

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: RH206

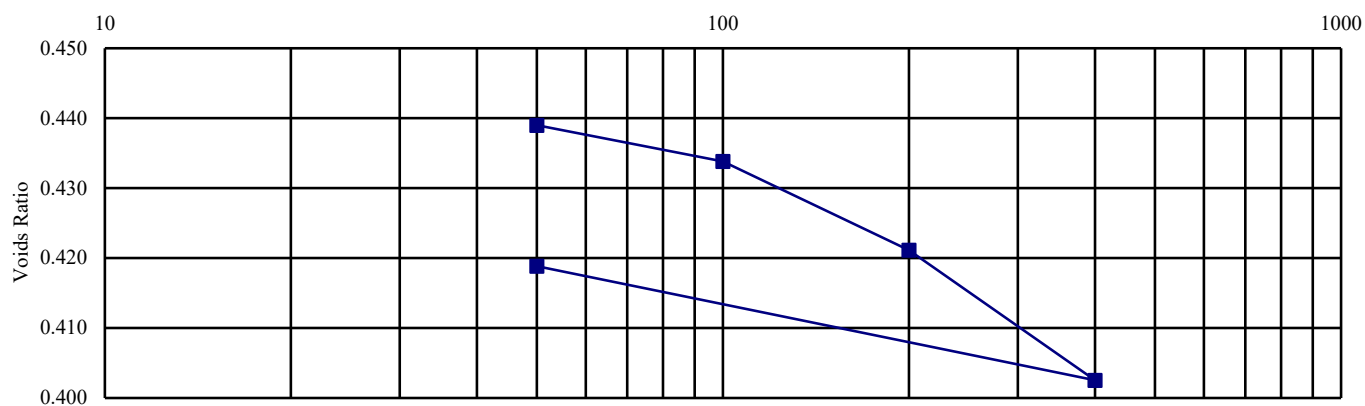
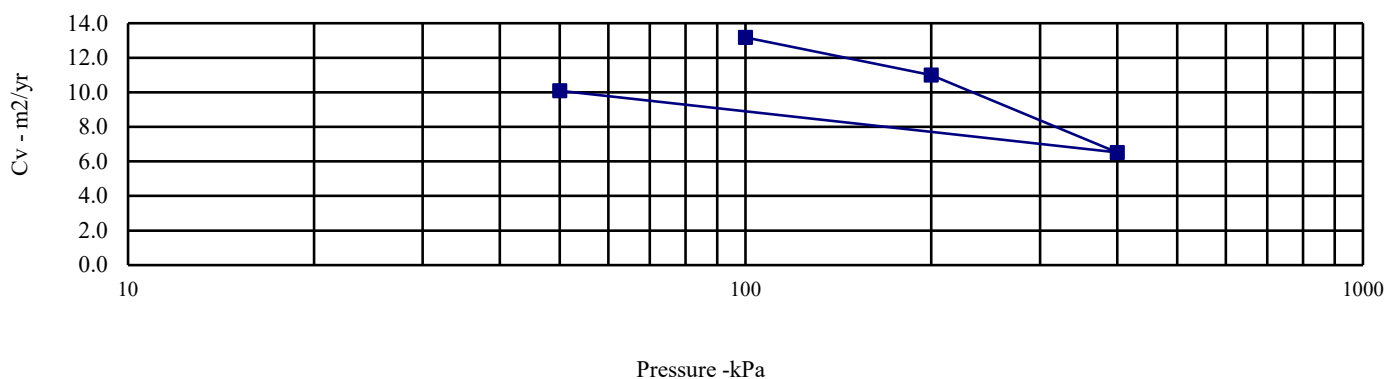
Top Depth (m): 6.00

Sample Number:

Base Depth (m) : 6.45

Sample Type: CS

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	16	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	2.13	0	50	Swelling	Swelling	Method used to	
Dry Density (Mg/m3):	1.83	50	100	0.072	13.178	determine CV:	T90
Voids Ratio:	0.439	100	200	0.089	10.997	Nominal temperature	
Degree of saturation:	97.7	200	400	0.065	6.522	during test ' C:	20
Height (mm):	20.05	400	50	0.033	10.086	Remarks:	
Diameter (mm)	75.06					See summary of soil descriptions	
Particle Density (Mg/m3):	2.63						
Measured							



Ten Acres Lane

Contract No:
PSL22/3506
Client Ref:
LD10385

ONE DIMENSIONAL CONSOLIDATION TEST

BS 1377: Part 5: 1990: Clause 3

Hole Number: CP207

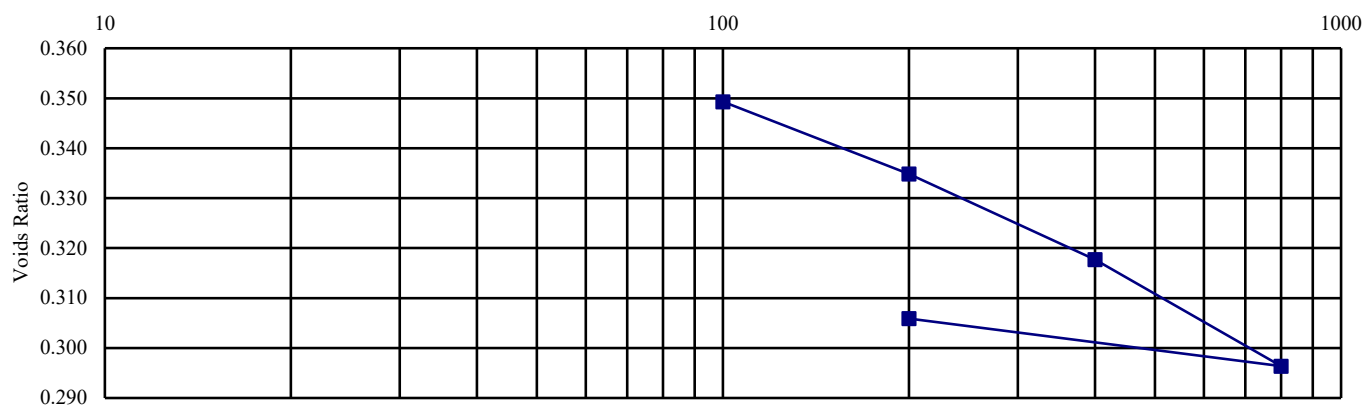
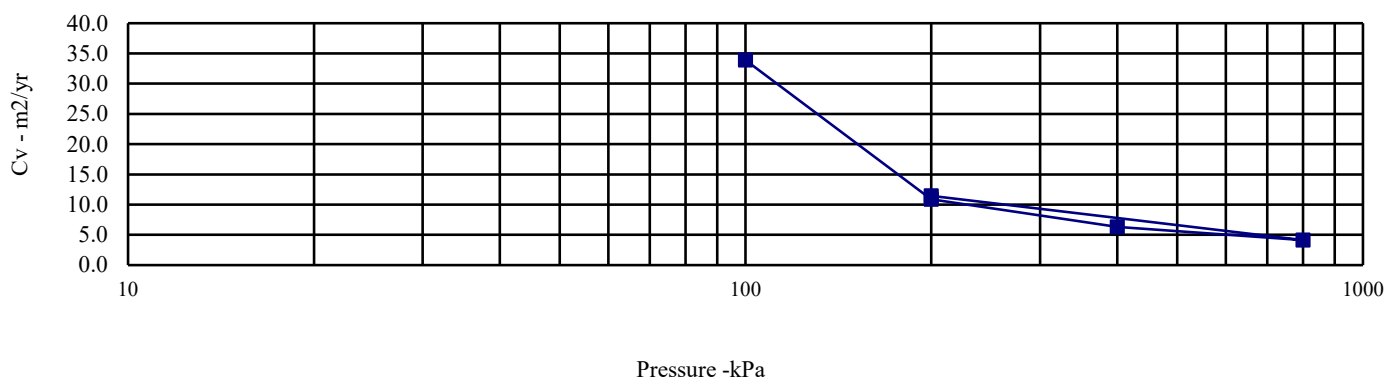
Top Depth (m): 15.00

Sample Number:

