End-of-Well Science Programme Report DEL-GT-01 and DEL-GT-02

TU Delft campus geothermal project

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December 2024

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TU Delft

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Executive Summary

The TU Delft campus geothermal project has joint objectives of research and commercial thermal energy production. It has been developed and will be operated by the Geothermie Delft (GTD) consortium, a commercial cooperation between TU Delft, Aardyn, EBN and Shell Geothermal. This report gives an overview of the research activities that have been carried out during the implementation of the doublet drilling the wells DEL-GT-01 and DEL-GT-02, and the sidetracks DEL-GT-02-S1 and DEL-GT-02-S2 in the period June - December 2023. The research programme and related operations during the installation of the campus geothermal wells have been led by the scientific team of TU Delft department of Geoscience and Engineering. The project is part of the national research infrastructure for solid Earth science (https://epos-nl.nl/), and offers the possibility to do state of the art research on an operating geothermal system.

The main research activities that were carried out during the implementation of the geothermal wells included rock sampling in the form of a detailed drill cutting sampling set, full cores and sidewall cores of the caprock and the geothermal reservoir, open-hole logging of the reservoir formations and the installation of a fibre optic cable in the producer (still to be carried out).

Overall, the following samples and data were collected as part of the scientific programme:

- 15m of 4”core from the direct caprock of the producer reservoir section
- 71m of 4”core from the reservoir section of the producer
- 78 sidewall cores from the injector reservoir section
- 2400 cutting samples
- 3000m of open-hole and closed-hole logging data

Details of these activities can be found in the report and the related appendices. All data presented in this report have been published via TU Delft institutional data repository and can be found online as part of the data collection associated with the research programme of the project: Geothermal Project on TU Delft Campus Collection at https://doi.org/10.4121/85b3725b-80fa-4b0b-9db2-475bfd8f0265.

List of Abbreviations

AAR	after action review
AHD	along hole depth (often in meters), same as MD
AHDRT	along hole depth (from rotary table)
BH	Baker Hughes (logging partner)
BHA	bottom hole assembly
BOP	blow out preventer
DDR	daily drilling report
DSV	drilling supervisor (company man)
DWOP	drilling the well on paper
EBN	energy company
EOB	end of bent
EOJR	end of job report
EOWR	end of well report
EPOS-NL	funding by NWO
ESP	electrical submersible pump
FOC	fibre optic cable
GeoService	mudlogging company
GL	ground level
GTD	Geothermie Delft
ID	inner diameter
IOT	coring company
KOP	kick off point
MD	measured depth (often in meters), same as AHD
OBM	oil based mud
OD	outer diameter
PA	project-assistant
PBR	polished bore receptacle
POOH	pull out of hole
RIH	run in hole
ROP	rate of penetration
RT	rotary table
RWOP	research well on paper
SWC	side wall core
TD	total depth
TOC	top of cement
TOL	top of liner
TVD	true vertical depth
TVDRT	true vertical depth (from rotary table)
VAMTOP	type of drill pipe thread
VCA	Dutch safety course needed to work on drill site
WBM	water based mud
WWS	wire wrapped screen

Contents

1 Introduction

The campus geothermal project is designed to be a unique full-scale research infrastructure of global relevance. This project is the first geothermal system built including an extensive research infrastructure in the low-enthalpy energy range. Low-enthalpy (direct-use) geothermal systems produce water <100°C that can be used directly for domestic and industrial heating. For the geothermal research project, two deep wells ("*a doublet*" consisting of an injector and a producer) for geothermal energy extraction have been installed on the TU Delft campus next to the combined heat and power plant ("*warmtekrachtcentrale - WKC*"), see Figure 1 for an illustration of the project.

The campus geothermal project is a project with joint objectives of research and commercial heat production. It has been developed and will be operated by the Geothermie Delft (GTD) consortium, a commercial cooperation between TU Delft, Aardyn, EBN and Shell Geothermal. This report gives an overview of the research activities that have been carried out during the implementation of the doublet (called DEL-GT-01 and DEL-GT-02) in the period June - December 2023. The research programme and related operations during the implementation of the campus wells have been led by the TU Delft and are part of the Dutch national research infrastructure EPOS-NL (https://epos-nl.nl/). Details on the drilling operations are not included when these do not relate to the scientific operations specifically.

All data presented in this report has been published via TU Delft institutional data repository 4TU.ResearchData under the CC BY 4.0 license, and can therefore be freely used, requiring only a reference to the original source. The data can be found online at https://doi.org/10.4121/85b3725b-80fa-4b0b-9db2-475bfd8f0265.

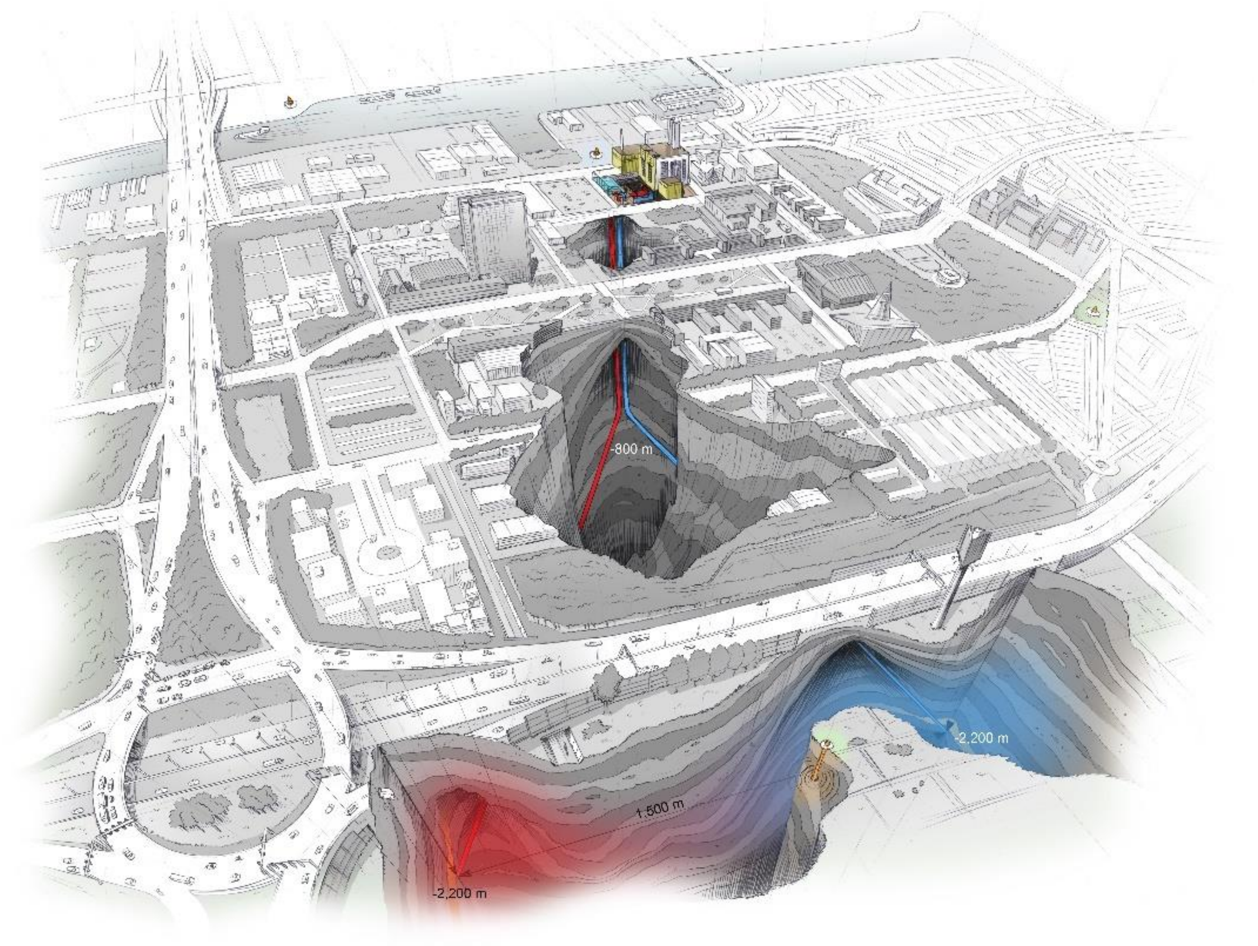


Figure 1: Illustration of the Campus geothermal project, including the currently gas-fired power plant, the heating grid, and the geothermal doublet (illustration credit: Total shot productions).

2 Scientific objectives

The campus geothermal project offers the possibility to create a full-scale research infrastructure of global relevance. The unique aspect of the facility will be the possibility to do research on an operating geothermal system, using state of the art monitoring equipment. The scientific objectives for this geothermal research infrastructure are to:

1) Improve the predictive power of flow models
2) Improve understanding on Hydraulic-Thermal-Chemical-Mechanical behaviour:
    a. Chemistry of geothermal fluids and their interaction with reservoir rocks and technical installations
    b. Monitoring of travelling fluid and cold fronts
    c. Advanced inflow estimation
3) Monitor and improve understanding of the effect of human activities in the subsurface on the natural and urban environment at surface
4) Carry out a detailed site specific characterisation: geological characterisation including heterogeneities, reservoir fluids, in-situ stress, enabling future research have a sound basis

The research activities carried out during the implementation of the campus geothermal wells are an essential first step in achieving the above mentioned overall objectives.

The activities summarized in this report are the following:

1. Describing the general stratigraphy and gather geological and operational information
    a. Cutting sampling
2. Taking intact samples (cores) from the following formations:
    a. Overburden
    b. Geothermal reservoir
3. Geophysical well-logging to investigate formation properties at different depths
4. Fibre optic cable design and installation

3 Location and monitoring system

The drill site for the geothermal wells is located on the TU Delft campus, close to the gas-fired combined heating and power station, the Warmtekrachtcentrale (WKC), at latitude 51.99946089 and longitude 4.36940246 (Figure 2).

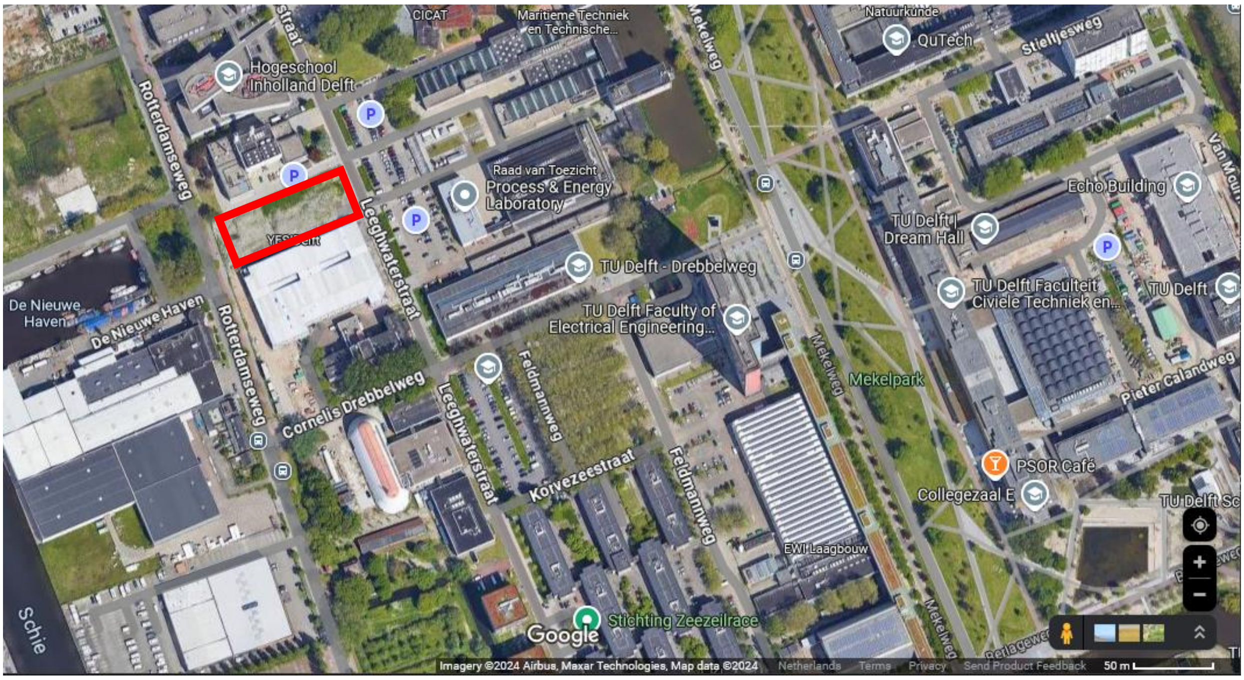


Figure 2. Drill site on the TU Delft campus (Source: google maps).

The campus geothermal project consists of a doublet targeting the early Cretaceous Delft sandstone formation, which is located at approximately 2 km (vertical depth) beneath the city of Delft. The target reservoir location is situated within a syncline bounded to the south-west by a seismically-inactive fault at approximately 1-km distance and to the north-east by another seismically-inactive fault at approximately 4-km distance from the surface location (Figure 3). Both wells are deviated to north and east-northeast, respectively, such that they move away from the closer fault and target a deeper (hotter) portion of the reservoir. To the east and north-east of the reservoir are two other geothermal projects that serve to provide heat mainly to greenhouses, highlighting the proximity and potential of interaction of geothermal projects (Figure 3).

The area where the geothermal project is installed is not naturally seismic, and does not have previously observed seismic activity. However, there is a significant social focus on seismicity and current models predict the potential of fault slippage that could lead to seismicity from cooling. Therefore, a local seismic network surrounding the project has been installed in 2022, with the layout shown in Figure 4. The system was designed in order to be able to detect and locate any seismic activity related to project activities. The central and two most southerly seismic stations were installed to 200-m depth. At the top of the figure, the northern seismic monitoring station DAPGEO-02 is seen, which was developed as a significant sub-project descibed in the Drilling Report published in 2022 (https://doi.org/10.4233/uuid:fde70c00-cf65-4174-9cd3-89585a5e61bd). Here, a 490-m deep seismic monitoring station was installed. A series of geophones and optical fibres were installed to investigate low-magnitude seismicity. The data from two of the seismic stations is available through the Royal Netherlands Meteorological Institute, KNMI (stations ZH08 (including shallower offset stations ZH086, ZH085) and ZH03; https://www.knmi.nl/nederland-nu/seismologie/stations/live-seismogrammen).

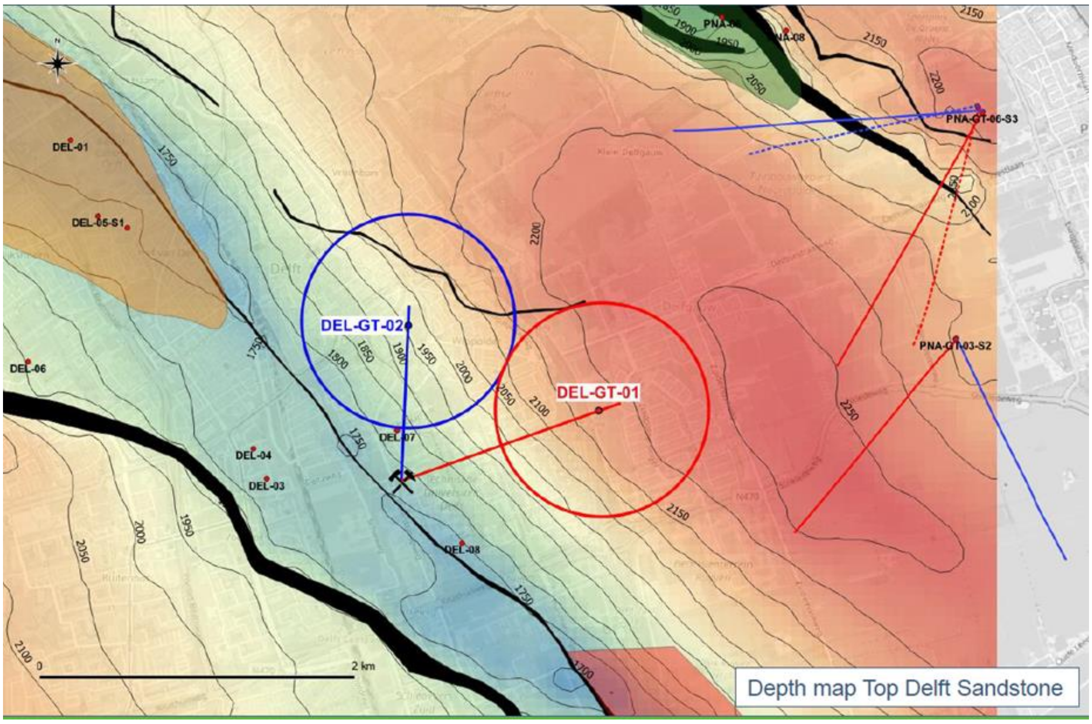


Figure 3. Location of the campus geothermal project (producer and injector; DEL-GT-01 and DEL-GT-02) at depth. Also included are two other geothermal project targeting the same reservoir (source GTD).

Figure 4. Local seismic monitoring network (yellow circles) around the campus geothermal wells (base map source: google maps).

4 Well design and drilling overview

The campus geothermal project has been planned over many years and the well design changed with time. The main challenge was to create a scientific infrastructure while also making it a commercially-viable doublet for energy supply. DEL-GT-01, the producer, was designed as a 3-section well featuring a 16" surface casing to ~800m, below that a 9-5/8" liner to reservoir and below that 7" wire wrapped screens over the full reservoir (Figure 5) to allow inflow from the reservoir. The surface casing is 'regular' steel as opposed to the production liners which are 13Cr (meaning 13% Chrome in 80.000psi yield steel). The surface casing is not expected to see flow, therefore the corrosion resistant, but more expensive 13Cr is not used. Underneath the pump the fibre optic cable will be installed (illustrated in red in Figure 5).

DEL-GT-02, the injector, was designed as a two-section well featuring a 13 3/8” surface casing to ~800m and below that a 9-5/8” production casing to reservoir. Together with the production casing the fibre optic cable should be brought into place. In order to avoid damage to the cable, oriented perforations were planned for the injector in the reservoir section.

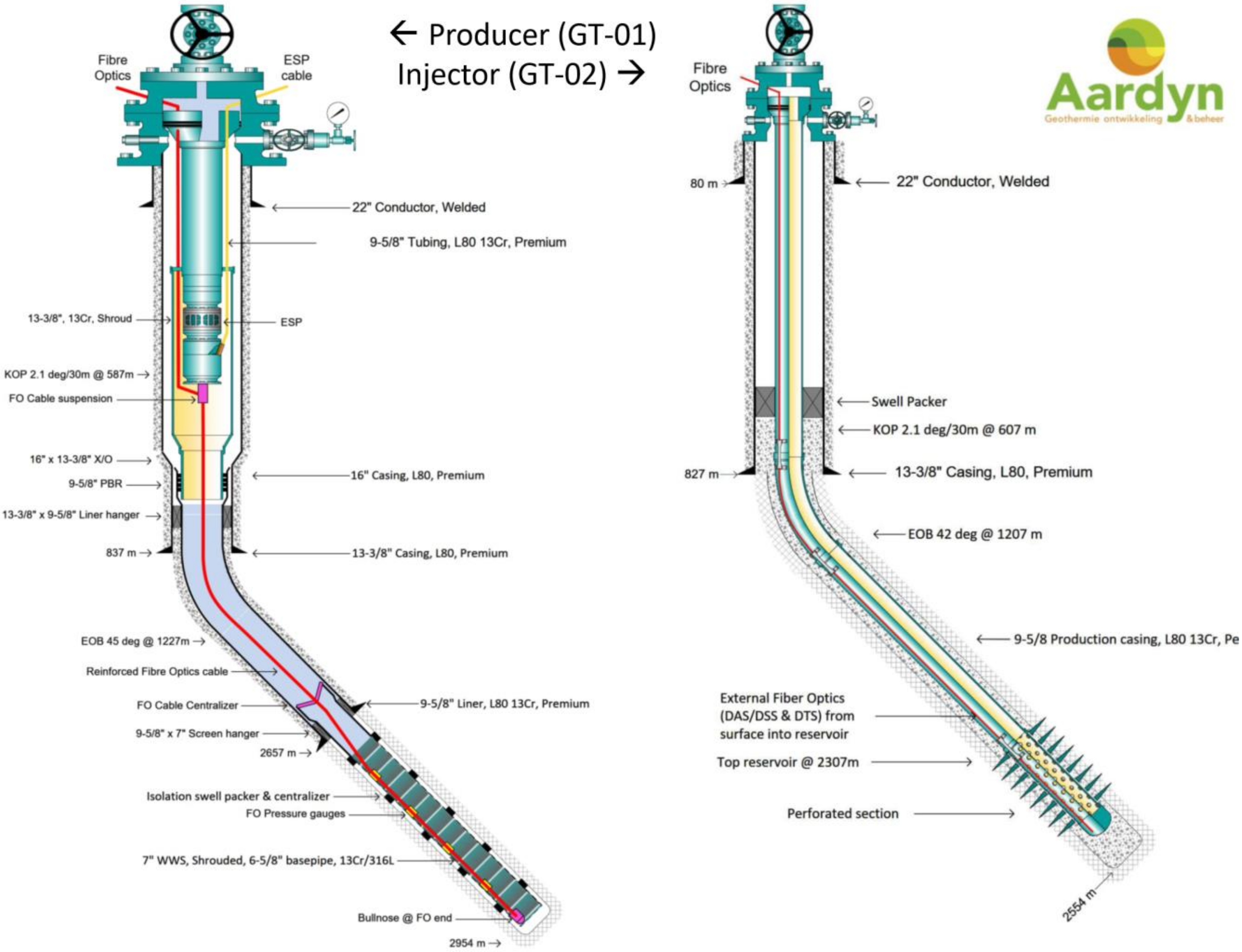


Figure 5. Pre-drilling well designs including R&D components of the Producer (DEL-GT-01) and the Injector (DEL-GT-02) wells drilled at TU Delft campus (source GTD).

Drilling of the campus geothermal project was carried out in 2023. The spud date of the producer (DEL-GT-01) was on 13-7-2023 and that of the injector (DEL-GT-02) on 30-6-2023. The injector (DEL-GT-02) required two sidetracks to reach and complete the total depth (TD). In Figure 6 and Figure 7, the location of the wells are given. Figure 6 shows a top view of the doublet as installed and including the two side tracks of the injector. In Figure 7, a schematic cross section is shown in order to illustrate the trajectories of the different wells at depth.

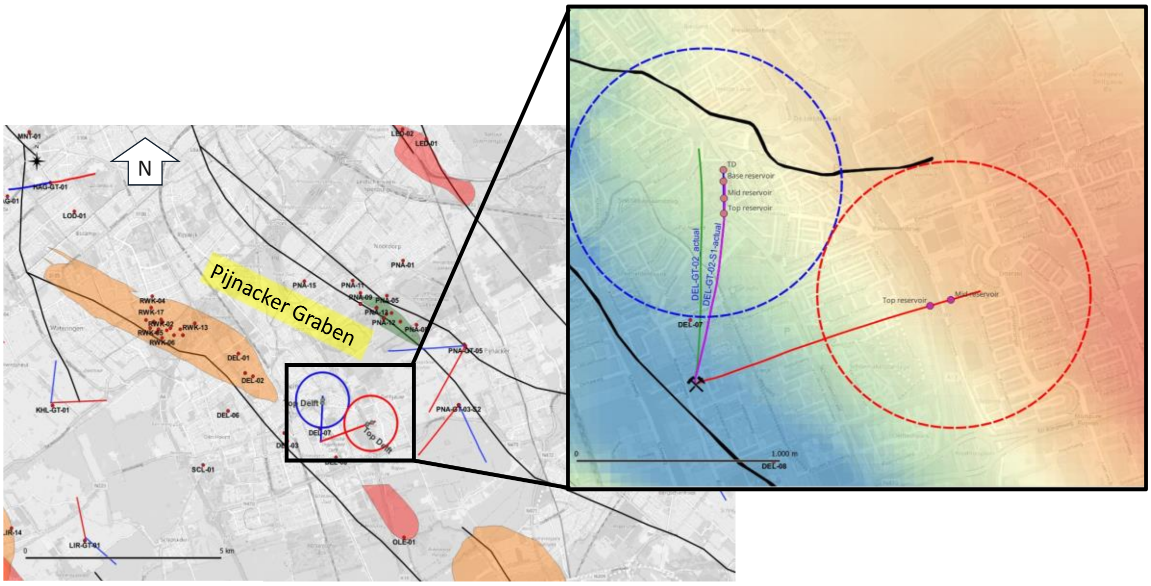


Figure 6. Producer (DEL-GT-01 in red) and injector (DEL-GT-02 in blue) location within the Pijnacker Graben. Zoom shows doublet as installed and including sidetracks; DEL-GT-02 in green, DEL-GT-02-S1 in purple, and DEL-GT-02-S2 in blue (source GTD).

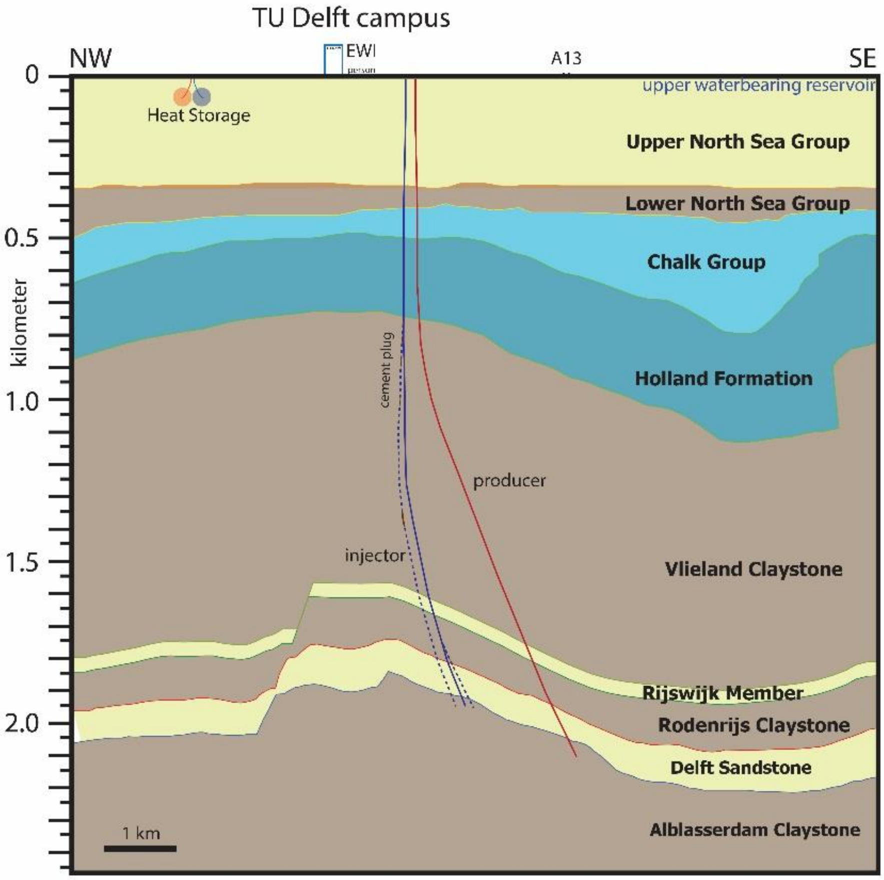


Figure 7. Schematic illustration of the producer and injector trajectories at depth. The dotted lines are the two sidetracks DEL-GT-02-S1 and DEL-GT-02-S2, respectively.

The final well design of producer and injector - as implemented - are illustrated in Table 1 and Figure 8.

Table 1. Final well design as installed. S1 represents sidetrack#1 of the injector (DEL-GT-02) and S2 the second sidetrack of the injector.

Producer (DEL-GT-01)	**Measured depth [m]**	**Injector (DEL-GT-02)**	**Measured depth [m]**
22” conductor	81	22” conductor	81
20” hole	845	17 1/2” hole	845
16” x 13 3/8” casing	842	13 3/8” casing	842
12 ¼” hole	2573	12 ¼” hole (motherbore)	2638
9 5/8” liner	2570	Plug back, 12 ¼”	1054-727
8 ½” coring + hole	2931	12 ¼” hole (S1)	2560
6 5/8” WWS liner	2918	9 5/8” casing	2394
		8 ½” hole + side wall coring (S2)	2580
		7” liner	2579

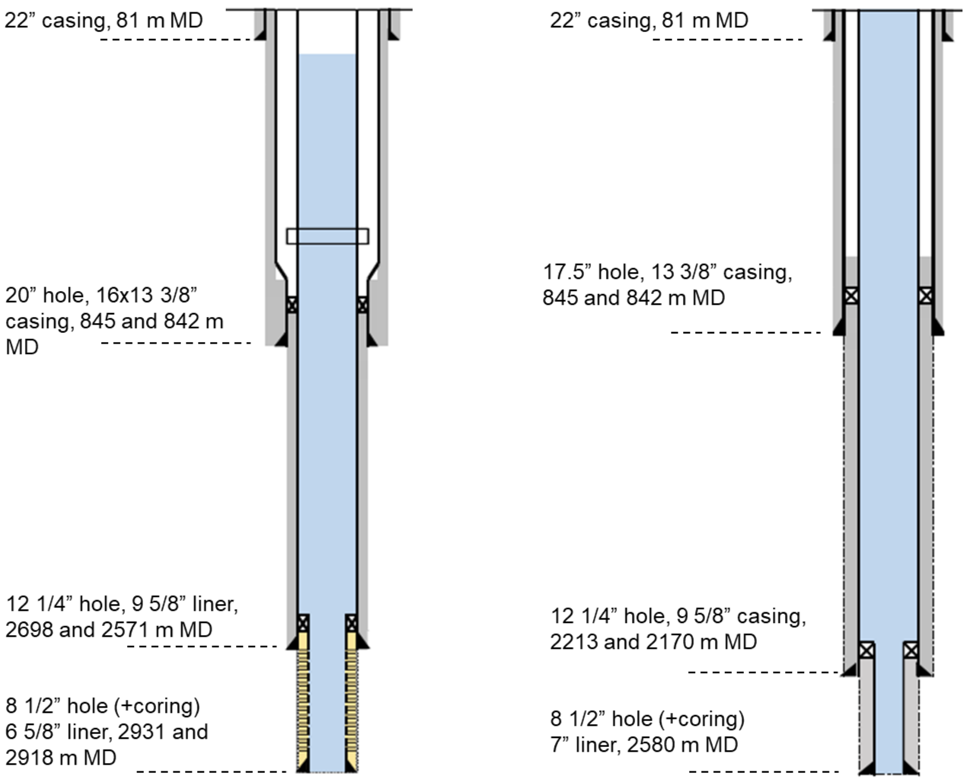


Figure 8. Well schematics of DEL-GT-01–producer (right) and DEL-GT-02-S2–injector (left)

4.1 Drilling information producer (DEL-GT-01)

The 22” conductor was drilled to a depth of 81m and cemented to surface. The 20” hole was drilled with a water based mud (WBM) ranging from 1.11 SG to 1.18 SG. The 12 ¼” section was drilled with an oil-based-mud (OBM) ranging from 1.14 SG to 1.19 SG. The 8 1/2" section, was drilled with OBM ranging from 1.09 to 1.12 SG. An overview of the main challenges encountered during drilling of the producer is given below:

12 1/4" section

- High overpulls and pack-offs from 1175m MD onwards. The formation is argillaceous and sandy claystones.
- Several tight spots at 1175 m with several reaming operations.
- At approximately 2200 m, BHA dropping inclination angle with changes in WOB with minimal effect.
- Losses at 2405m up to 20 m^3/hr inside the Rijswijk Sandstone.
- After coring, continue reaming to 2326 m. High torque and vibrations with being unable to pass 2490 m and required to pick up a new PDC bit.
- Drillstring was POOH and bit 1/16" undergauge.

8 1/2" section

- No significant challenges

4.2 Dilling information injector (DEL-GT-02, DEL-GT-02-S1, DEL-GT-02 -S2)

The 22" conductor was drilled to a depth of 81m and cemented to surface. The 17.5" hole was drilled with a water based mud (WBM) ranging from 1.08 SG to 1.15 SG. The 12 ¼" section was drilled with an OBM ranging from 1.15 SG to 1.20 SG. The 12 ¼" (DEL-GT-02-S1) sidetrack was drilled with OBM mud from 1.2 to 1.24 SG. In addition to this, wellbore strengthening material was added to the mud system to reduce the risk of wellbore instability. The 8-½" sidetrack (DEL-GT-02-S2) was initiated from the 9-⅝" casing using a whipstock. An overview of the main challenges encountered during drilling of the injector is given below:

12 1/4" section

- The 12- ¼ hole was drilled to 2015m MD at which sudden losses up to 30 m^3/hr were observed.
- Immediate losses up to 12 m^3/hr were observed and continued drilling to 2033m in an attempt to cure the losses with drilled cuttings but without success.
- A wiper trip back to surface was performed, observing several pack-offs. RIH BHA to 2033m while observing several tight spots.
- Drilled to 2107m MD, but losses maintained. LCM was spotted to reduce the static loss rate to 4-5m^3/hr.
- Drilling continued without losses with 1.19 SG MW to final TD at 2638m.
- Multiple overpulls and pack-offs were observed on the trip OOH.
- Observed obstruction at 1432m and unable to pass and unable to POOH. Work string free and wash and ream OOH to 1361m MD only with up to 45 mt overpull, where the string remained stuck. The decision was made to severe the BHA and plugback for a sidetrack.

9 5/8" section

- Decision was made by the science team to not run the FO cable together with the casing due to the observed cavings and pack-offs and the possibility of not reaching target depth or breaking the cable while rotating the casing.
- RIH 9-⅝" casing, pack-off was observed at 1003 m.
- This area was worked with the defuse shoe down to 1057m, when no further progress was made.
- The casing was POOH.
- A 12 ¼" cleaning assembly was RIH to clean the tight spots.
- Multiply areas to ream until 2328 m.
- On a second attempt, the casing was RIH to a final depth of 2407m

8 1/2" section

- No significant challenges

5 Research activities and timeline

The research activities carried out in the campus geothermal wells are described in the following table.

Table 2 Research activities carried out at the campus geothermal wells DEL-GT-01 (producer) and DEL-GT-02 (injector).

Activity	Executed by	Described in section
Producer DEL-GT-01		
Coring caprock	IOT	5.1.1
Coring reservoir	IOT	5.1.2
Open-hole logging	Baker Hughes	5.1.3
Installation fibre-optic cable	Halliburton	5.1.4
Injector DEL-GT-02 (-S1-S2)		
Open-hole logging	Baker Hughes	5.2.1
Side-wall coring	Baker Hughes	5.2.2
Preparations for installation fibre-optic cable	Halliburton	5.2.3
Both wells		
Cutting sampling, washing and drying	GeoService/ TU Delft	5.3.1
Core preservation and labelling	IOT/TU Delft	5.3.2
Core and sample transport / storage	TU Delft	5.3.3
Gamma ray and CT scanning of cores	TU Delft	5.3.4

Table 3. Important dates during planning and drilling of the campus geothermal project

Date (d/m/2023)	Operational day	R&D activity (number given in Figure 9)	Summary
10 May	-		Drilling well on paper (DWOP)
08 June	-		Research well on paper (RWOP)
29 June	1		Start drilling top section DEL-GT-02 (injector)
08 July	9		Skid rig to DEL-GT-01 (producer)
06 August	38	1	Core #1
25 August	56	2	Core #2-7
09 September	71	3	Open hole logging, 3 runs
19 September	78		DEL-GT-01 well test, suspend well
20 September	80		Skid rig to DEL-GT-02 (injector)
21 October	108		Start sidetrack DEL-GT-02-S1
23 November	143		Start sidetrack DEL-GT-02-S2
28 November	147	4	Open hole logging, 3 runs
30 November	149		Sidewall coring, 3 runs
04 December	155		Rig down

The time-depth graph shown in Figure 9 illustrates the operational days taken per well plotted to depth. The skids at operational day 9 and 80 can clearly be seen. TUD rigtime (TUD paid) is indicated in orange and numbered, explanation for these numbers can be found in Table 3. Clearly, during TUD rigtime, not much depth was added as during these times either (sidewall) coring or logging took place.

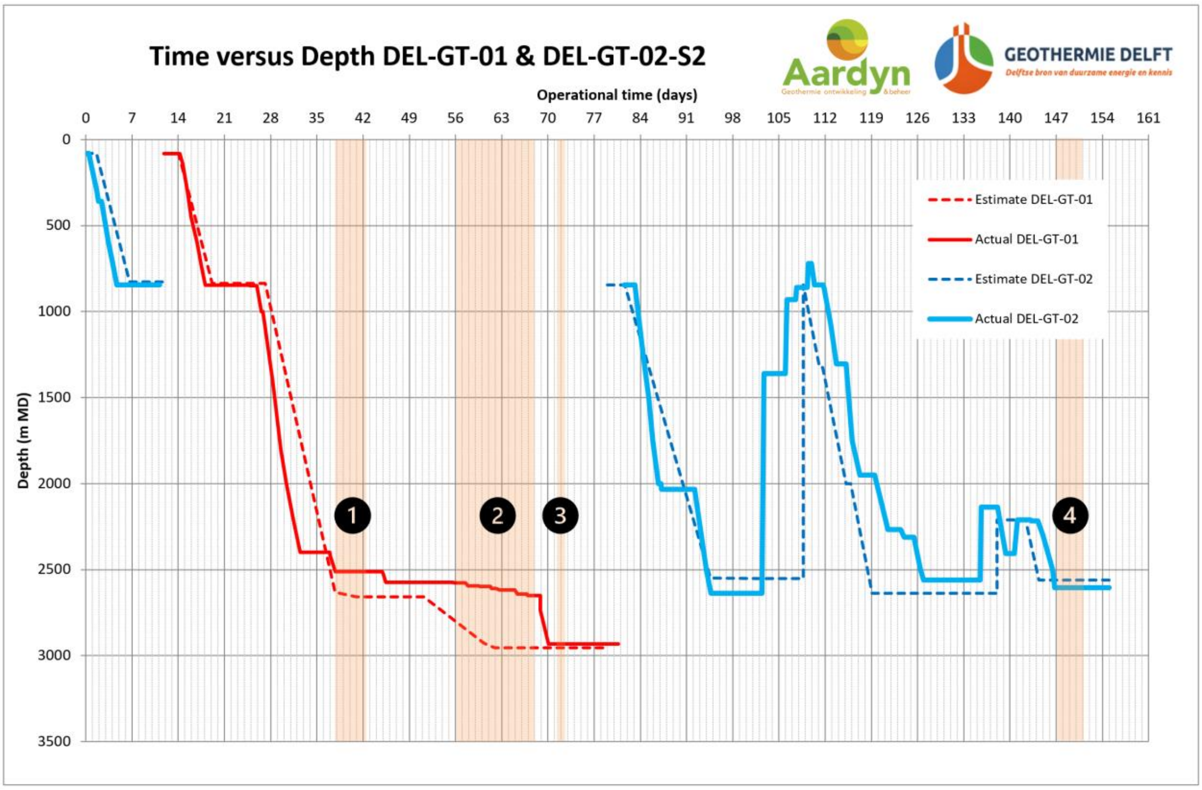


Figure 9. Time vs depth both wells (GTD) The marked orange areas indicate research activities. These have been marked with numbers (1) core #1; (2) core #2-7; (3) open-hole logging 3 runs and (4) open hole logging 3 runs + side-wall coring 3 runs.

5.1 Producer DEL-GT-01

5.1.1 Coring caprock

<table>
<tr><td>Activity
Coring Caprock (IOT)
Core#1; Targets: Rodenrijs claystone and Delft Sandstone</td><td>Date
6 – 11 August 2023</td></tr>
<tr><td colspan="2">Brief description of the activity
The objective of Core#1 (C1) was to core the Rodenrijs Claystone and the transition into the Delft Sandstone Members. The ambition was to core 20 m of claystone and add 7 m core segments until the reservoir has been reached. The reservoir was to be identified through cuttings at surface and drilling parameters.

Coring started at 2511.5 m based on preceding integrated stratigraphy analysis of where the top reservoir was to be expected and live stratigraphic markers from the MDW Gamma Ray data. At a depth of 2527 m, the core barrel jammed. This was identified by a pressure drop, the reduction in torque and zero rate of penetration (ROP). It was decided to drill rather than core to the reservoir sands, because of the limited potential to retrieve long cores as the reservoir was predicted to be very close to the bottom of hole after Core #1. Science budget was preserved to collect a significant length of reservoir core.

Final coring interval: 2511.5 m – 2527 m
Core recovery: 15.5 m</td></tr>
<tr><td>Output
End of Job Report by IOT
15.5 m of 4” core
Photos and initial description of core ends</td><td>Appendix
A.1.1 Coring caprock and reservoir
End of Job report (IOT)
Initial core description (TUD)</td></tr>
</table>

5.1.2 Coring reservoir

Activity Coring reservoir (IOT) Core#2-7; Targets: Delft Sandstone and Ablasserdam	**Date** 25 August – 7 September 2023

Brief description of the activity

The objective of Core#2 to Core#6 was to core the full reservoir section meaning the Delft Sandstone Member and potentially the top of the Ablasserdam Claystone Member. The ambition was to core 270 m of these Nieuwerkerk Formation sediments.
Recovery was much lower than anticipated, due to core jamming in the core barrel. The relative high angle between coring and rock layering and the occasionally heterogeneous nature of the rocks may have resulted in more jamming than anticipated. During the coring operations, several changes were made in the process in order to increase recovery. Details on this can be found in the report by IOT (in the Appendix) and briefly below.

Core#2:
Coring started at 2576 m MD after setting section TD and drilling a few meters below that. At 2591 m MD, severe motor stalls occurred. There were several attempts to restart coring without success.
Final coring interval: 2576 m – 2591 m
Core recovery: 15.5 m

Core#3:
Coring started at 2594 m. At 2598 m MD, motor stalls occurred with no possibility to restart coring. Core was jammed inside the shoe and the catcher appeared broken when inspected at surface.
Final coring interval: 2594 m – 2598 m
Core recovery: 2.25 m

Core#4:
Due to the limited recovery of Core#1-Core #3, it was decided to shorten the core barrel to 30 m to lower the BHA stiffness.
Coring started at 2597 m MD. At 2610 m, a connection was made, but there was no possibility to restart coring. The string stalled and it was decided to stop coring.
Final coring interval: 2597.5 m – 2610 m
Core recovery: 12.5 m

Core#5:
Coring started at 2610 m. After 8 m, the operation had to be stopped due to jamming of the core. As still limited cored lengths were obtained, it was decided to continue coring. There were no clear signs that core recovery would be better in the injector well. Drilling an interval and continue coring the lower reservoir was deemed too expensive at this stage while at the same time increasing open-hole time. This reasoning resulted in continuing coring Core #5, Core #6, and add Core #7 to the programme.
Final coring interval: 2610 m – 2617.5 m
Core recovery: 7.32 m

Core#6:
Due to the limited recovery of the previous cores, a lubricating pill using base oil was used immediately prior to coring. This would reduce the resistance of broken core intervals in the core barrel. Coring started at 2618 m MD. At 2642 m, the operation had to be stopped due to jamming of the core.
Final coring interval: 2618 m – 2642 m
Core recovery: 23.95 m

Core#7:
After the successful Core#6 run and the budget that allowed this, it was decided to add another run in order to retrieve more sandstone.
Coring started at 2641 m. After 10 m, a clear jamming signal was observed. It was decided to stop coring and pull out of the hole. Budget did not allow to continue coring, as coring was going to take place in the injector also. Hole integrity issues causes that full coring in the injector DEL-GT-02 was replaced by side-wall coring of targeted intervals (see section 5.2.2).

Final coring interval: 2618 m – 2651 m
Core recovery: 9.9 m

Output	Appendix
End of Job Report by IOT 71.5 m of 4” core Photos and initial description of core ends	A.1.1 Coring caprock and reservoir End of Job report (IOT) Initial core description (TUD)

5.1.3 Open-hole logging

Activity	Date
Open hole logging (Baker Hughes)	9 – 10 September 2023

Brief description of the activity

The objective in the producer was to log the 8.5” open hole section and characterize the Delft Sandstone reservoir. The logging programme was set up to combine the different tools in the most efficient way and takes into account certain recommendations of the logging company (e.g., log all services that require orientation before the magnetic resonance tool in order to avoid negative effects on the orientation data due to magnetized iron particles).

The logging programme in the producer included three runs:

1. Acoustics and resistivity
   Depth (m MD): 2507 – 2934
   Services: Gamma Ray, Resistivity, Caliper, Acoustic, Orientation
   Logging speed: 6 m/min
   A cased-hole logging run was performed while pulling the tools out of hole.
2. Imaging
   Depth (m MD): 2546 – 2933
   Services: Gamma Ray, Micro-resistivity Image, Ultra Sonic Image
   Logging speed: 3 m/min
3. Porosity and magnetic resonance
   Depth (m MD): 2542 – 2933
   Services: Spectral Gamma Ray, Neutron, Density, Magnetic Resonance
   Logging speed: 1 m/min
   A repeat pass was done at 6 m/min to evaluate the performance of the magnetic resonance tool at a higher logging speed.

Output	Appendix
Logging data and interpretation	A.1.2 Open-hole logging https://www.doi.org/10.4121/2a7b2a63-dd7b-46bc-a275-97729b3ab348

5.1.4 Fibre optic cable design and installation

Activity Fibre optic cable installation (Halliburton)	**Date** Expected Q3 2025

Brief description of the activity

A fibre optic cable will be installed together with the ESP. The cable is currently manufactured by Halliburton and expected to be deployed to Delft in Q2 2025.
The specifics for the cable design and manufacturing are given below:

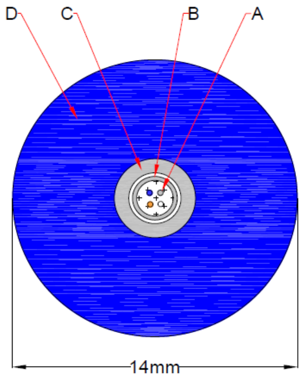
Fibre requirements:
2 x Single Mode (SM) fibre for pressure measurements
2 x Single Mode (SM) fibre for acoustic measurements

Data requirements:
Pressure: Pressure gauges connected to a single-mode (SM) fibre provides a Distributed Pressure Sensing (DPS) system.
Temperature: Acquired using a single-mode (SM) fibre based on Brillouin Scattering.
Acoustics: Distributed Acoustic Sensing (DAS) through a single-mode (SM) fibre.

Cable specifications:
The primary function of the FO cable is to host the optical fibres and the pressure gauges for the DPS, DTS and DAS systems. As the FO cable is not clamped on the outside of the casing, but spooled inside the casing stand-alone, the cable needs to be strong and stiff enough to allow installation without any damage to the fibres and pressure gauges.

All the optical fibres will be placed inside a Fibre in Metal Tube (FIMT). This FIMT is filled with Sepigel and will accommodate the Extra Fibre Length (EFL). This EFL ensure that the fibres will not break in case the cable stretches. The FIMT is placed inside a stainless steel tube (Tubing Encapsulated Fibre – TEF) with an OD of 4mm. The stainless steel tube is in theory the outside of the FO cable. In order to protect the cable, several additional components are included.

4mm TEF w/ 4 OPTICAL FIBERS

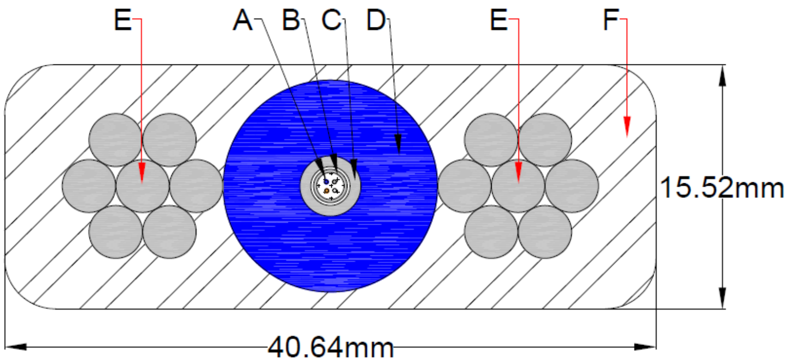


Components

A: 2 x Prysmian Pure Core 50/125 Multi-mode Acrylate Coated Fiber; Colored Blue & Orange
A: 2 x Corning® SMF-28® ULL Optical Fiber; Colored Slate & White
B: FIMT: 2.2 mm x 1.8 mm Stainless Steel 316L, Filled with Sepigel EFL 0.25% ± 0.05%
C: 316L Stainless Steel Tube; Wall Thickness: 0.71 mm (0.028"); O.D.: 4.0 mm (0.157") Nom
D: Blue Round Profile Polypropylene; O.D.: 14 mm (0.551") Nom.

The 14mm OD cable is placed inside a flatpack. This flatpack consists of 2 each 7/16" bumper wires on each side of the 14mm OD cable. The pumper wires and the FO cable are all placed inside a transparent polypropylene 40x15mm flatpack. The bumper wires will give the strength and stiffness to the FO cable, while at the same time protecting the slimline pressure gauges against crushing.

FLATPACK: 4mm TEF w/ 4 OPTICAL FIBERS and TWO 7/16” BUMPERS



Components

A: 2 x Prysmian Pure Core 50/125 Multi-mode Acrylate Coated Fiber; Colored Blue & Orange
A: 2 x Corning® SMF-28® ULL Optical Fiber; Colored White & Slate
B: FIMT: 2.2 mm x 1.8 mm Stainless Steel 316L, Filled with Sepigel EFL 0.25% ± 0.05%
C: 316L Stainless Steel Tube; Wall Thickness: 0.71 mm (0.028”); O.D.: 4.0 mm (0.157”) Nom
D: Blue Round Profile Polypropylene; O.D.: 14 mm (0.551”) Nom.
E: 2 X 7/16” 7 Wire EHS Galvanized Steel Wires
F: Natural[1] Rectangle Profile Polypropylene; Major x Minor: 40.64 mm x 15.52 mm (1.60” x 0.611”) Nom.

Slimline gauges:
The pressure gauges required to perform the distributed pressure measurements need to be sized such that the flow path restrictions will be minimal. The Slimeline Gauges from Halliburton allow for an array-based point pressure and temperature sensing while at the same time they do not create any additional friction as they are smaller in OD than the flatpack. The Slimline gauge has an OD of 11mm and is connected to a 4mm OD connection tube. The slimline gauges will be connected to the TEF by a splice housing.

Output	**Appendix**
The FO cable in the producer still has to be installed.	-

5.2 Injector DEL-GT-02 (-S1-S2)

5.2.1 Open-hole logging

Activity Open hole logging (Baker Hughes)	**Date** 28 - 29 November 2023
Brief description of the activity The objective in the injector was to log the entire 12 1/4" open hole section and characterize the overburden as well as the Delft Sandstone reservoir. Due to the well stability issues, it was not possible to log the motherbore. There was a logging attempt in Sidetrack S1. The tool string did not reach to TD since it was not able to overcome an obstruction at 940 m MD approximately. In this section, the following run was executed: 1. Acoustics and resistivity Depth (m MD): 790 – 934 Services: Gamma Ray, Resistivity, Caliper, Acoustic, Orientation Logging speed: 6 m/min A cased-hole logging run was performed while pulling the tools out of hole. In Sidetrack S2, the full 8.5" open hole section was logged. The logging programme was the same as for the producer and included three runs: 2. Acoustics and resistivity Depth (m MD): 2145 – 2585 Services: Gamma Ray, Resistivity, Caliper, Acoustic, Orientation Logging speed: 6 m/min A cased-hole logging run was performed while pulling the tools out of hole. 3. Imaging Depth (m MD): 2179 – 2581 Services: Gamma Ray, Micro-resistivity Image, Ultra Sonic Image Logging speed: 3 m/min 4. Porosity and magnetic resonance Depth (m MD): 2187 – 2588 Services: Spectral Gamma Ray, Neutron, Density, Magnetic Resonance Logging speed: 1 m/min A repeat pass was done at 6 m/min to evaluate the performance of the magnetic resonance tool at a higher logging speed. The upper open hole section of Sidetrack S2 is close to the cased Sidetrack S1 as Sidetrack S2 leaves Sidetrack S1 using a whipstock. The open hole logging data are therefore influenced by the casing and whipstock in the upper interval of Sidetrack S2.	
Output Logging data and interpretation	**Appendix** A.2.1 Open-hole logging DEL-GT-02-S2 https://www.doi.org/10.4121/2a7b2a63-dd7b-46bc-a275-97729b3ab348

5.2.2 Side-wall coring

Activity Side-wall coring (Baker Hughes)	**Date** 30 November – 1 December 2023
Brief description of the activity The coring activities in the 12 ¼" section of the injector were cancelled due to hole stability issues in DEL-GT-01, which resulted in drilling of the sidetracks. Also, coring in DEL-GT-01 had learnt that low core recoveries could be anticipated. It was therefore decided to perform side-wall coring with a wireline tool in the 8.5" open hole section. This gives the opportunity to sample a diverse set of lithologies from the reservoir section. The locations for sampling could be accurately chosen and pinpointed based on the open-hole logging results, including the image logs that were speed-processed with this purpose. Different lithologies were selected with prioritization of reservoir sands in the lower reservoir as these were not cored in the producer and the underlying Alblasserdam Member. As side-wall core jamming could also occur, lower priority stratigraphic	

levels were placed later in each side-wall coring run of maximum 30 stratigraphic levels. Two runs could be done using MaxCore sidewall coring system drilling 1.5 inch cores, afterwards the tool needed maintenance. As time to wait for the maintaince was too long both for the budget as for the open hole, the last run was performed with the PCore system, drilling 1 inch cores. Sidewall core jamming occurred in the third run after 21 cores. The following runs were carried out: 1. Side wall coring; 1.5 " core diameter Sampling depth (m MD): 2401.5 – 2542.0 Core recovery : 30 cores 2. Side wall coring; 1.5" core diameter Sampling depth (m MD): 2349.8 – 2566.1 Core recovery: 28 cores 3. Side wall coring; 1" core diameter Sampling depth (m MD): 2287.3 – 2455.7 Core recovery: 20 cores

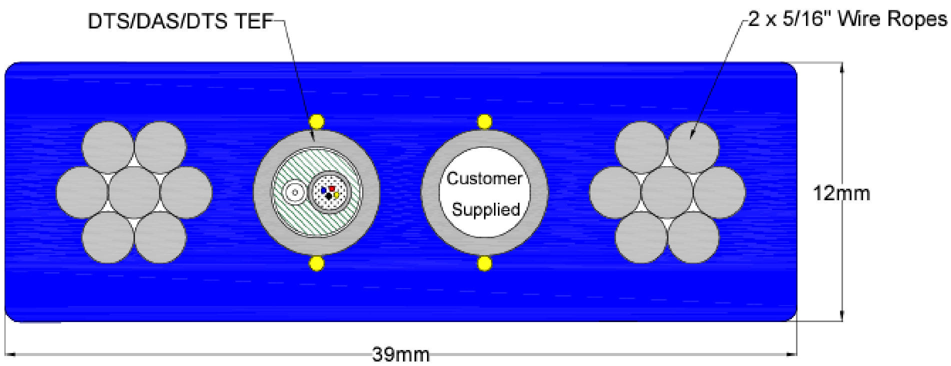
Output	**Appendix**
A total of 78 sidewall cores were collected, most of which are complete plugs, some are fragments Sidewall core photos and initial description	A.2.2 Side wall coring Initial description SWCs https://www.doi.org/10.4121/2292437e-2ce4-42b7-8350-7774d762cc60

5.2.3 Fibre optic cable design

Activity	**Date**
Fibre optic cable installation (Halliburton)	
Brief description of the activity The objective was to install a fibre optic cable in the injector that is cemented in place on the outside of the 9 5/8" casing. Due to the hole stability issues the cable was in the end not deployed. But it has been manufactured and delivered. The specifics for the cable design and manufacturing are given below: Fibre requirements: 1 x Enhanced Backscatter Fibre (EBF) 1 x Single Mode (SM) fibre for Strain measurements 3 x Single Mode (SM) 1x Multimode (MM) fibre for Acoustic and Temperature measurements Data requirements: Acoustics: In order to perform the Vertical Seismic Profiling, an enhanced backscatter fibre (EBF) is required. Temperature: To be obtained with fibre optics, using a single-mode (SM) fibre based on Brillouin Scattering. Strain: to be done using the fibre optics system, using single mode (SM) fibre in a tight-buffer. Cable specifications: Two cables are manufactured that are combined in one flatpack. The first cable includes the fibres for Distributed Acoustic Sensing, Distributed Temperature Sensing and Strain Sensing. The second cable includes the enhanced backscatter fibre. To provide additional strength, the flatpack includes two bumper bars on the outside (see schematic below).	

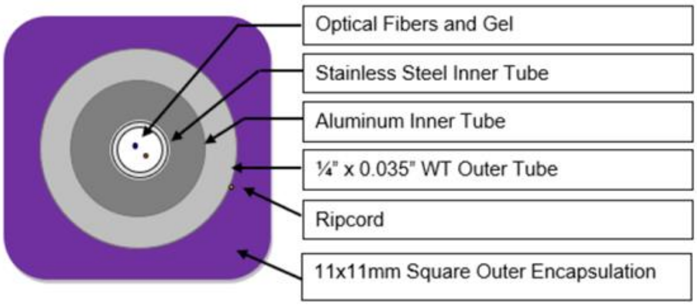
Cable Engineered by Prysmian

DTS/DAS FIMT + DSS FIBER + CUSTOMER SUPPLIED SHEATH TUBE FLATPACK



Drawing not to Scale

Customer supplied enhanced backscatter fibre:



Output	**Appendix**
The fibre optic cable is stored at the TU Delft campus and will be used for other purposes.	-

5.3 Activities in both wells DEL-GT-01 / DEL-GT-02 (-S1-S2)

5.3.1 Cutting sampling, washing and drying

Activity Cutting sampling, washing and drying	**Date** 30 June – 27 November 2023

Brief description of the activity

Sampling frequency increased with depth, with the highest sampling every 3m to ensure maximum reservoir samples for research. TU Delft staff collected and washed the majority of samples taken at 5m and 3m sampling frequencies as part of the research campaign, otherwise sample processing was carried out by Geoservices.

Cuttings samples processed by TU Delft were handled in plastic containers. Wet unprocessed samples were put into a 0.63 µm sieve to be washed using base oil (same as the OBM), for at least one minute and rinsed with tap water. Then, wet and washed cuttings samples (250 ml each) were dried for 5 days at room temperature and stored in labelled cloth bags.

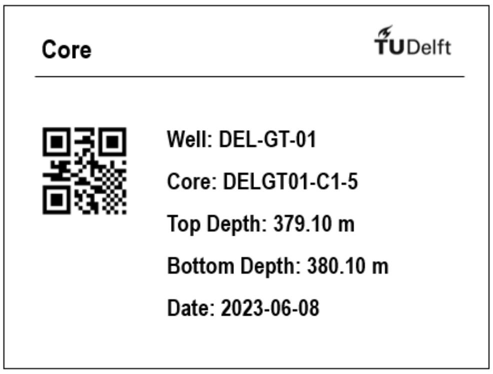
Wet and unwashed cuttings samples (500 ml each) are stored in plastic containers and sealed by stretching a piece of parafilm across the opening underneath the lid.

List of cutting samples processed by TU Delft by depth range and the sample state.

Well	# Samples	Top Depth (m)	Bottom Depth (m)	Sampling rate (every x meter)	Wet unwashed	Wet washed	Dry washed
DEL-GT-01							
	154	90	840	10			
	617	845	2510	5			
	297	2511	2930	3			
Subtotal	**1068**				**541**	**49**	**481**
DEL-GT-02							
	152	90	840	10			
	568	845	2290	5			
	218	2293	2638	3			
Subtotal	**938**				**483**		**455**
DEL-GT-02-S1							
	89	2000	2300	5			
	173	2303	2560	3			
Subtotal	**262**				**132**		**130**
DEL-GT-02-S2	**161**	2218	2581	3	**122**		**39**
Total	**2429**						

Output Cuttings samples were inventoried as wet unwashed, wet washed, or dry washed. Cuttings washing and handling procedures were produced.	**Appendix** A.3.1 Cutting sampling, washing and drying https://www.doi.org/10.4121/2292437e-2ce4-42b7-8350-7774d762cc60

5.3.2 Core preservation and labelling

Activity Core preservation and labelling	**Date** 10 August – 6 September 2023
Brief description of the activity All 4-inch cores were cut into 1-metre sections on-site by IOT. In total, TU Delft inventoried 93 core sections into the database and labelled them on site. Labels were printed onto anti-scratch resin-coated paper with the following information:   Photographs of cores were taken showing both OIT and TU Delft labelling for verification. A total of 27 core chips were collected on-site, mostly from the section ends. Plastic (yellow) caps were placed and secured with hose clamps on both ends of the cores. After drilling 4 mm holes into the aluminium liners, cores were drained and then foamed. Every other meter, the caps of the cores were also foamed to preserve them with as little as possible oxygen flow, while for the other cores, the caps were left unfoamed to take core plugs on both ends.Every other meter, the caps of the cores were also foamed to preserve them with as little as possible oxygen flow, while for the other cores, the caps were left unfoamed to take core plugs on both ends.	
Output All 1-metre long cores were labelled as above and registered in the sample database.	**Appendix** A.3.2 Core preservation and labelling https://www.doi.org/10.4121/2292437e-2ce4-42b7-8350-7774d762cc60

5.3.3 Sample transport / storage

Activity Core and cutting transport / storage	**Date** August – November
Brief description of the activity Cores and cuttings have been transported to the TU Delft and stored at TU Delft's Core Storage Room located in the basement of the CiTG building (building 23, Stevinweg 1, 2628 CN Delft). TU Delft labelled cores were placed in core transport containers and loaded onto the electric vehicle to transport to the faculty. Unload the core transport containers was done using a the pallet stacker and they were moved around with a pallet lifter. After CT scanning, all cores were stored horizontally, of which 74 are stored in shelves at room temperature and 19 at 4C in a refrigerator. Some cores were vacuumed sealed in aluminium bags. Vacuum sealing and storage at 4C is done in order to prevent changes in organic matter rich cores due to oxygen diffusion and the evaporation of pore fluid.	


Illustration of the labelled cores and cuttings in shelves at room conditions.

Output	**Appendix**
All cores and cuttings are securely stored at the TU Delft core storage, properly labelled and under the correct conditions for their preservation.	-

5.3.4 Gamma ray and CT scanning of the cores

Activity	**Date**
Scanning of the cores using X-ray computed tomography (CT) and gamma ray	

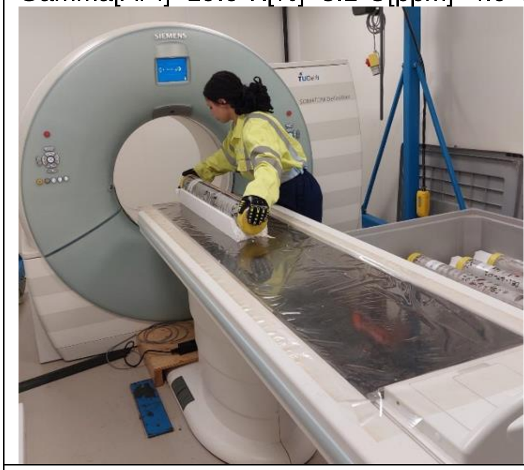
Brief description of the activity

The cores were scanned at the imaging facilities of TU Delft using a medical CT scanner (Siemens Somatom). Each core was scanned in one go using a slice resolution of 1.5 mm, which produced 700 slices, approximately. After scanning, the scan data was processed according to two procedures, “normal’ and “extended”. The procedure at normal scale used the standard grey scale settings of medical scanners of -1000 HU to +3000 HU. The procedure at extended scale used -10.000 HU to +30.000 HU in steps of 10 HU each.

Gamma ray was measured on the cores 2 to 7 using a GT-30 Portable Gamma Spectrometer (http://www.georadis.com/en/products/gt-30.html): A field gamma-ray spectrometer for rapid determination of potassium, uranium and thorium concentrations. Assay data for determining K, U and Th concentrations:

Depth = Core measured depth

Gamma[API]=19.6*K[%]+8.1*U[ppm]+4.0*Th[ppm]




Output	**Appendix**
CT-scan data (raw and processed cross-section images) are available for download from 4TU.ResearchData repository. GR data for Core#1-to Core#7	A.3.3 Gamma Ray and CT scanning of cores https://www.doi.org/10.4121/5504a8bd-81ac-42cc-bd9d-0297c462492d

6 Data management

A data management strategy has been implemented to ensure data are securely and consistently stored, tracked, accessible, and shareable.

Digital data are stored in institutional drives, which are maintained by TU Delft ICT services and are backed up daily, including drilling data and reports, sample inventories, photographs, CT-scan data, initial lithological descriptions, geophysical well logs, geological model, and reservoir simulation models. Table 4 lists of the data types collected from the geothermal wells.

Table 4: Data types from the campus geothermal project

Data Management Overview			
Well	**Activity**	**Data type**	**Format**
DEL-GT-01	Drilling	Drilling report	pdf
		Drilling data	csv
	Cuttings	Physical sample	-
		Mudlogging report	pdf
	Cores	Physical sample	-
		Coring report Raw CT-scan data	pdf ima
	Open-hole logging	Log plots	pdf
		BOREHOLE PROFILE LOG ACOUSTIC CEMENT BOND LOG COMPENSATED NEUTRON LOG COMPENSATED Z-DENSILOG GEOEXPLORER ULTRASONIC EXPLORER MAGNETIC RESONANCE & EXPLORER LOG SPECTRAL LOG X-MULTIPOLE ARRAY ACOUSTIC LOG HIGH DEFINITION INDUCTION LOG	las, dlis
DEL-GT-02(-S1,-S2)	Drilling	Drilling report	pdf
	Cuttings	Physical sample	-
		Mudlogging report	pdf
	Sidewall cores	Physical sample	-
		Log file	las
	Open-hole logging (S2)	Log plots	pdf
		BOREHOLE PROFILE LOG ACOUSTIC CEMENT BOND LOG COMPENSATED NEUTRON LOG COMPENSATED Z-DENSILOG GEOEXPLORER ULTRASONIC EXPLORER MAGNETIC RESONANCE & EXPLORER LOG SPECTRAL LOG X-MULTIPOLE ARRAY ACOUSTIC LOG HIGH DEFINITION INDUCTION LOG MAXCORE PCORE	las, dlis
	Cased-hole logging (S1)	HIGH DEFINITION INDUCTION LOG X-MULTIPOLE ARRAY ACOUSTIC LOG GAMMA RAY BOREHOLE PROFILE LOG	las, dlis

Physical samples and laboratory analyses are linked using an electronic laboratory notebook that provides the following functionality: 1) sample inventory to track sample lineage (parent and children samples), material availability, and physical storage, 2) experiment journal to document analyses performed, devices used, selection of parameters, all of which is linked to the corresponding samples, 3) protocol and procedure management to standardise experimental procedures and to enforce naming convention, and 4) remote access via web browser to allow multiple users collaborate on experiments and management of storage units. Access to this platform is restricted to TU Delft staff.

In addition, a related database was created as a simple and easy-to-use tool to facilitate the initial registration of samples collected by TU Delft staff at the drilling site. It has been created as a desktop application using Access, the database management system from Microsoft, to enable a graphical user interface customised for the geothermal well project. The complete sample database has been made open to the public in our online data collection described below, with the purpose to disseminate the initial sample collection and to enable sample requests.

All data collected from the geothermal well are published via TU Delft institutional data repository 4TU.ResearchData, under the CC BY 4.0 license. Data will be released publicly no later than at the time of publication of the corresponding scientific papers. Data sets can be found online: *Geothermal Project on TU Delft Campus Collection* at https://www.doi.org/10.4121/85b3725b-80fa-4b0b-9db2-475bfd8f0265.

The following data sets have been already made available to the public:

a. Geothermal Project on TU Delft Campus - DEL-GT-01 and DEL-GT-02-S2 Wireline Logs.

   DOI: https://www.doi.org/10.4121/2a7b2a63-dd7b-46bc-a275-97729b3ab348

b. Geothermal Project on TU Delft Campus - Database of physical samples from wells DEL-GT-01 and DEL-GT-02

   DOI: https://www.doi.org/10.4121/2292437e-2ce4-42b7-8350-7774d762cc60

c. Geothermal Project on TU Delft Campus –DEL-GT-01 core CT-scan data

   DOI: https://www.doi.org/10.4121/5504a8bd-81ac-42cc-bd9d-0297c462492d

7 Project team

Table 5. Parties involved in the research activities during implementation of the campus geothermal project

Institution/company	Activity
Delft University of Technology (TU Delft), Department of Geosciences & Engineering	Scientific lead Cutting sampling, washing and drying Sample transport to TU Delft storage Labelling and preservation of samples Scanning of cores
Geothermie Delft BV	Owner of the campus geothermal wells (shareholders Aardyn, Shell Geothermal, EBN and TU Delft)
Aardyn BV	Operator of the campus geothermal wells
IOT	Coring Core cutting into 1-meter long sections Sealing of cores with foam Initial labelling of cores
Baker Hughes	Open-hole logging Sidewall coring
GeoService GmbH	Mudlogging
Halliburton	Fibre optic cable manufacturing and installation

8 Acknowledgments

The idea of a geothermal well on the TU Delft campus was born in 2007 and over the years numerous people have been involved that cannot all be listed. So we would like to thank all partners and colleagues for their valuable contribution and support during the preparation and the implementation of the campus geothermal project and without whom this project would not have been successful.

We want to highlight the following people that were essential to carry out the research activities on the drill site and in our laboratory during the 24/7 operation:

Project Assistants:

Sjoerd Akkermans

Julian Biesheuvel

Juliette Bruining

Alexandru Gavrilaş

Tara Graafland

Annabel Rijsenbrij

Thom van der Ven

Loes Vogelaar

Technical Support

Ellen Meijvogel- de Koning

Roland Klasen

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A. Appendices

A.1 Producer DEL-GT-01

A.1.1 Coring caprock and reservoir

END OF JOB REPORT

GEOTHERMIE DELFT WELL: DEL-GT-01

October 4, 2023

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Contents

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1.1 INTRODUCTION

IOT Holland Group were contracted by Geothermie Delft for providing coring and core handling services on the Geothermie Delft (GTD) project, which is in Delft the Netherlands at the University Delft. The project will be to drill a new Geothermal double, consisting of a producer DEL-GT-01 and injector DEL-GT-02

This report will analyse the coring performance on DEL-GT-01 and try to draw conclusions and recommendations for any future operations on DEL-GT-02.

Basic Well Information 12 ¼" & 8 ½" Section for DEL-GT-01

Formation Type : Roderijs Claystones, Delft Sandstones, Alblassedam/Pijnacker, Lower Holland Marl, Vlieland Claystone, Rijswijk Sandstone

Core Length : 27m & 54m Corebarrel

Coring Interval : 1st 2645 up to 2672mMD and 2nd 2675 up to 2945mMD

Hole Size : 12 ¼" & 8 ½"

Hole Inclination : 45°

Hole Temperature : 55°

Max. Dogleg Severity : 0°

Core Size : 4"

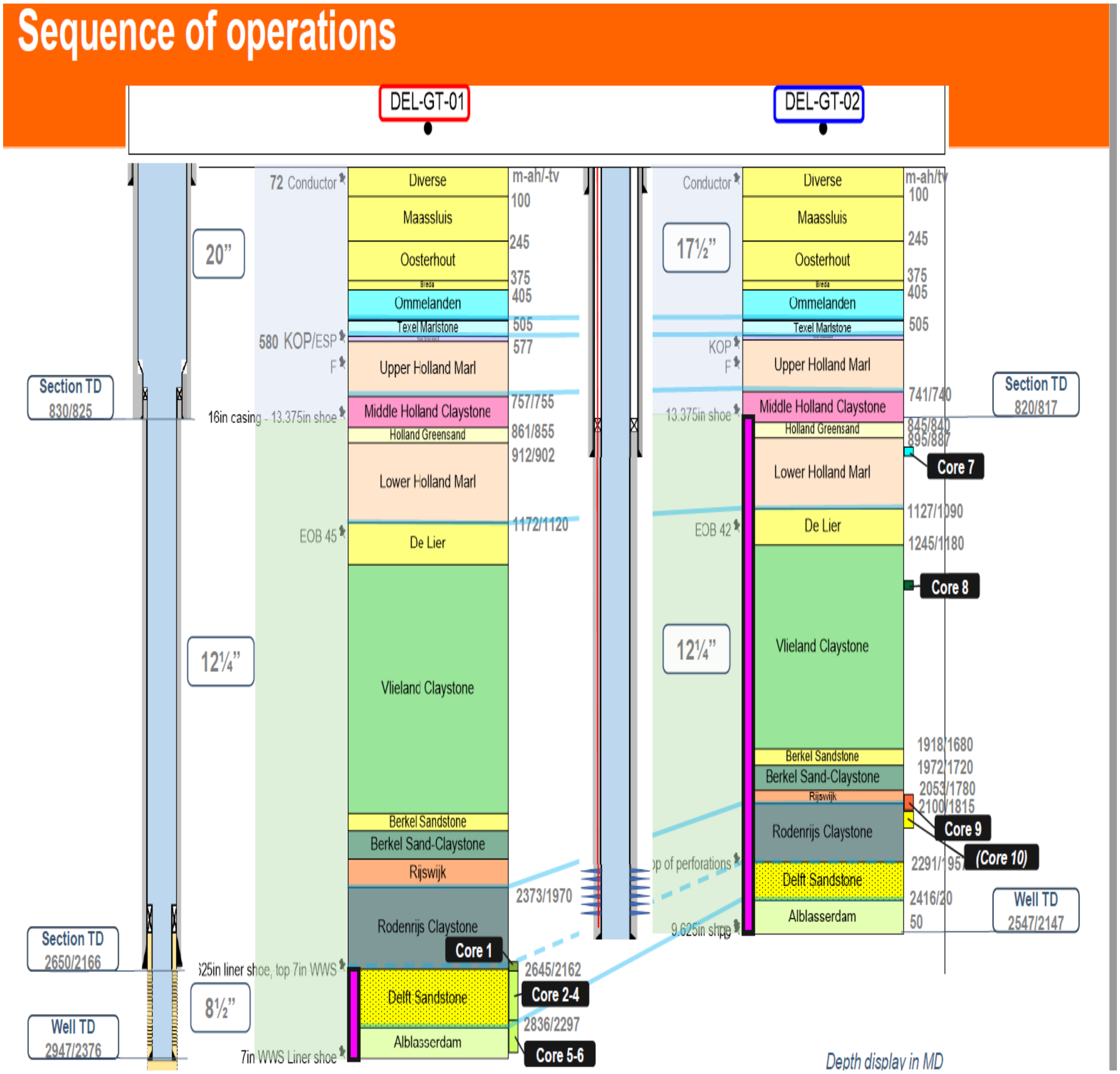
Mud System : Synthetic OBM with low solids

Mud Weight : 1.09 – 1.18 s.g.

Viscosity : 55 cL

Rig : Huisman – LOC400

Contractor : TU Delft



1.2 Safety

The operation on DELFT DEL-GT-01 Well was carried out according to IOT Groups safety procedures. All risk assessments, permit requirements and safe working practices were followed along with detailed communication between all parties involved.

1.3 Core Program Main Targets

The following run schedule is proposed for DEL-GT-01

- Core 1: 27 meters 8 ½" x 4" (in 12 ¼" open hole) Rotary drilled. (GT-01) Optionally +7 meters intervals up to a maximum of 54 meters: From 2645 up to 2672mMD
- Core 2-6: 54 meters 8 ½" x 4" drilled with motor. (GT-01) 2675 up to 2945 mMD

1.4 Initial Coring Plan as Proposed

The coring plan was proposed as shown here in Table 1.

Table 1: Core Plan

Run#	Coring Interval (m MD)	Barrel Length (m)	Comments
1	**~2645m – 2672m**	**54m**	Slick Aluminium Liners Standard CBL, Conventional Catcher system and 8 ½" S013S incl 1.5 TFA Corehead - Rotary
Run#	**Coring Interval (m MD)**	**Barrel Length (m)**	**Comments**
2	**~2675m – 2729m**	**54m**	Slick Aluminium Liners Standard CBL, Conventional Catcher system and 8 ½" S013S incl 1.5 TFA Corehead - Including Motor
3	**~2729m – 2783m**	**54m**	Slick Aluminium Liners Standard CBL, Conventional Catcher system and 8 ½" S013S incl 1.5 TFA Corehead - Including Motor
4	**~2783m – 2837m**	**54m**	Slick Aluminium Liners Standard CBL, Conventional Catcher system and 8 ½" S013S incl 1.5 TFA Corehead - Including Motor

IOT Holland
Boekel 36,
1921CE Akersloot,
T+ 31 (0)725333222

Table 1			
Run#	**Coring Interval (m MD)**	**Barrel Length (m)**	**Comments**
5	**~2837m – 2891m**	**54m**	Slick Aluminium Liners Standard CBL, Conventional Catcher system and 8 ½" S013S incl 1.5 TFA Corehead - Including Motor
6	**~2891m – 2945m**	**54m**	Slick Aluminium Liners Standard CBL, Conventional Catcher system and 8 ½" S013S incl 1.5 TFA Corehead - Including Motor

BHA Description

Run #1: CH-54m CBL, Circ Sub, Float Sub, X-O, 8"DC, 11 5/8"String Stab, 2x8" DC, 12"String Stab, 3x8"DC , JAR, 5"HWDP

Run #2-6: CH-63m CBL, X/O, Dynomax Moto, STAB-6 ½", Circ Sub, Float Sub, 2x 6 1/2"DC, 7.875 string stab, 5x 6 ½" DC, 10x HWDP

2.1 CORE ACQUISITION DESIGN AND IMPLEMENTED METHODOLOGY

Implemented Methodology

The programme took a proactive approach to optimising field performance as follows:

- **Core Barrel:**

IOT's core barrel with stabilisers positioned every 4,5m at the bottom section, followed by stabilization every 9 meter, utilising a HD spring core catcher system.

- **Coreheads:**

The primary corehead selected for DEL-GT-01 was the 8 ½" x 4" IOTS 013 a 10 bladed core head with 13mm cutters. 1.5 TFA. Optional core heads were available at the location.

Corehead specification sheets are available in the appendices.

- **Inner Assembly:**

Slick aluminium liners were used alongside a standard spring catcher for the formation.

- **Surface Handling:**

Implemented intrinsic core surface handling procedures to minimise mechanical core damage during recovery and ensure the highest possible core quality. Once the core was recovered to surface it was laid down using the cradle, marked, performed Gamma Ray services from this point on the first core only and cut into 1 meter sections and professionally packed in IOT Core Transport boxes.

- **Mud:**

Versaclean LTOBM 1.17 s.g.

- **Corebarrel BHA:**
  - Run 1

    A 54m x 8 ½” x 4” core barrel assembly complete with an 8 ½” x 4” 013S PDC Corehead, 8 15/32” Corebarrel stabilisers, Slick Aluminium liner, standard swivel system and Smooth core catcher assembly.

  - Run 2 & 3

    A 54m x 8 ½” x 4” core barrel assembly complete with an 8 ½” x 4” 013S PDC Corehead, 8 15/32” Corebarrel stabilisers, Dynomax High Torque low speed motor, Slick Aluminium liner, standard swivel system and Smooth core catcher assembly.

  - Run 4 - 6

    A 27m x 8 ½” x 4” core barrel assembly complete with an 8 ½” x 4” 013S PDC Corehead, 8 15/32” Corebarrel stabilisers, Slick Aluminium liner, standard swivel system and Smooth core catcher assembly.

  - Run 7

    A 36m x 8 ½” x 4” core barrel assembly complete with an 8 ½” x 4” 013S PDC Corehead, 8 15/32” Corebarrel stabilisers, Slick Aluminium liner, standard swivel system and Smooth core catcher assembly.

