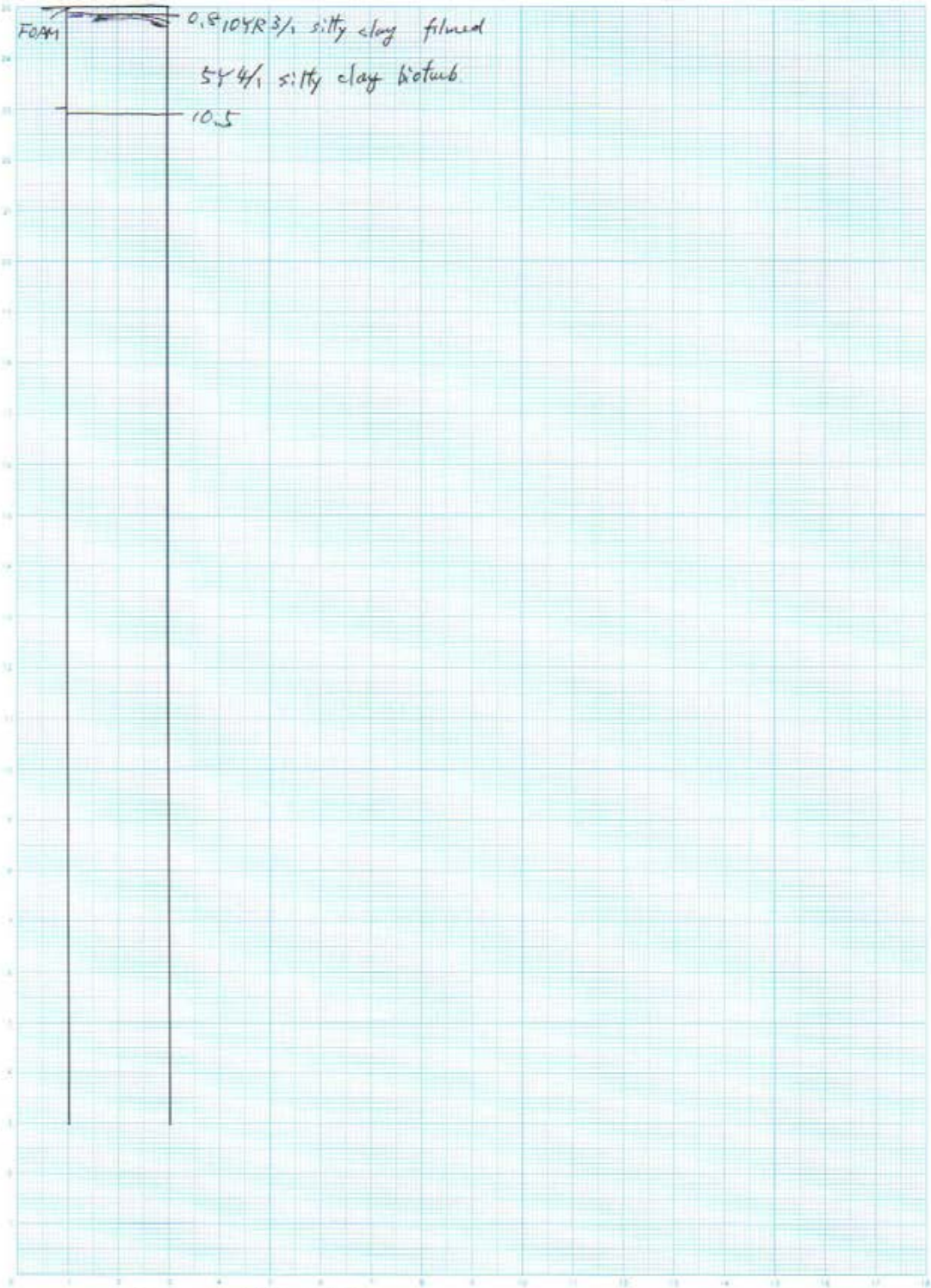
0-99 (662.2-761.2)

MR17-06 PC07 ccw



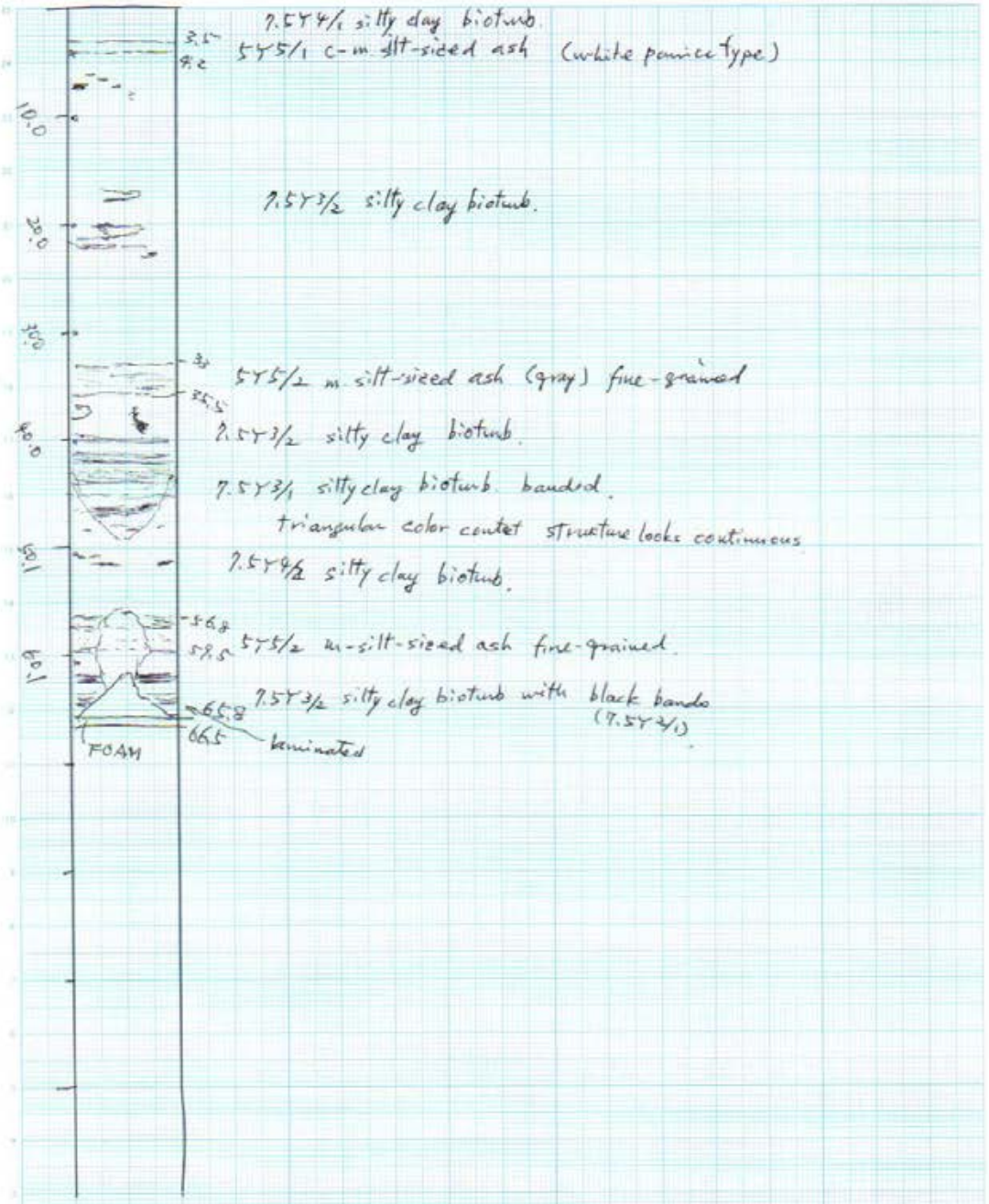
10 - 15.7 (761.2 - 762.9)
(-4)