Base Depth (m) : 15.45

Sample Type: U

Initial Conditions		Pressure Range		Mv	Cv	Specimen location	
Moisture Content (%):	14	kPa		m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	2.19	0	100	0.172	33.893	Method used to	
Dry Density (Mg/m3):	1.93	100	200	0.107	10.880	determine CV:	T90
Voids Ratio:	0.373	200	400	0.064	6.326	Nominal temperature	
Degree of saturation:	97.0	400	800	0.040	4.136	during test ' C:	20
Height (mm):	20.104	800	200	0.012	11.431	Remarks:	
Diameter (mm)	75.033					See summary of soil descriptions	
Particle Density (Mg/m3):	2.65						
Assumed							



Ten Acres Lane

Contract No:
PSL22/3506
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LD10385



ANALYTICAL TEST REPORT

Contract no: 110069

Contract name: Ten Acres Lane

Client reference: PSL22/3506

Clients name: Professional Soils Laboratory

Clients address: 5/7 Hexthorpe Road
Doncaster
DN4 0AR

Samples received: 07 June 2022

Analysis started: 07 June 2022

Analysis completed: 16 June 2022

Report issued: 16 June 2022

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
\$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing

Approved by:

Rachael Burton

Reporting Team Lead

Chemtech Environmental Limited

SOILS

Lab number Sample id Depth (m) Sample Type Date sampled			110069-1 CP202 11.00-12.00 B -	110069-2 CP203 7.00 B -	110069-3 CP204 4.00 B -	110069-4 CP205 8.00 B -	110069-5 CP206 4.00 B -	110069-6 CP207 10.00-11.00 B -
Test	Method	Units						
pH	CE004 ^U	units	9.6	8.8	8.2	8.4	8.2	8.7
Magnesium (2:1 water soluble)	CE061	mg/l Mg	1.1	7.9	22	12	10	2.6
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	29	6.7	8.3	6.3	4.4	12
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	<1	<1	1.0	<1	4.6	<1
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	517	132	534	154	118	316
Sulphate (total)	CE062 ^U	mg/kg SO ₄	2101	547	1914	690	561	1281
Sulphur (total)	CE119	mg/kg S	2036	1004	1114	1355	605	1418
Sulphur (total)	CE119	% w/w S	0.20	0.10	0.11	0.14	0.06	0.14
Total Organic Carbon (TOC)	CE197	% w/w C	0.9	-	3.6	-	1.4	1.9
Estimate of OMC (calculated from TOC)	CE197	% w/w	1.6	-	6.1	-	2.4	3.2

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SOILS

Lab number			110069-7	110069-8	110069-9	110069-10	110069-11	110069-12
Sample id			CP208	CP209	CP210	TP202	TP211	TP213
Depth (m)			15.00-15.45	18.00	10.00	2.00	1.80	1.00
Sample Type			U	B	B	B	B	B
Date sampled			-	-	-	-	-	-
Test	Method	Units						
pH	CE004 ^U	units	8.5	8.6	8.8	7.6	7.6	7.9
Magnesium (2:1 water soluble)	CE061	mg/l Mg	4.3	4.5	2.8	9.7	16	3.9
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	4.1	9.1	6.9	4.4	4.3	6.7
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	<1	1.0	<1	<1	<1	3.4
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	114	86	23	74	570	209
Sulphate (total)	CE062 ^U	mg/kg SO ₄	462	439	141	376	2692	1433
Sulphur (total)	CE119	mg/kg S	795	791	141	164	2077	942
Sulphur (total)	CE119	% w/w S	0.08	0.08	0.01	0.02	0.21	0.09
Total Organic Carbon (TOC)	CE197	% w/w C	-	-	-	0.9	6.3	-
Estimate of OMC (calculated from TOC)	CE197	% w/w	-	-	-	1.6	10.8	-

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SOILS

Lab number			110069-13	110069-14	110069-15	110069-16	110069-17	110069-18
Sample id			TP214	TP219	TP220	TP223	TP236	TP237
Depth (m)			2.00	1.20	2.00	2.20	1.50	4.50
Sample Type			B	B	B	B	B	B
Date sampled			-	-	-	-	-	-
Test	Method	Units						
pH	CE004 ^U	units	7.7	9.4	-	-	-	8.8
Magnesium (2:1 water soluble)	CE061	mg/l Mg	13	2.3	6.1	-	-	6.1
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	9.0	14	-	-	-	4.2
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	2.0	3.0	-	-	-	1.7
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	1443	989	-	-	-	340
Sulphate (total)	CE062 ^U	mg/kg SO ₄	5497	4377	-	-	-	630
Sulphur (total)	CE119	mg/kg S	2420	2139	-	-	-	454
Sulphur (total)	CE119	% w/w S	0.24	0.21	-	-	-	0.05
Total Organic Carbon (TOC)	CE197	% w/w C	0.6	2.4	4.5	3.5	0.4	-
Estimate of OMC (calculated from TOC)	CE197	% w/w	1.0	4.1	7.8	6.0	0.7	-

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SOILS

Lab number			110069-19	110069-20	110069-21	110069-22	110069-23	110069-24
Sample id			TP250	TP252	TP252	RH201	RH205	RH206
Depth (m)			1.00	1.00	2.10	15.80-16.00	12.50-12.80	6.00-6.45
Sample Type			B	B	B	CS	CS	CS
Date sampled			-	-	-	-	-	-
Test	Method	Units						
pH	CE004 ^U	units	6.9	8.3	8.6	8.4	8.5	8.6
Magnesium (2:1 water soluble)	CE061	mg/l Mg	22	4.4	1.5	13	9.2	9.9
Chloride (2:1 water soluble)	CE049 ^U	mg/l Cl	3.9	9.3	6.1	7.5	8.2	4.7
Nitrate (2:1 water soluble)	CE049 ^U	mg/l NO ₃	2.0	6.9	<1	1.3	<1	<1
Sulphate (2:1 water soluble)	CE061 ^U	mg/l SO ₄	597	142	36	165	82	50
Sulphate (total)	CE062 ^U	mg/kg SO ₄	1883	1051	216	639	447	418
Sulphur (total)	CE119	mg/kg S	1598	654	<100	516	739	522
Sulphur (total)	CE119	% w/w S	0.16	0.07	<0.01	0.05	0.07	0.05
Total Organic Carbon (TOC)	CE197	% w/w C	4.7	4.5	0.6	-	-	-
Estimate of OMC (calculated from TOC)	CE197	% w/w	8.1	7.7	1.0	-	-	-

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METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received	U	-	units
CE061	Magnesium (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		1	mg/l Mg
CE049	Chloride (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l Cl
CE049	Nitrate (2:1 water soluble)	Aqueous extraction, IC-COND	Dry	U	1	mg/l NO ₃
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO ₄
CE062	Sulphate (total)	Acid extraction, ICP-OES	Dry	U	100	mg/kg SO ₄
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		100	mg/kg S
CE119	Sulphur (total)	Acid extraction, ICP-OES	Dry		0.01	% w/w S
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w

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DEVIATING SAMPLE INFORMATION

Comments

Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.

For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.

Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
110069-1	CP202	11.00-12.00	Y	All (NSD)
110069-2	CP203	7.00	Y	All (NSD)
110069-3	CP204	4.00	Y	All (NSD)
110069-4	CP205	8.00	Y	All (NSD)
110069-5	CP206	4.00	Y	All (NSD)
110069-6	CP207	10.00-11.00	Y	All (NSD)
110069-7	CP208	15.00-15.45	Y	All (NSD)
110069-8	CP209	18.00	Y	All (NSD)
110069-9	CP210	10.00	Y	All (NSD)
110069-10	TP202	2.00	Y	All (NSD)
110069-11	TP211	1.80	Y	All (NSD)
110069-12	TP213	1.00	Y	All (NSD)
110069-13	TP214	2.00	Y	All (NSD)
110069-14	TP219	1.20	Y	All (NSD)
110069-18	TP237	4.50	Y	All (NSD)
110069-19	TP250	1.00	Y	All (NSD)
110069-20	TP252	1.00	Y	All (NSD)
110069-21	TP252	2.10	Y	All (NSD)
110069-22	RH201	15.80-16.00	Y	All (NSD)
110069-23	RH205	12.50-12.80	Y	All (NSD)
110069-24	RH206	6.00-6.45	Y	All (NSD)

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 4 weeks from initial receipt unless otherwise instructed.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

Analytical results are inclusive of stones, where applicable.