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'Bottom Hole Assembly No;	6.75 x 54m
Location : Delft - GT -01 12 1/4 section - RUN 1	8 1/2" Coring in 12 1/4" section
Driller : Bogdan, Costa	

BIT DATA:		OTHER important data:		
Diameter	8½" x 4"	Weight of Top drive	16	Ton
Serie No	DN-CH-002-001-013	Weight of DCs below jar	11.00	Ton
Type	SN013	Weight below jar	21.00	Ton
Jets	10x12/32"	Weight of DCs & HWDP ab Acc	11.00	Ton
T.F.A.	1.5	Mud weight	1.18	sg

ITEM	SerNo:	'Nominal OD	ID	'Fish neck Length	OD	Connection	Length	Total Length	kg/m	weight (kg)	Buoyant total weight in mud (mT)	Assy #
Core Head 8½" x 4"	DN-CH-002-001-01	8 1/2	4			IOT B	0.44	0.44	278.9	122.7	0.10	#1
Stab 8 7/16"	IDN-CST-004	8 3/8		0.29	6 3/4	IOT P x B	1.22	1.66	278.9	340.3	0.39	
outer tube	IDN-CP3-675-002	6 3/4	5 3/8		6 3/4	IOT P x B	3.36	5.02	278.9	937.1	1	
Stab 8 7/16"	IOT0002-001	8 3/8		0.29	6 3/4	IOT P x B	1.22	6.24	278.9	340.3	1	
outer tube	IDN-CP3-675-001	6 3/4	5 3/8		6 3/4	IOT P x B	3.35	9.59	222.4	745.0	2	
Stab 8 7/16"	IDN-CST-003	8 3/8		0.29	6 3/4	IOT P x B	1.22	10.81	222.4	271.3	2	
outer tube	IDN-CB-675-006	6 3/4	5 3/8		6 3/4	IOT P x B	7.93	18.74	222.4	1763.6	4	#2
Stab 8 7/16"	IDN-CST-005	8 3/8		0.29	6 3/4	IOT P x B	1.22	19.96	222.4	271.3	4	
outer tube	IDN-CB-675-001	6 3/4	5 3/8		6 3/4	IOT P x B	7.93	27.89	222.4	1763.6	6	#3
Stab 8 7/16"	IOT-0002-003	8 3/8		0.29	6 3/4	IOT P x B	1.22	29.11	222.4	271.3	6	
outer tube	IDN-CB-675-003	6 3/4	5 3/8		6 3/4	IOT P x B	7.93	37.04	222.4	1763.6	7	#4
Stab 8 7/16"	IDN-CST-001	8 3/8		0.29	6 3/4	IOT P x B	1.22	38.26	79.29	96.7	7	
outer tube	IDN-CB-675-002	6 3/4	5 3/8		6 3/4	IOT P x B	7.93	46.19	222.4	1763.6	9	#5
Stab 8 7/16"	IOT-0002-002	8 3/8		0.29	6 3/4	IOT P x B	1.22	47.41	79.29	96.7	9	
outer tube	IDN-CB-675-004	6 3/4	5 3/8		6 3/4	IOT P x B	7.93	55.34	79.29	628.8	9	#6
Stab 8 7/16"	IDN-CST-002	8 3/8		0.29	6 3/4	IOT P x B	1.22	56.56	79.29	96.7	10	
top sub	IOT-0001-001	6 3/4	?	0.29	6 3/4	IOT P x NC 50 B	0.99	57.55	79.29	78.5	10	
6 1/2" circ sub	IDN-CS-003	6 1/2	1,57"		6 1/2	NC 50 P x B	0.68	58.23	79.29	53.9	10	#7
6 1/2" float sub	IDN-XO-268	6 1/2	~2,5"		6 1/2	NC 50 P x B	0.82	59.05	79.29	65.0	10	#8
XO	DN-XO-244	8"	2.8125	0.6	8"	NC 50 P x 6 5/8 Reg B	1.07	60.12	79.29	84.8	10	
1x 8 1/4" DC	Rig	8 1/4"	2.81"			6 5/8 Reg P x B	9.41	69.53	236	2220.8	12	
11 5/8" string stabi	11625-005	11 5/8	2.875	0.8	8 1/4	6 5/8 Reg P x B	2.11	71.64	79.29	167.3	12	#9
2 x 8 1/4" DC	Rig	8 1/4"	2.81"			6 5/8 Reg P x B	17.35	88.99	236	4094.6	15	
12" string stab	ITP2011-139IK	11 31/32	2.875	0.95	8 1/4	6 5/8 Reg P x B	2.44	91.43	79.29	193.5	15	#10
3 x 8 1/4" DC	Rig	8 1/4"	2.81"			6 5/8" REG P x B	26.42	117.85	236	6235.1	21	
8" Jar	INCO	8"	3"	0.8	8	6 5/8 REG P x B	9.09	126.94	220	1999.8	22	
2x 8 1/4" DC	Rig	8 1/4"	2.81"			6 5/8 REG P x B	17.46	144.40	236	4120.6	26	
8" Accelerator	INCO	8"	3 1/2"	0.56	8	6 5/8 REG P x B	8.52	152.92	220	1874.4	28	
2x 8 1/4" DC	Rig	8 1/4	2.81"			6 5/8 REG P x B	18.73	171.65	236	4420.3	31	
XO	Rig	6"	3"	0.46	6	6 5/8 REG P x NC 50 B	0.93	172.58	79.29	73.7	31	
15 x 5" HWDP	Rig	5"	3"			NC 50 P x B	138.58	311.16	63	8730.5	39	

Run #1

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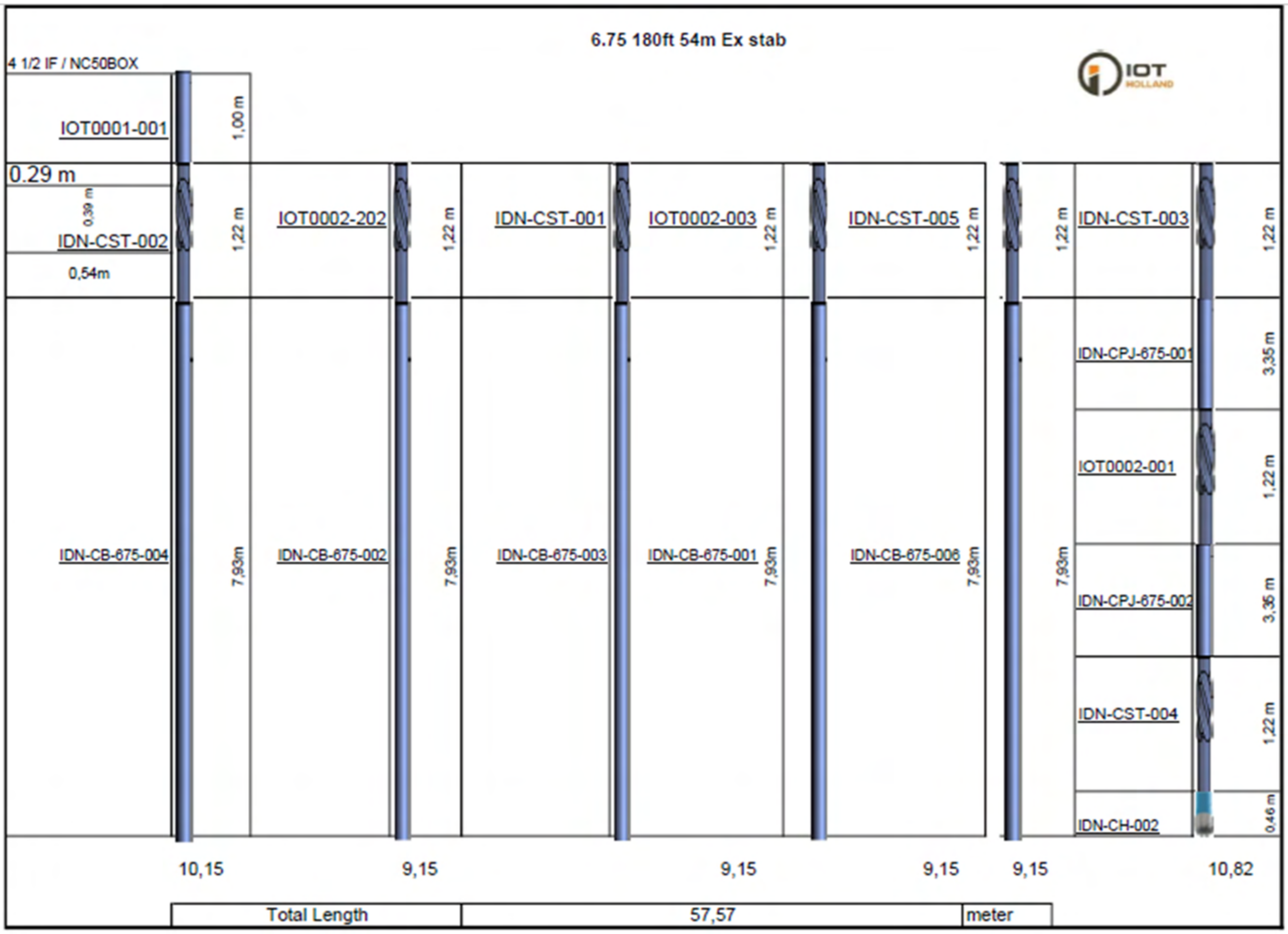

Run #1 54m 8 ½" x 4" Core BHA

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	'Bottom Hole Assembly No;					6.75 x 54m					
Location :	Delft - GT 01 - 8 1/2" Section - Core RUN 2-3					8 1/2" Motor Coring					
Driller :											
BIT DATA:			OTHER important data:								
Diameter	8½" x 4"		Weight of Top drive					Ton			
Serie No			Weight of DCs					Ton			
Type			Weight below jar					Ton			
Jets			Weight of DCs & HWDP					Ton			
T.F.A.			Mud weight					Kg/l			

ITEM	SerNo:	'Nominal		'Fish neck				Total		Total	weight
		OD	ID	Length	OD	Connection	Length	Length	kg/m	weight(kg)	in mud(kg)
Core Head 8½" x 4"	IDN-CH-002	8 1/2	4			IOT B	0,46	0,46		42,0	
Stab 8 7/16"	IDN-CST-004	6 3/4			6 3/4	IOT P x B	1,22	1,68		95,0	
outer tube	IDN-CPJ-675-002	6 3/4			6 3/4	IOT P x B	3,35	5,03		242,0	
Stab 8 7/16"	IOT0002-001	6 3/4			6 3/4	IOT P x B	1,22	6,25		95,0	
outer tube	IDN-CPJ-675-001	6 3/4			6 3/4	IOT P x B	3,35	9,60		242,0	
Stab 8 7/16"	IDN-CST-003	6 3/4			6 3/4	IOT P x B	1,22	10,82		95,0	
outer tube	IDN-CB-675-006	6 3/4			6 3/4	IOT P x B	7,93	18,75		570,0	
Stab 8 7/16"	IDN-CST-005	6 3/4			6 3/4	IOT P x B	1,22	19,97		95,0	
outer tube	IDN-CB-675-001	6 3/4			6 3/4	IOT P x B	7,93	27,90		570,0	
Stab 8 7/16"	IOT0002-003	6 3/4			6 3/4	IOT P x B	1,22	29,12		95,0	
outer tube	IDN-CB-675-003	6 3/4			6 3/4	IOT P x B	7,93	37,05		570,0	
Stab 8 7/16"	IDN-CST-001	6 3/4			6 3/4	IOT P x B	1,22	38,27		95,0	
outer tube	IDN-CB-675-002	6 3/4			6 3/4	IOT P x B	7,93	46,20		570,0	
Stab 8 7/16"	IOT0002-002	6 3/4			6 3/4	IOT P x B	1,22	47,42		95,0	
outer tube	IDN-CB-675-004	6 3/4			6 3/4	IOT P x B	7,93	55,35		570,0	
slick sub	IOT0122-001	6 3/4			6 3/4	IOT P x B	1,22	57,79		70,0	
Stab 8 7/16"	IDN-CST-002	6 3/4			6 3/4	IOT P x B	1,22	56,57		95,0	
Top Sub	IOT0001-001	6 3/4			6 3/4	IOT P x NC 50 B	1,00	58,79		130,0	
Pin/pin X/O	IDN-XO-337	6 3/4			6 3/4	4 1/2" REG P x NC 50 P	1,02	59,81		80,9	
Motor	DM675BT004	6 3/4			6 3/4	4 1/2" BOX REG x NC50 B	9,75	69,56		1320,0	
8,250 - string stab	IDN-8.250-061	6 3/4			6 3/4	NC50 P x NC50 B	1,44	71,00		198,2	
6 ½"Circ Sub	IDN-CS-003	6 1/2			6 1/2	NC50 P x NC50 B	0,68	71,68		53,9	
6 ½" Floatsub	IDN-XO-268	6 1/2	2 13/16"		6 1/2	NC 50 P x NC 50 B	0,91	72,59		72,2	
2 x 6 1/2" DC					6 1/2	NC 50 P x NC 50 B	18,46	91,05		1463,7	
7,875 - string stab	IDN-8.000-051	6 3/4	2 3/4		6 3/4	NC50 P x NC50 B	2,50	93,55		198,2	
3 x 6 1/2" DC		8"	2 7/8"		6 1/2	NC 50 P x NC 50 B	27,48	121,03		2178,9	
6 1/2" Jar	HJDA650-088	8"	3"		6 1/2	NC50 P x NC50 B	9,90	130,93		785,0	
2 x 6 1/2" DC		8"	2 7/8"		6 1/2	NC 50 P x NC 50 B	18,46	149,39		1463,7	
10 x 5" HWDP		5"	3 1/4"		5.00	NC50 P x NC50 B	94,82	244,21		7518,3	

Run #2 & 3

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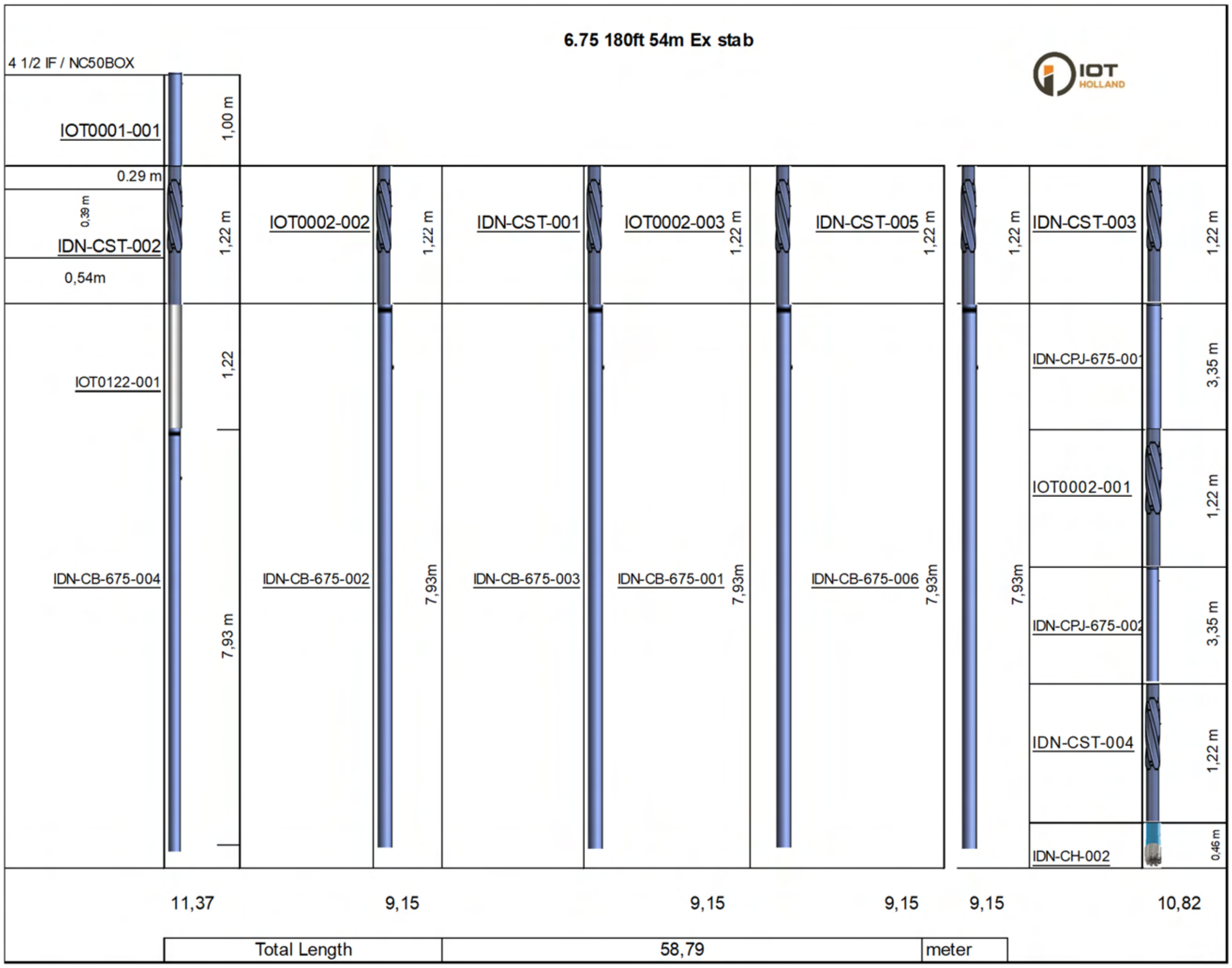

Run #2 & 3 54m 8 ½” x 4” Core BHA Incl Motor

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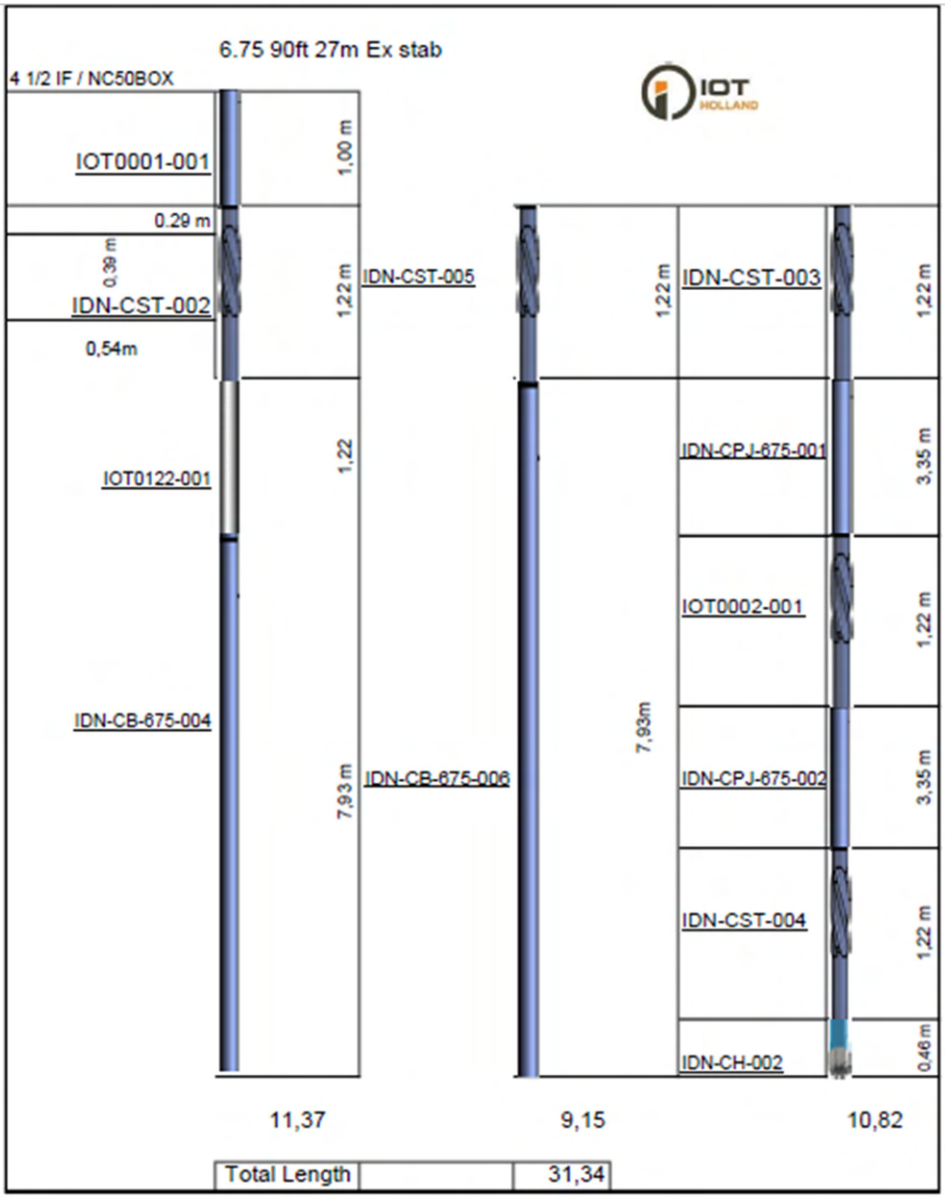
	'Bottom Hole Assembly No 11;		**6.75 x 54m**
	Location :	**Delft - GT -01 8 1/2 section - RUN 3**	**8 1/2" Motor Coring**
	Driller :	**Marco, Bogdan**	

BIT DATA:		**OTHER important data:**		
Diameter	8½" x 4"	**Weight of Top drive**	16	Ton
Serie No	IDN-CH-002-001-013	**Weight of DCs below jar**	7,50	Ton
Type	SN013	**Weight below jar**	10,50	Ton
Jets	10x12/32"	**Weight of DCs & HWDP ab Jar**	8,00	Ton
T.F.A.	1,5	**Mud weight**	1,10	sg

ITEM	SerNo:	'Nominal		'Fish neck		Connection		Total			Buoyant total weight	Assy #
		OD	ID	Length	OD		Length	Length	kg/m	weight (kg)	in mud (mT)	
Core Head 8½" x 4"	IDN-CH-002-001-013	8 1/2	4			IOT B	0,44	0,44	278,9	122,7	0,11	#1
Stab 8 7/16"	IDN-CST-004	8 3/8		0,29	6 3/4	IOT P x B	1,22	1,66	79,29	96,7	0,19	
outer tube	IDN-CP3-675-002	6 3/4	5 3/8		6 3/4	IOT P x B	3,36	5,02	222,4	747,3	1	
Stab 8 7/16"	IOT0002-001	8 3/8		0,29	6 3/4	IOT P x B	1,22	6,24	79,29	96,7	1	
outer tube	IDN-CP3-675-001	6 3/4	5 3/8		6 3/4	IOT P x B	3,35	9,59	222,4	745,0	2	
Stab 8 7/16"	IDN-CST-003	8 3/8		0,29	6 3/4	IOT P x B	1,22	10,81	79,29	96,7	2	
outer tube	IDN-CB-675-006	6 3/4	5 3/8		6 3/4	IOT P x B	7,93	18,74	222,4	1763,6	3	#2
Stab 8 7/16"	IDN-CST-005	8 3/8		0,29	6 3/4	IOT P x B	1,22	19,96	79,29	96,7	3	
outer tube	IDN-CB-675-004	6 3/4	5 3/8		6 3/4	IOT P x B	7,93	27,89	222,4	1763,6	5	#6
Slick sub	IOT-0122-001	6 3/4			6 3/4	IOT P xB	1,22	29,11	79,29	96,7	5	
Stab 8 7/16"	IDN-CST-002	8 3/8		0,29	6 3/4	IOT P x B	1,22	30,33	79,29	96,7	5	
top sub	IOT-0001-001	6 3/4	?	0,29	6 3/4	IOT P x NC 50 B	0,99	31,32	79,29	78,5	5	
6 1/2" circ sub	IDN-CS-003	6 1/2	1,57"		6 1/2	NC 50 P x B	0,68	32,00	79,29	53,9	5	#9
6 1/2" float sub	IDN-XO-268	6 1/2	~2,5"		6 1/2	NC 50 P x B	0,82	32,82	79,29	65,0	5	#10
1x 6 1/2" DC	Rig	6 1/2	2.81"		6 1/2	NC 50 P x B	8,93	41,75	134,88	1204,5	6	
8,250 - string stab	IDN-8.250-061	8 1/4		0,62	6 3/4	NC 50 P x B	1,44	43,19	222,4	320,3	6	#8
2x 6 1/2" DC	Rig	6 1/2	2.81"		6 1/2	NC 50 P x B	18,14	61,33	134,88	2446,7	7	
7.875" string stabi	IDN-8.000-051	7 7/8	2,875	0,8	6 3/4	NC 50 P x B	2,51	63,84	79,29	199,0	7	#11
3 x 6 1/2" DC	Rig	6 1/2	2.81"		6 1/2	NC 50 P x B	26,78	90,62	134,88	3612,1	10,5	
6.5" Jar	HJDA650-088	6 1/2	3"	0,8	6 1/2	NC 50 P x B	9,90	100,52	79,29	785,0	11	
2x 6 1/2" DC	Rig	8 1/4"	2.81"		6 1/2	NC 50 P x B	18,10	118,62	134,88	2441,3	13	
10 x 5" HWDP	Rig	5"	3"		5	NC 50 P x B	92,39	211,01	74,09	6845,2	19	

Run #4 -6 (Run 7 a 36 meter long core barrel has been used with the same DD BHA)



Run #4-6 27m 8 ½" x 4" Core BHA

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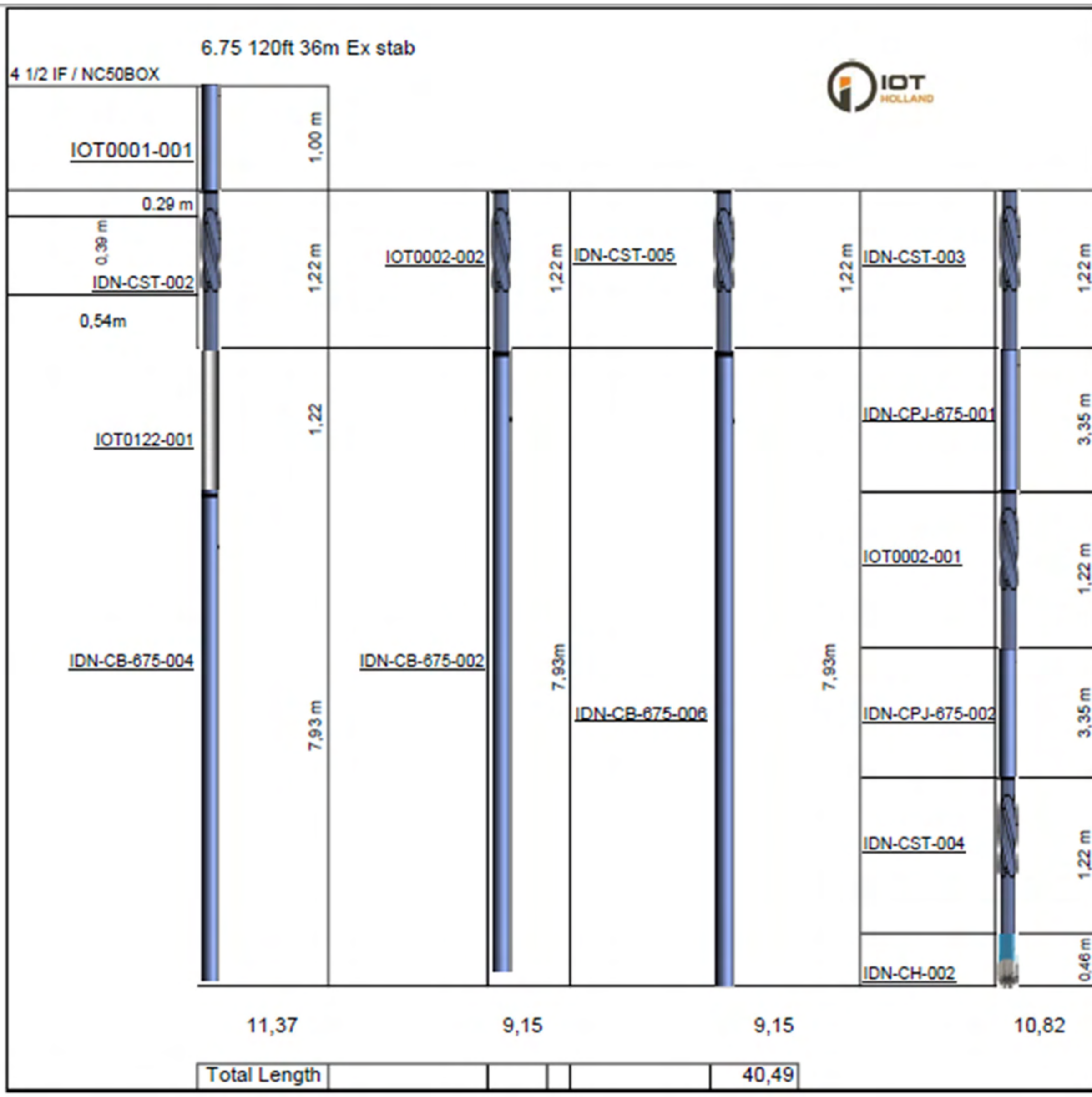

Run #7 36m 8 ½" x 4" Core BHA

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2.2 Coring Observations

2.2.1 Coring interval 2511,5 – 2527m (Run – 1) Cut 15,5m -15,5m RECOVERY.

During running in the corebarrel it came to the attention that the 12 ¼” PDC drill bit used in the previous BHA was 44mm under gauged, as well as the Gun Reamer further up the BHA. This confirmed an undergauged holes, therefor the coring BHA has been last minute revised, such a 54m core could be taken without getting ingauge with the undergauged section.

After the BHA change, we continued RIH and tagged bottom using 2 tons, and a pump rate of 2000 LPM, without any rotation. Confirmed core start depth at 2511,5m.

Started coring using 1-2 tons WOB and 60 RPM, ready to imbed the corehead into the formation. The the first 2 to 3 meters low parameters were used, 3 to 4 tons WOB and 70 RPM.

At depth 2519,5 the rate of penetration (ROP) dropped to zero. The decision was made to increase the WOB to 6 tons. This seemed to be successful while the ROP picked up again.

At depth 2524m a connection was required, the connection was made in 14 minutes and was successful. At depth 2026,5m another jamming indication came forward, decided was to increase the WOB again to 10T. Initially this seemed to be successful, however at 2527m it was clear by monitoring a pressure drop from 80 – 72 bar and as well as torque reduction and zero ROP that the Corebarrel was jammed.

A final try of another 2 ton tons on top of the 10 tons did not bring any positive response to the core barrel, confirming this was a clear jam. Decision to pull from bottom and noticed a 6 ton break, possible from the cored rock.

POOH wet as an indication the Corebarrel was jammed and prepared a slug prior activating the circulation sub.

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At surface a 100% core was recovered and the corehead was dullgraded as 0-0-A-X-I-NO-PR.

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2511,5	2527	15,5	2,63	5,89	15,5	28,25	100,00	No more R.O.P

COREHEAD — ***DULL GRADING***

Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-New
OD:	8.5	**Thread:**	Heavy Duty Thread	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-New

After laying down the core cradles processing of the cores was started, Gamma Ray, Core Cutting, Chipping, Capping and clipping before preparing the cores for transport into the core containers.

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The 9 meter innertubes were cut using the IOT Shearboot.

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After POOH the innertube, the innertube were placed into the corecradle which was attached to the right side gangway. After this was done, the Manitou could gently lift the corecradle into a horizontal position and place the corecradly at the processing area.

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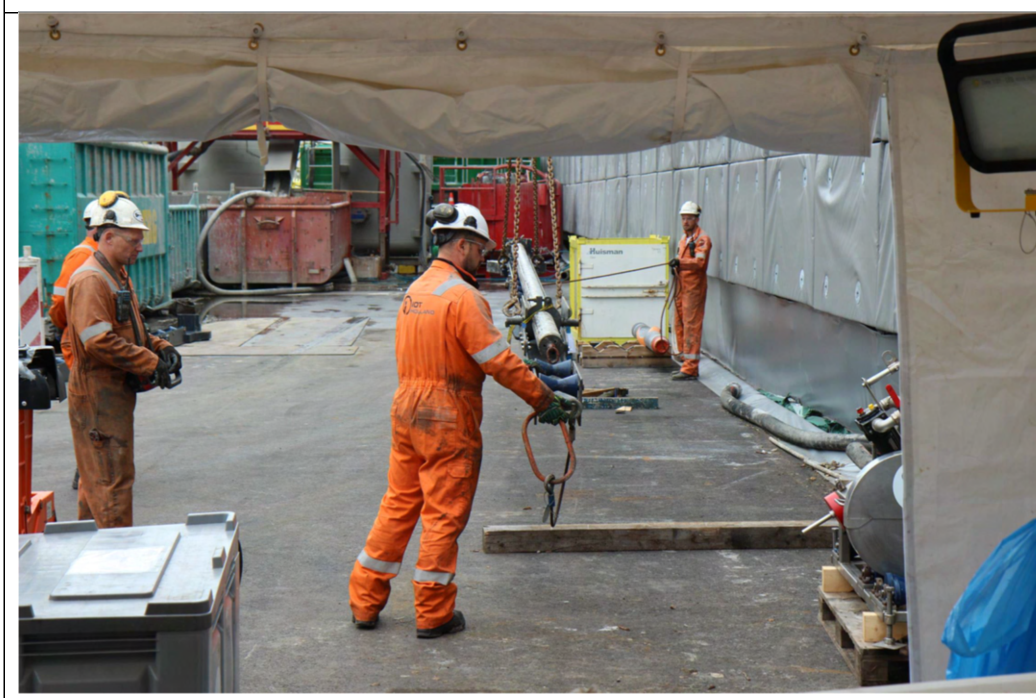
Core lowered into a horizontal position via the core cradle



Transportation of a 9 meter innerbarrel to the processing area with the Manitou.

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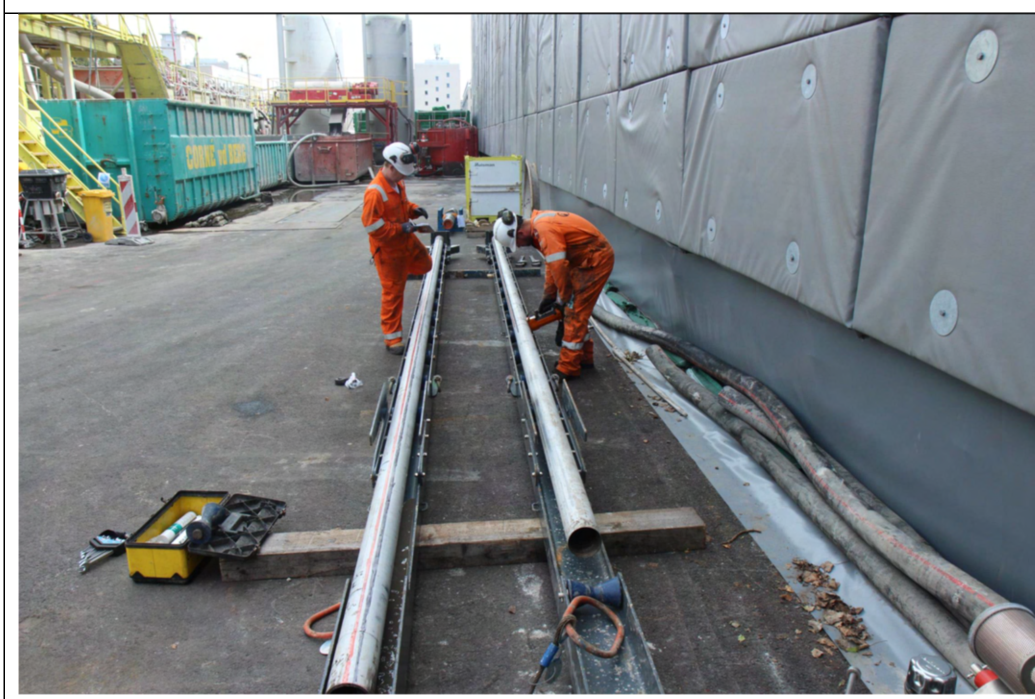
Measuring and marking the innertubes, prior to further processing.



Core gamma logging services

Cutting the core in 1 meter section's

After cutting the cores the cores were further processed by the TU Delft Team. They additionally labelled and photographed the core ends, foaming (by IOT), cap & clipping, packing into the core transport box container and transporting the cores to the TU Delft facility.

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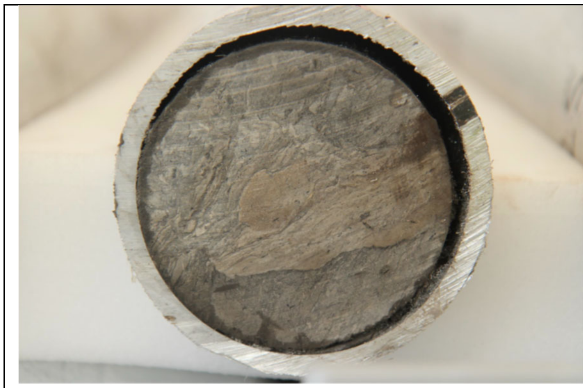
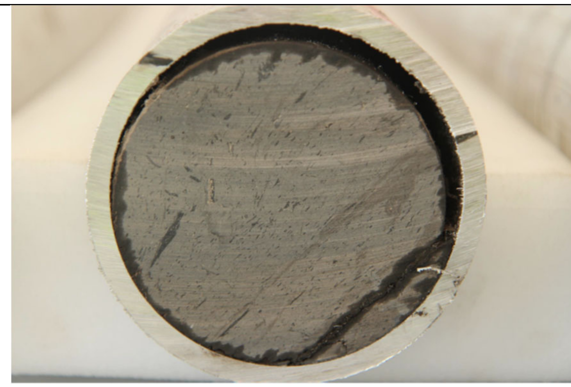
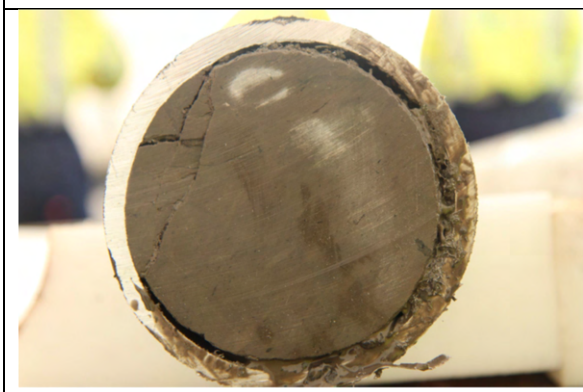
 2513.5m MD	 2515.5 m MD
 2520.5m MD	 2520.5m MD

2.2.2 Coring interval 2576 – 2591m (Run - 2) Cut 15m – 15m Recovery

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2576	2591	15	6,67	2,25	15	27,34	100,00	Motor Stalling

COREHEAD / ***DULL GRADING***

Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-New
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-New

Previous drilling out the shoetrack and cut 3 m formation, using a jung basket and a magnet DC.
The drillbit dullgraded on request and it appeared 0-1-WT/LT-G-X-1-TD 1 /32"undergauge. LT as the diamond table of the centre cutter was no longer there.

Drillbit used for drill our the shoetrack

During tripping in and on request to investigate the possible junk at the junk basket, metal was found at the magnet and as well junk including Tong Dies inside the junk basket.

Tong dies found inside the junk basket

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Prior to start Core run #2 A toolbox talk has been held with all crew on the Rig floor 1 single off bottom.

Lowered the string until the bit and 1st stab were inside the 8 ½" hole, 1m above bottom @ 2575m.
Break circulation with 1200 lpm = minimum operating flowrate for the motor, SPP 54 bar
Tag bottom with very little weight 0.5t – 1t, immediate a high 30 bar pressure spike was noticed. We stopped and let the pressure drop back to 54 bar. Add some weight again and immediate again a +/- 30bar pressure spike occurred. We stopped again, pulled up 0.5 meter and let the pressure drop back to 54 bar, go back to bottom.

Commenced coring without issues with slowly increasing parameters; 1 – 2 - 3t WOB, 1200 lpm, 54 to 63 bar SPP (9 bar diff pressure).

With the parameters balanced at 3t WOB, 10 bar diff pressure, 3.5 knm torque at surface the auto driller was activated with max 6 m/hr set point.

No issues during +/- 10m coring on this first single, stable pressure, diff pressure, torque and ROP.

At +/- 1m before the connection the Assistant Driller noticed that at the mud pump pre-charge pump a valve was in a wrong position. After setting the valve in the correct position the SPP rose immediately to 118 bar (the bit was on bottom and coring was in progress).

It was calculated that the flow before had been 950lpm, -> this is under the Motor limit and can cause serious damage to the motor power section.

1 meter deeper the single was down (with 11 meters cored) and a connection was made according the IOT procedures;
Drill off WOB stop circulation, no more diff press -> off botom pressure dropped to 87 bar.
P/U minimum enough to set the auto slips, make connection, take auto slips out and start pumps with 1200lpm, apply WOB.

07:00 crew change

Different than prior the connection been made, SPP was spiking and the ROP fluctuating.
Note: Depth at 2590m changed by drillers decision and logging unit to 2588,8m (IOT had no involvement in this).

Coring continued for another 4 meters but the downhole conditions became worse with the pressure fluctuating and spiking constantly with increasing numbers.

At (2591m) severe motor stalls occurred.
Making attempts to re-start several times (while the core was still not broken) the string was moved up and down without success.
Decided to break the core using 11T (this number after recalculating the string weights) and pulled off bottom.

To make a last effort to re-start, the weights were taken off and off bottom pressures noted.
It was tried to re-start coring but it was not possible to apply any WOB, the SPP would spike immediately putting severe stress on the motor power section.

The decision was made to stop coring and P.O.O.H

We suspected the corehead and/or the stabilizers would be undergauge, therefor the core barrel assembly was POOH to investigate, and confirmed all as new, no damage seen.

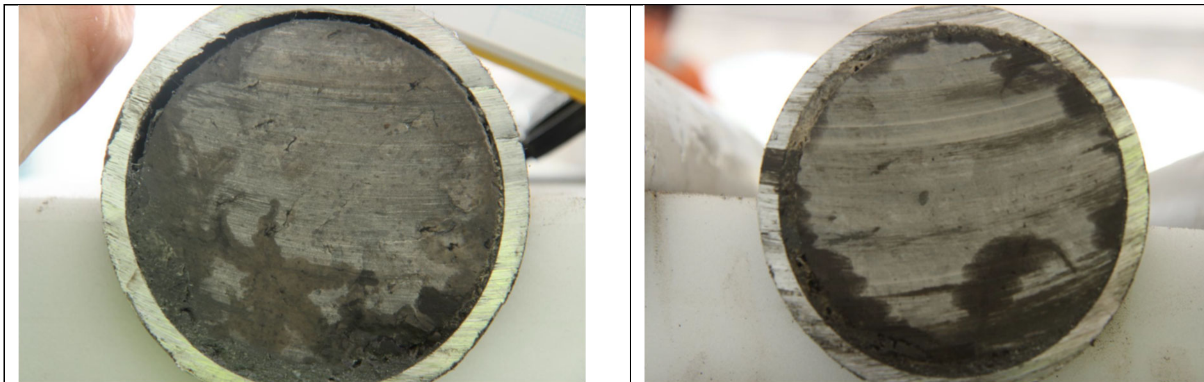
At surface we recovered 14,75 meter.

Returned the motor to base for further inspection.

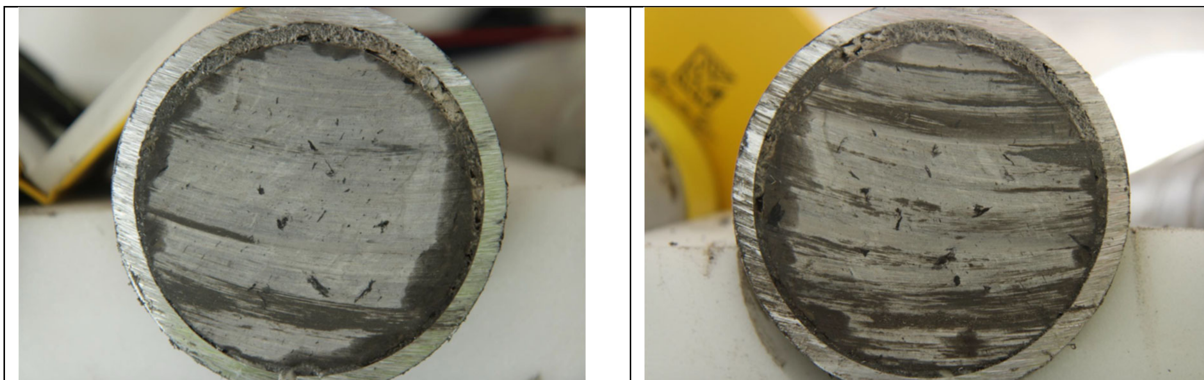
TU delft made the decision to consume the Core shoe and catcher in order to split this to ensure the valuable core does not get damage while pushing out the core.

Note: Reviewing the plugged shoe as well noticed the stalling behaviour only using 1/2 T of weight attempting to get on bottom, it is very likely the corehead and shoe had been completely packed off and therefor restricted to pass any flow through the corehead throat and ports.
There was some slight evidence of hard rock closing of the ports being pushed trough the ports from the out side to the very inside.

This has been witnessed by the TU observer and cleaned by the engineer using a screwdriver while this was seriously blocked.



2578m MD - Medium to coarse silt, hard, floating thin but cm scale wide organic matter in fluidised form throughout, medium gray.



2580 m MD – Medium to coarse siltstone, light to medium grey, mm-size floating organic matters, some cm-sized plant remains. The annules shows the stabilization of foam material.

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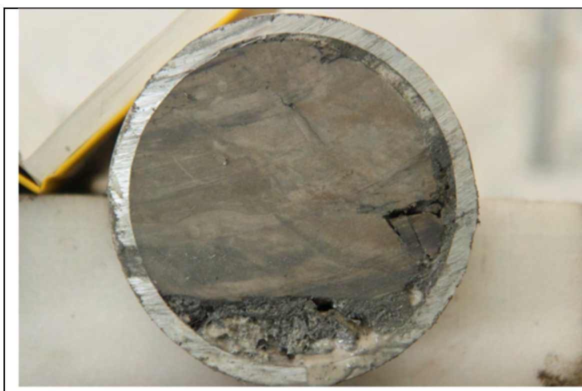
2581.1 – 2581.38m MD - Hard and solid, quite homogeneous, dark grey coarse siltstone, breaks shows some patterns that esembled slickensides in a paleosoil



2586.38m MD - Brownish grey, slicked or fluidised, medium to coarse siltstone, black organic filled ‘cracks’, some pieces missing

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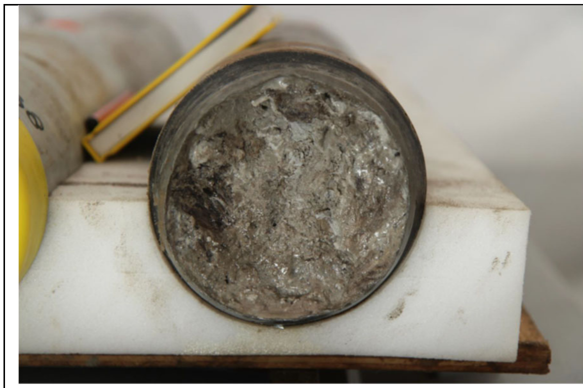	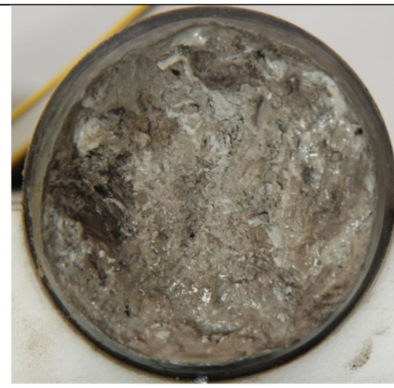

2591.09m MD - Seemingly unconsolidated, soft, very fine sandstone, some organic matter in slicks or slided fractures, shoe completely filled distortion from coring and from rock?

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2.2.3 Coring interval 2594 – 2598m (Run - 3) Cut 4m – 2.25m Recovery

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2594	2598	4	1,15	3,48	2,25	7,29	56,25	Jammed, no more ROP

COREHEAD / ***DULL GRADING***

Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-RR
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-PR

Test Dynomax Mud Motor IDN-CST-003. 940 lpm / 11 bar, 1250 lpm / 17 bar, 1500 lpm / 23 bar

Redressed the corebarrel using rerun aluminum liners, a new bearing and pre-set ADBS.

RIH smoothly at the last singles P/U pup joint to space out for full single coring, Take weights without pumps; 65t up, 44t down, Toolbox meeting on Rotary Floor with full crew

Wash down from 2584 m to 2591m with 1200lpm. Continue to run to bottom find resistance @ 2584m, performed a pipe stretch test, 0.45m, connection, adjust depth at Tooljoint.

Cleaning or Coring 8 1/2" hole from 2591m to 2594m using 1200lpm and presumed start of coring with 0 to 0.5t WOB, 1 bar diff press, ROP 32 m/hr

From 2594 to 2598m, 1250 lpm, 13 bar diff press, WOB 1.4t to 6t, ROP 3 to 6 m/hr seem to be more realistic.

After 4m cored at depth 2598m, Motor Stall, p/u and stop pumps. P/U to neutral at 53t (0.4m), start pumps 1500lpm, and establish stable flow and SPP. Start rotation 20 rpm, SPP increase due to sudden weight transferred to the core head.

Go back to bottom but no more progress, increase WOB to max 10t, no diff press, not successful.

Pull to neutral, stop rotation, stop pumps, pull to up weight 65t, no overpull.

Indications that core is jammed and decided to break the core and attempt to restart.

Again back to bottom with 1500lpm, 20 rpm, 6t WOB, 0 bar diff prress, no progress.Pull inside shoe and drop circ.sub ball prior POOH.

Receiving the message from DSV ; 29-08-2023 consensus was reached that the well depth as per core run #2 is 2598m as bottom of the well was tagged at 2594m and coring stalled at 2598m. At surface a length of 2,25m core 56% was recovered.

Core was jammed inside the shoe and catcher was broken. Discovered the broken catcher is a school example of pulling while rotating, unfortunate this came due to the necessity to pull the motor in an attempt to overcome stalling.

While redressing the activation sub there was corroded metal found on top of the ball. Corehead was graded 0-0-NO-A-X-I-NO-PR

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The corehead after Run #3

Corroded metal found on top of the ball (activations sub)

	
	

Photo's from the core ends

2.2.4 Coring interval 2597.5 – 2610m (Run - 4) Cut 12.5m – 12.5m Recovery

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2597,5	2610	12,5	3,23	3,87	12,5	45,57	100,00	Jammed at connection

COREHEAD | ***DULL GRADING***

Type:	S013	**SN:**	IOT	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-RR
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-PR

Redressed the Circulation sub and prepared a 27m ADBS Corebarrel, instead of 54m and proceed with RIH.

Running to core point went smooth washed down pipe at 2580M, using 990LPM creating 30 bar pressure SCR's taken, continue to wash down to bottom, during this pump problems from 20:15h till 20:40

20:40, activated ADBS using 1500LPM, activated creating 27B increase. 21:00, using 950LPM and 60RPM reaming to bottom, tagged bottom at depth 2597,5m using 2-3T at depth 2610m connection was carefully made but failed to continue coring , string stalled after attempting re-start.

Decision to stop Coring was made.

At surface a 12,5m core was recovered, un-connecting the empty innertubes, laying down the innertubes including the rock with the cradles using the Manitou to overcome any breakage. Prepared for processing. Reviewing the corehead and found a piece of rock inside this, removed and dullgraded 0-0-NO-A-X-I-NO-PR.

Rock stuck in the corehead.

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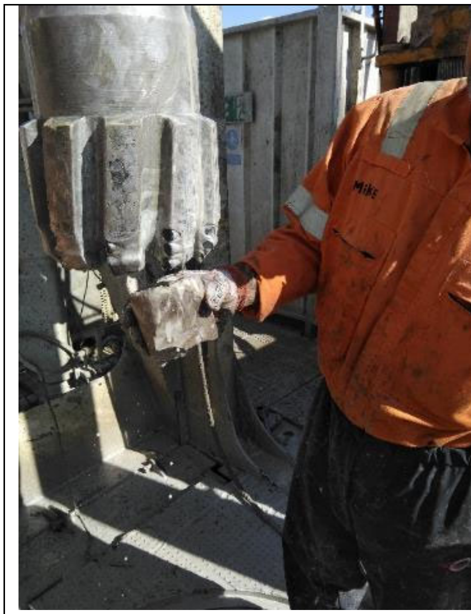	

Inspection of the corehead.

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2.2.5 Coring interval 2610 – 2617,5m (Run - 5) Cut 7,5m – 7,32m Recovery

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2610	2617,5	7,5	2,18	3,44	7,32	27,34	97,60	Jammed

COREHEAD — ***DULL GRADING***

Type:	S013	SN:	IDN-CH-002	IADC:		Before run:	0-0-NO-A-X-I-NO-RR
OD:	8.5	Thread:	IOT	TFA:	1,5	After run:	0-0-NO-A-X-I-NO-PR

Redressed Circ sub and prepared a 27m ADBS Corebarrel, using remaining rerun innertubes, RIH.

Running to core point, this went smoothly, washed down pipe to bottom, At 09.20 depth 2596,5 check depth at TJ.

Depth 2603m, using 20 RPM - Stall, increase to 70 RPM ream down to2609,5m

09:40, SCR's up: 59T, rotating: 49T using 20RPM

09:50 Activated ADBS 1500 LPM, 88B. When activation was set, decreased to 1000 LPM using 44B of Bottom pressure.

Start coring manually using 2T WOB, 70 RP, 1000LPM 0n bottom 47B.

Coring commenced bedding in 2 Tons, 70RPM and 1000LPM, this to avoid any possible fractures getting disturbed, such jamming occur.

Realizing interbedded shale as well introduce sand layers plugging off, possibly due to weight transferred at the innerbarrel to overcome jamming at the vertical fracture within the shale, silt layers. To overcome any risk making the connection as super single was prepared prior to start coring.

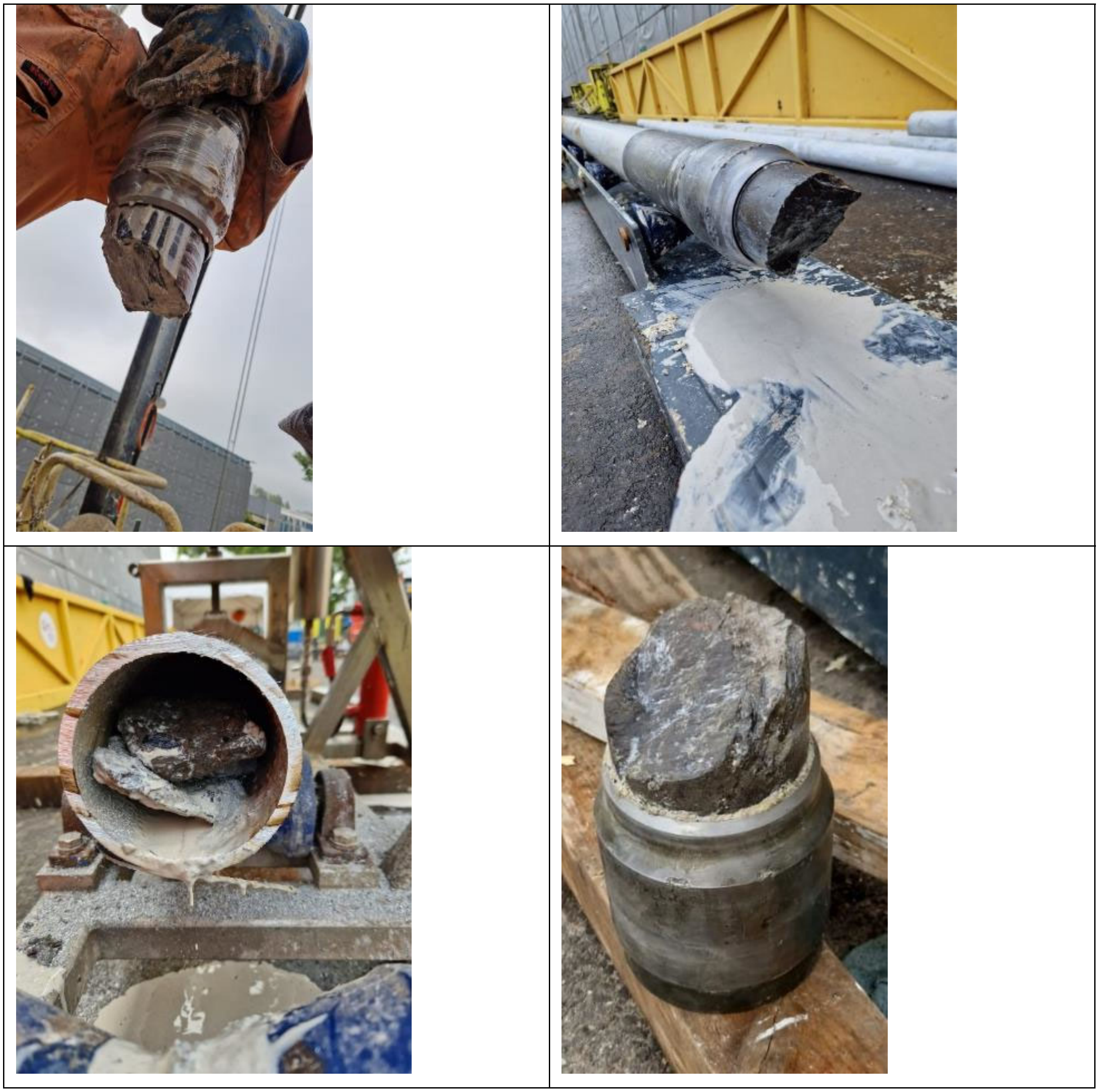
All scenarios seem to be covered, unfortunate after 8m the coring operation had to stop due to jamming. Attempted to use different weights but this failed.

At surface a 7,32m core was recovered (97,6%) very likely related to the pipe squad using 10-12T and the formation seems too hard to drill or mill.

Reviewing the core while processing.

In the shoe there is a paleosoil developed in a hard siltstone full with slickensides, it may have jammed coring. The piece just before however we got out nicely as one long solid core, so it would mean that a few slickensides have jammed the whole core within the catcher.

Around 2614.5m, it is most sandy in this interval, but still not the sand that was expected below the pick of the Delft Sandstone.



Core stuck in shoe

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Front view of core number 5

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2.2.6 Coring interval 2618 – 2642m (Run - 6) Cut 24m – 23,95m Recovery

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2618	2642	24	7,80	3,08	23,95	87,49	99,79	Jammed, no more ROP

COREHEAD / *DULL GRADING*

Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-RR
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-PR

Realizing lubrication could be a serious factor of jamming the formation, between the annulus of the innertube and core, it was suggested to create an oilbase pill using the following calculation;

1. Inner barrel volume 27m = 250liter
2. Pipe volume = 10l/m

Activating the ADBS whenever this lubrication pill is inside or close within the innertubes, pumping enough to activate (density 0.8kg/m) the ADBS, to overcome the oil based pill leaves the innertube.

Decided to prepare and pump a pill of 2m3, calculating the time frame (2000-250)/1500 = 70sec enough time to activate the ADBS.

At the shoe 2570m, a TBT At the shoe around 2570m a TBT was requested, from this moment circulating 800LPM giving 22B washing down the pipe.

During this procedure from depth 2587m reaming was required using 50RPM. During this operation the corebarrel stalled at depth 2607m, therefor increase of 70RPM was required. (At that time) current tally 2617 Weights where measured / noted 60T up 16T down rotating 51T. Prepared super single attempt to minimize the number of connections during coring. SCR where measured,

Rotating 60RPM 10K/NM TQ, Rotating 70RPM 10K/NM TQ ,Rotating 80RPM 10,5K/NM TQ

At 14.05 Starting the OBM pill

At 14.50 pumped pill with 800LPM

Activated ADBS using 1800LPM creating 78B , @ 800LPM 31B

Start Coring at presumed Depth 2618m.Using 1-2T weight achieving a fast 5min/m ROP.At depth 2631m the driller suspected the pipe tally was incorrect.

While expecting coring operations approx. already cutting 13m, realistically from this point of we should have been on depth 2631m but recalculating backwards coring actually just started at 2618m.

From this point on it was decided to fullfill the corebarrel maximum ignoring depths. At 2642m core jammed confirmed no more TQ and ROP. Lay down 1 single and drop the circulation sub activation ball. Confirmed landing start pumping 2000LPM. P.O.O.H

At surface a 100% core was recovered. Corehead indicated JD (junk/debris) at the shank

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2.2.7 Coring interval 2641 – 2651m (Run - 7) Cut 10m – 9,9m Recovery

PERFORMANCE

Depth In	Depth Out	Cut Length	Hours	ROP	Recover	Efficiency	Recover	Reason for stopping coring:
[m]	[m]	[m]	[hrs]	[m/hrs]	[m]	%	%	
2641	2651	10	2,88	3,47	9,9	27,34	99,00	

COREHEAD / *DULL GRADING*

Type:	S013	SN:	IDN-CH-002	IADC:		Before run:	0-0-NO-A-X-I-NO-RR
OD:	8.5	Thread:	IOT	TFA:	1,5	After run:	0-0-NO-A-X-I-NO-PR

After a reasonable success rate cutting 24m using a 27m corebarrel, it was agreed to adjust the corebarrel to a 36m length. Using the same corehead as previous runs. A part of the success at run 6 been claimed to the OBM pill pumped downhole such it was timed to set within the innertube at the very moment the ADBS was activated.

Running in hole smoothly at depth 2614m a 995 LPM was pumped and washed down pump pressure indicated 33B. Without rotation some spikes of weight (1-2 T) were observed.

SCR's were taken at 2626m using 1000LPM and noted, continued washing down with rotation of 30 RPM till 2639m, from this stage a super single was picked up in order to bring in maximum pipe to extend the meterage prior connection.

Displace OBM pill using 800LPM, from there expecting it would set within the innertube after 35min. Activated the ADBS using 1850LPM , back to 800LPM and 7Bar increase 25-32, indicate the ball was at the seat closing the innertube from flow.

Coring operation commences smoothly using minimum of weight and RPM to overcome any disturbance until nearly 10m where cored, a clear jamming signal was presented; No more ROP, TQ when down , pressure raised , although attempted to push the formation through the recognized jamming , using 7T, without success.

Being aware the formation could be a (softer) sand and therefor plugged, it was decided to stop coring and pull from bottom, there was no overpull seen.

POOH of hole at surface the innertubes where layed out until the last 2 innertubes indicated cored rock was inside. From there the recovery procedures including cradle proceeded. At the bottom innertube core was sticking out the shoe.

During processing and cutting it was noted at several places core jammed within the innertube and core shoe. At the workshop it took 10T to push the core out of the shoe.

Break out Coring assembly to pick up drilling equipment. Visualized the corehead, the severe damage at the shank remained the same but cutters graded as 0-0.

Although it's clear why the core jammed, there is a slight suspicion while reviewing the time of pumping OBM pill, and time of activating the ADBS should be under investigation especially for any future coring at these circumstances.

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2.3 CONCLUSION AND RECOMMENDATIONS FOR FUTURE OPERATIONS

IOT designed and implemented a core acquisition program complying with all recommended procedures. All coring and processing operations were conducted safely and efficiently.

2.3.1 Pre-Planning

CAP (core Acquisition Plan) has been prepared / job discussions/ meetings were held between all relevant company and contractor parties thus ensuring a detailed core acquisition programme was available for the start of operations. Such good communication and early alignment shall be a “must have” for any future coring operations.

2.3.2 Hole Conditions

The coring BHA is a stiff assembly, as such it is normally recommended that the hole be finished with an equally stiff BHA before running the core barrel to maximise the chance of trouble free tripping.
Recovery Challenges were observed , it’s recommended to use OBM in order to keep Wellbore stabilization and core recovery using long core barrels efficient. The jamming is a result of high angled fractures and friction on the inner barrel. To reduce that friction has an effect, either barrel friction or fluid lubricity.
The baracarb did not help either, it is sharp hard and angular and maybbalso effect the cores.

2.3.3 Coring Equipment

A overall good equipment performance can be pointed out here hence for any similar “Rat Hole” Coring application same equipment like e.g. IOT´s 54m long heavy duty core barrel with stabilisation at the first bottom section every 4,5m following section each stabilizer at approx. 7,5m positioned.
Using a IOT S013 Corehead operating on all core runs

2.3.4 Coring future Recommendations

Reviewing the formation dip and rig time, reducing the Corebarrel length should be considered. However a solution for the mud should be investigated as well. Trying to have a better lubricating effect, so that the core has less friction to enter the inner tube.

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Another solution tool could have been the Neo Torq

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2.3.5 CORE RECOVERY

As further detailed above, a total of 89 meters were cored with 86,42 meters of core being recovered resulting in a 97,1% recovery rate.

Coring Log

SUMMARY | **Revision** 00

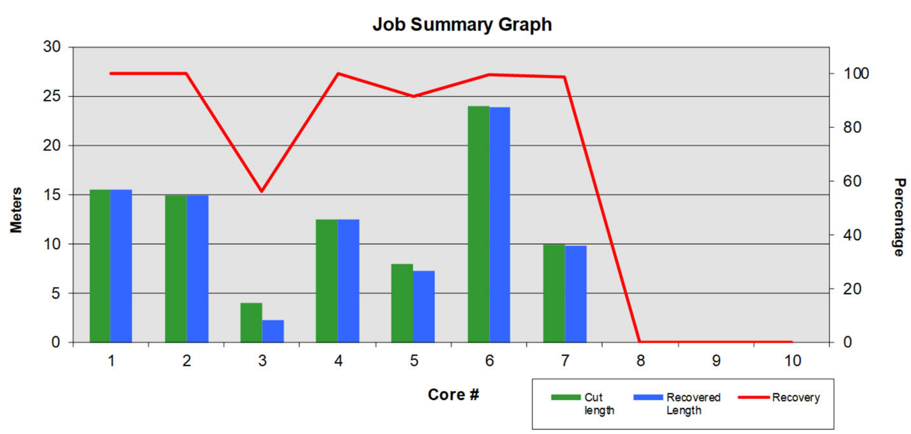
Unit system in use: *METRIC*

Well #:	Delft GT-01	**Hole size:**	12 1/4"	**Service eng. names:**	R.Koets, M.Taal, M.van Wieringen
Rig:	Huisman LOC400	**Casing Ø:**	16		
Operator:	Aardyn	**Shoe depth:**	845	**Date(s) On:**	6-Aug-23
Contractor:	TU Delft	**Well angle:**	45 deg.		
Country:	Netherlands	**Mud type:**	Versa clean	**Date(s) Off:**	10-Aug-23
Field:	Delft	**Mud weight:**	1,18 ppg		

Well #:	6" 3/4 x 4"	**Hole size:**	8 1/2"	**Service eng. names:**	R.Koets, M.Taal, M.van Wieringen
Rig:	Conventional (RS)	**Casing Ø:**	9 5/8"		
Operator:	180	**Shoe depth:**	2573	**Date(s) On:**	26-Aug-23
Contractor:	0	**Well angle:**	48 deg.		
Country:	Heavy Duty Thread	**Mud type:**	Bara Xcel	**Date(s) Off:**	
Field:	Aluminium Slick	**Mud weight:**	1.09 ppg		

Formation name:	Rodenrijs, Delfland
Formation description:	Shale, Sst, Sitlst

Core #	Corehead Type	Inner Tube Type	CBRL Length [ft]	Depth In [m]	Cut length [m]	Recovered Length [m]	Recovery %	Hours [Hrs]	ROP [m/hrs]	Formation
1	S013	Aluminium Slick	180	2511,5	15,5	15,5	100,0	2,63	5,89	Rodenrijs
2	S013	Aluminium Slick	180	2576	15,0	15	100,0	6,67	2,25	Rodenrijs/Delfland
3	S013	Aluminium Slick	180	2594	4,0	2,25	56,3	1,15	3,48	Delfland
4	S013	Aluminium Slick	90	2597,5	12,5	12,5	100,0	3,23	3,87	Delfland
5	S013	Aluminium Slick	90	2610	8,0	7,32	91,5	2,18	3,66	Delfland
6	S013	Aluminium Slick	90	2618	24,0	23,95	99,8	7,80	3,08	Delfland
7	S013	Aluminium Slick	120	2641	10,0	9,9	99,0	2,88	3,47	Delfland
8										
9										
10										
	Overall performance				89,0	86,42	97,1	26,55	3,35	



REMARKS

jamming is a result of high-angled fractures and friction on the inner barrel. To reduce that friction has an effect, either barrel friction or fluid lubricity. The baracarb did not help either, it is sharp hard and angular and maybe also effect the cores.

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2.3.6 Core shearing

Core shearing by using the IOT shear clamp was successful.

2.3.7 CORE DESCRIPTION & GAMMA RAY SERVICES

Prior to cutting the core IOT preservations team described the core innertube, performed Gamma Ray services, cut, and enclosed with Caps & Clips, and packed for transport towards the TU Delft facility.

A Core Gamma Ray services has been performed only at Run 1. This was performed while the 9m length innertubes were still on the IOT Core Cradle. Measurement were taken every 20cm.

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Company: TU Delft

IOT Holland

Well: DEL-GT-01

Project: Q22-5457 Delft GT-01

Gamma ray report

Depth range: 2511,5m ~ 2526,7m MD

Analyst: D.Rood

Sample type: 4" core in aluminium barrel

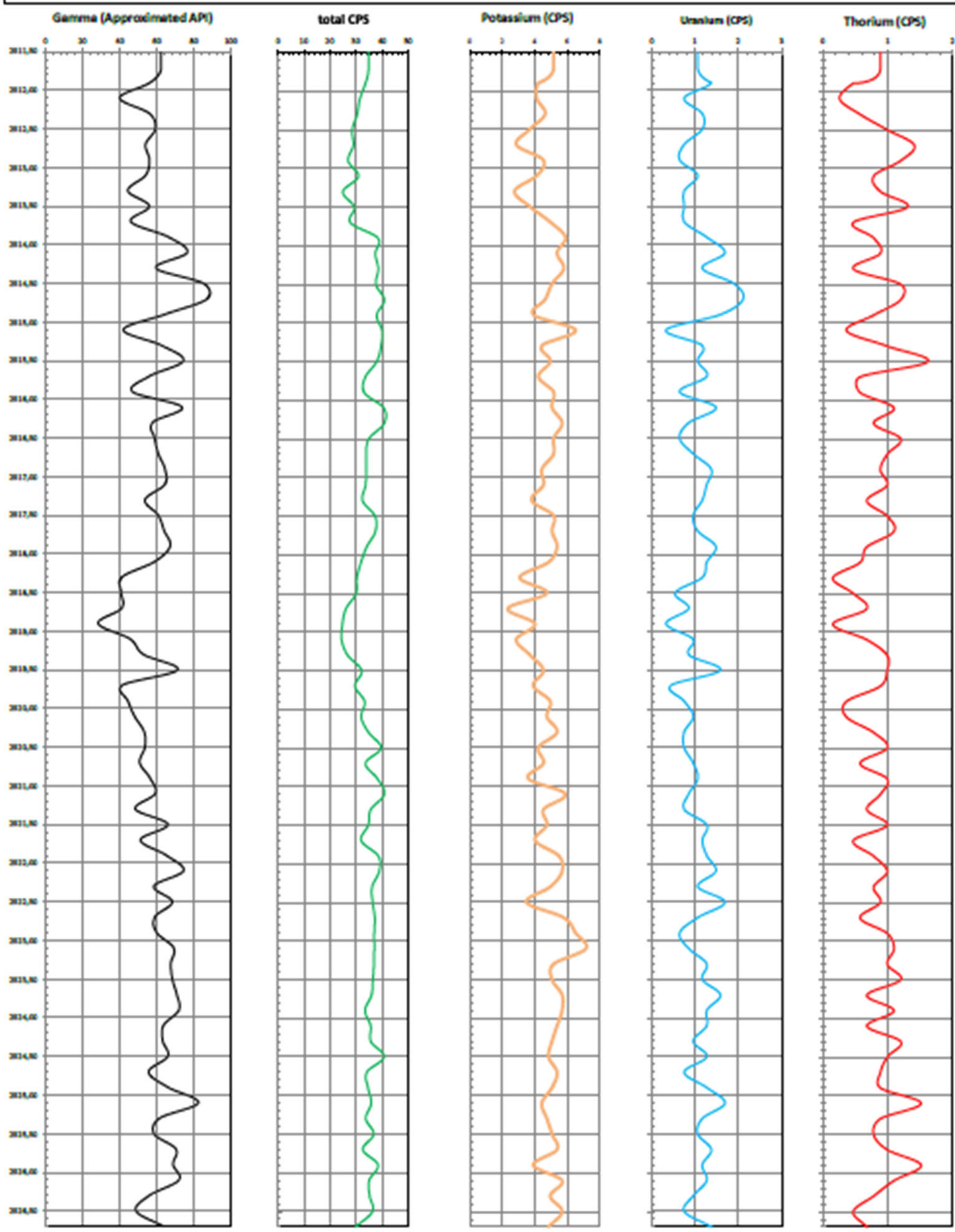
Date: 10-08-2023

Document reference: [illegible] version1

Core 1

Gamma logger: 3389

Core depth unit: meters



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3.1 APPENDICES

Please refer to the enclosed to email:

- Core logs / Core Report
- Core packing list
- Core Dullgrade

Coring Log

REPORT - CORE # 1 | **Revision** 00

Unit system in use: (•) *Metric* ( ) *Imperial*

WELL INFORMATION

Well :	Delft GT-01	**Country:**	Netherlands	**Hole temp:**	55	°c	**Drive:**	Top Drive
Rig:	Huisman LOC400	**Field:**	Delft	**Surf temp:**	14	°c	**Form. name:**	Rodenrijs
Operator:	Aardyn	**Section:**	12 1/4"	**Well angle:**	45	deg.	**Form. descr:**	Shale
Contractor:	TU Delft	**Location:**	X: 85106,Y: 446165					
		Geothermal						

CORE BARREL

Size:	6" 3/4 x 4"	**Thread:**	Heavy Duty Thread	**Spacing:**	45,00	mm	**Core catcher:**	HD
Type:	Conventional (RS)	**Inner Tube:**	Aluminium Slick	Min Spacing:	29,54	mm	**Lower Half Shoe:**	STD
Length:	180 ft - 54,86 m			Max Spacing:	32,54	mm		

COREHEAD

DULL GRADING

Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-New
OD:	8.5	**Thread:**	Heavy Duty Thread	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-New

MUD PROPERTIES

Type:	Versa clean		**API Filter:**			**PV:**	22	cP	**Sand:**	0,10	%
Mud Weigth:	1,18	ppg	**H2O/Oil:**	31/69		**YP:**	14	Pa	**Solids:**	2,90	%
Viscosity:	55	cP	**Gels:**	21	ppb	**pH:**					

BHA DESCRIPTION

CH-54m CBL, Circ Sub, Float Sub, X-O,

BACKGROUND READING

String Weight			**Drop Ball**			**Hydraulics**		
↑	69	T	**Flow rate**	800	Lpm	**Flow rate**	900	Lpm
⇄	57	T	**Press Inc**	2	Bar	**On Bottom**	45	Bar
↓	50	T	**Mn to drop**	13	min.	**Off Bottom**	42	Bar

TIMING

	START CORING	*STOP CORING*
Date:	9-Aug-23	9-Aug-23
Time:	9:30	12:08

PERFORMANCE

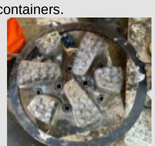
Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2511,5	2527	15,5	2,63	5,89	15,5	28,25	100,00	No more R.O.P

OVERPULL (last connection is at POOH)

Connection	1	2	3	4	5	6	7	8	9	10
Overpull [T]	6									

REMARKS

12 1/4" Bit run prior to coring was 44mm u.g, as well the Gun Reamer further at the BHA. This confirmed an undergauged hole size , therefor the coring BHA had been revised: revised coring BHA such a 54m core could be taken without getting ingauge with the undergauged section.
Tagged bottom using 2T, pumprate 2000LPM and without rotation.
Coring confirmed at 2511,5m. using 1-2 T 60 RPM ready to imbed the corehead. At the first 2-3m low parameters were used, 3-4 T weigth on bit and 70 RPM were used. As soon the second stab was within the 8 1/2" Rat hole at approx. 6m, it was decided to maintain these parameters while noticed a fast R.O.P of 14 m/h
At depth 2519,5 ROP dropped to zero and decided to respond with using using higer weight up to 6T, this seemed to be succesfull while the ROP picked up again.
At depth 2524m a connection was required, and performed succesfull, this took 14min.
Another jamming indication came forward at 2026,5 m depth increased the weight again to 10T, innitially it seemed to be succesfull , unfortunate at 2527m it was clear monitoring presure drop from 80 - 72 Bar, as well TQ reduction and **Zero** ROP.
Another 2 T of weight up to 12T did not bring any respond, confirmed this was seen as a clear jam. Pulled from Bottom noticed a 6T break, possibly from the cored rock. POOH wett as an indication the corebarrel was jammed. Prepared a slug prior to activate circsub.
At surface a 100% core was recovered, corehead was dullgraded as 0-0-A-X-I-NO-PR. (gauge need to be confirmed at warehouse inspection).
Equipment layed down starting the processing (Gamma Ray, Cutting the core, chipped, capped and clipped and prepared for transport packed in the Core containers.




IOT Representative

Customer Representative

Coring Log

Penetration & Parameters Log - *CORE # 1* **Revision** 00

Unit in use is : ***METRIC***

Depth [m]	Cored #	Time [min/m]	ROP [m/hrs]	ROP Log	Torque [daN.m] Min	Torque [daN.m] Max	Torque Log (Off Bottom / Max)	WOB [T] Min	WOB [T] Max	RPM	Flow [Lpm]	SPP [Bar]	Remarks
2511,5	*= Starting depth*			*Graph Zoom:* 31	Min	Max	*Graph Zoom:* 50	Min	Max				
2512,5	1	24	2,50		9	12		1	2	70	1200	75	
2513,5	2	21	2,86		13	15		3	4			80	
2514,5	3	17	3,53		12	13		3	3			79	
2515,5	4	4	15,00		12	13		3	3			79	
2516,5	5	5	12,00		12	13		3	3			79	
2517,5	6	4	15,00		12	13		3	3			80	
2518,5	7	4	15,00		12	13		4	4			80	
2519,5	8	9	6,67		11	12		4	6			78	
2520,5	9	9	6,67		13	14		4	5			78	R.O.P. Dropped to Zero
2521,5	10	5	12,00		12	13		5	6			79	
2522,5	11	4	15,00		12	18		4	5			81	
2523,5	12	4	15,00		9	18		4	5			79	Connection 14min
2524,5	13	6	10,00		9	18		4	5			79	
2525,5	14	5	12,00		12	13		2	4			79	
2526,5	15	8	7,50		10	13		4	7			78	Dropped R.O.P to Zero
2527	15,5	13	4,62		10	11		10	12	70	1200	75	Dropped R.O.P to Zero

Coring Log

REPORT - CORE # 2 | **Revision** 00

Unit system in use: *METRIC*

WELL INFORMATION

Well :	Delft GT-01	**Country:**	Netherlands	**Hole temp:**	57	°c	**Drive:**	Top Drive
Rig:	Huisman LOC400	**Field:**	Delft	**Surf temp:**	17	°c	**Form. name:**	Rodenrijs/Delfland
Operator:	Aardyn	**Section:**	81/2"	**Well angle:**	48	deg.	**Form. descr:**	Shale sst
Contractor:	TU Delft	**Location:**	X: 85106,Y: 446165					
		Geothermal		-			-	

CORE BARREL*

Size:	6" 3/4 x 4"	**Thread:**	Heavy Duty Thread	**Spacing**:**	45,00	mm	**Core catcher:**	HD
Type:	FCS Conventional	**Inner Tube:**	Aluminium Slick	Min Spacing:	28,90	mm	**Lower Half Shoe:**	STD
Length:	180 ft - 54,86 m			Max Spacing:	31,90	mm		

COREHEAD

DULL GRADING

Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-New
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-New

MUD PROPERTIES

Type:	Bara Xcel		**API Filter:**			**PV:**	11	cP	**Sand:**	0,00	%
Mud Weigth:	1.09	ppg	**H2O/Oil:**	32/68		**YP:**	11	Pa	**Solids:**	9,30	%
Viscosity:	55	cP	**Gels:**	17	ppb	**pH:**					

BHA DESCRIPTION

CH-54m Cbl-X-O pin pin-Dynomax Motor-8 1/4"Stab-61/2"Circ Sub-61/2"Float sub-2x61/2"DC-7,875"string stab-5x61/2"DC-10x HWDP

BACKGROUND READING

String Weight			Off Bottom Torque			ADBS /Preactivated			Hydraulics		
		T	**50 Rpm**		daN.m	**Flow rate**	N/A	Lpm	**Flow rate**		Lpm
		T	**60 Rpm**		daN.m	**Press Inc**	N/A	Bar	**On Bottom**		Bar
		T	**70 Rpm**		daN.m	**Mn to drop**	N/A	min.	**Off Bottom**		Bar

TIMING

	START CORING	STOP CORING
Date:	27-Aug-23	27-Aug-23
Time:	4:05	10:45

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2576	2591	15	6,67	2,25	15	27,34	100,00	Motor Stalling

OVERPULL (last connection is at POOH)

Connection	1	2	3	4	5	6	7	8	9	10
Overpull [T]										

REMARKS

Previous drilling out the shoetrack and cut 3 m formation, using a jung basket and magnet DC.
Bit dullgraded on request it appeared 0-1-WT/LT-G-X-1-TD 1 /32"undergauge. LT as the diamond table of the centre cutter disappeared
During tripping in and on request to investigate the possible junk at the junk basket , metal was found at the magnet and as well junk including Tong Dies inside the junk basket.
Core run #2
TBT with all crew on the Rig floor 1 single off bottom.
Lower the string until the bit and 1st stab were inside the 8 ½" hole, 1m above btm @ 2575m.
Break circulation with 1200 lpm = minimum operating flowrate for the motor, SPP 54 bar
Tag bottom with very little weight 0.5t – 1t, immediate a high 30 bar pressure spike was noticed. Stop and let the pressure drop back to 54 bar. Add some weight again and immediate again a +/- 30bar pressure spike occurred. Stop, p/u 0.5m and let the pressure drop back to 54 bar, go back to bottom.
Commenced coring without issues with slowly increasing parameters; 1 – 2 - 3t wob, 1200 lpm, 54 to 63 bar SPP (9 bar diff pressure)
With the parameters balanced at 3t WOB, 10 bar diff pressure, 3.5 knm trq at surface the auto driller was activated with max 6 m/hr set point.
No issues during +/- 10m coring on this first single, stable pressure, diff pressure, trq and ROP.
+/- 1m before connection the AD noticed that at the mud pump pre-charge pump a valve was in a wrong position.
After setting the valve in the correct position the SPP rose immediately to 118 bar (the bit was on bottom and coring was in progress).
It was calculated that the flow before had been 950lpm, -> this is under the Motor limit and can cause serious damage to the motor power section.
1 meter deeper the single was down (with 11 meters cored) and a connection was made according the IOT procedures;
Drill off WOB stop circulation, no more diff press -> off btm pressure dropped to 87 bar.
P/U minimum enough to set the auto slips, make connection, take auto slips out and start pumps with 1200lpm, apply WOB.
07:00 crew change
Different than prior the connection been made, SPP was spiking and the ROP fluctuating.
Note: Depth at 2590m changed by drillers decision and logging unit to 2588,8m (IOT had no involvement in this).
Coring continued for another 4 meters but downhole conditions became worse with the pressure fluctuating and spiking constantly with increasing numbers.
At (2591m) severe motor stalls occurred making the electric pop offs trip the pumps.
Making attempts to re-start several times (while the core was still not broken) the string was moved up and down without success.
Decided to break the core using 11T (this number after recalculating the string weights) and pulled off bottom.
In order to make a last effort to re-start, weights were taken and off bottom pressures noted.
It was tried to re-start coring but it was not possible to apply any WOB, the SPP would spike immediately putting severe stress on the motor power section.
Decision was to stop coring and P.O.O.H
Suspect corehead and/or stabilizers is undergauge, therefor break the core barrel assembly to investigate, and confirmed all as new, no damage seen.
At surface we recovered 14,75
Returned motor to base for further inspection.
TU delft made the decision to consume the Core shoe and catcher in order to split this to ensure the valuable core
does not get damage while pushing out the core.
Note: Reviewing the plugged shoe as well noticed the stalling behaviour only using 1/2 T of weight attempting to get on bottom, it is very likely the corehead and shoe had been completly packed off and therefor restricted to pass any flow through the corehead throoth and ports.
Therewas some slight evidens of hard rock closing of the ports being pushed trough the ports from the out side to the very inside.
This has been withnesed by the TU observer and cleaned by the engineer using a screwdriver while this was seriously blocked

IOT Representative

Marcel Taal, Rene Koets, Mike Van Wieringen

Customer Representative

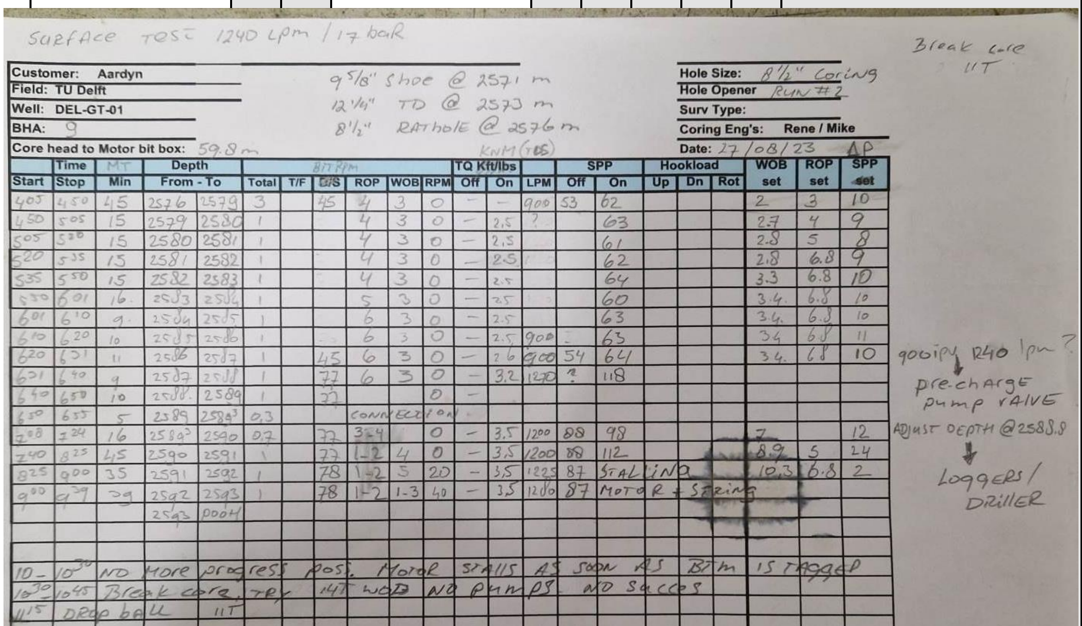
Nick Bruin / Laurens v.d. Sluijs

Coring Log

Penetration & Parameters Log - *CORE # 2* **Revision** 00

Unit in use is : ***METRIC***

Depth [m]	Cored #	Time [min/m]	ROP [m/hrs]	ROP Log	Torque [daN.m] Min	Torque Max	Torque Log (Off Bottom … Max)	WOB [T] Min	WOB Max	RPM	Flow [Lpm]	SPP [Bar]	Remarks
2576	= Starting depth			Graph Zoom: 25			Graph Zoom: 50						
2577	1	10	6,00		2,5	2,5		2	3	45	950	53	
2578	2	9	6,67		2,5	2,5		3	3	45	950	62	
2579	3	21	2,86		2,5	2,5		3	3	45	950	61	
2580	4	20	3,00		2,5	2,5		3	3	45	950	63	
2581	5	16	3,75		2,5	2,5		3	4	45	950	62	
2582	6	14	4,29		2,5	2,5		4	4	45	950	62	
2583	7	15	4,00		2,5	2,5		4	4	45	950	62	
2584	8	11	5,45		2,5	2,5		4	4	45	950	61	
2585	9	9	6,67		2,5	2,5		4	5	45	950	62	
2586	10	10	6,00		2,5	2,5		4	4	45	950	63	
2587	11	11	5,45		2,6	2,6		4	4	77	950	63	discovered super charge half open
2588	12	9	6,67					3	3	77	1200	114	
2589	13	9	6,67					3	4	77	1200	118	Connection
2590	14	34	1,76					4	4	97	1200	122	
2591	15	136	0,44					4	5	117	1200	106/89	No more progress motor stall continuesly



SurfAce TesT 1240 Lpm / 17 baR

Break core 11T

Customer: Aardyn
Field: TU Delft
Well: DEL-GT-01
BHA: 9
Core head to Motor bit box: 59.8 m

9 5/8" Shoe @ 2571 m
12 1/4" TD @ 2573 m
8 1/2" RAThole @ 2576 m
KNM (TDS)

Hole Size: 8 1/2" Coring
Hole Opener RUN # 2
Surv Type:
Coring Eng's: Rene / Mike
Date: 27/08/23 AP

Time Start	Time Stop	MT Min	Depth From	Depth To	Total	T/F	D/S	ROP	WOB	RPM	TQ Kft/lbs Off	TQ On	LPM	SPP Off	SPP On	Hookload Up	Hookload Dn	Hookload Rot	WOB set	ROP set	SPP set
405	450	45	2576	2579	3		45	4	3	0	–	–	900	53	62				2	3	10
450	505	15	2579	2580	1			4	3	0	–	2,5	?		63				2.7	4	9
505	520	15	2580	2581	1			4	3	0	–	2,5			61				2.8	5	8
520	535	15	2581	2582	1			4	3	0	–	2.5			62				2.8	6.8	9
535	550	15	2582	2583	1			4	3	0	–	2.5			64				3.3	6.8	10
550	601	16	2583	2584	1			5	3	0	–	2.5			60				3.4	6.8	10
601	610	9	2584	2585	1			6	3	0	–	2.5			63				3.4	6.8	10
610	620	10	2585	2586	1			6	3	0	–	2.5	900		63				3.4	6.8	11
620	631	11	2586	2587	1		45	6	3	0	–	2.6	900	54	64				3.4	6.8	10
631	640	9	2587	2588	1		77	6	3	0	–	3.2	1270	?	118						
640	650	10	2588	2589	1		77			0	–										
650	655	5	2589	2589.3	0.3			CONNECTION													
708	724	16	2589.3	2590	0.7		77	3-4		0	–	3.5	1200	88	98				7		12
740	825	45	2590	2591	1		77	1-2	4	0	–	3.5	1200	88	112				8.9	5	24
825	900	35	2591	2592	1		78	1-2	5	20	–	3.5	1225	87	STALLING				10.3	6.8	2
900	939	39	2592	2593	1		78	1-2	1-3	40	–	3.5	1200	87	MOTOR + STRING						
			2593	POOH																	

10 – 10 30 NO More progress poss. Motor STAlls AS soon AS BTm IS TAgged
10 30 – 10 45 Break core, TRY 14T WOB NO Pumps NO Succes
11 15 DROP ball 11T

900lpm R40 lpm ?
pre-charge pump vAlVE

ADJUST DEPTH @ 2588.8
Loggers / DRiller

Coring Log

REPORT - CORE # 3 | **Revision** 00

Unit system in use: *METRIC*

WELL INFORMATION

Well :	Delft GT-01	**Country:**	Netherlands	**Hole temp:**	57	°c	**Drive:**	Top Drive/Motor
Rig:	Huisman LOC400	**Field:**	Delft	**Surf temp:**	17	°c	**Form. name:**	Delfland
Operator:	Aardyn	**Section:**	81/2"	**Well angle:**	48	deg.	**Form. descr:**	Sst
Contractor:	TU Delft	**Location:**	X: 85106,Y: 446165					
		Geothermal		-			-	

CORE BARREL*

Size:	6" 3/4 x 4"	**Thread:**	IOT	**Spacing**:**	45,00	mm	**Core catcher:**	IOT
Type:	Motor	**Inner Tube:**	Aluminium Slick	Min Spacing:	28,90	mm	**Lower Half Shoe:**	STD
Length:	180 ft - 54,86 m			Max Spacing:	31,90	mm		

COREHEAD

DULL GRADING

Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-RR
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-PR

MUD PROPERTIES

Type:	Bara Xcel		**API Filter:**			**PV:**	13	cP	**Sand:**	0,00	%
Mud Weigth:	1.09	ppg	**H2O/Oil:**	32/68		**YP:**	12	Pa	**Solids:**	9,30	%
Viscosity:	55	cP	**Gels:**	17	ppb	**pH:**					

BHA DESCRIPTION

CH-54m Cbl-X-O pin pin-Dynomax Motor-8 1/4"Stab-61/2"Circ Sub-61/2"Float sub-2x61/2"DC-7,875"string stab-3x61/2"DC-Jar-2x61/2"DC-10x HWDP

BACKGROUND READING

String Weight			Off Bottom Torque			ADBS /Preactivated			Hydraulics		
		T	**50 Rpm**		daN.m	**Flow rate**	N/A	Lpm	**Flow rate**		Lpm
		T	**60 Rpm**		daN.m	**Press Inc**	N/A	Bar	**On Bottom**		Bar
		T	**70 Rpm**		daN.m	**Mn to drop**	N/A	min.	**Off Bottom**		Bar

TIMING

	START CORING	STOP CORING
Date:	29-Aug-23	29-Aug-23
Time:	3:55	5:04

PERFORMANCE

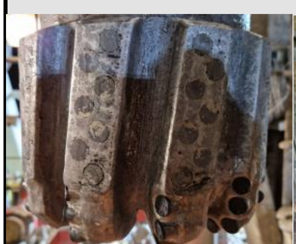
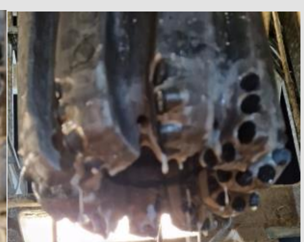
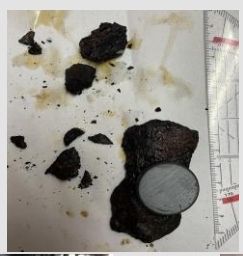
Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2594	2598	4	1,15	3,48	2,25	7,29	56,25	Jammed, no more ROP

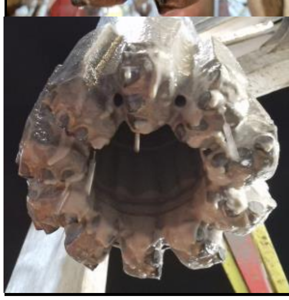
OVERPULL (last connection is at POOH)

Connection	1	2	3	4	5	6	7	8	9	10
Overpull [T]	0									

REMARKS

Test Dynomax Mud Motor IDN-CST-003. 940 lpm / 11 bar, 1250 lpm / 17 bar, 1500 lpm / 23 bar
Redressed Corebarrel using rerun alu liners, new bearing and pre-set ADBS.
RIH smoothly at the last singles P/U pup joint to space out for full single coring, Take weights without pumps; 65t up, 44t down, TBT on RF with full crew
Wash down from 2584 m to 2591m with 1200lpm. Continue to run to bottom find resistance @ 2584m, perfomed a pipe stretch test, 0.45m, connection, adjust depth at TJ.
Cleaning or Coring 8 1/2" hole from 2591m to 2594m using 1200lpm and presumed start of coring with 0 to 0.5t WOB, 1 bar diff press, ROP 32 m/hr
From 2594 to 2598m, 1250 lpm, 13 bar diff press, WOB 1.4t to 6t, ROP 3 to 6 m/hr seem to be more realistic.
Af ter 4m beend cored at depth 2598m, Motor Stall, p/u and stop pumps. P/U to neutral at 53t (0.4m), start pumps 1500lpm, and establish stable flow and SPP. Start rotation 20 rpm, SPP increase due to sudden weight transfered to the bit.
Go back to bottom but no more progress, increase WOB to max 10t, no diff press, not succesfull.
Pull to neutral, stop rotation, stop pumps, pull to up weight 65t, no overpull.
Indications that core is jammed, decided to break core and attempt to restart
Again back to bottom with 1500lpm, 20 rpm, 6t WOB, 0 bar diff prress, no progress.Pull inside shoe and drop circ.sub ball prior POOH.
Receiving the message from DSV ; 29-08-2023 consensus was reached that the well depth as per core run #2 is 2598m as bottom of the well was tagged at 2594m and coring stalled at 2598m. At surface a length of 2,25m core 56% was recovered.
Core was jammed inside the shoe and catcher was broken. Discovered the broken catcher is a school example of pulling wihle rotating, unfortunate this came due to the necesarity to pull the motor in an attempt to overcome stalling.
While redressing the activation sub there was coroded metal found on top of the ball. Corehead was graded 0-0-NO-A-X-I-NO-PR


IOT Representative

Marcel Taal, Rene Koets, Mike Van Wieringen

Customer Representative

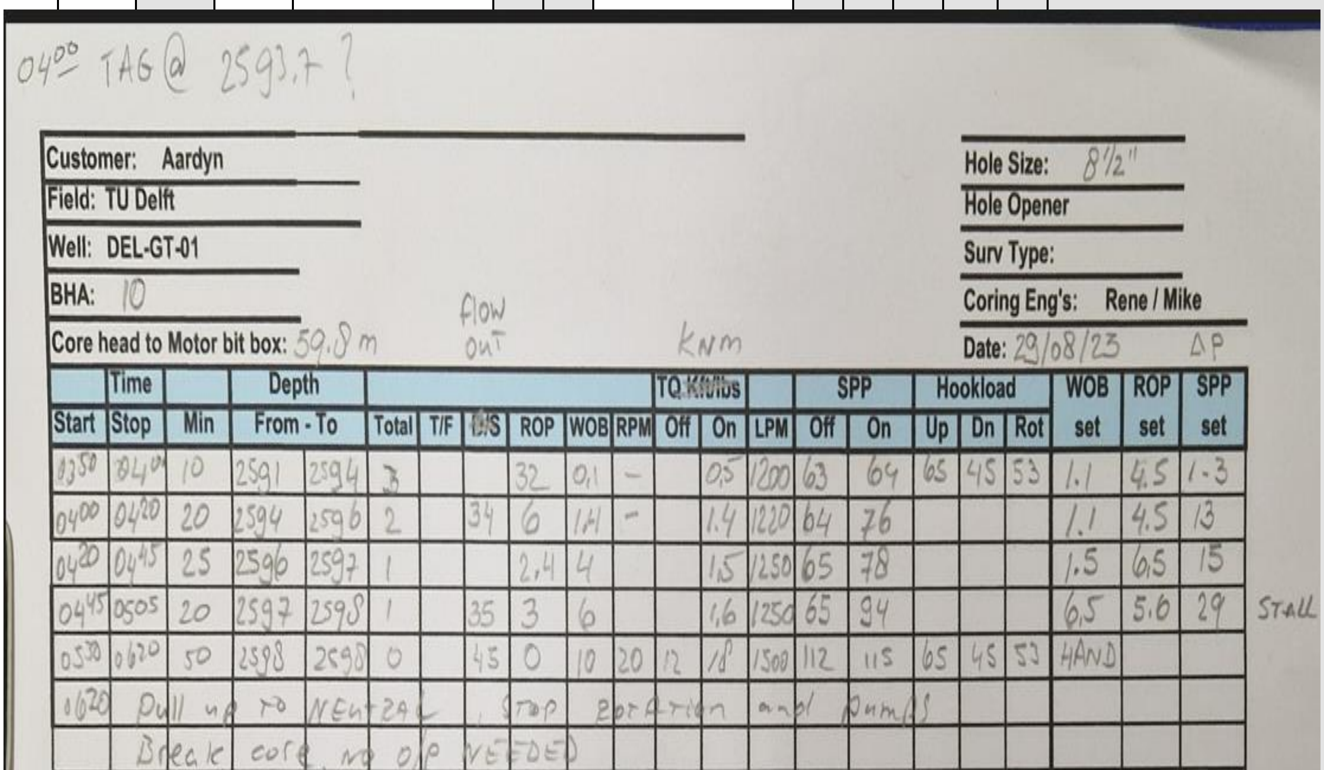
Nick Bruin / Laurens v.d. Sluijs

Coring Log

Penetration & Parameters Log - *CORE # 3* **Revision** 00

Unit in use is : ***METRIC***

Depth [m]	Cored #	Time [min/m]	ROP [m/hrs]	ROP Log	Torque [daN.m] Min	Torque [daN.m] Max	Torque Log Off Bottom Max	WOB [T] Min	WOB [T] Max	RPM	Flow [Lpm]	SPP [Bar]	Remarks
2594	*= Starting depth*			*Graph Zoom:* 25			*Graph Zoom:* 50						
2595	1	2	30,00					1			1200	75	Bottom?
2596	2	19	3,16			1500		1	1,5		1240	77	
2597	3	32	1,88			1450		1	1,5		1240	80	
2598	4	23	2,61			1500		5	6		1245/ 1500	90 /112	Jammed/Stall



04⁰⁰ TAG @ 2593.7 ?