MR17-06 PL07 1W



0.8-10.5 (0-9.7)

MR17-06 PL07 2W



0 - 65.8 (9.7 - 75.5)

Operation Inventory

Coring Inventory

PRC-SG1-030 別紙-12
PC インベントリシート

< Observation info.>

Cruise name	MR17-06	Operator	山口
Date (UTC) Y/M/D	2017/10/6	Recorded by	片山
Core Number	PC01	Transponder	海洋電子製 超深海用トランスポンダ(ST2-7KP)
Area	下北沖.他	Inclinometer	—
Sampling Site	PC01	others	—

<Corer info.>

Corer type	(Inner) / Outer	(Piston) / Gravity	Pilot type 74
Weight	~~480~~ 592 kg		Pilot Weight 112 kg
Pipe Length AL / (SUS)	6 m		Pilot Pipe Length 0.7 m
Main wire	φ 8mm 12.8 m		Pilot Wire φ8mm 12.8 m
Free Fall	~~4.4~~ 3.8 (余剰1.3) m		

<Condition>

Weather	晴水	Wave height	0.7 m
Wind direction	189 deg.	Current direction	67.8 deg.
Wind speed	9.9 m/s	Current speed	0.7 knt ~~m/s~~

<Operation>

	Time		Latitude	Longitude	Depth
Start operation	0:07				
Hit the bottom	2:55:56	(TP)	40-27.5412N	144-26.9300E	7517 m
		(Ship)	40-27.363N	144-26.9331E	7590 m
Finish operation	5:23				

MEMO

トラポン ON 10/6 0:37 (UTC)
OFF 10/6 4:49 (UTC)
注水時、水抜き穴に手が届かないため PC02 以降は水抜き穴の栓を取付けない。
安全ピンが抜けにくかった。

Coring Inventory

PRC-SG1-030 別紙-12
PC インベントリシート

< Observation info.>

Cruise name	MR17-06	Operator	片山
Date (UTC) Y/M/D	2017/10/17	Recorded by	佐藤
Core Number	PC02	Transponder	超深海トランポン(SI2-1KP)
Area	十勝沖	Inclinometer	—
Sampling Site	PC02	others	—

<Corer info.>

Corer type	Inner / (Outer)	(Piston) / Gravity	
Weight	592 kg	Pilot type	74
Pipe Length AL / (SUS)	6 m	Pilot Weight	112 kg
Main wire	φ 10 × 12.8 m	Pilot Pipe Length	0.7 m
Free Fall	~~4.5~~ m	Pilot Wire	12.8 m
	3.8 (余剰1.3)		

<Condition>

Weather	Cloudy	Wave height	1.1 m
Wind direction	152 deg.	Current direction	284 deg.
Wind speed	9.2 m/s	Current speed	0.4 m/s

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	00:03			
Hit the bottom	2:36:09	(TP) —	—	— m
		(Ship) 41-12.9577N	145-00.0234E	7191 m
Finish operation	4:54			

MEMO

0024 TPON
トランポン作動せず.
→スイッチがきちんとONになっていなかった

Ver.3.0(20140909)
Marine Works Japan LTD.

Coring Inventory

PRC-SG1-030 別紙-12
PC インベントリシート

< Observation info.>

Cruise name	MR17-06	Operator	~~片山~~ 佐藤
Date (UTC) Y/M/D	2017/10/~~8~~ 7~8	Recorded by	山口
Core Number	PC03	Transponder	超深海トランスポン
Area	十勝沖	Inclinometer	—
Sampling Site	PC03	others	—

<Corer info.>

Corer type	Inner / Outer Piston / Gravity	Pilot type	74
Weight	~~582~~ 592 kg	Pilot Weight	112 kg
Pipe Length AL / SUS	~~07~~ 6 m	Pilot Pipe Length	0.7 m
Main wire	φ 10 × 12.8 m	Pilot Wire	12.8 m
Free Fall	~~4.5~~ m		
	~~3.8~~ 3.8 (余り1.3)		

<Condition>

Weather	雲り	Wave height	3.0 m
Wind direction	339 deg.	Current direction	108 deg.
Wind speed	4.0 m/s	Current speed	0.2 knt ~~m/s~~

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	~~23:57~~ 0:00			
Hit the bottom	2:42:51	(TP) 41-11.8574N	144-55.0722E	7186 m
		(Ship) 41-11.8228N	144-55.1629E	7174 m
Finish operation	5:08			

MEMO

※ 10/8 23:47 超深海トランスポン応答を確認.（スイッチ ON）
0:26 〃 応答再確認，作動良好

※ 6:30 頃 SOJ 衛星 接続が遮断される（エラー表示）
再接続し，問題なくデータを取得していることを確認した.