A P P E N D I X N

Geological Cross Sections

ABBREVIATIONS

TF = Topsoil Fill

CONC = Concrete

CMG = Cohesive Made Ground

CMG = Granular Made Ground

DW = Suspected Construction and Demolition Waste

CW = Suspected Combustion Waste

CS = Suspected Colliery Spoil

HW = Suspected Household Waste

RNG = Suspected Reworked Natural Ground

CGT = Cohesive Glacial Till

GGT = Granular Glacial Till

CF = Chester Formation

CSF = Collyhurst Sandstone Formation

Project Id: LD10385
Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Site Plan
Scale: 1:3500
Engineer: Wardell Armstrong LLP
Contractor: Geotron



Project Id: LD10385

Project Title: Ten Acres Lane

Location: Newton Heath

Client: NUVU Developments Ltd

Title: Section line 1

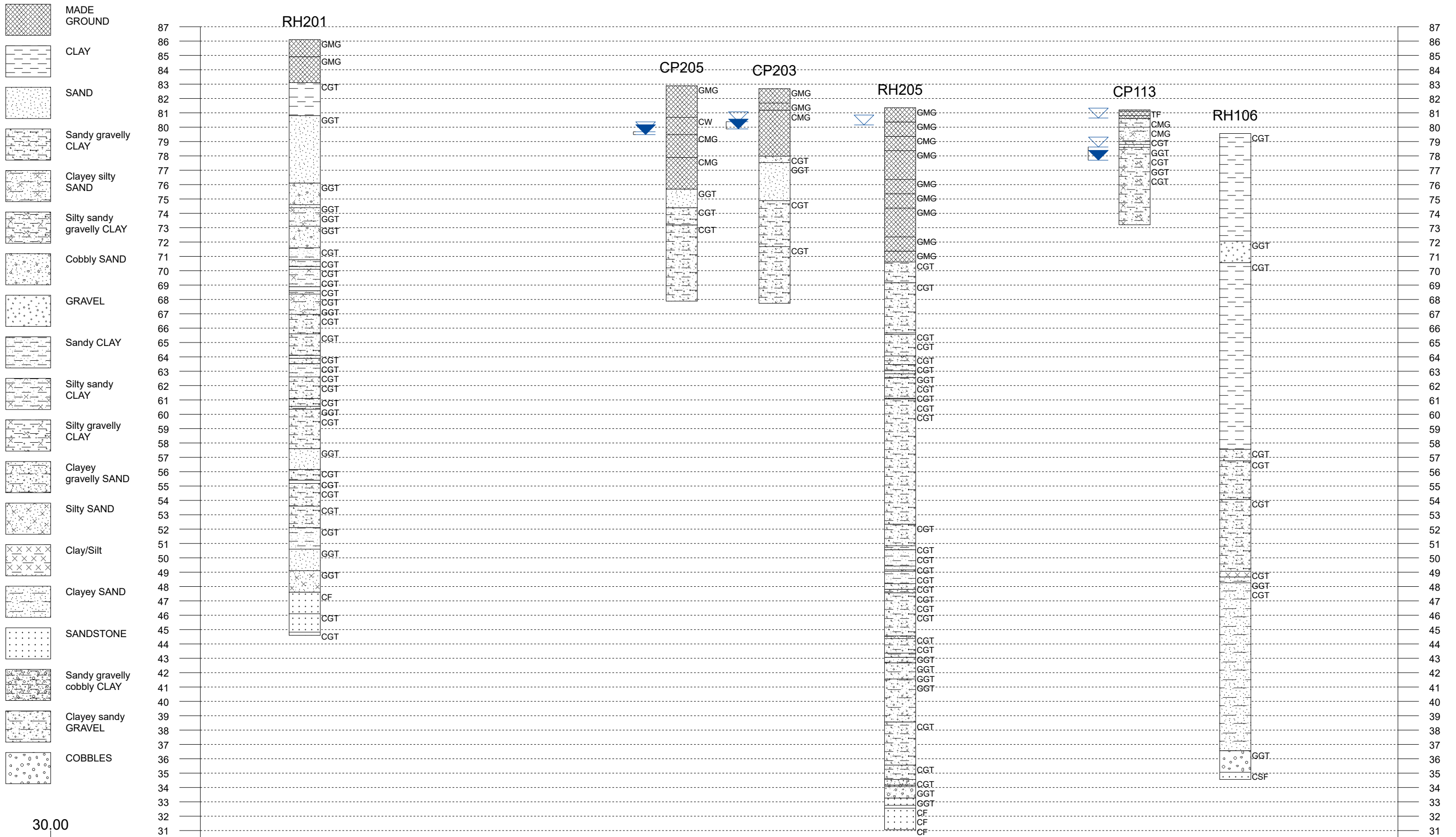
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Horizontal Scale: 1:2000

Engineer: Wardell Armstrong LLP



Legend Key

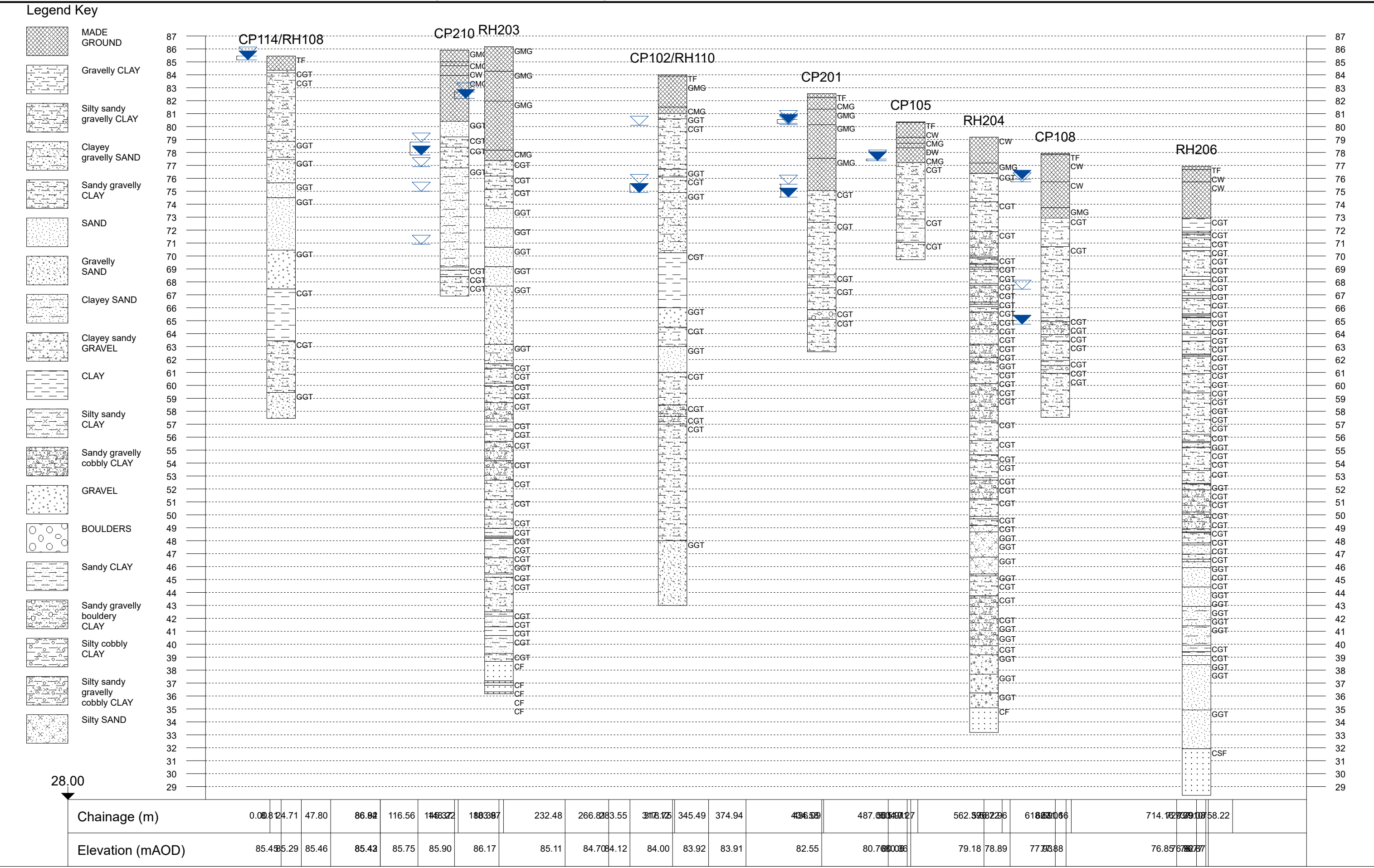


30.00

Chainage (m)	0.00	18.38	138.94	220.63	232.49	244.28	270.42	282.98	337.78	352.36	362.04	389.15	416.81	463.52	515.72	517.52	526.94	543.09
Elevation (mAOD)	86.10		83.28	82.88	82.50		82.68		81.36	81.34		81.12	81.29	81.20		79.59	79.24	