Customer: Aardyn

Field: TU Delft

Well: DEL-GT-01

BHA: 10

Core head to Motor bit box: 59.8 m

Hole Size: 8 1/2"

Hole Opener

Surv Type:

Coring Eng's: Rene / Mike

Date: 29/08/23

Time Start	Time Stop	Min	Depth From	Depth To	Total	T/F	[illegible]/S	ROP	WOB	RPM	TQ Off (flow out, KNm)	TQ On	LPM	SPP Off	SPP On	Hookload Up	Hookload Dn	Hookload Rot	WOB set	ROP set	SPP set (ΔP)	
0350	0400	10	2591	2594	3			32	0,1	–		0,5	1200	63	64	65	45	53	1.1	4.5	1-3	
0400	0420	20	2594	2596	2		34	6	1,41	–		1.4	1220	64	76				1.1	4.5	13	
0420	0445	25	2596	2597	1			2,4	4			1,5	1250	65	78				1.5	6,5	15	
0445	0505	20	2597	2598	1		35	3	6			1,6	1250	65	94				6,5	5.6	29	STALL
0530	0620	50	2598	2598	0		45	0	10	20	12	18	1500	112	115	65	45	53	HAND			
0620	Pull up to NEUTRAL, STOP ROTATION and PUMPS																					
	Break core, no o/p NEEDED																					

Coring Log

REPORT - CORE # 4 | **Revision** 00

Unit system in use: *METRIC*

WELL INFORMATION

Well:	Delft GT-01	**Country:**	Netherlands	**Hole temp:**	55	°c	**Drive:**	Top Drive
Rig:	Huisman LOC400	**Field:**	Delft	**Surf temp:**	14	°c	**Form. name:**	Delfland
Operator:	Aardyn	**Section:**	81/2"	**Well angle:**	48	deg.	**Form. descr:**	Sst
Contractor:	TU Delft	**Location:**	X: 85106,Y: 446165					
		Geothermal		-			-	

CORE BARREL

Size:	6" 3/4 x 4"	**Thread:**	IOT	**Spacing:**	32,00	mm	**Core catcher:**	Spring
Type:	Conventional	**Inner Tube:**	Aluminium Slick	Min Spacing:	16,27	mm	**Lower Half Shoe:**	STD
Length:	90 ft - 27,43 m			Max Spacing:	19,27	mm		

COREHEAD

DULL GRADING

Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-RR
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-PR

MUD PROPERTIES

Type:	Bara Xcel		**API Filter:**			**PV:**	23	cP @50°	**Sand:**		%
Mud Weigth:	1.1	ppg	**H2O/Oil:**	30/59		**YP:**	15	Pa	**Solids:**	8,50	%
Viscosity:	55	cP	**Gels:**	26	pa	**pH:**					

BHA DESCRIPTION

CH-27m Cbl-61/2"Circ Sub-61/2"Float sub-1x61/2"DC-8 1/4"Stab-2x61/2"DC-7,875"string stab-3x61/2"DC-Jar-2x61/2"DC-10x HWDP

BACKGROUND READING

String Weight		Off Bottom Torque			ADBS Drop Ball			Hydraulics		
64	T	**50 Rpm**		daN.m	**Flow rate**	1500	Lpm	**Flow rate**	950	Lpm
52	T	**60 Rpm**		daN.m	**Press Inc**	27,5	Bar	**On Bottom**	48	Bar
45	T	**70 Rpm**	1000	daN.m				**Off Bottom**	45	Bar

TIMING

	START CORING	*STOP CORING*
Date:	30-Aug-23	31-Aug-23
Time:	21:04	0:18

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2597,5	2610	12,5	3,23	3,87	12,5	45,57	100,00	Jammed at connection

OVERPULL (last connection is at POOH)

Connection	1	2	3	4	5	6	7	8	9	10
Overpull [T]	9									

REMARKS

Redressed Circ sub, Prepared a 27m ADBS Corebarrel, RIH.
Running to core point went smooth washed down pipe at 2580M, using 990LPM creating 30B presure
SCR's taken , continue to wash down to bottom, during this pump problems at 20:15h till 20:40
20:40, activated ADBS using 1500LPM, activated creating 27B increase.
21:00, using 950LPM and 60RPM reaming to bottom, tagged bottom at depth 2597,5m using 2-3T
at depth 2610m connection was carefully made but failed to continue coring , string stalled after attemping re-start.
Decission to stop Coring was made.
At surface a 12,5m core was recovered, unconnecting the empty innertubes, laying down the innertubes including the rock with the cradles using the manitoe to overcome any breakage. Prepared for processing. Reviewing the corehead and found a piece of rock inside this, removed and dullgraded 0-0-NO-A-X-I-NO-PR.






IOT Representative

Customer Representative

Nick Bruin / Laurens v.d. Sluijs

Coring Log

Penetration & Parameters Log - ***CORE # 4*** **Revision** 00

Unit in use is : ***METRIC***

Depth [m]	Cored #	Time [min/m]	ROP [m/hrs]	ROP Log	Torque [daN.m] Min	Torque [daN.m] Max	Torque Log (Off Bottom – Max)	WOB [T] Min	WOB [T] Max	RPM	Flow [Lpm]	SPP [Bar]	Remarks
2597,5	*= Starting depth*			*Graph Zoom:* 25			*Graph Zoom:* 50						
2598,5	1	20	3,00		10	10		2	7	70	990	47	
2599,5	2	14	4,29		13	13		2	3	70	990	45	
2600,5	3	11	5,45		14	14		2	3	70	990	45	
2601,5	4	9	6,67		14	14		3	3	70	990	45	
2602,5	5	6	10,00		14	14		2	3	70	990	45	
2603,5	6	6	10,00		14	14		3	3	70	990	45	
2604,5	7	7	8,57		14	14		3	4	70	990	43	
2605,5	8	5	12,00		14	14		3	4	70	990	43	
2606,5	9	7	8,57		14	14		3	4	70	990	43	
2607,5	10	5	12,00		14	14		3	4	70	990	43	
2608,5	11	7	8,57		14	14		3	4	70	990	43	
2609,5	12	12	5,00		14	14		3	4	70	990	43	jammed at connection
2610	12,5	45	1,33		9	14		3	10	70	990	44/46	String stalled

Coring Log

REPORT - CORE # 5 | **Revision** 00

Unit system in use: *METRIC*

WELL INFORMATION

Well:	Delft GT-01	**Country:**	Netherlands	**Hole temp:**	55	°c	**Drive:**	Top Drive
Rig:	Huisman LOC400	**Field:**	Delft	**Surf temp:**	14	°c	**Form. name:**	Delfland
Operator:	Aardyn	**Section:**	81/2"	**Well angle:**	45	deg.	**Form. descr:**	
Contractor:	TU Delft	**Location:**	X: 85106,Y: 446165					
		Geotherma		-			-	

CORE BARREL

Size:	6" 3/4 x 4"	**Thread:**	IOT	**Spacing :**	32,00	mm	**Core catcher:**	IOT
Type:	Conventional	**Inner Tube:**	Aluminium Slick	Min Spacing:	16,27	mm	**Lower Half Shoe:**	STD
Length:	90 ft - 27,43 m			Max Spacing:	19,27	mm		

COREHEAD

						DULL GRADING	
Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-RR
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-PR

MUD PROPERTIES

Type:	Bara Xcel		**API Filter:**			**PV:**	13	cP	**Sand:**	0,00	%
Mud Weigth:	1.09	ppg	**H2O/Oil:**	32/68		**YP:**	12	Pa	**Solids:**	9,30	%
Viscosity:	55	cP	**Gels:**	17	ppb	**pH:**					

BHA DESCRIPTION

CH-27m Cbl-61/2"Circ Sub-61/2"Float sub-1x61/2"DC-8 1/4"Stab-2x61/2"DC-7,875"string stab-3x61/2"DC-Jar-2x61/2"DC-10x HWDP

BACKGROUND READING

String Weight			Off Bottom Torque			ADBS			Hydraulics		
	61	T	50 Rpm		daN.m	Flow rate	1000	Lpm	Flow rate	1000	Lpm
	52	T	60 Rpm		daN.m	Press Inc	17	Bar	On Bottom	47	Bar
	45	T	70 Rpm	52	daN.m			min.	Off Bottom	44	Bar

TIMING

	START CORING	STOP CORING
Date:	1-Sep-23	1-Sep-23
Time:	10:01	12:12

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2610	2617,5	7,5	2,18	3,44	7,32	27,34	97,60	Jammed

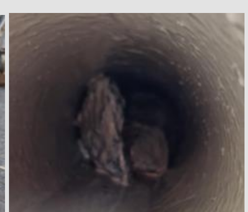
OVERPULL (last connection is at POOH)

Connection	1	2	3	4	5	6	7	8	9	10
Overpull [T]	5									

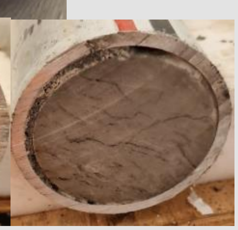
REMARKS

Redressed Circ sub, Prepared a 27m ADBS Corebarrel, using remaining rerun innertubes, RIH.
Running to core point, this went smoothly, washed down pipe to bottom , At 09.20 depth 2596,5 check depth at TJ .
Depth 2603m, using 20 RPM - Stall, increase to 70 RPM ream down to2609,5m
09:40, SCR's up: 59T, rotating: 49T using 20RPM
09:50 Activated ADBS 1500 LPM, 88B. When activation was set, decreased to 1000 LPM using 44B of Bottom pressure.
Start coring manualy using 2T WOB, 70 RP, 1000LPM 0n bottom 47B.
Coring commenced bedding in 2 Tons , 70RPM and 1000LPM , this to avoid any possible fractures getting disturbed, such jamming occure.
Realising interbedded shale as well introduce sand layers plugging off, possibly due to weight transferred at the innerbarrel to overcome jamming at the vertical fracture within the shale, silt layers. To overcome any risk making the connection as super single was prepared prior to start coring.
all scenarios seem to be covered , unfortunate after 8m the coring operation had to stop due to jamming.
Attempted to use different weights but this failed .
At surface a 7,32m core was recovered (97,6%) very likely related to the pipe squad using 10-12T and the formation seems too hard to drill or mill.
Reviewing the core while processing.
In the shoe there is a paleosoil developed in a hard siltstone full with slickensides, it may have jammed coring. The piece just before however we got out nicely as one long solid core, so it would mean that a few slickensides have jammed the whole core within the catcher.
Around 2614.5m, it is most sandy in this interval, but still not the sand that was expected below the pick of the Delft Sandstone.









IOT Representative	*Customer Representative*
Marcel Taal, Rene Koets, Mike Van Wieringen	Nick Bruin / Laurens v.d. Sluijs

Coring Log

Penetration & Parameters Log - *CORE # 5* | **Revision** 00

Unit in use is : ***METRIC***

Depth [m]	Cored #	Time [min/m]	ROP [m/hrs]	ROP Log	Torque [daN.m]		Torque Log	WOB [T]		RPM	Flow	SPP	Remarks
2610	*= Starting depth*			*Graph Zoom:* 25	Min	Max	Off Bottom *Graph Zoom:* 50 Max	Min	Max		[Lpm]	[Bar]	
2611	1	3	20,00		14	14		1	3	70	1000	50	Adjust Depth
2612	2	17	3,53		13	13		2	3	70	1000	49	
2613	3	11	5,45		13			2	3	70	1000	49	Auto Driller
2614	4	4	15,00		13	14		2	3	70	1000	49	
2615	5	14	4,29		13	14		2	3	70	1000	49	
2616	6	9	6,67		13	14		2	3	70	1000	49	
2617	7	35	1,71		10	12		6	7	70	1000	49	
2617,5	8	46	1,30		8	9		7	12	60/70	1000	50	Jammed

Coring Log

REPORT - CORE # 6 | Revision 00

Unit system in use: *METRIC*

WELL INFORMATION

Well:	Delft GT-01	**Country:**	Netherlands	**Hole temp:**	60 °c	**Drive:**	Top Drive
Rig:	Huisman LOC400	**Field:**	Delft	**Surf temp:**	14 °c	**Form. name:**	Delfland
Operator:	Aardyn	**Section:**	81/2"	**Well angle:**	48 deg.	**Form. descr:**	
Contractor:	TU Delft	**Location:**	X: 85106,Y: 446165				
		Geothermal		-		-	

CORE BARREL

Size:	6" 3/4 x 4"	**Thread:**	IOT	**Spacing**:**	32,00 mm	**Core catcher:**	IOT
Type:	Conventional	**Inner Tube:**	Aluminium Slick	Min Spacing:	17,89 mm	**Lower Half Shoe:**	STD
Length:	90 ft - 27,43 m			Max Spacing:	20,89 mm		

COREHEAD

						DULL GRADING	
Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-RR
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-PR

MUD PROPERTIES

Type:	Bara Xcel	**API Filter:**	1	**PV:**	17 cP	**Sand:**	%
Mud Weigth:	1.09 ppg	**H2O/Oil:**	32/68	**YP:**	12 Pa	**Solids:**	10,20 %
Viscosity:	55 cP	**Gels:**	17 ppb				

BHA DESCRIPTION

CH-27m Cbl-61/2"Circ Sub-61/2"Float sub-1x61/2"DC-8 1/4"Stab-2x61/2"DC-7,875"string stab-3x61/2"DC-Jar-2x61/2"DC-10x HWDP

BACKGROUND READING

String Weight		Off Bottom Torque			ADBS			Hydraulics		
60	T	**60 Rpm**	10	daN.m	**Flow rate**	800	Lpm	**Flow rate**	1000	Lpm
57	T	**70 Rpm**	10	daN.m	**Press Inc**	9	Bar	**On Bottom**	46	Bar
26	T	**80 Rpm**	10,5	daN.m				**Off Bottom**	49	Bar

TIMING

	START CORING	STOP CORING
Date:	3-Sep-23	3-Sep-23
Time:	16:06	23:54

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2618	2642	24	7,80	3,08	23,95	87,49	99,79	Jammed, no more ROP

OVERPULL (last connection is at POOH)

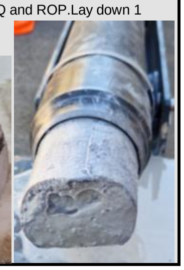
Connection	1	2	3	4	5	6	7	8	9	10
Overpull [T]	0	0	3							

REMARKS

Realizing lubrication could be a serious factor of jamming the formation, between the annulus of the innertube and core, it was suggested to create an oilbase pill using the following calculation ;
1.Inner barrel volume 27m = 250liter
2.Pipe volume = 10l/m

Activating the ADBS whenever this lubrication pill is inside or close within the innertubes, pumping enough to activate (density 0.8kg/m)the ADBS, to overcome the oil based pill leaves the innertube.
Decided to prepare and pump a pill of 2m3, calculating the time frame (2000-250)/1500 = 70sec enough time to activate the ADBS.
At the shoe 2570m, a TBT At the shoe around 2570m a TBT was requested, from this moment circulating 800LPM giving 22B washing down the pipe.
During this procedure from depth 2587m reaming was required using 50RPM. During this operation the corebarrel stalled at depth 2607m , therefor increase of 70RPM was required. (At that time) current tally 2617 Weights where measured / noted 60T up 16T down rotating 51T. Prepared supersingle attempt to minimize the amount of connections during coring. SCR where measured ,
Rotating 60RPM 10K/NM TQ , Rotating 70RPM 10K/NM TQ ,Rotating 80RPM 10,5K/NM TQ
At 14.05 Starting the OBM pill
At 14.50 pumped pill with 800LPM
Activated ADBS using 1800LPM creating 78B , @ 800LPM 31B
Start Coring at presumed Depth 2618m.Using 1-2T weight achieving a fast 5min/m ROP.At depth 2631m the driller suspected the pipe tally was incorrect.
While expecting coring operations approx. already cutting 13m, realistically from this point of we should have been on depth 2631m but recalculating backwards coring actually just started at 2618m.
From this point on it was decided to fullfill the corebarrel maximum ignoring depths.At 2642m core jammed confirmed no more TQ and ROP.Lay down 1 single and drop the circulation sub activation ball. Confirmed landing start pumping 2000LPM. P.O.O.H
At surface a 100% core was recovered . Corehead indicated JD (junk/debris)at the shank



IOT Representative

Marcel Taal, Rene Koets, Mike Van Wieringen

Customer Representative

Nick Bruin / Laurens v.d. Sluijs

Coring Log

Penetration & Parameters Log - *CORE # 6* **Revision** **00**

Unit in use is : ***METRIC***

Depth [m]	Cored #	Time [min/m]	ROP [m/hrs]	ROP Log	Torque [daN.m]		Torque Log Off Bottom Max	WOB [T]		RPM	Flow [Lpm]	SPP [Bar]	Remarks
2618	*= Starting depth*			*Graph Zoom:* 25	**Min**	**Max**	*Graph Zoom:* 50	Min	Max				
2619	1	25	2,40	IIIIII	12	13,4	IIIIIIII	2	3	70	1000	50	
2620	2	26	2,31	IIIII	13,1	13,4	II	3	4	70	1000	49	Connection 17:20 - 17:35
2621	3	35	1,71	IIII	13,1	13,2	I	3	4	70	1000	48	
2622	4	19	3,16	IIIIIII	13,2	13,2	I	3	4	70	1000	48	
2623	5	19	3,16	IIIIIII	13	13,2	I	3	4	70	1000	48	
2624	6	20	3,00	IIIIIII	13,2	13,5	II	3	4	70	1000	48	
2625	7	19	3,16	IIIIIII	13	13,5	III	3	4	70	1000	48	
2626	8	15	4,00	IIIIIIIIII	13	13,2	I	3	4	70	1000	49	
2627	9	12	5,00	IIIIIIIIIIII	13,2	13,2	I	3	4	70	1000	50	
2628	10	21	2,86	IIIIIII	13,2	13,3	I	3	4	70	1000	49	
2629	11	15	4,00	IIIIIIIIII	13,2	13,5	II	4	4	70	1000	49	
2630	12	26	2,31	IIIII	11,8	13,5	IIIIIIIII	4	4	70	1000	49	
2631	13	32	1,88	IIII	12	12	I	4	4	70	1000	47,2	
2632	14	22	2,73	IIIIII	12	12,9	IIIII	3,5	3,5	70	1000	47,5	
2633	15	9	6,67	IIIIIIIIIIIIIIII	12,9	13	I	3,5	3,5	70	1000	48	
2634	16	12	5,00	IIIIIIIIIIII	13	13	I	3,5	3,5	70	1000	48	
2635	17	16	3,75	IIIIIIIII	13	13	I	3,5	3,5	70	1000	46	Connection 21:50 - 22:02
2636	18	16	3,75	IIIIIIIII	13	13	I	3,5	3,5	70	1000	46	
2637	19	10	6,00	IIIIIIIIIIIIIII	13,2	13,2	I	3,5	3,5	70	1000	48	
2638	20	13	4,62	IIIIIIIIIII	13	13	I	3,5	3,5	70	1000	49	
2639	21	18	3,33	IIIIIIII	12,5	12,5	I	3,5	3,5	70	1000	49	
2640	22	16	3,75	IIIIIIIII	12,5	12,5	I	3,5	3,5	70	1000	49	
2641	23	23	2,61	IIIIII	12,5	12,6	I	3,2	3,4	70	1000	50	
2642	24	6	10,00	IIIIIIIIIIIIIIIIIIIIIIIII	12,1	12,6	III	3,2	4,2	70	1000	50	2T breakage Core

Coring Log

REPORT - CORE # 7 | **Revision** 00

Unit system in use: *METRIC*

WELL INFORMATION

Well:	Delft GT-01	**Country:**	Netherlands	**Hole temp:**	60	°c	**Drive:**	Top Drive
Rig:	Huisman LOC400	**Field:**	Delft	**Surf temp:**	14	°c	**Form. name:**	Delfland
Operator:	Aardyn	**Section:**	81/2"	**Well angle:**	48	deg.	**Form. descr:**	
Contractor:	TU Delft	**Location:**	X: 85106,Y: 446165					
		Geothermal		-			-	

CORE BARREL

Size:	6" 3/4 x 4"	**Thread:**	IOT	**Spacing**:**	37,00	mm	**Core catcher:**	IOT
Type:	Conventional	**Inner Tube:**	Aluminium Slick	Min Spacing:	22,85	mm	**Lower Half Shoe:**	STD
Length:	120 ft - 36,58 m			Max Spacing:	25,85	mm		

COREHEAD

						DULL GRADING	
Type:	S013	**SN:**	IDN-CH-002	**IADC:**		**Before run:**	0-0-NO-A-X-I-NO-RR
OD:	8.5	**Thread:**	IOT	**TFA:**	1,5	**After run:**	0-0-NO-A-X-I-NO-PR

MUD PROPERTIES

Type:	Bara Xcel		**API Filter:**			**PV:**	17	cP	**Sand:**		%
Mud Weigth:	1.1	ppg	**H2O/Oil:**	34/66		**YP:**	14	Pa	**Solids:**	9,60	%
Viscosity:	55	cP	**Gels:**	16	ppb						

BHA DESCRIPTION

CH-36m Cbl-61/2"Circ Sub-61/2"Float sub-1x61/2"DC-8 1/4"Stab-2x61/2"DC-7,875"string stab-3x61/2"DC-Jar-2x61/2"DC-10x HWDP

BACKGROUND READING

String Weight		Off Bottom Torque			ADBS			Hydraulics		
60	T	**60 Rpm**	9	daN.m	**Flow rate**	800	Lpm	**Flow rate**	1000	Lpm
52	T	**70 Rpm**	9	daN.m	**Press Inc**	7	Bar	**On Bottom**	53	Bar
45	T	**80 Rpm**	10	daN.m			min.	**Off Bottom**	52	Bar

TIMING

	START CORING	STOP CORING	CBRL at SURFACE	CBRL READY TO RUN	TOTAL Hrs
Date:	5-Sep-23	5-Sep-23			
Time:	9:53	12:46			

PERFORMANCE

Depth In [m]	Depth Out [m]	Cut Length [m]	Hours [hrs]	ROP [m/hrs]	Recover [m]	Efficiency %	Recover %	Reason for stopping coring:
2641	2651	10	2,88	3,47	9,9	27,34	99,00	

OVERPULL (last connection is at POOH)

Connection	1	2	3	4	5	6	7	8	9	10
Overpull [T]	0									

REMARKS

After a reasonable succesrate cutting 24m using a 27m corebarrel, it was agreed to adjust the corebarrel to a 36m length. Using the same corehead as previous runs. A part of the succes at run 6 been claimed to the OBM pill pumped downhole such it was timed to sett within the innertube at the very moment the ADBS was activated.

Running in hole smoothly at depth 2614m a 995 LPM was pumped and washed down pump pressure indicated 33B. Without rotation some spikes of weight (1-2 T) were observed.

SCR's were taken at 2626m using 1000LPM and noted, continued washing down with rotation of 30 RPM till 2639m, from this stage a super single was picked up in order to bring in maximum pipe to extend the meterage prior connection.

Displace OBM pill using 800LPM, from there expecting it would set within the innertube after 35min. Activated the ADBS using 1850LPM , back to 800LPM and 7Bar increase 25-32, indicate the ball was at the seat closing the innertube from flow.

Coring operation commences smoothly using minimum of weight and RPM to overcome any disturbtion until nearly 10m where cored, a clear jamming signal was presented; No more ROP, TQ when down , pressure rised , although attempted to push the formation through the recognized jamming , using 7T, without succes.

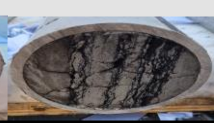
Being aware the formation could be a (softer) sand and therefor plugged, it was decided to stop coring and pull from bottom, there was no overpull seen.

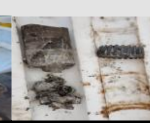
POOH of hole at surface the innertubes where layed out until the last 2 innertubes indicated cored rock was inside. From there the recovery procedures including cradle proceded. at the bottom innertube core was sticking out the shoe.

During processing and cutting it was noted at several places core jammed within the innertube and core shoe. At the workshop it took 10T to push the core out of the shoe.

Break out Coring assembly to pick up drilling equipment. Visualized the corehead, the severe damage at the shank remained the same but cutters graded as 0-0.

Although it's clear why the the core jammed , there is a slight suspecion while reviewing the time of pumping OBM pill, and time of activating the ADBS should be under investigation especially for any future coring at these circumstances.

IOT Representative

Marcel Taal, Rene Koets, Mike Van Wieringen

Customer Representative

Nick Bruin / Ibrahim Derbas

Coring Log

Penetration & Parameters Log - *CORE # 7* **Revision** **00**

Unit in use is : ***METRIC***

Depth [m]	Cored #	Time [min/m]	ROP [m/hrs]	ROP Log	Torque [daN.m]		Torque Log (Off Bottom … Max)	WOB [T]		RPM	Flow [Lpm]	SPP [Bar]	Remarks
2641	*= Starting depth*			*Graph Zoom:* 25	**Min**	**Max**	*Graph Zoom:* 50	Min	Max				
2642	1	13	4,62	IIIIIIIIIII	12,4	13,5	IIIIII	2	2	70	1000	53	
2643	2	11	5,45	IIIIIIIIIIIII	13	13,5	III	2	2,5	70	1000	54	
2644	3	11	5,45	IIIIIIIIIIIII	13	13	I	2	2,5	70	1000	54	
2645	4	12	5,00	IIIIIIIIIIII	13	13,3	II	2,5	2,5	70	1000	53	
2646	5	9	6,67	IIIIIIIIIIIIIIII	13,2	13,2	I	2,5	2,5	70	1000	52	
2647	6	16	3,75	IIIIIIIII	13,2	13,4	II	2,5	2,5	70	1000	53	
2648	7	14	4,29	IIIIIIIIII	13	13	I	2,5	2,5	70	1000	52	
2649	8	12	5,00	IIIIIIIIIIII	12,5	12,5	I	2,5	2,5	70	1000	52	
2650	9	48	1,25	III	10	12	IIIIIIIIIII	3	5	70	1000	54	
2651	10	23	2,61	IIIIII	10	11	IIIIII	3	7	70	1000	56	Jammed

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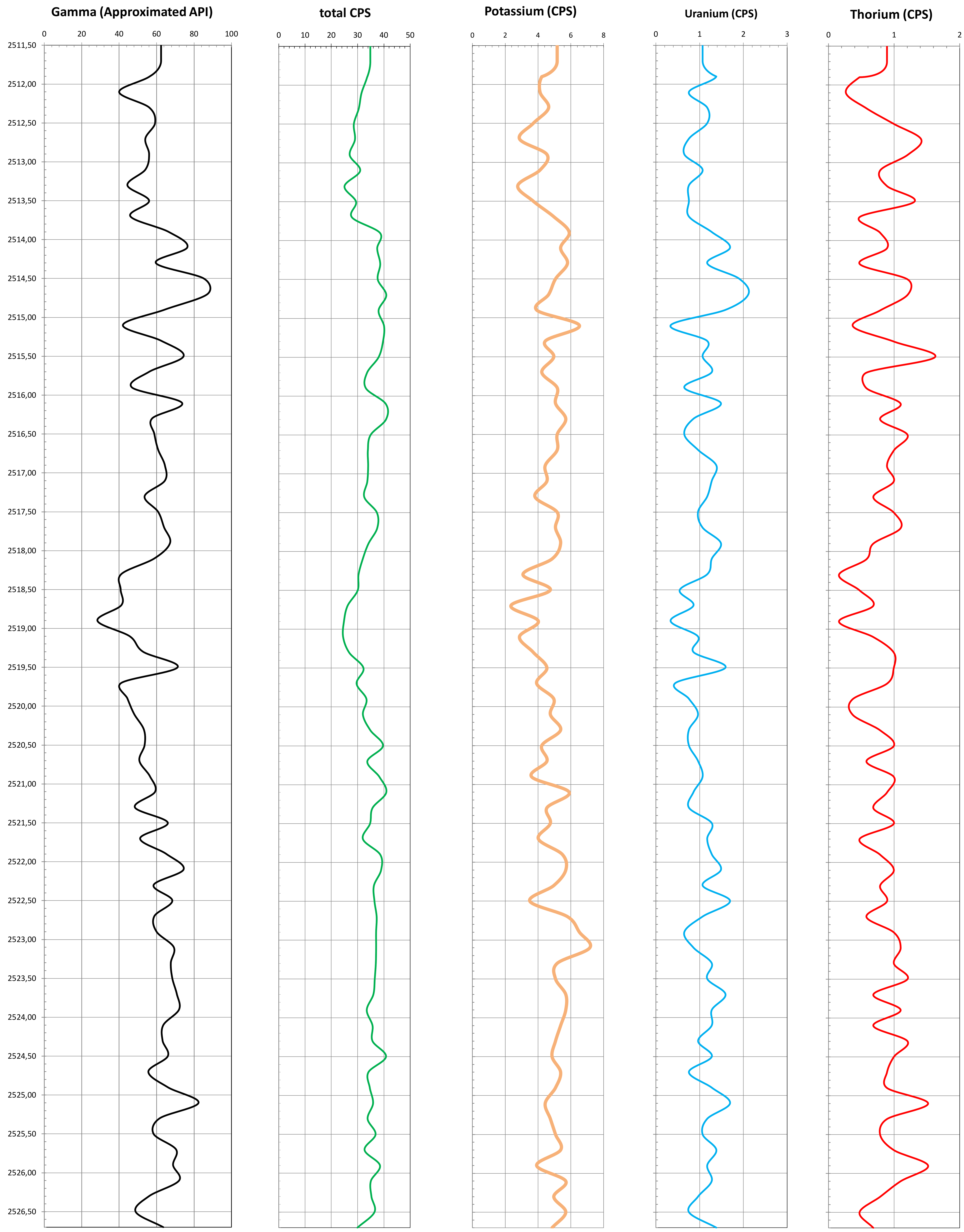
GAMMA REPORT
CORE 1

WELL: DELFT GT-01

PREPARED FOR: TU Delft

Presented by	D. Rood
Approved by	Marcel Taal
Written by	D. Rood
Date of issue	10 AUG 2023
Period of work	Q3 2023
Document number	GB-19-J242_003-version2

Company: TU Delft		**IOT Holland**
Well: DEL-GT-01	**Gamma ray report**	**Project: Q22-5457 Delft GT-01**
	Depth range: 2511,5m ~ 2526,7m MD	**Analyst: D.Rood**
Sample type: 4'' core in aluminium barrel		**Date: 10-08-2023**
Document reference: GB-19-J242_003-version1	**Core 1**	**Gamma logger: 3389**
		Core depth unit: meters



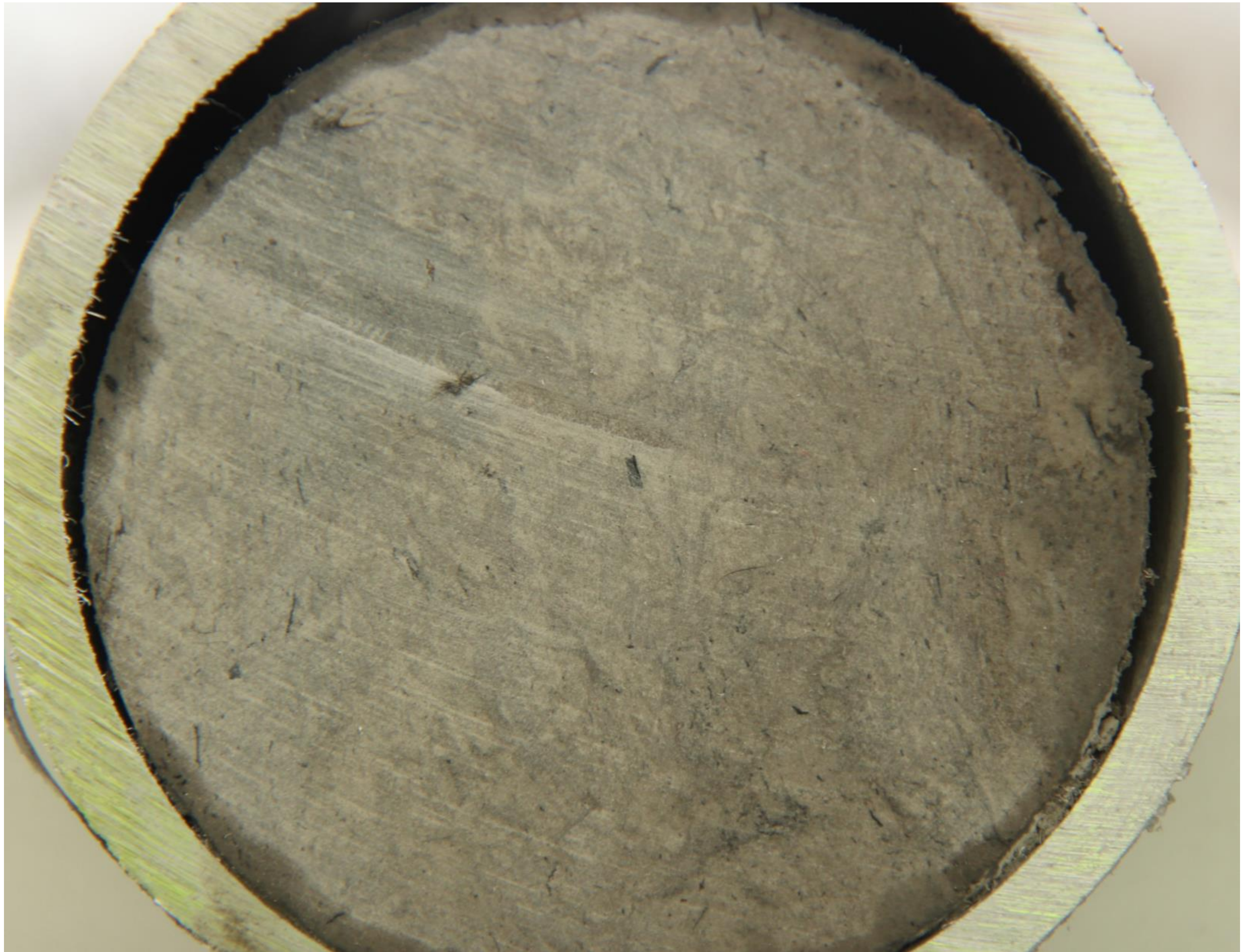
Core #1 in DEL-GT-01 Images and Initial Descriptions

TU Delft – Hemmo Abels - 10 August 2023

2511.5m MD

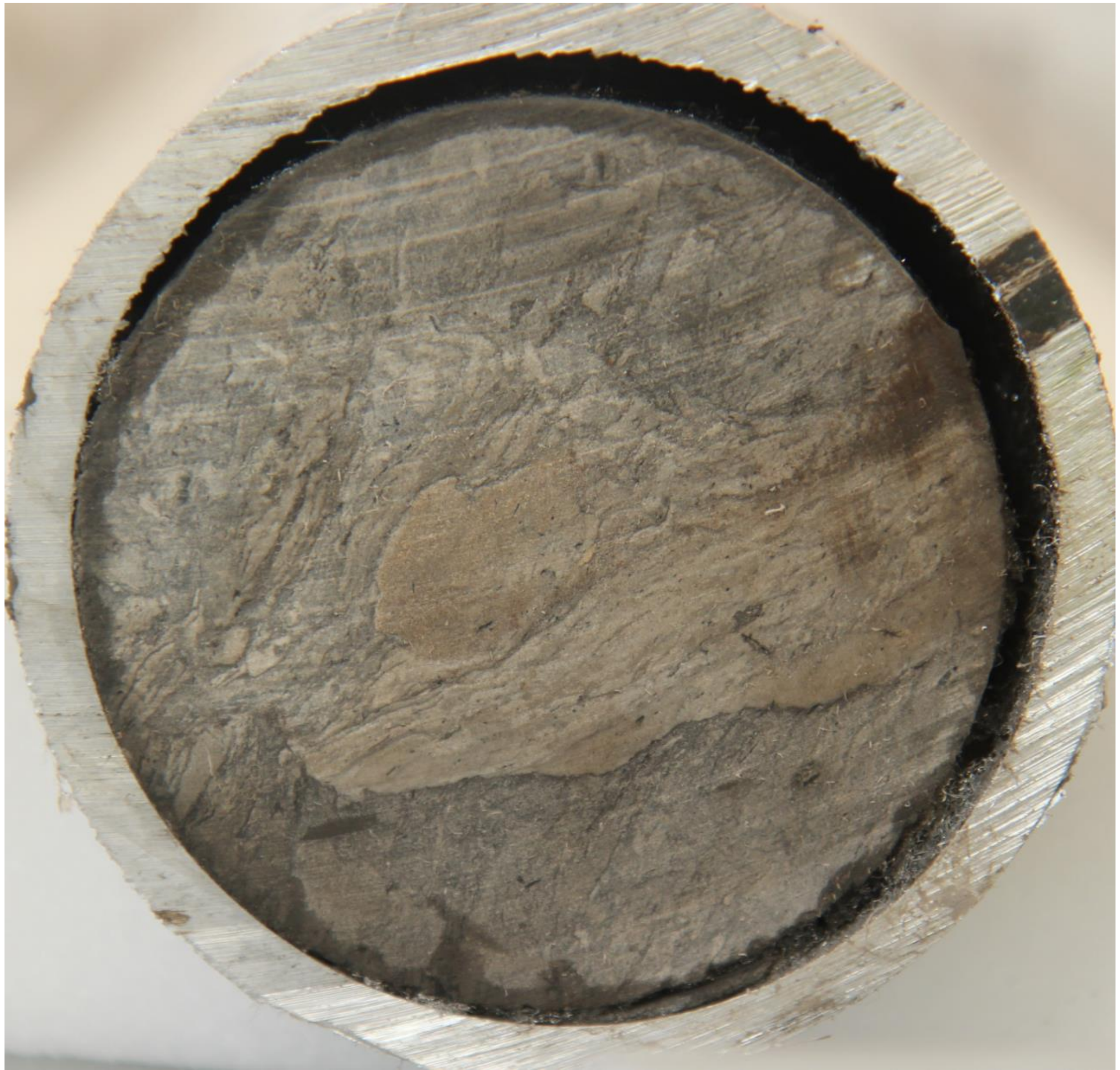
Medium grey brown, coarse siltstone, very hard rock, dark-grey filled cracks that look synsedimentary or early diagenetic, drilling print of destructive bit visible, some floating organic matter

2512.5m MD



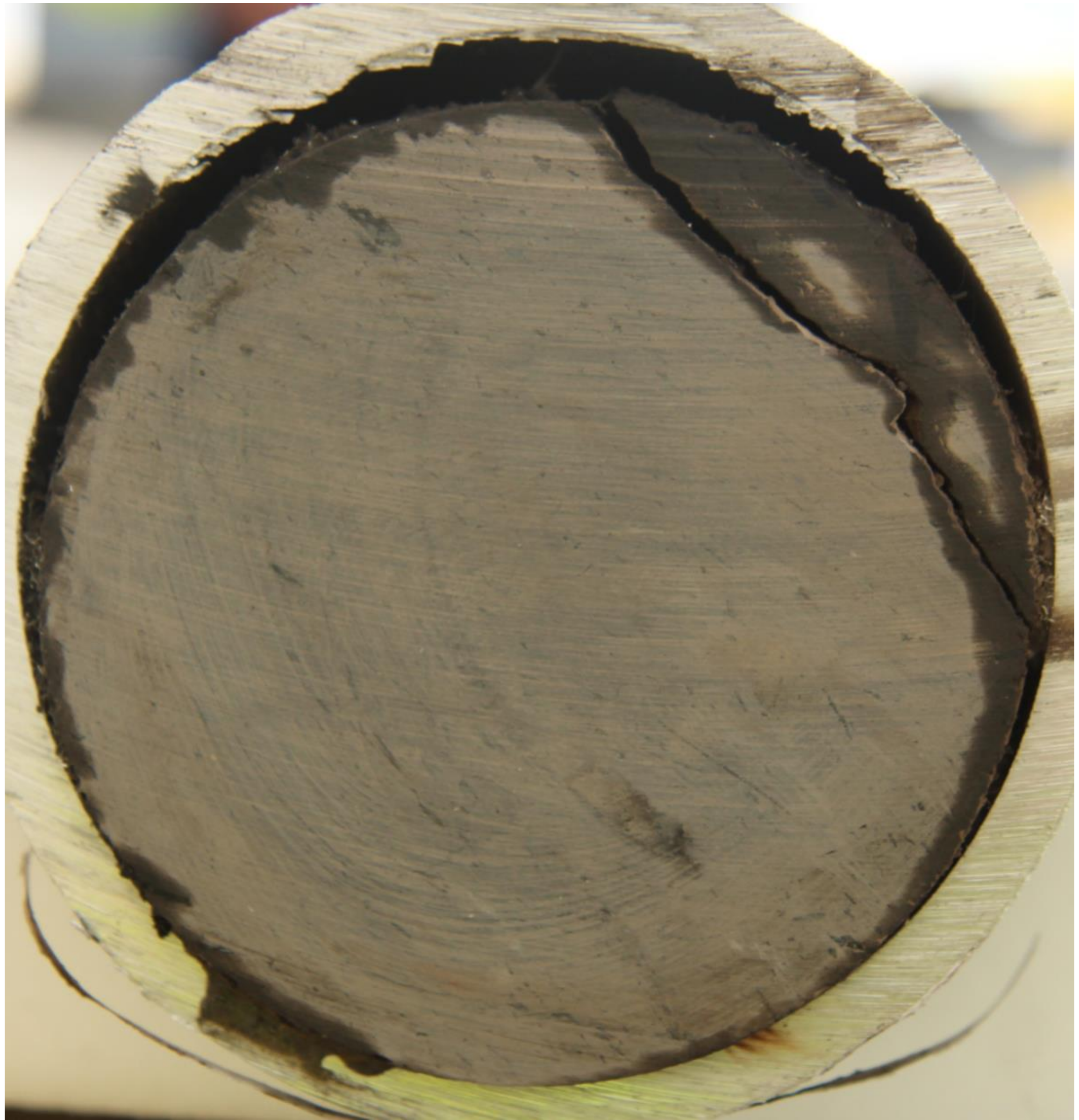
Medium grey, coarse siltstone, few floating mm-sized organic particles, some fluidisation

2513.5m MD



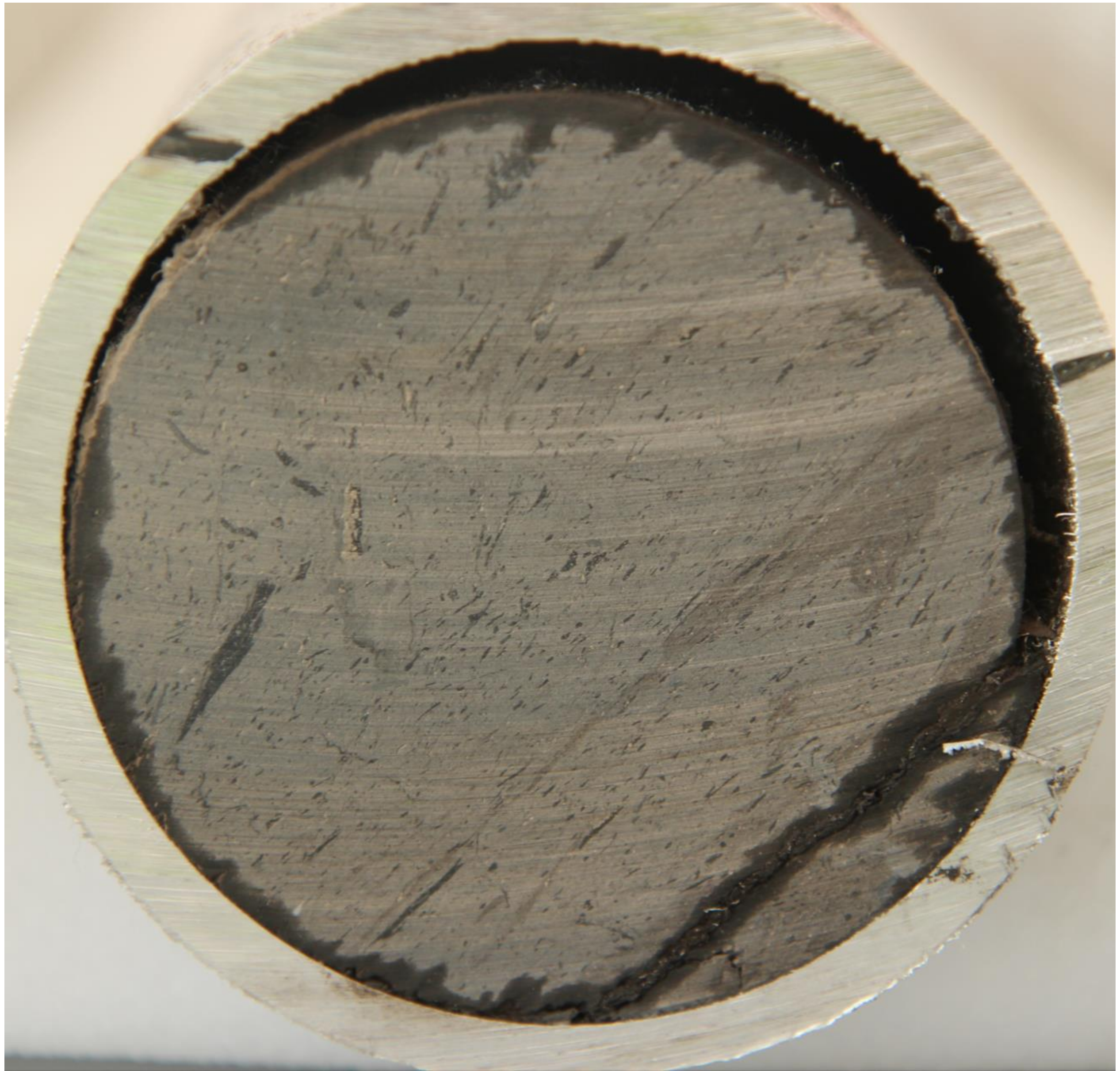
Dark and light grey, coarse silt, fluidized throughout, originally mm-scale laminated and some cm-scale bedded it seems, some orange-lightbrown colours in homogenous mudclasts, some very-fine organic remains in laminae and as particles

2514.5m MD



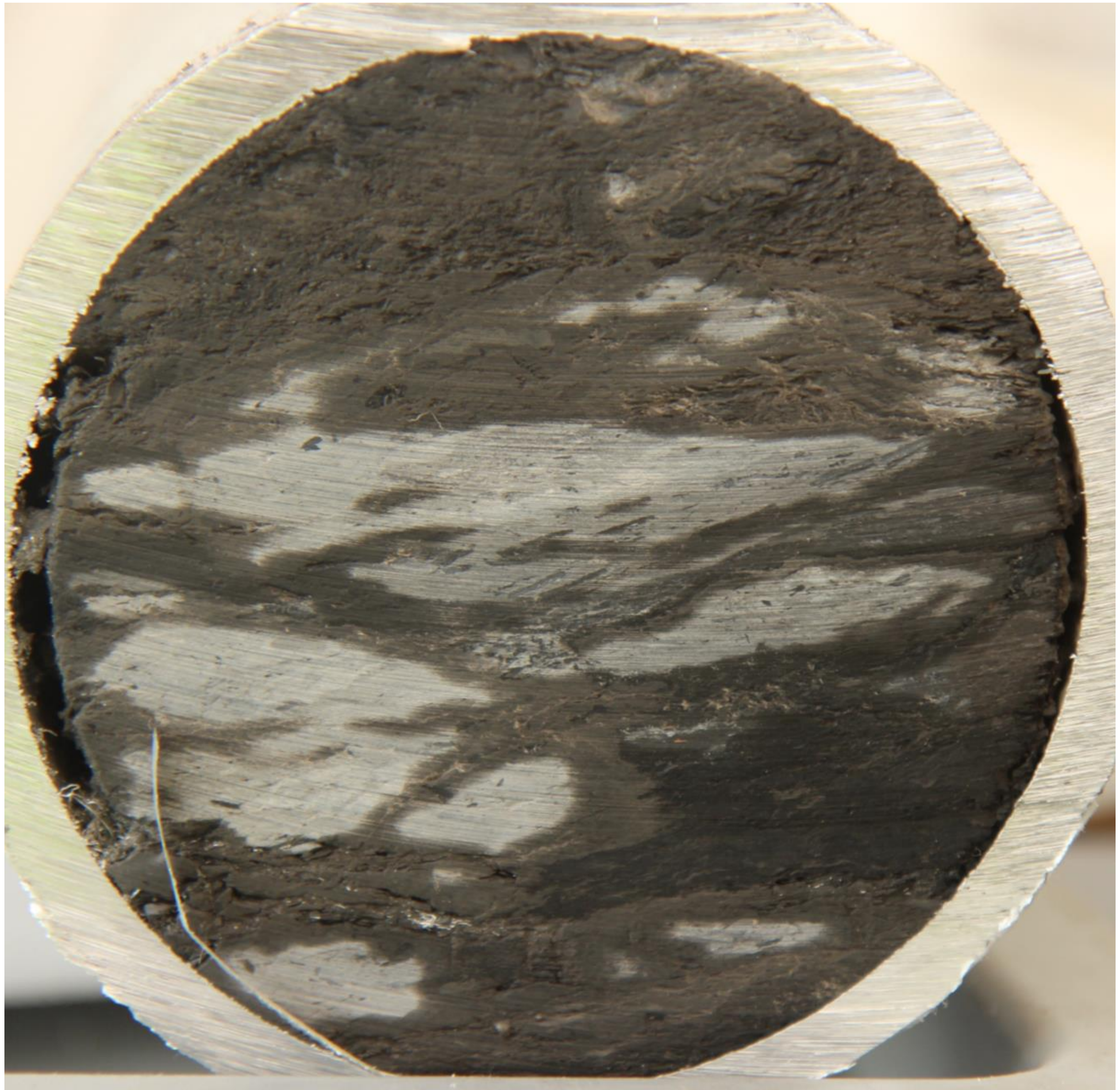
Grey silt, solid rock, floating mm-size dark particles, surface not sufficiently cleaned for inspection, one drilling-induced fracture

2515.5m MD



Medium hard, m. dark grey silt, floating dark particles seemingly fine-grain organic matter, one bigger, slicked crack, some other lighter-coloured fragments, no sorting

2516.5m MD



Dark grey siltstone, seemingly with floating fine-grained organic matter, fully fractured likely by slickensides of pedogenic origin

2517m MD

Core#1 section 1-2 transition

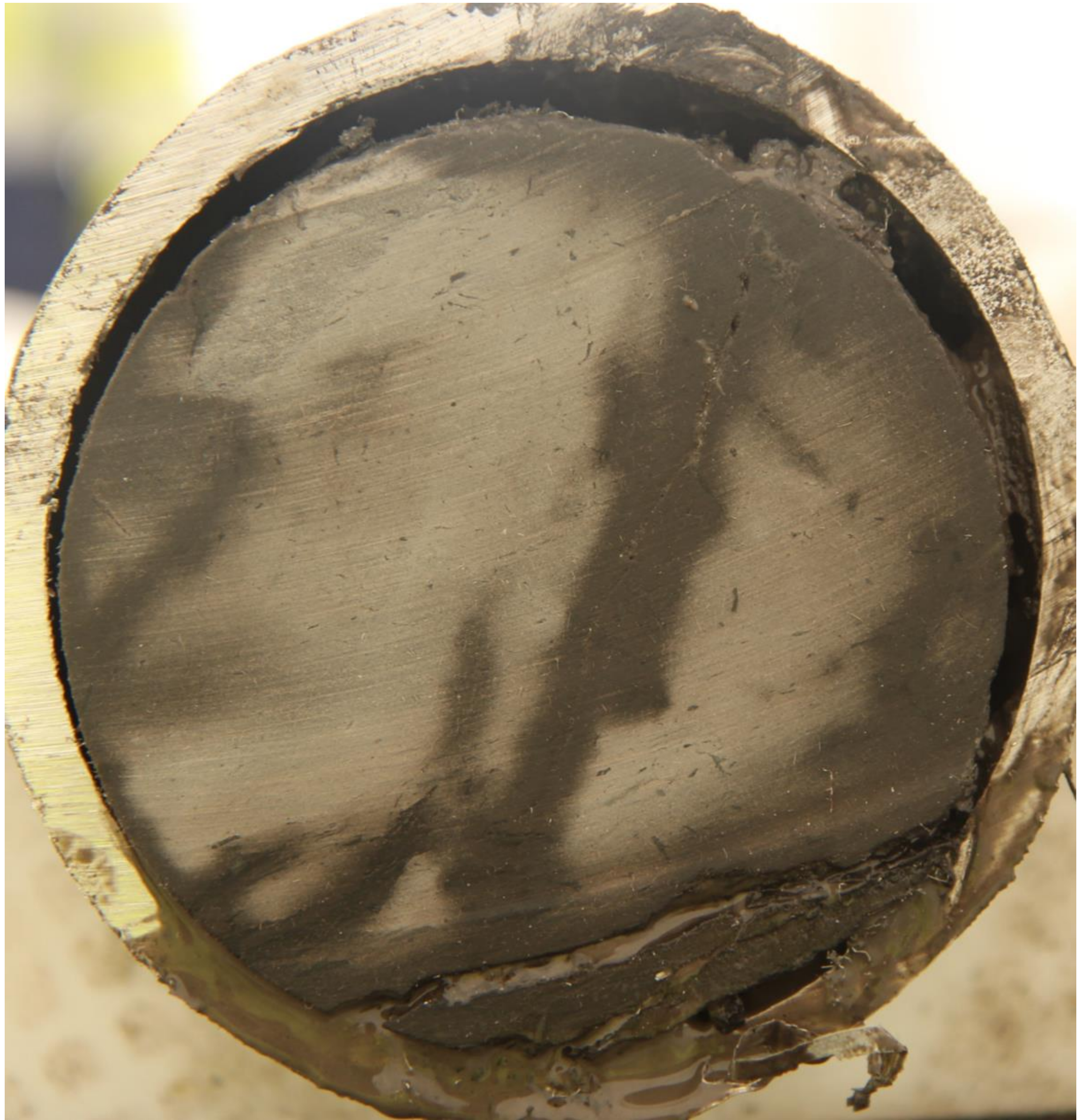
Dark grey clay to siltstone, relatively hard rock, slickensided throughout likely related to paleosoil formation (vertisol)

2517.5m MD

Dark grey, clayey silt, fluidised, floating d.grey particles, one bigger clayey fracture that could be a pedogenic slickenside

TUDelft

2518.5m MD



Clayey silt, (d) grey, floating mm-scale dark particles likely organic matter, quite solid rock, one bigger fracture that is likely a slickenside

TUDelft

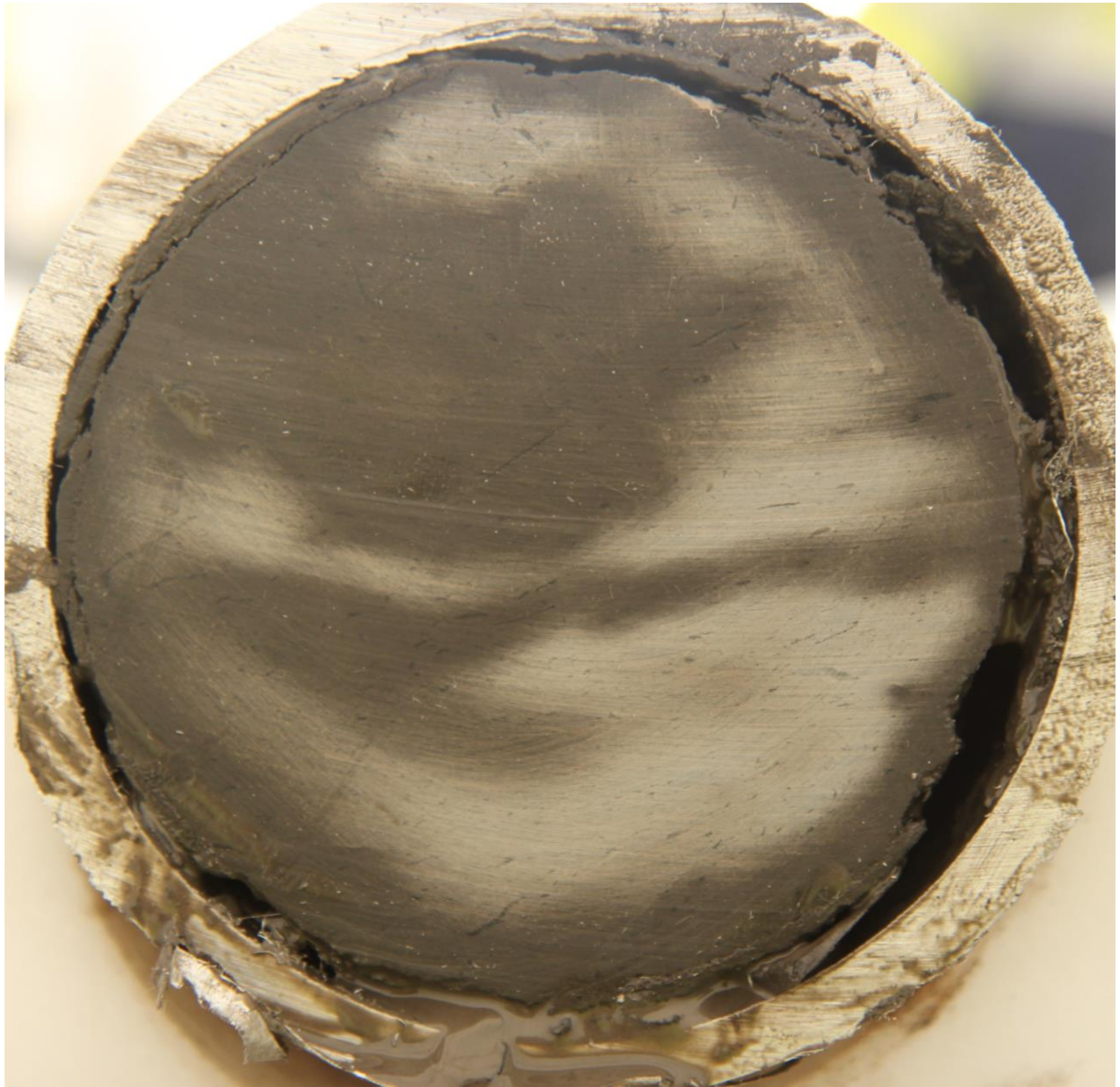
2519.5m MD

Medium grey brown silt, homogeneous, some fluidisation, some floating very-fine grained organic matter

2520.5m MD

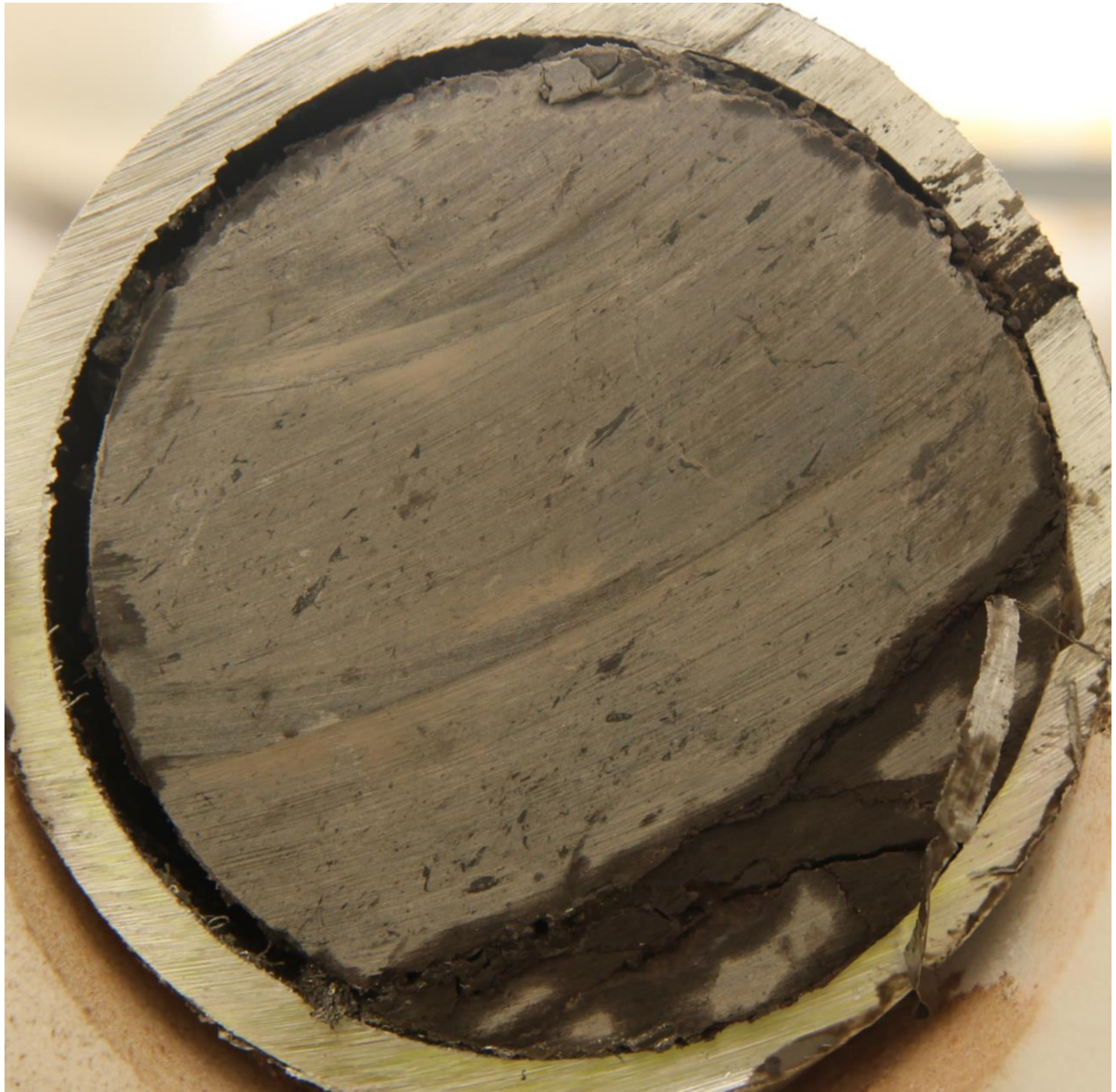
Brown-grey clayey silt, not very cleaned during examination, few floating fine-grain organic matter visible, coring-induced fracture

2521.5m MD



(Dark) grey silty clay, homogeneous, seemingly with some floating fine-grained organic matter

2522.5m MD



(dark) grey clayey silt, floating fine-grained organic matter, no sorting, one drilling induced fracture

2523.5m MD

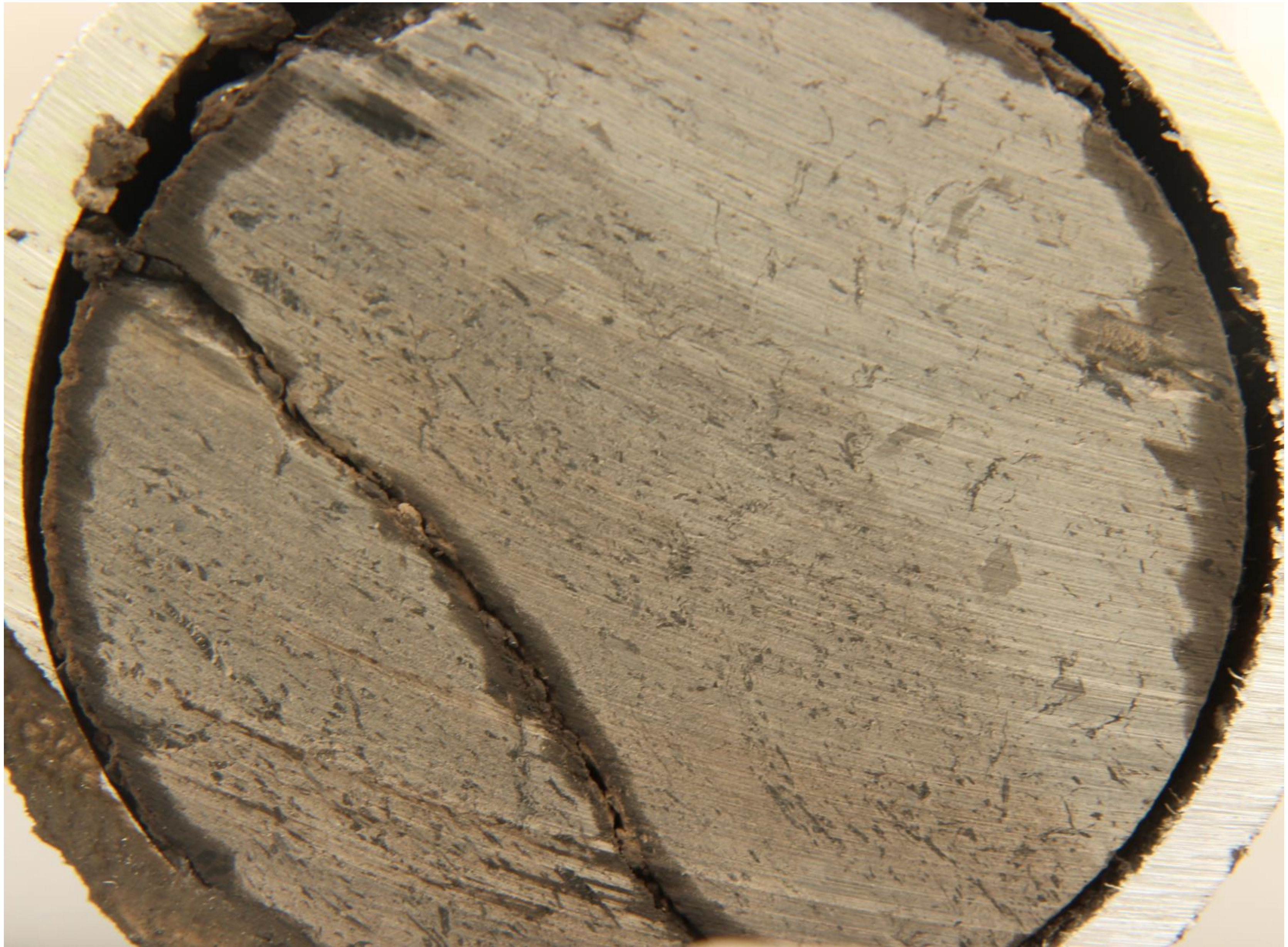
(Dark) grey clayey silt, floating mm-sized dark organic remains, white filled fracture (drilling mud?)

2524.5m MD

Dark grey-brown, silty clay, slickensides that could be of pedogenic origin, some open fractures that seem drilling induced

TU Delft

2525.5m MD



Clayey silt, (d.) grey, lots of floating mm-scale dark organic and some clay particles, one bigger fracture that could be slick or coring induced or both, some sorting along what could be bedding

2526.5m MD

Light grey-brown, coarse silt to very fine sandstone, a bit fluidised, seemingly bedded (top leftish is the original top?), fractured by coring, floating organic remains and fine-grain material in lower 2/3, rock dries quickly

2526.9m MD

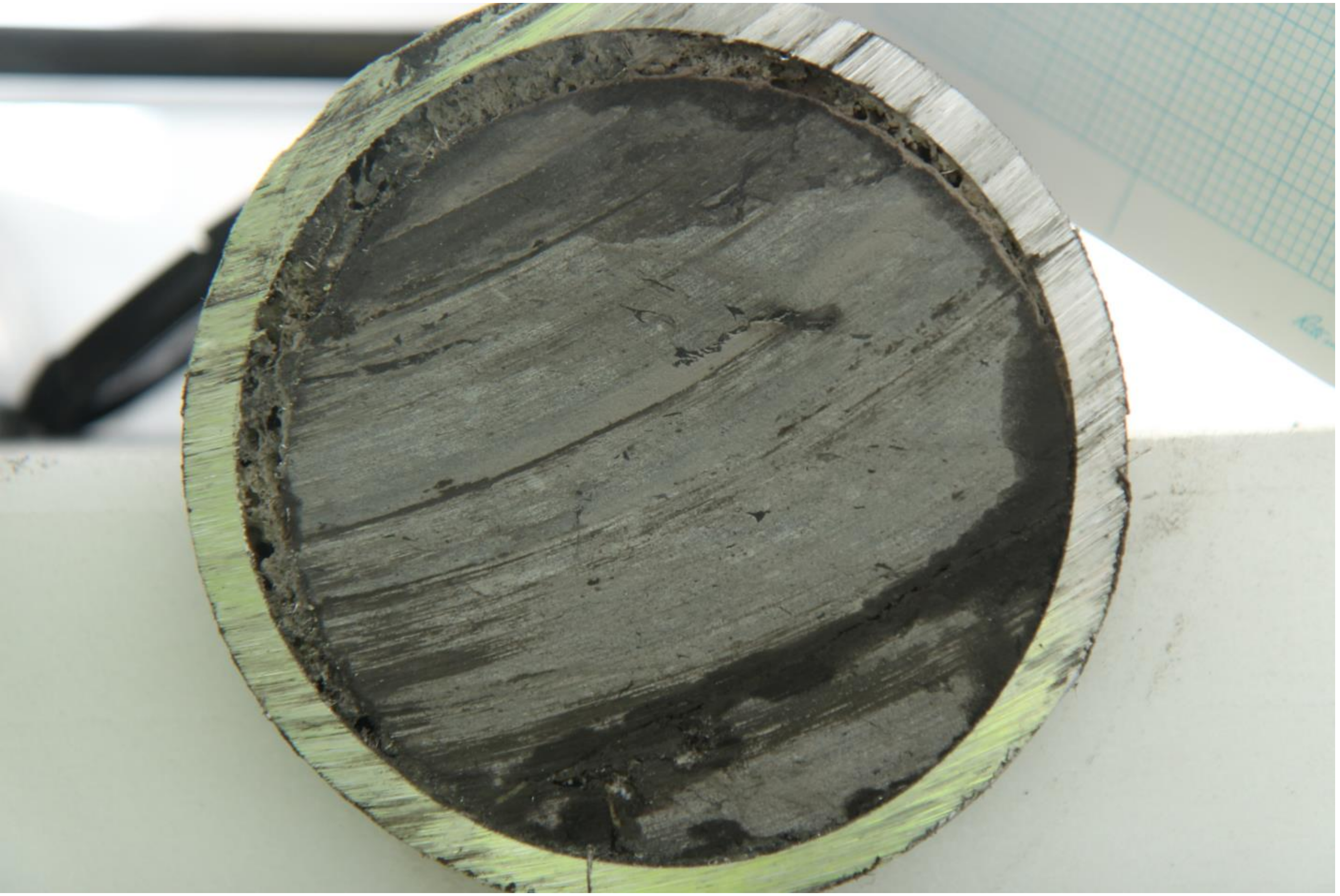
Section is dirty and could not be cleaned properly, drilling mud and aluminium particles from sawing lay on top of rock, rock seems to be a silt to sandstone, grey-brown in colour, quite competent rock it seems, a bit irregularly organized, maybe slicked?

DEL-GT-01 Core #2 Images and Initial Descriptions

TU Delft - Hemmo Abels – 29 August 2023

TU Delft

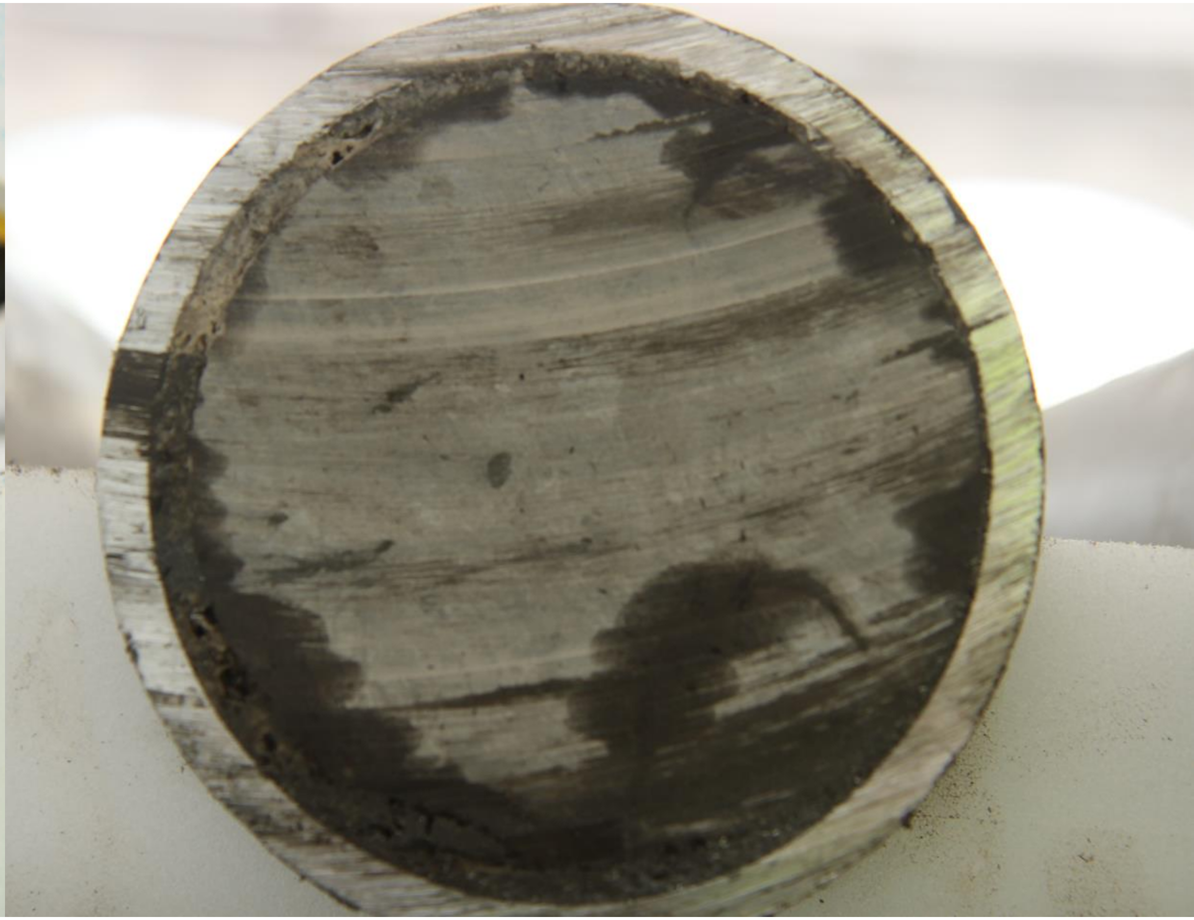
2577.00m MD



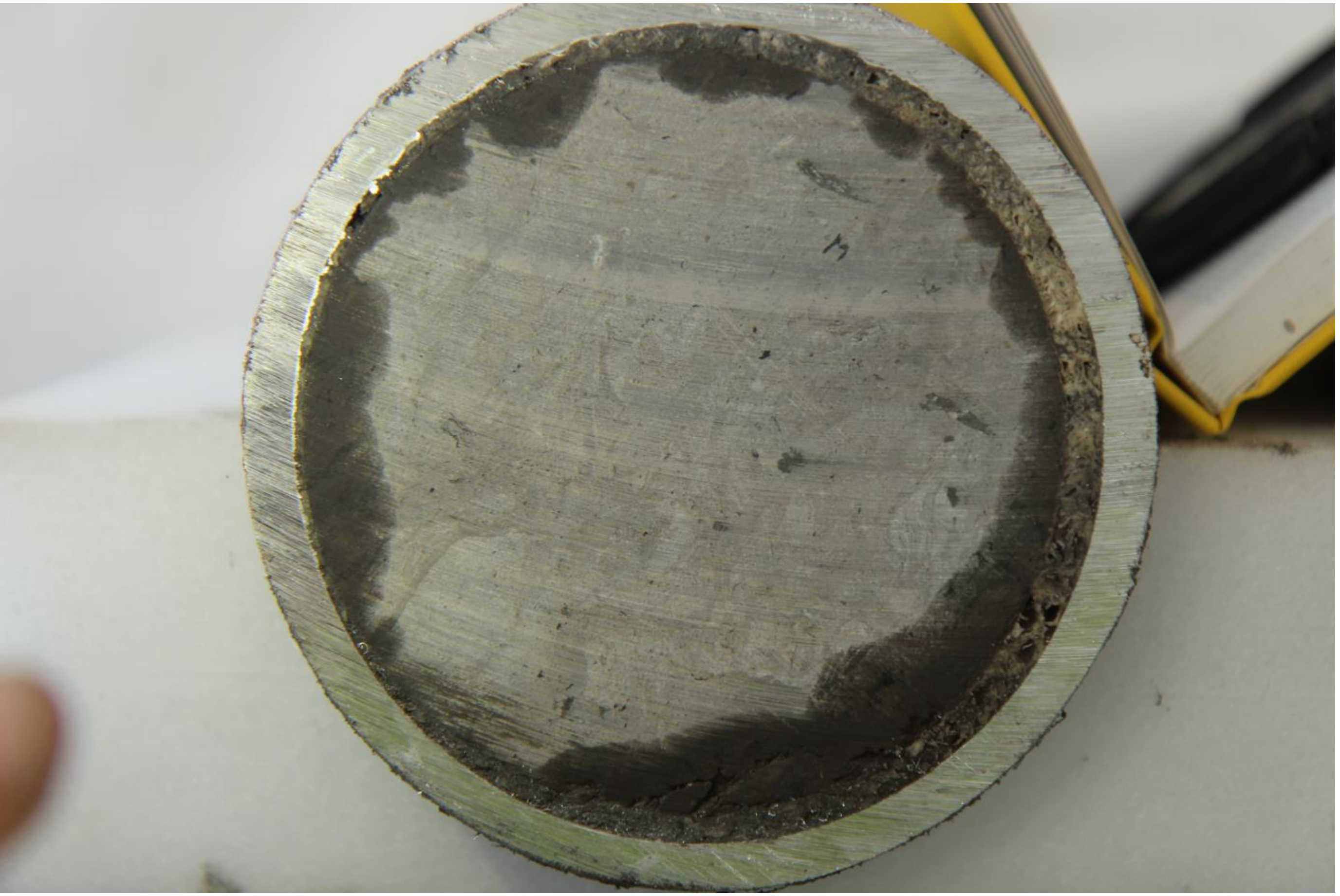
Medium grey siltstone, relatively hard rock, floating fine-grained organic matter, some fluidisation?