0:35 頃 SOJ 再起動. ファイルを新しく作成した.

Coring Inventory

PRC-SG1-030 別紙-12
PC インベントリシート

< Observation info.>

Cruise name	MR17-06	Operator	山口
Date (UTC) Y/M/D	2017/10/9	Recorded by	片山
Core Number	PC04	Transponder	超深海トランスポンダー
Area	十勝沖	Inclinometer	—
Sampling Site	PC04	others	—

<Corer info.>

Corer type	Inner / Outer, Piston / Gravity	Pilot type	~~φ8mm×12.8m~~ 74
Weight	592 kg	Pilot Weight	112 kg
Pipe Length AL / SUS	6 m	Pilot Pipe Length	0.7 m
Main wire	φ 10mm×12.8 m	Pilot Wire	12.8. m
Free Fall	3.8 (余裕1.3) m		

<Condition>

Weather	くもり	Wave height	1.8 m
Wind direction	118 deg.	Current direction	283.7 deg.
Wind speed	4.7 m/s	Current speed	1.1 kne ~~m/s~~

<Operation>

	Time		Latitude	Longitude	Depth
Start operation	0:02				
Hit the bottom	2:35:50	(TP)	41-28.4127N	145-32.3657E	7004. m
		(Ship)	41-28.3826N	145-32.4041 ~~4010~~ E	7078 m
Finish operation	4:52				

MEMO

トランポンON 10/9 0:24(UTC)
トランポンOFF 10/9 4:24(UTC)
引揚収時にROVテクニシャンの通信が切れたため再起動を行った。

Coring Inventory

PRC-SG1-030 別紙-12
PC インベントリシート

< Observation info.>

Cruise name	MR17-06	Operator	片山
Date (UTC) Y/M/D	2017/10/10	Recorded by	佐藤
Core Number	PC05	Transponder	超深海トランポン
Area	釧路沖	Inclinometer	—
Sampling Site	PC05	others	—

<Corer info.>

Corer type	(Inner) / Outer (Piston) / Gravity	Pilot type	74
Weight	592 kg	Pilot Weight	112 kg
Pipe Length AL / (SUS)	6 m	Pilot Pipe Length	0.7 m
Main wire	φ 10 × 12.8 m	Pilot Wire	12.8 m
Free Fall	~~**~~ m		
	3.8 (余剰 1.3)		

<Condition>

Weather	Cloudy	Wave height	1.8 m
Wind direction	16 deg.	Current direction	297 deg.
Wind speed	7.8 m/s	Current speed	1.3 m/s

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	0:00			
Hit the bottom	2:33:49	(TP) 41-30.8306N	145-41.7600E	7059 m
		(Ship) 41-30.8235N	145-41.8397E	7137 m
Finish operation	4:27:50			

MEMO

0830 トランポンON
13:23 トランポン OFF
外インナーつなぎ目から海水流出（コア長 60cm 以下と思われる）

Coring Inventory

PRC-SG1-030 別紙-12
PC インベントリシート

< Observation info.>

Cruise name	MR17-06	Operator	佐藤
Date (UTC) Y/M/D	2017 / 10 / 10 ~ 11	Recorded by	木戸
Core Number	PC06	Transponder	超深海 (ST2-1KP)
Area	Off Kushiro	Inclinometer	N/A
Sampling Site	PC06	others	N/A

<Corer info.>

Corer type	(Inner) / Outer (Piston) / Gravity	Pilot type	74
Weight	582 kg	Pilot Weight	112 kg
Pipe Length AL / (SUS)	8 m	Pilot Pipe Length	0.7 m
Main wire	φ 10mm 14.8 m	Pilot Wire	14.8 m
Free Fall	3.8 (余剰11.3) m		

<Condition>

Weather	Cloudy	Wave height	2 m
Wind direction	60 deg.	Current direction	280 deg.
Wind speed	7.1 m/s	Current speed	1.0 m/s

<Operation>

	Time		Latitude	Longitude	Depth
Start operation	10/10 23:57				
Hit the bottom	10/11 02:41:11	※(TP)	41-38.9515N	145-57.0817E	7186 m
		(Ship)	41-38.9479ON	145-57.1449OE	7291 m
Finish operation	05:04				

MEMO

トラポン ON 8:30 (JST) , OFF 13:32 (JST)

※着底時、トラポンが受かっていなかったため、02:43:15 (水深7297m, 線長7218.9) のトラポンデータを記入した。

Coring Inventory

PRC-SG1-030 別紙-12
PC インベントリシート

< Observation info.>

Cruise name	MR17-06	Operator	不破
Date (UTC) Y/M/D	2017/10/12	Recorded by	片山
Core Number	PC07	Transponder	超深海トランスポンダ
Area	日 釧路沖	Inclinometer	ー
Sampling Site	PC07	others	ー

<Corer info.>

Corer type	Inner / Outer	Piston / Gravity	Pilot type 74
Weight	592 kg		Pilot Weight 112 kg
Pipe Length AL / SUS	8 m		Pilot Pipe Length 0.7 m
Main wire	φ 10mm 14.8 m		Pilot Wire 14.8 m
Free Fall	3.8 (錘11.3) m		

<Condition>

Weather	くもり	Wave height	2.6 m
Wind direction	118 deg.	Current direction	14.3 deg.
Wind speed	14.0 m/s	Current speed	0.6 kn ~~m/s~~

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	0:00			
Hit the bottom	2:39:~~52~~ 46	(TP) 41-45.8597N	146-10.7994E	7190 m
		(Ship) 41-45.8735N	146-10.7852E	7269 m
Finish operation	5:05			