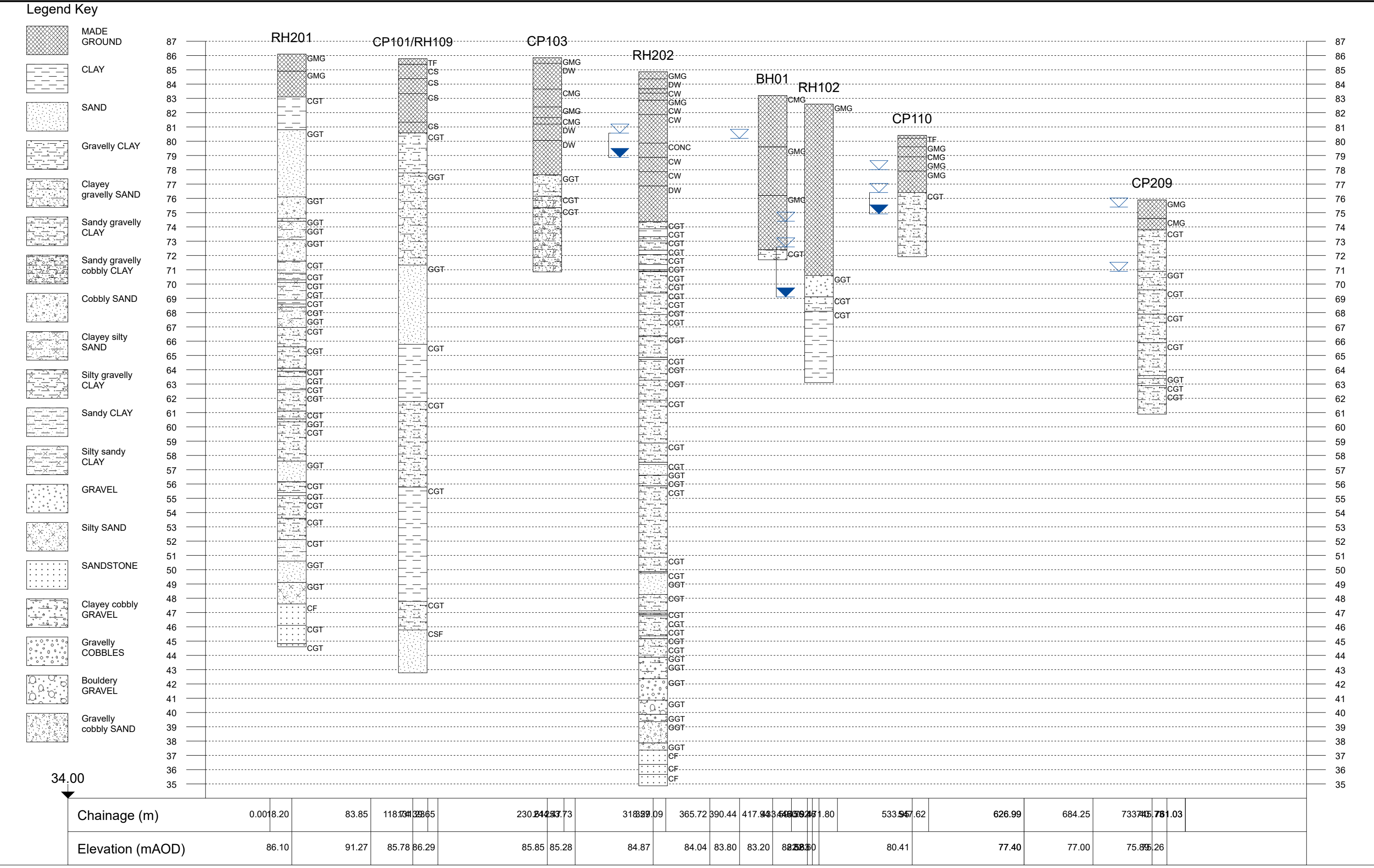
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 2
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Engineer: Wardell Armstrong LLP



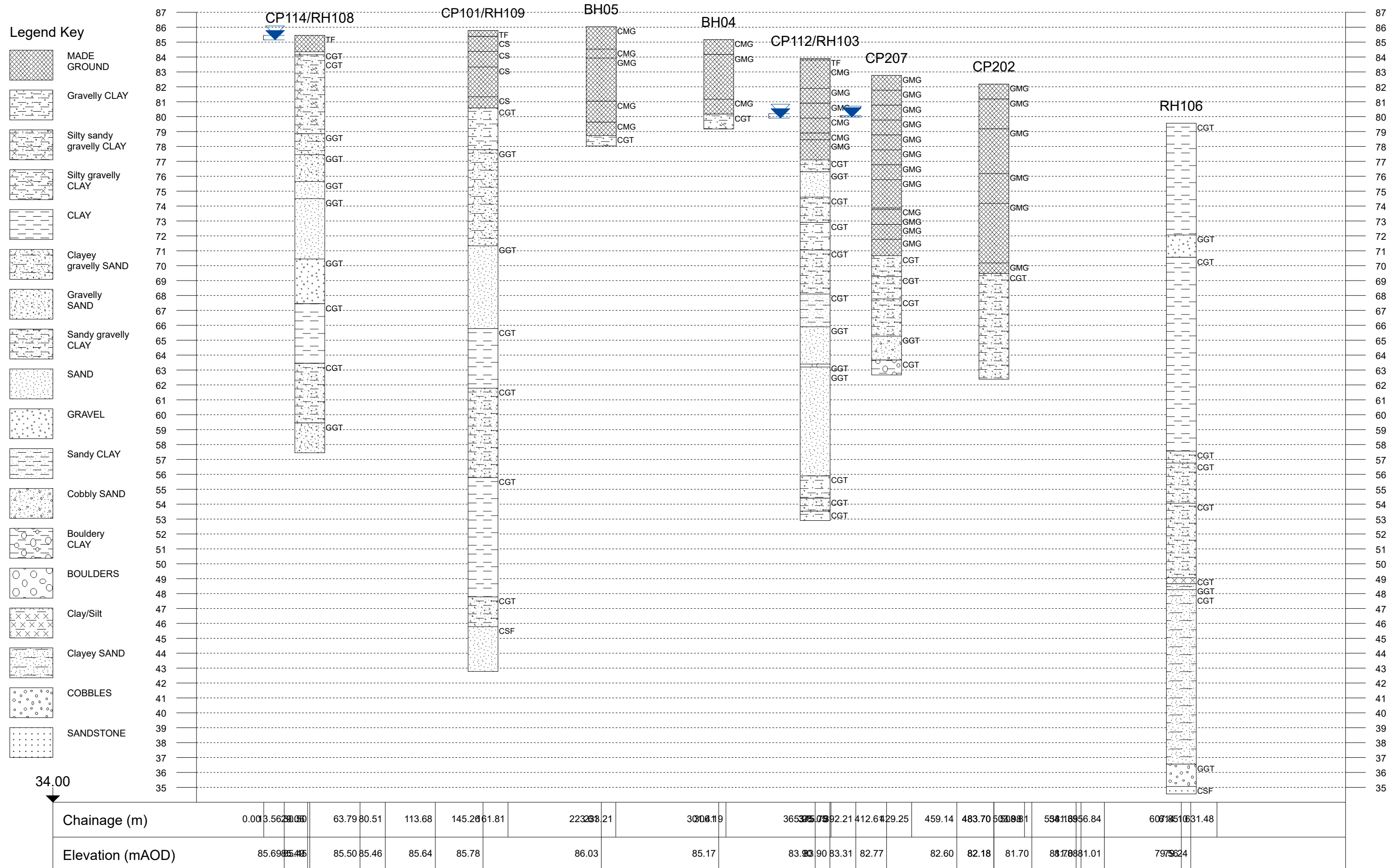
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 3
Vertical Scale: 1:240
Horizontal Scale: 1:2850
Engineer: Wardell Armstrong LLP