2578.00m MD

Medium to coarse silt, hard, floating thin but cm-scale wide organic matter in fluidised form throughout, medium gray



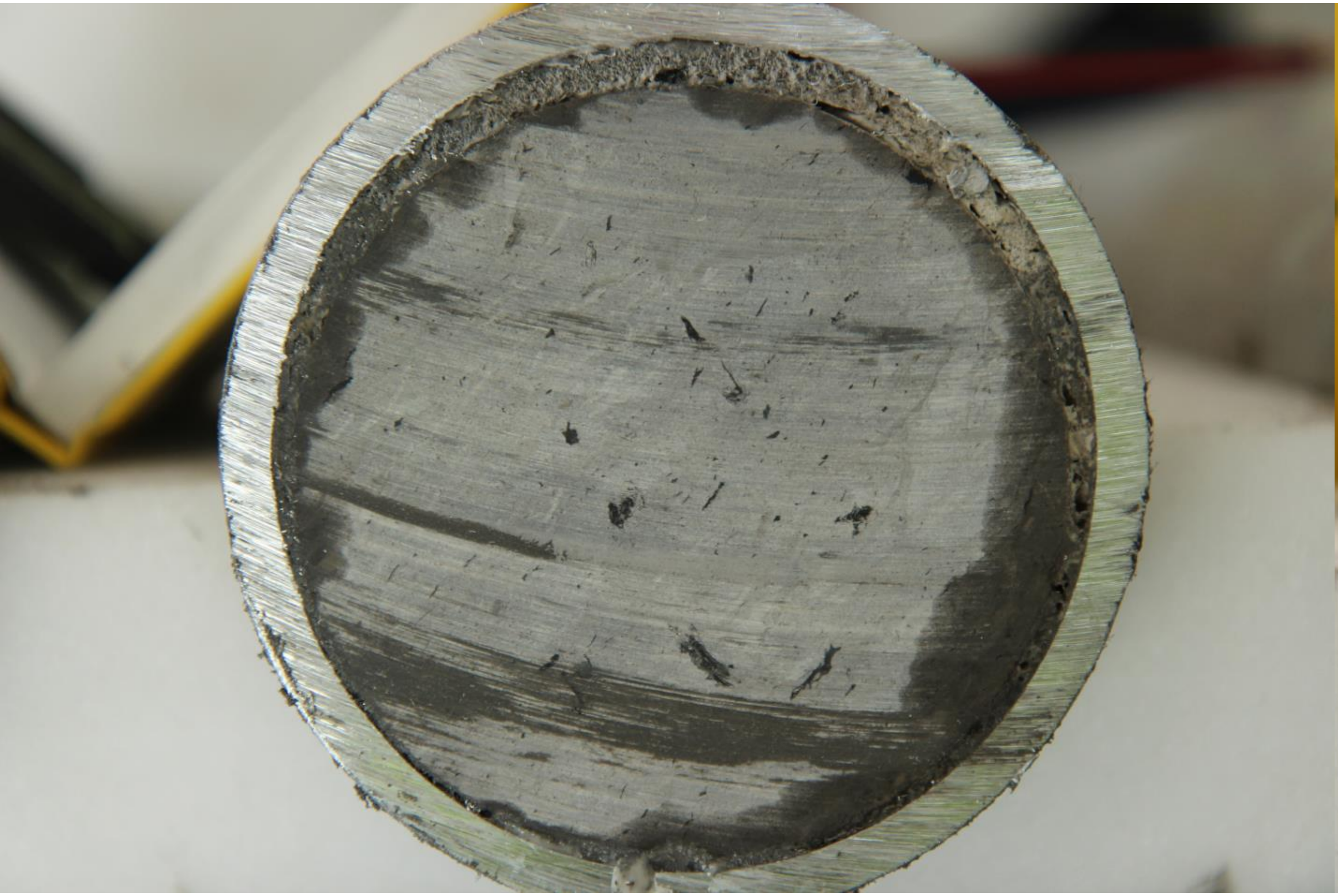
DEL-GT-01 2579m MD

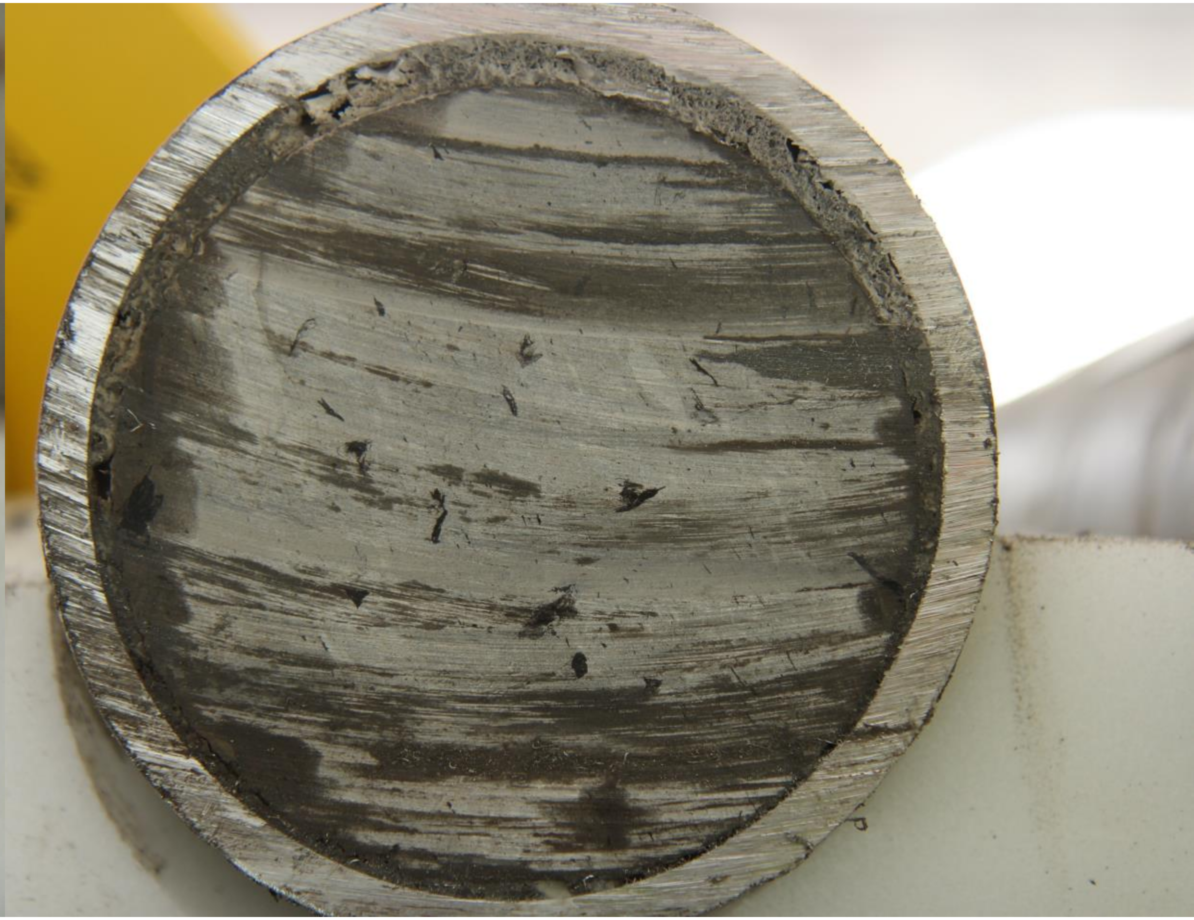


Medium to coarse siltstone, medium grey, some lamination that is fluidised, some fine-grained organic matter

DEL-GT-01 2580m MD

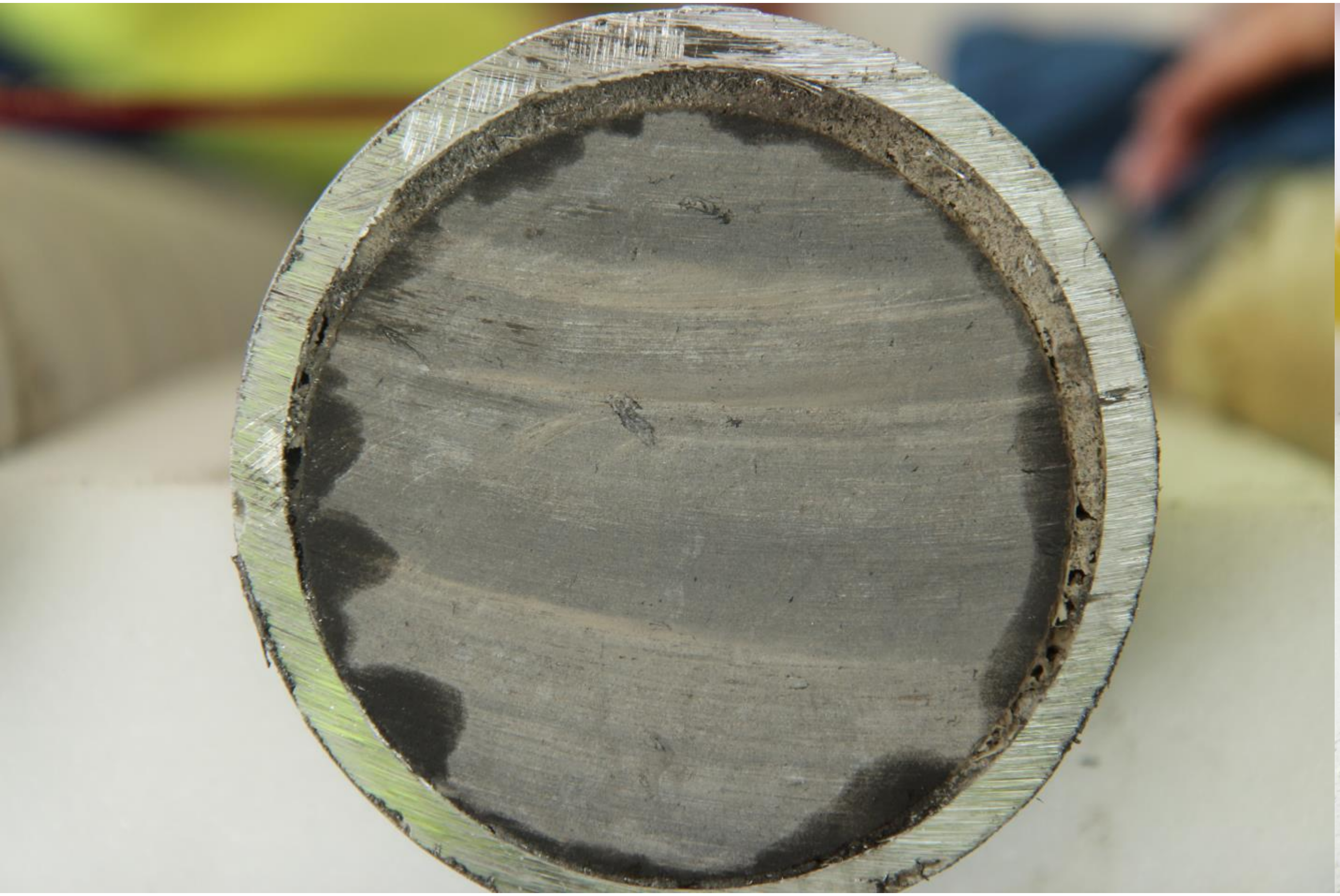
Medium to coarse siltstone, light to medium grey, mm-size floating organic matter, some cm-sized plant remains





DEL-GT-01   2581m MD

Hard rock, medium to dark grey, coarse silt, some mostly very-fine and floating org. matter



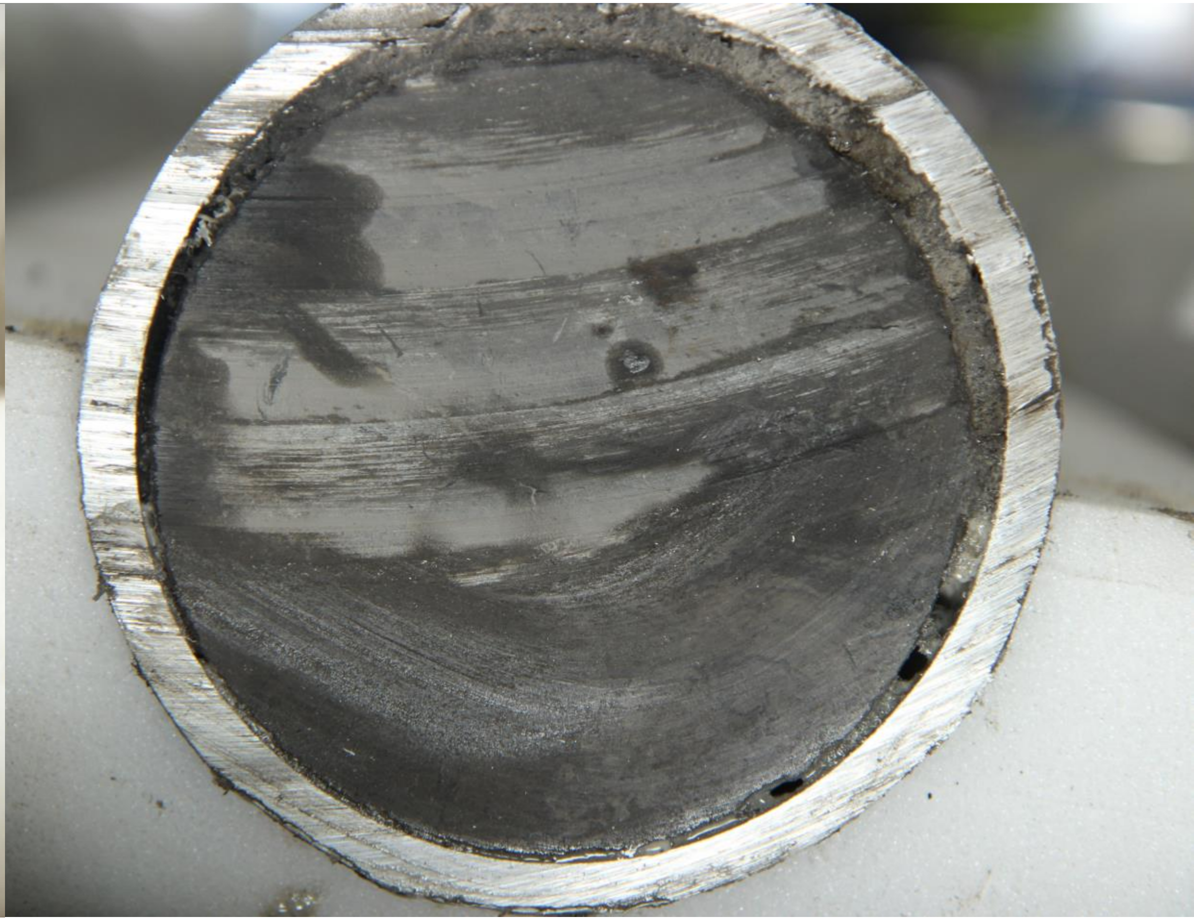
TU Delft

DEL-GT-01
2581.1 - 2581.38

Hard and solid, quite homogeneous, dark-grey coarse siltstone, breaks shows some patterns that resembled slickensides in a paleosoil

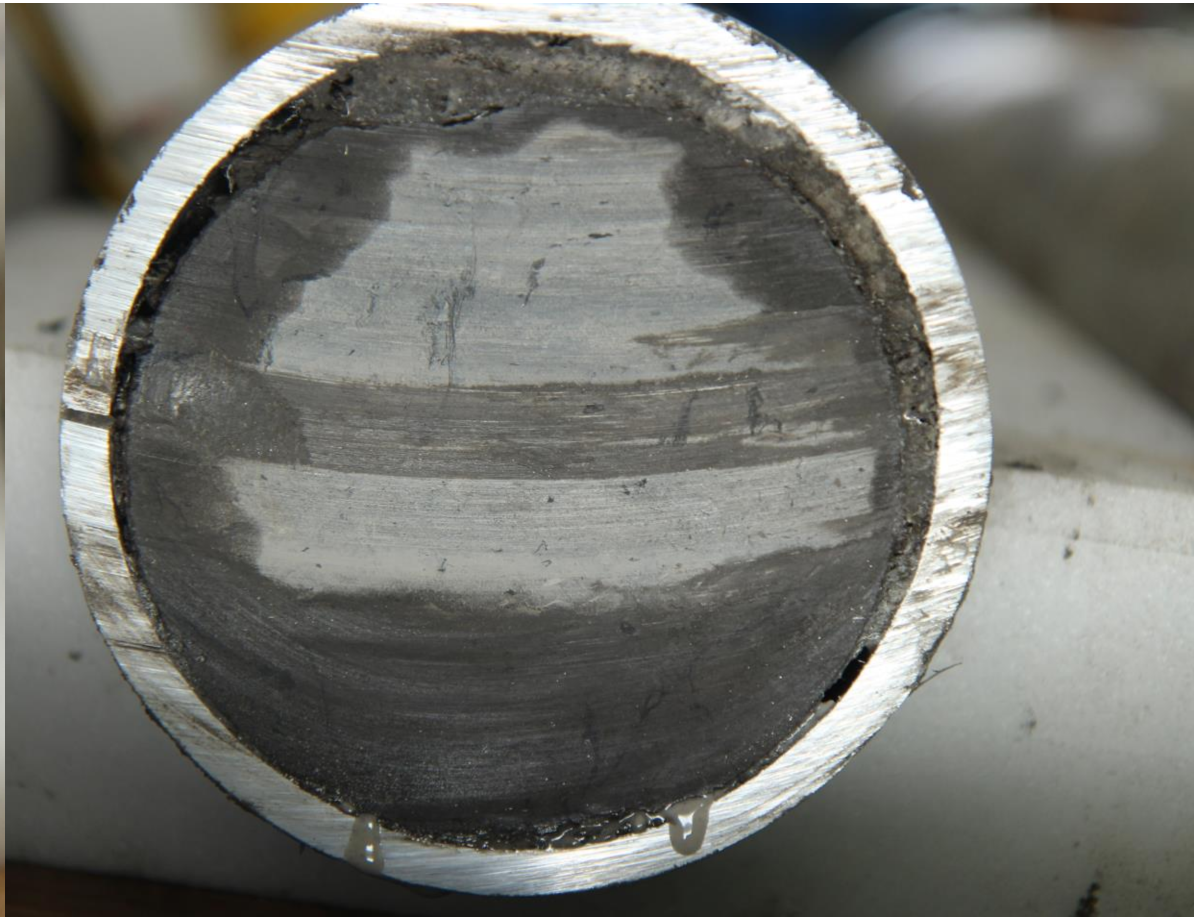
TU Delft

DEL-GT-01 2582.38m MD



Dark grey siltstone, mm-sized floating plant fragments

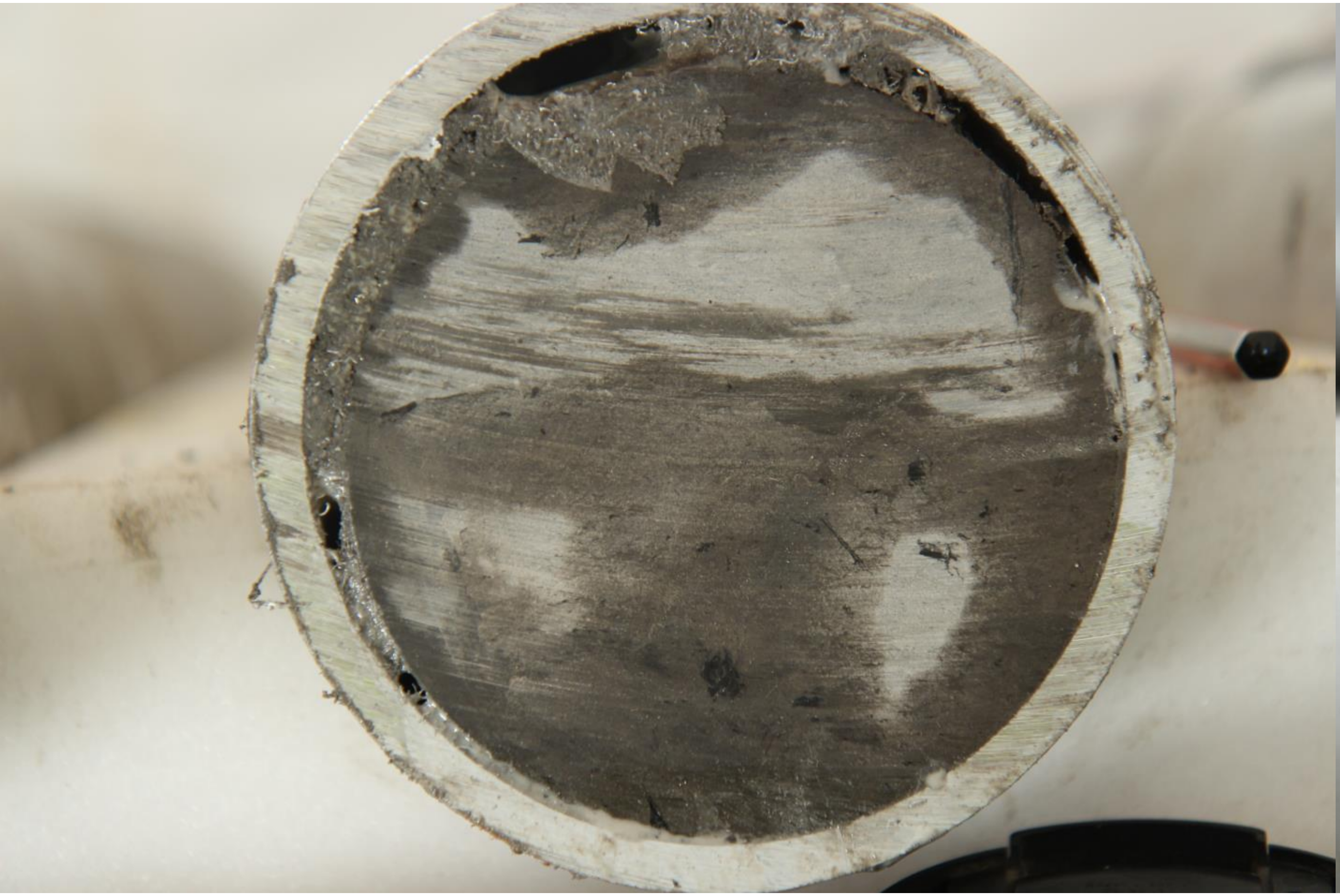
DEL-GT-01   2583.38m MD



Medium grey siltstone, abundant floating organic matter of mm-scale thickness and cm-scale width → plants

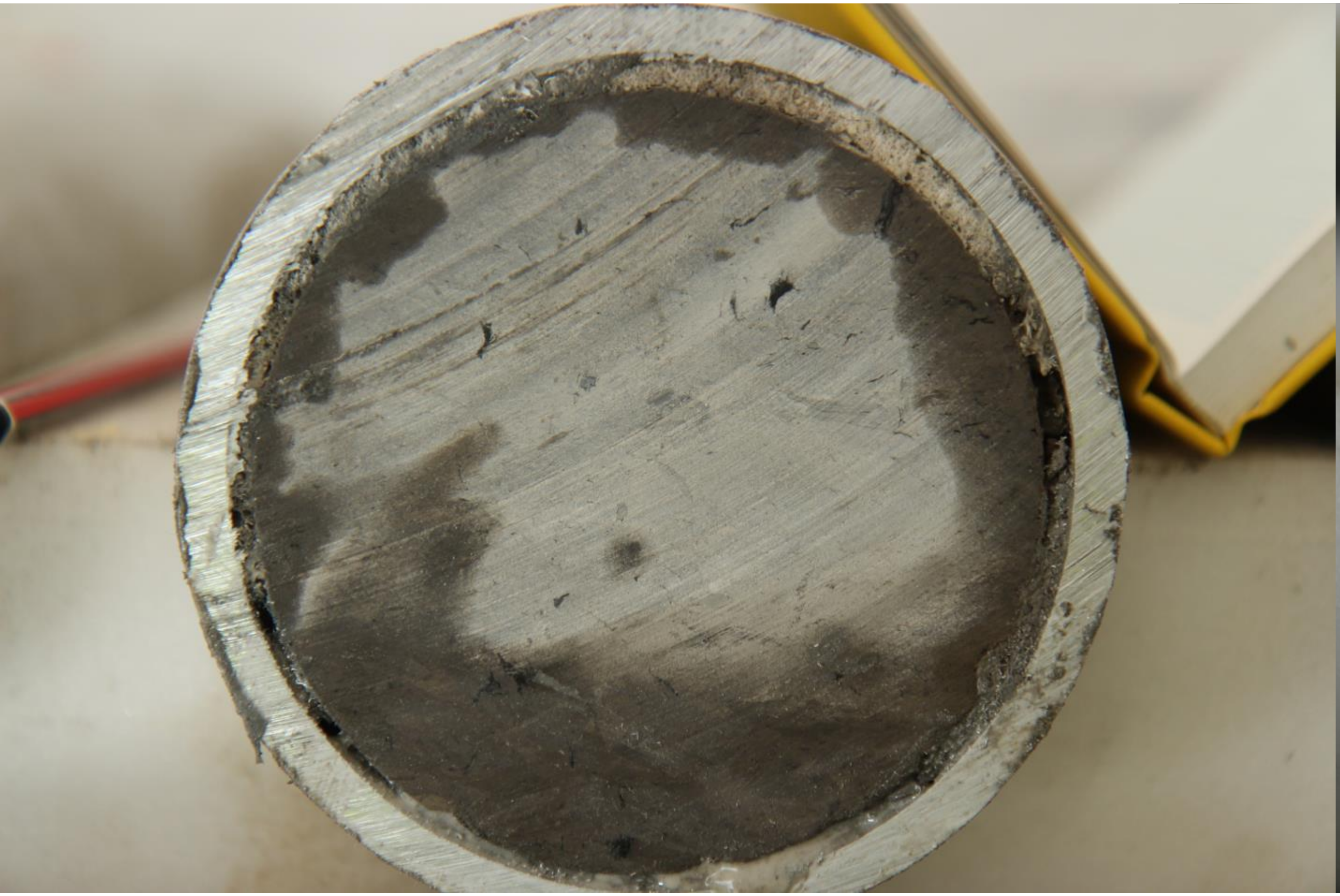
TU Delft

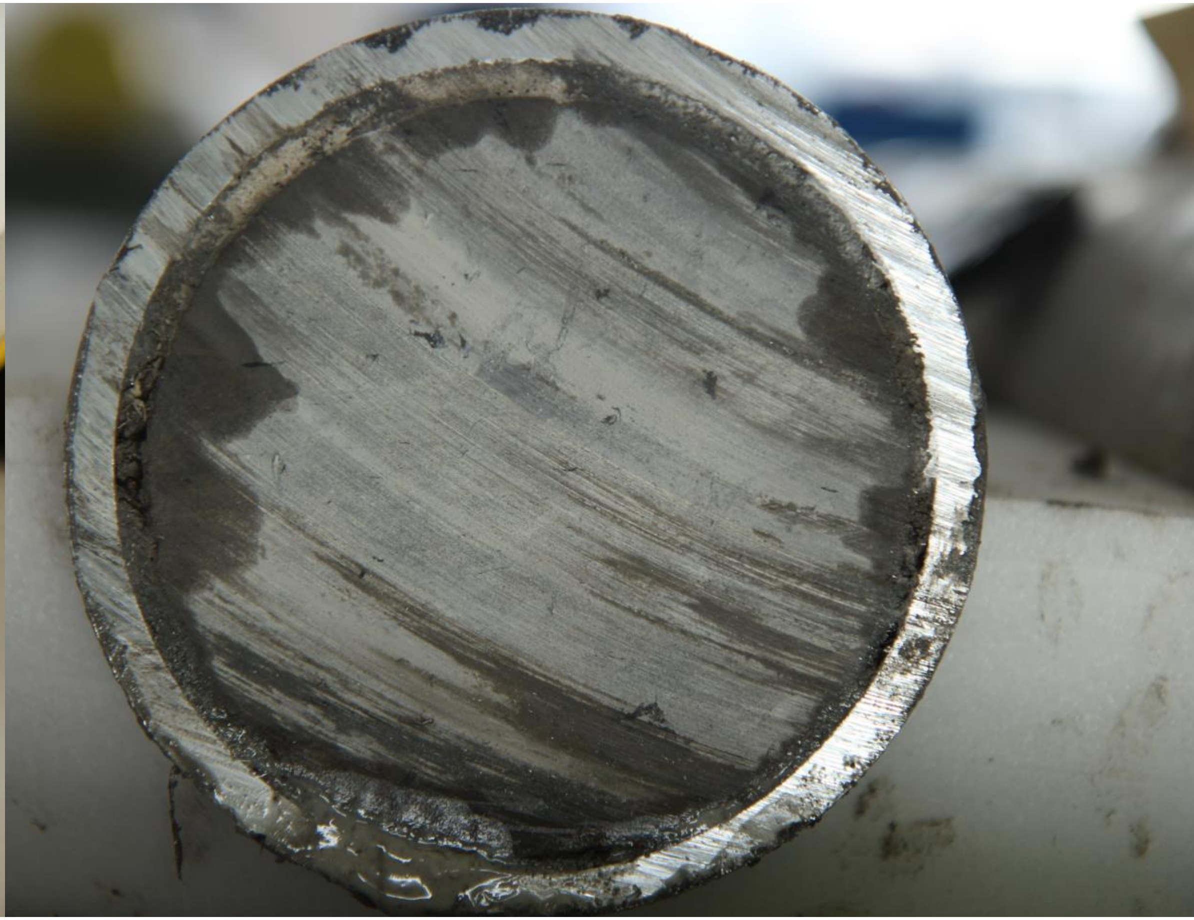
DEL-GT-01   2584.38m MD



Light to medium grey siltstone, common are 1-cm sized floating organic matter remains (plants)

DEL-GT-01   2585.38m MD

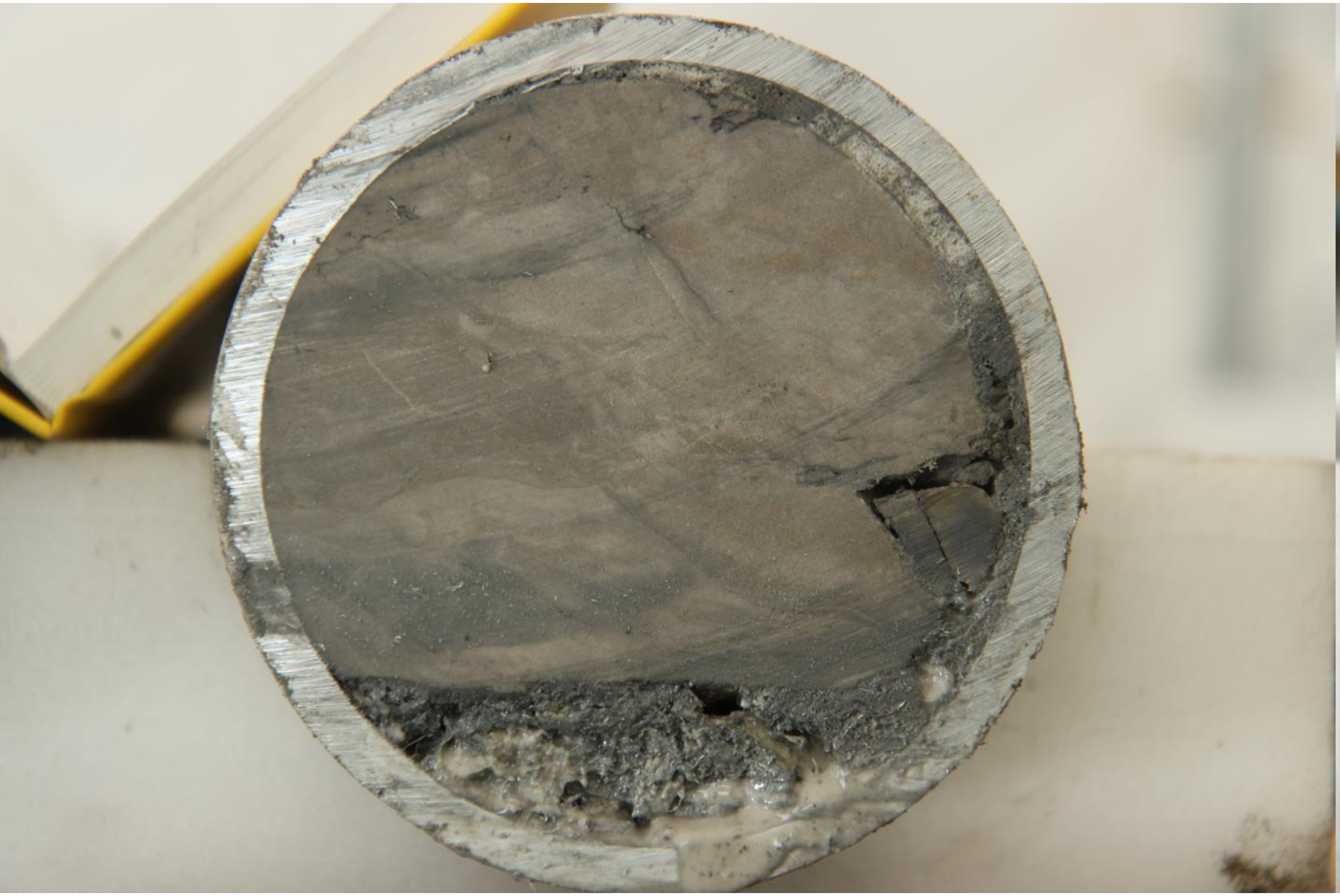


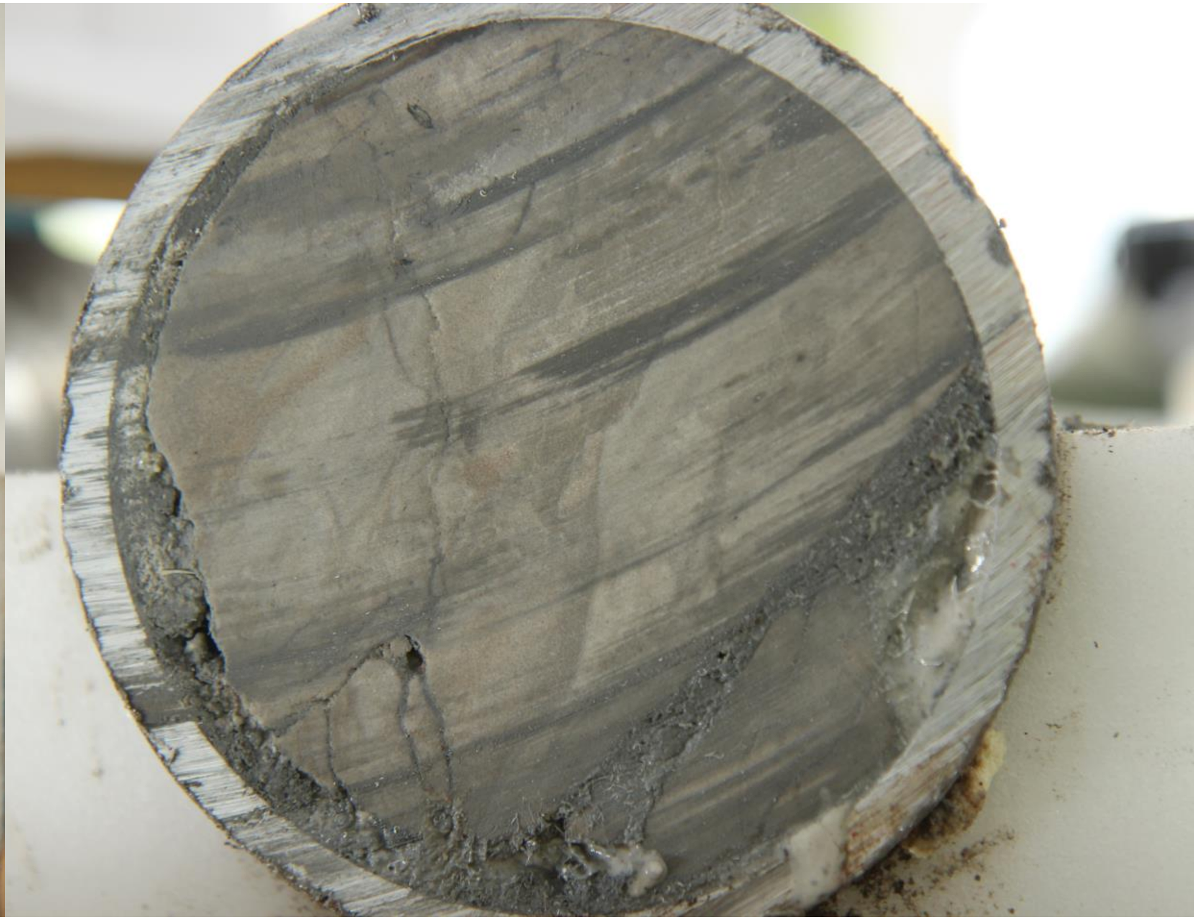


Light to medium grey siltstone, abundant mm-cm scale organic matter remains, floating, some fluidisation?

TUDelft

DEL-GT-01 2586.38m MD

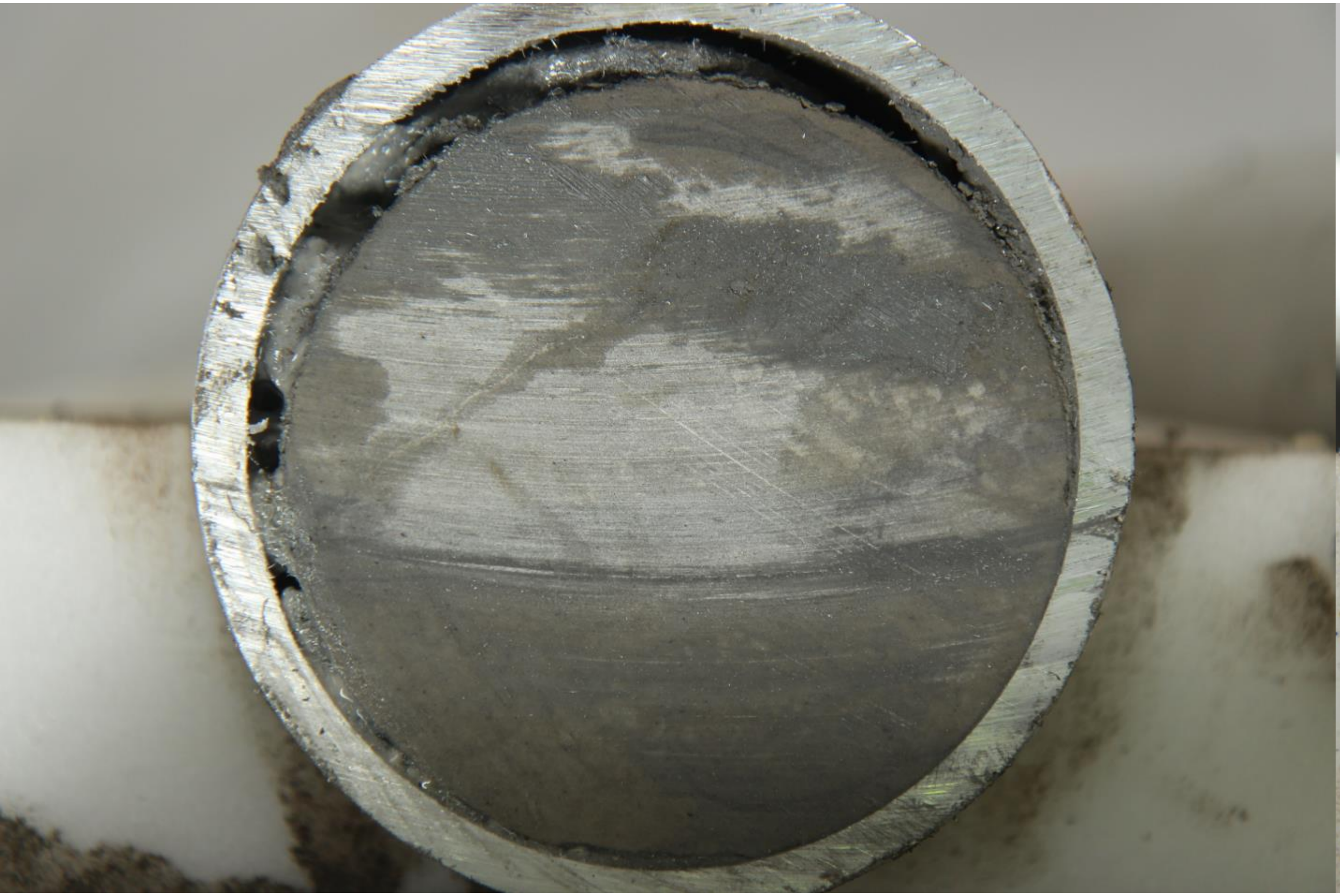




Brownish grey, slicked or fluidised, medium to coarse siltstone, black-organic filled ‘cracks’, some pieces missing

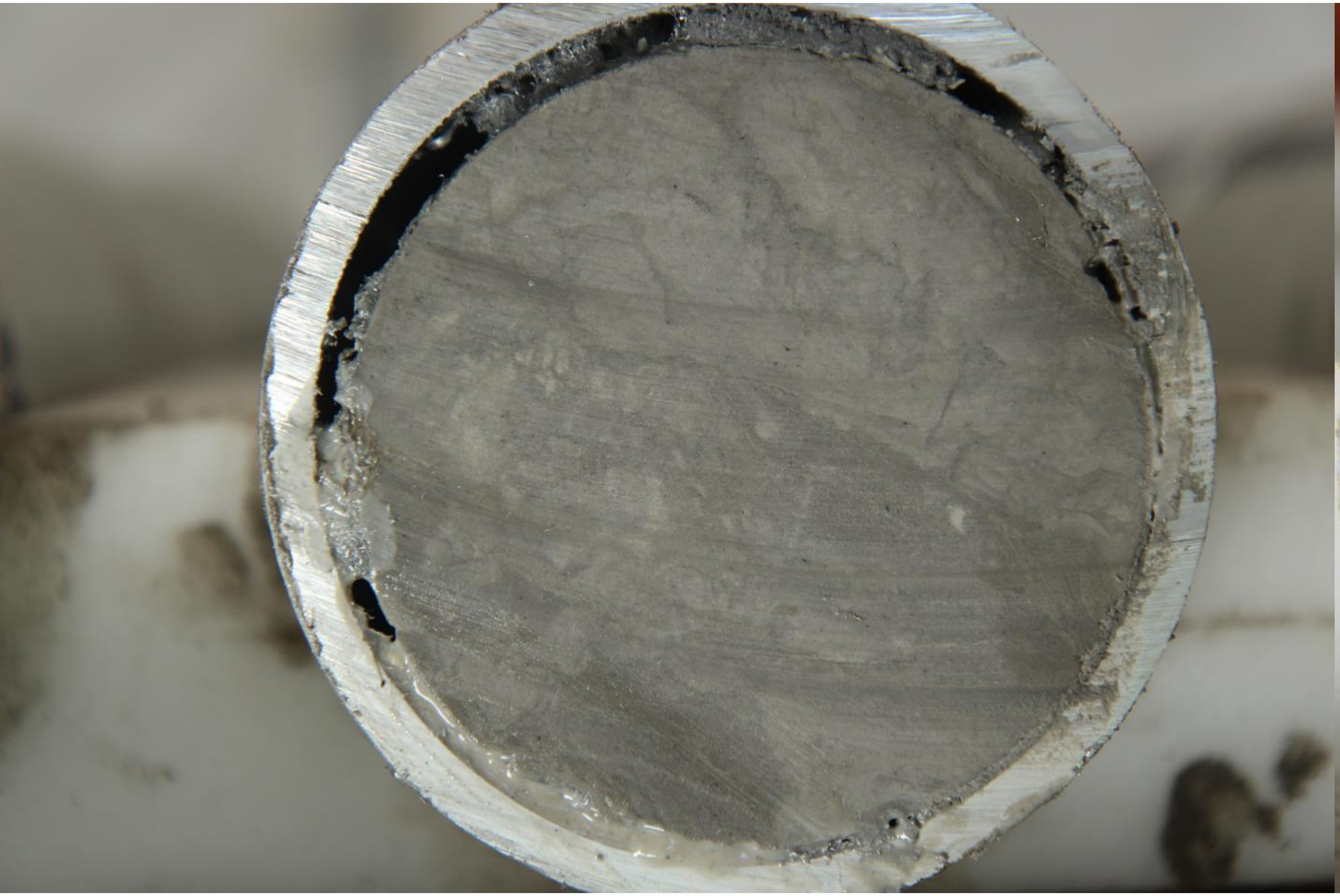
TU Delft

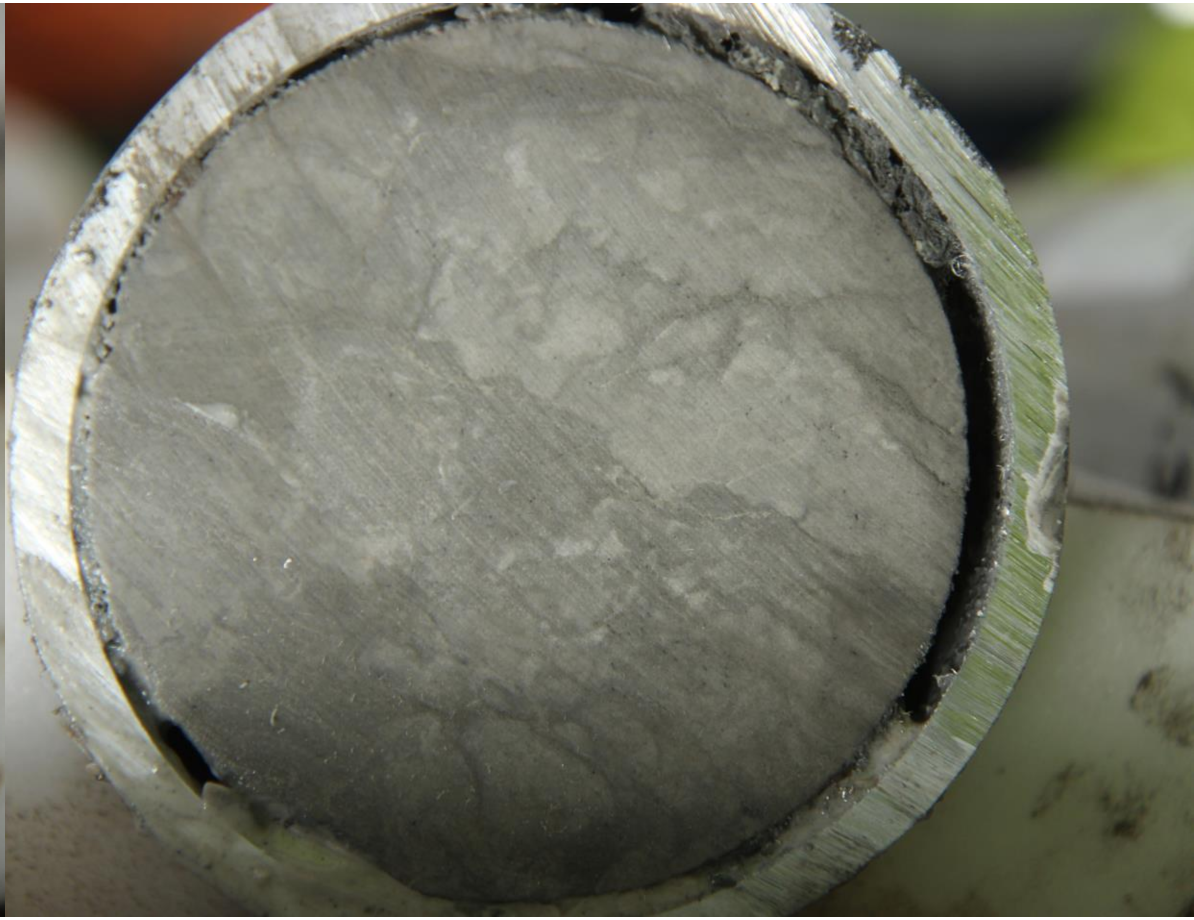
DEL-GT-01 2587.38m MD



Medium grey, medium to coarse silt, one light-filled crack, rock is hard and homogeneous

DEL-GT-01 2588.38m MD

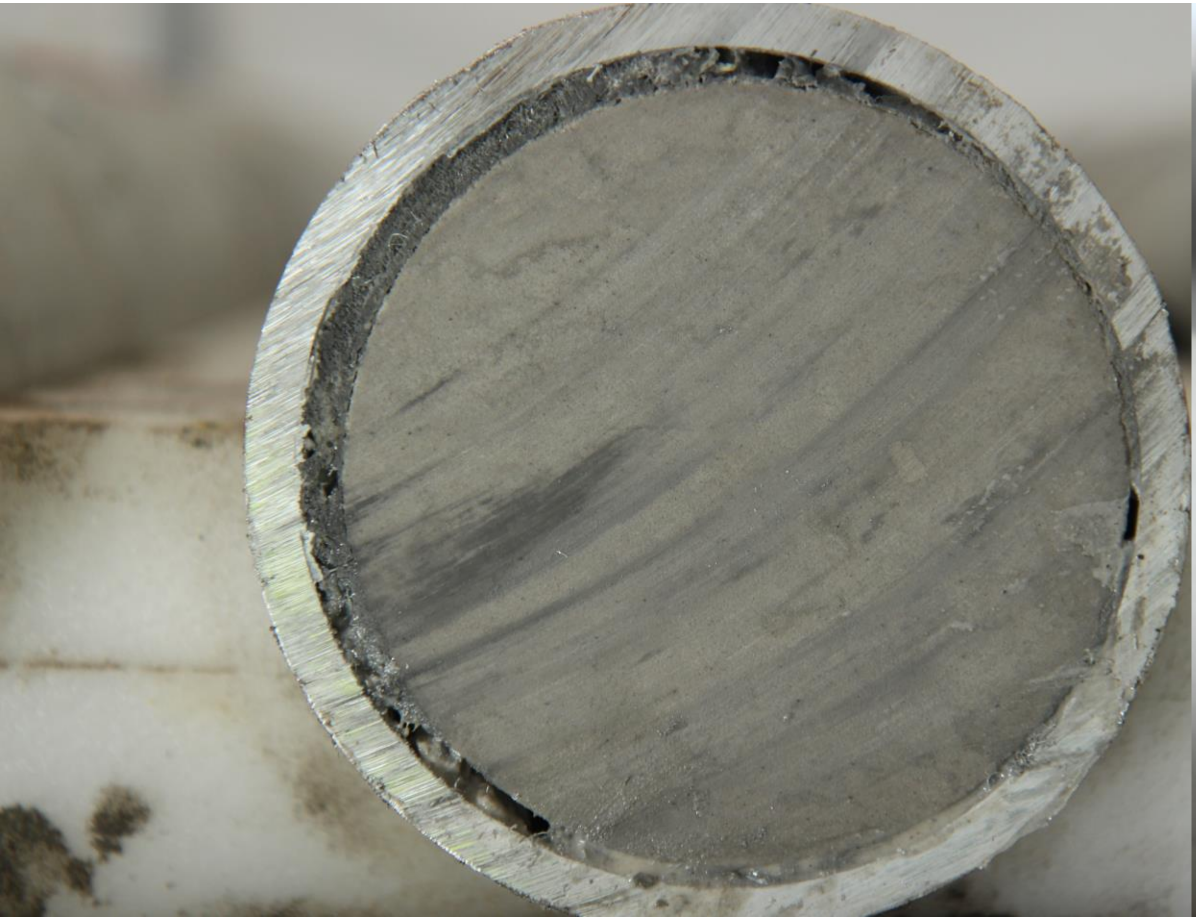


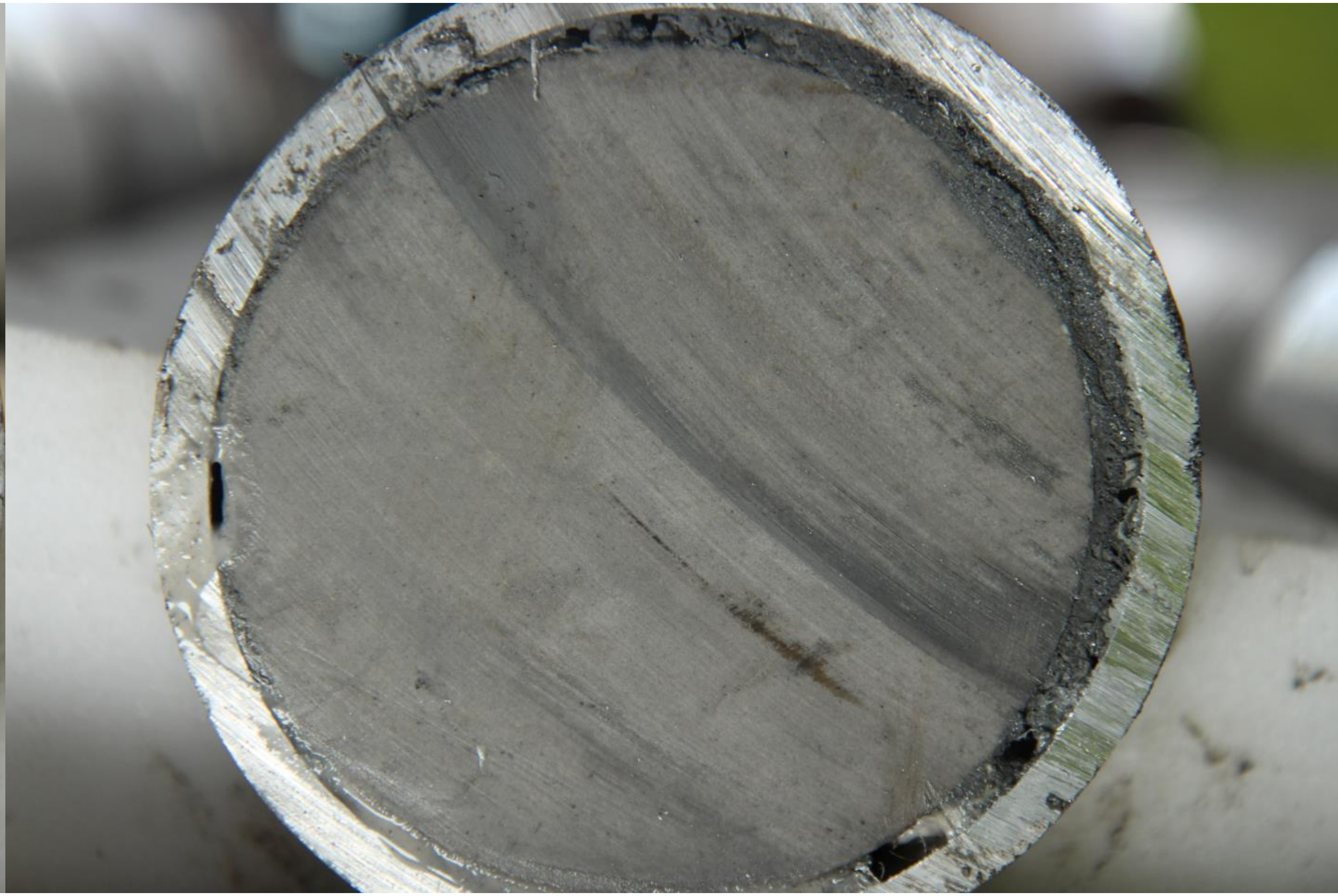


Medium grey, medium to coarse siltstone, fluidised throughout at small scale, light and darker colours

TU Delft

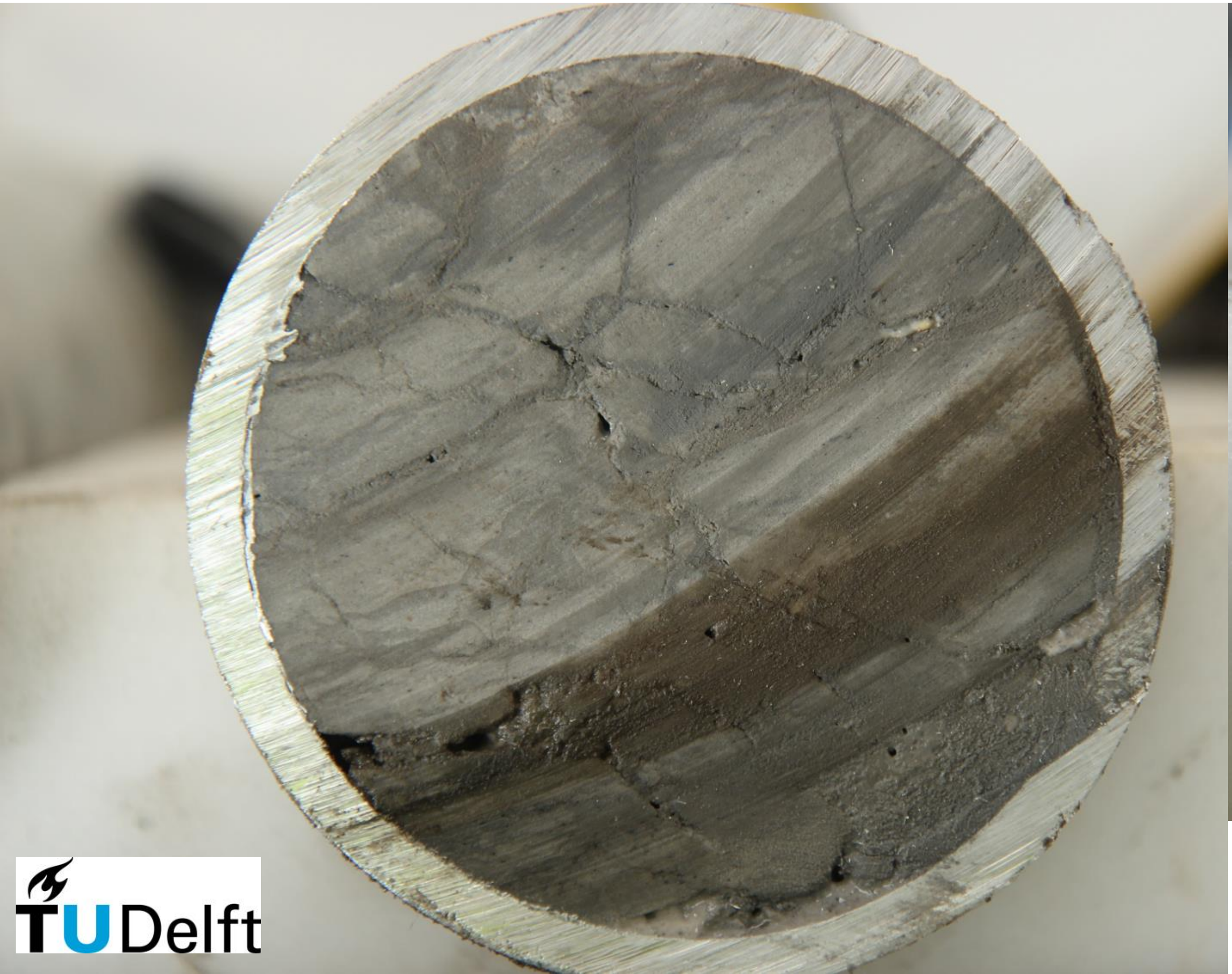
DEL-GT-01 2589.38m MD

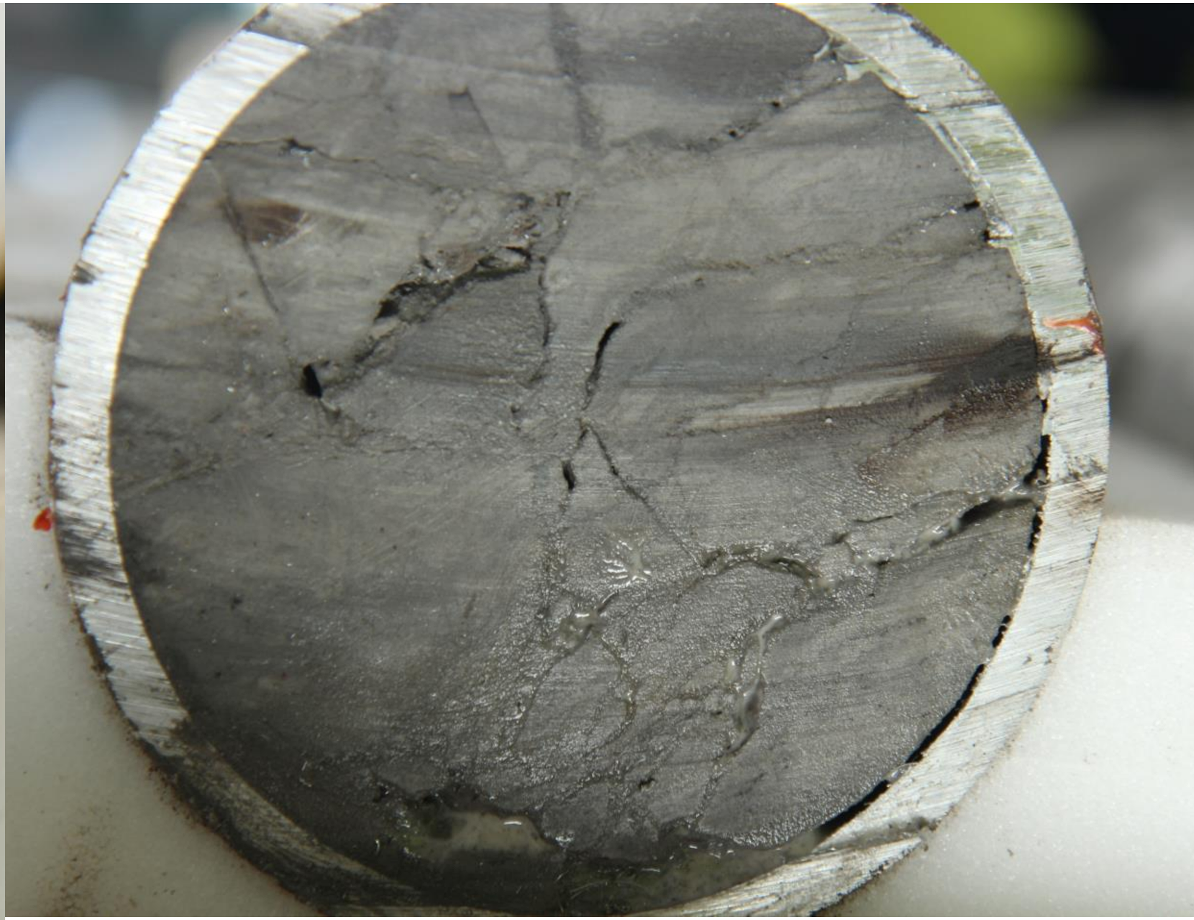




Medium grey, rather homogeneous hard medium to coarse silt, no organic matter

DEL-GT-01   2590.38m MD





M-dark grey, coarse silt, coring-induced fractures throughout filled with foam, very fine organic matter

DEL-GT-01   2591.09m MD

Seemingly unconsolidated, soft, very fine sandstone, some organic matter in slicks or slided fractures, shoe completely filled → distortion from coring and from rock?

TU Delft

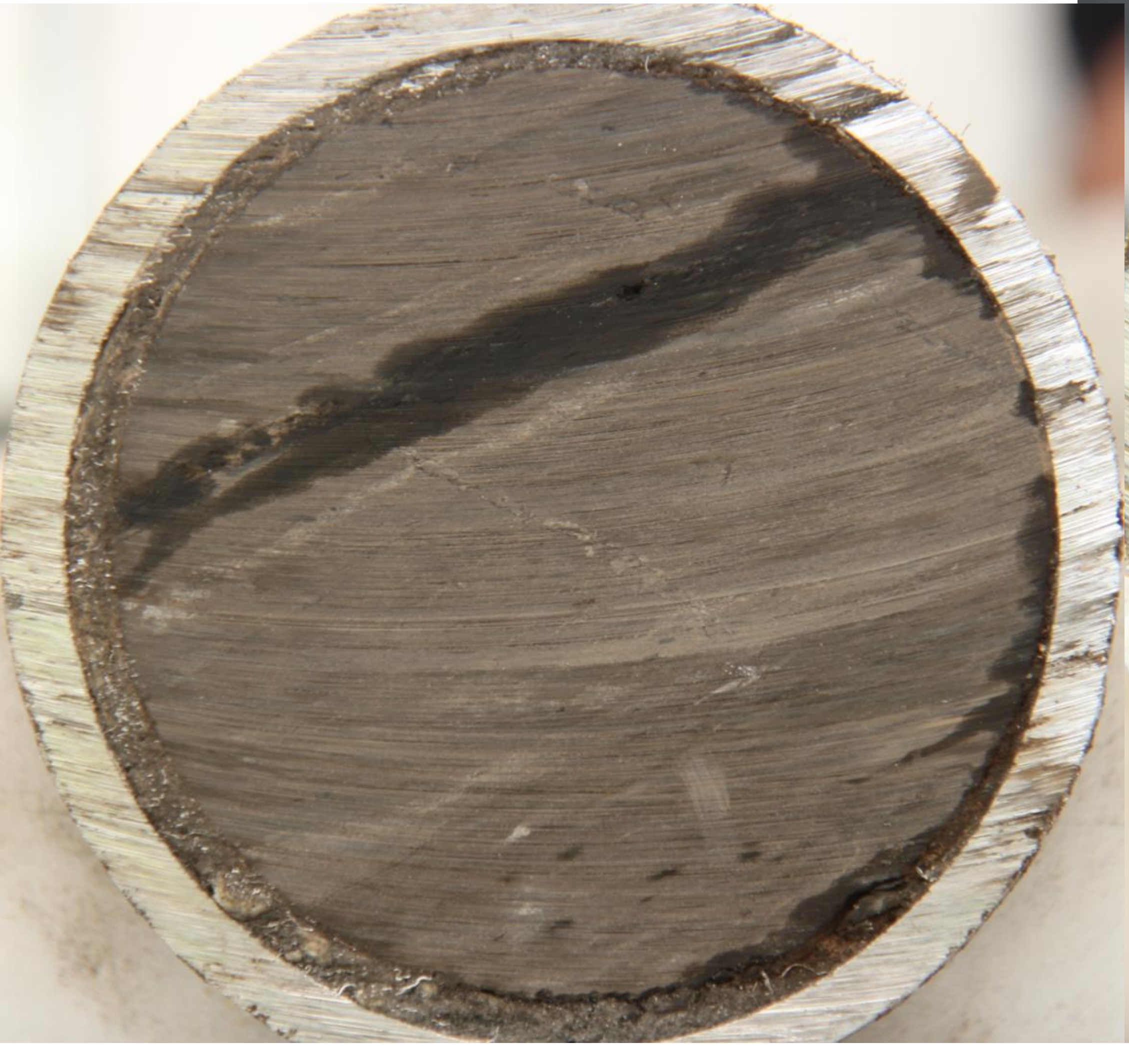
DEL-GT-01 Core #3 Images and Initial Descriptions

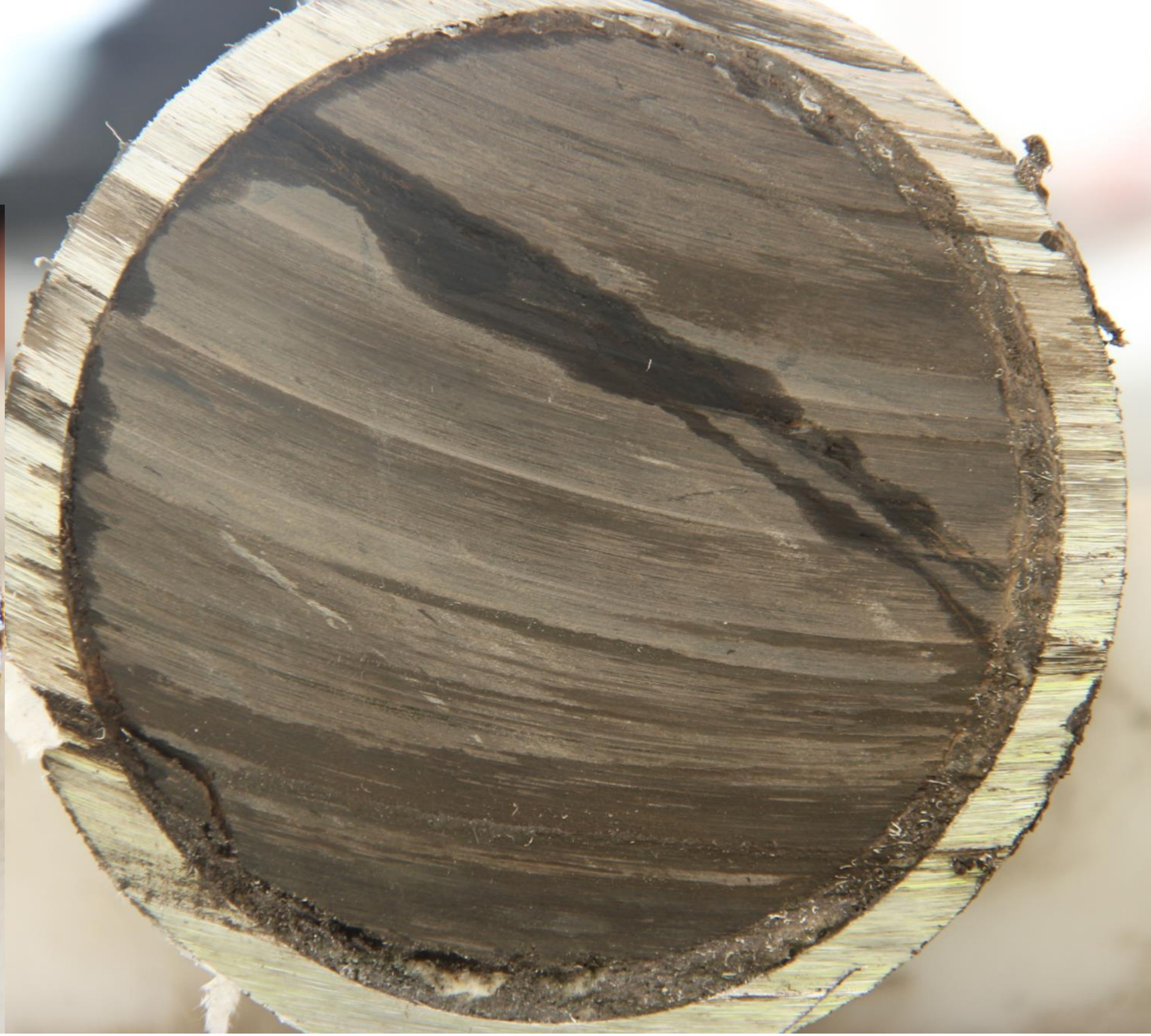
TU Delft – Hemmo Abels – 30 August 2023

2594.5m MD

Whitish very fine-grained sandstone, with abundant black organic remains in ‘smears’ through the rock, sst is quite hard

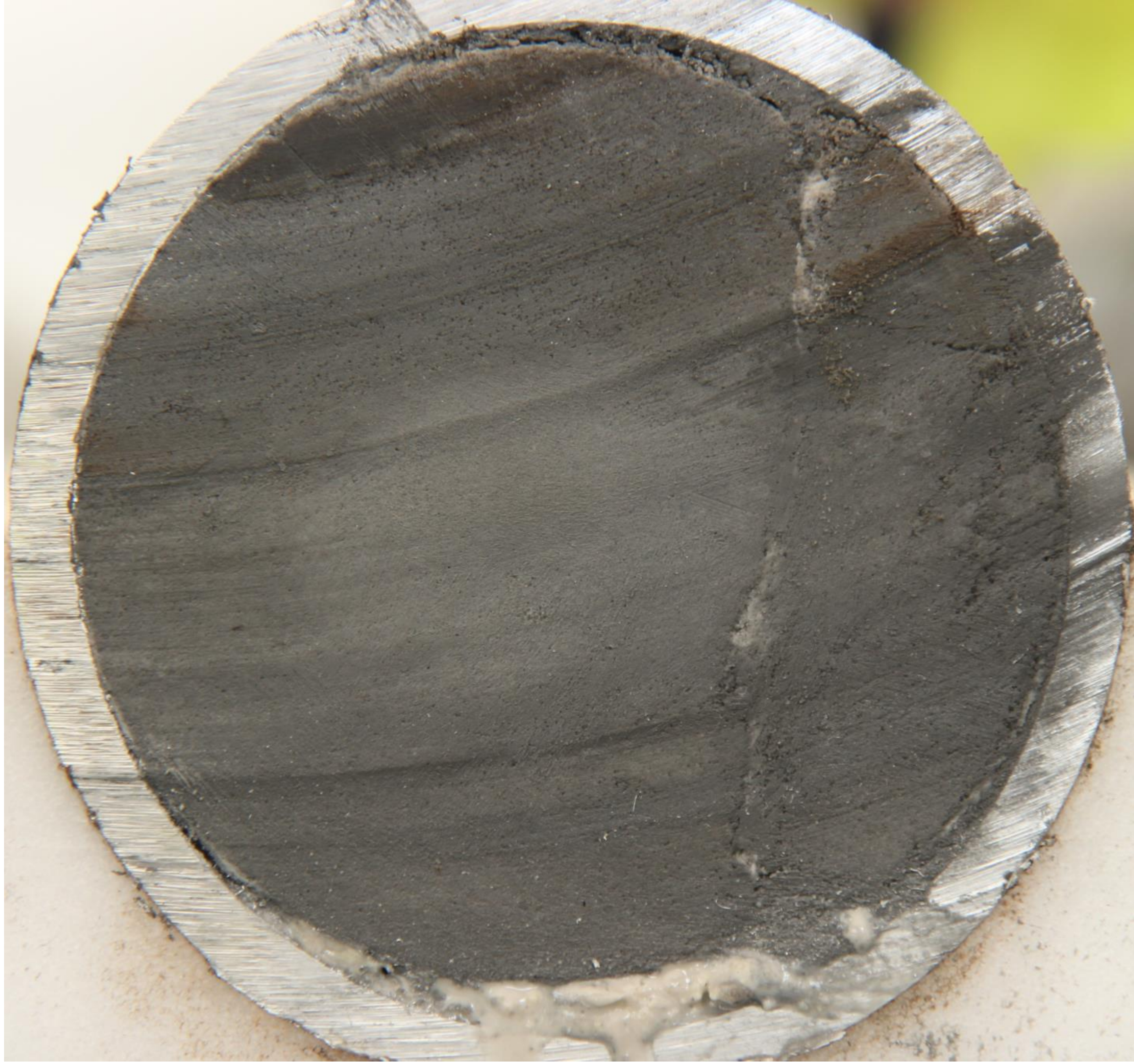
2595.5m MD





Dark brownish grey, silty clay, rather homogeneous, some coring induced fractures

2596.5m MD



Seems to be a very fine sandstone, dark grey, rather homogeneous; surface was not sufficiently cleaned for examination

2597.01m MD

Very fine sandstone with organic remains throughout, sediment both hard and soft, cm-scale sed.structures, silt and organics intercalating, fining up to 2596.5 within 50 cm

TU Delft

DEL-GT-01 Core #4 Images and Initial Descriptions

TU Delft – Hemmo Abels – 1 September 2023

2597.5m MD



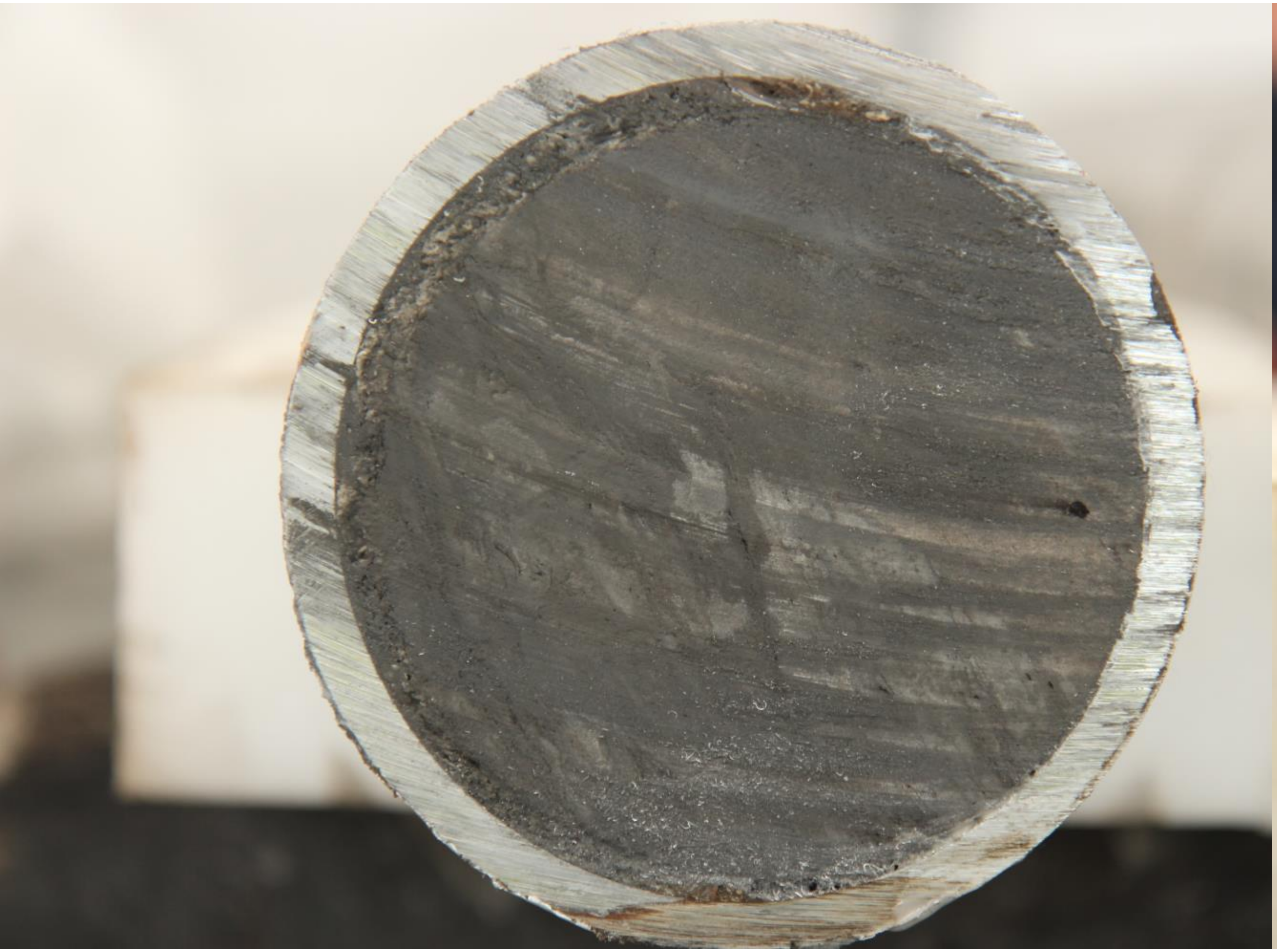
Light-grey, fine sandstone, two organic-rich planes that seem sedimentary with a diagenetic component, grey-black siltstones occur intercalated in laminae and as mudclasts

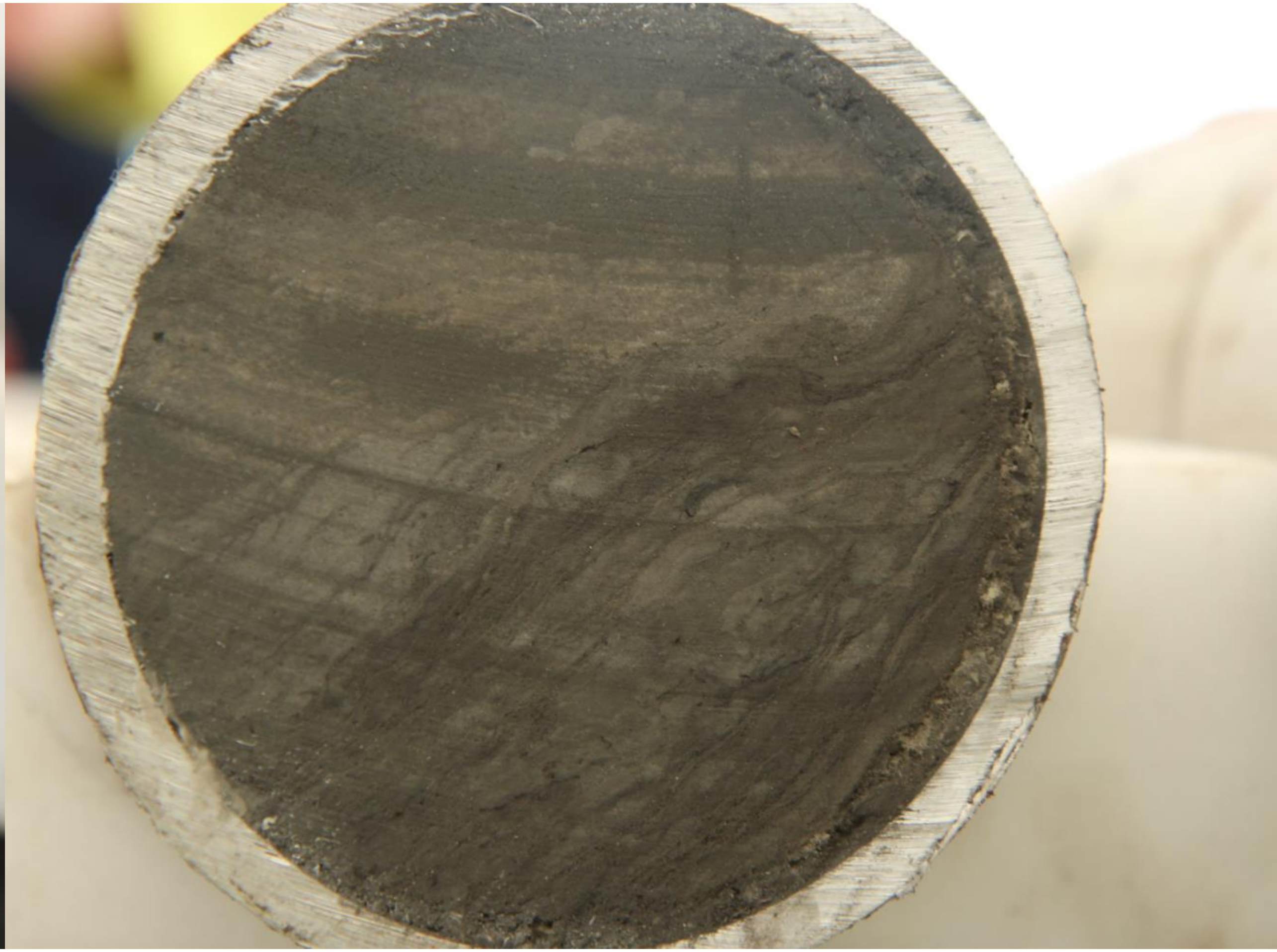
TU Delft

2597.5m MD

Grey-black siltstone, hard, fractured in long, flat pieces, on top of the sandstone, unknown relation with the sand, likely occurring not far on top of it

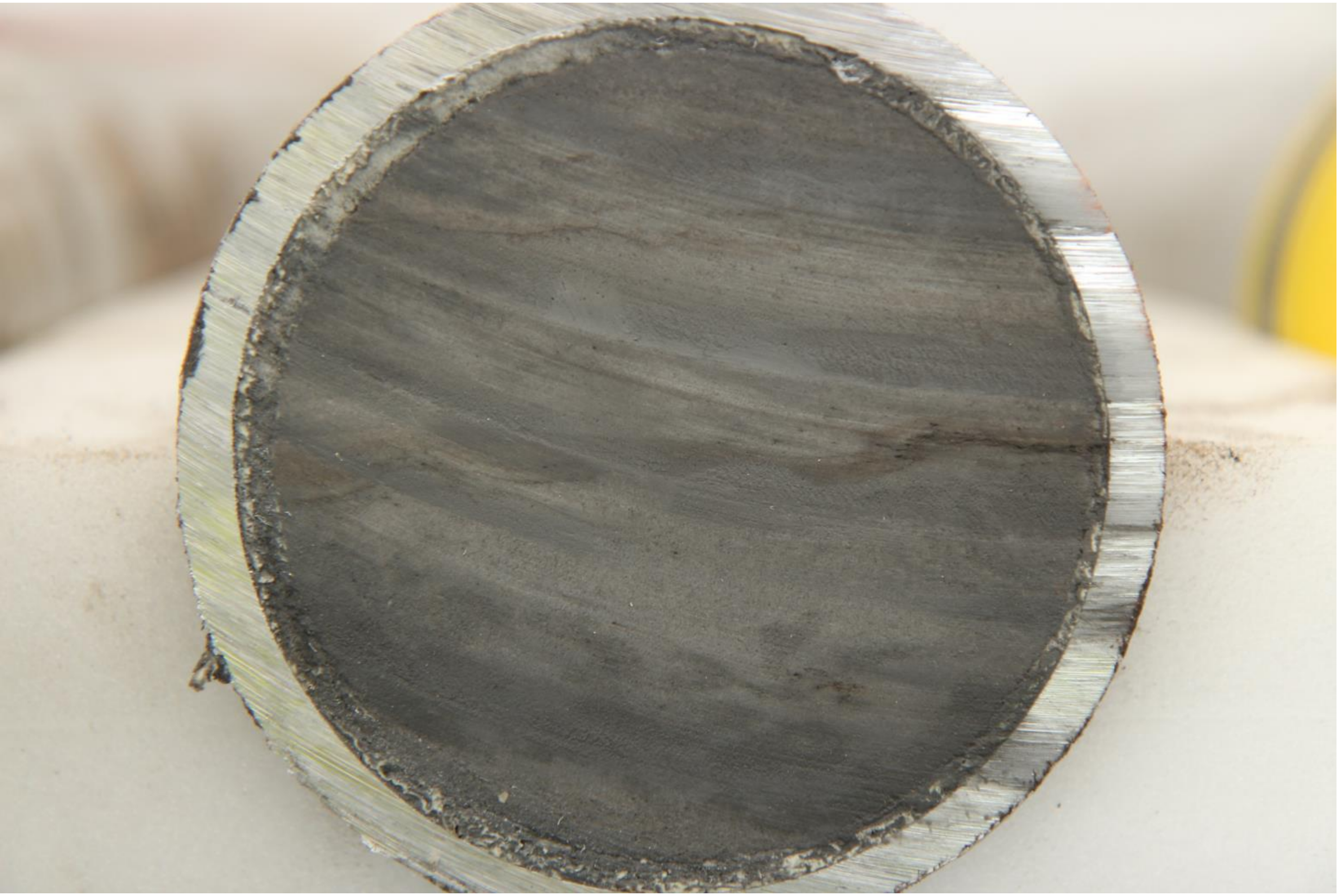
2598.5m MD





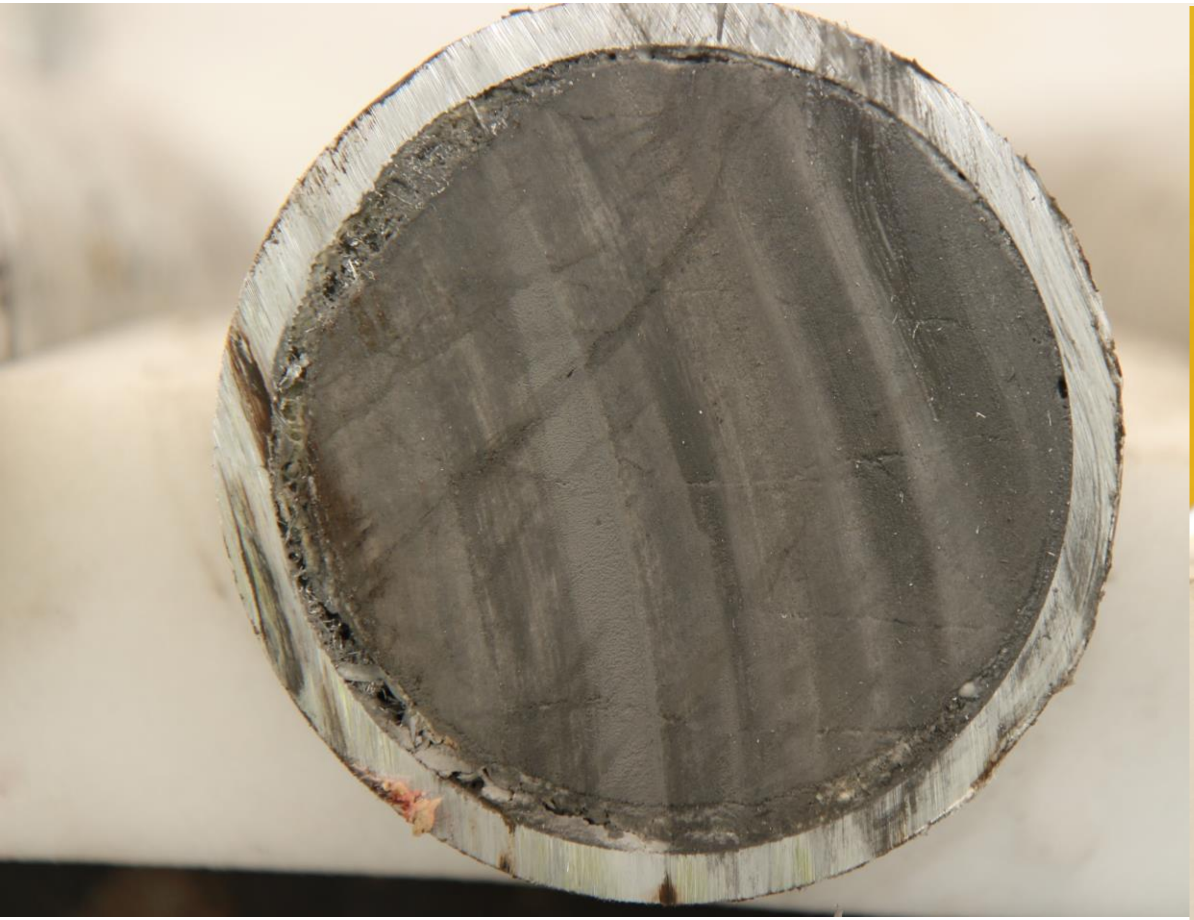
Dark grey silt, homogeneous, very-fine grained organic remains, some fractures/slickensides seemingly sedimentary

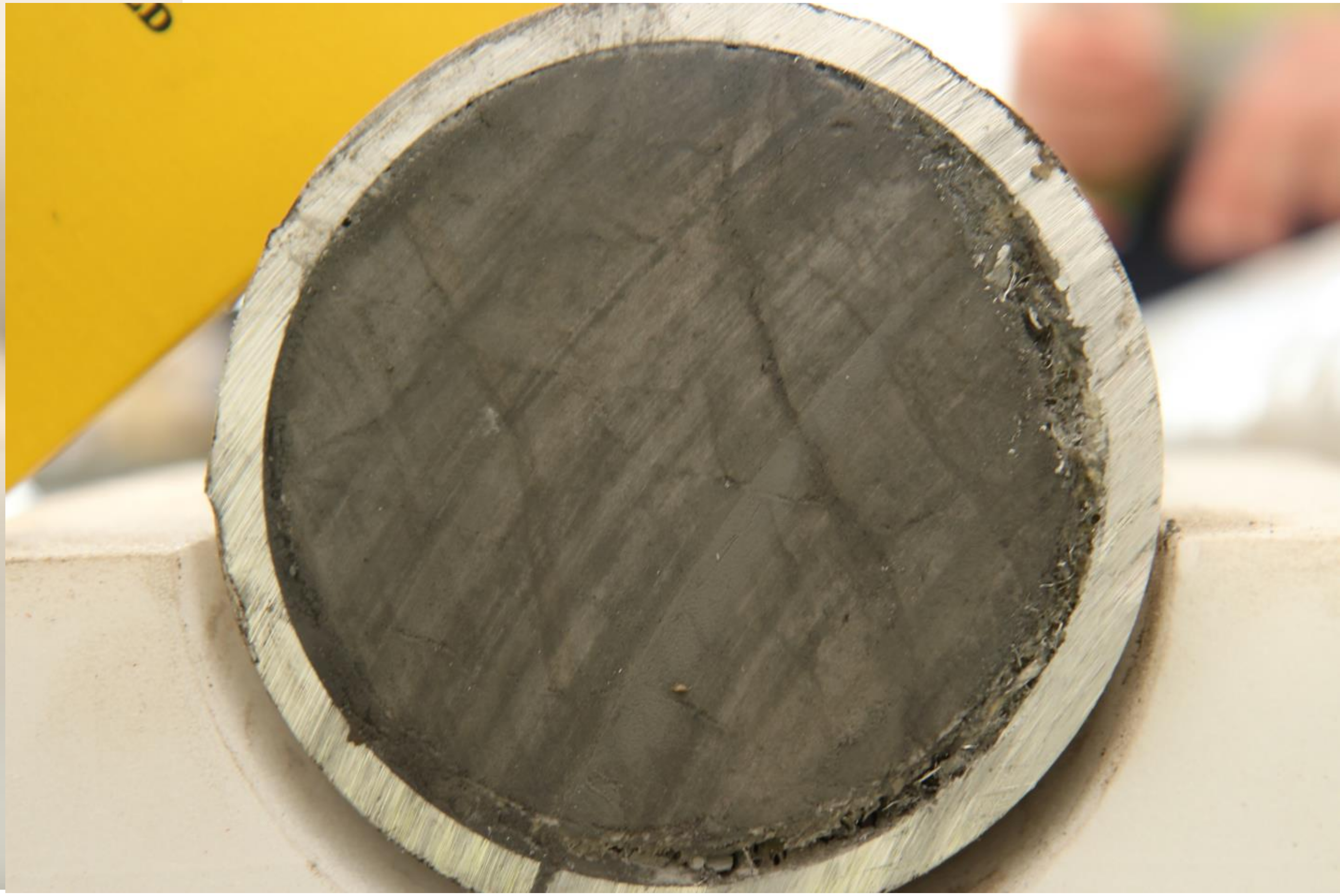
2599.5m MD



Both silt and clay in bedding, cm-scale, separated by films of organic matter, dark grey, hard but not very hard

2601.0m MD



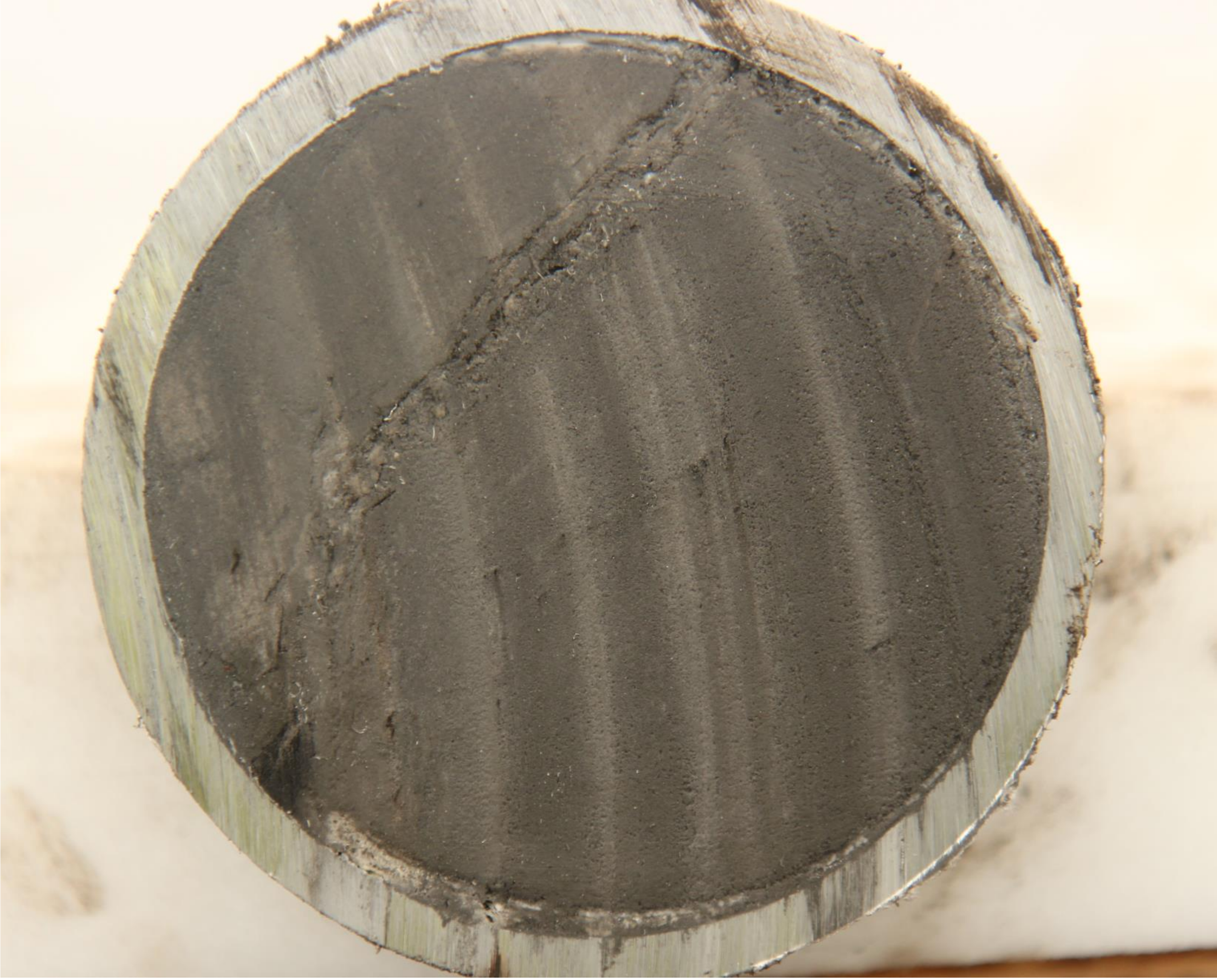


Seems to be a grey, bit fractured silt, the surface was not sufficiently cleaned during examination