MEMO

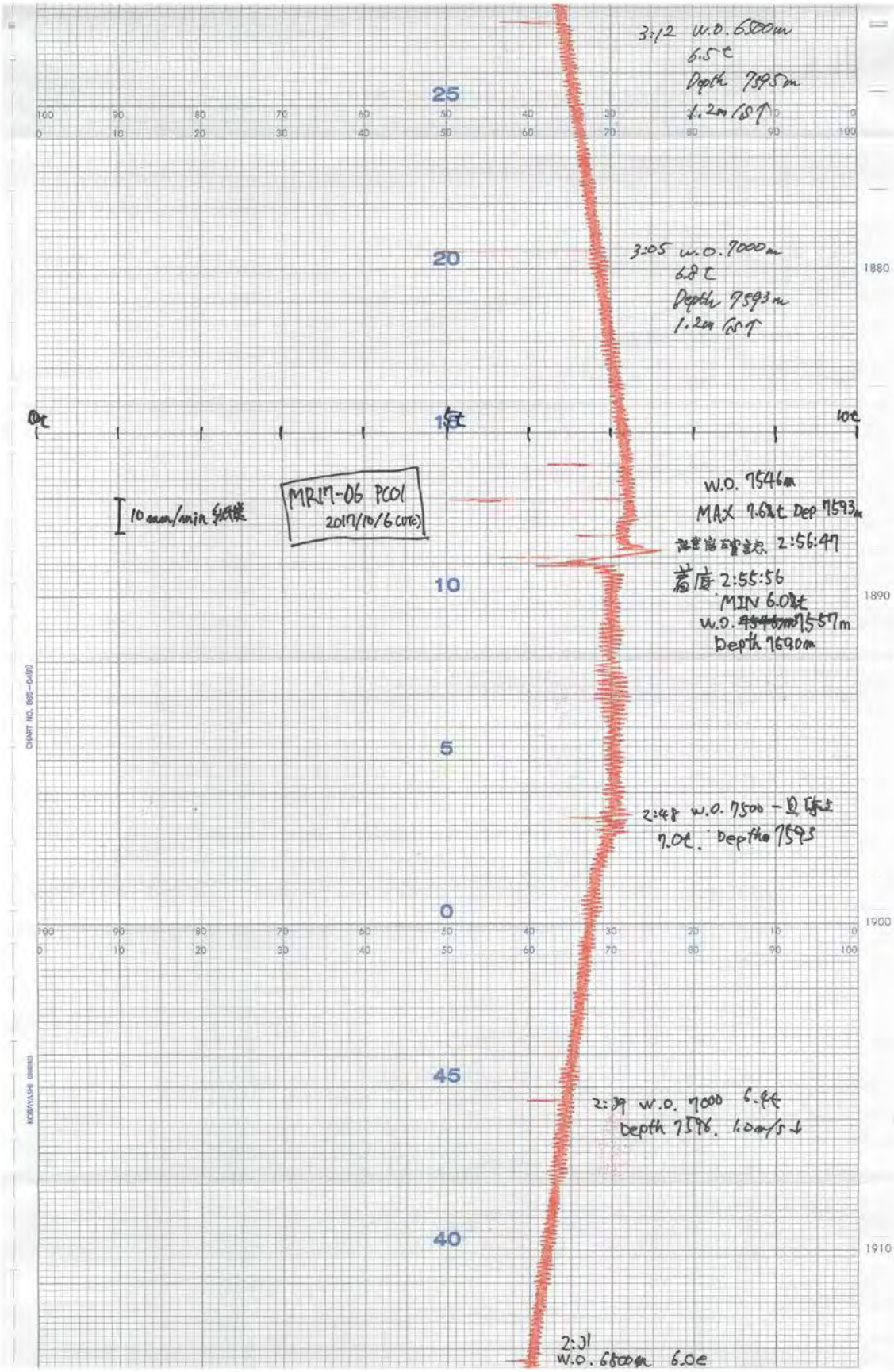
トランポンON 23:30, 10/11 (UTC)
トランポンOFF 4:34, 10/12 (UTC)