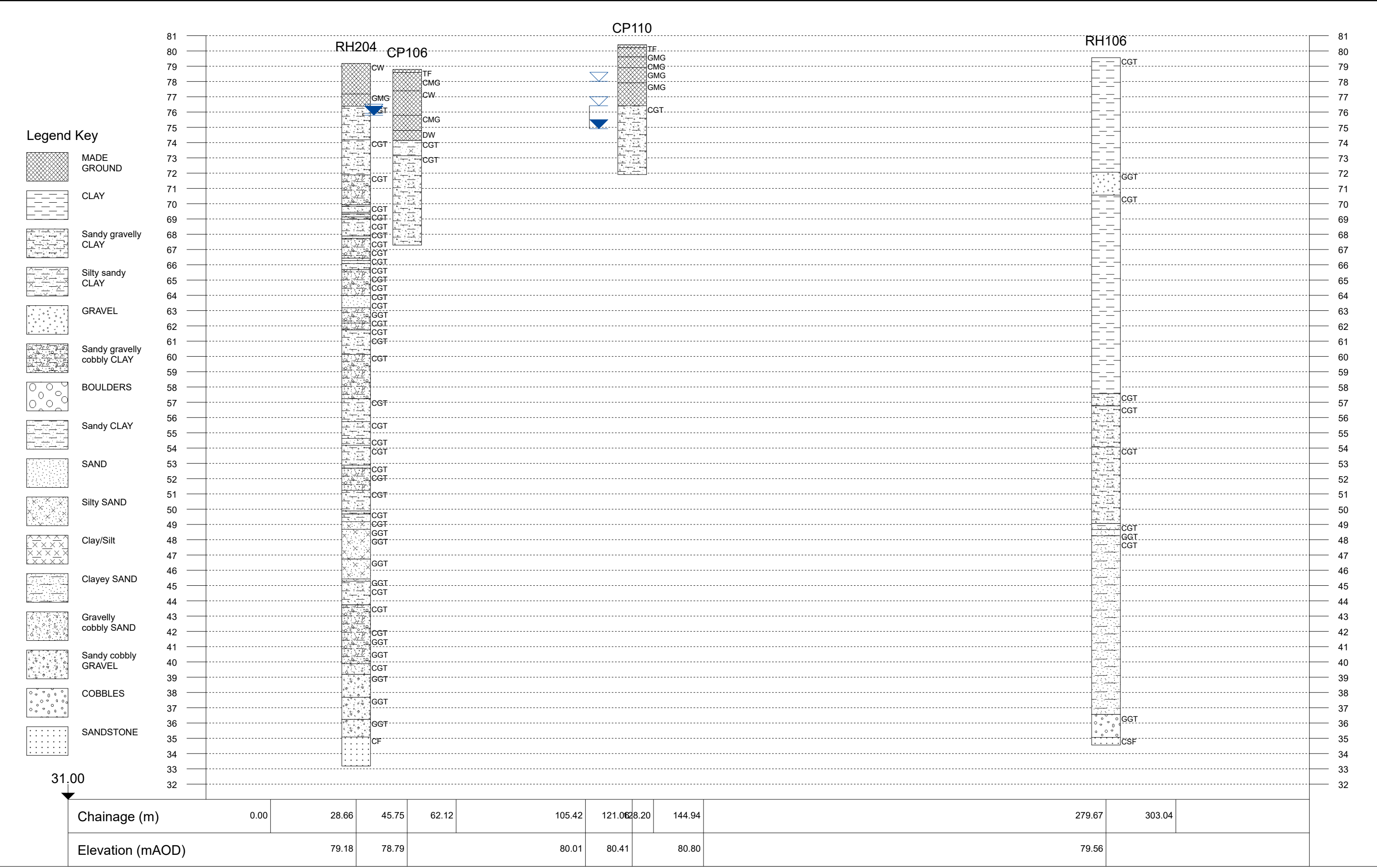
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 4
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Horizontal Scale: 1:2370
Engineer: Wardell Armstrong LLP



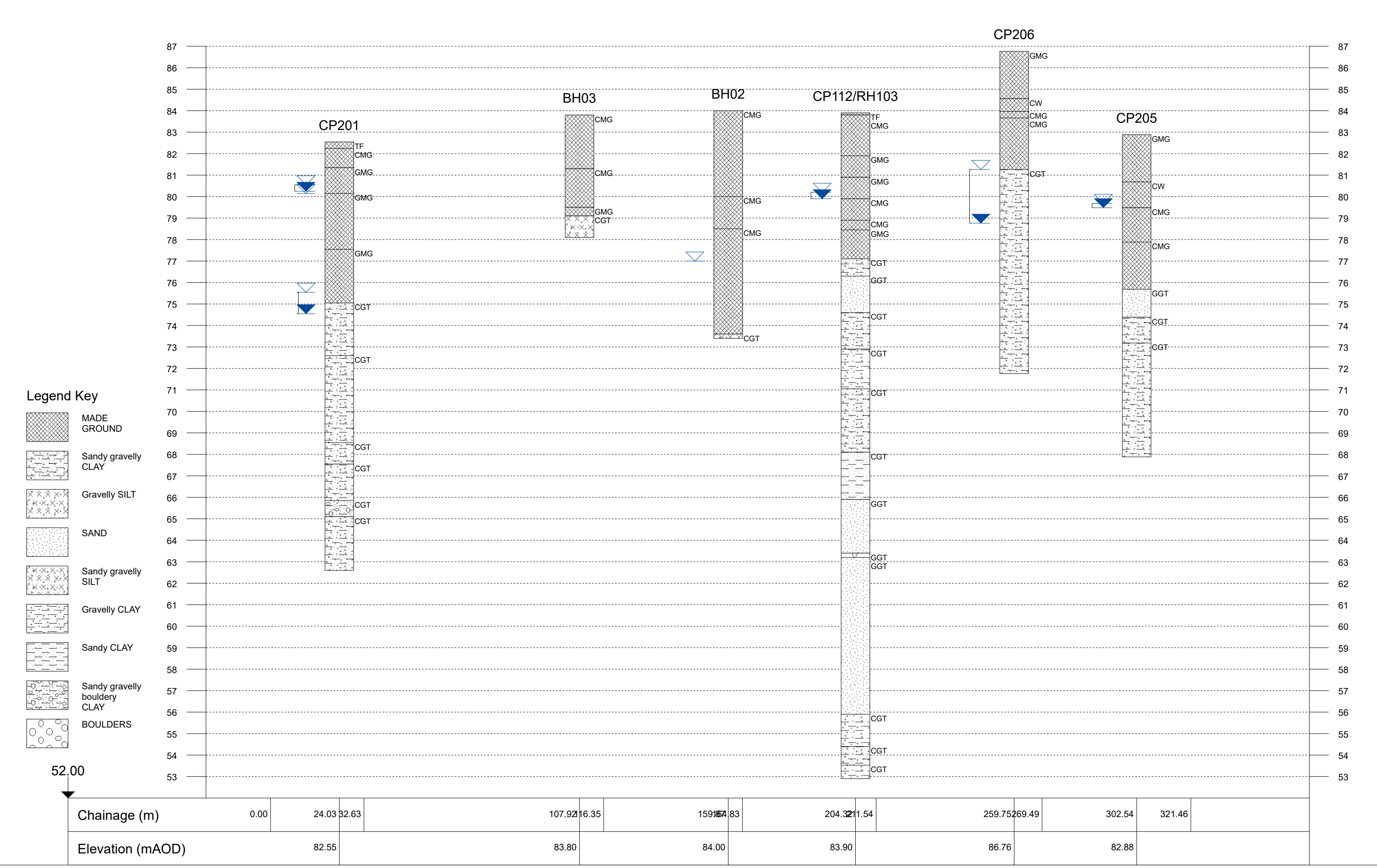
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 5
Vertical Scale: 1:225
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Engineer: Wardell Armstrong LLP