2602.0m MD

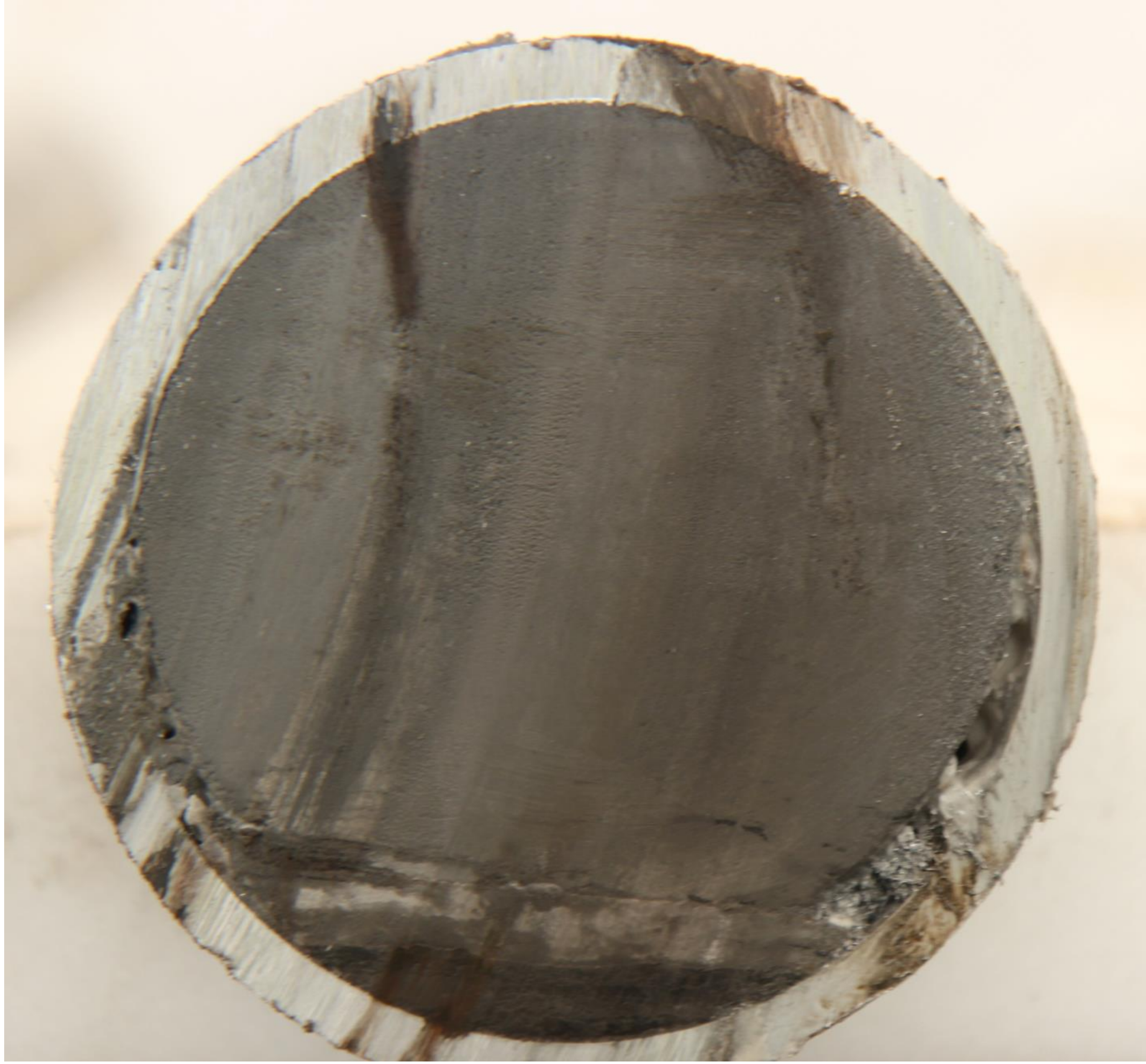
Seems to be a grey, bit fractured very fine sand, the surface was not sufficiently cleaned during examination

2603.0m MD



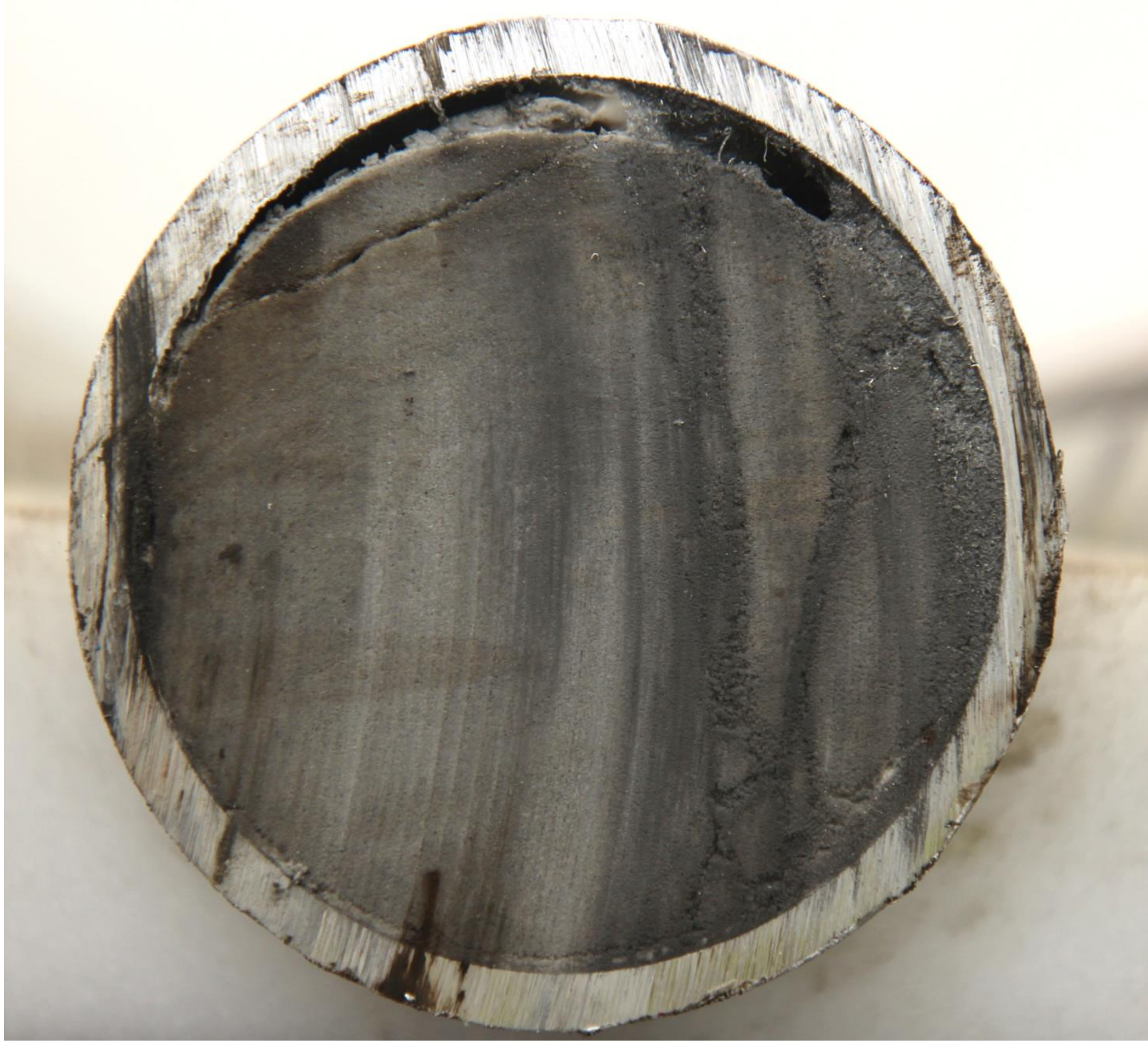
Seems to be a grey, bit fractured very fine sand, the surface was not sufficiently cleaned during examination

2604.0m MD



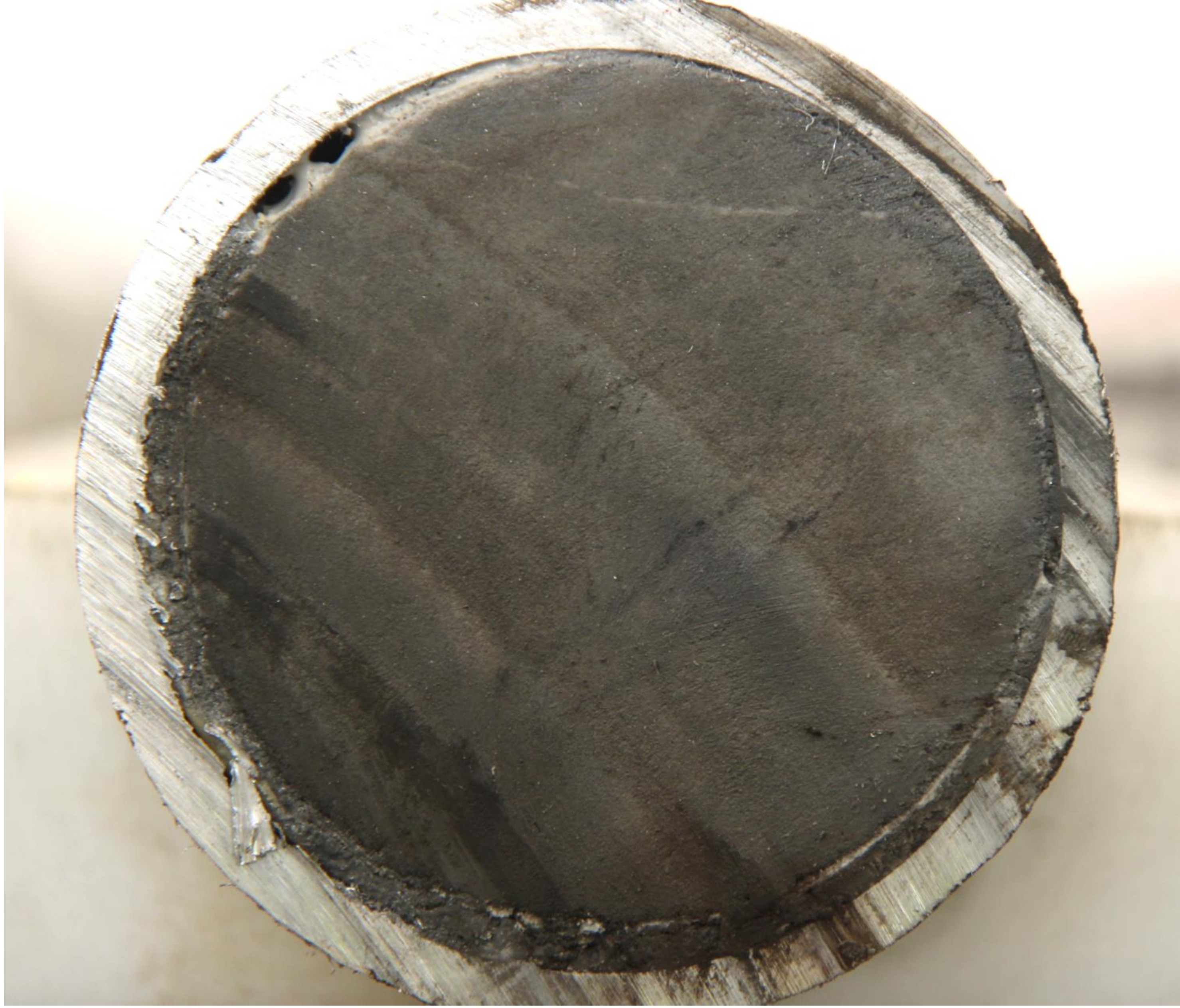
Seems to be a grey, bit fractured silt to very fine sand, the surface was not sufficiently cleaned during examination

2605.0m MD



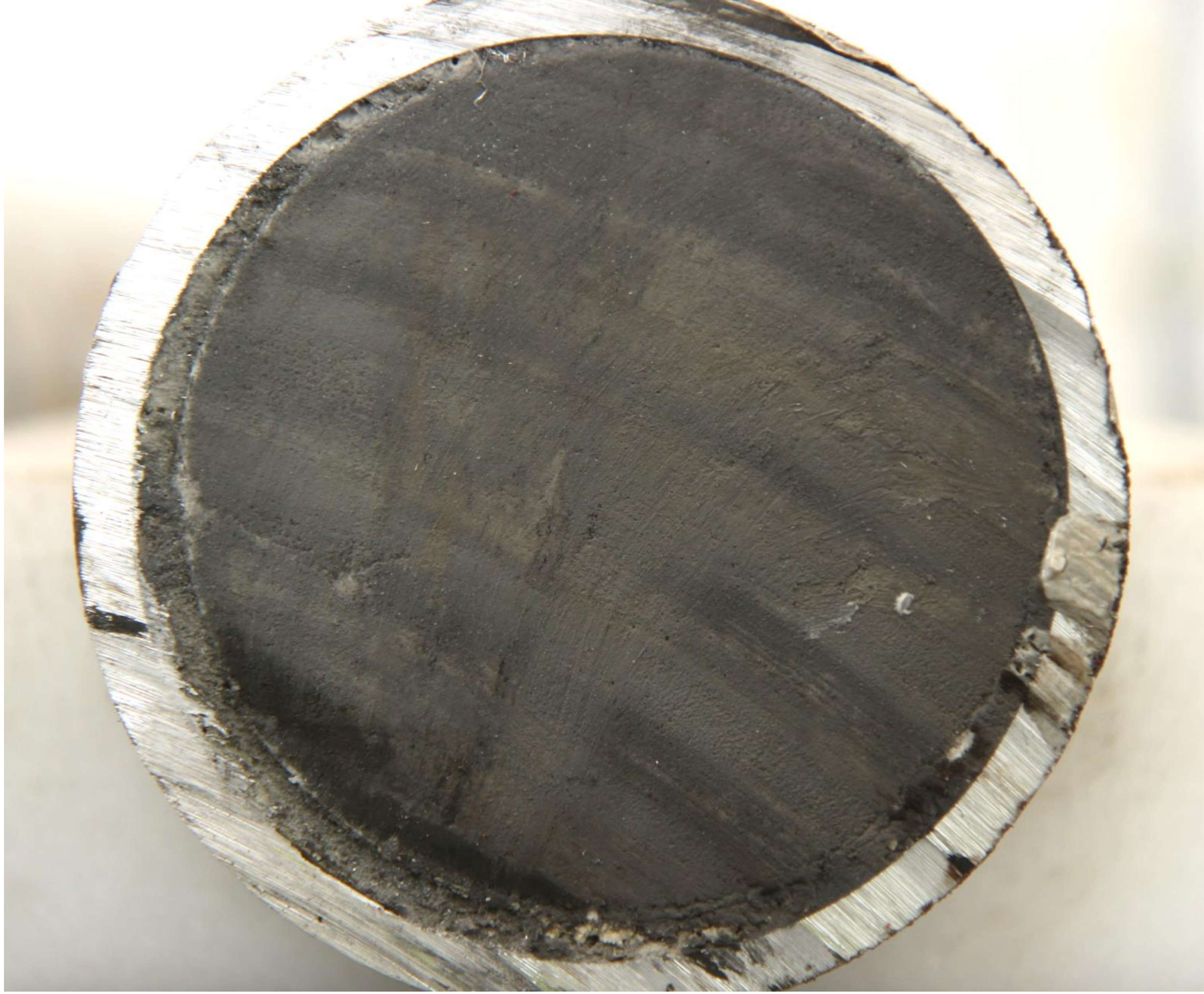
Seems to be a grey, bit fractured very fine sand, the surface was not sufficiently cleaned during examination

2606.0m MD



Seems to be a grey, very-fine sand, with organics, the surface was not sufficiently cleaned during examination

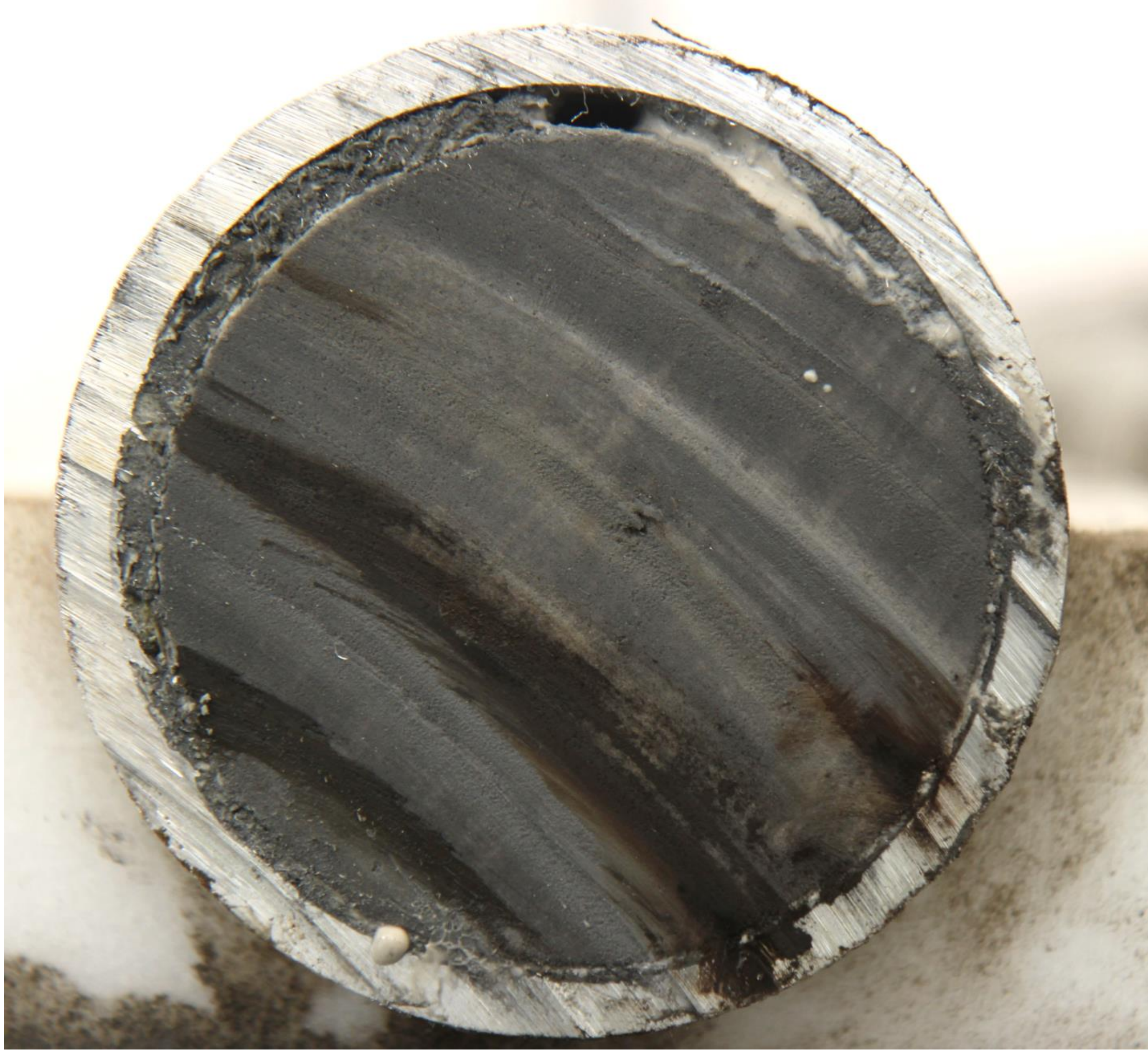
2607.0m MD



Seems to be a grey silt to very fine sand; the surface was not sufficiently cleaned during examination

TUDelft

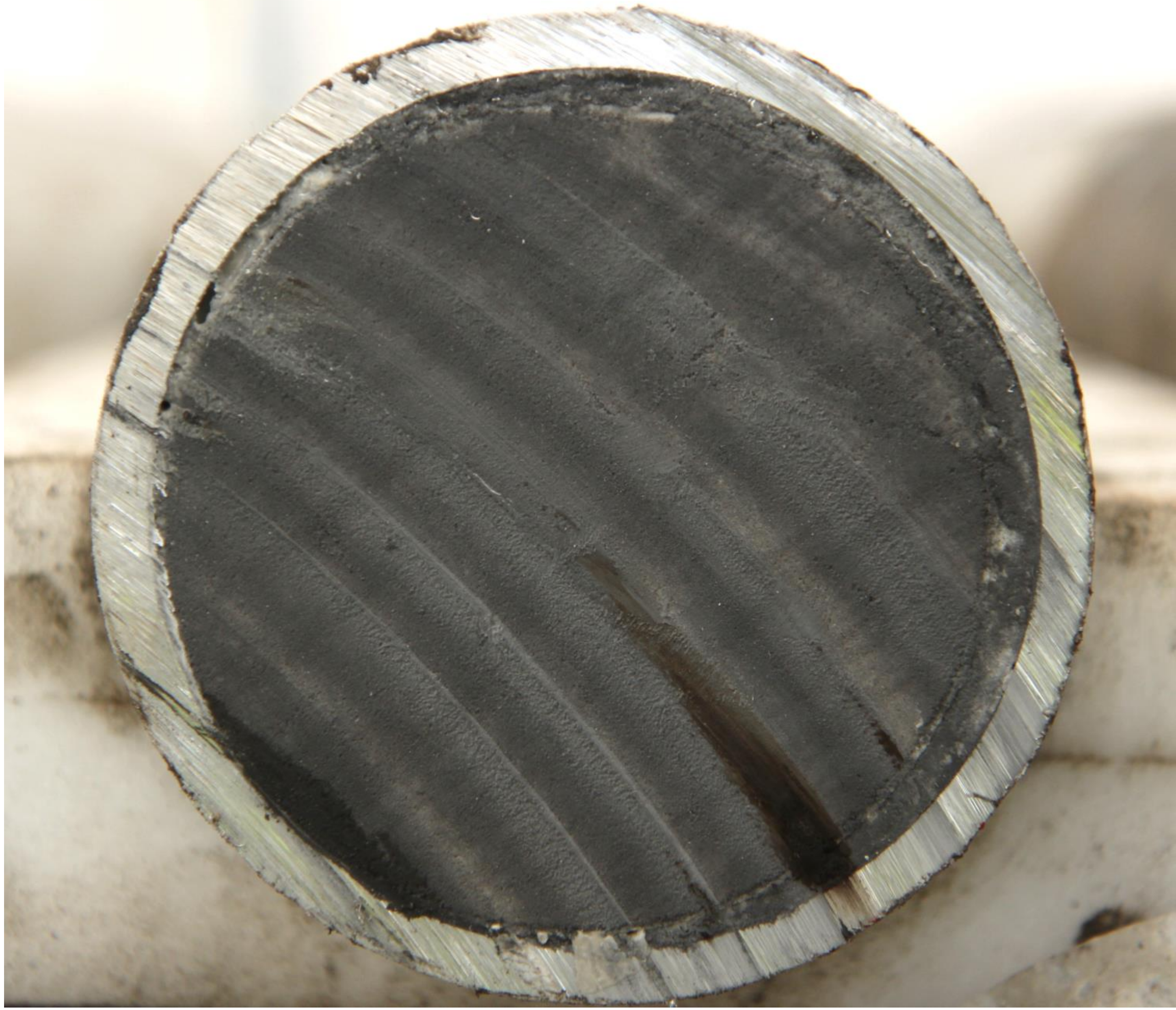
2608.0m MD



Seems to be a grey silt; the surface was not sufficiently cleaned during examination

TUDelft

2609.0m MD



Seems to be a grey silt; the surface was not sufficiently cleaned during examination

2609.82m MD

Very fine to fine, friable sandstone, light-grey, bedded with darker-coloured sands and laminae of organic matter

TU Delft

DEL-GT-01 Core #5 Images and Initial Descriptions

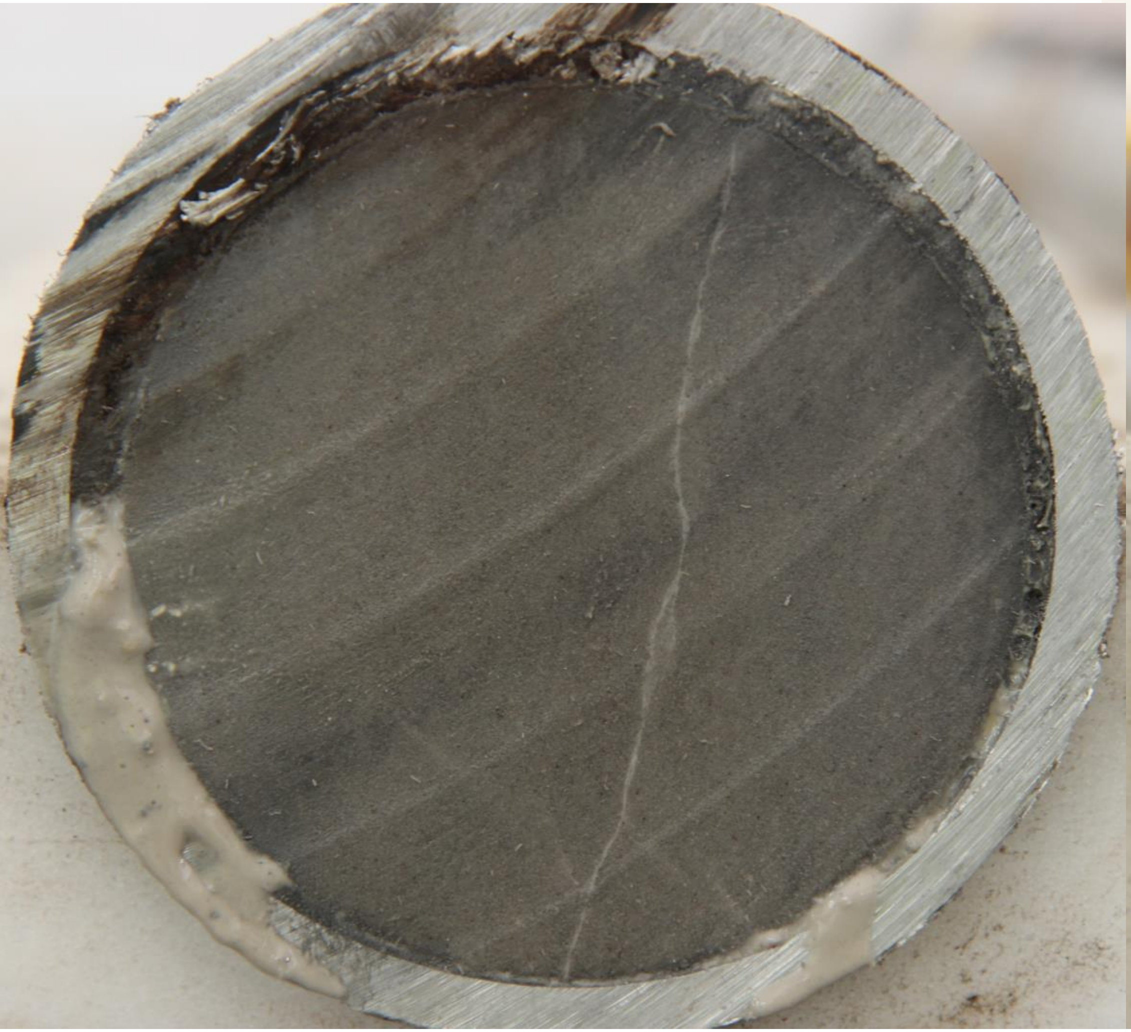
TU Delft – Hemmo Abels – 2 September 2023

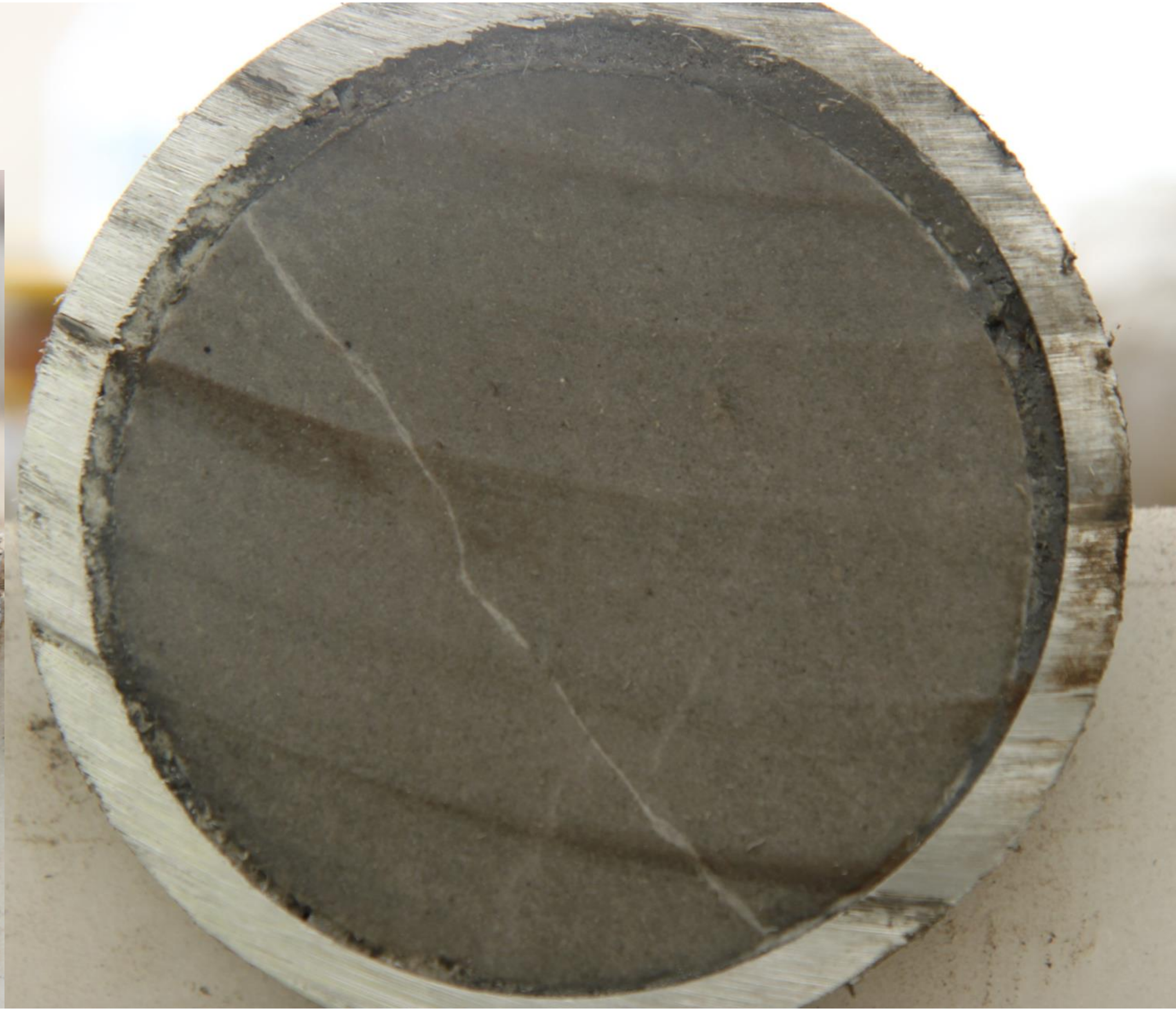
2610.5m MD

TU Delft

Greenish dark grey siltstone with cm and mm-scale black floating blocky particles (clay pebbles?), blocky ped features likely of paleosoil formation, quite hard rock

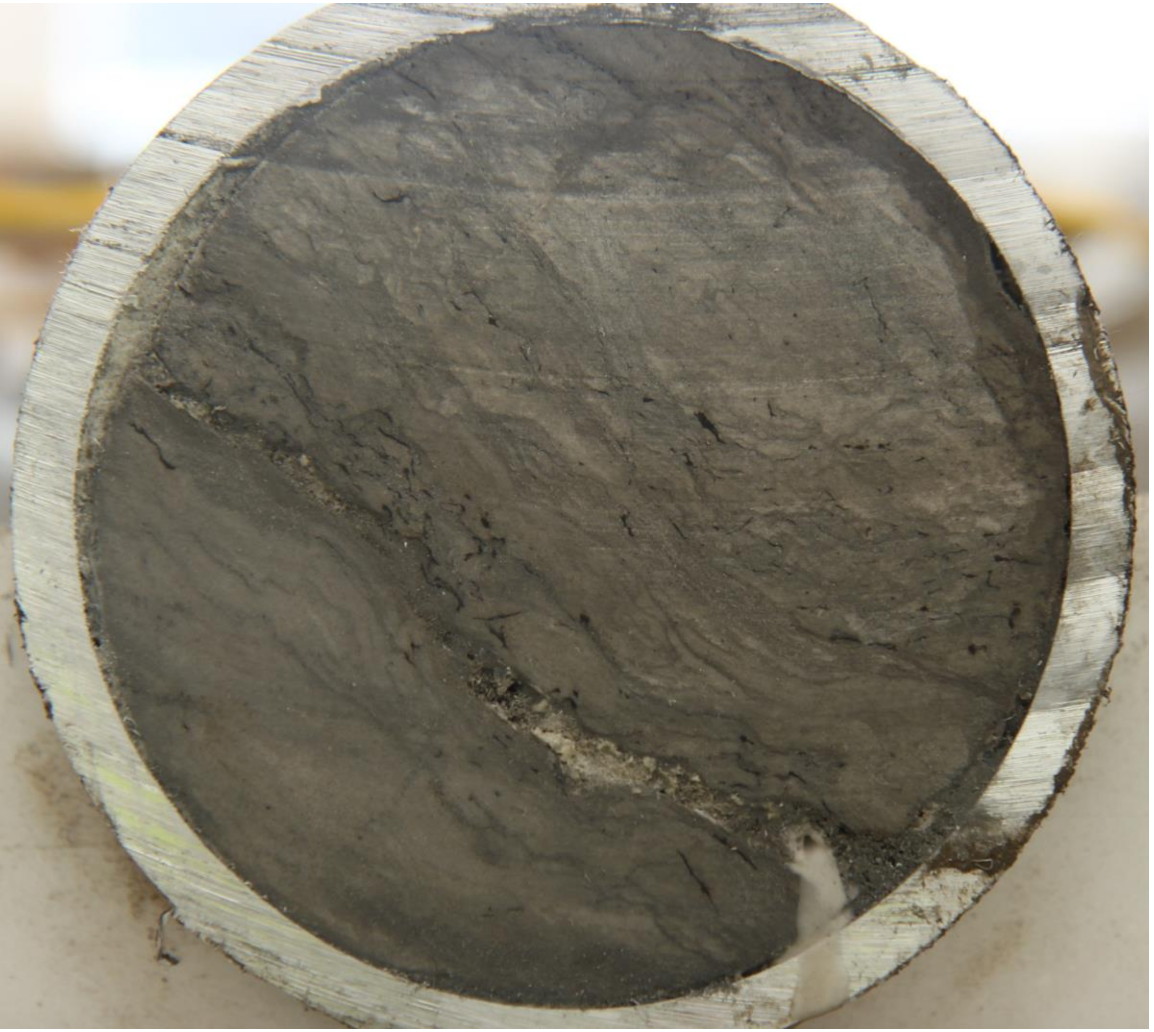
2611.5m MD

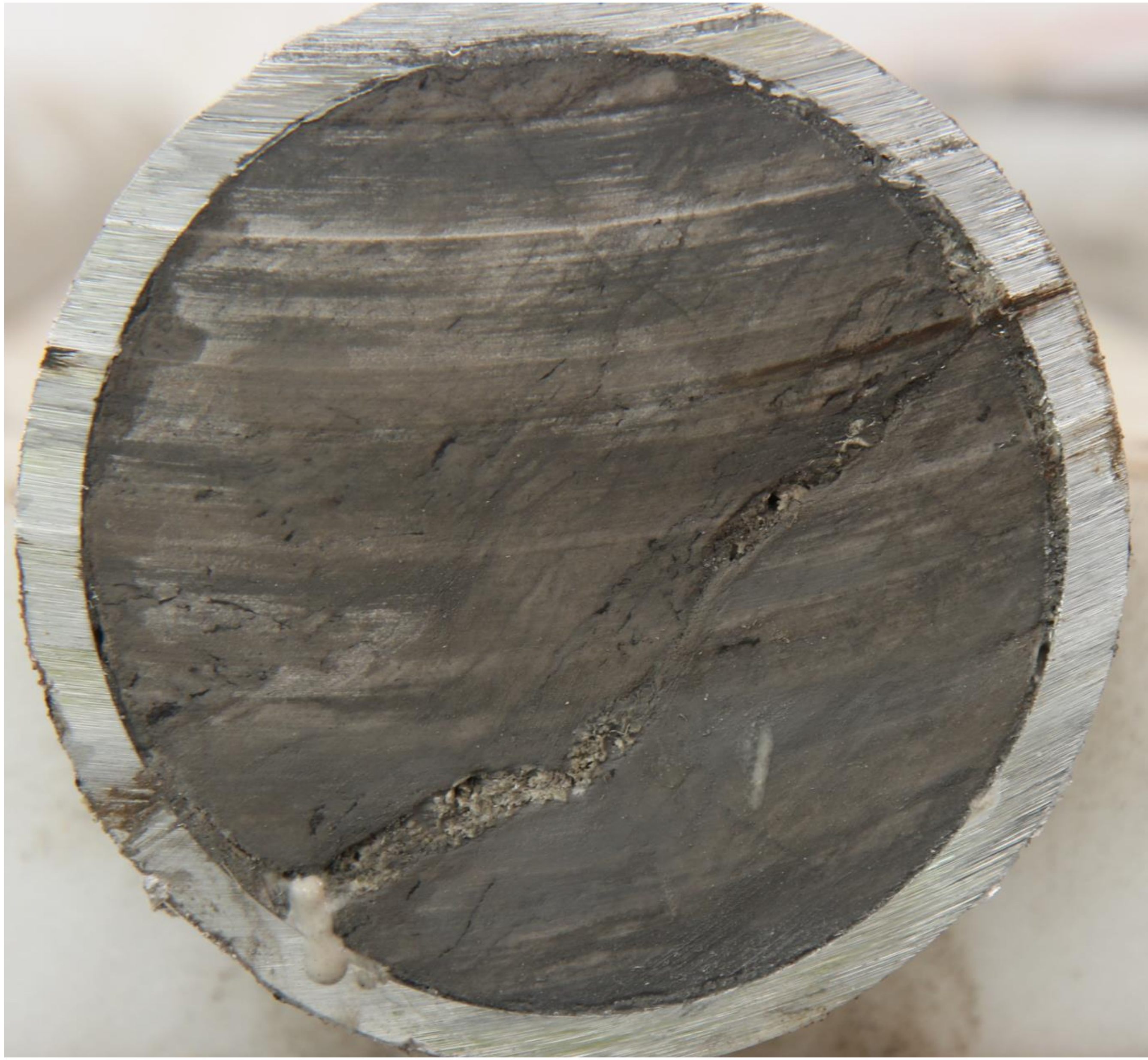




Homogeneous, m.grey coarse siltstone, fine fractures with light filling → OBM? Some floating very fine black particles

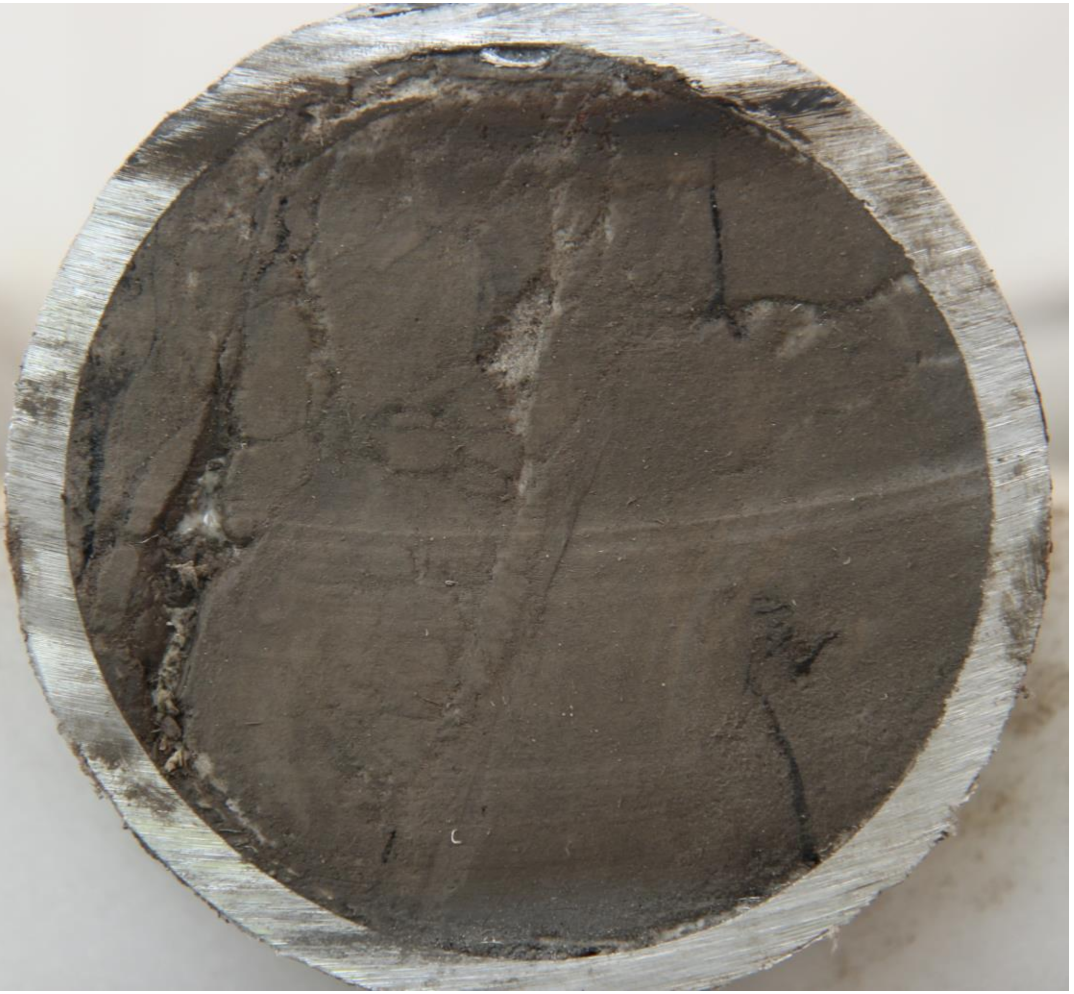
2612.5m MD

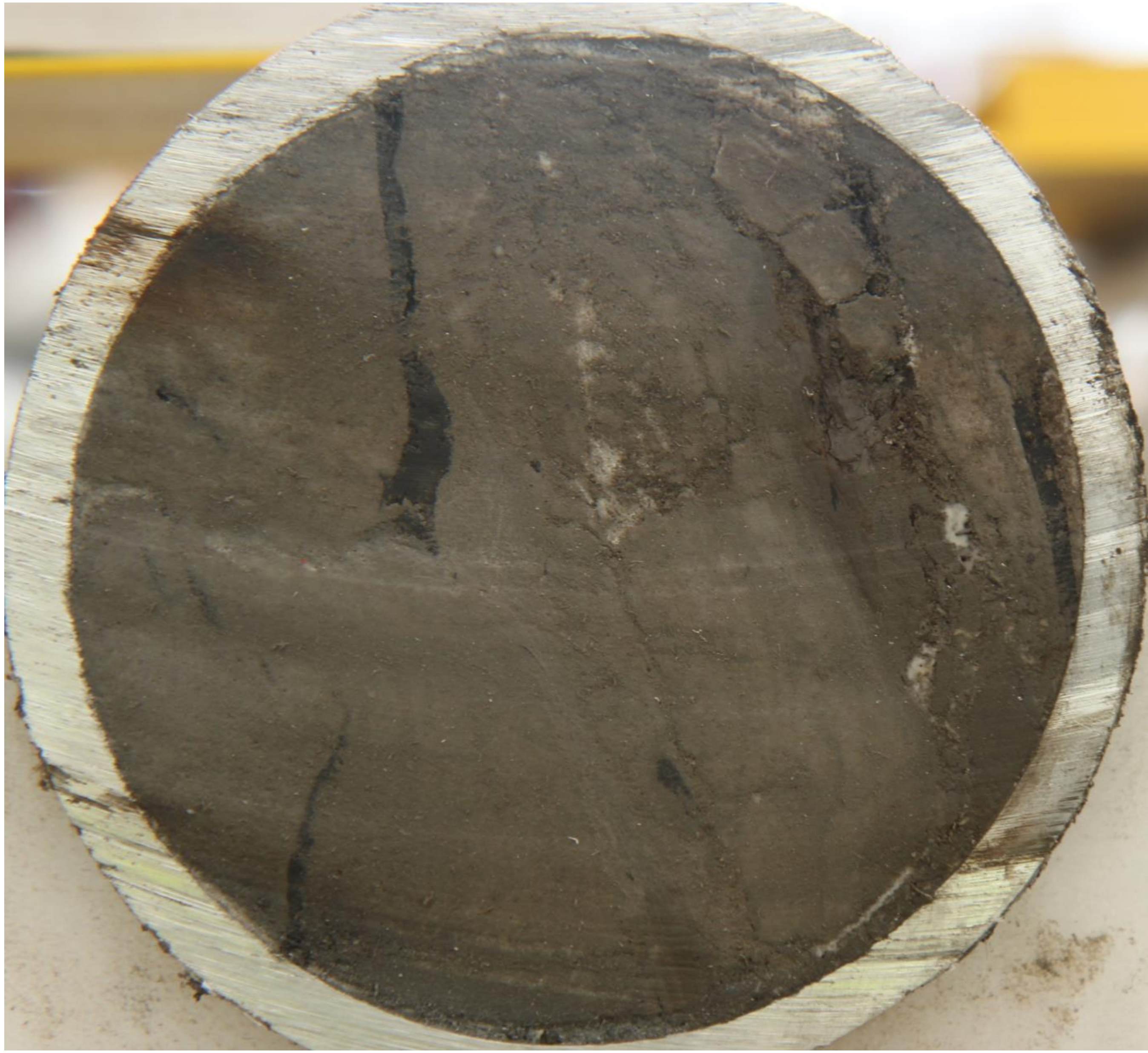




Silt and clay, m.grey, irregularly banded → fluidisation, organic laminae and very-fine grained org.matter, one bigger crack

2613.5m MD

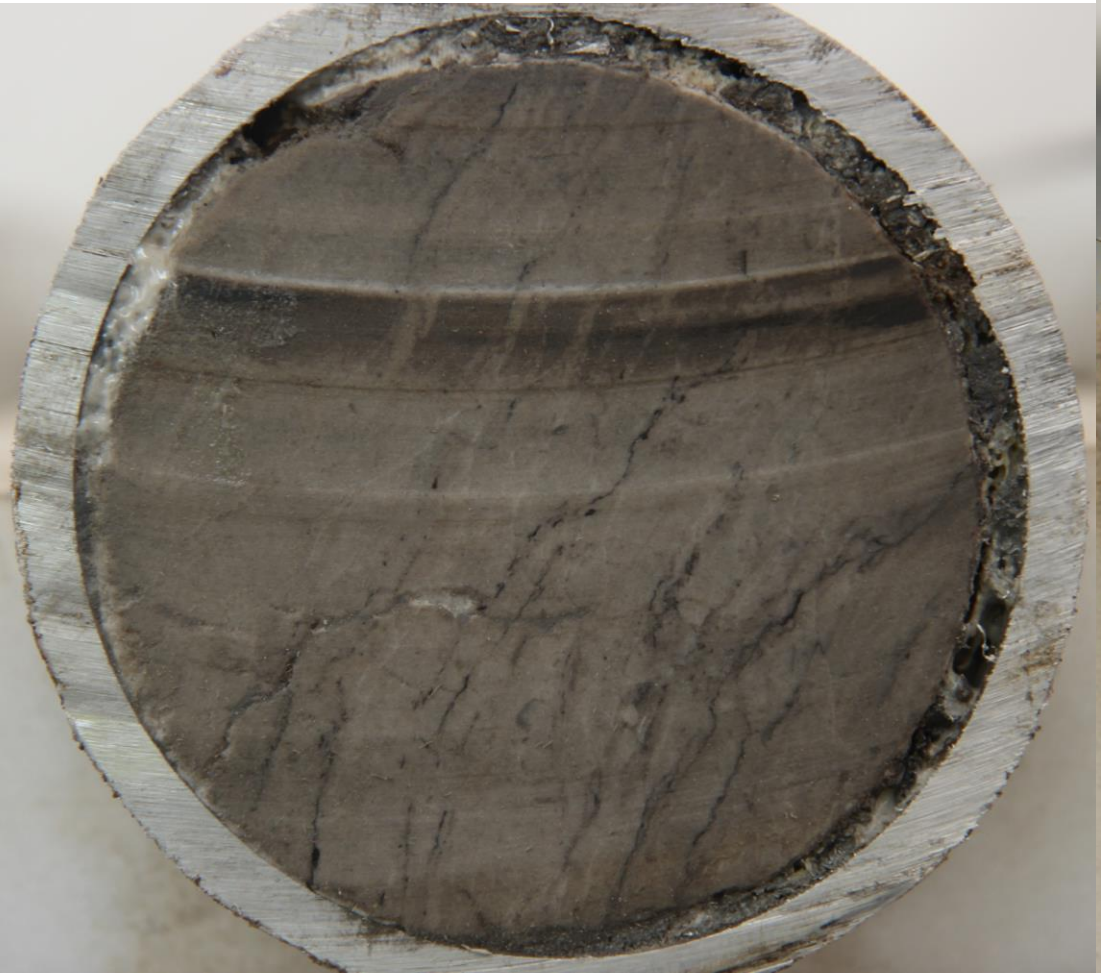


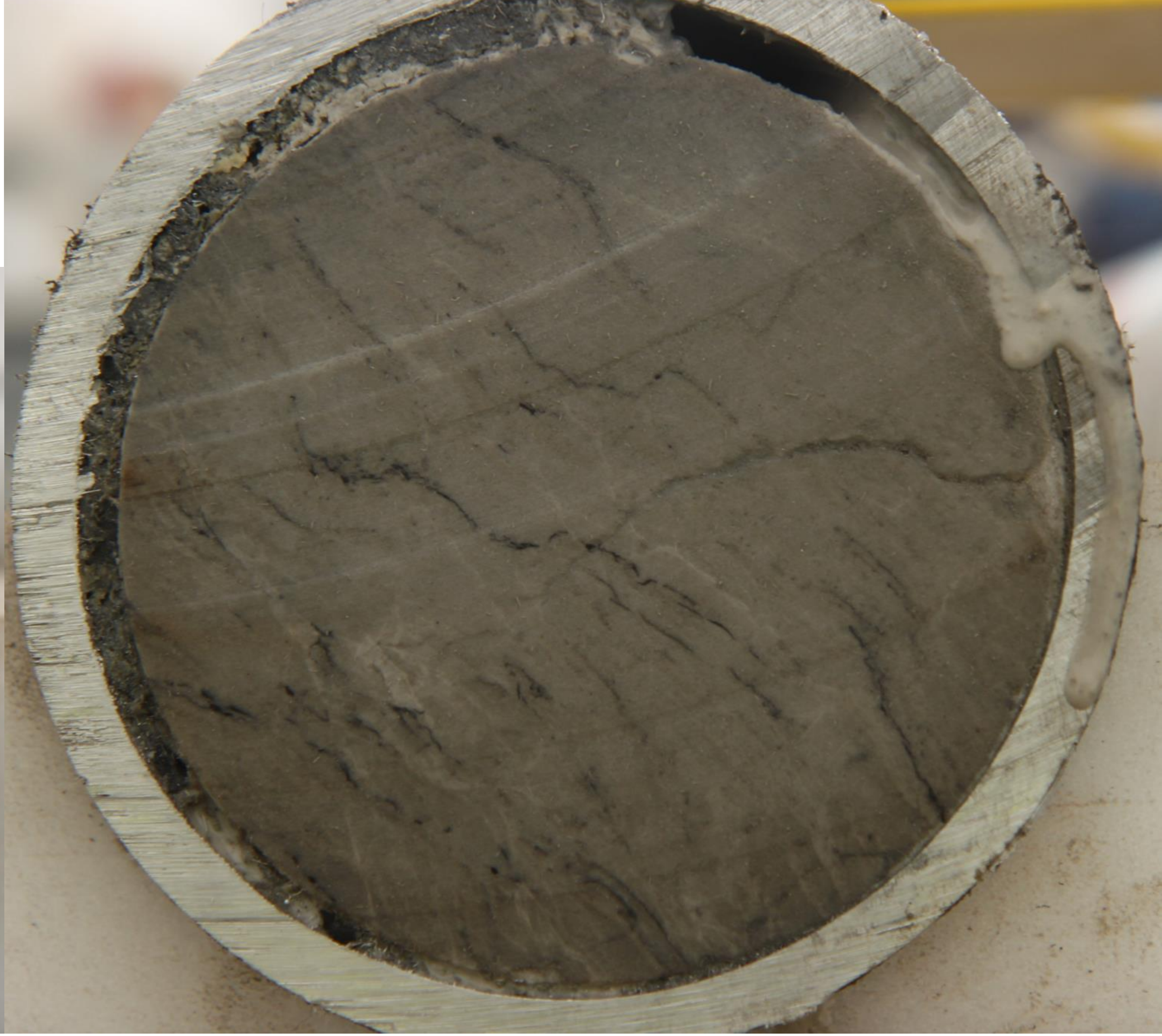


Medium brownish grey, fractured, sandy coarse siltstone, organic laminae, fluidised

TU Delft

2614.5m MD

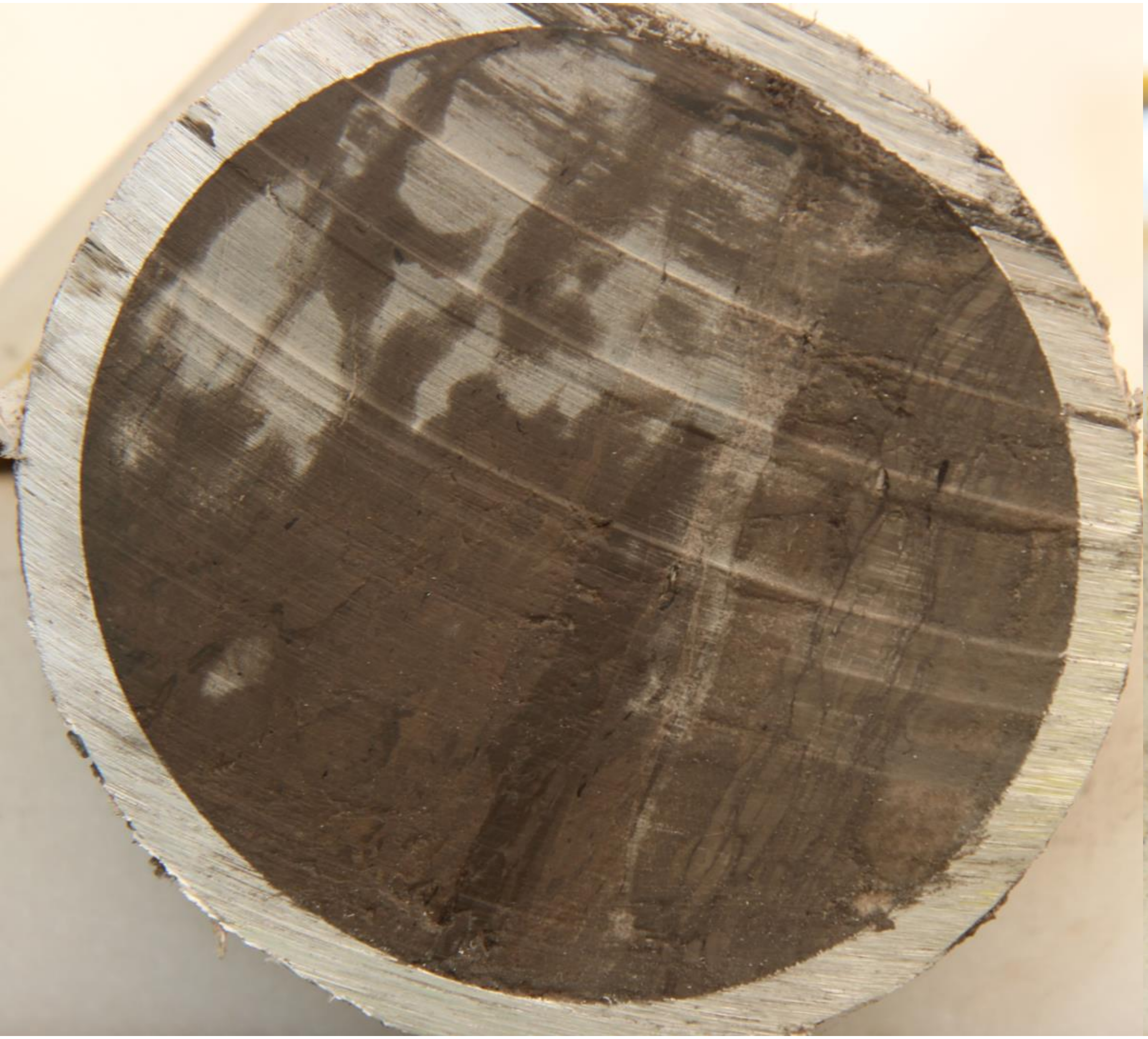




Very fine sandstone, light grey, fluidised, organic laminae (along bedding plane?) in relatively irregular pattern

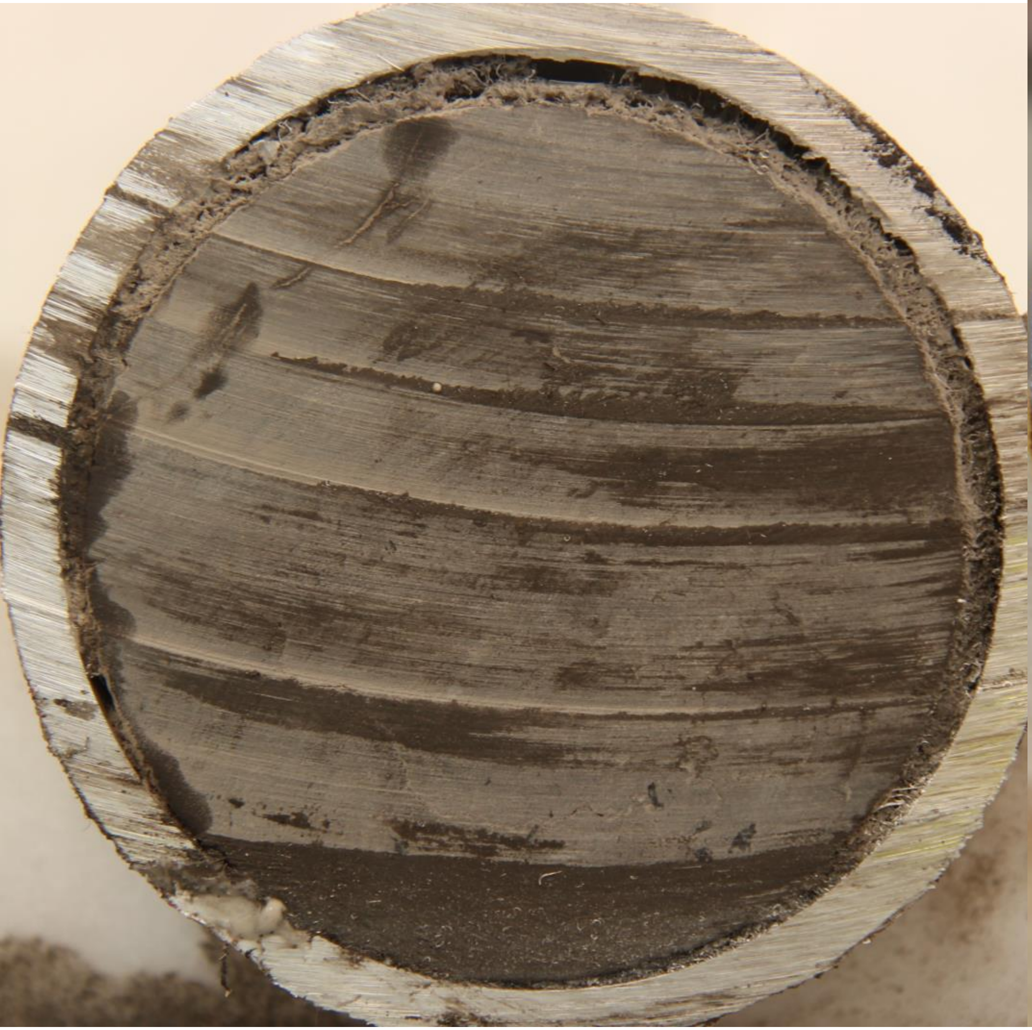
TUDelft

2615.5m MD



Section has two intervals; one more homogeneous siltstone with floating black particles, the other more laminated and fractured, siltstone, lighter coloured, with organic laminae

2616.5m MD



Homogeneous, dark grey siltstone, quite hard rock, one fracture, floating organic remains, bit fluidised rock

2616.82m MD

Homogeneous, rather hard siltstone, dries quickly, few floating mm-scale dark particles, some fluidisation?

2617.69m MD

dark grey, silty claystone, hard rock, homogeneous, slickensided by paleosoil formation (vertisol), little black stains, floating org. specks

2617.10 - 2617.69m MD

Hard and solid core interval, dark grey siltstone showing fluidisation with darker laminae of organic matter, some slickensides

2617.82m MD

Hard, dark grey, clayey siltstone with organic matter, slickensided (by paleosoil?)

DEL-GT-01 Core #6 Images and Initial Descriptions

TU Delft – Hemmo Abels – 5 September 2023

2619.0m MD

(clayey?) siltstone, brown grey and light brown grey, fluidised, mm-scale spherical white specks that seem diagenetic, mm-scale organic fragments

TU Delft

2620.0m MD

Light brown grey and dark brown grey, siltstone, solid formation, fluidised throughout, mm-sized organic matter

TUDelft

2621.0m MD

Light-brown greyish siltstone, fluidised, distorted laminae of darker grey silts, floating pieces of mm-sized organic matter, whitish spherical specks → diagenetic?

TU Delft

2622.0m MD

Light-brown greyish siltstone, mm-scale organic fragments, mm-scale spherical white specks, dark-green grey intervals

TU Delft

2622.81m MD

Siltstone, brown, small-scale slicked and peds throughout, larger soil slickensides, organic-mm-sized specks → floodplain soil it seems

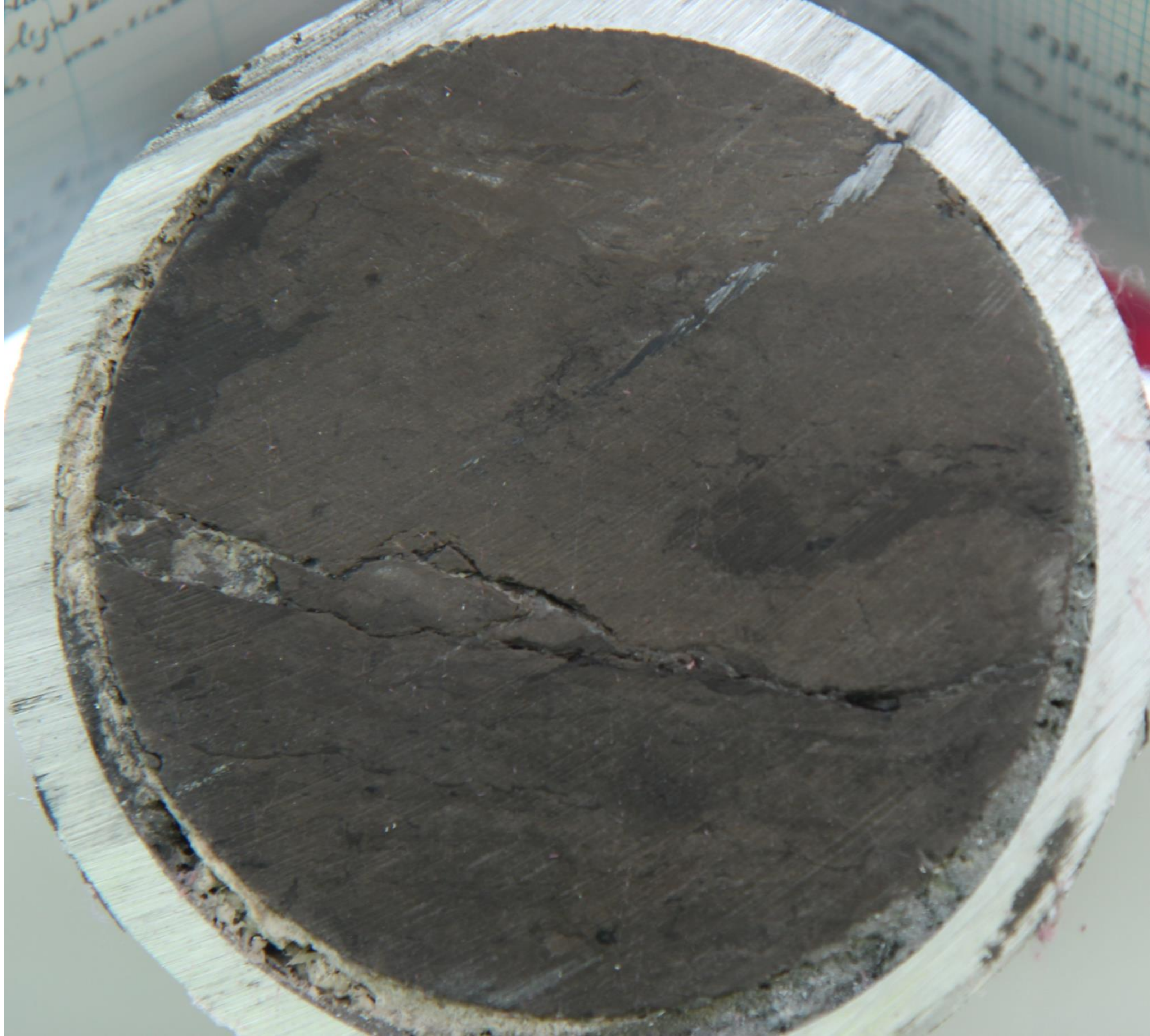
TU Delft

2623.81m MD

Dark-brown grey siltstone, fine blackish laminae, distorted, fluidised, hard competent rock

TU Delft

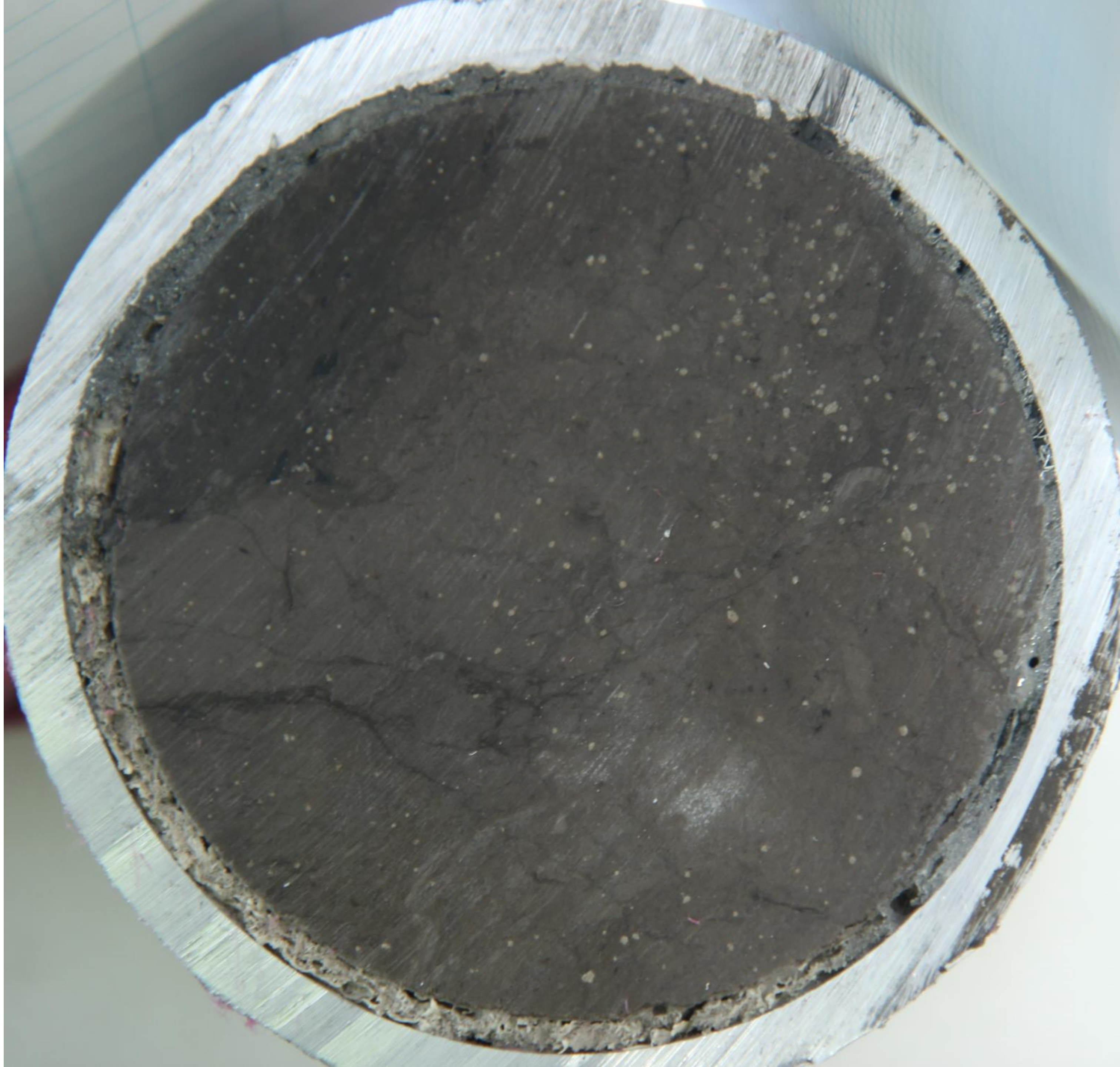
2624.81m MD



medium to dark grey siltstone, fluidised, few floating organic particles, fractures or slickensides filled with brown clay/silt

TUDelft

2625.81m MD



Brown-grey siltstone, dark-grey fluidised intervals and laminae, white spherical mm-sized specks, hard and competent rock, no fractures

2626.81m MD

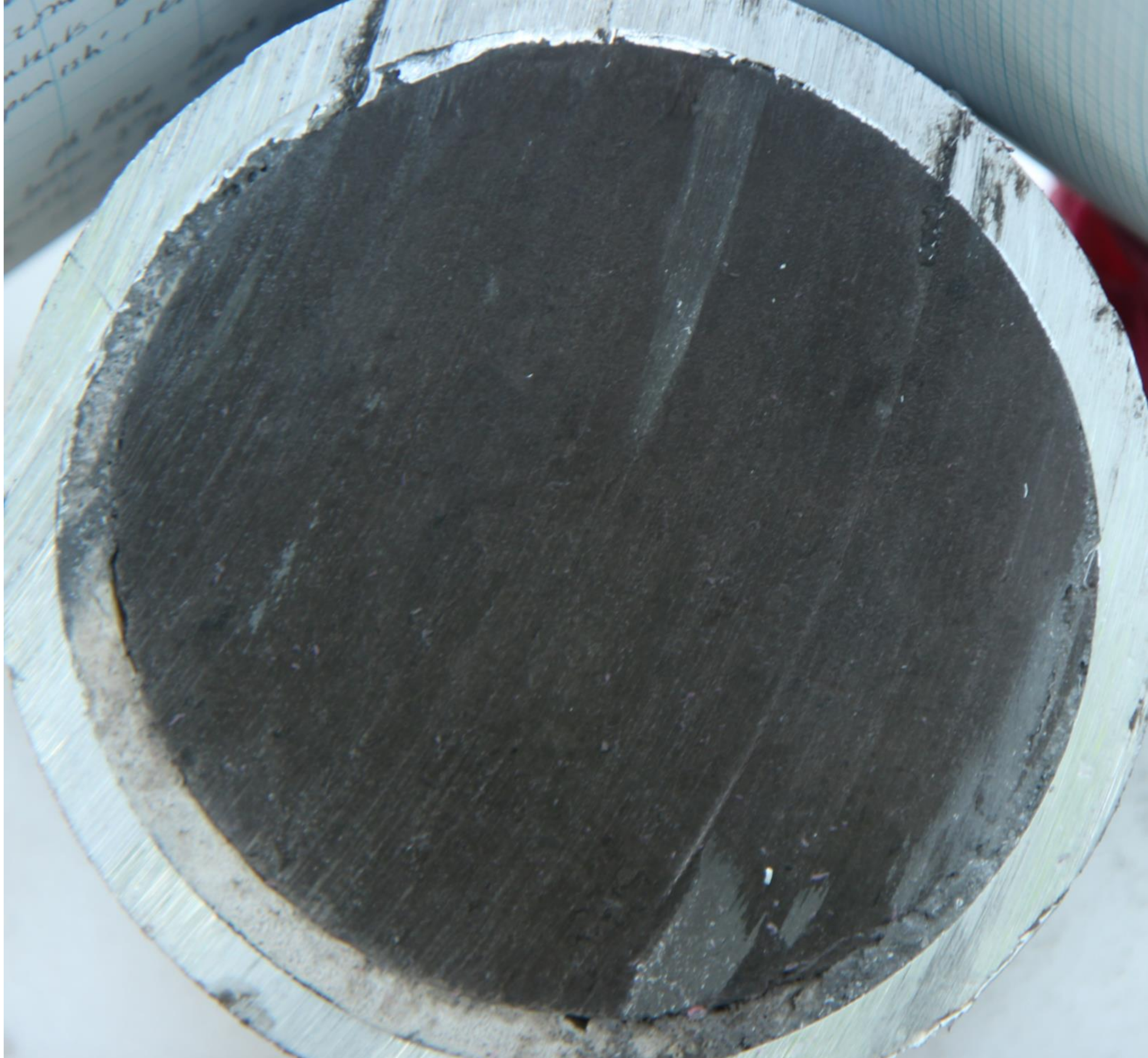
Brownish grey siltstone, dark brown-grey zones with few mm-sized organic particles, few contacts between lighter and dark zones are 'open', rest competent solid rock

TU Delft

2627.81m MD

Dark brown-grey siltstone, fluidised with lighter grey zones showing patterns / laminae, some floating organic matter that is both flat and wide, mm-cm scale, hard competent rock

2628.81m MD



Dark green grey siltstone, homogeneous, some floating organic matter <mm scale, hard and competent rock

TU Delft

2629.81m MD

Dark brown-grey siltstone, fluidised, <mm scale organic remains, hard competent rock

2630.81m MD

Light brown very coarse silt, fluidised, light-grey-brown intervals, few mm-sized organic remains, some org. flat and wide

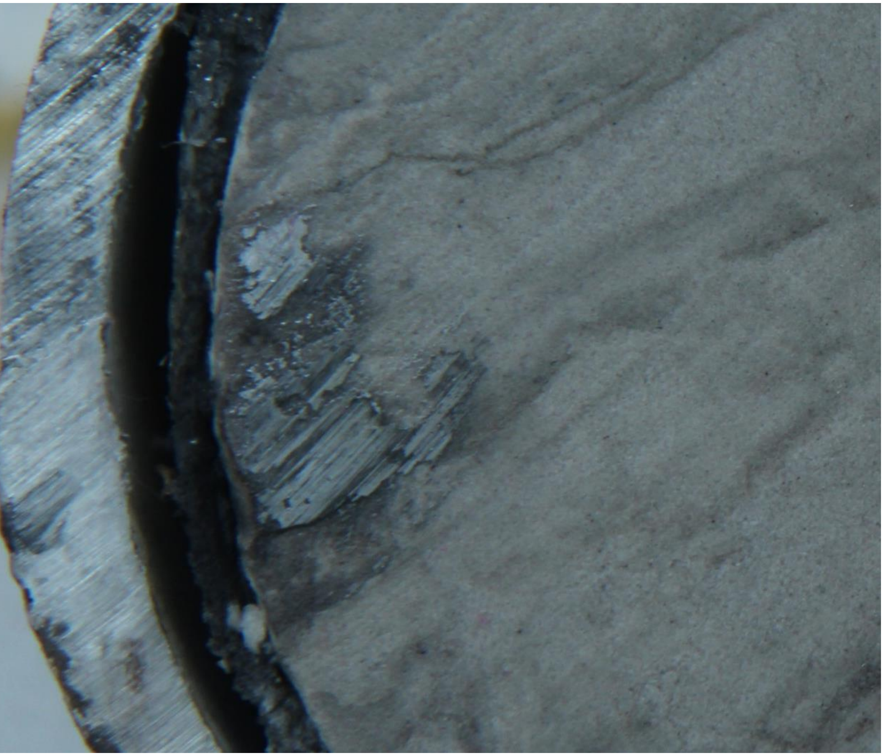
TU Delft

2631.81m MD

Very coarse silt to very fine sst, fluidised a bit along bedding / laminae, darker and lighter intervals of light grey brown, one big open fracture, rest competent solid rock

TU Delft

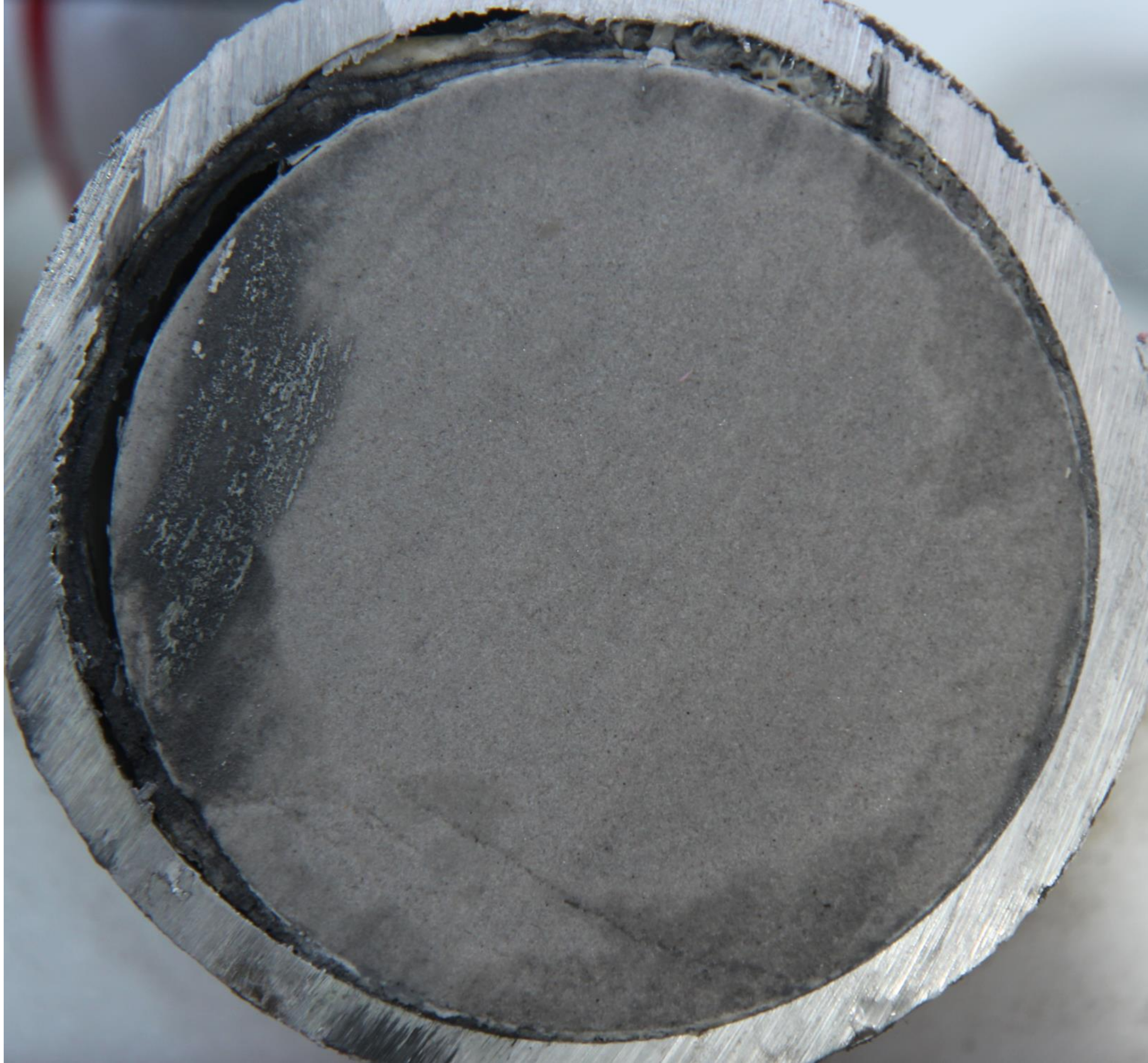
2632.94m MD



Very coarse silt to very fine sst, siderite nodule, a bit distorted laminae of darker colours, mostly light ylw grey, few <mm org particles, quite solid hard rock

TU Delft

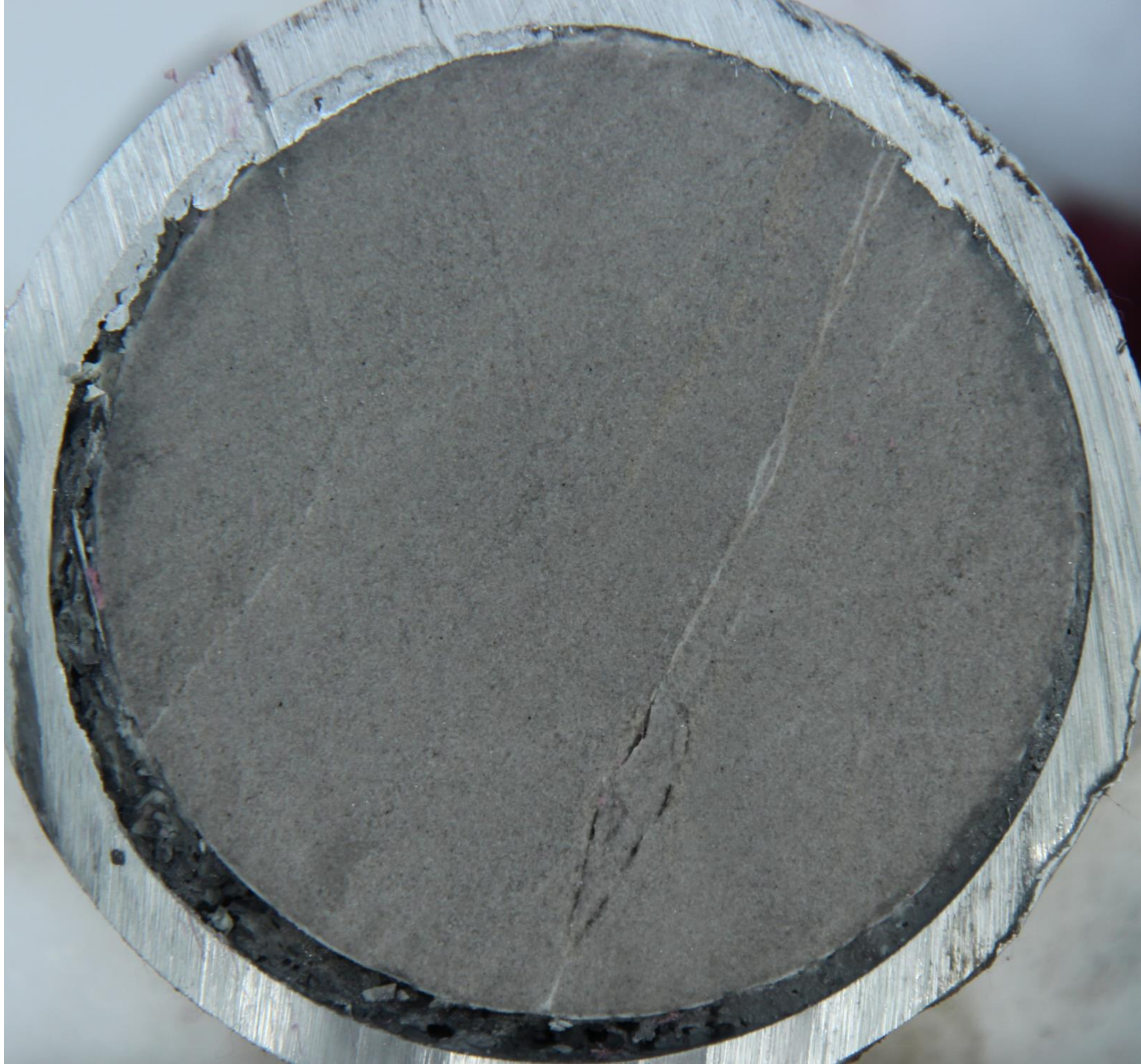
2633.94m MD



Light grey very fine sandstone, some sedimentary structures or fractures, some siderite concretions, homogeneous sediment, solid and competent rock

TUDelft

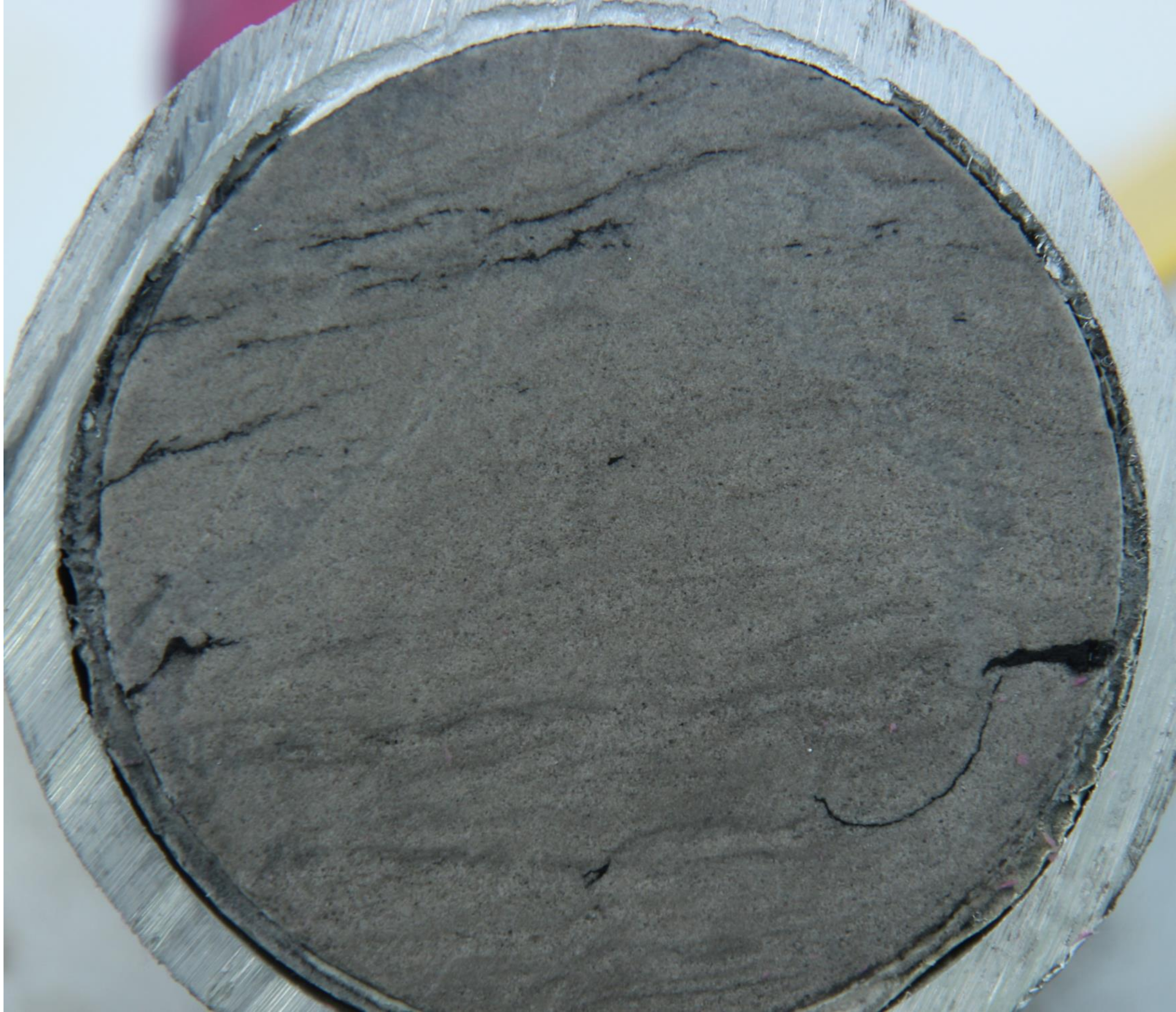
2634.94m MD



Light grey, very fine sandstone, well sorted, homogeneous, white-filled fractures, black grains throughout a bit bigger than the other grains → organics?