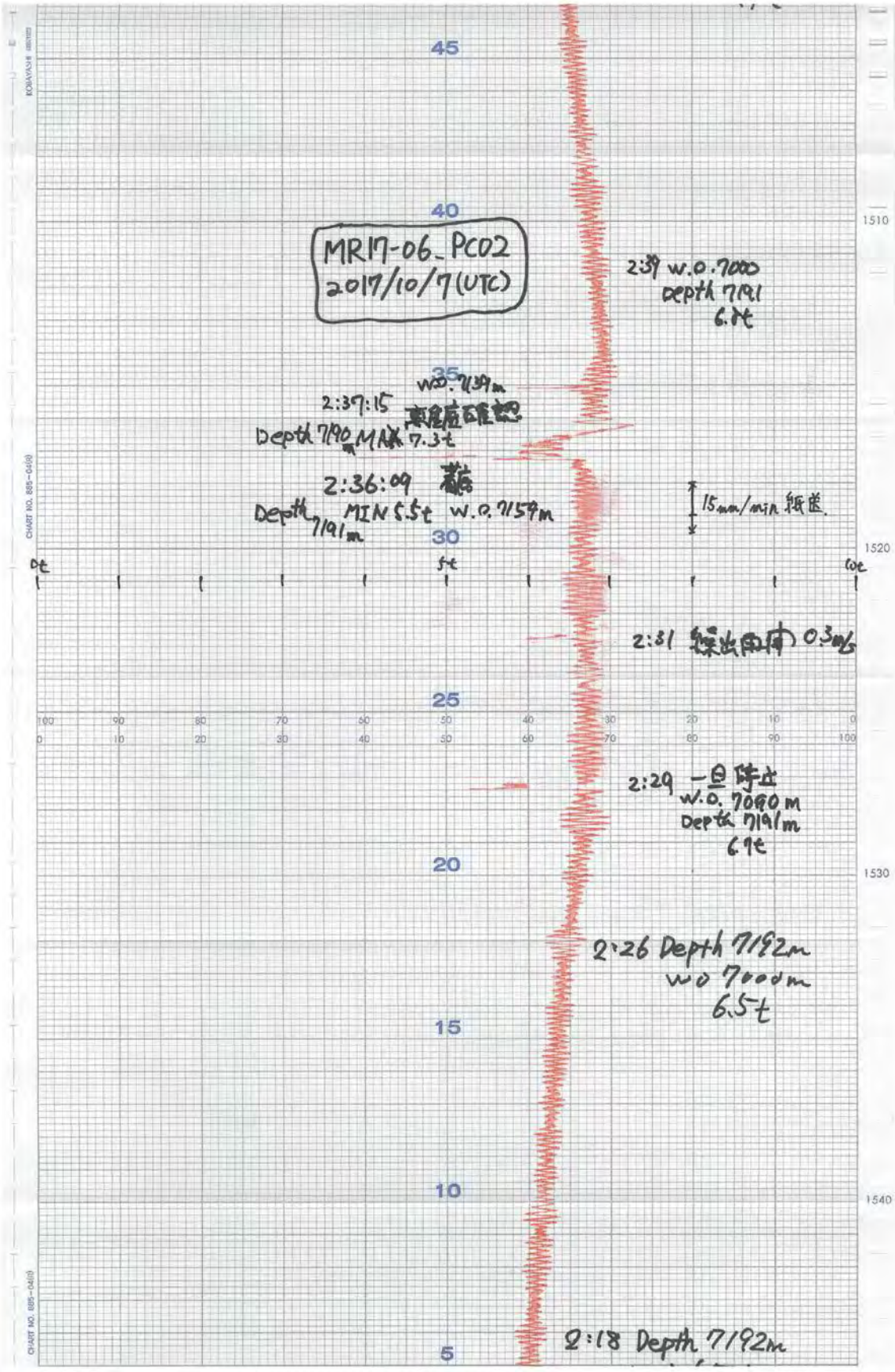
Winch Cable Tension record

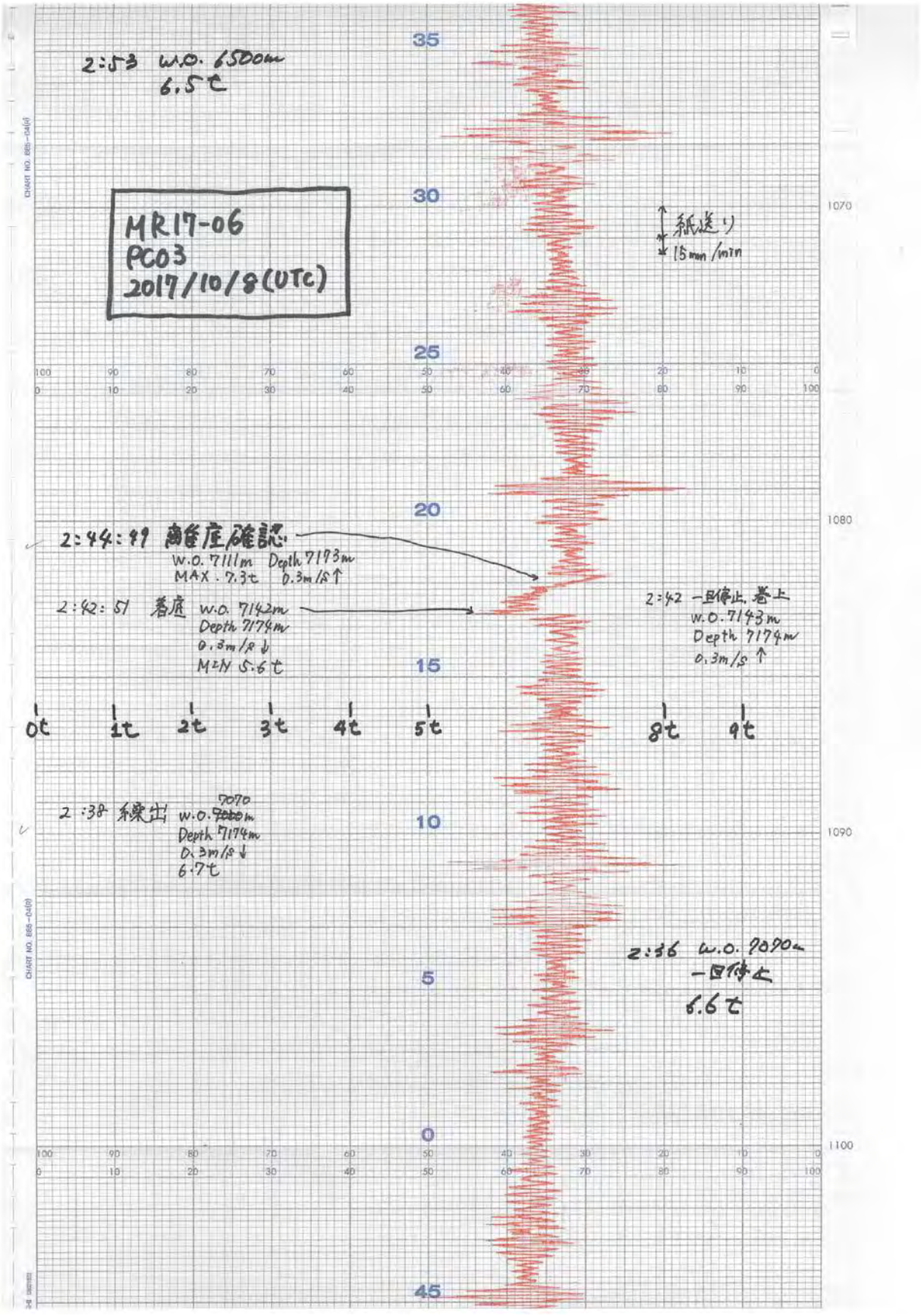
Horizontal axis :tension (kn)