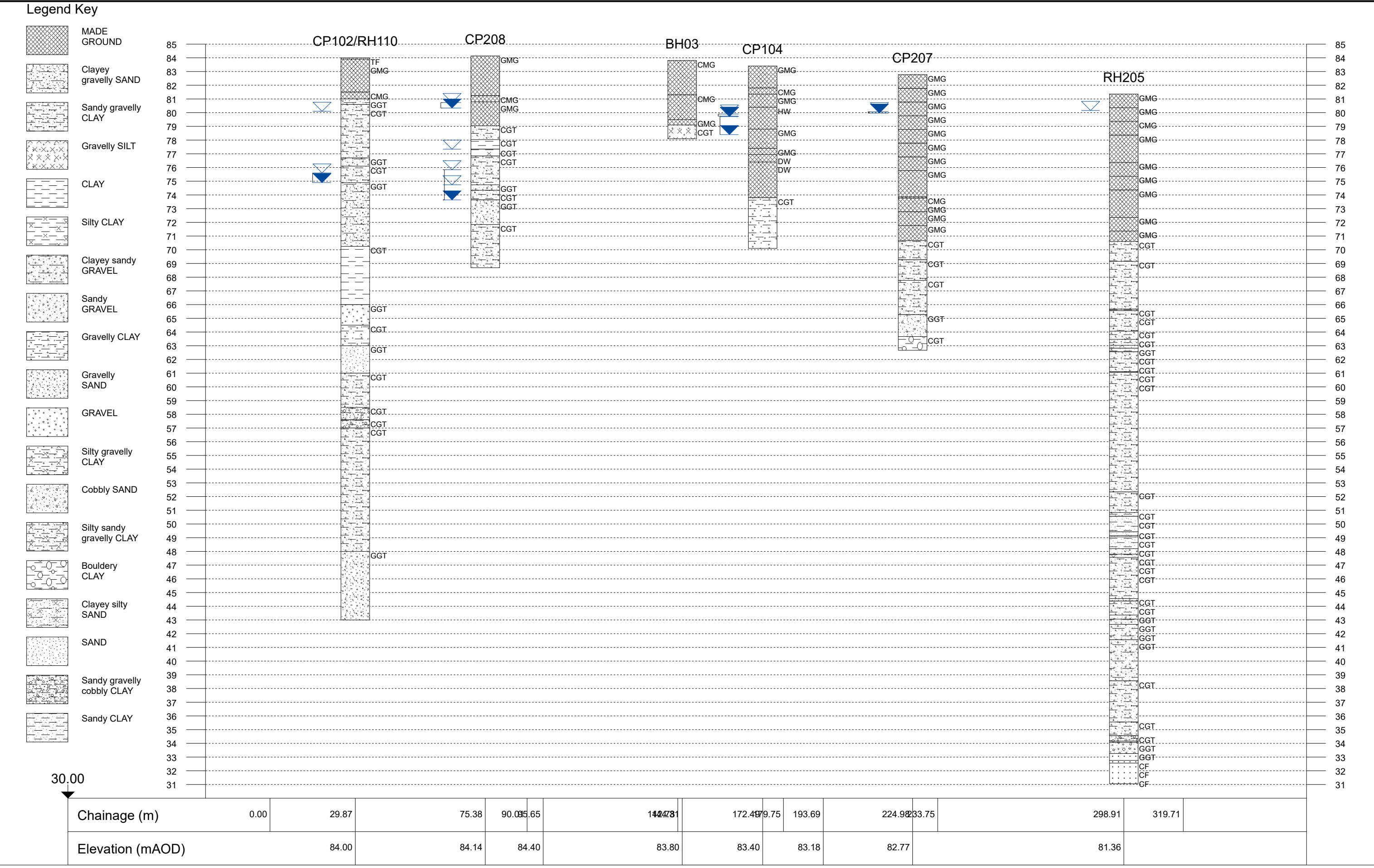
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 6
Vertical Scale: 1:160
Horizontal Scale: 1:1200
Engineer: Wardell Armstrong LLP



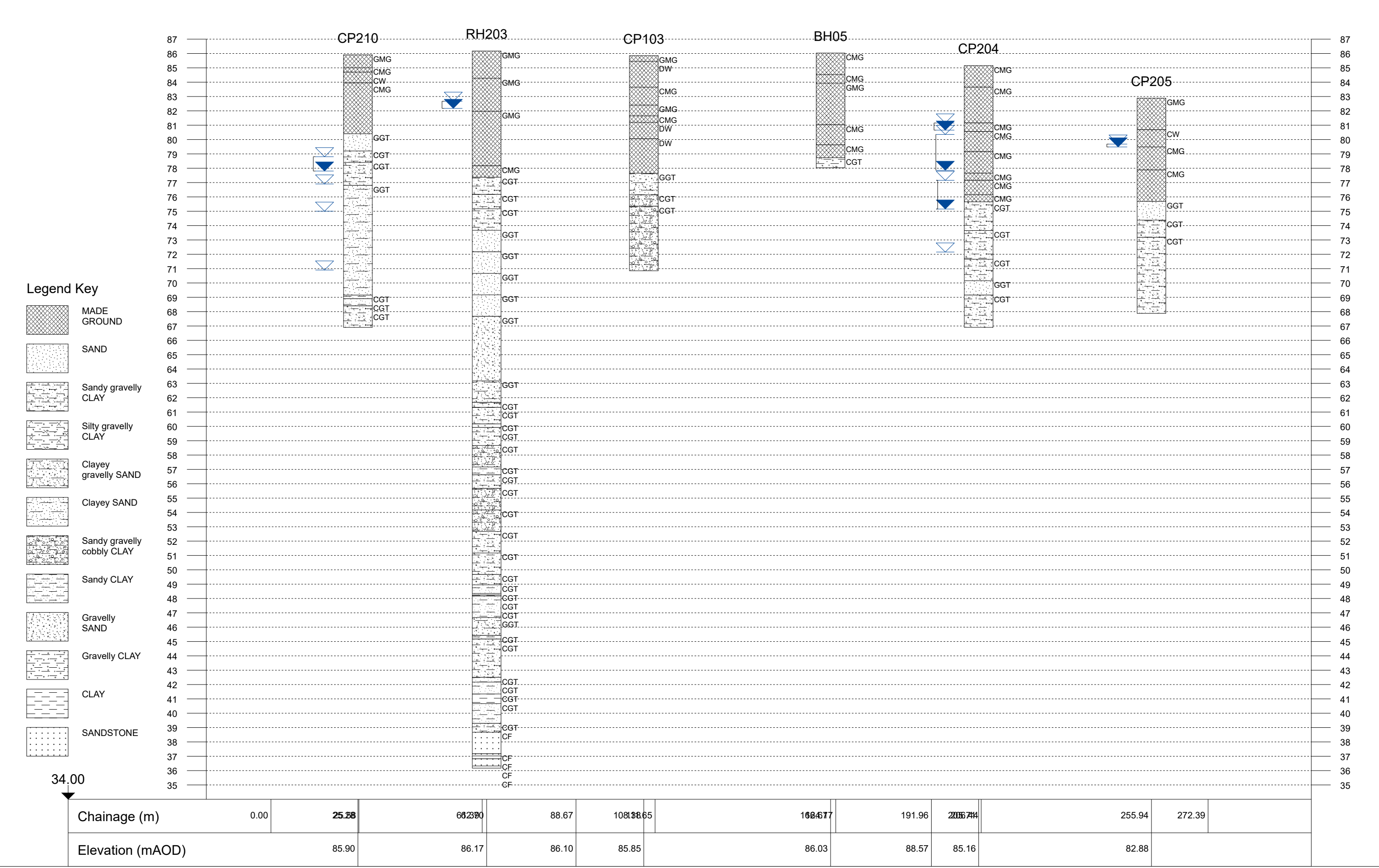
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 7
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Engineer: Wardell Armstrong LLP