TU Delft

2635.94m MD



Very fine sandstone (coarser than 2634,94), black organic grains throughout, organic remains <mm flat and cm-wide in laminae (along bedding plane?), competent hard rock

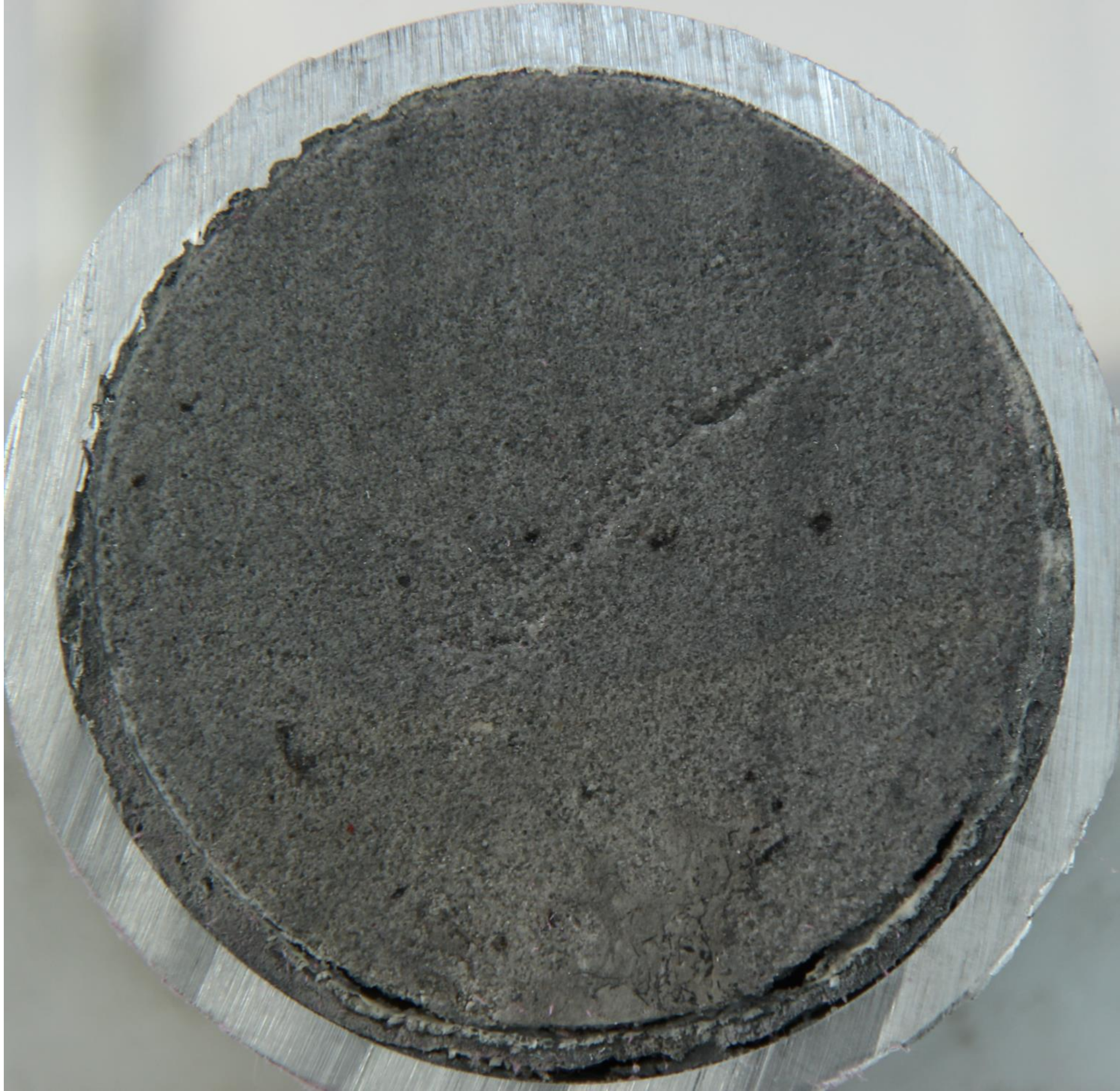
2636.94m MD

Very fine sandstone, quite homogeneous, same grain-size as 2635.94, mica and black grains throughout, large floating organic remains, thin and wide, few light-filled fractures

2637.94m MD

Light brown, medium sorted fine sandstone showing bedding / sedimentary structures, floating organic remains, sand is quite loose in the rock → washing / touching results in loose grains, laminae of silt and very fine sand occur

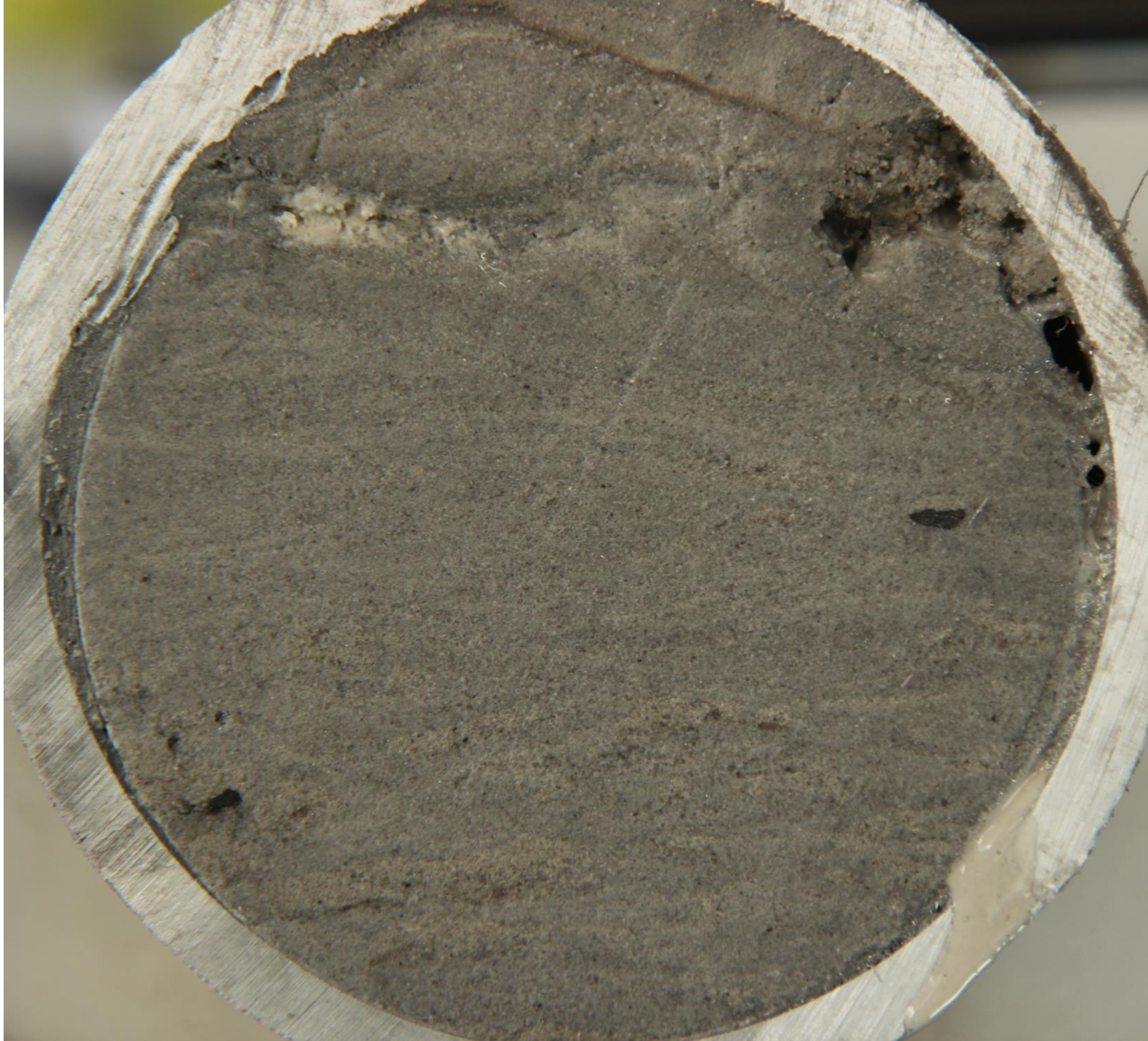
2638.94m MD



Grey, fine sandstone, medium to well sorted, homogeneous, floating mm-sized organic matter, black grains occur, is there mica?, quite hard and competent rock

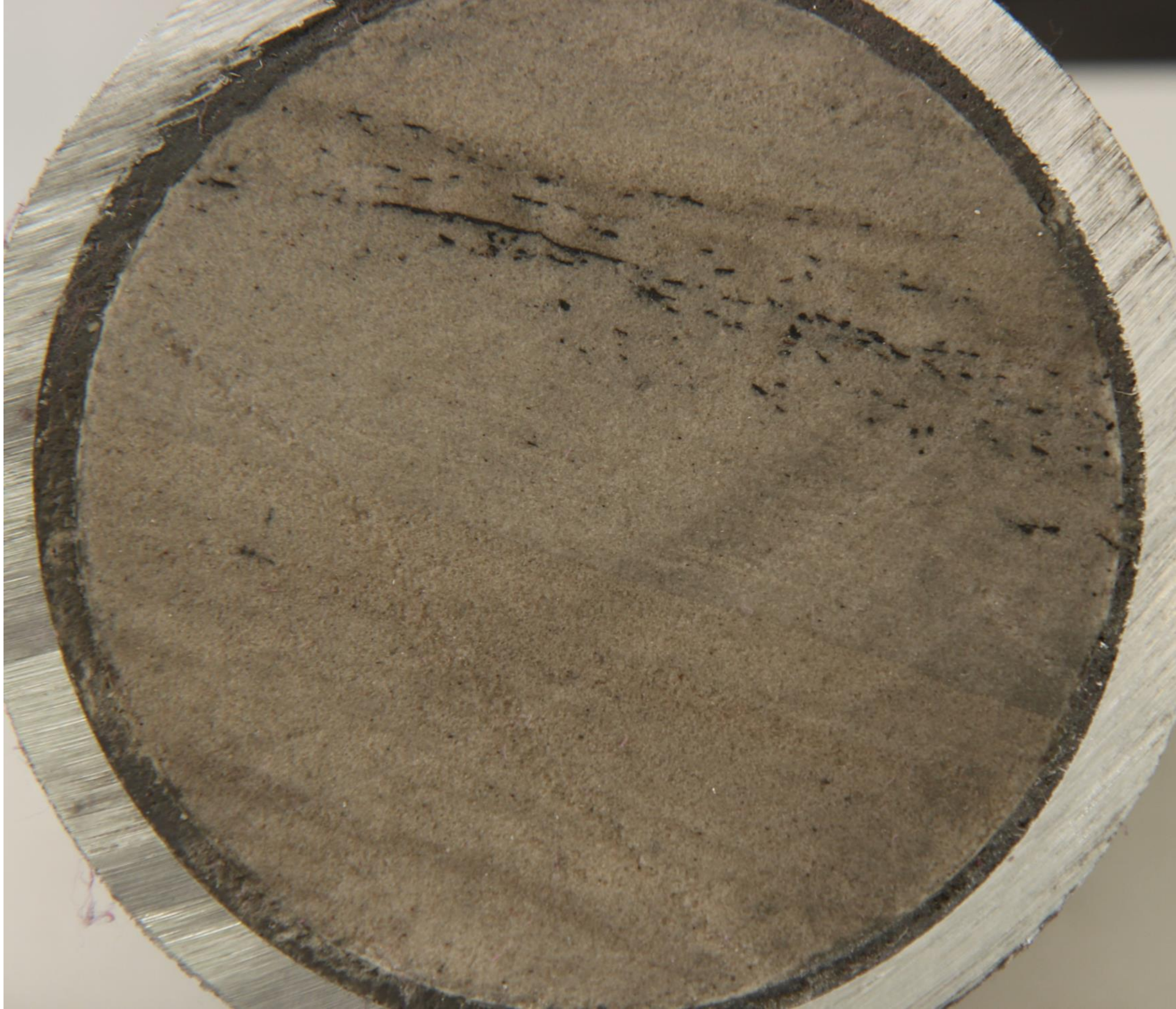
TUDelft

2639.94m MD



Grey, very fine sandstone, medium to well sorted, part is fine sandstone, seemingly small-scale cross bedding, floating organic matter mm-sized some larger

2640.94m MD



Light yellow grey very fine sandstone, finer than 2639.94m, bedding of slight colour changes and thin-wide organic matter remains, homogeneous sediment, hard and competent rock

2641.95m MD

Light grey fine sandstone, well sorted, quite homogeneous with intercalations of large organic remains up to 4-5cm in size, coalified, and seemingly on planes of sedimentary structures, quartz and black grains visible

DEL-GT-01 Core #7 Images and Initial Descriptions

TU Delft – Hemmo Abels – 6 September 2023

2642 m MD

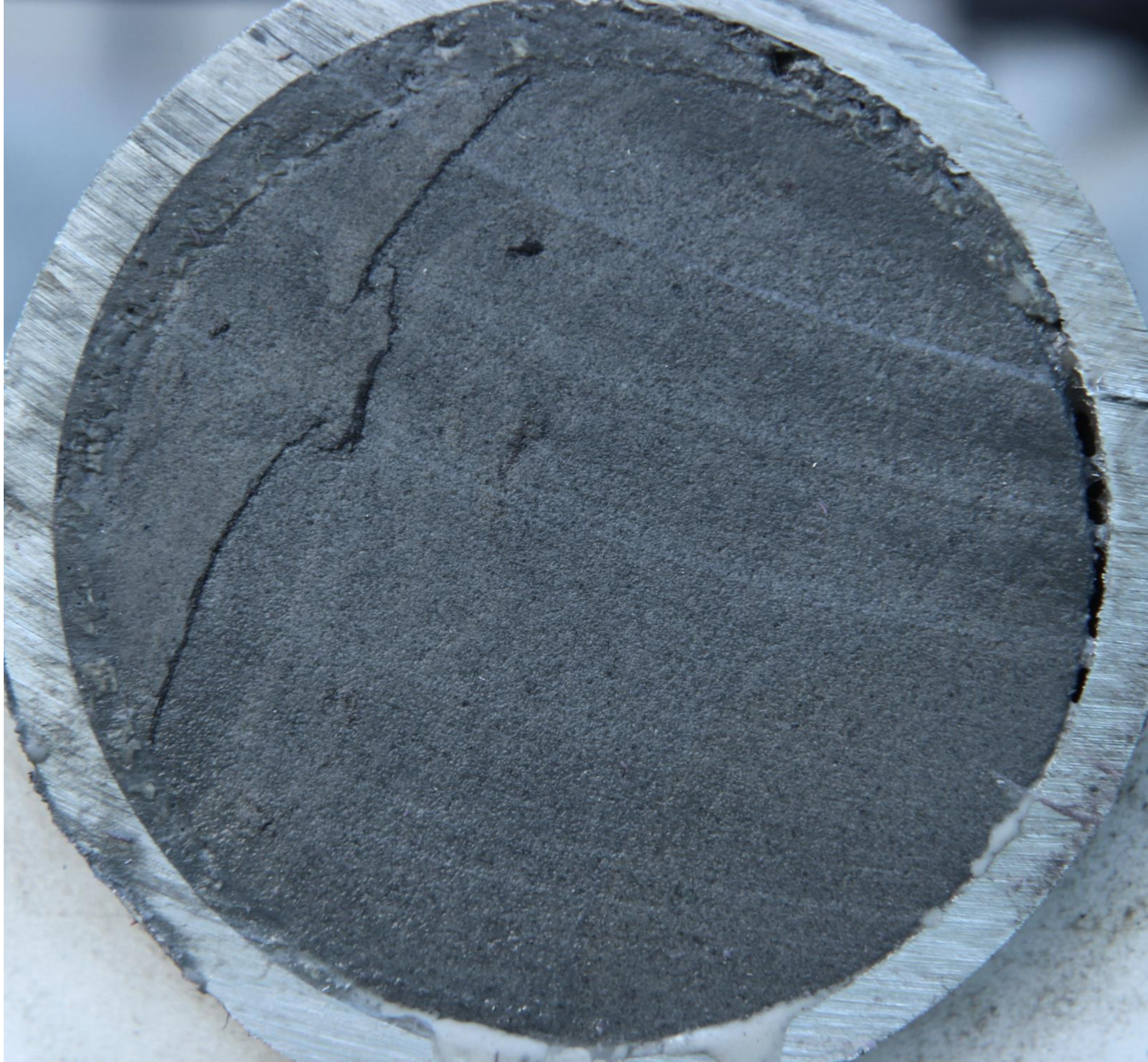
Dark green grey siltstone, fluidised, some thin organic fragments

2643.0m MD

Very fine to fine sandstone, light grey, homogeneous with laminae of organic matter (on cross-lamination?), some >mm organic particles, coalified, sorting medium to well

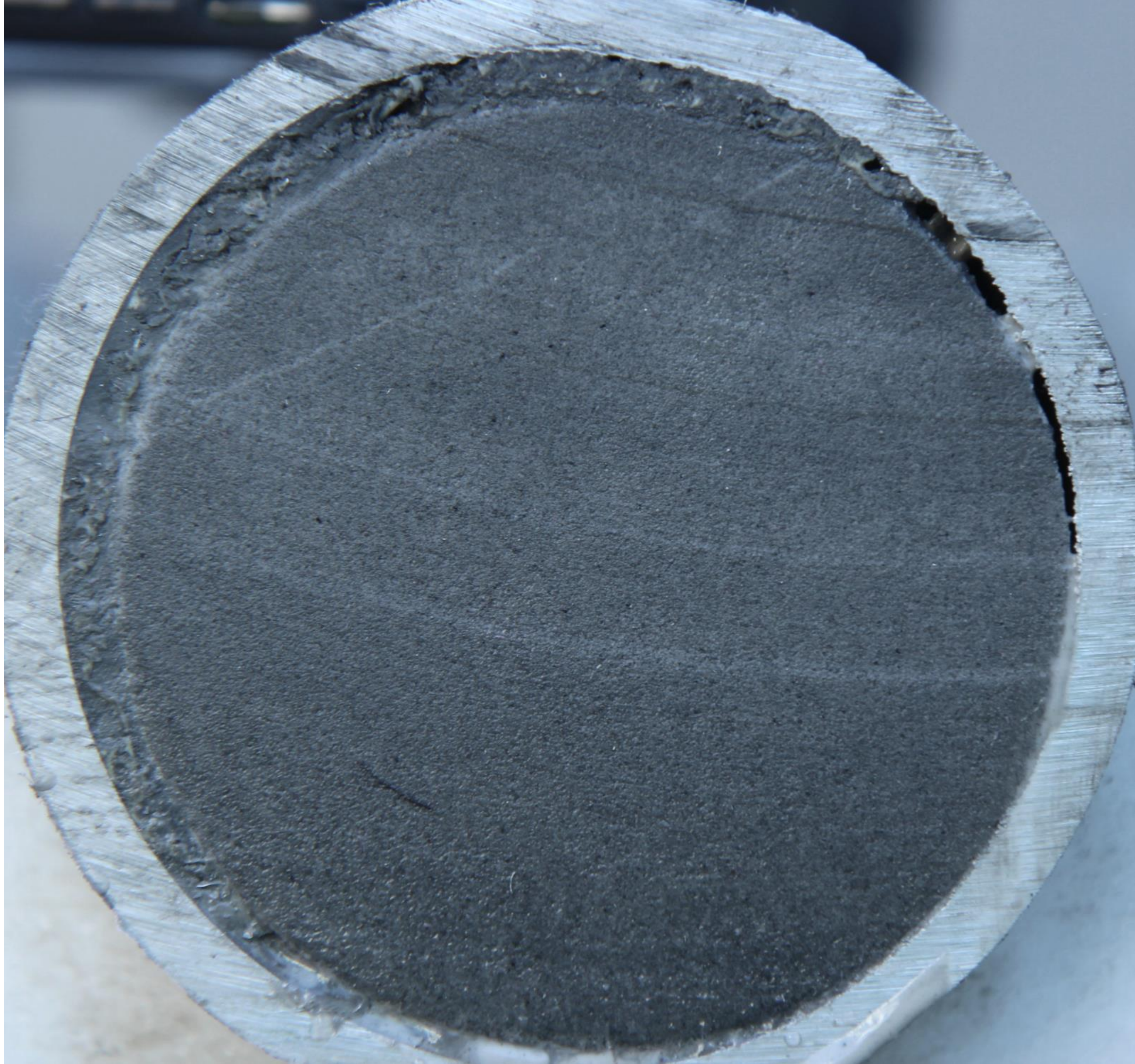
TUDelft

2644.0m MD



Well-sorted fine sandstone, homogeneous, black grains, one organic lamina, few mm-pieces of org. matter unsorted, grey

2645.0m MD



Well-sorted very fine sandstone, coarser black grains, one white-filled fracture, grey, homogeneous

2646.0m MD

Well-sorted very fine to fine sandstone, coring induced fracturing, homogeneous, fine black grains, organic matter along one irregular plane

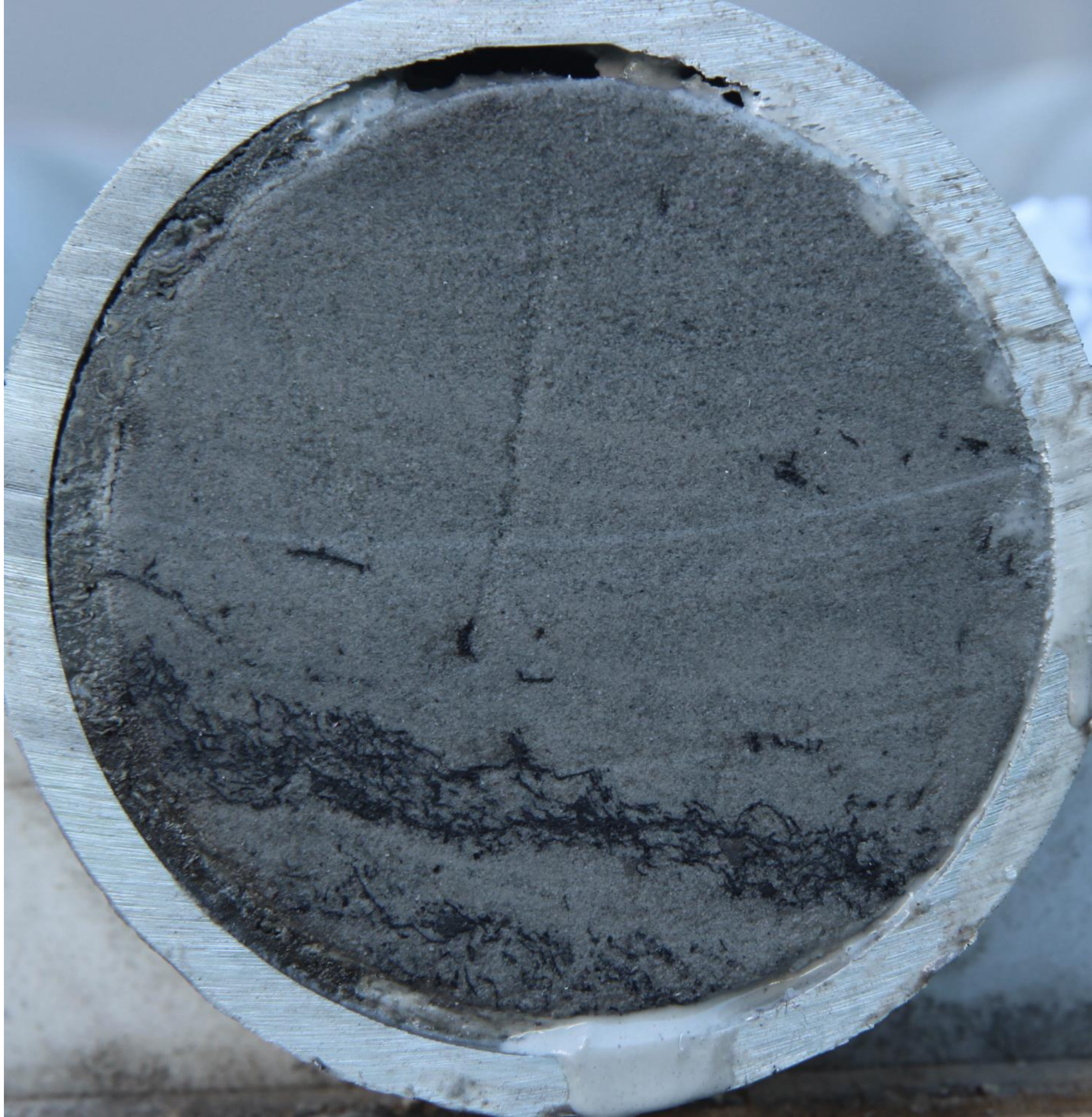
2647.00m MD

well sorted very fine to fine sandstone, black grains, organic matter along irregular laminae, few mm-scale org.particles, homogeneous sandstone

2648.00m MD

Well-sorted fine and very fine sandstone in two beds, black grains, coring induced fracturing, medium grey colour, friable sandstone (after coring)

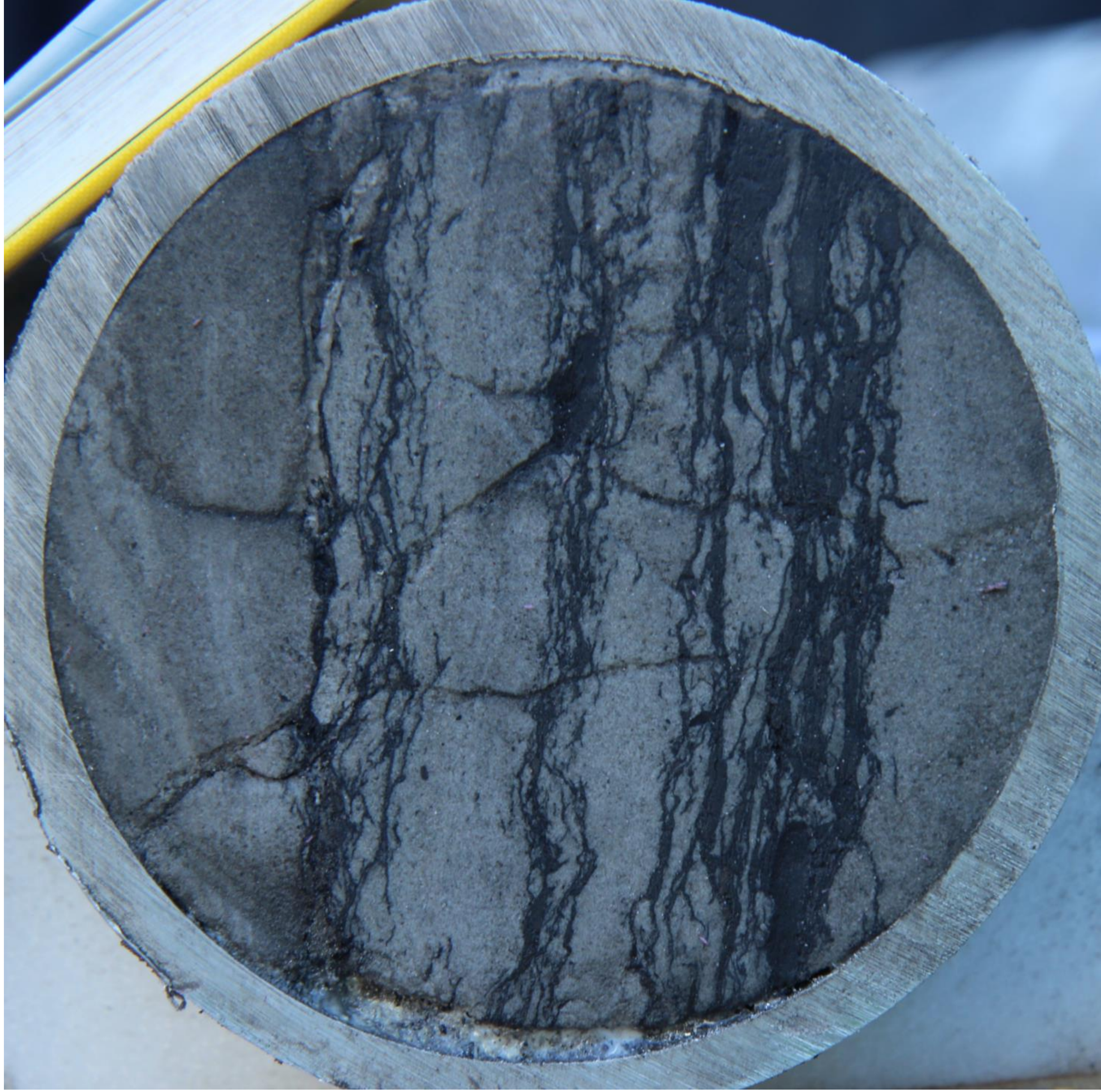
2649.00m MD



Very fine to fine sandstone, gradual grading, vf sst has laminae of flat, wide organic remains alike dune toe-sets, fine sandstone, friable, well-sorted overall

TU Delft

2650.00m MD



Very fine sandstone, close to fine sandstone, laminae of flat-wide organic matter at cm-scale alternating with sandstone similar to dune-toe sets, fractures nearly perpendicular to lamination, light-medium grey, coring induced fracturing fills barrel, original top to right?

2651.00m MD

Well-sorted very fine sandstone to coarse silt, organic laminae and interbedded flat-wide organic remains, horizontal (?) lamination and some small-scale crossbedding (?), core barrel filled by organic-rich laminated part, black grains, few white bit larger grains

2651.63m MD

Very fine sandstone, light grey, laminae of organic matter, some bigger pieces of organic matter, white-filled fractures, solid and competent rock, front of core smoothened by coring bit during jamming

A.1.2 Open-hole logging DEL-GT-01

Open Hole Wireline Log DEL-GT-01
XMAC
HDIL

WellCAD — ALT Advanced Logic Technology

Company:	GEOTHERMIE DELFT		**API number:**
Well Name:	DEL-GT-01		**UWI number:**
Field:	DELFT		
Country:	NETHERLANDS	**State:**	**Rig Name:**

Location	LOC400#3			**Elevations**				
East / Long:	0.0000	**North / Lat:**	0.0000	**K.B.**	**D.F.**	7.46	**G.L.**	-0.54

Perm Datum:		**Elevation:**	7.46
Log measured from:	DF	7.46	**Above Permanent Datum**
Drill measured from:			

Date	09-SEP-2023		
Run	1		
Depth - Driller	2931.0		
Depth - Logger	2931.0		
Bottom Logged Interval	2928.8		
Top Logged Interval	2570.0		
Casing Driller			
Casing Logger			
Bit Size	8.5		
Equip No	21 HRS 30 MINS		
Recorded By	HEKEL/BUHNE/BUJOR		
Witness	AUKE BARNHOORN		

REMARKS

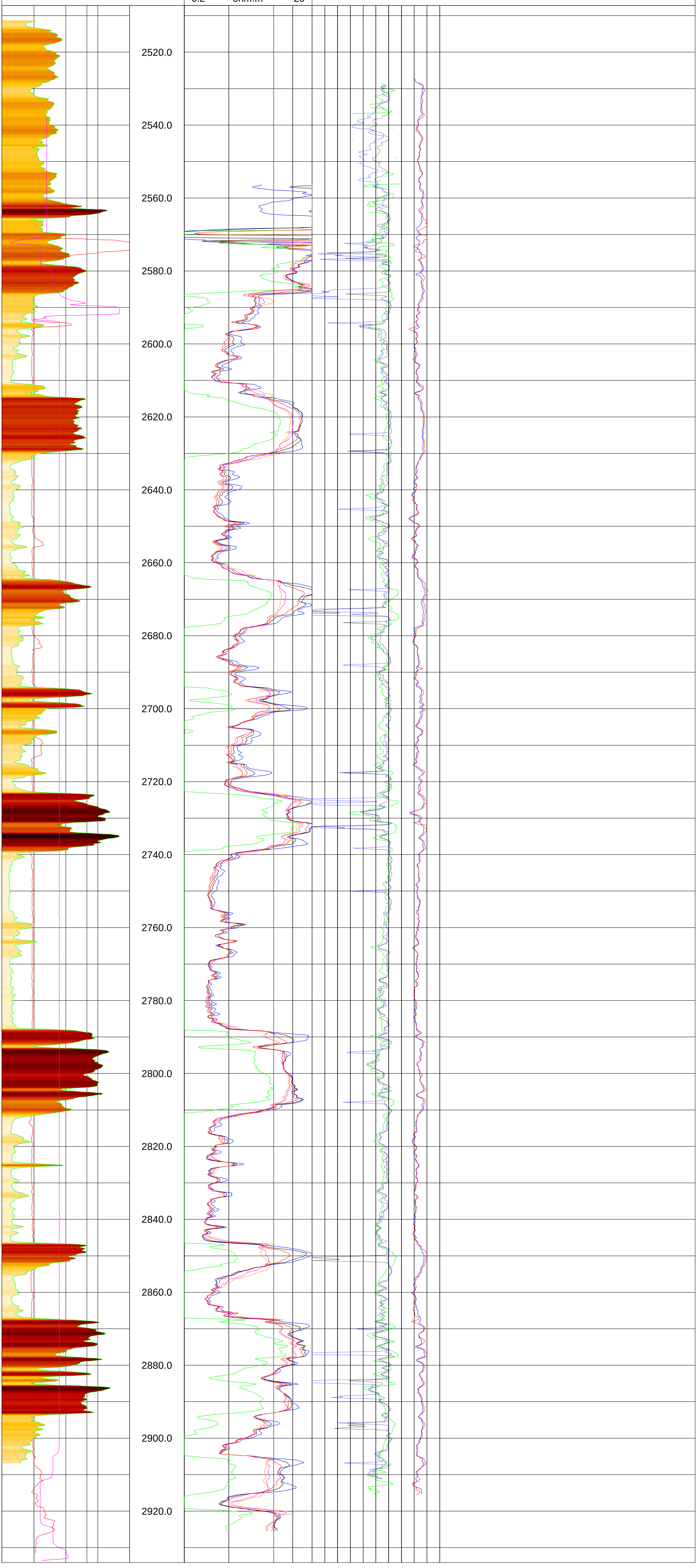
Remark 1:

Remark 2:

Remark 3:

Remark 4:

BIT: 6 in 16	Depth 1m:1000m	M2R1: 0.2 ohm.m 20	DT24AQI: 240 us/ft 40
CHADW: 6 in 16		M2R2: 0.2 ohm.m 20	DTCQI: 240 us/ft 40
GR: 0 gAPI 150		M2R3: 0.2 ohm.m 20	DTSQI: 240 us/ft 40
SPD: 0 m/min 20		M2R6: 2 ohm.m 20	DTXXQI: 240 us/ft 40
		M2R9: 0.2 ohm.m 20	DTYYQI: 240 us/ft 40
		M2RX: 0.2 ohm.m 20	



Open-Hole Wireline Log DEL-GT-01

Company: GEOTHERMIE DELFT		**API number:**	
Well Name: GT-01		**UWI number:**	
Field: DELFT			
Country: NETHERLANDS	**State:**	**Rig Name:**	
Location LOC400#3		**Elevations**	
East / Long: 4.36969	**North / Lat:** 52.0004	**K.B.**	**D.F.** 7.46 **G.L.** -0.54
Perm Datum:	**Elevation:** 7.46		
Log measured from: DF	7.46 **Above Permanent Datum**		
Drill measured from:			

Date	09-SEP-2023		
Run	1		
Depth - Driller	2931.0		
Depth - Logger	2931.0		
Bottom Logged Interval	2928.8		
Top Logged Interval	2570.0		
Casing Driller			
Casing Logger			
Bit Size	8.5		
Equip No	21 HRS 30 MINS		
Recorded By	HEKEL/BUHNE/BUJOR		
Witness	AUKE BARNHOORN		

REMARKS

Remark 1:

Remark 2:

Remark 3:

Remark 4:

Open-Hole Wireline Log DEL-GT-01
MREX
PPLO

Company:	GEOTHERMIE DELFT		**API number:**
Well Name:			**UWI number:**
Field:	DELFT		
Country:	NETHERLANDS	**State:**	**Rig Name:**
Location	LOC400#3		**Elevations**
East / Long:	0.0000	**North / Lat:** 0.0000	**K.B.** **D.F.** 7.46 **G.L.** -0.54
Perm Datum:		**Elevation:** 7.46	
Log measured from:	DF	7.46	**Above Permanent Datum**
Drill measured from:			

Date	10-SEP-2023		
Run	3		
Depth - Driller	2931.0		
Depth - Logger	2930.8		
Bottom Logged Interval	2928.0		
Top Logged Interval	2570.0		
Casing Driller			
Casing Logger			
Bit Size	8.5		
Equip No	41 HRS 30 MINS		
Recorded By	HEKEL/BUHNE/BUJOR		
Witness	AUKE BARNHOORN		

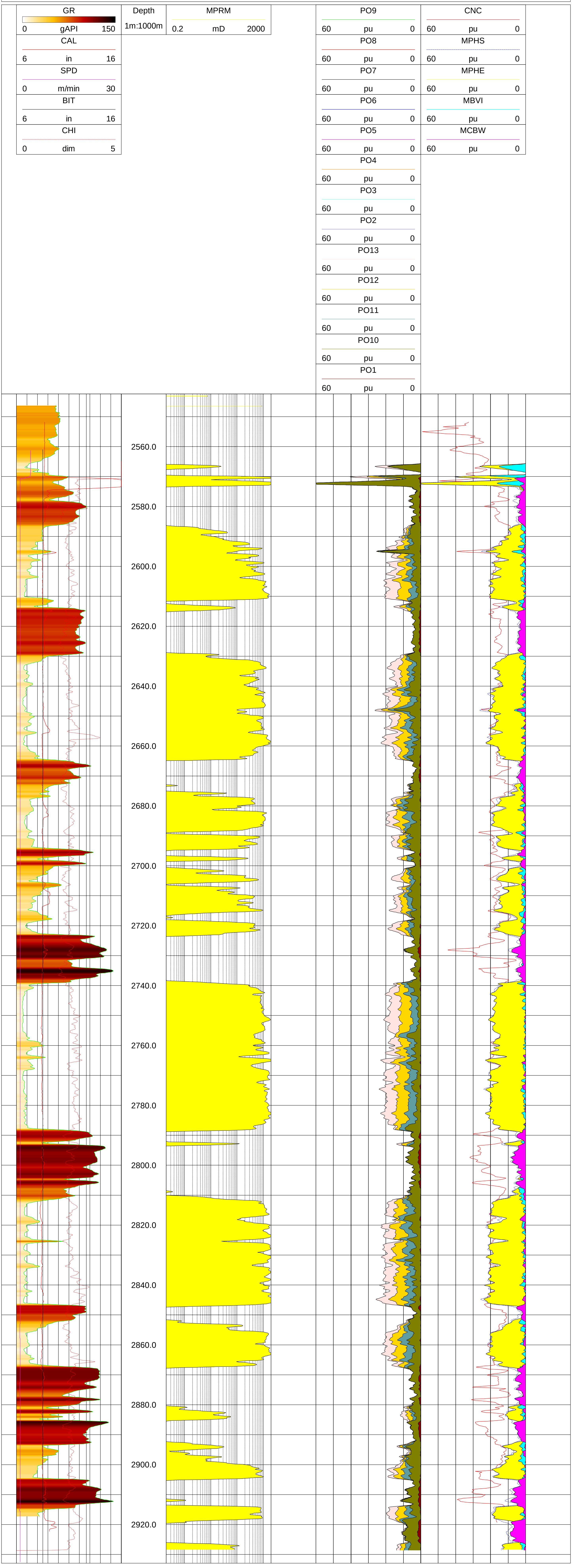
REMARKS

Remark 1:

Remark 2:

Remark 3:

Remark 4:



Open-Hole Wireline Log DEL-GT-01
ZDL
CN

WellCAD

Advanced Logic Technology

Company: GEOTHERMIE DELFT		**API number:**	
Well Name:		**UWI number:**	
Field: DELFT			
Country: NETHERLANDS	**State:**	**Rig Name:**	
Location LOC400#3		**Elevations**	
East / Long: 0.0000	**North / Lat:** 0.0000	**K.B.**	**D.F.** 7.46 **G.L.** -0.54
Perm Datum:	**Elevation:** 7.46		
Log measured from: DF	7.46 **Above Permanent Datum**		
Drill measured from:			

Date	10-SEP-2023		
Run	3		
Depth - Driller	2931.0		
Depth - Logger	2930.8		
Bottom Logged Interval	2920.5		
Top Logged Interval	2570.0		
Casing Driller			
Casing Logger			
Bit Size	8.5		
Equip No	41 HRS 30 MINS		
Recorded By	HEKEL/BUHNE/BUJOR		
Witness	AUKE BARNHOORN		

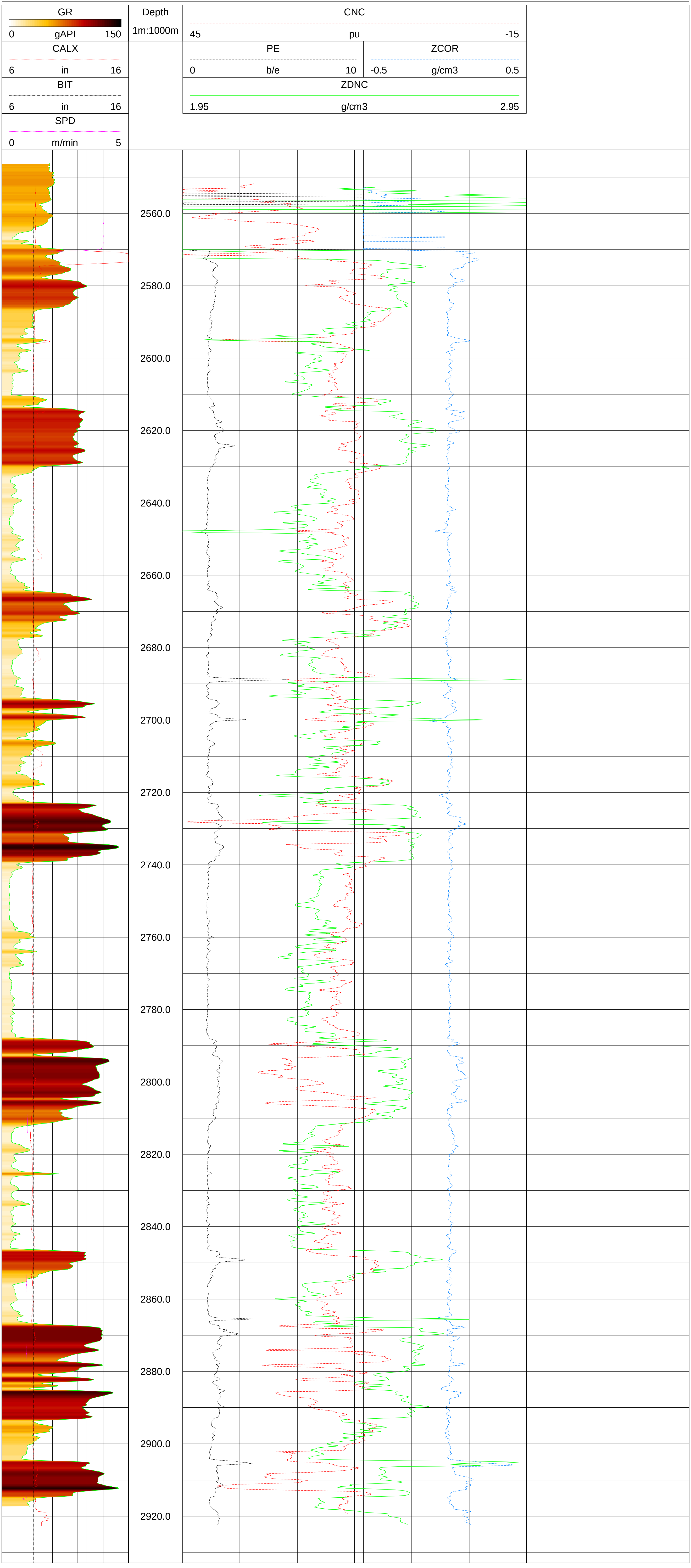
REMARKS

Remark 1:

Remark 2:

Remark 3:

Remark 4:



A.2 Injector DEL-GT-02-(S1-S2)

A.2.1 Open-hole logging DEL-GT-02-S2

Open Hole Wireline Log DEL-GT-02-S2
XMAC
HDIL

Company:	GEOTHERMIE DELFT	**API number:**	
Well Name:	DEL-GT02-S2	**UWI number:**	
Field:	DELFT		
Country:	NETHERLANDS	**State:**	**Rig Name:**

Location	LOC400#3			**Elevations**			
East / Long:	52.0000	**North / Lat:**	4.3000	**K.B.**	**D.F.** 7.46	**G.L.**	-0.54

Perm Datum:		**Elevation:**	7.46
Log measured from:	DF	7.46	**Above Permanent Datum**
Drill measured from:			

Date	28_NOV-2023		
Run	1		
Depth - Driller	2580.0		
Depth - Logger	2581.6		
Bottom Logged Interval	2576.7		
Top Logged Interval	2205.0		
Casing Driller			
Casing Logger			
Bit Size	8.5		
Equip No	18.1		
Recorded By	HEKEL/VAN DIJKEN		
Witness	A. BARNHOORN		

REMARKS

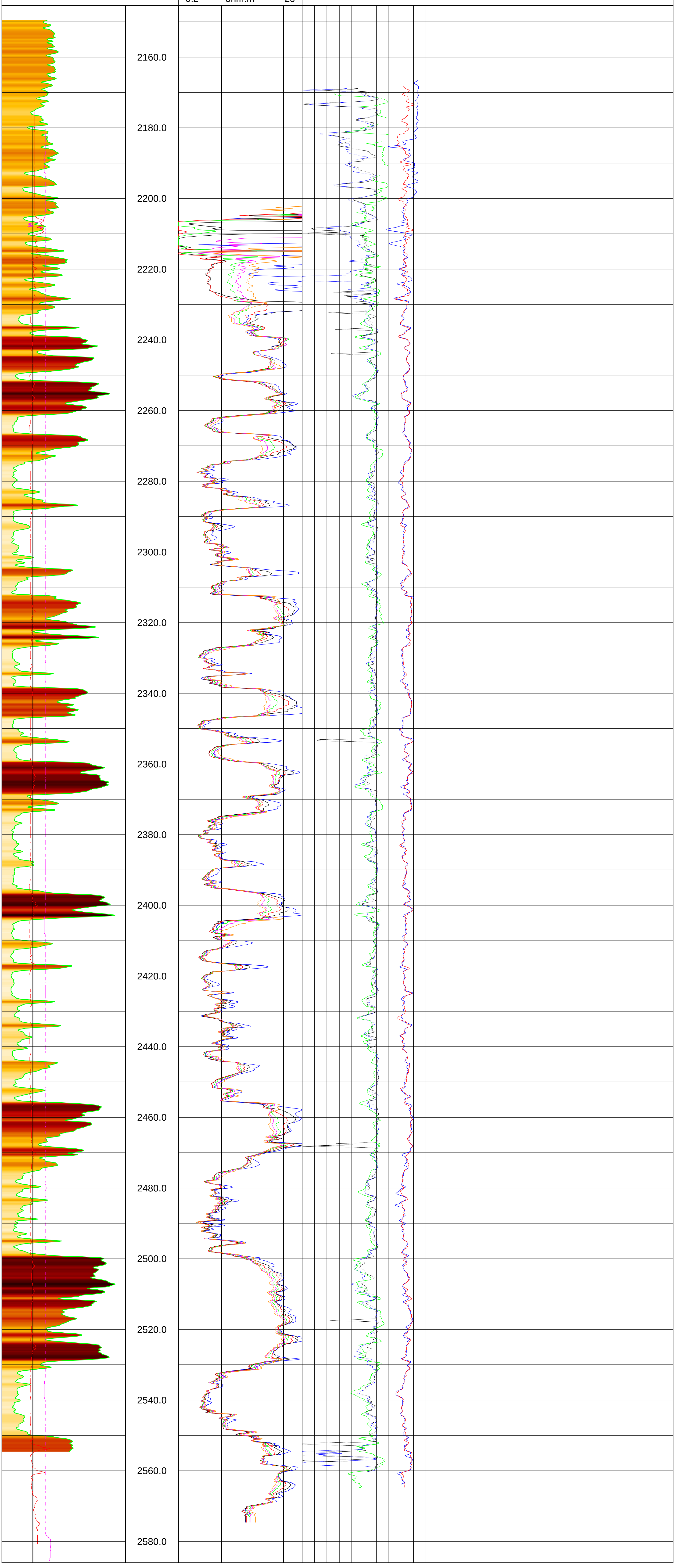
Remark 1:

Remark 2:

Remark 3:

Remark 4:

GR / BIT / SPD / CHADW	Depth	M1R1 / M1R2 / M1R3 / M1R6 / M1R9 / M1RX	DT24QI / DTCQI / DTSQI / DTXXQI / DTYYQI
GR: 0 gAPI 150	1m:1000m	M1R1: 0.2 ohm.m 20	DT24QI: 240 us/ft 40
BIT: 6 in 16		M1R2: 0.2 ohm.m 20	DTCQI: 240 us/ft 40
SPD: 0 m/min 20		M1R3: 0.2 ohm.m 20	DTSQI: 240 us/ft 40
CHADW: 6 in 16		M1R6: 0.2 ohm.m 20	DTXXQI: 240 us/ft 40
		M1R9: 0.2 ohm.m 20	DTYYQI: 240 us/ft 40
		M1RX: 0.2 ohm.m 20	



Open-Hole Wireline Log DEL-GT-02-S2

WellCAD | ALT Advanced Logic Technology

Company:	GEOTHERMIE DELFT		**API number:**
Well Name:	GT-02-S2		**UWI number:**
Field:	DELFT		
Country:	NETHERLANDS	**State:**	**Rig Name:**
Location	LOC400#3		**Elevations**
East / Long:	52	**North / Lat:** 4.3	**K.B.** **D.F.** 7.46 **G.L.** -0.54
Perm Datum:		**Elevation:** 7.46	
Log measured from:	DF	7.46	**Above Permanent Datum**
Drill measured from:			

Date	29_NOV-2023		
Run	3		
Depth - Driller	2580.0		
Depth - Logger	2581.6		
Bottom Logged Interval	2573.3		
Top Logged Interval	2234.1		
Casing Driller			
Casing Logger			
Bit Size	8.5		
Equip No	39.6 HOURS		
Recorded By	HEKEL/VAN DIJKEN		
Witness	S. LAUMANN		

REMARKS

Remark 1:

Remark 2:

Remark 3:

Remark 4:

Depth	ARRAY_WBI_AMP	CAL / GR#2(MREX)	CNC(MREX) / ZDNC(MREX)	PE(MREX) / PE(CN_ZDL)	DTSQI / DTCQI	M1R1 / M1R3 / M1R9
1m:500m	31 – 3000; 0° 90° 180° 270° 0°	CAL: 0 in 20; GR#2(MREX): 0 gAPI 150	CNC(MREX): 45 pu -15; ZDNC(MREX): 1.95 g/cm3 2.95	PE(MREX): 1 b/e 6; PE(CN_ZDL): 1 b/e 8	DTSQI: 180 us/ft 40; DTCQI: 180 us/ft 40	M1R1: 0.2 ohm.m 20; M1R3: 0.2 ohm.m 20; M1R9: 0.2 ohm.m 20

Open-Hole Wireline Log DEL-GT-02-S2
MREX
PPLO

WellCAD

Advanced Logic Technology

Company: GEOTHERMIE DELFT		**API number:**	
Well Name:		**UWI number:**	
Field: DELFT			
Country: NETHERLANDS	**State:**	**Rig Name:**	
Location LOC400#3		**Elevations**	
East / Long: 52.0000	**North / Lat:** 4.3000	**K.B.**	**D.F.** 7.46 **G.L.** -0.54
Perm Datum:	**Elevation:** 7.46		
Log measured from: DF	7.46 **Above Permanent Datum**		
Drill measured from:			

Date	29_NOV-2023		
Run	3		
Depth - Driller	2580.0		
Depth - Logger	2581.6		
Bottom Logged Interval	2573.3		
Top Logged Interval	2234.1		
Casing Driller			
Casing Logger			
Bit Size	8.5		
Equip No	39.6 HOURS		
Recorded By	HEKEL/VAN DIJKEN		
Witness	S. LAUMANN		

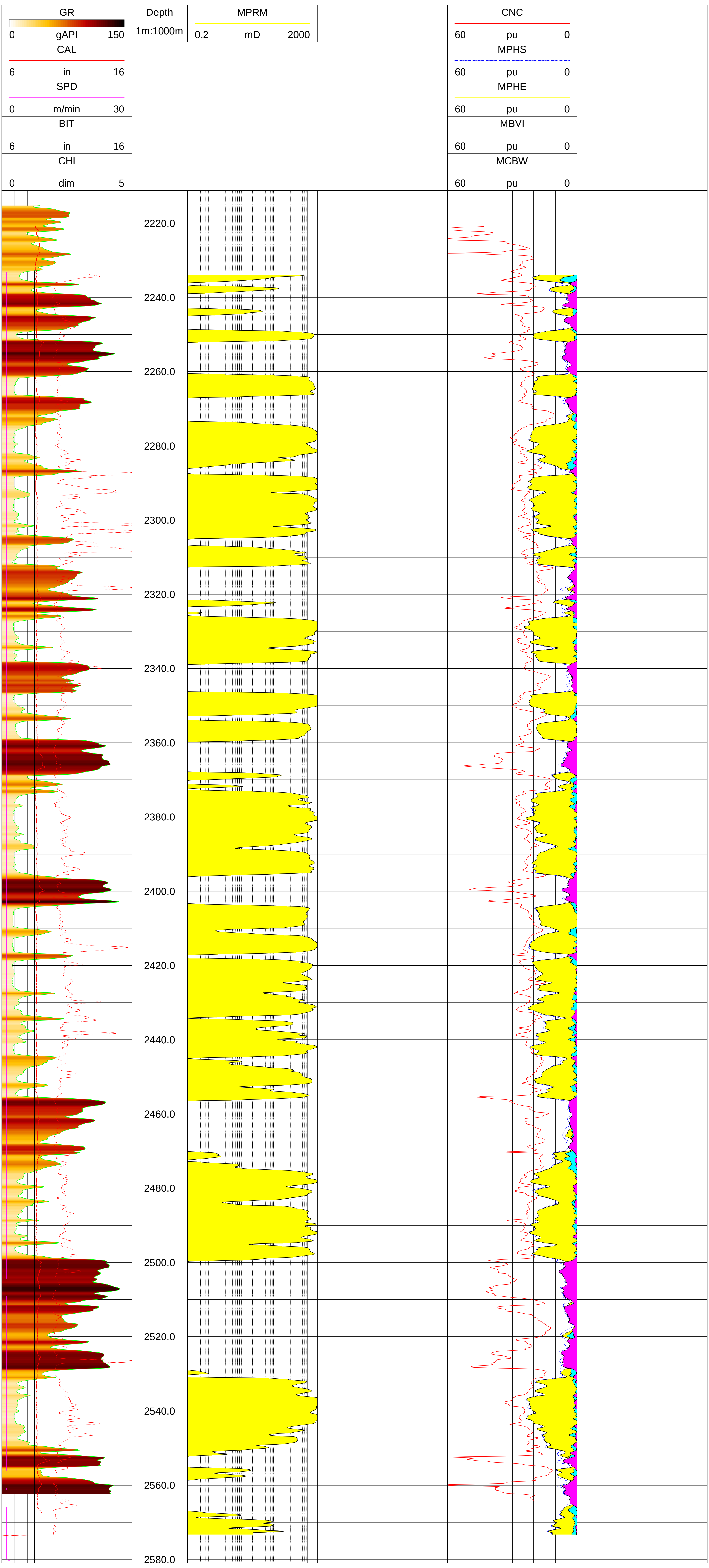
REMARKS

Remark 1:

Remark 2:

Remark 3:

Remark 4:



Open-Hole Wireline Log DEL-GT-02-S2
ZDL
CNC

WellCAD

Advanced Logic Technology

Company: GEOTHERMIE DELFT		**API number:**	
Well Name:		**UWI number:**	
Field: DELFT			
Country: NETHERLANDS	**State:**	**Rig Name:**	
Location LOC400#3		**Elevations**	
East / Long: 52.0000	**North / Lat:** 4.3000	**K.B.**	**D.F.** 7.46 **G.L.** -0.54
Perm Datum:	**Elevation:** 7.46		
Log measured from: DF	7.46 **Above Permanent Datum**		
Drill measured from:			

Date	29_NOV-2023		
Run	3		
Depth - Driller	2580.0		
Depth - Logger	2581.6		
Bottom Logged Interval	2573.3		
Top Logged Interval	2234.1		
Casing Driller			
Casing Logger			
Bit Size	8.5		
Equip No	39.6 HOURS		
Recorded By	HEKEL/VAN DIJKEN		
Witness	S. LAUMANN		

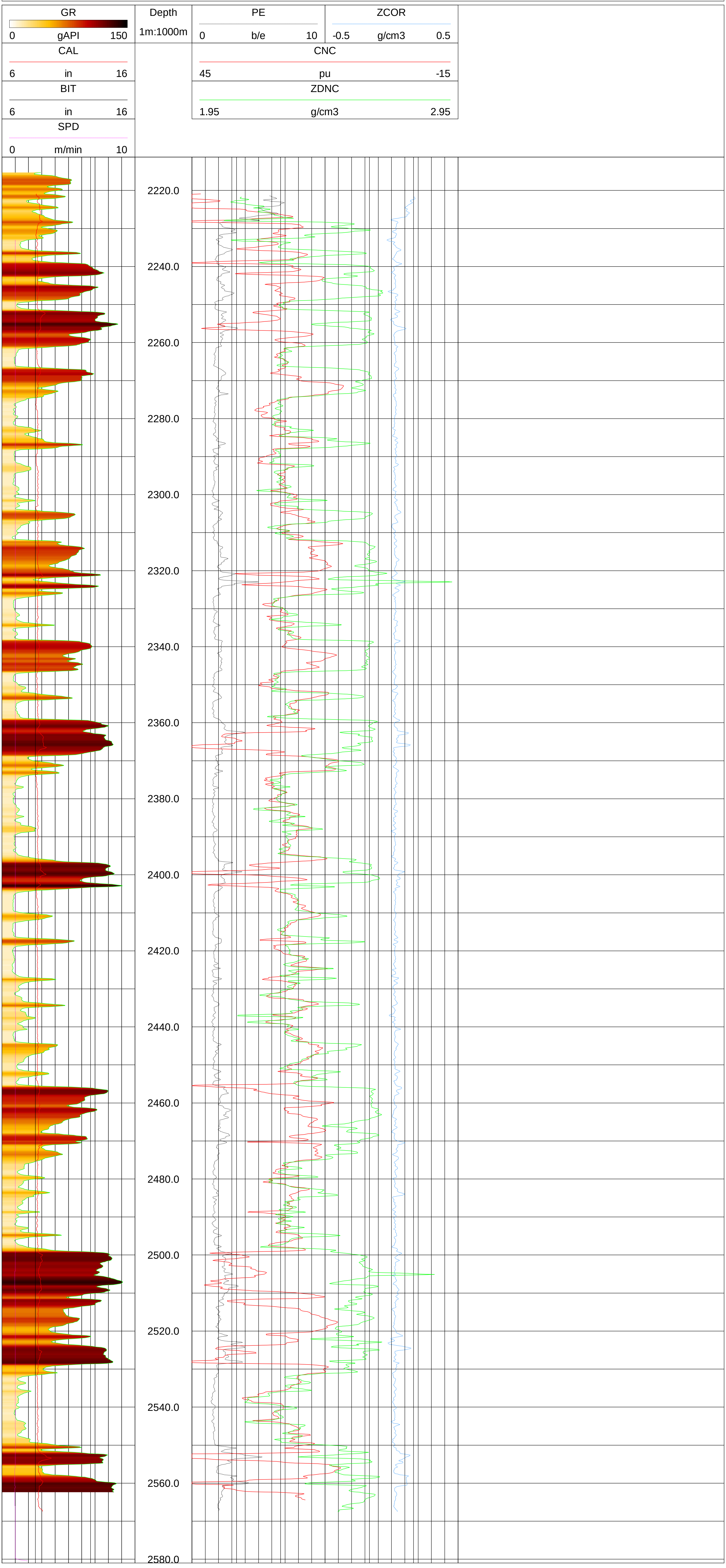
REMARKS

Remark 1:

Remark 2:

Remark 3:

Remark 4:



A.2.2 Side wall coring

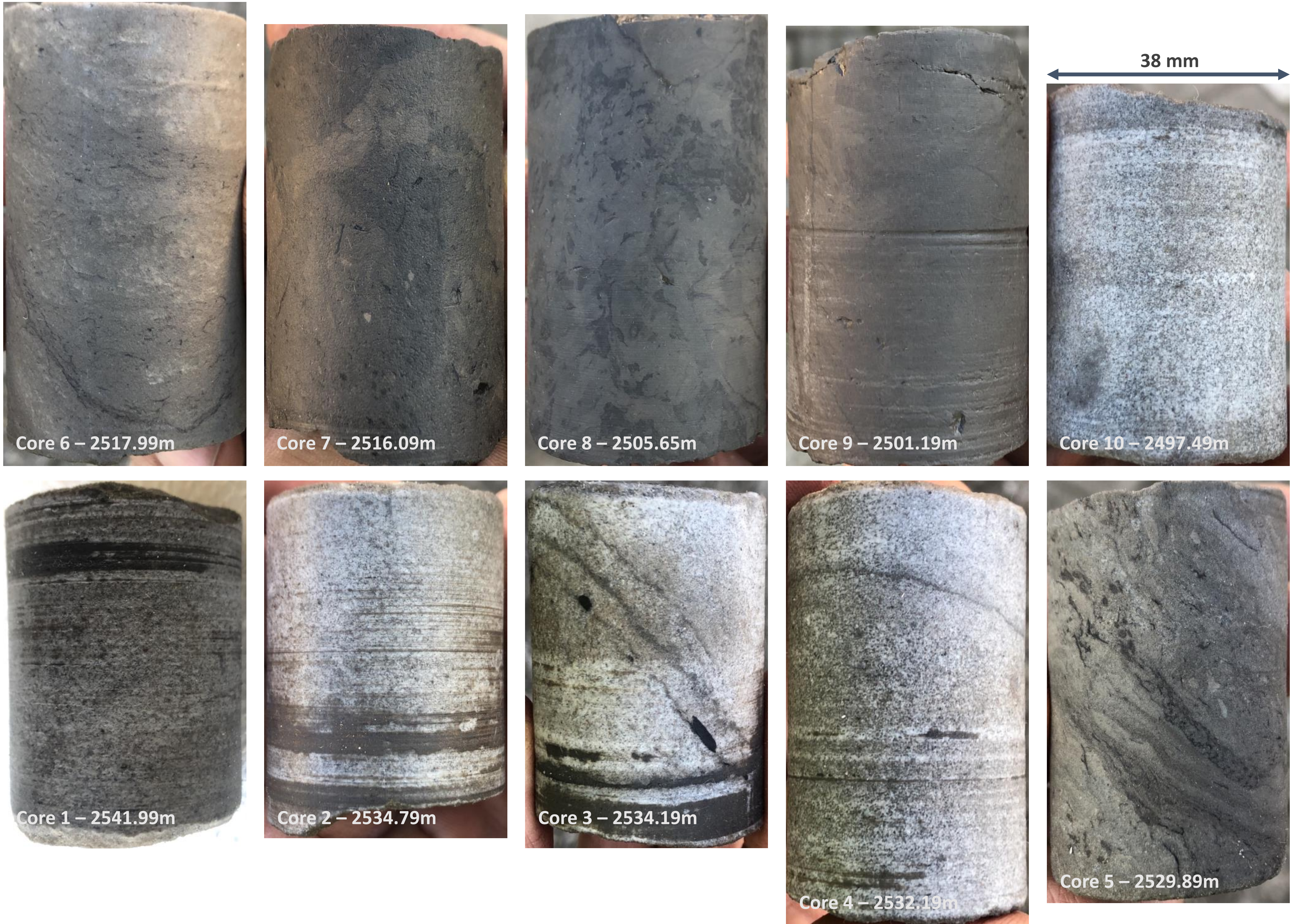
SWCores DEL-GT-02-S2

TU Delft – Hemmo Abels – Sidewall core photographs

4 December 2023

Sidewall Cores
DEL-GT-02-S2
TU Delft – GSE dept.

Depths in MD



Sidewall Cores
DEL-GT-02-S2
TU Delft – GSE dept.

Depths in MD

Sidewall Cores
DEL-GT-02-S2
TU Delft – GSE dept.

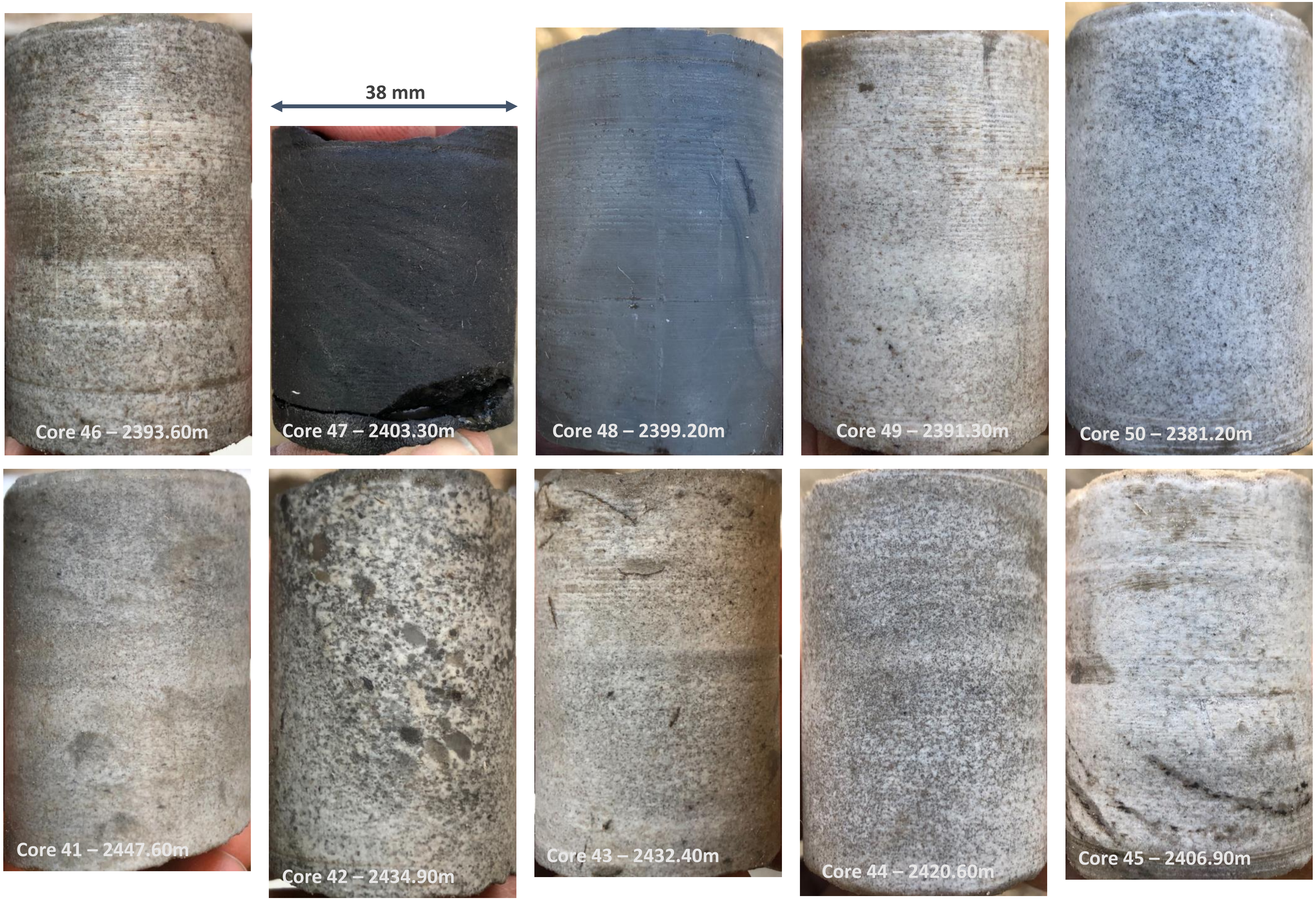
Depths in MD

Sidewall Cores
DEL-GT-02-S2
TU Delft – GSE dept.

Depths in MD

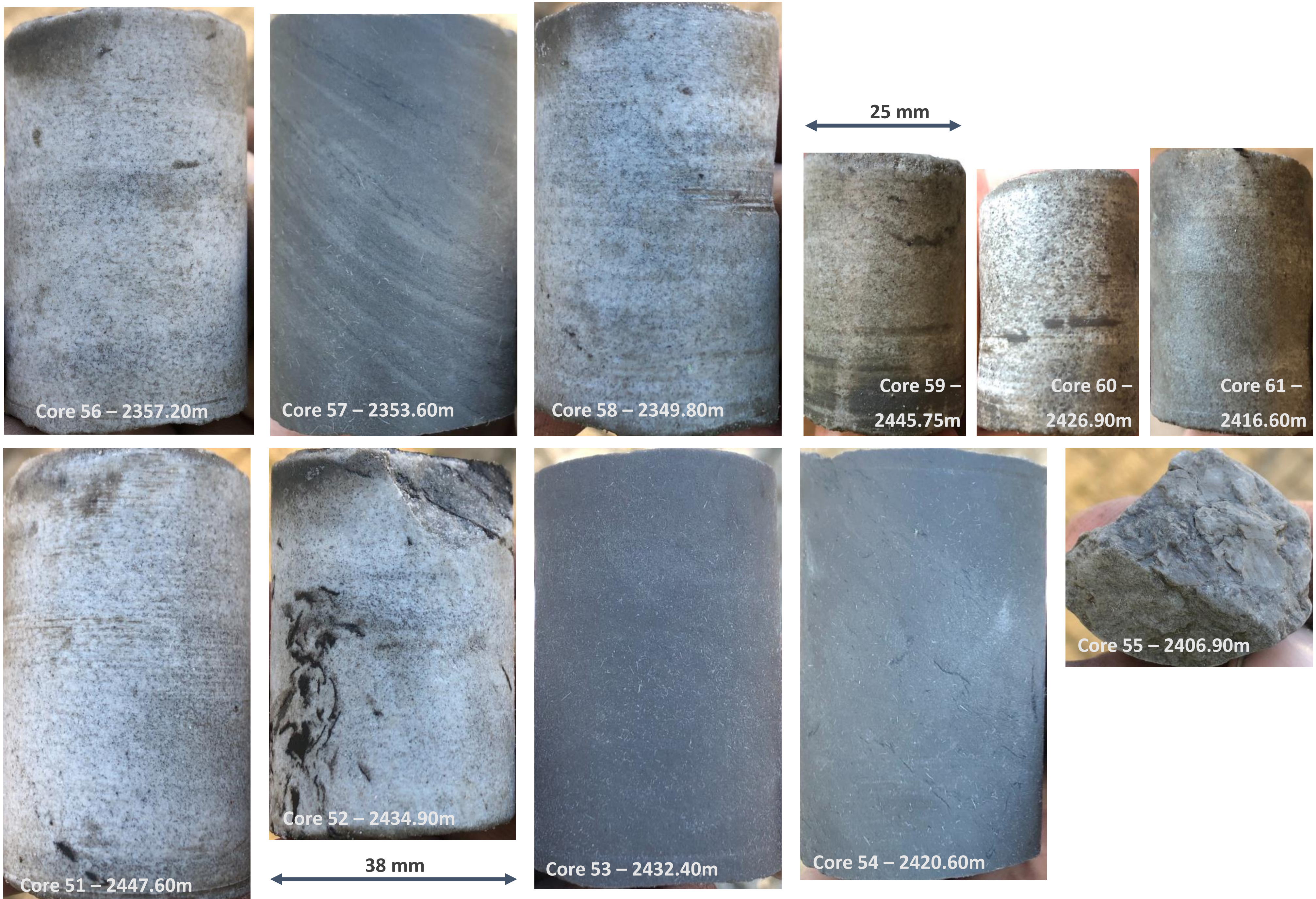
Sidewall Cores
DEL-GT-02-S2
TU Delft – GSE dept.

Depths in MD



Sidewall Cores
DEL-GT-02-S2
TU Delft – GSE dept.

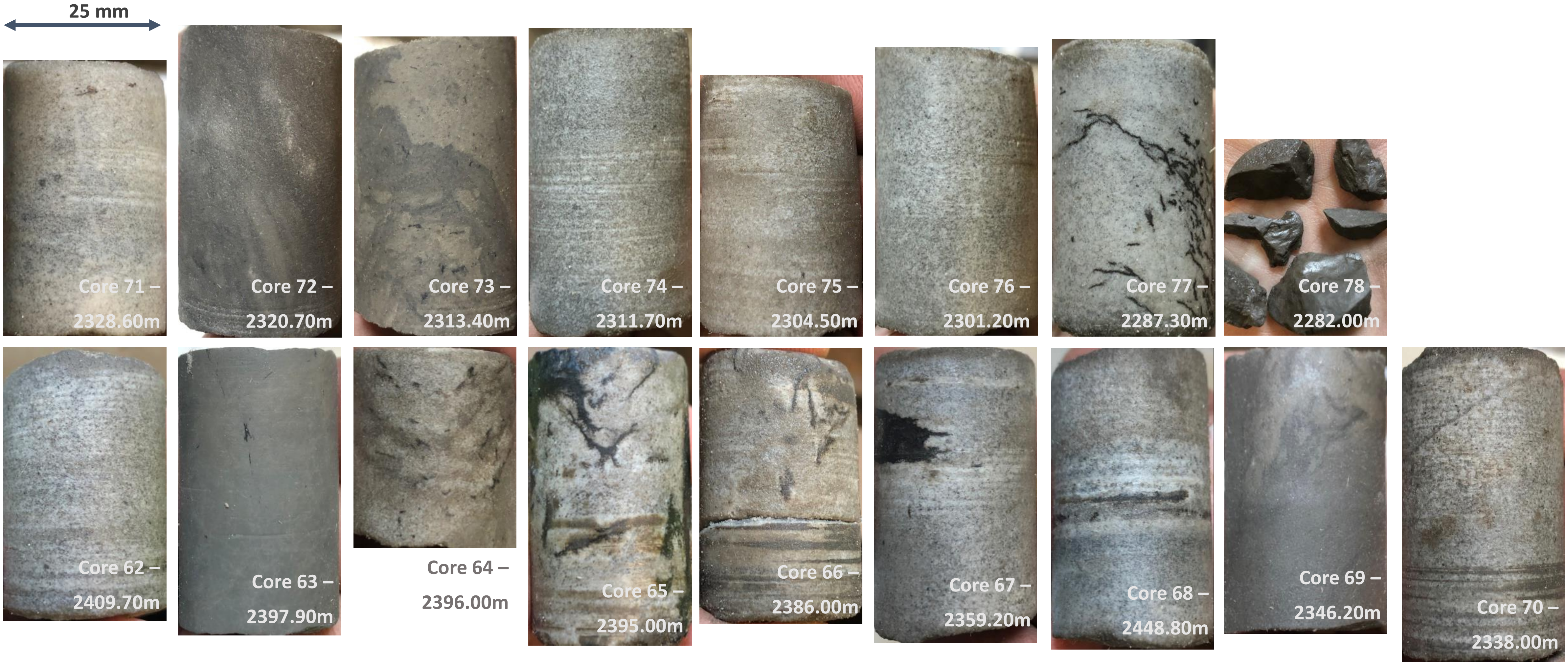
Depths in MD



Sidewall Cores
DEL-GT-02-S2

TU Delft – GSE dept.

Depths in MD



TU Delft - Hemmo Abels - 04 December 2023

Sidewall Coring DEL-GT-02 - Initial core descriptions

Run #1	Core no.	Level MD	width(mm)	length(mm)	Lithology	Grain size	GR (API)	Remarks Lithology	Remarks Core
1	**1**	2541,99	38	*55*	sandstone	fine-medium sandstone	13	well-sorted, homogeneous	competent core, *length approximated from photographs*
1	**2**	2534,79	38	*58*	sandstone	fine-medium sandstone	18	two organic matter laminae	competent core, *length approximated from photographs*
1	**3**	2534,19	38	*57*	sandstone	fine-medium sandstone	19	well-sorted, laminae of organic matter, mm-size pieces of organic matter	competent core, *length approximated from photographs*
1	**4**	2532,19	38	*67*	sandstone	fine-medium sandstone	19	well-sorted, light and dark particles, organic laminae	competent core, *length approximated from photographs*
1	**5**	2529,89	38	*64*	sandstone	very fine sandstone	47	fluidised, lots of floating vf organic matter, flat wide plant fragments (?), mm-sized angular mudclasts	competent core, *length approximated from photographs*
1	**6**	2517,99	38	*67*	sandstone	silt to very fine sandstone	78	grey, laminated by org. laminae, mm-size floating organic matter, looks fluidised but could be bedding plane	competent core, *length approximated from photographs*
1	**7**	2516,09	38	*65*	siltstone	coarse silt	76	fluidised, floating org. matter, mm-scale flat pieces and some bigger, larger darker and lighter zones	competent core, *length approximated from photographs*
1	**8**	2505,65	38	*65*	siltstone	silt	113	d.brown-grey, org.rich, fluidised, floating dark mixed with lighter grey brown-green mud	competent core, *length approximated from photographs*
1	**9**	2501,19	38	*59*	siltstone	silt	127	mm-thin dark laminae --> bed plane? Some slickensides --> soil? Blocky peds?	competent core, *length approximated from photographs*
1	**10**	2497,49	38	*51*	sandstone	fine sandstone	20	light and dark grains, well sorted, mm-sized siderite grains, homogeneous	competent core, *length approximated from photographs*
1	**11**	2495,19	38	*52*	sand-&siltstone	laminated sand and siltstone	68	light to darker brown grey laminated sand and silt, org. matter laminae, some ripples	competent core, two broken pieces at the ends
1	**12**	2490,49	38	*59*	sandstone	fine-medium sandstone	15	well-sorted, light&dark grains, homogeneous	competent core, mudcake, *length approximated from photographs*
1	**13**	2489,79	38	*58*	sandstone	fine-medium sandstone	19	well-sorted, homogeneous, fine siderite particles, dark&light grains	competent core, *length approximated from photographs*
1	**14**	2485,29	38	*50*	sandstone	fine sandstone	25	homogeneous, well-sorted, some lamination, coal-pieces intermixed, shiny black intercalated in 'flames', several pieces cm-size	competent core, *length approximated from photographs*
1	**15**	2479,98	38	*56*	sandstone	fine sandstone and very fine sands	34	light and dark grey and coaly interval, light: fine-sst well-sorted, dark: vf sst, floating organic matter, small pieces of siderite	competent core, *length approximated from photographs*
1	**16**	2477,94	38	*62*	sand-&siltstone	fine sandstone	17	homogeneous, well-sorted, organic laminae, part is darker grey silt laminated with fine organic laminae	competent core, broken at lithology boundary, two pieces
1	**17**	2473,59	38	*60*	sand-&siltstone	coarse silt to very fine sandstone	68	fairly homogeneous, few cm-size burrows, organic colours dispersed, bit fluidised	competent core, no mudcake *length approximated from photographs*
1	**18**	2471,40	38	*57*	sand-&siltstone	coarse silt to very fine sandstone	47	fluidised visible by organic laminae, one part more sandy and lighter, one cm-size burrow	competent core, bit banana-shape, *length approximated from photographs*
1	**19**	2468,28	38	*57*	siltstone	silt	65	grey fluidised silt, fine organic laminae, some mm-sized organic remains, coalified, some spherical brownish homogeneous floating clastic particles --> mud clasts?	competent core, *length approximated from photographs*
1	**20**	2466,93	38	*58*	sand-&siltstone	coarse silt to very fine sandstone	45	m. - d. grey, fluidised with floating particles, mm-org matter, some flat wide org. particles, brownish 1-2mm spherical clastic particles --> mud clasts? All fairly homogeneous	competent core, *length approximated from photographs*
1	**21**	2459,25	38	*61*	siltstone	silt	99	dark grey, some lighter patches, fluidised, few fine grains of siderite or pyrite (copper colour), floating org.matter, very fine grained, some bigger grains	competent core, *length approximated from photographs*
1	**22**	2454,99	38	*54*	sandstone	fine-medium sandstone	18	well-sorted, light&dark grains, homogeneous, couple dark laminae rich in shale (+org.?)	competent core, *length approximated from photographs*
1	**23**	2453,59	38	*55*	sandstone	very fine to fine sandstone	28	laminated at cm-scale + org.laminae	competent core, *length approximated from photographs*
1	**24**	2445,98	38	*51*	sand-&siltstone	coarse silt to very fine sandstone	57	homogeneous, floating vf organic matter, bit fluidised, siderite/pyrite in one layer	competent core, no mudcake, *length approximated from photographs*
1	**25**	2441,69	38	*57*	sandstone	fine-medium sandstone	13	well-sorted, light&dark grains, homogeneous	competent core, *length approximated from photographs*
1	**26**	2423,99	38	*53*	sandstone	medium sandstone	11	moderate sorting, some coarse vc grains, no bedding nor organic matter, homogeneous, friable sst	competent core, mudcake (keeps core together?), *length approximated from photographs*
1	**27**	2415,99	38	*56*	sandstone	fine sandstone	14	light-filled fracture, well-sorted, some org. grains, homogeneous	competent core, *length approximated from photographs*
1	**28**	2413,78	38	*56*	sandstone	very fine sandstone	12	well-sorted, homogeneous, few org.fragments, vf floating, light&dark grains, no laminae nor bedding	competent core, *length approximated from photographs*
1	**29**	2410,99	38	*60*	sand-&siltstone	coarse silt to very fine sandstone	61	vf laminae of org. matter, a bit fluidised, floating pieces of vf org. matter	competent core, no mud cake, *length approximated from photographs*
1	**30**	2401,48	38	*64*	siltstone	coarse silt	87	homogeneous, m-d grey, two thin laminae of org. matter	competent core, no mud cake, *length approximated from photographs*

Run #1	Core no.	Level MD	width(mm)	length(mm)	Lithology	Grain size	GR (API)	Remarks Lithology	Remarks Core
2	**31**	2556,10	38	60	siltstone	silt	42	d. blue grey, homogeneous, org.matter particles floating	competent core
2	**32**	2550,70	38	59	siltstone	silt	70	grey, laminated, org.matter laminae (bedding?), a little fluidised in flames, few mm-scale floating org. matter particles	nice core, no mud cake
2	**33**	2548,00	38	59	sandstone	mL-mU sandstone		well-sorted, dark&light grains, some vf siderite	nice compentent core, not much mud cake
2	**34**	2538,90	38	55	sandstone	mL-mU sandstone	17	well-sorted, qtz grains & dark grains, coaly org. matter in flames, mm-cm size, some vf siderite,	mud cake around core, one piece broken
2	**35**	2527,00	10	10	siltstone	clayey silt	121	slidenside on one side --> paleosoil?	very small fragment 25x10X10 mm
2	**36**	2522,70	38	58	sand-&siltstone	silt-vfL sandstone	56	m-d grey, fluidised with org. matter fragments of flat cm-size to vf size	competent core
2	**37**	2510,70	38	58	siltstone	silt	92	dark grey, homogeneous, fluidised patches of darker and lighter colours, no clear pieces of org. matter	competent core
2	**38**	2499,20	38	60	sandstone	mU-cL sandstone	67	vcU mudclasts, moderate sorting, mm-size org. matter particles, bedding(?), 3x3 cm mud clast of grey silt with floating org. matter -> towards channel lag?	competent core
2	**39**	2475,80	38	54	sandstone	fL sandstone	34	well-sorted, light&dark grains, vf org. matter floating, dirt on core or fluidisation?	competent core, mudcake on core
2	**40**	2451,20	38	54	sandstone	fU-mL sandstone	16	well-sorted, homogeneous, two thin org.matter laminae, dark&light grains	competent core, mudcake on core
2	**41**	2447,60	38	57	sandstone	fU sandstone	26	homogeneous, well-sorted, dark&light grains, very few grains of org. matter, mU size	competent core
2	**42**	2434,90	38	53	sandstone	cL-cU sandstone up to vcU and gra	23	1x1 cm size mudclast, some bedding/lamination, vcU grains are less sorted, cL-cU more sorted, light-grey-black grains	competent core
2	**43**	2432,40	38	57	sandstone	cL sandstone	24	homogeneous, well-sorted, floating flat cm-wide org. fragments, vf grained siderite	competent core
2	**44**	2420,60	38	34	sandstone	mU sandstone	12	well-sorted, light&dark grains, homogeneous, friable sandstone	competent core, nothing visible why it is short / why it broke
2	**45**	2406,90	38	57	sandstone	mU-cL sandstone	14	homogeneous, well-sorted, slight FU or CU visible through core, no lamination, few vf siderite, light&dark grains	competent core
2	**46**	2393,60	38	55	sandstone	mL sandstone	100	well-sorted, homogeneous with few laminae of org.matter bedding or cross-bedding, friable sst	competent core with mud cake, friable sandstone
2	**47**	2403,30	38	43	siltstone	silt	128	dark grey, some lamination visible, no slickensides, quite hard rock	core bit broken
2	**48**	2399,20	38	57	siltstone	clayey silt	15	grey, homogeneous, rel. soft touch, vague fluidised org. lamination, very few pieces of floating org. matter	relatively soft core, competent core
2	**49**	2391,30	38	57	sandstone	mU-cL sandstone	15	well-sorted, homogeneous, light&dark grains, vf grains of siderite,	compentent core, mud cake on core
2	**50**	2381,20	38	59	sandstone	fU-mL sandstone	13	well-sorted, homogeneous, some vf grains of siderite, few mU org. matter grains	compentent core
2	**51**	2379,00	38	62	sandstone	mU-cU sandstone	13	well-sorted, homogeneous, some up to vcU grains of org. matter floating, no lamination	compentent core, mud cake on core
2	**52**	2376,00	38	57	sandstone	fU-mL sandstone	13	laminae of org. remains, very thin to mm-thick, some flat floating org. particles of cm-wide, mostly quartz grains (light&dark grains mostly mudcake?)	one broken piece, rest compentent core
2	**53**	2371,00	38	60	siltstone	silt	67	dark grey, homogeneous, no slickensides, only very vague org. colours	very competent core, no mudcake
2	**54**	2367,70	38	59	siltstone	clayey silt	104	dark grey, homogeneous, thin mm-wide org. matter remains a bit in lamination and floating / fluidised	competent core
2	**55**	2360,30	10	15	siltstone	silt	109	grey brown, indurated, not reacting to HCl, scretches nail, surface looks a bit slicked / cracked	small broken piece of rock, 37x30x17 mm
2	**56**	2357,20	38	58	sandstone	mL sandstone	19	well-sorted, light&dark grains, homogeneous, very little siderite vf grains, only very few mU org. matter grains	competent core
2	**57**	2353,60	38	57	sand-&siltstone	coarse silt to vfL sandstone	85	dark brown grey silt, laminated mm-scale with light and darker silt-laminae and some very thin org. laminae	competent core, no mudcake
2	**58**	2349,80	38	61	sandstone	mU sandstone	15	well-sorted, homogeneous, light&dark grains, only very few cL org grains	competent core, bit banana-shape

Run #1	Core no.	Level MD	width(mm)	length(mm)	Lithology	Grain size	GR (API)	Remarks Lithology	Remarks Core
3	**59**	2445,75	25	39	sandstone	fU-mL sandstone		well-sorted, light&dark grains, one organic lamina, some org. particles	competent core
3	**60**	2426,90	25	38	sandstone	cL sandstone	30	well-sorted, dark&light grains, some vf siderite, homogeneous, some coarse org. grains throughout	competent core
3	**61**	2416,60	25	39	sandstone	mL sandstone	30	well-sorted, homogeneous, some mm-size floating org. matter	competent core
3	**62**	2409,70	25	36	sandstone	mU sandstone	20	well-sorted, homogeneous, some organic particles vcU size	competent core
3	**63**	2397,90	25	42	siltstone	clayey silt	110	homogeneous, dark grey blue, few floating org. remains, flat small	competent core
3	**64**	2396,00	25	27	sand-&siltstone	mU sandstone and silt	45	laminated, org. laminae and particles, homogeneous, floating vf organics, silt and sand in abrupt transition	competent core
3	**65**	2395,00	25	42	sandstone	cL sandstone	20	up to 30mmx5mm size organic particles floatgin without orientation	competent core
3	**66**	2386,00	25	40	sandstone	mU sandstone	15	few organic remains, homogeneous, well-sorted	core broken in two pieces
3	**67**	2359,20	25	40	sandstone	mL-mU sandstone	45	homogeneous, well-sorted, 25x9mm size organic remains, few vf siderite grains	competent core
3	**68**	2348,80	25	43	sandstone	mL sandstone	15	well-sorted, homogeneous, no other structures	competent core
3	**69**	2346,20	25	42	siltstone	silt	80	dark grey, some light colours in fluidised flames	competent core
3	**70**	2338,00	25	43	sandstone	mU sandstone	20	homogeneous, one organic lamina	competent core
3	**71**	2328,60	25	39	sandstone	cL-cU sandstone	15	well-sorted, homogeneous	competent core, mud caked
3	**72**	2320,70	25	44	siltstone	(clayey) silt	90	dark grey, laminated with darker laminae (not organic), a bit fluidised, few cL grains of organic matter	competent core
3	**73**	2313,40	25	42	siltstone	silt	70	grey, fluidised, cL-vcU organic particles, floating	competent core
3	**74**	2311,70	25	45	sandstone	mU-cL sandstone	15	homogeneous, well-sorted, one white-filled plane, vf grains of siderite,	competent core
3	**75**	2304,50	25	38	sandstone	cL sandstone	30	fine grained siderite, homogeneous,	competent core, bit a banana
3	**76**	2301,20	25	40	sandstone	mL sandstone	18	well-sorted, homogeneous	competent core
3	**77**	2291,90	25	42	sandstone	fU sandstone	20	fully mixed with flat-wide org. matter in all orientations	competent core
3	**78**	2287,30	5	10	siltstone	clayey silt	70	dark grey, slickensided --> paleosoil?	broken in 6 pieces of mm to cm size
3	**79**	2282,00	25	15	sandstone	mU sandstone	20	well-sorted, hard to see due to OBM and part still in catcher	core stuck in bit, small piece remains stuck after trial, OBM through core

A.3 Both wells DEL-GT-01 / DEL-GT-02 (-S1-S2)

A.3.1 Cutting sampling, washing and drying

1.6 Job description

Task		Description	
1	**Sample recovery**		
1.1	In intervals of 10 m from 81 m to 845 m MD	Sample preparation: cleaning and drying, separation in coarse and fine fraction. Sample processing: lithological analysis and documentation. 2x storage of dry samples in glass sample tubes. 2x storage of unprocessed wet samples in plastic sample bags. 1x unprocessed wet sample in plastic containers provided by the TU Delft 1x washed, wet sample in plastic containers provided by the TU Delft	OP
1.2	In intervals of 5 m from 850 m to 2510 m MD	Sample preparation: cleaning and drying, separation in coarse and fine fraction. Sample processing: lithological analysis and documentation. 2x storage of dry samples in glass sample tubes. 2x storage of unprocessed wet samples in plastic sample bags. 1x unprocessed wet samples in plastic containers provided by the TU Delft 1x washed, wet samples in plastic containers provided by the TU Delft when not taken by TU assistents.	OP
1.3	In intervals of 6 m from 2513 m to 2931 m MD	Sample preparation: cleaning and drying, separation in coarse and fine fraction. Sample processing: lithological analysis and documentation. 2x storage of dry samples in glass sample tubes. 2x storage of unprocessed wet samples in plastic sample bags.	OP
2	**Interpretation**		
	Interpretation of geological samples	Lithological and stratigraphical analysis of the recovered samples. Interpretation of the results, taking the drilling parameters into consideration.	OP

1.6 Job description

Task		Description	
1	**Sample recovery**		
1.1	In intervals of 10 m from 82 m to 840 m MD	Sample preparation: cleaning and drying, separation in coarse and fine fraction. Sample processing: lithological analysis and documentation. 2x storage of dry samples in glass sample tubes. 2x storage of unprocessed wet samples in plastic sample bags. 1x unprocessed wet samples in plastic containers provided by the TU Delft 1x washed, wet samples in plastic containers provided by the TU Delft	OP
1.2	In variable intervals from 850 m to 2015 m MD	Sample preparation: cleaning and drying, separation in coarse and fine fraction. Sample processing: lithological analysis and documentation. 2x storage of dry samples in glass sample tubes. 2x storage of unprocessed wet samples in plastic sample bags. 1x unprocessed wet samples in plastic containers provided by the TU Delft 1x washed, wet samples in plastic containers provided by the TU Delft	OP
1.3	In variable intervals from 2015 m to 2638 m MD	Sample preparation: cleaning and drying, separation in coarse and fine fraction. Sample processing: lithological analysis and documentation. 2x storage of dry samples in glass sample tubes. 2x storage of unprocessed wet samples in plastic sample bags. 1x unprocessed wet samples in plastic containers provided by the TU Delft 1x washed, wet samples in plastic containers provided by the TU Delft	OP

Cuttings Handling Procedure

Required PPE:

Important:

The safety guidelines of the core storage room (00.31) also apply to the drying room (KG K0.160).