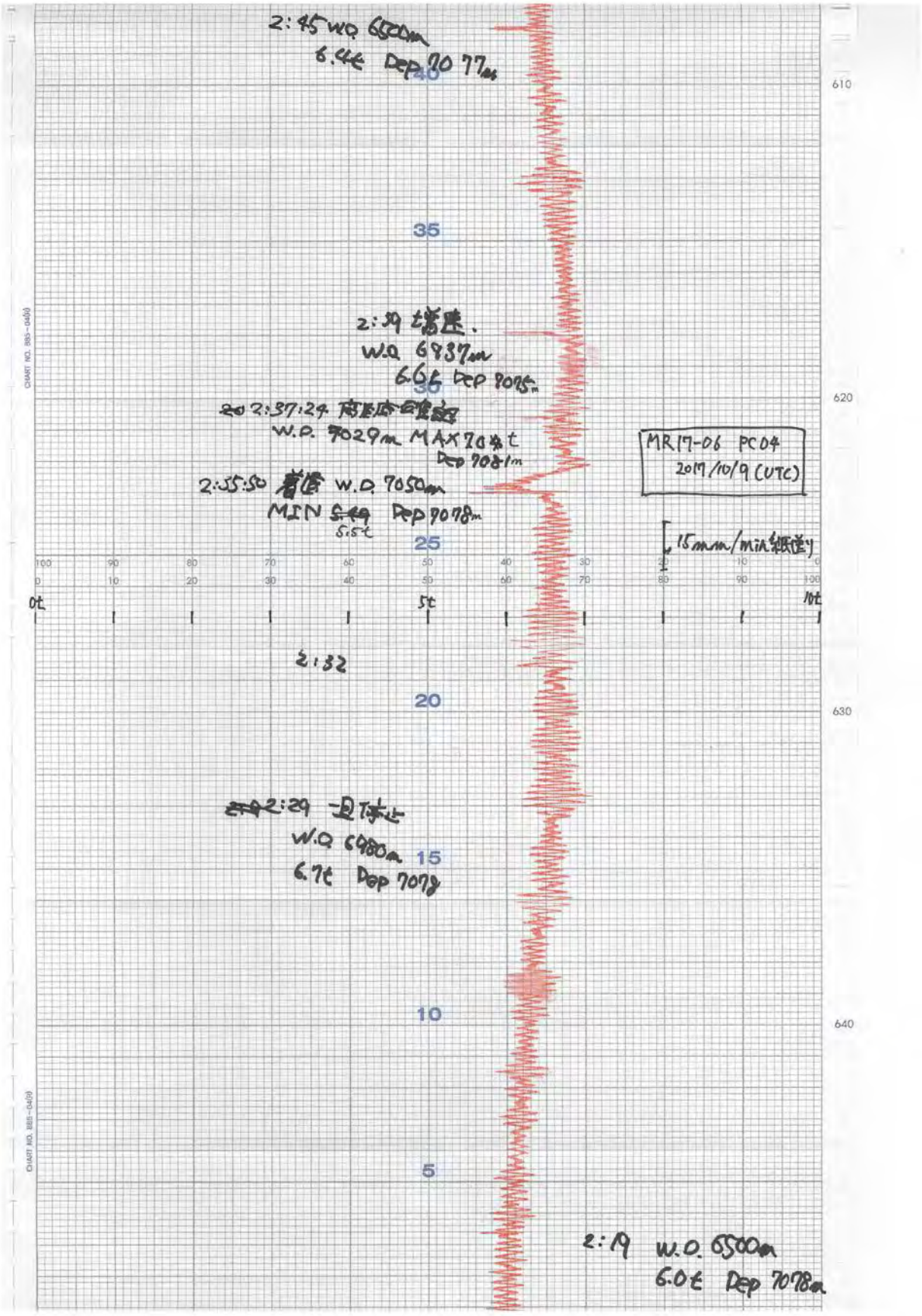
Vertical axis: time

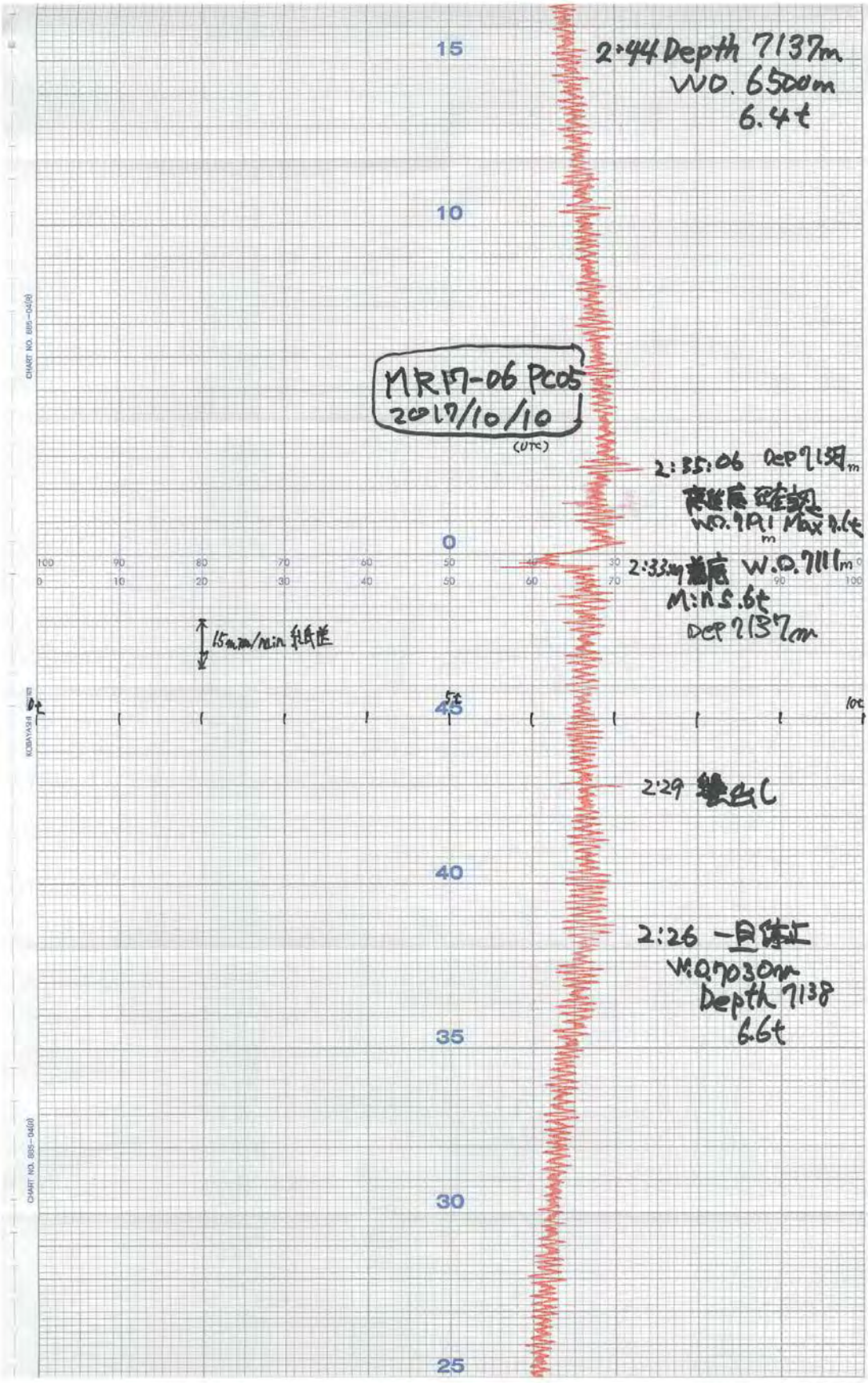
Annotation: Events

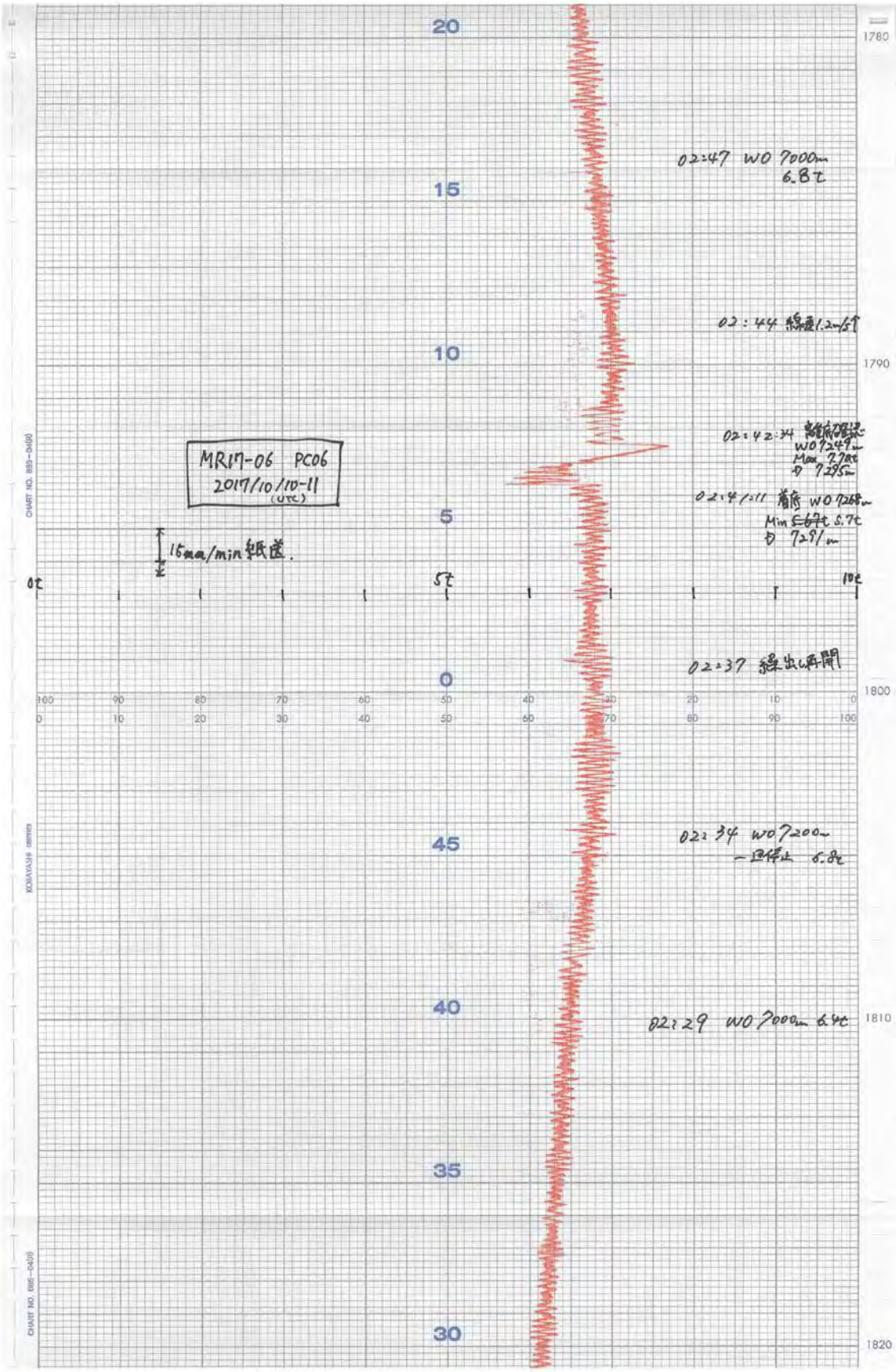

3:12 W.O. 6500m
6.5℃
Depth 7595m
1.2m/s↓
3:05 W.O. 7000m
6.8℃
Depth 7593m
1.2m/s↓
0℃
10℃
10mm/min
MR17-06 PCOI
2017/10/6 CORE)
W.O. 7546m
MAX 9.6℃ Dep 7593m
2:56:47
2:55:56
MIN 6.0℃
W.O. 7557m
Depth 7690m
2:48 W.O. 7500 - 底着
9.0℃. Depth 7593
2:39 W.O. 7000 6.8℃
Depth 7596. 1.0m/s↓
2:31
W.O. 6800m 6.0℃
1880
1890
1900
1910
CHART NO. 8685-04(D)