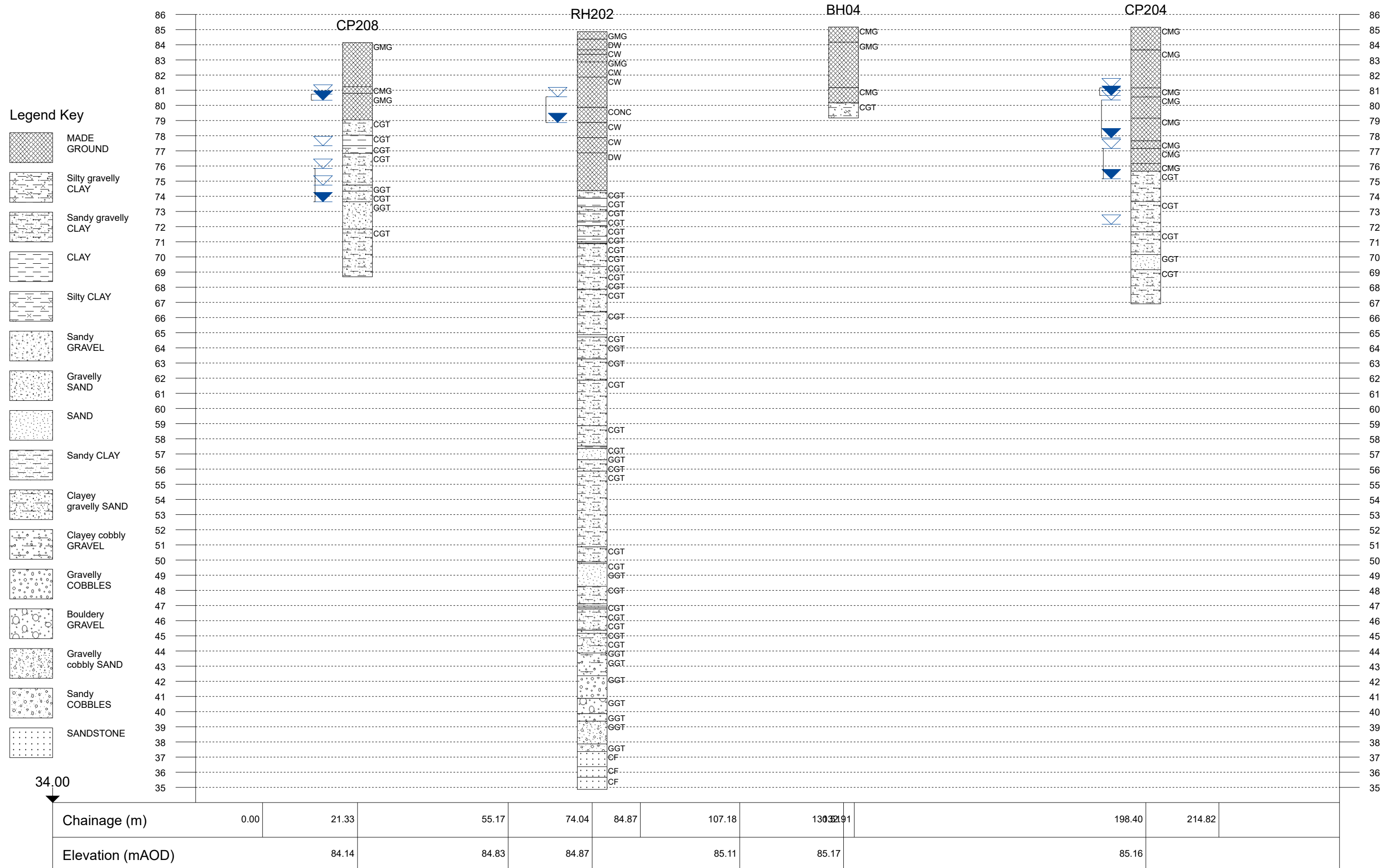
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 8
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Engineer: Wardell Armstrong LLP



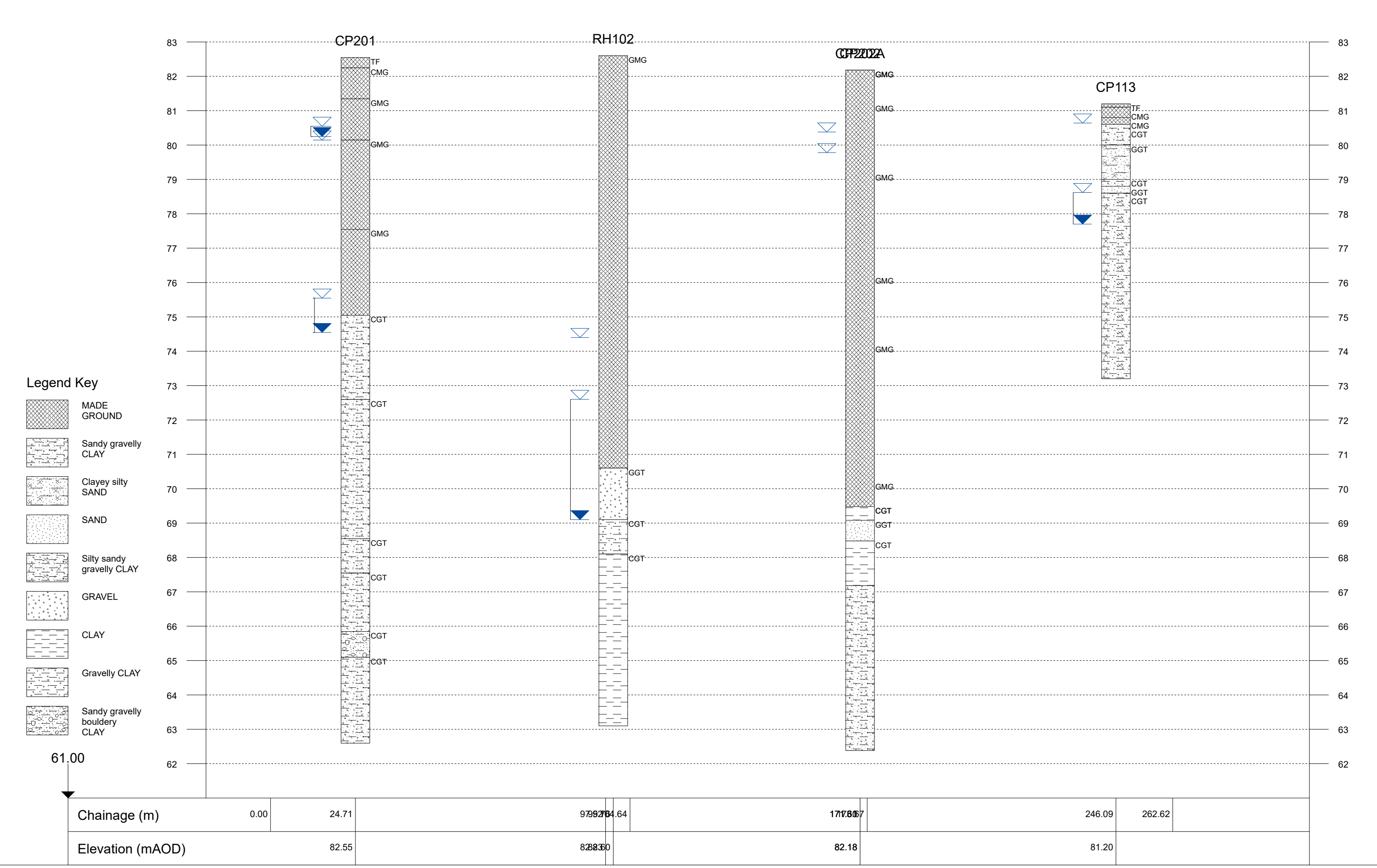
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 9
Vertical Scale: 1:235
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Engineer: Wardell Armstrong LLP