Start a timer for 2 hours EVERYTIME you enter the core storage room (00.31) or the drying room (KG K0.160). After 2 hours you must leave and remain upstairs for at least 30 minutes. You can then return and continue working in 00.31 or KG.K0.160.

The safety helmet is only needed when working in the core storage room (00.31) and not necessary in the drying room (KG K0.160).

As you move along in the process, mark each step complete on the Cuttings Handling Checklist to ensure each step is completed for every sample batch.
Cuttings (CU) - All Spreadsheets (tudelft.nl)

If you do or witness anything happening to the cuttings samples during processing (ex. Spilling a sample on the ground), add the remark to the datasheet with as much info as possible. If this is a safety incident, notify the TU Delft Core Preserver immediately so the proper people can be made aware. Check the PlanningDAPwell.xlsm (sharepoint.com) document on teams to see who is fulfilling the Core Preserver role.

Procedure

Samples Collected & Transported to Faculty

1. GeoService labelled cuttings containers are placed in a transport container on site and the Cutttings Sample Manifest is signed by GeoService and the TU Delft staff member picking up the samples. A document containing the time the sample was taken is included. Take a picture of both documents and upload to the Sample Manifest - All Spreadsheets (tudelft.nl) folder in the Cuttings data on the SharePoint. The file should be named following the following formatting:

   Well name-sample state-CU document type-date-time

   Manifest: DELGT02-Washed CU Sample Manifest-JUL04-1534
   Timesheet: DELGT02-CU Timesheet-JUL04-1534

2. Transport the samples to the faculty following the Sample Transport Procedure
3. Unload the cuttings transport containers on the ground in the corridor in front of 00.31 within the taped off area
4. Enter the date and the cuttings sample batch number in the Cuttings Handling Checklist. Mark the **Samples Collected & Transported to Faculty** step as complete.

The remaining procedure is divided into sections. Complete the steps of each section for each sample type as time permits, and update the section as complete in the Cuttings Handling Checklist as you go. If you are waiting for a step to finish, like the drying step, you can work on other sections of the procedure. Just be sure to update the Cuttings Handling Checklist.

250 ml cuttings samples (washed and wet)

Data Entry

1. Separate the 250 ml samples from the 500 ml containers in the corridor. Temporarily place the transport containers with the 500 ml samples on the shelf of the right work bench in 00.31. In a separate bin, load the 250 ml samples and bring them into 00.31.
2. Select five samples randomly from the group. Find these samples in the Timesheet documents in the Sample Manifest - All Spreadsheets (tudelft.nl) folder on the SharePoint. Verify that these depths are included on the timesheet. If there are discrepancies:
   1) Fill in your name, the date you noticed the discrepancy, and the sample information in the Sample Discrepancy Sheet.xlsx (tudelft.nl) immediately. Place this sample in the **Sample Check** box located on the bottom shelf of the right work bench in 00.31.
   2) Check 5 additional sample labels
3. Now enter the samples one by one in the access database using your laptop
4. Open the access database. Select **Enter Data**.
5. Choose the **[CU] Cuttings tab** to open the data entry sheet for cuttings. Enter the mandatory data fields and if wished / needed optional fields. Once all information is entered, select the **Save Records** button.
6. Check that the data you entered appears in the spreadsheet below. If the data is correctly entered into the spreadsheet, continue entering data for the next cuttings sample. If any data needs to be edited, follow the steps outlined in the Editing Database section of the Access and Elab User Guide.pptx
7. Enter the data for all the cuttings samples.
8. Once this is finished, filter the data in the spreadsheet by clicking the down arrow next to the **Date** column. Deselect all except today's date. Select ok.
9. Check that the filtered data contains the relevant cuttings samples you entered into the database.
10. Now, select **Export records to a spreadsheet.** An excel file containing your data should open. Again, check that this is the correct data you want to enter into ELab. If there is data that has already been imported in ELab, delete these rows.
11. Double check all the data you want to import is still there. Save the excel file as Well name-CU-date-time. (Example: DELGT01-CU-JUL25-1045).
12. Check for mistakes (duplicate data, missing fields, etc.)
13. Upload this file on SharePoint in the Data Entry - All Spreadsheets (tudelft.nl) folder.
14. Login to ELab and import the samples. For a tutorial follow the steps outlined in the Importing Samples section of the Access and Elab User Guide.pptx
    - From the top menu select **Inventory** then **Sample List**.
    - Select **Import Samples** on the right-hand side
    - Type the number of samples to import and click **Browse** and select **Temporary Storage**
    - Choose the **Sample Type** (Cuttings) from the dropdown list.

- Click **Deselect All** from the list of fields to import, this leaves only Mandatory fields selected.
- Finally click **Start Import**
- In the saved excel file, select all rows with data excluding the field names
- Copy the data (CRTL+C) and click **Paste** or CRTL+V paste the data in the table.
- CHECK that all fields are filled correctly. Scroll the bar at the bottom to see all fields.
- Finally click **Import**

15. As you import samples, ensure the data in ELab matches the cuttings samples. Place the samples in the correct series on ELab (ex. DELGT01-CU).

Label Containers

16. Once all samples are imported on ELab, print the labels for each sample. For a tutorial follow the steps outlined in the Printing Labels section of the Access and Elab User Guide.pptx
    - First, connect the printer to your computer via the USB cable. Plug in the printer and turn it on.
    - Select the correct cuttings sample series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select 1 sample by selecting the box to the left of the sample. Choose the **Print Label** option from the dropdown list in the **Sample Actions**
    - Select the **Cuttings Label-small** template. Press Print. In the pop-up window, select the printer you are using. Press OK.
    - If this label looks good and the formatting is correct, you can print the rest of the labels for your remaining samples by selecting the box to the left of the sample s and follow the same steps as above
17. Place the correct label on each sample container.

Drying

18. Transport the 250 ml samples to the drying room (KG K0.160) using the trolley located in 00.31. The location and picture of where to store samples is shown at the bottom of the document.
19. Remove the caps of the samples and place next to each container. Leave them on the shelves to dry.
20. Note the date and time this is started in the Cuttings Handling Checklist in the SharePoint Cuttings (CU) - All Spreadsheets (tudelft.nl)
21. Check the samples after 5 days to be fully dry. They are fully dry when they appear more dusty.

Label Cloth Bags

22. This step should be done in 00.31. Once the samples are dry, print the labels for the dried samples. Follow the same steps outlined in Step 16.
23. Put the labels on the tag part of the cloth bags. Check that the label on the cloth bag matches the GeoService label on the top of the sample container.

Transfer Sample to Cloth Bag

24. Load the dried 250 ml samples in the drying room (KG K0.160) onto the trolley and bring them to the left work bench in 00.31.
25. Carefully transfer the dried sample into the labelled cloth bags using a plastic spoon.

- All materials are located in a box on the shelf of the left work bench in 00.31
- Wipe the spoon with a clean paper towel and DI water between each sample. If the spoon remains dirty, use a new spoon. Put all waste in the waste bin located to the left of the work bench

26. Secure the cloth cuttings bags with the plastic ties, or roll the top of the bag
27. Sort these bags by depth from top to bottom, with the label clearly visible

Storing the 250 ml samples

28. You can begin putting samples away. The dry washed, cuttings samples will be stored in cabinet 4. A map of the cabinets is shown below and available in 00.31 next to the door.
29. Starting from the uppermost available drawer, fill 30 samples in order by depth in the smaller drawer. In the larger drawers at the bottom (K) put 50 samples. Write the first and last depths put into each drawer on a sticky note and place on the drawer.
30. Continue filling the drawers this way until all samples are put away.

Washing Containers

31. Wash the empty 250 ml containers
    - All materials are located in a box on the shelf of the left work bench in 00.31
    - The tap for water is located in the corner of the basement lab next to the drying room
32. In a clean bucket, place tap water and some Dreft until the water is slightly foamy.
33. Take a brush and thoroughly clean the container in the soapy water
34. Remove and dispose of the labels on the lid and container in the waste bin
35. When the container is clean, rinse the cup with DI water
36. Place the container on the shelf top shelf of rack 1 shown below. Place the containers upside down, cap off, to dry.

Changing Storage location in ELab

37. Transfer all the samples to the correct storage location on ELab and edit the drawer name to include the depth range. For a tutorial follow the steps outlined in the Moving Samples section of the [Access and Elab User Guide.pptx.]
    - Select the correct cuttings sample series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select the samples you want to move by selecting the box to the left of the samples. Choose the **Move** option from the dropdown list in the **Sample Actions**
    - Then select **Cabinet 4** in the Navigation. Select the correct drawer using the storage map (double check this)! Then press **Store**
    - Left click the drawer to edit the name to include the depth range of the samples labelled on the sticky notes. For example drawer A13 with samples 230.5 to 571.6m should be named A13 Depth 230.5-571.6 m.

500 ml cuttings samples (unwashed and wet)

Data Entry

1. Find the 500 ml samples on the shelf of the right work bench in 00.31.

2. Select five samples randomly from the group. Find these samples in the Timesheet documents in the Sample Manifest - All Spreadsheets (tudelft.nl) folder on the SharePoint. Verify that these depths are included on the timesheet. If there are discrepancies:
   1) Fill in your name, the date you noticed the discrepancy, and the sample information in the Sample Discrepancy Sheet.xlsx (tudelft.nl) immediately. Place this sample in the **Sample Check** box located on the bottom shelf of the right work bench in 00.31.
   2) Check 5 additional sample labels
3. Now enter the samples one by one in the access database using your laptop
4. Open the access database. Select **Enter Data**.
5. Choose the **[CU] Cuttings tab** to open the data entry sheet for cuttings. Enter the mandatory data fields and if wished / needed optional fields. Once all information is entered, select the **Save Records** button.
6. Check that the data you entered appears in the spreadsheet below. If the data is correctly entered into the spreadsheet, continue entering data for the next cuttings sample. If any data needs to be edited, follow the steps outlined in the Editing Database section of the Access and Elab User Guide.pptx
7. Enter the data for all the cuttings samples.
8. Once this is finished, filter the data in the spreadsheet by clicking the down arrow next to the **Date** column. Deselect all except today's date. Select ok.
9. Check that the filtered data contains the relevant cuttings samples you entered into the database.
10. Now, select **Export records to a spreadsheet.** An excel file containing your data should open. Again, check that this is the correct data you want to enter into ELab. If there is data that has already been imported in ELab, delete these rows.
11. Double check all the data you want to import is still there. Save the excel file as Well name-CU-date-time. (Example: DELGT01-CU-JUL25-1045).
12. Check for mistakes (duplicate data, missing fields, etc.)
13. Upload this file on SharePoint in the Data Entry - All Spreadsheets (tudelft.nl) folder.
14. Login to ELab and import the samples. For a tutorial follow the steps outlined in the Importing Samples section of the Access and Elab User Guide.pptx
    - From the top menu select **Inventory** then **Sample List**.
    - Select **Import Samples** on the right-hand side
    - Type the number of samples to import and click **Browse** and select **Temporary Storage**
    - Choose the **Sample Type** (Cuttings) from the dropdown list.
    - Click **Deselect All** from the list of fields to import, this leaves only Mandatory fields selected.
    - Finally click **Start Import**
    - In the saved excel file, select all rows with data excluding the field names
    - Copy the data (CRTL+C) and click **Paste** or CRTL+V paste the data in the table.
    - CHECK that all fields are filled correctly. Scroll the bar at the bottom to see all fields.
    - Finally click **Import**
15. As you import samples, ensure the data in ELab matches the cuttings samples. Place the samples in the correct series on ELab (ex. DELGT01-CU).

Label Containers

16. Remove the lid of the container and stretch a piece of parafilm across the opening. Ensure there is no openings in the parafilm and put the lid back on
17. Once all samples are imported on ELab, print the labels for each sample. For a tutorial follow the steps outlined in the Printing Labels section of the Access and Elab User Guide.pptx

a. First, connect the printer to your computer via the USB cable. Plug in the printer and turn it on.
b. Select the correct cuttings sample series your imported samples are stored in from the **Inventory** > **Sample List**.
c. In the series, select 1 sample by selecting the box to the left of the sample. Choose the **Print Label** option from the dropdown list in the **Sample Actions**
d. Select the **Cuttings Label-big** template. Press Print. In the pop-up window, select the printer you are using. Press OK.
e. If this label looks good and the formatting is correct, you can print the rest of the labels for your remaining samples by selecting the box to the left of the sample s and follow the same steps as above

18. Place the correct label on each sample container.

Storing the 500 ml samples

17. Once the containers are labelled, put the samples away. The 500 ml wet unwashed cuttings samples will be stored in on the last column (19) of the rack against the wall. A map of the racks is shown below and available in 00.31 by the door.
18. Starting from the uppermost available shelf, place the samples in order by depth on the shelf from left to right. If you complete a row, restart and place the next sample on the left and continue filling to the right. Write the first and last depths put on each shelf on a sticky note and place on the shelf.
19. Continue filling the shelves this way until all samples are put away.

Changing Storage location in ELab

20. Transfer all the samples to the correct storage location on ELab and edit the drawer name to include the depth range. For a tutorial follow the steps outlined in the Moving Samples section of the Access and Elab User Guide.pptx.
    - Select the correct cuttings sample series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select the samples you want to move by selecting the box to the left of the samples. Choose the **Move** option from the dropdown list in the **Sample Actions**
    - Then select **Core Rack 2 DEL-GT-02** in the Navigation. Select the **Wet Cuttings Shelves**. Select the correct shelf, then press **Store.**

Leave all empty transport containers next to the door beside the cabinet in 00.31. Store all supplies in the box they were found in on the shelf of the left work bench. Place the label printer and the cables on the shelf of the left work bench.

Drying Room Location & Drying Racks

Cabinet & Rack Maps

Top Cabinets

	1	2	3	4
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

Cabinet 1

	5	6	7	8
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

Cabinet 2

	9	10	11	12
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

Cabinet 3

Bottom Cabinets

	DEL-GT-01		DEL-GT-02	
	13	14	15	16
A	30 samples	30 samples	30 samples	30 samples
B	30 samples	30 samples	30 samples	30 samples
C	30 samples	30 samples	30 samples	30 samples
D	30 samples	30 samples	30 samples	30 samples
E	30 samples	30 samples	30 samples	30 samples
F	30 samples	30 samples	30 samples	30 samples
G	30 samples	30 samples	30 samples	30 samples
H	30 samples	30 samples	30 samples	30 samples
I	30 samples	30 samples	30 samples	30 samples
J	30 samples	30 samples	30 samples	30 samples
K	50 samples	Micro cores	50 samples	Micro cores

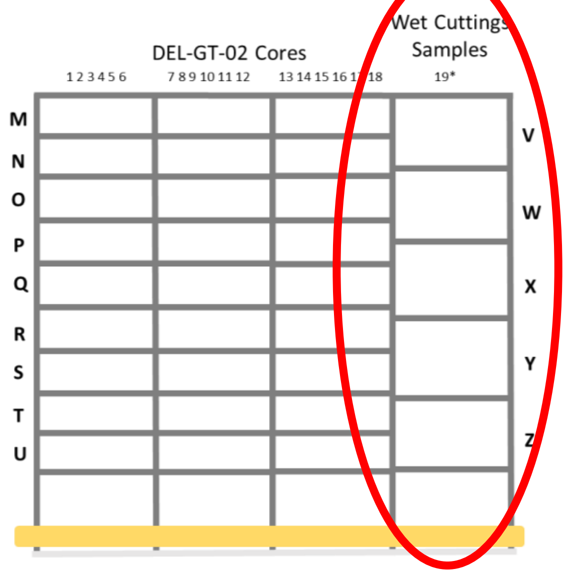
Cabinet 4
DEL-GT Wells Dry Cuttings

		DEL-GT-01	DEL-GT-02	
	17	18	19	20
A	Core 1 CH	27 samples P	16 samples P	
B	Core 2 CH	27 samples P	16 samples P	
C	Core 3 CH	27 samples P	16 samples P	
D	Core 4 CH	27 samples P	16 samples P	
E	Core 5 CH	27 samples P	16 samples P	
F	Core 6 CH	27 samples P	16 samples P	
G	Core 7 CH	27 samples P	16 samples P	
H	Core 8 CH	27 samples P	16 samples P	
I	Core 9 CH	27 samples P	16 samples P	
J	*Core 10 CH	27 samples P	16 samples P	
K	DAPGEO Shoe/Shelby Samples	DAPGEO Shoe/Shelby Samples	DAPGEO Shoe/Shelby Samples	DAPGEO Shoe/Shelby Samples

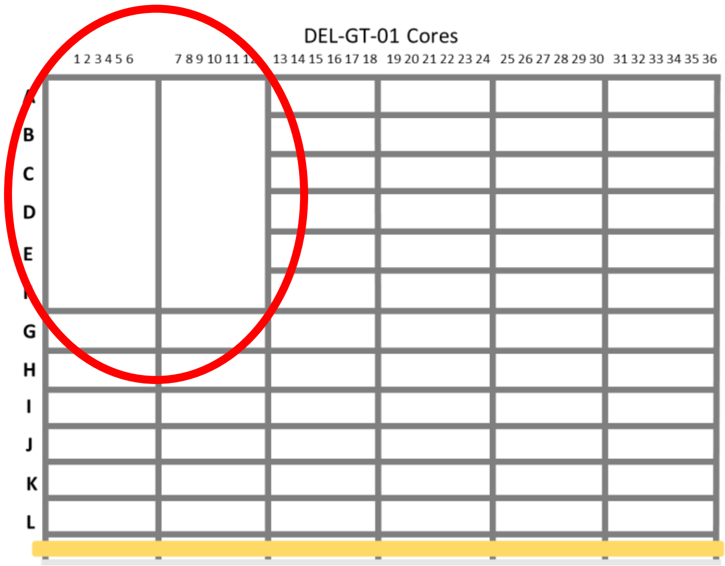
Cabinet 5
DEL-GT Wells Core Chips (CH)
and Core Plugs (P)

	21	22	23	24
A	Dry samples 0-25m	Dry samples 251-275m	Wet samples 0-25m	Wet samples 251-275m
B	26-50m	276-300m	26-50m	276-300m
C	51-75m	301-325m	51-75m	301-325m
D	76-100m	326-350m	76-100m	326-350m
E	101-125m	351-375m	101-125m	351-375m
F	126-150m	376-400m	126-150m	376-400m
G	151-175m	401-425m	151-175m	401-425m
H	176-200m	426-450m	176-200m	426-450m
I	201-225m	451-475m	201-225m	451-475m
J	226-250m	476-500m	226-250m	476-500m
K	Shoe/Shelby Samples	Shoe/Shelby Samples	Shoe/Shelby Samples	Shoe/Shelby Samples

Cabinet 6
DAPGEO-02 Cuttings



Clean Container Drying Location



Cuttings Washing Procedure

Required PPE:

Important:

When moving around on-site, pay special attention to the surroundings. There is equipment and vehicles constantly moving, so be aware at all times. Check regularly above your head, don't stand under hanging load etc.

Be extremely careful on the rig. Especially pay attention to the floor which can have openings and large gaps.

Watch for tripping hazards. Always keep at least one hand free to catch yourself in case you fall.

Procedure Cuttings Washing

We are using the mudlogger unit, we are guests here, so only use the sink area and don't make a mess of the unit, make sure you work clean and tidy.

Samples to be split:

1. Take a 500 ml sample to be washed and check the depth. Place a matching depth sticker on the lid of an empty 250 ml container
2. Using a metal spoon stir the sample and place a quarter of the 500 ml sample into the 0.63 µm sieve to be washed. Close the 500 ml container and set this aside
3. Soak the sample in the bucket of base oil for at least a minute (longer if time permits)
    - Keeping the sieve horizontal, dip the sieve in the bucket and gently shake to disperse the sample over the mesh.
    - When the sample is ready to be washed, drain as much of the base oil form the sieve as possible
4. Take the sample into the mudlogging unit to wash in the sink.
5. Rinse the sample using the spray nozzle, gently shaking the sieve to distribute the sample and thoroughly rinse the cuttings.
    - Be aware that the boiler isn't too large so try to not use too much water.
6. Using the detergent, wash the sample adding a small amount to the sample and manually (very carefully) swirling the cuttings around the sieve to distribute the solution completely through the cutting sample, then rinsing with tap water
    - Repeat this until the sample is clean
7. Place the cleaned sample in the empty labelled 250 ml container
8. Wash the sieve using water and detergent so there is no remaining OBM or sample on the sieve. If this is not working, use the base oil as well to remove all OBM from the sieve.

9. Repeat steps 1-8.
10. When the base oil gets too viscous (you get quite some resistance while putting the sieve in the bucket and it looks a bit like chocolate milk), change out the base oil in the bucket. Leave the bucket outside of the mudlogger unit, because of the fumes.
11. When your shift is over clean up after yourself (inside and outside of the cabin). Inform the next person what samples to start with.

All Other Samples:

1. Take a 250 ml sample to be washed and check the depth. Place a matching depth sticker on the lid of an empty 250 ml container
2. Place all of the 250 ml sample into the 0.63 µm sieve to be washed. Use a metal spoon to help get as much of the sample out as possible. Close the now empty 250 ml container and place in the waste crate
3. Soak the sample in the bucket of base oil for at least a minute (longer if time permits)
    - Keeping the sieve horizontal, dip the sieve in the bucket and gently shake to disperse the sample over the mesh.
    - When the sample is ready to be washed, drain as much of the base oil form the sieve as possible
4. Take the sample into the mudlogging unit to wash in the sink.
5. Rinse the sample using the spray nozzle, gently shaking the sieve to distribute the sample and thoroughly rinse the cuttings.
    - Be aware that the boiler isn't too large so try to not use too much water.
6. Using the detergent, wash the sample adding a small amount to the sample and manually (very carefully) swirling the cuttings around the sieve to distribute the solution completely through the cutting sample, then rinsing with tap water
    - Repeat this until the sample is clean
7. Place the cleaned sample in the empty labelled 250 ml container
8. Wash the sieve using water and detergent so there is no remaining OBM or sample on the sieve. If this is not working, use the base oil as well to remove all OBM from the sieve.
9. Repeat steps 1-8.
10. When the base oil gets too viscous (you get quite some resistance while putting the sieve in the bucket and it looks a bit like chocolate milk), change out the base oil in the bucket. Leave the bucket outside of the mudlogger unit, because of the fumes.
11. When your shift is over clean up after yourself (inside and outside of the cabin). Inform the next person what samples to start with.

A.3.2 Core preservation and labelling

On-Site Core Handling Procedure

This information is the same as the procedures described in the CAPpt2.v2.1

2.7 Core Labelling, Chipping & Capping

(planned) cores	1 to 9
Location	On-site-lab
Main responsible	TUD R&D
Others involved	IOT
Material/equipment	Laptop Labelling equipment Knife Sealing Tape TUD Core Manifest Tablet Whiteboard Storage bags Hammer Screwdriver/chisel/awl Collection bucket Caps Hose clamps Cordless drill
Safety & points of attention	- General PPE - Wear protective glasses - Wear cut resistant (level F) gloves

Notes: As you move along in the process, check off and initial each step on the Core Manifest Checklist to ensure each step is completed for every core. Once processing a core is done, the Core Manifest Checklist needs to be signed by representative or core preserver. Take a picture* and upload this on the SharePoint in coring documents.

*Write information about what the picture is being taken for and the date on the whiteboard if there is not a clearly visible label in the picture.

If you do or witness anything happening to the cores or core chips during processing (hit the table, fall on the ground etc.), add the remark to the datasheet with as much info as possible. If this is a safety incident, notify the TU Delft representative immediately so the proper people can be made aware.

1. Start these processes from the top depth section of the core. Remove all (if any) caps on the cores.
2. Ensure you are wearing the cut resistant gloves.
3. Cut the foam pieces off the core barrel using the knife and seal the hole with tape.
4. Once this is finished, open the access database. Select **Enter Data**.
5. Choose the **[C] Core tab** to open the data entry sheet for cores. Enter the mandatory data fields. Once all information is entered, select the **Save Records** button.
6. Press the **Refresh** button. Check that the data you entered appears in the spreadsheet below. If the data is correctly entered into the spreadsheet, press **New Record**. If not, press

Save Records again, and then **Refresh**. If any data needs to be edited, follow the steps outlined in the Editing Database section of the Access and ELab User Guide.

7. Enter the data for all the cores currently in the tent. Pay attention if cores are added later, this process will need to be repeated.
8. Once this is finished, filter the data in the spreadsheet by clicking the down arrow next to the **Date** column. Deselect all except today's date. Select ok.
9. Check that the filtered data contains the relevant cores you entered into the database.
10. Now, select **Export records to a spreadsheet.** An excel file containing your data should open. Again, check that this is the correct data you want to enter into ELab. If there is data that has already been imported in ELab, delete these rows.
11. Double check all the data you want to import is still there. Save the excel file as Well name-C-date-time. (Example: DELGT01-C-July25-1045).
12. Check for mistakes (duplicate data, missing fields, etc.) If there are no mistakes, check off the data entry step for the cores on the Core Manifest Checklist.
13. Login to ELab and import the samples. As you import samples, ensure the data in ELab matches the cores. Place the samples in the correct series on ELab (ex. DELGT01-C). Once this is finished, proceed with entering the data for the core chips.
14. Open the access database. Select **Enter Data**.
15. Choose the **[CH] Core Chip** tab to open the data entry sheet for cores. Enter the mandatory data fields. Once all information is entered, select the **Save Records** button.
16. Repeat steps 6-10 for the core chip data entry.
17. Once you have the exported excel sheet, double check all the data you want to import is there. Save the excel file as Well name-CH-date-time. (Example: DELGT01-CH-July25-1045).
18. Check for mistakes (duplicate data, missing fields, etc.) If there are no mistakes, check off the data entry step for the core chips on the Core Manifest Checklist.
19. Login to ELab and import the samples. As you import samples, ensure the data in ELab matches the cores that will be chipped. Place the samples in the correct series on ELab (ex. DELGT01-CH).
20. Once data is input for the set cores that will be processed and the core chips, you can begin labelling.
21. Connect your laptop to the printer using the USB cable, ensure the printer is on with the ink and labels loaded.
22. On ELab, print the labels for the cores. Ensure to select the label template for cores and check the bigger label size format is used. Print one test label. If the format is good, select the first 10 core samples and print the labels.
23. Next, print labels for core chips. Ensure to select the label template for core chips and check the smaller label size format is used. Print one test label. If the format is good, select 10 core chip samples (the same as the core labels printed) and print the labels.
24. Place the core chip labels on the plastic storage bags
25. To label the cores, check first that the IOT labelling on the core matches the data on the printed label. If it matches place the label on the top mid-section of the core, away from the taped holes. Label all 10 cores the labels have been printed for. Check off the labelling step for the cores and core chips on the Core Manifest Checklist
26. Take a picture of each core (entire core) with the IOT labels and TU Delft labels visible
27. Next take the core chips.
28. Allow meter-core to drain
29. Before chipping, check that the label on the bag matches the IOT label on the core barrel and the TU label.
30. If needed, clean the cut surface with a cloth
31. Take picture of the cut surface
    a. Ensure the label is included in the picture

32. Always chip the top/base of the meter-core
    a. Last meter-core section of the core also the base of the meter-core section
33. Place the collection bucket under the core end
34. Evaluate the core;
    a. Is it friable – take a piece of about 2cm softly using the chisel, awl or screwdriver
    b. Is it hard and a fracture is visible – place screwdriver, awl or chisel in the fracture and slowly apply force to get a chip, increasing force slowly.
    c. It is a consolidated surface – place chisel about 2cm below liner (see Figure 3). Aim chisel towards liner under 45degree angle (for stiffer materials a higher angle is needed, for softer materials a lower angle is needed). Carefully hit chisel with hammer until a piece with of about 1cm deep * 3-4cm (as little into the core as possible) breaks off
35. Make sure to catch all material in the bucket.
36. Take a picture of the core chip material with the whiteboard as background.
    a. Ensure the label is included in the picture
37. Once chipping is complete, transfer all material from the collection bucket into the same labelled bag as the core chip sample.
38. Verify that the label on the bag matches the label on the core. Add any remarks (first description of the lithology (grain size, colour, any other remark)) to the core chip data entry sheet.
39. Store the core chip in the designated container in the tent for later transport. Check off the core chipping step for the cores on the Core Manifest Checklist
40. Clean all used tools (bucket, white cup, chisel, etc.) with water and dry with paper towels.
41. Continue with labelling and chipping the remaining cores by repeating steps 10-30.
42. Once they are labelled go back and inspect once more that
    a. All cores have a TU label
    b. The TU label matches the IOT label on the core barrel

    Check off the final label check for the cores on the Core Manifest Checklist
43. Once all the cores entered into the excel files have been labelled and chipped, check if there are more cores added to the tent. If so, repeat steps 1-30 until all cores in the tent are entered into the database, labelled and chipped.
44. Once all cores are entered into the database, labelled, chipped and checked, the next step is capping.
45. Place the caps in water heated using the electric kettle. Allow to soak for at least 5 minutes.
46. Ensure you are wearing the cut resistant gloves.
47. Place the caps on both ends of the cores. While capping, verify that each core has a TU Delft label that matches the IOT label on the core barrel.
48. Set the cordless drill to low torque setting to prevent over-torquing hose clamps.
49. Next, secure the caps on the ends of the cores with the hose clamps. Use the cordless drill to screw the hose clamps tight. Check that they are secured on both ends.
50. Once IOT has foamed the cores, Check off the capped and foam step for the cores on the Core Manifest Checklist.
51. Repeat the capping and securing of the hose clamps core by core, so IOT can begin foaming the completed cores.

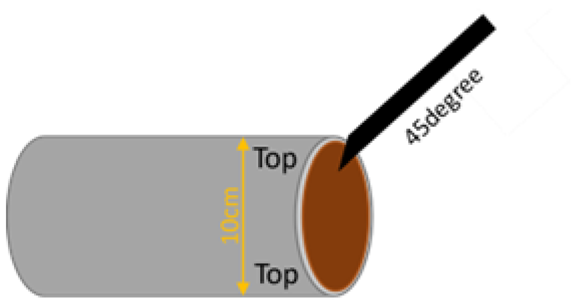


Figure 3 chip schematic

Faculty Core Handling Procedure

Required PPE:

Important:

Cores must be kept horizontal at all times during handling and processing

Must have a minimum of 2 people to handle cores

Start a timer for 2 hours EVERYTIME you enter the core storage room (00.31) After 2 hours you must leave and remain upstairs for at least 15 minutes. You can then return and continue working in 00.31.

You may remove the safety gloves only for writing or typing. Wear the safety gloves otherwise when handling the cores. Impact protection safety gloves should worn for general core handling, and oil-resistant safety gloves must be worn for plugging.

If you do or witness anything happening to the cores or core chips during processing (hit the table, fall on the ground etc.), add the remark to the datasheet with as much info as possible. If this is a safety incident, notify the TU Delft Core Preserver immediately so the proper people can be made aware. Check the PlanningDAPwell.xlsm (sharepoint.com) document on teams to see who is fulfilling the Core Preserver role.

Record the core number and each individual core section on the Storage Procedure Checklist document. If a new core is being processed, use a new Storage Procedure Checklist. The procedure is divided into sections. Complete the steps of each section as time permits. Check off and initial each section of the procedure for each core section on the Storage Procedure Checklist as you go, to ensure each step is completed for every core section (This is a physical document located in 00.31).

Procedure

On-site

1. TU Delft labelled cores are placed in core transport container on site. The Core Manifest is signed by IOT and TU Delft Core Preserver or Representative. Take a picture of this document and upload this in the Sample Manifest - All Spreadsheets (tudelft.nl) folder on the SharePoint. The file should be named according to the following formatting:

    Well name -C#-document type-date-time

    Manifest: DELGT01-C1-IOT Core Manifest-JUL04-1534

2. The core transport container is loaded onto the EV (this is done by Huisman). Make sure the container is place toward the end of the EV wagon, not up to the window.
3. Transport the cores to the faculty following the Sample Transport Procedure
4. Bring the EV in front of 00.31 in the corridor and park with the front of the EV as close to the stairway as possible without blocking the door. Unload the core transport containers using

the pallet stacker following the Pallet Stacker Operating Instructions.pdf. Only those who have followed the pallet stacker training may complete this step.

5. Return the pallet stacker to 00.31
6. Use the pallet lifter aka "pomp wagen" to move the core transport container around the faculty.

The Core Preserver will inform if the cores can be scanned immediately or not. If they cannot be scanned, take the container to 00.31 and continue with steps 14-23. After, put the cores back in the transport container and store the transport container in the designated area in front of 00.31 until further instruction. If the cores can be scanned immediately, proceed with step 7.

CT Scanning

7. Use a pallet lifter aka "pomp wagen" (not the pallet stacker in 00.31) to load the core transport container. Bring only 1 full core transport container at a time to be scanned. Bring both drills.
    - If 2 full core transport containers are ever in the same space, keep them at least 1m apart to not exceed the weight limit of the floor (excluding the basement)
8. Use the freight elevator (B) to bring the core transport container to floor 1, and bring the container to the medical CT scanner in the lab located in room KG 01.280.
9. Open the doors that directly access the CT scanner and place the core transport container beside the scanner, with enough space to walk by the scanner. And have the core tops facing the CT scanner. Close the doors.
10. With a minimum of 2 people handling the cores, assist the lab staff to scan the cores, keeping them horizontal. Follow all instructions from the lab staff during this process.
11. Using the drill, loosen the hose clamps on the caps and remove them from the top and bottom of the cores on the first layer.
12. Take the first (shallowest depth) core section out of the core transport container with one person holding either end. Place it on the medical CT scanner in the Styrofoam tray that is attached to the scanning table.
    - Place the Top of the core section toward the CT scanner and the Bottom facing the window (away from the scanner).
    - Make sure the red and black lines along the length of the core section are facing straight up, to keep the same orientation of the cores when scanned. The red line should always be to the right. Use the laser on the CT scanner to position the core so the top laser line is exactly in the middle of the black and red line (pictured below for reference).
    - Line the yellow cap of the core to meet the edge of the Styrofoam tray (pictured below for reference).
13. After placing the core section in the correct position on the CT scanner, check with the lab staff if all is okay.
14. Step out of the CT scanner room and wait for the lab staff to scan the core section.
    - Name of the CT data core sections: DELGT01-C1-1 (so same name as on the label, then the depths do not have to be included in the naming CT data)
15. Once you have permission from the lab staff, go back into the room and take the core section out of the Styrofoam tray and place in an empty 5 core foam tray from the core transport container.
16. Scan the remaining cores in order by depth from the first layer.
17. Once all cores have been scanned from the first layer, place the hose clamps back on the caps of the cores in the foam tray and tighten them using the drill. The hose clamp is properly secured if you can pull on it and it does not move

- Make sure the yellow cap is up to the line on the core barrel, and press your palm against the edge of the cap to ensure it is properly against the inner liner.
- If the cap is not in the proper position, readjust the cap before placing the hose clamp back on

18. Repeat steps 5-11 for each layer of cores in the core transport container.
19. Once all cores have been scanned, place the cores back in order according to the manifest in the core transport container. Check that all hose clamps have been put back on, and all cores are in the same orientation in the core transport container.
20. Once this is done, return the cores to 00.31 using elevator B.
21. If scanning another load of cores immediately after this, place the core transport container in 00.31 and take the next transport container to be scanned.
22. If there are no more cores to be scanned, continue with the next steps of the Faculty Core Handling Procedure

Verify Manifest

23. Unload the cores in the corridor in front of 00.31, verify the IOT core transport container manifest and confirm the cores in the box match what is recorded on the manifest
24. With at least 2 people, lift the first core starting from the edge of the core transport container and place into the Styrofoam trays onto the floor within the taped off area. If there is not enough space to place all the cores within the taped off area, place some cores in front of Core Rack 2. Keep the cores in order by section number.
    - After each core is removed from the transport container, check the label on the core with the IOT core manifest to confirm the correct core is being removed. Once the last core has been removed and checked, sign the IOT core manifest (name, date, and time). Take a picture of this document and upload to Sample Manifest - All Spreadsheets (tudelft.nl) folder on SharePoint. Store the physical document in the folder located on the shelf of the right work bench in 00.31.
    - If there is a discrepancy in the manifest, immediately contact the Core Preserver by phone. If they are not available, call the Site Representative. If neither answer by phone, return to site to inform them before proceeding
25. Once the core box is emptied and the manifest is signed, use the pallet lifter (not the pallet stacker) to place the core transport box within the taped off area of the corridor until it is transported back to site by the Core Preserver.
26. Never leave core sections sitting in the corridor if your shift ends. Place them all carefully on the floor in 00.31 in front of Core Rack 2 if you cannot process all core sections before the end of your shift or you need to go elsewhere for more than 30 minutes.

Label Check

27. Print the corresponding labels to place on one end of the core section. For a tutorial follow the steps outlined in the **Printing Labels** section of the Access and Elab User Guide.pptx
    - First, connect the printer to your computer via the USB cable. Plug in the printer and turn it on.
    - Select the correct cuttings sample series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select 1 sample by selecting the box to the left of the sample. Choose the **Print Label** option from the dropdown list in the **Sample Actions**
    - Select the **Core Rack Label-big** template. Press Print. In the pop-up window, select the printer you are using. Press OK.

- If this label looks good and the formatting is correct, you can print the rest of the labels for your remaining samples by selecting the box to the left of the sample s and follow the same steps as above

28. Place the correct label on each core section end. Ensure the label added to the end matches the TU label and the IOT label on the core barrel.

Radiation Measurement

29. In order by section number, measure the radioactivity of each core section using the handheld Geiger counter and record the measurement in the excel data sheet for the corresponding cores (this is the exported core excel data sheet from the access database). These flies can be located in the Data Entry - All Spreadsheets (tudelft.nl) folder on SharePoint. Do this one at a time. For a tutorial follow the steps outlined in the Geiger Counter Procedure.

Gamma Ray

30. Line the cores up on the work bench in order by section number in the Styrofoam trays, starting with the lowest section number of the group. Place the core sections is sequence lined up from top to bottom. So, core section 1 base is placed against core section 2 top. Continue ordering the cores this way until the work bench is full and scan the full length of cores according to the steps outlined in the **Gamma-Ray Instructions**.
31. Now, take away the first core sections, leaving the last core section. Use that section to begin ordering the next cores samples, so there is always an overlap of the core sections in the gamma-ray data. Continue this process until all cores have been gamma-rayed
32. Carefully place the cores back onto the ground as you finish scanning them in order by section number in the Styrofoam trays

Plug Cores

All steps for this section need to be completed at once. If you cannot process all the cores, the caps of the cores need to be put back on with the hose clamps and tightened before leaving. This is to minimize the amount of time the open core surface is exposed to the air. So, if at any point you need to stop at this point in the procedure, put all the caps and hose clamps back on the cores.

33. Put on your coveralls, safety glasses, dust mask, and ear protection. Ensure you are wearing oil resistant safety gloves.
34. Identify all the core sections that need to be plugged. These core sections have no stickers on the caps or barrel and no visible foam or hole on the end caps. Place all cores that need to be plugged on the work benches.
35. Use the cordless drill to remove the hose clamps and remove the caps. Place them in the cap box located on the shelf of the right work bench.
36. Now enter the data for each core plug that will be taken one by one in the access database using your laptop. Do this in order by section number.
37. Open the access database. Select **Enter Data**.
    - The core plug number is sequential. If this is the first core plug being taken, this is core plug number 1. The next is 2,3,4…etc. If there are samples present in the database, start with the next number from the last core plug sample entered. Example: The last core plug number entered was 78. Your sample will be 79.

- There will be 2 samples entered per core section because you will take a core plug from the top and the bottom of each core section. So ensure you enter the data for the top and bottom core plug.
- Use the Lithology Description Sheet.pdf as a guideline for describing the lithology

38. Choose the **[P] Core Plugs tab** to open the data entry sheet for core plugs. Enter the mandatory data fields and if wished / needed optional fields. Once all information is entered, select the **Save Records** button.
39. Check that the data you entered appears in the spreadsheet below. If the data is correctly entered into the spreadsheet, continue entering data for the next core plug sample. If any data needs to be edited, follow the steps outlined in the Editing Database section of the Access and Elab User Guide.pptx
40. Enter the data for all the core plug samples.
41. Once this is finished, filter the data in the spreadsheet by clicking the down arrow next to the **Registration Date** column. Deselect all except today's date. Select ok.
42. Check that the filtered data contains the relevant core plug samples you entered into the database.
43. Now, select **Export records to a spreadsheet.** An excel file containing your data should open. Again, check that this is the correct data you want to enter into ELab. If there is data that has already been imported in ELab, delete these rows.
44. Double check all the data you want to import is still there. Save the excel file as Well name-P-date-time. (Example: DELGT01-P-JUL25-1045). The file should be saved in the **Surfdrive** folder > **spreadsheets** > sample type.
45. Check for mistakes (duplicate data, missing fields, etc.)
46. Upload this file on SharePoint in the Data Entry - All Spreadsheets (tudelft.nl) folder.
47. Login to ELab and import the samples. For a tutorial follow the steps outlined in the **Importing Samples** section of the Access and Elab User Guide.pptx
    - From the top menu select **Inventory** then **Sample List**.
    - Select **Import Samples** on the right-hand side
    - Type the number of samples to import and click **Browse** and select **Temporary Storage**
    - Choose the **Sample Type** (Core Plug) from the dropdown list.
    - Click **Deselect All** from the list of fields to import, this leaves only Mandatory fields selected.
    - Finally click **Start Import**
    - In the saved excel file, select all rows with data excluding the field names
    - Copy the data (CRTL+C) and click **Paste** or CRTL+V paste the data in the table.
    - CHECK that all fields are filled correctly. Scroll the bar at the bottom to see all fields.
    - Finally click **Import**
48. As you import samples, ensure the data in ELab matches the core plug samples. Place the samples in the correct series on ELab (ex. DELGT01-P).
49. Once all samples are imported on ELab, print the labels for each sample. For a tutorial follow the steps outlined in the **Printing Labels** section of the Access and Elab User Guide.pptx
    - First, connect the printer to your computer via the USB cable. Plug in the printer and turn it on.
    - Select the correct cuttings sample series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select 1 sample by selecting the box to the left of the sample. Choose the **Print Label** option from the dropdown list in the **Sample Actions**
    - Select the **Core Plug-small** template. Press Print. In the pop-up window, select the printer you are using. Press OK.

- If this label looks good and the formatting is correct, you can print the rest of the labels for your remaining samples by selecting the box to the left of the sample s and follow the same steps as above

50. Label the bags the core plugs will be stored in. Ensure you have a label for the top and bottom core plugs of each core section.
51. Now take the core plugs in order by section number. For a tutorial follow the steps outlined in the **Core Plugging Instructions**. All waste (debris, paper towels, etc.) from plugging needs to be put in the bags labelled **OBM Waste.**
52. Place each core plug in the prelabelled bag. Ensure the label on the bag matches the TU label and the IOT label on the core barrel and the correct location the plug was taken (Top (T) or Bottom (B).
53. Place the core plug bags in the core plug box sorted by depth and store on the shelf beneath the right work bench.
54. Heat water in the electric kettle to fill the cap bin to cover most of the caps. Allow to soak for 5 minutes.
55. Put the caps back on the ends of the core sections. Use the cordless drill set to low torque settings to put the hose clamps on.
56. You can begin putting samples away. The core plug samples will be stored in cabinet 5. A map of the cabinets is shown below and available in 00.31 next to the door.
57. Starting from the uppermost available drawer, fill 27 or 16 samples in order by depth in the smaller drawer. Write the first and last depths put into each drawer on a sticky note and place on the drawer.
58. Continue filling the drawers this way until all samples are put away.
59. Transfer all the samples to the correct storage location on ELab and edit the drawer name to include the depth range. For a tutorial follow the steps outlined in the **Moving Samples** section of the Access and Elab User Guide.pptx.
    - Select the correct core plug sample series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select the samples you want to move by selecting the box to the left of the samples. Choose the **Move** option from the dropdown list in the **Sample Actions**
    - Then select **Cabinet 5** in the Navigation. Select the correct drawer using the storage map (double check this)! Then press **Store**
    - Left click the drawer to edit the name to include the depth range of the samples labelled on the sticky notes. For example drawer A13 with samples 230.5 to 571.6m should be named A13 Depth 230.5-571.6 m.

Wax plugged cores (Only for Plugged Cores)

60. With 2 people, dip each end of the core section into the wax bath. Ensure the entire cap and at least ~3cm of the barrel is covered in wax. Allow the wax to cool slightly before placing the core section back in the Styrofoam tray on the work bench
61. Once the wax on that end of the core has cooled sufficiently, wax the other end if a plug was taken.
62. Allow the wax to set for 20 minutes before proceeding.

Weigh

63. Place the scale on the work bench. In order by section number, place each core in the tray on a zeroed scale to weigh. Record the weight in kg in the excel data sheet for the corresponding cores (this is the exported core excel data sheet from the access database).

These flies can be located in the Data Entry - All Spreadsheets (tudelft.nl) folder on SharePoint.

64. Once all the data is entered in the excel sheet, login to Elab and import this new data (radiation measurement and weight). For a tutorial follow the steps outlined in the **Importing Samples** section of the Access and Elab User Guide.pptx. To edit data into existing series on Elab.
    - Select the correct cuttings sample series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select all the samples you want to edit by selecting the box to the left of the samples.
    - Choose the **Edit Samples** option from the dropdown list in the **Sample Actions**
    - Click **Deselect All** from the list of fields to import, and select **Core in barrel weight [kg], CT Scanned, Gamma-Ray Measured, and Radiation [Bq].**
    - Finally click **Start Edit**
    - In the saved excel file, select all rows with the weight and radiation
    - Copy the data (CRTL+C) and click **Paste** or CRTL+V paste the data in the table. You may have to paste one column of data at a time
    - Ensure the data copied corresponds to the correct cores
    - Change the **CT Scanned and Gamma-Ray Measured** to **Yes.** Press the arrow to the right of box to update all cores.
    - CHECK that all fields are filled correctly. Scroll the bar at the bottom to see all fields.
    - Finally click **Save.**

Store in Racks

Only those who have followed the pallet stacker training may complete these steps

65. In order by section number, secure the cores on pallet stacker roller platform. Ensure all the core rack labels on the caps are facing the cabinets. Line 6 cores across. Place 2 pallet jack straps lengthwise across the cores and 2 pallet jack straps diagonally across the cores. Make sure the strap loops around the forks as well. Tighten the straps.
66. Following the Pallet Stacker Operating Instructions.pdf, slowly position the pallet stacker in front of the shelf they will be placed. DEL-GT-01 cores should be placed Core Rack 1 and DEL-GT-02 cores should be placed Core Rack 2. A map of the racks is shown below and available in 00.31 by the door.
    - Cores in Core Rack 1 should be placed in the bottom right shelf first and filled in to the left. Fill up the first column before filling the next column. Example: core 1, section 1 will go in row L column 36
    - Cores in Core Rack 2 should be placed in the bottom left shelf first and filled in to the right. Fill up the first column before filling the next column. Example: core 7, section 1 will go in row U column 1
67. Be aware of the taped areas where there are objects above you can hit. Raise the pallet stacker to the height of the shelf the cores will be placed
68. Using the staircase, loosen the pallet straps and slide each core in the designated area on the shelf.
69. Once all cores on the roller platform are placed in the shelves lower the pallet stacker and double check the label the end of the core with their positioning on the shelf.
70. Repeat steps 56-60 until all cores have been unloaded and placed in the appropriate place in the storage racks

71. After the cores are placed in rack, transfer all the samples to the correct storage location on Elab. For a tutorial follow the steps outlined in the **Moving Samples** section of the [Access and Elab User Guide.pptx.]
    - Select the correct core series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select the samples you want to move by selecting the box to the left of the samples. Choose the **Move** option from the dropdown list in the **Sample Actions**
    - Then select **Core Rack 1 DEL-GT-01** or **Core Rack 2 DEL-GT-02** in the Navigation. Select the correct shelf, then press **Store.**

Once processing is done, the Storage Procedure Checklist needs to be signed by the representative or core preserver. Take a picture of this document and upload this in the Storage Procedure Checklist - All Spreadsheets (tudelft.nl) folder on the SharePoint. The file should be named according to the following formatting:

Well name -C#- document type-date-time

Checklist: DELGT01-C1-Storage Procedure Checklist-JUL04-1534

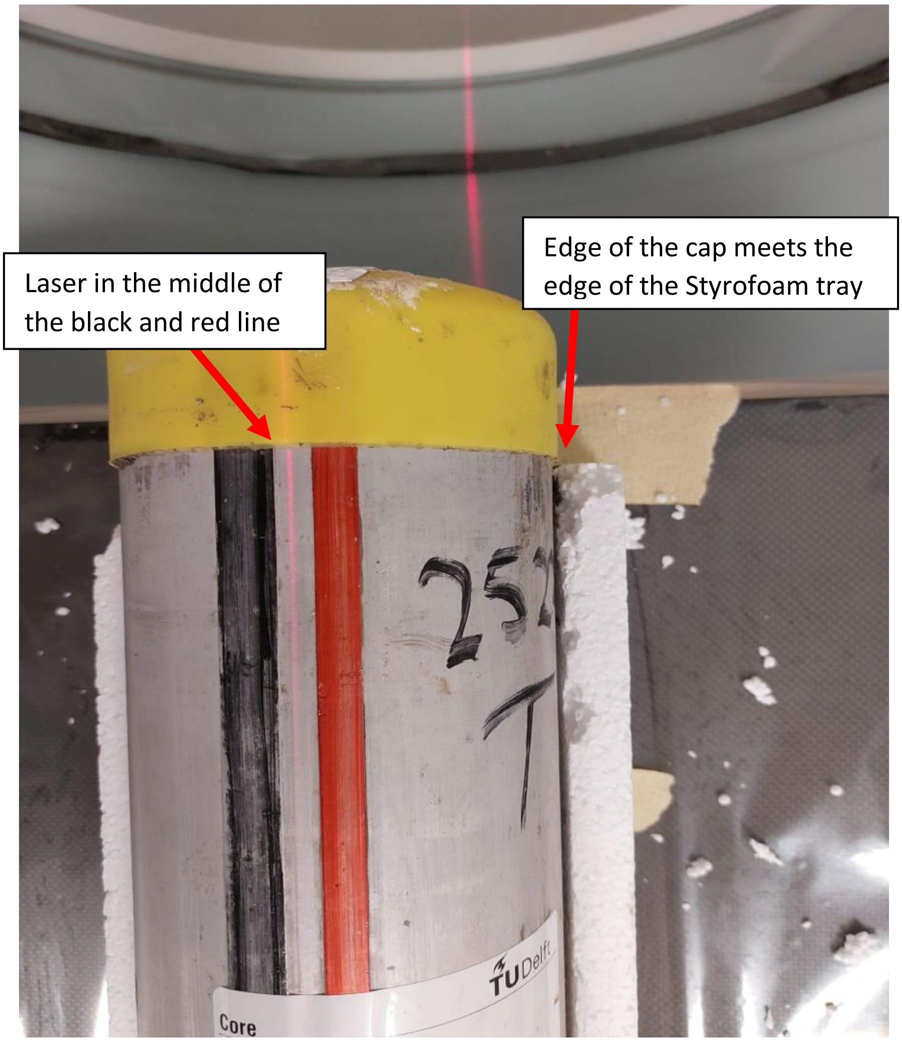
Cores to the Fridge

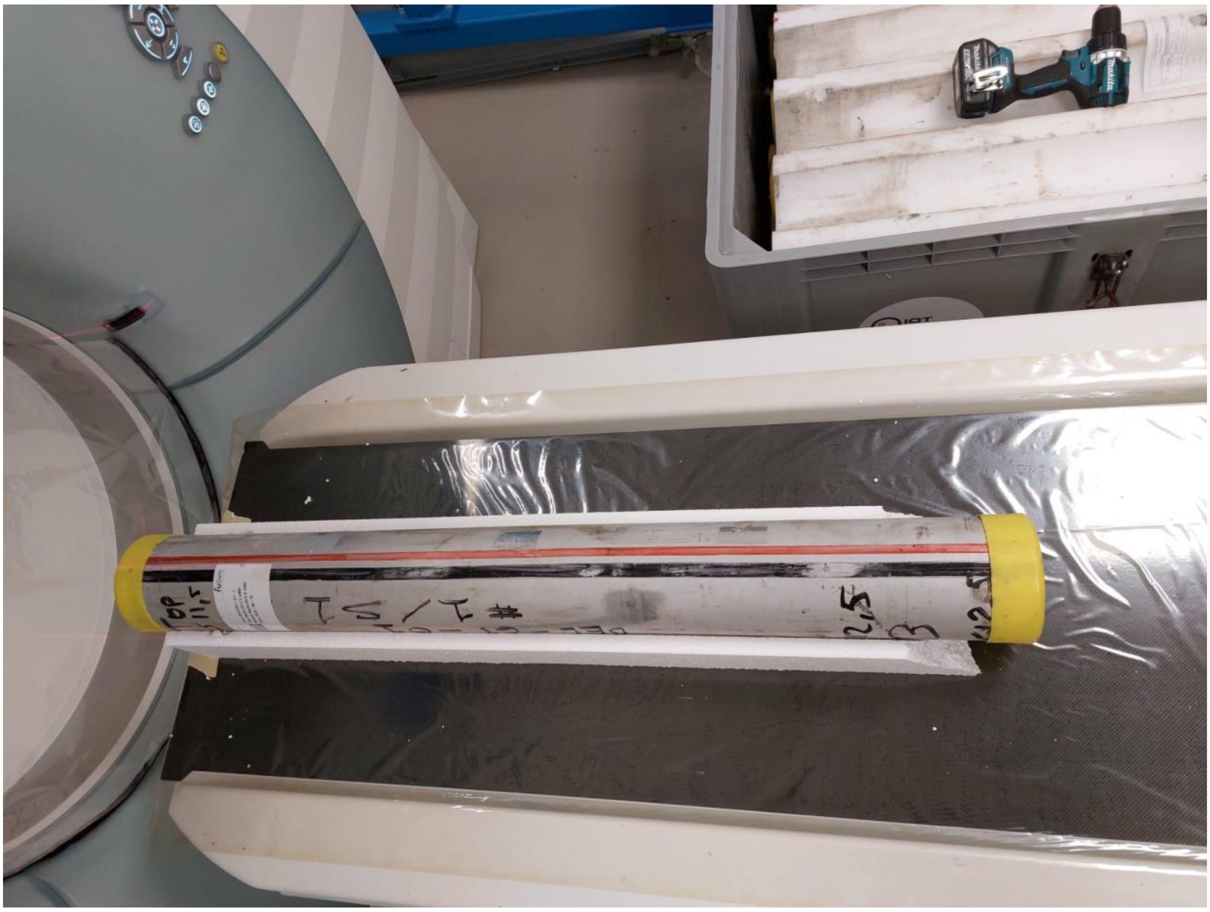
72. Cores that need to be refrigerated will be communicated to you by the Core Preserver. If cores have been decided to be stored in the fridge, check their location in the storage rack on Elab.
73. Use the pallet stacker if needed if the core is placed higher on the rack. Follow the Pallet Stacker Operating Instructions.pdf. Check the label on the core end matches the core that needs to go in the fridge. A map of the racks is shown below and available in 00.31 by the door. Take the cores out one by one.
    - Slowly position the pallet stacker in front of the shelf where the core is located
    - Be aware of the taped areas where there are objects above you can hit. Raise the pallet stacker to the height of the shelf the cores is located in
    - Using the staircase, slide each core onto the roller platform. Place 2 pallet jack straps lengthwise across the cores and 2 pallet jack straps diagonally across the cores. Make sure the strap loops around the forks as well. Tighten the straps.
    - Lower the pallet stacker and remove the pallet straps
74. Carefully remove the core from the pallet stacker roller platform rack place on the work bench in order by depth, shallowest to deepest. Repeat until all cores that need to go in the fridge are on the work bench.
75. Load 4 core sections in their trays at a time onto the trolley.
76. Transport them the to the fridge.
77. Place them in the fridge racks by depth.
78. Continue until all selected cores have been moved to the fridge.
79. After the cores are placed in rack, transfer all the samples to the correct storage location on Elab. For a tutorial follow the steps outlined in the **Moving Samples** section of the Access and Elab User Guide.pptx.
    - Select the correct core series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select the samples you want to move by selecting the box to the left of the samples. Choose the **Move** option from the dropdown list in the **Sample Actions**
    - Then select **DEL-GT Core Fridge** in the Navigation. Select the correct shelf, then press **Store.**

Core Chip Storage

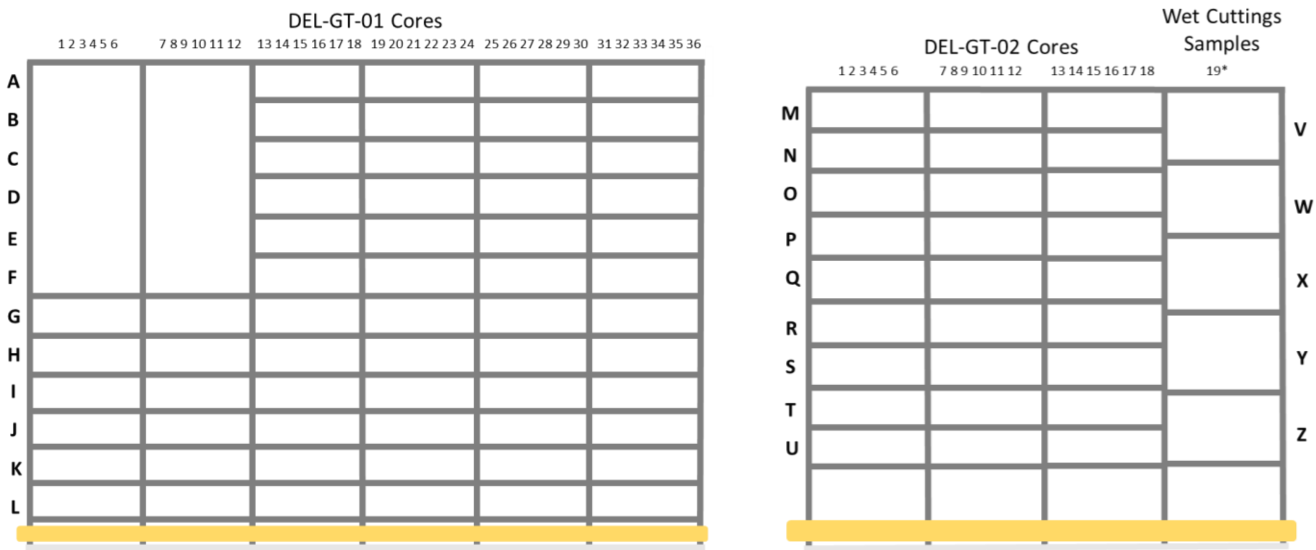
1. Transport the core chips to the faculty following the Sample Transport Procedure and place them in 00.31.
2. You can begin putting samples away. The core chip samples will be stored in cabinet 5. A map of the cabinets is shown below and available in 00.31 next to the door.
3. Select the correct drawer for the samples depending on what core the samples were taken from according to the storage map. For example, all core chips from planned Core 1 go in the drawer located at row A, column 17. Place the samples in order by depth. Ensure the label is visible.
4. Continue filling the drawer this way until all samples are put away.
5. Transfer all the samples to the correct storage location on Elab. For a tutorial follow the steps outlined in the **Moving Samples** section of the Access and Elab User Guide.pptx.
    - Select the correct core chip sample series your imported samples are stored in from the **Inventory** > **Sample List**.
    - In the series, select the samples you want to move by selecting the box to the left of the samples. Choose the **Move** option from the dropdown list in the **Sample Actions**
    - Then select **Cabinet 5** in the Navigation. Select the correct drawer using the storage map (double check this)! Then press **Store**

CT Scan Placement





Cabinet & Rack Maps



Top Cabinets

Cabinet 1

	1	2	3	4
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

Cabinet 2

	5	6	7	8
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

Cabinet 3

	9	10	11	12
A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

Bottom Cabinets

	DEL-GT-01		DEL-GT-02	
	13	14	15	16
A	30 samples	30 samples	30 samples	30 samples
B	30 samples	30 samples	30 samples	30 samples
C	30 samples	30 samples	30 samples	30 samples
D	30 samples	30 samples	30 samples	30 samples
E	30 samples	30 samples	30 samples	30 samples
F	30 samples	30 samples	30 samples	30 samples
G	30 samples	30 samples	30 samples	30 samples
H	30 samples	30 samples	30 samples	30 samples
I	30 samples	30 samples	30 samples	30 samples
J	30 samples	30 samples	30 samples	30 samples
K	50 samples	Micro cores	50 samples	Micro cores

Cabinet 4
DEL-GT Wells Dry Cuttings

		DEL-GT-01	DEL-GT-02	
	17	18	19	20
A	Core 1 CH	27 samples P	16 samples P	
B	Core 2 CH	27 samples P	16 samples P	
C	Core 3 CH	27 samples P	16 samples P	
D	Core 4 CH	27 samples P	16 samples P	
E	Core 5 CH	27 samples P	16 samples P	
F	Core 6 CH	27 samples P	16 samples P	
G	Core 7 CH	27 samples P	16 samples P	
H	Core 8 CH	27 samples P	16 samples P	
I	Core 9 CH	27 samples P	16 samples P	
J	*Core 10 CH	27 samples P	16 samples P	
K	DAPGEO Shoe/Shelby Samples	DAPGEO Shoe/Shelby Samples	DAPGEO Shoe/Shelby Samples	DAPGEO Shoe/Shelby Samples

Cabinet 5
DEL-GT Wells Core Chips (CH) and Core Plugs (P)

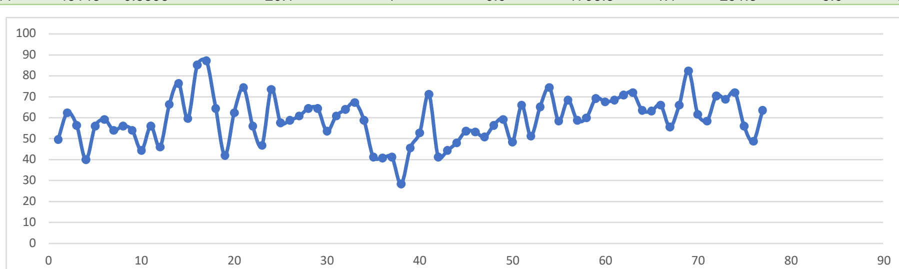
	21	22	23	24
A	Dry samples 0-25m	Dry samples 251-275m	Wet samples 0-25m	Wet samples 251-275m
B	26-50m	276-300m	26-50m	276-300m
C	51-75m	301-325m	51-75m	301-325m
D	76-100m	326-350m	76-100m	326-350m
E	101-125m	351-375m	101-125m	351-375m
F	126-150m	376-400m	126-150m	376-400m
G	151-175m	401-425m	151-175m	401-425m
H	176-200m	426-450m	176-200m	426-450m
I	201-225m	451-475m	201-225m	451-475m
J	226-250m	476-500m	226-250m	476-500m
K	Shoe/Shelby Samples	Shoe/Shelby Samples	Shoe/Shelby Samples	Shoe/Shelby Samples

Cabinet 6
DAPGEO-02 Cuttings

A.3.3 Gamma Ray and CT scanning of cores

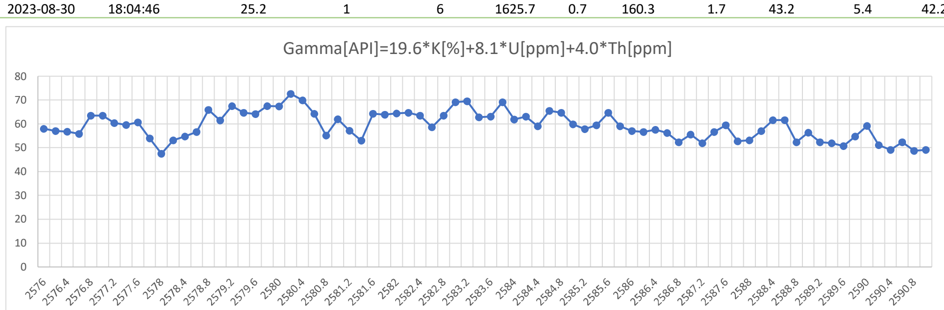
GR_DELGT01-C1

Depth (m)	Aproximated AP	Id	Date	Time	Temperature	Stabilized	Total[ppm]	Total[cpm]	K[%]	K[cpm]	U[ppm]	U[cpm]	Th[ppm]	Th[cpm]	Dose	Dose units
0,00	58.8	11931	45148	0.53366	24.5	1	6.4	1726.7	0.9	222.5	0	26.5	11.1	91.1	51.1	nSv/h
0	35.6	11932	45148	0.53398	24.5	1	5.3	1425.3	0.7	178.6	1.9	45.3	2.3	22.1	31.2	nSv/h
0	36.8	11933	45148	0.53424	24.5	1	5	1338.8	0.9	190.3	0	13.9	5.6	47	32.2	nSv/h
0	49.2	11934	45148	0.53449	24.5	1	6.8	1839.2	1.3	297.7	2.1	51.6	2.9	28.4	43.3	nSv/h
2511,50	49.6	11935	45148	0.53479	24.5	1	6.7	1801.7	1.2	266.3	0.7	39	6.2	53.5	43.3	nSv/h
2511.7	62.4	11936	45148	0.53505	24.5	1	7.7	2090.1	1.3	310.2	2.2	64.1	6	53.5	53.6	nSv/h
2511.9	56.4	11937	45148	0.5353	24.5	1	7.5	2015.4	0.9	253.9	3.9	82.9	2.7	28.4	48.9	nSv/h
2512.1	40	11938	45148	0.53552	24.7	1	7	1889.8	1.1	247.6	2.1	45.3	1.4	15.9	34.9	nSv/h
2512.3	56	11939	45148	0.53578	24.7	1	6.8	1826.7	1.1	278.9	3	70.4	3.6	34.7	48.7	nSv/h
2512.5	59.2	11940	45148	0.53603	24.7	1	6.3	1713.9	0.8	222.5	2.4	70.4	6.8	59.7	50.3	nSv/h
2512.7	54	11941	45148	0.53634	24.8	1	6.4	1739.2	0.6	172.4	0.4	45.3	10.3	84.8	45.4	nSv/h
2512.9	56	11942	45148	0.5366	24.8	1	6	1620.3	1.2	272.7	0.3	39	8.6	72.3	48.1	nSv/h
2513.1	54	11943	45148	0.53692	24.8	1	6.9	1858.5	0.9	247.6	2.3	64.1	5.3	47.2	47.5	nSv/h
2513.3	44.4	11944	45148	0.5372	24.8	1	5.6	1500.9	0.6	166.1	1.2	45.3	6.3	53.5	37.6	nSv/h
2513.5	56	11945	45148	0.53748	24.7	1	6.5	1764.3	0.9	222.5	0.5	45.3	9.4	78.6	47.6	nSv/h
2513.7	46	11946	45148	0.53775	24.7	1	6.2	1670.4	1.3	297.7	1.7	45.3	2.9	28.4	41.5	nSv/h
2513.9	66.4	11947	45148	0.53803	24.9	1	8.5	2310	1.4	354.2	3	76.7	5	47.2	58.9	nSv/h
2514.1	76.4	11948	45148	0.53832	24.9	1	8.3	2247.3	1.2	322.8	4.3	101.7	5.7	53.5	65.2	nSv/h
2514.3	59.6	11949	45148	0.53858	24.9	1	8.6	2316.3	1.5	347.9	3.1	70.4	2.7	28.4	52.3	nSv/h
2514.5	85.2	11950	45148	0.53881	24.9	1	8.4	2260.1	1	304.1	4.6	114.3	8.1	72.3	71.7	nSv/h
2514.7	87.2	11951	45148	0.53907	24.9	1	9.1	2454.4	0.8	279	5.3	126.8	8	72.3	73.4	nSv/h
2514.9	64.4	11952	45148	0.53934	24.9	1	8.4	2278.4	0.7	235.1	4.1	95.5	5.1	47.2	55.4	nSv/h
2515.1	42	11953	45148	0.53962	24.9	1	8.9	2403.8	1.9	391.7	0.4	20.2	2.1	22.2	39.9	nSv/h
2515.3	62.4	11954	45148	0.54009	24.9	1	8.8	2379.2	1	266.5	2.4	70.4	6.8	59.8	53.6	nSv/h
2515.5	74.4	11955	45148	0.5406	24.9	1	8.4	2278.7	1.2	297.8	1.1	64.1	11.6	97.4	62.9	nSv/h
2515.7	56	11956	45148	0.54097	25.1	1	7.5	2015.4	0.9	253.9	3.4	76.7	3.6	34.7	48.6	nSv/h
2515.9	46.8	11957	45148	0.54192	25.2	1	7.4	1990.3	1.4	310.3	1.2	39	3.7	34.7	42.1	nSv/h
2516.1	73.6	11958	45148	0.54275	24.9	1	9	2441.9	1.1	304.1	3.3	89.2	7.4	66	63.2	nSv/h
2516.3	57.6	11959	45148	0.54306	25.1	1	9.1	2448.4	1.5	341.7	1.6	51.6	5.2	47.2	50.9	nSv/h
2516.5	58.8	11960	45148	0.54341	24.9	1	7.8	2096.9	1.4	310.3	0.3	39	8.5	72.3	50.9	nSv/h
2516.7	60.8	11961	45148	0.54374	25.1	1	7.5	2034	1.3	310.3	1.6	57.8	6.8	59.8	53.3	nSv/h
2516.9	64.4	11962	45148	0.54398	25.1	1	7.5	2040.5	0.9	266.4	3.3	82.9	5.9	53.5	55.7	nSv/h
2517.1	64.4	11963	45148	0.54481	25.2	1	7.5	2021.2	1	272.6	2.7	76.6	6.7	59.7	55.8	nSv/h
2517.3	53.6	11964	45148	0.54516	25.2	1	7.2	1952.5	0.8	228.8	2.9	70.4	4.4	41	46.4	nSv/h
2517.5	60.8	11965	45148	0.54541	25.2	1	8.3	2240.8	1.3	310.3	1.6	57.8	6.8	59.8	53.3	nSv/h
2517.7	64	11966	45148	0.54568	25.2	1	8.3	2247.1	1.2	304	1.8	64.1	7.6	66	56.1	nSv/h
2517.9	67.2	11967	45148	0.54591	25.2	1	7.6	2046.3	1.2	322.8	3.9	89.2	4.2	40.9	58.7	nSv/h
2518.1	58.8	11968	45148	0.54619	25.1	1	7.1	1915.1	1.1	291.5	3.4	76.7	3.5	34.7	51.4	nSv/h
2518.3	41.2	11969	45148	0.54648	25.1	1	6.7	1820.4	0.6	184.9	3.7	70.4	0.5	9.6	35.8	nSv/h
2518.5	40.8	11970	45148	0.54676	25.1	1	6.7	1801.7	1.3	285.1	1	32.8	3	28.4	37	nSv/h
2518.7	41.2	11971	45148	0.54703	25.3	1	5.8	1569.6	0.5	141	1.8	51.6	4.7	40.9	34.6	nSv/h
2518.9	28.4	11972	45148	0.54733	25.3	1	5.5	1488.2	1.2	241.2	0.8	20.2	0.7	9.6	25.8	nSv/h
2519.1	45.6	11973	45148	0.54758	25.3	1	5.4	1469.4	0.6	172.3	2.2	57.8	4.6	40.9	38.7	nSv/h
2519.3	52.8	11974	45148	0.54786	25.3	1	5.9	1607.2	0.9	222.4	1.3	51.6	7	59.7	45	nSv/h
2519.5	71.2	11975	45148	0.54818	25.3	1	7.2	1933.5	0.9	272.6	3.8	95.4	6.6	59.7	61.1	nSv/h
2519.7	41.2	11976	45148	0.54847	25.3	1	6.6	1776.8	1	235	0	26.5	6.3	53.5	37.4	nSv/h
2519.9	44.4	11977	45148	0.54878	25.3	1	7.4	2002.4	1.3	297.7	1.9	45.3	2.1	22.1	40	nSv/h
2520.1	48	11978	45148	0.54927	25.5	0	7.1	1920.9	1.2	285.2	2.6	57.8	2	22.1	42.7	nSv/h
2520.5	53.6	11979	45148	0.55003	25.6	1	8.8	2378.7	1.1	253.9	1	45.3	7	59.8	45.6	nSv/h
2520.3	53.2	11980	45148	0.55039	25.6	1	7.7	2090.6	1.4	322.8	1.2	45.3	5.3	47.2	47.8	nSv/h
2520.7	50.8	11981	45148	0.55069	25.6	1	7.5	2021.4	1.1	272.7	2.3	57.8	3.7	34.7	44.7	nSv/h
2520.9	56.4	11982	45148	0.55095	25.6	1	8.5	2297.5	0.8	216.3	2	64.1	6.9	59.8	48.1	nSv/h
2521.1	59.2	11983	45148	0.55131	25.6	1	9.1	2453.9	1.5	354.1	1.4	51.6	6	53.5	53.3	nSv/h
2521.3	48.4	11984	45148	0.55155	25.5	1	7.9	2140.5	1.2	272.7	1.4	45.3	4.5	41	42.6	nSv/h
2521.5	66	11985	45148	0.55186	25.5	1	7.7	2084.3	1.1	285.2	2.7	76.7	6.7	59.8	56.8	nSv/h
2521.7	51.2	11986	45148	0.55214	25.5	1	7.1	1921.1	0.9	241.3	3.2	70.4	2.8	28.4	44.4	nSv/h
2521.9	65.2	11987	45148	0.55242	25.7	1	8.6	2316.3	1.3	329.1	3	76.7	5.1	47.2	57.1	nSv/h
2522.1	74.4	11988	45148	0.55269	25.7	1	8.6	2335.6	1.3	341.7	3.4	89.2	6.6	59.8	64.5	nSv/h
2522.3	58.4	11989	45148	0.55301	25.7	1	8	2171.9	1.2	297.7	2.3	64.1	5.2	47.2	51.2	nSv/h
2522.5	68.4	11990	45148	0.5533	25.7	1	8.1	2184.9	0.6	210	4.4	101.7	5.9	53.5	56.8	nSv/h
2522.7	58.8	11991	45148	0.55354	25.7	1	8.3	2234.8	1.5	347.9	2.6	64.1	3.5	34.7	52	nSv/h
2522.9	60	11992	45148	0.5538	25.7	1	8.2	2222	1.8	391.7	0.5	39	6.8	59.8	54	nSv/h
2523.1	69.2	11993	45148	0.55406	25.7	1	8.2	2222.5	1.9	429.5	1.1	51.6	7.5	66	61.8	nSv/h
2523.3	67.6	11994	45148	0.55439	25.7	1	8.2	2215.7	1.2	310.3	2.7	76.6	6.7	59.8	58.6	nSv/h
2523.5	68.4	11995	45148	0.55464	25.7	1	8.1	2191.1	1.2	304.1	2	70.4	8.3	72.3	59.3	nSv/h
2523.7	70.8	11996	45148	0.55505	25.7	1	8	2159.3	1.3	341.6	4.2	95.5	4.1	41	61.9	nSv/h
2523.9	72	11997	45148	0.55542	25.7	1	7.4	2009.1	1.4	341.6	2.5	76.7	7.4	66	62.4	nSv/h
2524.1	63.6	11998	45148	0.55575	25.7	1	7.9	2140.5	1.3	322.8	3.2	76.6	4.3	41	55.2	nSv/h
2524.3	63.2	11999	45148	0.55605	25.7	1	7.9	2140.8	1.2	304	1.3	57.9	8.4	72.3	55.8	nSv/h
2524.5	66	12000	45148	0.55637	25.9	1	9.1	2447.9	1.1	291.5	2.7	76.7	6.7	59.8	57.2	nSv/h
2524.7	55.6	12001	45148	0.55667	25.9	1	7.6	2046.7	1.4	322.8	1.1	45.3	6.1	53.5	49.2	nSv/h
2524.9	66	12002	45148	0.55693	25.9	1	7.7	2078.1	1.2	304	2.9	76.7	5.9	53.5	56.7	nSv/h
2525.1	82.4	12003	45148	0.55721	26	1	8	2152.8	0.8	266.4	3.4	101.7	10.6	91.1	69.8	nSv/h
2525.3	61.6	12004	45148	0.55748	26	1	7.5	2028.2	1.1	285.3	2.5	70.4	6	53.5	53.5	nSv/h
2525.5	58.4	12005	45148	0.55777	26	1	8.2	2210	1.2	304.1	2.3	64.1	5.2	47.2	51.7	nSv/h
2525.7	70.4	12006	45148	0.55803	26	1	7.2	1958.8	1.2	322.8	3.1	82.9	6.6	59.8	61.3	nSv/h
2525.9	68.8	12007	45148	0.55833	25.9	1	8.5	2310.5	0.8	235.1	1.6	70.4	10.8	91.1	58.6	nSv/h
2526.1	72	12008	45148	0.55866	25.9	1	7.8	2102.7	1.4	341.6	2.5	76.6	7.4	66	62.4	nSv/h
2526.3	56	12009	45148	0.55897	26.1	1	7.8	2115.7	1.2	297.8	2	57.9	5.2	47.2	49.5	nSv/h
2526.5	48.8	12010	45148	0.55925	26.1	1	8.1	2184.4	1.5	341.6	1.7	45.3	2.8	28.4	44.8	nSv/h
2526.7	63.6	12011	45148	0.5595	26.1	1	6.6	1795.8	1.1	291.5	3.6	82.9	4.3	41	54.6	nSv/h



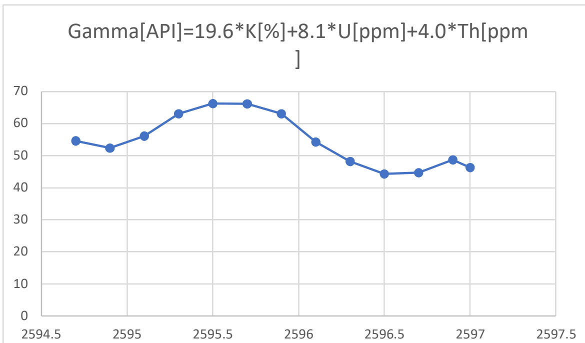
GR_DELGT01-C2

depth	Gamma[API]=1	Id	Date	Time	Temperature	Stabilized	Total[ppm]	Total[cpm]	K[%]	K[cpm]	U[ppm]	U[cpm]	Th[ppm]	Th[cpm]	Dose	Dose units
2576	57.87	60	2023-08-30	09:29:55	19.8	1	7.4	1991.8	0.9	211.7	2.3	54.5	5.4	41.7	39	nGy/h
2576.2	57.04	61	2023-08-30	09:35:11	20.7	1	7.1	1921.2	0.9	208.5	2	49.1	5.8	44.9	38	nGy/h
2576.4	56.67	62	2023-08-30	09:40:39	21.4	1	7.4	2011.1	0.8	199.6	1.9	50.1	6.4	49.7	38.8	nGy/h
2576.6	55.83	63	2023-08-30	09:46:05	21.8	1	7.4	1999.7	0.9	215.6	1.9	47.8	5.7	44.2	38.1	nGy/h
2576.8	63.48	64	2023-08-30	09:51:17	22.3	1	7.5	2038.5	0.9	216.5	2.4	59.1	6.6	51.6	42.8	nGy/h
2577	63.48	65	2023-08-30	09:57:09	22.6	1	7.6	2056.9	0.9	211.7	2.4	58.9	6.6	51.3	42.4	nGy/h
2577.2	60.33	66	2023-08-30	10:02:31	22.8	1	7.7	2079.7	0.8	204.6	2.5	59.1	6.1	47.2	41	nGy/h
2577.4	59.48	67	2023-08-30	10:07:47	23.2	1	7.4	2007.8	0.9	203.7	2.4	56.4	5.6	43.8	39.4	nGy/h
2577.6	60.67	68	2023-08-30	10:14:22	23.5	1	7.3	1984	0.9	207.7	2.3	55.8	6.1	47.6	40.4	nGy/h
2577.8	53.93	69	2023-08-30	10:19:47		1	6.7	1801.7	0.7	176.6	2.1	51.2	5.8	44.9	36.4	nGy/h
2578	47.49	70	2023-08-30	10:25:05	24	1	6.7	1819	0.7	172	1.7	43.2	5	38.6	32.5	nGy/h
2578.2	53.07	71	2023-08-30	10:30:12	24.2	1	6.6	1787.5	0.8	178	1.9	46.6	5.5	42.4	34.7	nGy/h
2578.4	54.69	72	2023-08-30	10:35:38	24.4	1	6.9	1876.1	0.8	188.7	2.1	51	5.5	42.6	36.6	nGy/h
2578.6	56.63	73	2023-08-30	10:41:00	24.6	1	7.6	2059.7	0.9	212.9	1.9	47.6	5.9	45.5	38.1	nGy/h
2578.8	65.9	74	2023-08-30	10:47:31	24.8	1	7.9	2142.2	0.9	227.3	2.6	63.3	6.8	53	45	nGy/h
2579	61.45	75	2023-08-30	10:52:47	24.8	1	7.6	2053.2	0.9	216.5	2.1	53.9	6.7	52.2	41.6	nGy/h
2579.2	67.42	76	2023-08-30	11:32:36	25.4	1	8.3	2250.3	1	241.6	2.2	58.1	7.5	57.9	45.8	nGy/h
2579.4	64.69	77	2023-08-30	11:36:46	24.8	1	8.1	2198.8	0.9	222.8	2.5	60.4	6.7	52.4	43.8	nGy/h
2579.6	64.12	78	2023-08-30	11:41:05	24.7	1	8.1	2195.9	1.1	248.1	1.6	46.8	7.4	57.1	43	nGy/h
2579.8	67.39	79	2023-08-30	11:46:20	24.6	1	8.3	2237	1.1	248.4	2.3	58.1	6.8	52.7	45	nGy/h
2580	67.36	80	2023-08-30	11:54:13	24.6	1	8.2	2219.5	1.1	253.9	2	53.4	7.4	57.1	45.2	nGy/h
2580.2	72.56	81	2023-08-30	11:58:40	24.7	1	8.6	2328	1.2	267.7	2.4	60.7	7.4	57.4	48.2	nGy/h
2580.4	69.82	82	2023-08-30	12:03:02	24.8	1	8.6	2336.4	1.1	256	2.6	63.6	6.8	53.2	47.2	nGy/h
2580.6	64.2	83	2023-08-30	12:07:24	24.8	1	8.2	2218.4	1	229.6	2	52.8	7.1	54.8	42.8	nGy/h
2580.8	55.07	84	2023-08-30	12:11:52	25	1	7.6	2059	0.8	197.2	1.9	49.2	6	47	37.8	nGy/h
2581	61.89	85	2023-08-30	12:16:06	25	1	7.6	2047	0.9	208.7	2.5	59.4	6	47	41.3	nGy/h
2581.2	57.07	86	2023-08-30	12:20:22	25.2	1	7.4	1994.5	0.8	194.1	1.9	50	6.5	50.1	38.5	nGy/h
2581.4	53.02	87	2023-08-30	12:24:51	25.4	1	7.3	1973.3	0.9	204.3	1.8	45.3	5.2	40.2	35.6	nGy/h
2581.6	64.25	88	2023-08-30	12:36:17	24.8	1	8	2173.4	0.9	217.3	2.1	56.2	7.4	57.7	43.5	nGy/h
2581.8	63.86	89	2023-08-30	12:41:22	25	1	8	2166.9	0.9	218.1	2.2	56.2	7.1	55.3	43	nGy/h
2582	64.31	90	2023-08-30	12:45:52	25	1	7.9	2145	0.9	215.8	2.7	63	6.2	48.5	43.1	nGy/h
2582.2	64.67	91	2023-08-30	12:50:07	25.2	1	8	2152.6	0.9	210.5	2.3	57.8	7.1	55.1	42.9	nGy/h
2582.4	63.47	92	2023-08-30	12:54:24	25.5	1	8	2159.3	0.9	207.1	2.3	57.3	6.8	52.7	41.9	nGy/h
2582.6	58.55	93	2023-08-30	12:58:54	25.4	1	7.9	2146.9	1	224.4	1.5	43.7	6.7	51.9	39.3	nGy/h
2582.8	63.45	94	2023-08-30	13:03:21	25.6	1	7.9	2136.1	0.9	221.2	2.1	54.7	7.2	56.1	43	nGy/h
2583	69.11	95	2023-08-30	13:07:40	25.6	1	7.9	2148	0.9	222.6	2.7	65.4	7.4	57.4	46.3	nGy/h
2583.2	69.52	96	2023-08-30	13:11:59	25.8	1	8.2	2206.6	0.9	218.6	2.8	67.5	7.3	56.9	46.4	nGy/h
2583.4	62.69	97	2023-08-30	13:48:22	26.4	1	7.9	2130.6	0.9	216.8	2.5	59.1	6.2	48	42	nGy/h
2583.6	63.07	98	2023-08-30	13:52:37	25.2	1	8.1	2191	0.9	220.5	2.3	58.1	6.7	51.7	42.8	nGy/h
2583.8	69.1	99	2023-08-30	13:57:06	24.8	1	8.3	2234.6	1	236.1	3	68	6.3	49.1	46	nGy/h
2584	61.87	100	2023-08-30	14:01:24	24.6	1	7.9	2135.3	0.9	222.3	2.3	56.5	6.4	49.8	42.1	nGy/h
2584.2	63.08	101	2023-08-30	14:05:36	24.6	1	7.7	2076.6	0.9	210.3	2.4	58.8	6.5	50.6	42.1	nGy/h
2584.4	59	102	2023-08-30	14:11:19	24.7	1	7.3	1972.3	1	220.2	2	50	5.8	45.4	39.2	nGy/h
2584.6	65.44	103	2023-08-30	14:21:33	24.2	1	8.4	2257	1	231.7	2.4	59.6	6.6	51.4	44	nGy/h
2584.8	64.68	104	2023-08-30	14:25:51	24.3	1	8.2	2212.1	0.9	223.3	2.4	59.9	6.9	53.2	43.9	nGy/h
2585	59.85	105	2023-08-30	14:30:26	24.3	1	7.8	2097.9	0.9	213.7	2.1	52.8	6.3	48.8	40.3	nGy/h
2585.2	57.83	106	2023-08-30	14:34:45	24.4	1	7.6	2049.9	0.9	208.7	1.9	48.9	6.2	48	38.7	nGy/h
2585.4	59.46	107	2023-08-30	14:40:14	24.6	1	7.6	2064	0.9	211	2.2	53.4	6	47	39.8	nGy/h
2585.6	64.68	108	2023-08-30	14:49:34	25	1	7.9	2134.8	0.9	210.8	2.4	58.9	6.9	53.2	42.7	nGy/h
2585.8	59.02	109	2023-08-30	14:54:06	25.2	1	7.7	2077.6	0.9	215	1.8	49.7	6.7	51.9	40.3	nGy/h
2586	57.02	110	2023-08-30	14:59:53	25.2	1	7.1	1929.1	0.9	200.6	1.8	47.6	6.2	48.3	37.9	nGy/h
2586.2	56.65	111	2023-08-30	15:04:20	25.2	1	7.1	1920	0.9	204.5	2.1	51.3	5.5	43	37.9	nGy/h
2586.4	57.52	112	2023-08-30	15:08:39	25.2	1	7.2	1950.1	0.8	197.2	2.4	55.7	5.6	43.3	38.7	nGy/h
2586.6	56.18	113	2023-08-30	15:14:11	25.2	1	7.4	1988.2	0.9	202.7	1.4	43.2	6.8	52.7	37.8	nGy/h
2586.8	52.29	114	2023-08-30	15:18:25	25.2	1	6.9	1869	0.8	186.2	2.1	48.4	4.9	38.1	34.7	nGy/h
2587	55.51	115	2023-08-30	15:23:07	25.2	1	6.7	1819.1	0.8	183.9	2.3	52.8	5.3	41.2	36.5	nGy/h
2587.2	51.84	116	2023-08-30	15:27:16	25.2	1	6.7	1798	0.8	184.7	1.6	42.4	5.8	44.9	34.6	nGy/h
2587.4	56.65	117	2023-08-30	16:44:54	24.8	1	7.5	2033.3	0.9	199.3	2.1	51	5.5	42.5	37.4	nGy/h
2587.6	59.45	118	2023-08-30	16:49:26	24.7	1	7.4	1997.2	0.9	201.6	2.1	52	6.2	48.5	39.2	nGy/h
2587.8	52.67	119	2023-08-30	16:53:55	24.8	1	7	1893	0.8	177.9	1.9	46.8	5.4	42.3	34.7	nGy/h
2588	53.05	120	2023-08-30	16:58:22	25.1	1	6.7	1804.7	0.8	181.8	1.7	45	5.9	45.4	35.2	nGy/h
2588.2	56.99	121	2023-08-30	17:03:23	25	1	7.2	1954.7	0.9	196.2	1.5	43.4	6.8	52.7	37.4	nGy/h
2588.4	61.52	122	2023-08-30	17:07:39	25.2	1	7.1	1932	0.8	190.9	2.4	58.3	6.6	51.4	40.8	nGy/h
2588.6	61.56	123	2023-08-30	17:11:53	25.2	1	7.4	1989.2	0.8	203.2	2.8	63.3	5.8	45.1	41.6	nGy/h
2588.8	52.29	124	2023-08-30	17:16:19	25.2	1	6.9	1862.4	0.8	181.8	2.1	49.2	4.9	38.1	34.6	nGy/h
2589	56.3	125	2023-08-30	17:21:10	25.2	1	6.9	1862.2	0.8	183.1	2.2	52.1	5.7	44.1	36.9	nGy/h
2589.2	52.31	126	2023-08-30	17:25:23	25.4	1	6.7	1808.5	0.7	171.1	1.9	48.9	5.8	45.1	35.4	nGy/h
2589.4	51.88	127	2023-08-30	17:29:39	25.4	1	6.6	1773.7	0.8	180.5	2	47.6	5	38.9	34.3	nGy/h
2589.6	50.71	128	2023-08-30	17:34:04	25.4	1	6.7	1807.6	0.7	174.5	1.9	47.4	5.4	41.7	34.5	nGy/h
2589.8	54.66	129	2023-08-30	17:38:39	25.4	1	6.9	1868.8	0.8	195.4	1.8	47.1	6.1	47.5	37.2	nGy/h
2590	59.11	130	2023-08-30	17:43:04	25.4	1	7.3	1970.7	0.8	190.2	2.3	56.8	6.2	48.3	39.6	nGy/h
2590.2	51.05	131	2023-08-30	17:47:17	25.4	1	7	1881.8	0.8	176.6	1.7	43.7	5.4	42	33.7	nGy/h
2590.4	49.09	132	2023-08-30	17:51:41	25.4	1	6.8	1835.1	0.7	175.8	1.7	44.5	5.4	42	33.9	nGy/h
2590.6	52.34	133	2023-08-30	17:56:02	25.4	1	6.8	1840.9	0.7	174.2	2.2	51	5.2	40.2	35.1	nGy/h
2590.8	48.7	134	2023-08-30	18:00:29	25.2	1	6.2	1680.8	0.7	170.3	1.8	45.3	5.1	39.9	33.2	nGy/h
2591.1	49.09	135	2023-08-30	18:04:46	25.2	1	6	1625.7	0.7	160.3	1.7	43.2	5.4	42.2	32.5	nGy/h