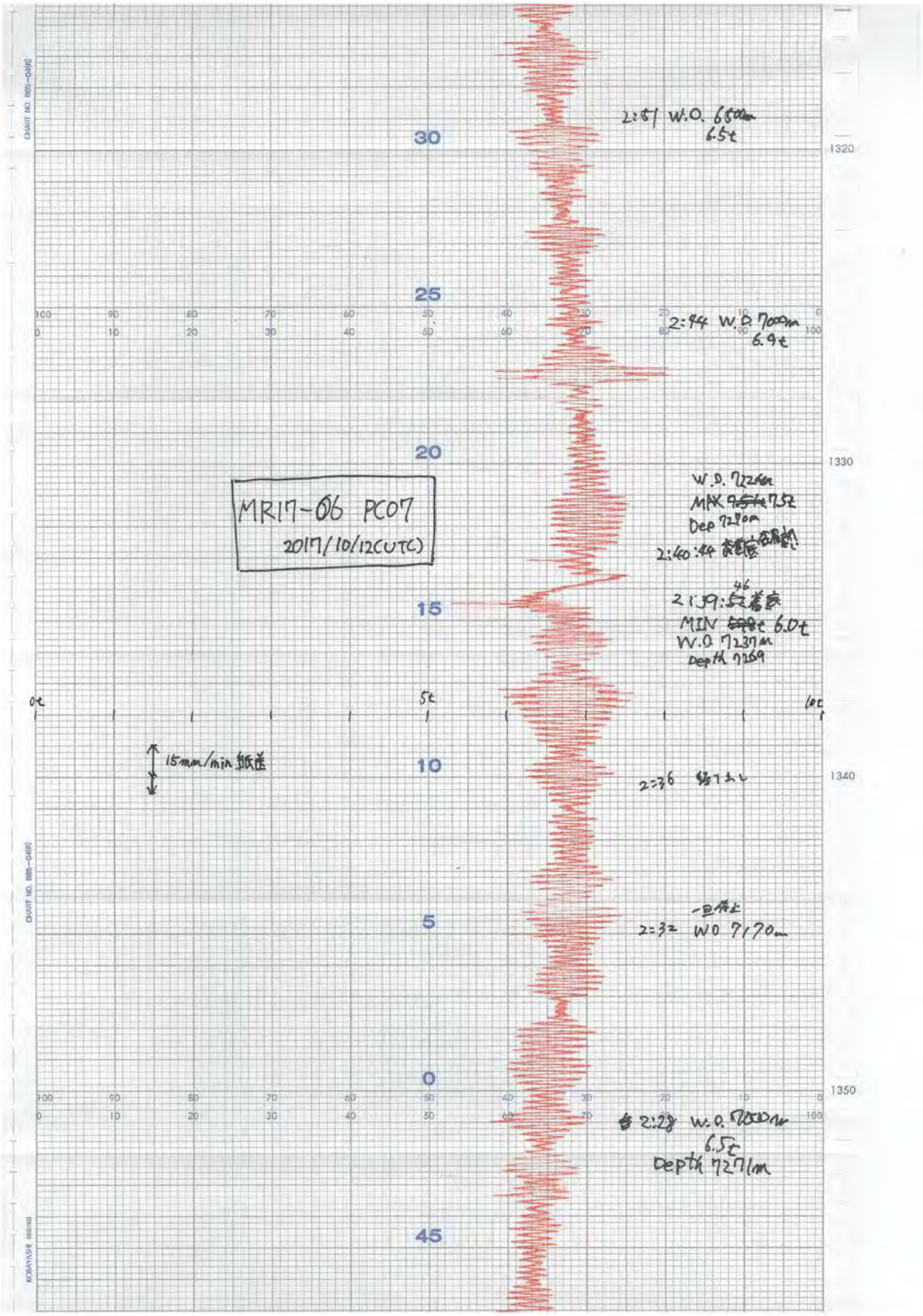

MR17-06_PC02
2017/10/7(UTC)
2:39 w.o. 7000
Depth 7191
6.8t
w.o. 7139m
2:37:15 底質確認
Depth 7190m MAX 7.3t
2:36:09 着底
Depth 7191m MIN 5.5t w.o. 7154m
15mm/min 繰出.
2:31 繰出開始 0.3m/s
2:29 一旦停止
w.o. 7090m
Depth 7191m
6.9t
2:26 Depth 7192m
w.o 7000m
6.5t
2:18 Depth 7192m
45
40
35
30
25
20
15
10
5
1510
1520
1530
1540


2:53 w.o. 6500m
6.5t
MR17-06
PC03
2017/10/8(UTC)
紙送り
15mm/min
2:44:49 離底確認
W.O. 7111m Depth 7193m
MAX. 7.3t 0.3m/s↑
2:42:51 着底 w.o. 7142m
Depth 7174m
0.3m/s↓
MAX 5.6t
2:42 一旦停止、巻上
w.o. 7143m
Depth 7174m
0.3m/s↑
2:38 繰出 w.o. 7070m
Depth 7174m
0.3m/s↓
6.7t
2:36 w.o. 9090m
一旦停止
6.6t
0t
1t
2t
3t
4t
5t
8t
9t


2:45 W.O. 6500m
6.4t Dep 7077m
2:39 着底.
W.O. 6937m
6.6t Dep 7075m
2:37:29 底質採取開始
W.O. 7029m MAX 7.0t
Dep 7081m
2:35:50 着底 W.O. 7050m
MIN 5.4t
5.5t Dep 7078m
2:32
2:29 一旦停止
W.O. 6980m
6.7t Dep 7079m
2:19 W.O. 6500m
6.0t Dep 7078m
MR17-06 PC04
2017/10/9 (UTC)
15mm/min繰出
0t
5t
10t
610
620
630
640
35
30
25
20
15
10
5


2:44 Depth 7137m
W.D. 6500m
6.4t
MR17-06 PC05
2017/10/10
(UTC)
2:35:06 Dep 7150m
2:33 着底 W.D. 7111m
M:11.5.6t
Dep 7137m
15m/min 巻降速
2:29 離底
2:26 一旦停止
W.D 7030m
Depth 7138
6.6t
15
10
0
45
40
35
30
25
190
200
210
220


MR17-06 PC06
2017/10/10-11
(UTC)
15mm/min 紙送.
02:47 WO 7000m
6.8t
02:44 線速1.2m/分
02:42:34 離底確認
WO 7249m
Max 7.7t
D 7295m
02:41:11 着底 WO 7268m
Min 5.7t
D 7291m
02:37 線出し再開
02:34 WO 7200m
一旦停止 5.8t
02:29 WO 7000m 6.4t
1780
1790
1800
1810
1820


MR17-06 PC07
2017/10/12(UTC)
2:51 W.O. 6.5t
2:44 W.D. 7009m 6.9t
W.D. 7226m
Dep 7290m
2:40:44
2:39:46
MIN 6.0t
W.D 7237m
Depth 7269
15mm/min 紙送
2:36
2:32 一旦停止 W.O 7170m
2:28 W.O. 6.5t
Depth 7271m
KOKIYASU