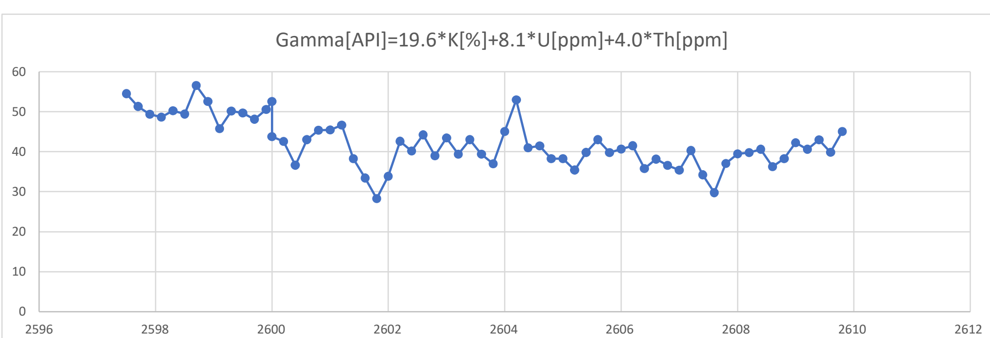
GR_DELGT01-C3

depth	Gamma[AP	Id	Date	Time	Temperature	Stabilized	Total[ppm]	Total[cpm]	K[%]	K[cpm]	U[ppm]	U[cpm]	Th[ppm]	Th[cpm]	Dose	Dose units
2594.7	54.68	136	2023-08-30	19:00:38	26	0	7	1890.9	0.8	194.6	2	49.2	5.7	44.1	36.9	nGy/h
2594.9	52.35	137	2023-08-30	19:05:21	24.8	1	6.6	1795.3	0.7	173.2	2.3	52.8	5	38.9	35.2	nGy/h
2595.1	56.18	138	2023-08-30	19:10:09	24.6	1	7.2	1941.1	0.9	208.7	1.4	42.4	6.8	52.4	38	nGy/h
2595.3	63.08	139	2023-08-30	19:14:25	24.8	1	8	2159.9	0.9	221.8	2.4	58.6	6.5	50.4	42.8	nGy/h
2595.5	66.27	140	2023-08-30	19:18:47	25	1	8	2165.9	0.9	220.5	2.3	59.1	7.5	57.9	44.6	nGy/h
2595.7	66.24	141	2023-08-30	19:23:09	25.2	1	8.1	2182.7	1	229.1	2.4	59.1	6.8	52.4	43.9	nGy/h
2595.9	63.09	142	2023-08-30	19:27:26	25.5	1	8.3	2244.6	0.9	215.8	2.5	60.2	6.3	49.3	42.5	nGy/h
2596.1	54.29	143	2023-08-30	19:31:38	25.4	1	7.3	1974.1	0.8	195.1	2.1	50.8	5.4	41.7	36.8	nGy/h
2596.3	48.27	144	2023-08-30	19:35:48	25.5	1	6.4	1728.7	0.7	166.4	1.5	41.1	5.6	43.6	32.6	nGy/h
2596.5	44.35	145	2023-08-31	09:59:31	19.9	1	5.8	1577	0.6	145.7	1.9	44	4.3	33.4	29.6	nGy/h
2596.7	44.7	146	2023-08-31	10:05:00	21.1	1	5.8	1560.7	0.7	165.3	1.8	41.1	4.1	31.5	29.8	nGy/h
2596.9	48.7	147	2023-08-31	10:09:43	21.9	1	6	1628.9	0.7	165.8	1.8	44.2	5.1	39.4	32.5	nGy/h
2597	46.3	148	2023-08-31	10:14:19	22.8	1	6.2	1687.6	0.7	163.8	1.8	42.4	4.5	34.7	30.8	nGy/h



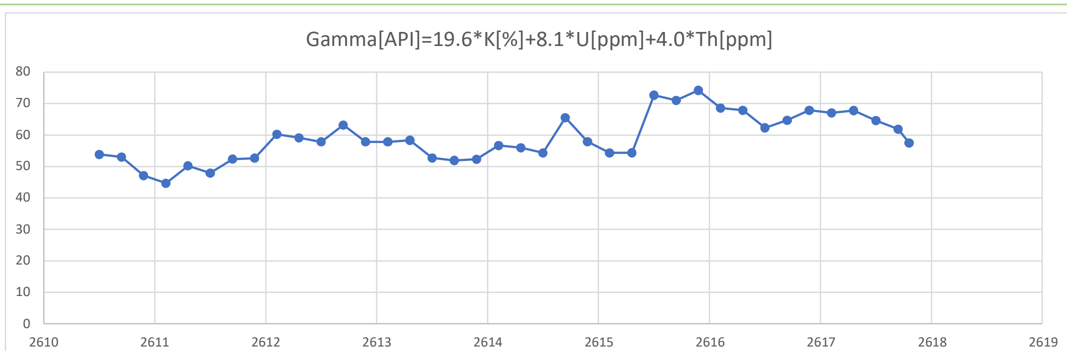
GR_DELGT01-C4

depth	Gamma[AP	Id	Date	Time	Temperature	Stabilized	Total[ppm]	Total[cpm]	K[%]	K[cpm]	U[ppm]	U[cpm]	Th[ppm]	Th[cpm]	Dose	Dose units
2609.8	45.04	149	2023-08-31	16:15:34	21.8	1	5.5	1491.6	0.8	180.2	1.6	38.2	4.1	32.1	30.2	nGy/h
2609.6	39.85	150	2023-08-31	16:19:55	22.1	1	4.9	1323.4	0.7	158.2	1.3	32.7	3.9	30.5	26.8	nGy/h
2609.4	42.96	151	2023-08-31	16:24:33	22.1	1	5.1	1383	0.9	186.4	1.2	30.9	3.9	30.5	28.3	nGy/h
2609.2	40.59	152	2023-08-31	16:29:06	22.4	1	5	1363.2	0.8	173.4	1.1	29.3	4	31.3	27.2	nGy/h
2609	42.22	153	2023-08-31	16:33:36	22.4	1	5.1	1389.1	0.8	169.7	1.4	34.8	3.8	29.2	27.9	nGy/h
2608.8	38.23	154	2023-08-31	16:38:28	22.6	1	5	1360.6	0.7	149.9	1.1	28.6	3.9	30	25	nGy/h
2608.6	36.24	155	2023-08-31	16:42:46	22.6	1	4.8	1310.2	0.7	146	1.2	28.6	3.2	25	23.6	nGy/h
2608.4	40.6	156	2023-08-31	16:46:59	22.8	1	5.2	1418.3	0.8	173.1	1.2	31.2	3.8	29.5	27.2	nGy/h
2608.2	39.79	157	2023-08-31	16:51:14	22.6	1	5.1	1376.2	0.8	177.3	1.1	29.3	3.8	29.2	27	nGy/h
2608	39.43	158	2023-08-31	16:55:28	22.6	1	5.3	1445.4	0.7	162.9	1.1	29.6	4.2	32.8	26.9	nGy/h
2607.8	37.04	159	2023-08-31	16:59:41	22.6	1	4.8	1289.6	0.7	150.9	1.2	29.6	3.4	26.6	24.6	nGy/h
2607.6	29.78	160	2023-08-31	17:04:56	22.8	1	4.3	1173.7	0.7	138.1	0.6	18.4	2.8	21.6	19.5	nGy/h
2607.4	34.21	161	2023-08-31	17:09:51	23	1	4.6	1247.5	0.7	147	0.9	24.6	3.3	25.3	22.7	nGy/h
2607.2	40.27	162	2023-08-31	17:14:32	23.2	1	5	1354	0.7	162.4	1.5	35.3	3.6	27.9	27.2	nGy/h
2607	35.37	163	2023-08-31	17:19:09	23.5	1	4.8	1299.7	0.8	162.1	0.9	24.1	3.1	23.7	23.2	nGy/h
2606.8	36.58	164	2023-08-31	17:24:21	23.4	1	4.9	1334.8	0.8	164.8	1	26.7	3.2	25	24.4	nGy/h
2606.6	38.17	165	2023-08-31	18:03:41	25	1	5.2	1417.5	0.8	165	0.9	24.9	3.8	29.2	24.9	nGy/h
2606.4	35.8	166	2023-08-31	18:08:00	23.9	1	5.1	1369.7	0.7	158.5	0.8	25.2	3.9	30.2	24.8	nGy/h
2606.2	41.46	167	2023-08-31	18:12:15	23.5	1	5.2	1397.1	0.7	162.4	1.4	35.1	4.1	31.5	28	nGy/h
2606	40.66	168	2023-08-31	18:16:30	23.2	1	5	1359	0.7	158.8	1.4	33.8	3.9	30.5	27.2	nGy/h
2605.8	39.78	169	2023-08-31	18:20:52	23	1	5	1362.4	0.8	163.5	1	28	4	31	26.1	nGy/h
2605.6	43.01	170	2023-08-31	18:25:26	22.8	1	5.3	1436.8	0.8	170.8	1.3	33.5	4.2	32.3	28.3	nGy/h
2605.4	39.8	171	2023-08-31	18:29:39	22.8	1	5.1	1377.8	0.8	168.9	1.2	30.9	3.6	28.2	26.6	nGy/h
2605.2	35.42	172	2023-08-31	18:33:56	22.8	1	5.1	1382.5	0.7	160.3	1	25.7	3.4	26.6	24.2	nGy/h
2605	38.24	173	2023-08-31	18:38:13	22.8	1	5.1	1389.8	0.7	160.1	1.2	30.1	3.7	28.9	25.9	nGy/h
2604.8	38.23	174	2023-08-31	18:42:24	22.7	1	5.1	1365	0.7	150.1	1.1	29.3	3.9	30.2	25.3	nGy/h
2604.6	41.45	175	2023-08-31	18:46:43	22.6	1	5.4	1464.8	0.7	164.8	1.3	33.3	4.3	33.1	28	nGy/h
2604.4	40.98	176	2023-08-31	18:50:59	22.4	1	5.7	1540.7	0.8	181.5	1	29.1	4.3	33.4	28.1	nGy/h
2604.2	52.95	177	2023-08-31	18:55:17	22.4	1	6.5	1762	1	214.1	1.5	40.8	5.3	41.5	35.4	nGy/h
2604	45.05	178	2023-08-31	19:00:28	22.4	1	5.8	1578.6	0.8	183.8	1.7	39.3	3.9	30.5	30.4	nGy/h
2603.8	36.97	179	2023-08-31	19:05:04	22.4	1	5	1355.6	0.8	165	0.9	25.7	3.5	26.8	24.6	nGy/h
2603.6	39.39	180	2023-08-31	19:09:38	22.6	1	5	1359.8	0.8	166.1	1.1	28.8	3.7	28.4	25.9	nGy/h
2603.4	43	181	2023-08-31	19:14:06	22.7	1	5.3	1430	0.8	171.3	1.2	33	4.4	34.4	28.7	nGy/h
2603.2	39.36	182	2023-08-31	19:19:01	22.7	1	5.1	1380.1	0.8	164.2	0.8	25.2	4.3	33.1	25.8	nGy/h
2603	43.42	183	2023-08-31	19:23:45	22.4	1	5.3	1434	0.8	173.1	1.4	34.8	4.1	31.8	28.7	nGy/h
2602.8	38.99	184	2023-08-31	19:28:11	22.4	1	5.3	1444.2	0.8	169.5	1.1	28	3.6	28.2	25.8	nGy/h
2602.6	44.2	185	2023-08-31	19:32:26	22.1	1	5.3	1434	0.9	188.3	1.6	36.1	3.4	26.8	29	nGy/h
2602.4	40.2	186	2023-08-31	19:36:46	21.9	1	5.4	1465.3	0.8	175.7	1.2	31.2	3.7	28.4	27.2	nGy/h
2602.2	42.6	187	2023-08-31	19:41:24	21.8	1	5.3	1419.6	0.8	167.4	1.2	32.5	4.3	33.1	28	nGy/h
2602	33.83	188	2023-08-31	19:46:04	21.7	1	4.5	1209.3	0.7	151.4	1.1	26.2	2.8	21.6	22.6	nGy/h
2601.8	28.28	189	2023-08-31	19:50:22	21.5	1	3.9	1045.6	0.5	116.2	0.8	21.2	3	23.2	19.1	nGy/h
2601.6	33.41	190	2023-08-31	19:55:43	21.5	1	4.7	1260.5	0.7	141.5	0.9	24.1	3.1	24	21.9	nGy/h
2601.4	38.24	191	2023-08-31	20:00:11	21.4	1	5	1362.8	0.7	150.9	1.2	29.9	3.7	28.7	25.1	nGy/h
2601.2	46.6	192	2023-08-31	20:04:41	21.3	1	5.8	1558.2	0.9	201.6	1.6	37.4	4	30.8	31.2	nGy/h
2601	45.43	193	2023-08-31	20:53:51	22.3	1	6	1627.7	0.8	187.5	1.5	38.5	4.4	34.4	31.3	nGy/h
2600.8	45.37	194	2023-08-31	20:58:08	21.1	1	5.7	1549.1	0.9	187.5	1.3	33.3	4.3	33.6	29.7	nGy/h
2600.6	43.02	195	2023-08-31	21:02:23	20.7	1	5.7	1539	0.8	171.8	1.4	35.6	4	31	28.7	nGy/h
2600.4	36.62	196	2023-08-31	21:06:42	20.5	0	5.3	1438.9	0.7	159	1	26.5	3.7	28.7	24.8	nGy/h
2600.2	42.53	197	2023-08-31	21:13:19	20.3	1	5.8	1565.6	0.9	183.8	0.9	27	4.4	33.9	27.9	nGy/h
2600	43.77	198	2023-08-31	21:17:47	20.1	1	5.8	1580.2	0.9	199.2	1.3	32.5	3.9	30.5	29.6	nGy/h
2600	52.54	199	2023-09-01	12:40:08	19.8	1	6.8	1837.3	1.1	234.8	1.8	42.4	4.1	32.1	35.1	nGy/h
2599.9	50.55	200	2023-09-01	12:44:49	20.2	1	6.3	1713.2	1	214.9	1.5	38	4.7	36.5	33.6	nGy/h
2599.7	48.11	201	2023-09-01	12:49:24	20.6	1	6.1	1647.7	1	204.7	1.1	31.4	4.9	37.8	31.4	nGy/h
2599.5	49.69	202	2023-09-01	12:53:34	20.9	1	6.3	1713.7	1.1	227.2	1.3	34	4.4	33.9	32.8	nGy/h
2599.3	50.14	203	2023-09-01	12:57:49	21.4	1	6.4	1724.7	1	215.2	1.4	36.6	4.8	37.3	33.4	nGy/h
2599.1	45.74	204	2023-09-01	13:01:59	21.5	1	6.4	1717.4	1	220.6	1.4	34.8	3.7	28.4	31.3	nGy/h
2598.9	52.55	205	2023-09-01	13:06:10	21.8	1	6.7	1800.7	1	223.5	1.5	40	5.2	40.4	35.6	nGy/h
2598.7	56.55	206	2023-09-01	13:10:20	21.9	1	6.8	1845.2	1.1	231.9	1.9	45.3	4.9	38.3	37.2	nGy/h
2598.5	49.4	207	2023-09-01	13:14:31	22.4	1	6.4	1738.6	0.9	209.2	1.6	40.8	4.7	36.5	34	nGy/h
2598.3	50.22	208	2023-09-01	13:18:40	22.7	1	6.2	1675.3	0.9	206	1.8	43.7	4.5	35.2	34.2	nGy/h
2598.1	48.62	209	2023-09-01	13:22:53	22.8	1	6.3	1691.5	0.9	196.9	1.8	42.4	4.1	32.1	32.5	nGy/h
2597.9	49.33	210	2023-09-01	13:27:12	22.8	1	6.5	1745.1	1	210.5	1.3	35.6	4.8	37.6	32.9	nGy/h
2597.7	51.29	211	2023-09-01	13:31:20	23	1	6.5	1753.7	1.1	226.1	1.3	34.8	4.8	37.6	33.8	nGy/h
2597.5	54.51	212	2023-09-01	13:35:31	23	1	6.7	1800.1	1.1	235.3	1.5	39.5	5.2	40.4	36.3	nGy/h



GR_DELGT01-C5

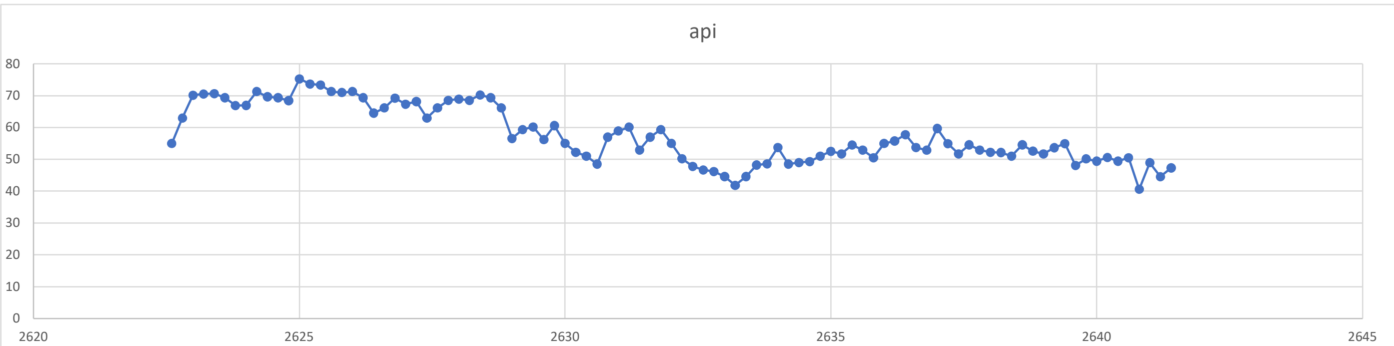
depth (m)	Gamma[AP	Id	Date	Time	Temperature	Stabilized	Total[ppm]	Total[cpm]	K[%]	K[cpm]	U[ppm]	U[cpm]	Th[ppm]	Th[cpm]	Dose	Dose units
2610.5	53.83	344	2023-09-12	10:32:59	21.1	1	6.8	1842.3	0.9	198.7	1.9	47.1	5.2	40.2	35.7	nGy/h
2610.7	53.06	345	2023-09-12	10:38:12	21.9	1	6.6	1795.8	0.9	198.2	2.2	48.7	4.4	33.9	34.7	nGy/h
2610.9	47.09	346	2023-09-12	10:43:29	22.4	1	6.4	1722.9	0.7	173.4	1.7	42.1	4.9	37.8	32.1	nGy/h
2611.1	44.67	347	2023-09-12	10:48:14	22.8	1	6.2	1675.1	0.7	160.6	1.5	38	4.7	36.5	29.8	nGy/h
2611.3	50.24	348	2023-09-12	10:52:30	22.8	1	6.3	1703.9	0.8	175.8	1.6	41.6	5.4	42	33.1	nGy/h
2611.5	47.91	349	2023-09-12	10:56:43	23.1	1	6.3	1700.7	0.7	173.7	1.9	45	4.7	36.8	32.7	nGy/h
2611.7	52.33	350	2023-09-12	11:01:01	23	1	6.5	1759	0.7	163.5	2.1	50	5.4	42.3	34.5	nGy/h
2611.9	52.68	351	2023-09-12	11:05:09	23.2	1	7	1879.2	0.8	180	2	48.7	5.2	40.7	35	nGy/h
2612.1	60.24	352	2023-09-12	11:09:23	23.2	1	7.7	2071.7	0.9	208.9	2	51.5	6.6	50.9	40.1	nGy/h
2612.3	59.13	353	2023-09-12	11:13:41	23.2	1	7.3	1982.9	0.8	203.2	2.5	59.1	5.8	45.1	40.4	nGy/h
2612.5	57.88	354	2023-09-12	11:18:44	23.4	1	7.4	1991.3	0.8	186	2	51.8	6.5	50.6	38.5	nGy/h
2612.7	63.17	355	2023-09-12	11:23:03	23.4	1	7.8	2109.9	0.7	190.4	2.5	62.5	7.3	56.9	43.1	nGy/h
2612.9	57.88	356	2023-09-12	11:27:31	23.5	1	7.6	2045.1	0.8	192.2	2	51.3	6.5	50.4	38.7	nGy/h
2613.1	57.84	357	2023-09-12	11:31:49	23.5	1	7.4	2006.4	0.8	197.5	1.6	47.6	7.3	56.6	39.6	nGy/h
2613.3	58.32	358	2023-09-12	11:35:58	23.4	1	7.4	2008.4	0.8	186.7	2.4	56.2	5.8	45.4	38.6	nGy/h
2613.5	52.75	359	2023-09-12	11:41:03	23.5	1	6.9	1875	0.7	173.7	2.3	52.8	5.1	39.6	35.4	nGy/h
2613.7	51.92	360	2023-09-12	11:45:36	23.6	1	6.9	1874.2	0.7	178.7	2	48.9	5.5	42.8	35.4	nGy/h
2613.9	52.32	361	2023-09-12	11:49:47	23.6	0	7.3	1973.5	0.7	178.9	2	48.9	5.6	43.3	35.6	nGy/h
2614.1	56.69	362	2023-09-12	12:01:34	23.6	1	7.3	1970.6	0.8	193.5	2.1	52.8	6	46.4	38.4	nGy/h
2614.3	55.94	363	2023-09-12	13:22:26	21.8	1	6.7	1819.9	0.7	176.3	2.2	53.1	6.1	47.2	37.4	nGy/h
2614.5	54.31	364	2023-09-12	13:27:36	22.4	1	6.9	1854.3	0.7	176.8	1.9	48.7	6.3	48.8	36.6	nGy/h
2614.7	65.52	365	2023-09-12	13:32:26	22.6	1	7.8	2105.5	0.9	212.1	2.8	65.1	6.3	49.3	43.6	nGy/h
2614.9	57.9	366	2023-09-12	13:36:36	22.8	1	7.2	1946.1	0.8	187	2.2	53.4	6.1	47.2	38.2	nGy/h
2615.1	54.31	367	2023-09-12	13:40:47	23.1	1	6.7	1824.3	0.7	178.6	1.9	50.2	6.3	48.8	37.2	nGy/h
2615.3	54.35	368	2023-09-12	13:46:24	23.2	1	6.8	1836.6	0.7	171.6	2.3	54.1	5.5	42.5	36.3	nGy/h
2615.5	72.66	369	2023-09-12	13:51:20	23.4	1	8.8	2368.7	1	240.3	2.6	65.6	8	62.1	48.7	nGy/h
2615.7	71.03	370	2023-09-12	13:57:04	23.5	1	9	2436.9	1.1	252.3	2.7	64.6	6.9	53.8	47.3	nGy/h
2615.9	74.21	371	2023-09-12	14:01:51	23.6	1	8.8	2390.6	1.1	248.7	2.5	63.8	8.1	62.6	48.9	nGy/h
2616.1	68.62	372	2023-09-12	14:06:06	23.6	1	8.5	2296.9	1	240.6	2.2	59.4	7.8	60.3	46.6	nGy/h
2616.3	67.87	373	2023-09-12	14:10:23	23.6	1	8.3	2245.8	0.9	223.3	2.3	60.7	7.9	61.6	46	nGy/h
2616.5	62.32	374	2023-09-12	14:16:51	23.6	1	7.9	2139.2	0.8	203.2	2.4	59.1	6.8	53	42.2	nGy/h
2616.7	64.66	375	2023-09-12	14:26:58	23.6	1	8.2	2224.1	0.9	221.8	2.2	56.5	7.3	56.6	43.6	nGy/h
2616.9	67.88	376	2023-09-12	14:34:53	23.8	1	8.2	2212.9	0.9	215.8	2.4	62	7.7	60	45.5	nGy/h
2617.1	67.07	377	2023-09-12	14:39:27	23.8	1	8.2	2216.3	0.9	211.1	2.3	59.6	7.7	59.5	44.4	nGy/h
2617.3	67.82	378	2023-09-12	14:43:39	23.8	1	8.5	2310.6	1	233	2.2	57.3	7.6	59	45.2	nGy/h
2617.5	64.63	379	2023-09-12	14:48:02	23.8	1	8.3	2248.2	0.9	206.4	1.9	54.4	7.9	61.3	43.1	nGy/h
2617.7	61.89	380	2023-09-12	14:56:18	23.9	1	7.9	2124	0.8	200.9	2.1	54.9	7.3	56.6	41.8	nGy/h
2617.8	57.5	381	2023-09-12	15:03:07	23.9	1	7.5	2024.2	0.8	198.5	2.2	54.7	6	47	39.3	nGy/h



GR_DELGT01-C6

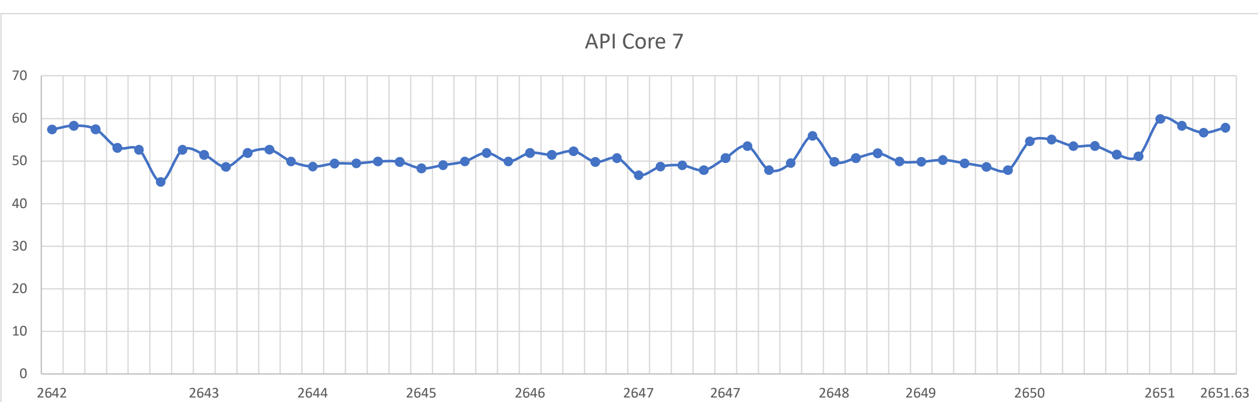
depth (m)	api	Id	Date	Time	Temperature	Stabilized	Total[ppm]	Total[cpm]	K[%]	K[cpm]	U[ppm]	U[cpm]	Th[ppm]	Th[cpm]	Dose	Dose units
2641.4	47.34	249	2023-09-04	15:36:27	26.3	1	5.9	1597.1	1	207.6	1.4	35.6	4.1	31.6	31.3	nGy/h
2641.2	44.53	250	2023-09-04	15:39:48	25.4	1	6.2	1664.8	0.9	195.8	0.9	28.8	4.9	38.1	30.1	nGy/h
2641	48.97	251	2023-09-04	15:47:15	26.3	1	6	1618.6	1	212.3	1.7	40.3	3.9	30.2	32.6	nGy/h
2640.8	40.6	252	2023-09-04	15:51:54	26.8	1	5.5	1499	0.8	179.4	1.2	30.9	3.8	29.7	27.6	nGy/h
2640.6	50.54	253	2023-09-04	15:56:25	27.4	0	6.4	1734.6	1	217	1.4	37.2	4.9	38.3	33.9	nGy/h
2640.4	49.42	254	2023-09-04	16:01:32	27.5	1	6.4	1729.2	0.9	201.6	1.8	41.9	4.3	33.4	33	nGy/h
2640.2	50.6	255	2023-09-04	16:05:51	27.6	1	6.1	1652.7	0.9	199.8	1.6	40.3	5	39.1	33.8	nGy/h
2640	49.43	256	2023-09-04	16:10:02	27.6	1	6.4	1717.4	0.9	210.2	1.9	44.2	4.1	31.6	33.8	nGy/h
2639.8	50.13	257	2023-09-04	16:14:20	27.6	1	6.5	1747.8	1	220.7	1.3	36.1	5	38.6	34	nGy/h
2639.6	48.12	258	2023-09-04	16:18:31	27.6	1	6.5	1751.4	1	212.8	1.2	34	4.7	36.5	32.4	nGy/h
2639.4	54.9	259	2023-09-04	16:22:40	27.6	1	6.8	1842.3	1.1	230.3	1.4	38.5	5.5	42.5	36.2	nGy/h
2639.2	53.63	260	2023-09-04	16:26:52	27.4	1	6.8	1842.1	1.2	244.2	1.1	33	5.3	41	35.3	nGy/h
2639	51.74	261	2023-09-04	16:31:04	27.4	1	6.7	1819.9	1	220.4	1.4	38	5.2	40.7	34.9	nGy/h
2638.8	52.56	262	2023-09-04	16:35:13	27.4	0	7	1896.9	1	225.4	1.6	40.6	5	38.9	35.6	nGy/h
2638.6	54.56	263	2023-09-04	16:40:46	27.4	1	6.8	1827	1	211.3	1.6	41.6	5.5	42.5	35.7	nGy/h
2638.4	50.97	264	2023-09-04	16:45:11	27.4	1	6.5	1743.3	1	212	1.7	40.8	4.4	34.4	33.7	nGy/h
2638.2	52.15	265	2023-09-04	16:49:38	27.6	1	6.5	1745.9	1	226.9	1.5	40.3	5.1	39.9	35.8	nGy/h
2638	52.18	266	2023-09-04	16:54:05	27.8	1	6.7	1823.8	1	226.2	1.8	42.7	4.5	35.2	35.3	nGy/h
2637.8	52.94	267	2023-09-04	17:00:52	27.8	1	6.7	1824	1	222.8	1.4	39.5	5.5	42.8	36	nGy/h
2637.6	54.59	268	2023-09-04	17:05:49	27.6	1	6.7	1822.2	1	217.8	1.9	46.6	4.9	37.8	36.4	nGy/h
2637.4	51.74	269	2023-09-04	17:10:06	27.6	1	6.8	1837.6	1	226.2	1.4	37.7	5.2	40.2	35.1	nGy/h
2637.2	54.93	270	2023-09-04	17:14:19	27.6	1	6.8	1828.5	1.1	236.6	1.7	43.2	4.9	38.1	36.9	nGy/h
2637	59.7	271	2023-09-04	17:18:37	27.6	1	7.2	1956.8	1.2	251	1.8	45.8	5.4	42	39.5	nGy/h
2636.8	52.89	272	2023-09-04	17:22:48	27.6	1	6.8	1838.7	1.1	227.2	1.3	36.7	5.2	40.2	34.9	nGy/h
2636.6	53.73	273	2023-09-04	17:26:58	27.6	1	7.1	1908.2	1.1	234.8	1.7	42.4	4.6	35.7	36	nGy/h
2636.4	57.76	274	2023-09-04	17:31:10	27.6	1	7.1	1910.1	1.1	242.6	2	48.4	5	38.6	38.8	nGy/h
2636.2	55.76	275	2023-09-04	17:35:18	27.5	1	7.1	1926.7	1	223.3	1.6	42.9	5.8	44.9	37.4	nGy/h
2636	54.96	276	2023-09-04	17:39:29	27.4	1	6.9	1862	1.1	240.3	2	46.3	4.3	33.6	36.9	nGy/h
2635.8	50.54	277	2023-09-04	17:46:53	27.2	1	6.5	1759.8	1	220.9	1.4	37.7	4.9	38.1	34.3	nGy/h
2635.6	52.94	278	2023-09-04	17:51:07	27.2	1	6.4	1727.9	1	211.3	1.4	38.7	5.5	42.3	34.8	nGy/h
2635.4	54.53	279	2023-09-04	17:55:15	27.2	1	6.6	1789.1	1.1	230.1	1.7	42.4	4.8	37	36	nGy/h
2635.2	51.75	280	2023-09-04	17:59:34	27.2	1	6.6	1785.4	1	220.7	1.5	39.8	5	38.6	35	nGy/h
2635	52.49	281	2023-09-04	18:04:09	27	1	6.6	1771.8	1.1	230.1	1.3	36.7	5.1	39.4	34.9	nGy/h
2634.8	51.01	282	2023-09-04	18:08:17	27.1	1	6.3	1711.5	0.9	210.7	1.7	43.2	4.9	37.8	35	nGy/h
2634.6	49.33	283	2023-09-04	18:12:29	27.1	1	6.2	1674.9	1	217.3	1.3	35.1	4.8	37.3	33.2	nGy/h
2634.4	49.02	284	2023-09-04	18:17:11	27	1	6.3	1695.1	0.9	205	1.8	41.9	4.2	32.3	33	nGy/h
2634.2	48.53	285	2023-09-04	18:21:40	27	1	6.3	1698.9	1	215.7	1.3	35.1	4.6	35.7	32.7	nGy/h
2634	53.74	286	2023-09-04	18:26:02	26.8	1	6.6	1776.8	1	228.8	1.4	40	5.7	44.3	36.9	nGy/h
2633.8	48.56	287	2023-09-04	18:30:42	26.8	1	6.1	1637.3	0.9	205.5	1.2	35.3	5.3	40.7	33.2	nGy/h
2633.6	48.21	288	2023-09-04	18:34:53	26.6	1	6.1	1654.5	0.9	196.6	1.7	40	4.2	32.9	32	nGy/h
2633.4	44.58	289	2023-09-04	18:39:02	26.6	1	5.8	1557.5	0.9	187	1.4	35.1	3.9	30	29.4	nGy/h
2633.2	41.8	290	2023-09-04	18:43:14	26.4	1	5.2	1401.8	0.8	170.8	1.2	31.2	4.1	31.8	27.6	nGy/h
2633	44.58	291	2023-09-04	18:47:42	26.4	1	5.7	1531.2	0.9	194.3	1.4	34.8	3.9	30.2	29.9	nGy/h
2632.8	46.15	292	2023-09-04	18:52:00	26.4	1	5.6	1507.8	0.9	186.2	1.1	32.2	4.9	38.3	30.4	nGy/h
2632.6	46.65	293	2023-09-04	18:56:11	26.4	1	5.7	1543.4	0.8	183.6	1.7	40.3	4.3	33.4	31.3	nGy/h
2632.4	47.77	294	2023-09-04	19:00:27	26.4	1	6.2	1663.1	0.9	194.8	1.3	36.1	4.9	37.8	32	nGy/h
2632.2	50.19	295	2023-09-04	19:04:53	26.4	1	6.8	1826.4	1	220.4	1.9	42.1	3.8	29.5	33.5	nGy/h
2632	55	296	2023-09-04	19:09:13	26.4	1	7	1885.5	1	227.7	2	47.1	4.8	37.3	37.1	nGy/h
2631.8	59.35	297	2023-09-04	19:13:24	26.4	1	7.4	2002	1.1	246.3	1.9	48.4	5.6	43.6	40.2	nGy/h
2631.6	56.99	298	2023-09-04	19:18:06	26.4	1	7.1	1915.8	1	225.9	1.9	48.1	5.5	42.8	38.5	nGy/h
2631.4	52.96	299	2023-09-04	19:22:17	26.4	1	6.8	1840	1	220.2	1.6	40.6	5.1	39.6	35.4	nGy/h
2631.2	60.15	300	2023-09-04	19:26:27	26.3	1	7.2	1957.3	1.1	242.4	1.9	48.7	5.8	44.9	40.3	nGy/h
2631	58.9	301	2023-09-04	19:30:44	26	1	7.6	2056.9	1.1	246.8	1.4	41.1	6.5	50.1	39.8	nGy/h
2630.8	57	302	2023-09-05	10:40:00	21	1	7	1902.1	1	221.7	2	48.7	5.3	41	38	nGy/h
2630.6	48.53	303	2023-09-05	11:02:31	21.9	1	6.5	1745.3	1	209.4	1.3	34.6	4.6	36	32.2	nGy/h
2630.4	51	304	2023-09-05	11:07:20	22.1	1	6.5	1755.7	0.9	194	1.6	41.9	5.1	39.6	33.9	nGy/h
2630.2	52.2	305	2023-09-05	11:12:11	22.3	1	6.7	1810.3	0.9	207.6	1.6	41.3	5.4	41.7	35.2	nGy/h
2630	55.03	306	2023-09-05	11:16:46	22.3	1	6.6	1793.4	0.9	209.4	1.9	46.8	5.5	42.8	37	nGy/h
2629.8	60.59	307	2023-09-05	11:21:29	22.3	1	7.2	1951.1	1	233.5	1.9	50.7	6.4	49.8	41.4	nGy/h
2629.6	56.18	308	2023-09-05	11:26:23	22.3	1	7.3	1981.2	1	230.1	1.8	45.3	5.5	42.8	38	nGy/h
2629.4	60.17	309	2023-09-05	11:31:01	22.1	1	7.5	2024.3	1.1	238.2	2.1	50.7	5.4	41.7	39.8	nGy/h
2629.2	59.36	310	2023-09-05	11:35:33	22.4	1	7.5	2039	1.1	247	2	49.4	5.4	42.3	40.2	nGy/h
2629	56.53	311	2023-09-05	11:40:13	22.4	1	7.5	2038.2	1.1	234	1.7	44	5.3	41.5	37.7	nGy/h
2628.8	66.19	312	2023-09-05	11:44:42	22.4	1	8	2153.6	1.1	254.4	2.3	57	6.5	50.6	44.7	nGy/h
2628.6	69.38	313	2023-09-05	11:49:13	22.4	1	8.4	2277	1.2	265.8	2.6	61.3	6.2	48.1	46.1	nGy/h
2628.4	70.19	314	2023-09-05	11:52:15	22.6	1	8.5	2307.9	1.2	276.8	2.7	62.2	6.2	48.3	47.1	nGy/h
2628.2	68.53	315	2023-09-05	12:42:26	23.2	1	8.4	2278.1	1.2	267.2	2.1	55.5	7	54.3	46	nGy/h
2628	68.94	316	2023-09-05	12:47:44	23	1	8.5	2310.7	1.2	276.6	2.2	56.8	6.9	53.5	46.8	nGy/h
2627.8	68.54	317	2023-09-05	12:52:17	23.4	1	8.2	2220.6	1.2	270.3	2.2	55.5	6.8	52.7	45.9	nGy/h
2627.6	66.14	318	2023-09-05	12:57:28	23.8	1	8.1	2186.4	1.2	263.8	2.2	54.7	6.2	48.5	44.2	nGy/h
2627.4	62.96	319	2023-09-05	13:01:56	24.2	1	8.1	2193.4	1.1	249.7	2	51.5	6.3	48.8	42.5	nGy/h
2627.2	68.17	320	2023-09-05	13:06:50	24.3	1	8.4	2272.6	1.1	258.8	2.1	56.2	7.4	57.4	46.3	nGy/h
2627	67.31	321	2023-09-05	13:11:12	24.4	1	8.2	2213.3	1.2	263.3	1.9	51.5	7.1	55.3	44.9	nGy/h
2626.8	69.27	322	2023-09-05	13:15:52	24.4	1	8.4	2272.3	1.3	276.8	1.9	52.3	7.1	55.3	46.1	nGy/h
2626.6	66.14	323	2023-09-05	13:20:14	24.4	1	8.4	2264.7	1.2	271.4	2.2	54.7	6.2	48.5	44.8	nGy/h
2626.4	64.55	324	2023-09-05	13:24:47	24.4	1	8.1	2199.5	1.1	255.9	1.9	50.5	6.9	53.5	43.7	nGy/h

2626.2	69.34	325	2023-09-05	13:29:13	24.6	1	8.5	2285.1	1.2	273.4	2.2	56.5	7	54.5	46.8	nGy/h
2626	71.31	326	2023-09-05	13:33:45	24.7	1	8.6	2315.1	1.3	281	2.3	58.3	6.8	52.4	47.3	nGy/h
2625.8	70.98	327	2023-09-05	13:38:06	24.6	0	8.4	2265.7	1.2	272.4	2.6	63	6.6	51.1	47.7	nGy/h
2625.6	71.3	328	2023-09-05	13:42:43	24.8	1	8.6	2332.7	1.3	279.5	2.2	57.3	7	54.5	47.4	nGy/h
2625.4	73.33	329	2023-09-05	13:47:07	24.8	1	9	2442.2	1.3	287.8	2.5	60.9	6.9	53.5	48.7	nGy/h
2625.2	73.67	330	2023-09-05	13:51:33	24.8	1	8.8	2371.9	1.4	300.9	2.3	57.3	6.9	53.5	48.7	nGy/h
2625	75.31	331	2023-09-05	13:55:52	25	1	9.1	2455.2	1.3	296.4	2.3	60.4	7.8	60.3	50.8	nGy/h
2624.8	68.49	332	2023-09-05	14:00:20	25	1	8.6	2329.8	1.3	280.5	2.1	54.2	6.5	50.4	45.7	nGy/h
2624.6	69.36	333	2023-09-05	14:04:50	25	1	8.5	2301.6	1.2	271.9	2.4	59.6	6.6	51.1	46.7	nGy/h
2624.4	69.66	334	2023-09-05	14:09:17	25.2	1	8.5	2295.3	1.3	282.1	1.8	51.3	7.4	57.7	46.7	nGy/h
2624.2	71.31	335	2023-09-05	14:13:35	25.2	1	8.8	2365.3	1.3	290.9	2.3	57.5	6.8	53	47.9	nGy/h
2624	66.93	336	2023-09-05	14:17:57	25.2	1	8.4	2283	1.2	273.4	2.1	54.7	6.6	51.4	45.6	nGy/h
2623.8	66.91	337	2023-09-05	14:22:16	25.2	1	8.4	2270.7	1.2	271.1	1.9	51.8	7	54.3	45.3	nGy/h
2623.6	69.35	338	2023-09-05	14:26:41	25.4	1	8.6	2331.6	1.2	268.5	2.3	58.6	6.8	53	46.6	nGy/h
2623.4	70.63	339	2023-09-05	15:37:39	29.1	1	8.4	2271.2	1.1	257.3	2.7	64.1	6.8	53.2	47.4	nGy/h
2623.2	70.5	340	2023-09-05	15:42:13	28.2	1	8.4	2272.4	1.3	279.5	2.2	55.5	6.8	52.7	46.5	nGy/h
2623	70.14	341	2023-09-05	15:46:43	27.9	1	8.5	2297.4	1.2	277.6	2.2	57.3	7.2	55.6	47.5	nGy/h
2622.8	62.95	342	2023-09-05	15:51:07	27.6	1	8.4	2261.7	1.1	251.3	1.9	50	6.5	50.1	42.5	nGy/h
2622.6	54.99	343	2023-09-05	15:55:30	27.4	1	7.2	1935.9	0.9	208.4	1.5	43.2	6.3	48.5	37.3	nGy/h



GR_DELGT01-C7

Depth (m)	API	Id	Date	Time	Temperatu	Stabilized	Total[ppm]	Total[cpm]	K[%]	K[cpm]	U[ppm]	U[cpm]	Th[ppm]	Th[cpm]	Dose	Dose units
2642	57.44	499	2023-09-22	16:35:37	19.7	1	6.8	1841.8	0.9	202.7	2	50	5.9	45.6	38	nGy/h
	58.28	500	2023-09-22	16:40:09	20.1	1	7.3	1982.9	0.9	208.2	2.4	56	5.3	41.5	39.1	nGy/h
	57.46	501	2023-09-22	16:44:42	20.3	1	7.2	1951	0.9	206.1	2.2	52.1	5.5	42.8	38.2	nGy/h
	53.14	502	2023-09-22	16:49:00	20.5	1	6.6	1795.1	0.7	175	2.2	52.6	5.4	41.7	35.9	nGy/h
	52.66	503	2023-09-22	16:53:15	20.5	1	6.7	1801	0.8	182	1.8	46.6	5.6	43.3	35.2	nGy/h
	45.14	504	2023-09-22	16:57:36	20.7	1	6.4	1740.2	0.6	154.6	1.8	44	4.7	36.5	31	nGy/h
	52.64	505	2023-09-22	17:02:13	20.9	1	7	1899.5	0.8	189.9	1.6	42.9	6	46.2	35.4	nGy/h
2643	51.49	506	2023-09-22	17:34:36	24.3	1	6.6	1785.2	0.7	166.1	1.7	45	6	46.2	34.3	nGy/h
	48.64	507	2023-09-22	17:41:19	22.7	1	6.7	1808.6	0.7	166.4	1.2	38.2	6.3	49	33.1	nGy/h
	51.91	508	2023-09-22	17:45:57	22.4	1	6.7	1818.5	0.7	170.6	1.9	47.1	5.7	44.3	34.7	nGy/h
	52.69	509	2023-09-22	17:50:34	22.3	1	6.8	1824.5	0.8	180.2	2.1	50	5	38.6	34.9	nGy/h
	49.91	510	2023-09-22	17:58:24	21.9	1	6.5	1748.3	0.7	165.1	1.9	46.3	5.2	40.4	33.2	nGy/h
2644	48.71	511	2023-09-22	18:02:58	21.9	0	6.4	1740.9	0.7	158.8	1.9	45.8	4.9	38.1	32.1	nGy/h
	49.41	512	2023-09-22	18:08:16	21.9	1	6.6	1782	0.8	189.1	1.3	37.4	5.8	44.9	33.5	nGy/h
	49.46	513	2023-09-22	18:12:43	21.9	1	6.7	1801	0.8	179.9	1.8	44	4.8	37	32.9	nGy/h
	49.91	514	2023-09-22	18:45:12	20.2	1	6.6	1776.2	0.7	166.9	1.9	46.8	5.2	40.2	33.4	nGy/h
	49.83	515	2023-09-22	18:49:32	20.7	1	6.7	1802.9	0.8	182	1.5	41.1	5.5	43	33.6	nGy/h
2645	48.28	516	2023-09-22	18:54:15	20.9	1	6.5	1759.5	0.7	158.8	1.6	42.4	5.4	42	32.1	nGy/h
	49.06	517	2023-09-22	18:58:39	21.3	1	6.6	1785.1	0.7	172.4	1.4	40	6	46.4	33.4	nGy/h
	49.92	518	2023-09-22	19:03:03	21.3	1	6.5	1762.4	0.7	165.6	2	48.4	5	38.9	33.5	nGy/h
	51.91	519	2023-09-22	19:07:35	21.4	1	6.7	1801.6	0.7	175.8	1.9	47.6	5.7	44.6	35.3	nGy/h
	49.9	520	2023-09-22	19:14:25	21.5	1	6.5	1770.2	0.7	172.4	1.8	45	5.4	42	33.8	nGy/h
2646	51.91	521	2023-09-22	19:18:45	21.5	1	6.5	1763.1	0.7	173.2	1.9	47.1	5.7	44.1	34.9	nGy/h
	51.48	522	2023-09-22	19:23:00	21.5	1	6.6	1787.5	0.7	169.2	1.6	44.2	6.2	47.7	34.6	nGy/h
	52.33	523	2023-09-22	19:27:19	21.5	1	6.5	1765.8	0.7	170	2.1	50.2	5.4	41.7	34.9	nGy/h
	49.8	524	2023-09-22	19:33:23	21.5	1	6.4	1736.3	0.8	174.2	1.2	37.7	6.1	47.2	33.1	nGy/h
	50.69	525	2023-09-22	19:37:36	21.5	1	6.5	1747.7	0.7	172.6	1.7	44	5.8	44.9	34.2	nGy/h
2647	46.68	526	2023-09-22	19:41:57	21.5	1	6.4	1727.6	0.7	168.2	1.6	40.8	5	39.1	31.7	nGy/h
	48.71	527	2023-09-22	19:47:53	21.5	1	6.3	1710.4	0.7	169	1.9	45.3	4.9	38.1	32.7	nGy/h
	49.01	528	2023-09-22	19:52:15	21.7	1	6.4	1741.2	0.8	187.3	1.3	37.7	5.7	43.8	33.2	nGy/h
	47.85	529	2023-09-22	20:17:44	21.5	1	6.5	1750.1	0.8	174.5	1.7	42.1	4.6	36	31.8	nGy/h
2647	50.73	540	2023-10-10	15:37:12	21.7	1	6.5	1767.6	0.7	172.1	2.1	50	5	39.1	34.4	nGy/h
	53.52	541	2023-10-10	15:41:44	21.9	1	6.9	1854.3	0.7	173.2	2	50	5.9	45.6	36	nGy/h
	47.87	542	2023-10-10	15:46:00	21.9	1	6.3	1707.3	0.7	163.8	1.5	41.1	5.5	43	32.3	nGy/h
	49.51	543	2023-10-10	15:50:23	21.9	1	6.3	1700.5	0.7	161.7	1.9	46.6	5.1	39.9	33	nGy/h
	55.91	544	2023-10-10	15:54:37	21.9	1	6.7	1799.2	0.8	182	2.3	53.1	5.4	42	36.6	nGy/h
2648	49.84	545	2023-10-10	16:01:56	21.9	1	6.6	1791.1	0.8	177.6	1.6	41.6	5.3	40.9	33	nGy/h
	50.7	546	2023-10-10	16:06:26	21.9	1	6.7	1816.7	0.7	162.5	1.8	46.6	5.6	43.6	33.8	nGy/h
	51.87	547	2023-10-10	16:10:53	22.1	1	6.8	1850.4	0.8	181.8	1.9	46.8	5.2	40.4	34.5	nGy/h
	49.89	548	2023-10-10	16:15:09	22.1	1	6.6	1778.5	0.7	170.5	1.7	43.7	5.6	43.6	33.6	nGy/h
2649	49.84	549	2023-10-10	16:19:28	22.3	1	6.7	1819.5	0.8	177.1	1.6	41.3	5.3	41.2	32.9	nGy/h
	50.25	550	2023-10-10	16:24:39	22.3	1	6.6	1776.5	0.8	176.8	1.7	43.4	5.2	40.4	33.3	nGy/h
	49.5	551	2023-10-10	16:29:10	22.3	1	6.7	1802.1	0.7	173.7	1.8	45	5.3	41.5	33.7	nGy/h
	48.64	552	2023-10-10	16:33:21	22.3	1	6.5	1747.8	0.8	175	1.6	40.8	5	39.1	32.2	nGy/h
	47.88	553	2023-10-10	16:37:31	22.3	1	6.4	1732.1	0.7	157.5	1.6	42.4	5.3	40.9	31.8	nGy/h
2650	54.64	554	2023-10-10	16:42:04	22.3	1	6.7	1800.8	0.8	181.5	1.6	45.5	6.5	50.6	36.5	nGy/h
	55.06	555	2023-10-10	17:04:23	22.3	1	6.8	1847.3	0.8	184.7	1.8	47.6	6.2	47.7	36.6	nGy/h
	53.48	556	2023-10-10	17:09:02	22.3	1	6.9	1858.2	0.8	193	2	48.4	5.4	42.3	36.2	nGy/h
	53.53	557	2023-10-10	17:13:16	22.3	1	6.6	1781.4	0.7	176.8	2.1	51.3	5.7	44.1	36.2	nGy/h
	51.51	558	2023-10-10	17:17:32	22.3	1	6.7	1818.3	0.7	171.1	1.9	47.4	5.6	43.3	34.6	nGy/h
	51.12	559	2023-10-10	17:21:46	22.1	1	6.6	1788.5	0.7	173.7	2	48.9	5.3	41.5	34.8	nGy/h
2651	59.87	560	2023-10-26	13:30:26	18.3	1	7.2	1937.2	0.8	195.9	1.9	51.5	7.2	55.6	40.3	nGy/h
	58.28	561	2023-10-26	14:17:42	17.7	1	7.2	1941.9	0.8	194.8	2	52.3	6.6	51.1	39.4	nGy/h
	56.67	562	2023-10-26	14:22:00	18.5	1	7.2	1937.7	0.8	198.5	1.9	49.2	6.4	49.8	38.5	nGy/h
2651.63	57.88	563	2023-10-26	14:26:19	18.9	1	7.2	1951	0.8	195.1	2	50.7	6.5	50.1	38.7	nGy/h



Core CT scans

DEL-GT-01

TUDelft

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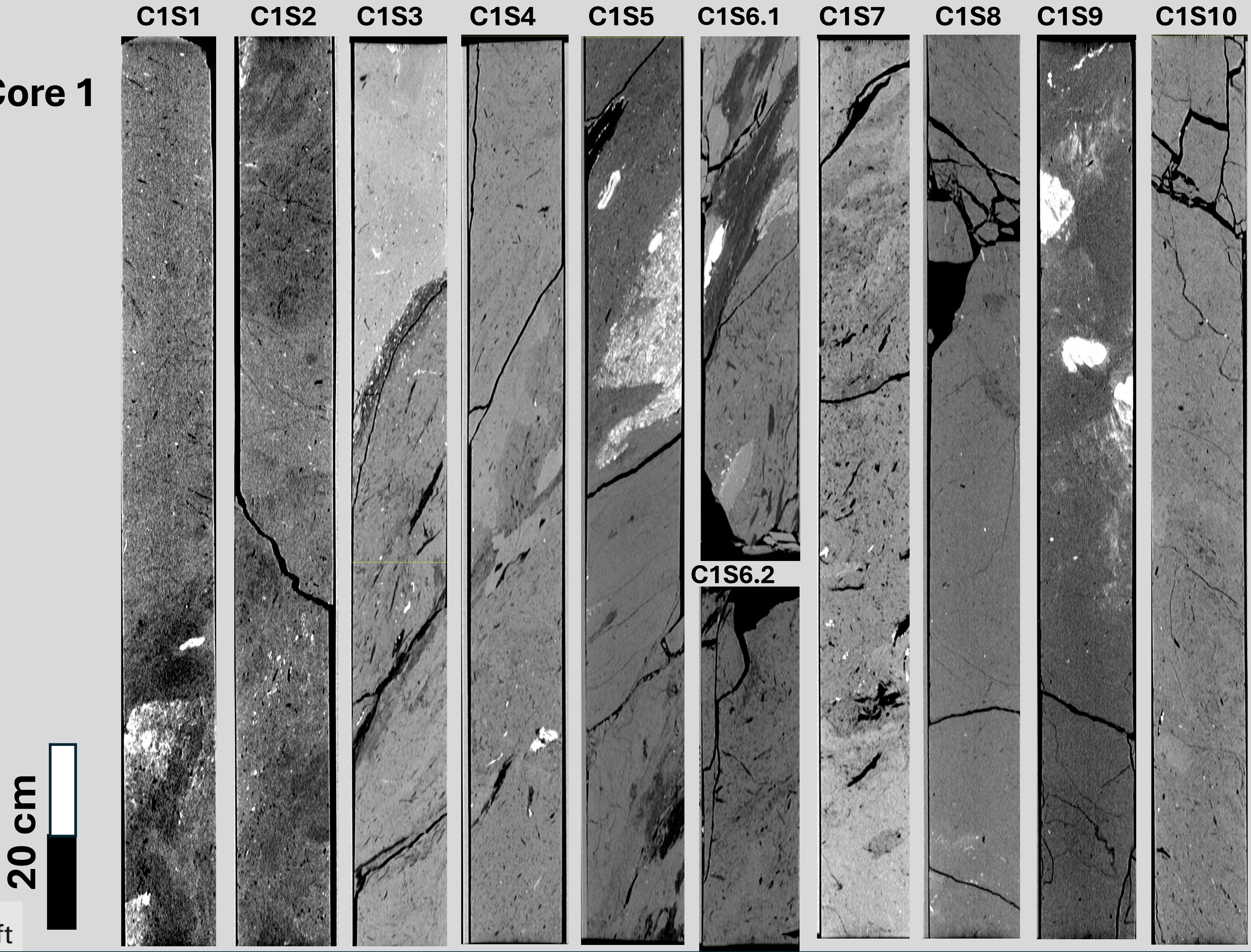
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C1S6.1
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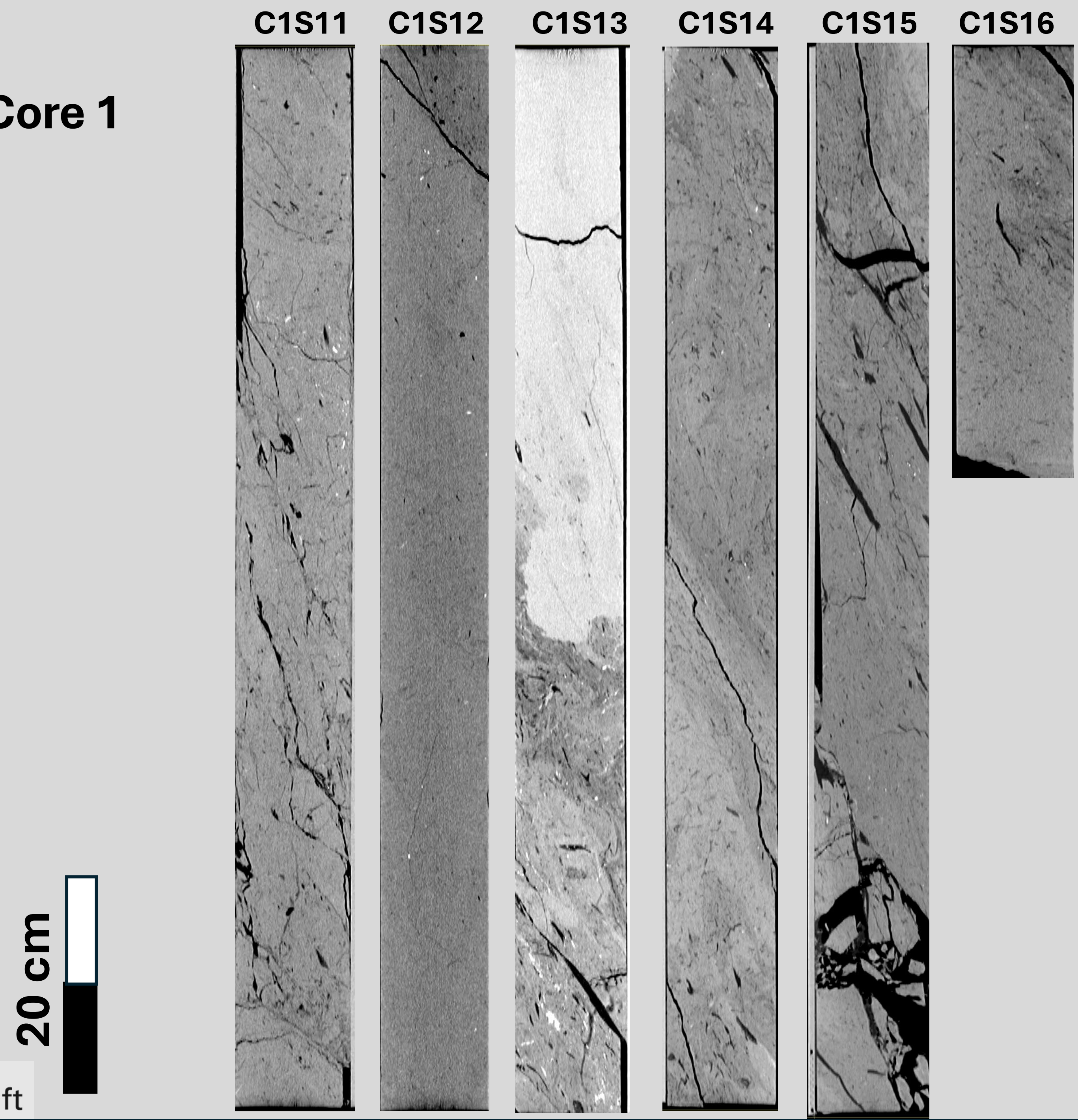
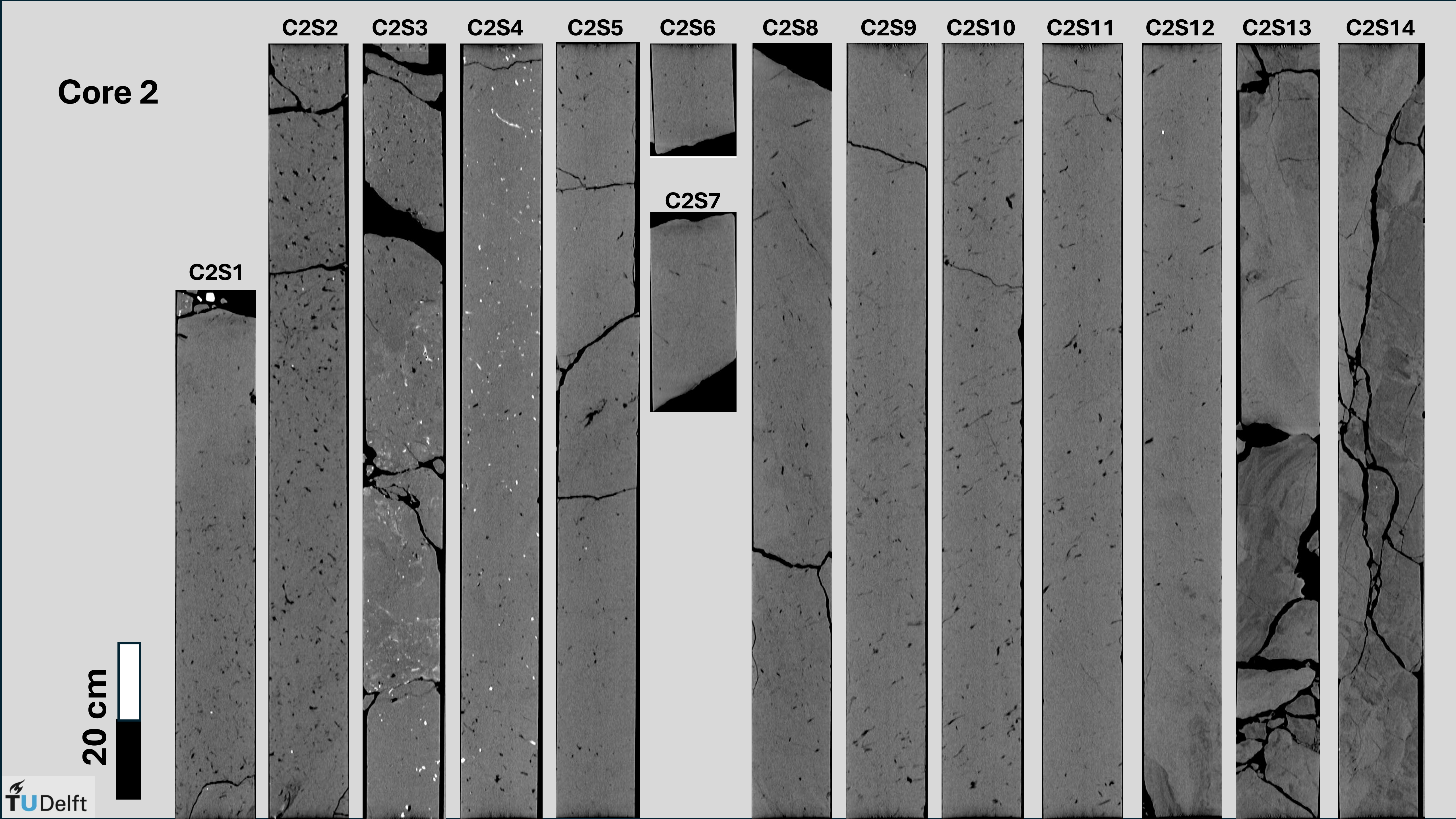
C1S9
C1S10
20 cm

Core 1



TU Delft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C2S2
C2S3
C2S4
C2S5
C2S6
C2S7
C2S8
C2S9
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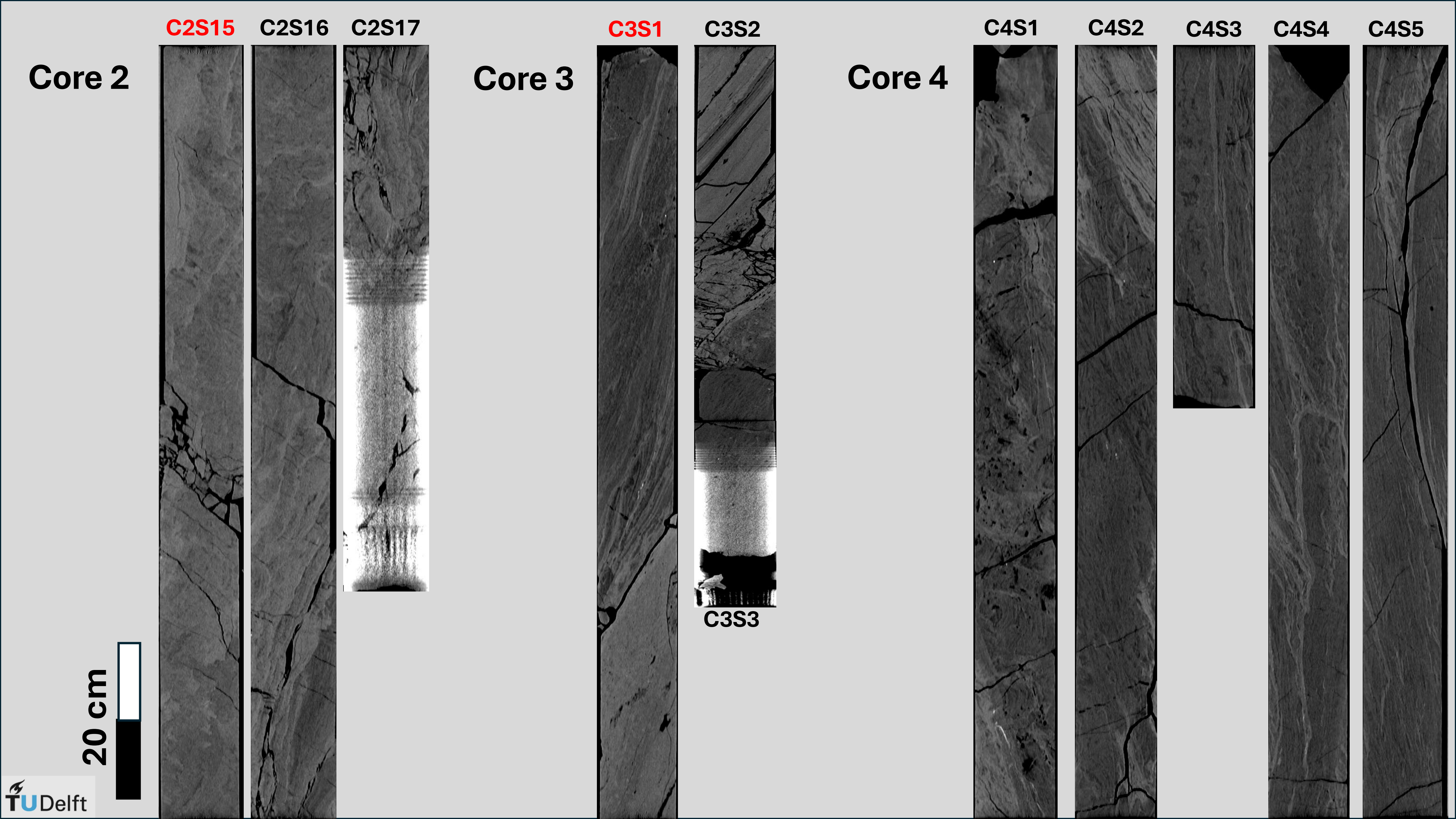
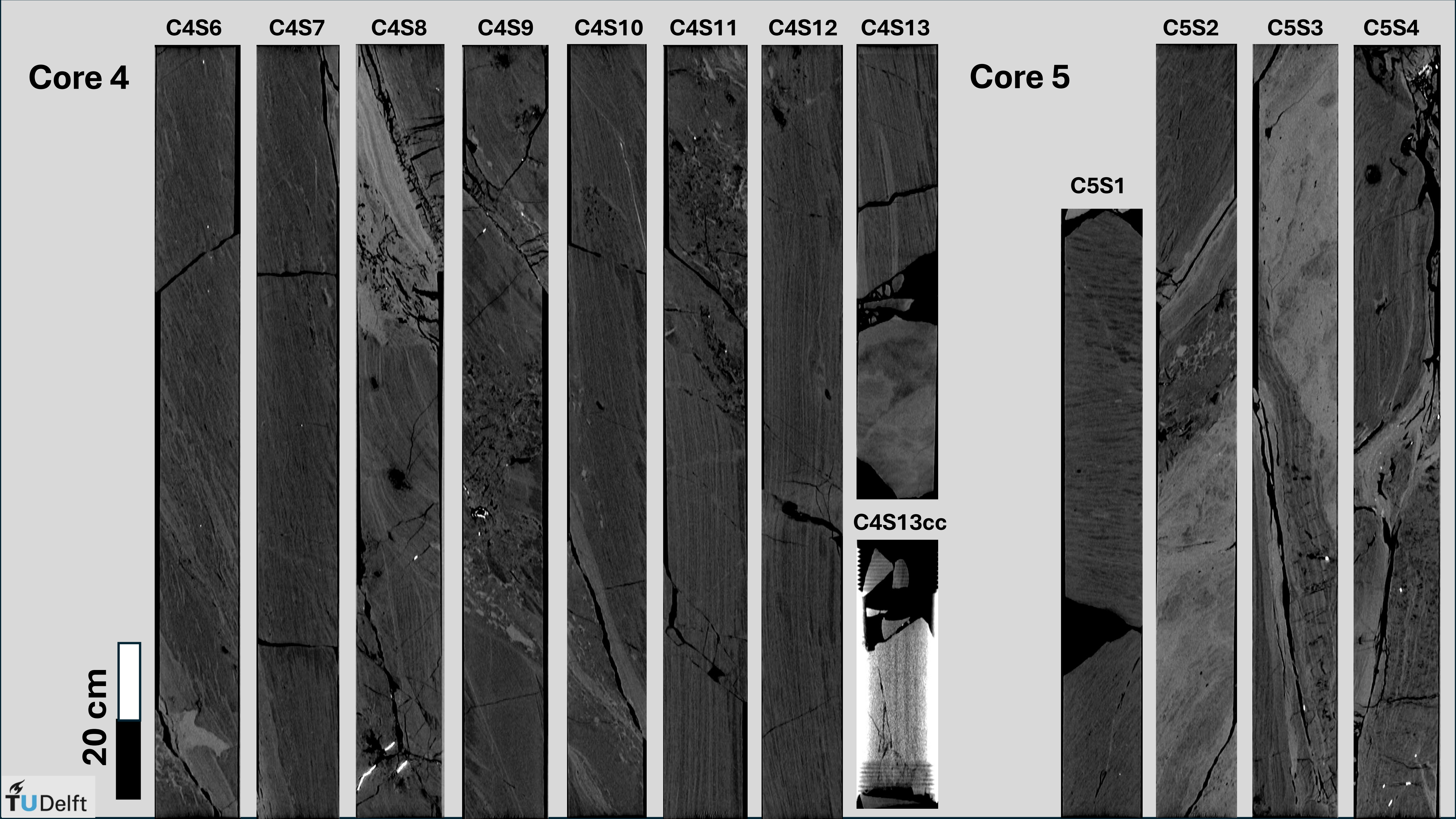
C2S14
20 cm
TUDelft



Core 2
C2S15
C2S16
C2S17
Core 3
C3S1
C3S2
C3S3
Core 4
C4S1
C4S2
C4S3
C4S4
C4S5
20 cm
TU Delft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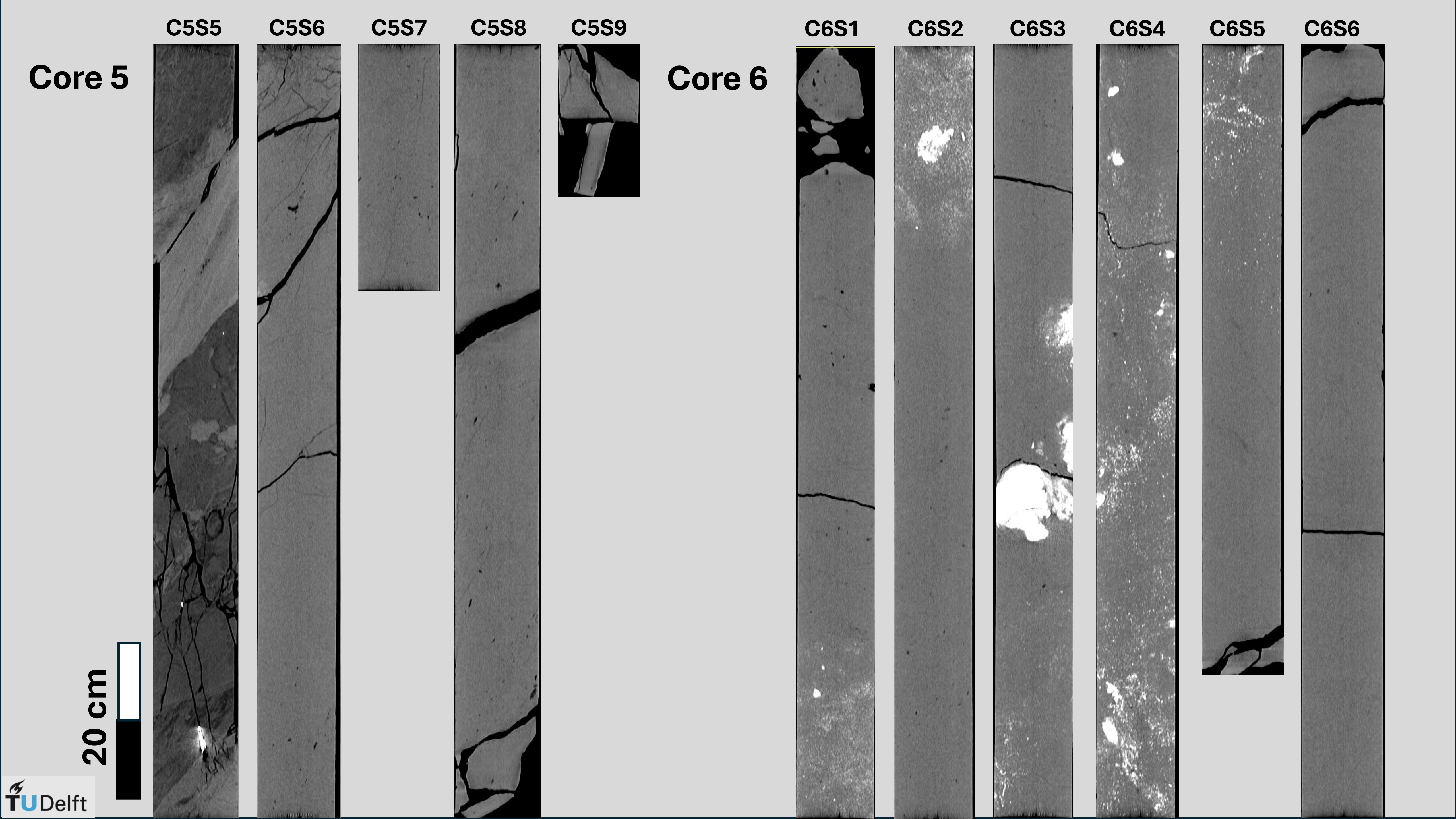
C4S7
C4S8
C4S9
C4S10
C4S11
C4S12
C4S13
C4S13cc
Core 5
C5S1
C5S2
C5S3
C5S4
20 cm
TU Delft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C5S6
C5S7
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Core 6
C6S1
C6S2
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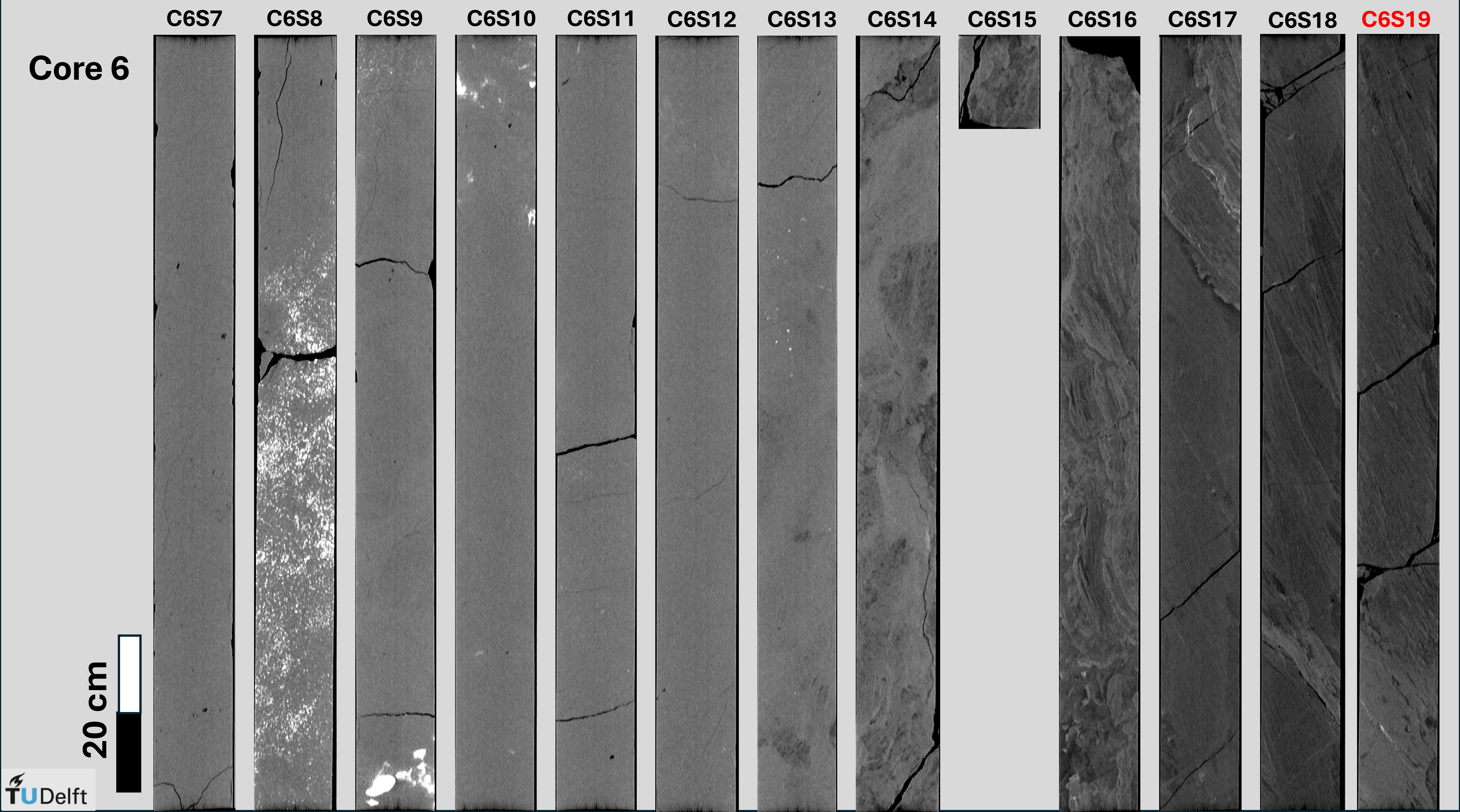
C6S5
C6S6
20 cm
TU Delft


Core 6
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C6S9
C6S10
C6S11
C6S12
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C6S14
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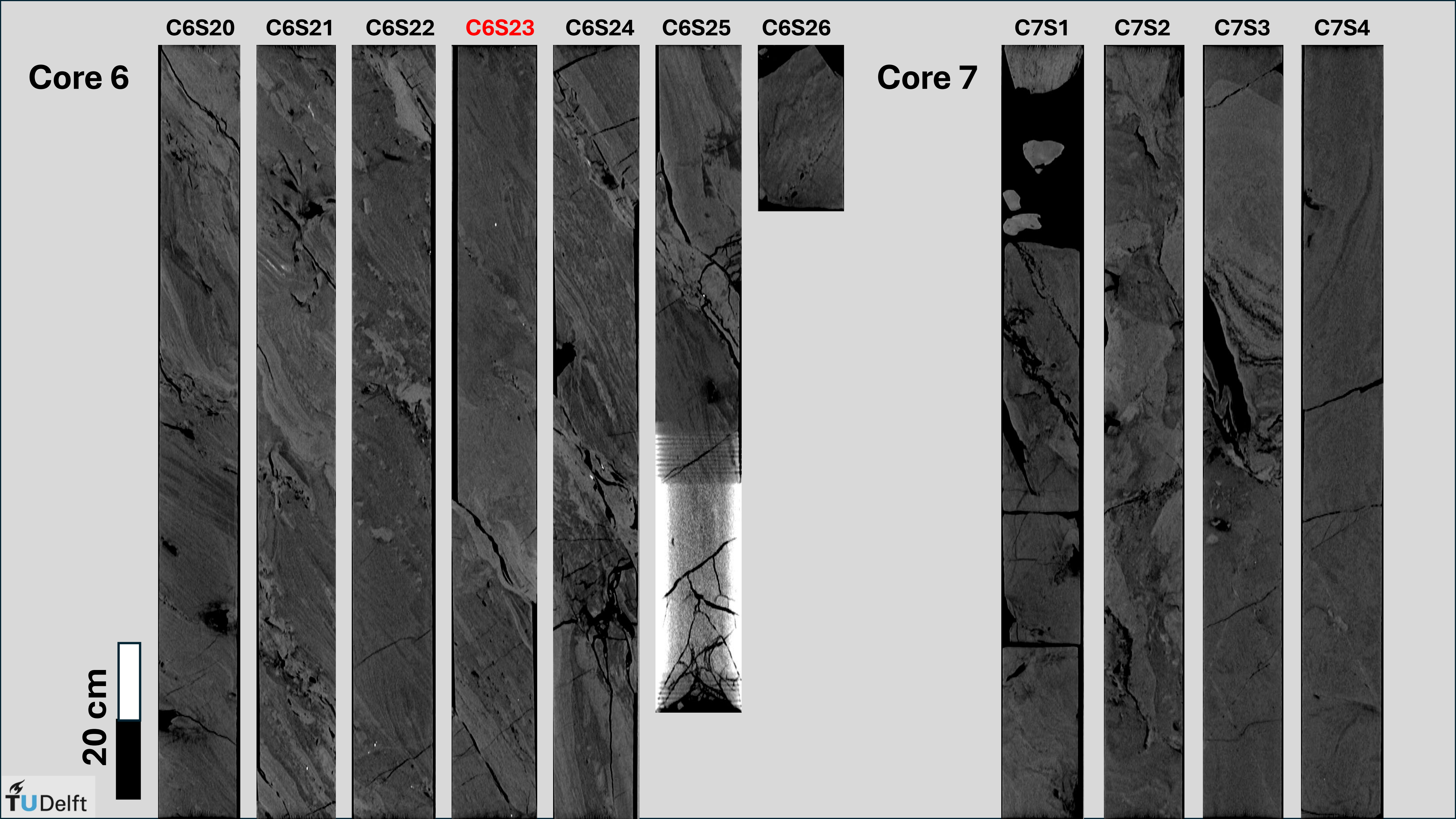
C6S17
C6S18
C6S19
20 cm
TU Delft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C6S22
C6S23
C6S24
C6S25
C6S26
C7S1
C7S2
C7S3
C7S4
Core 6
Core 7
20 cm
TUDelft

Core 7