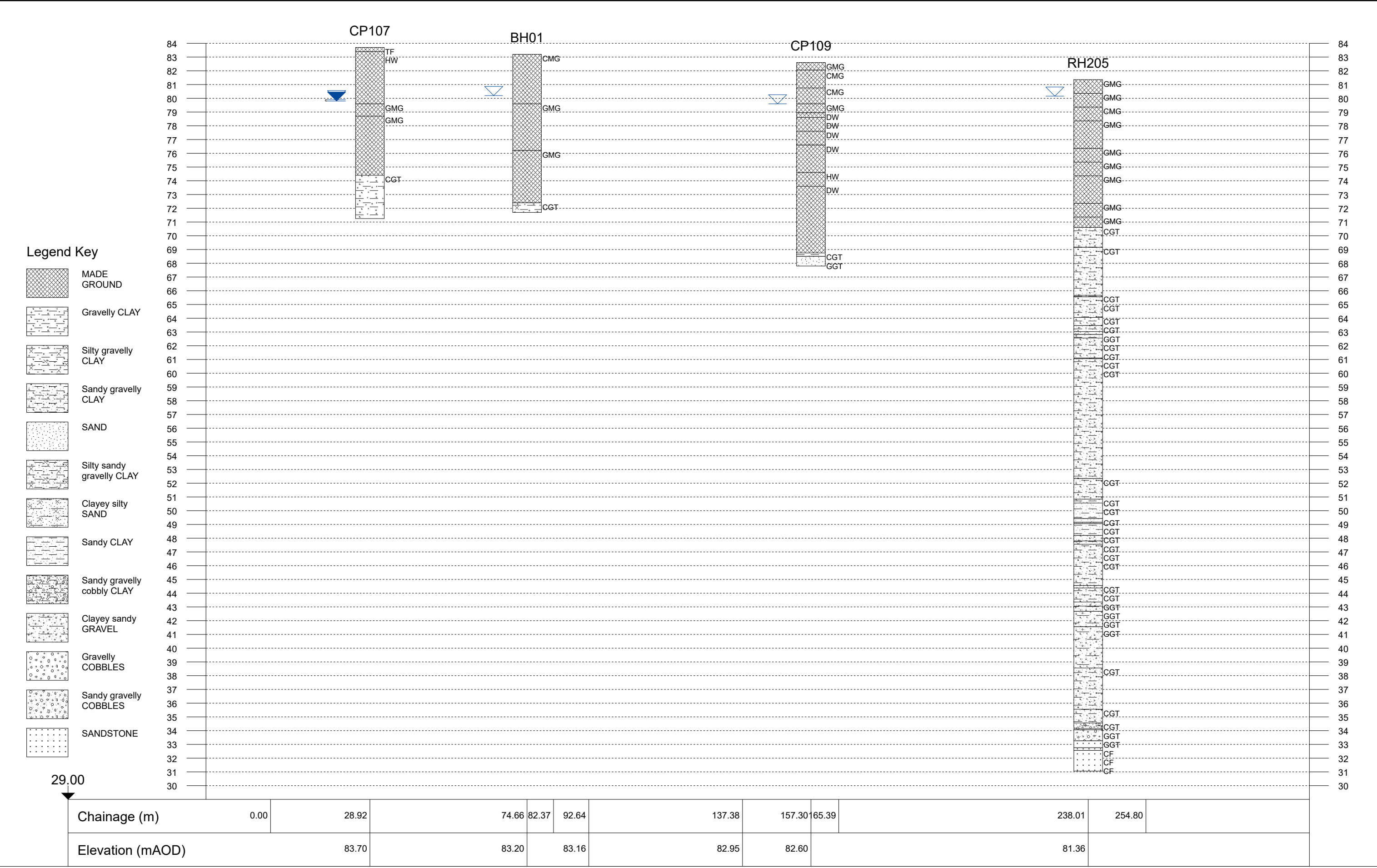
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 10
Vertical Scale: 1:100
Horizontal Scale: 1:1000
Engineer: Wardell Armstrong LLP



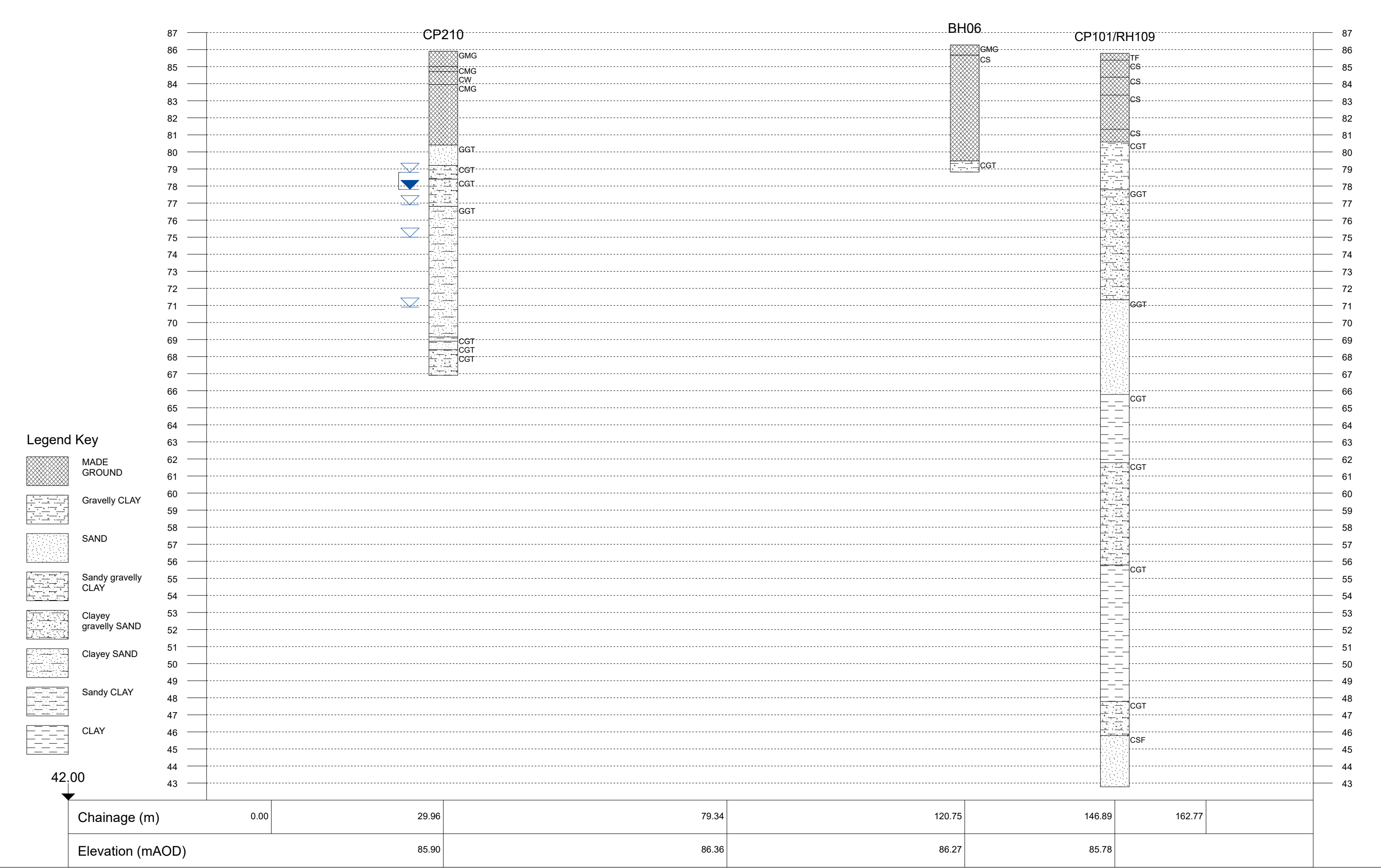
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 11
Vertical Scale: 1:250
Horizontal Scale: 1:1000
Engineer: Wardell Armstrong LLP



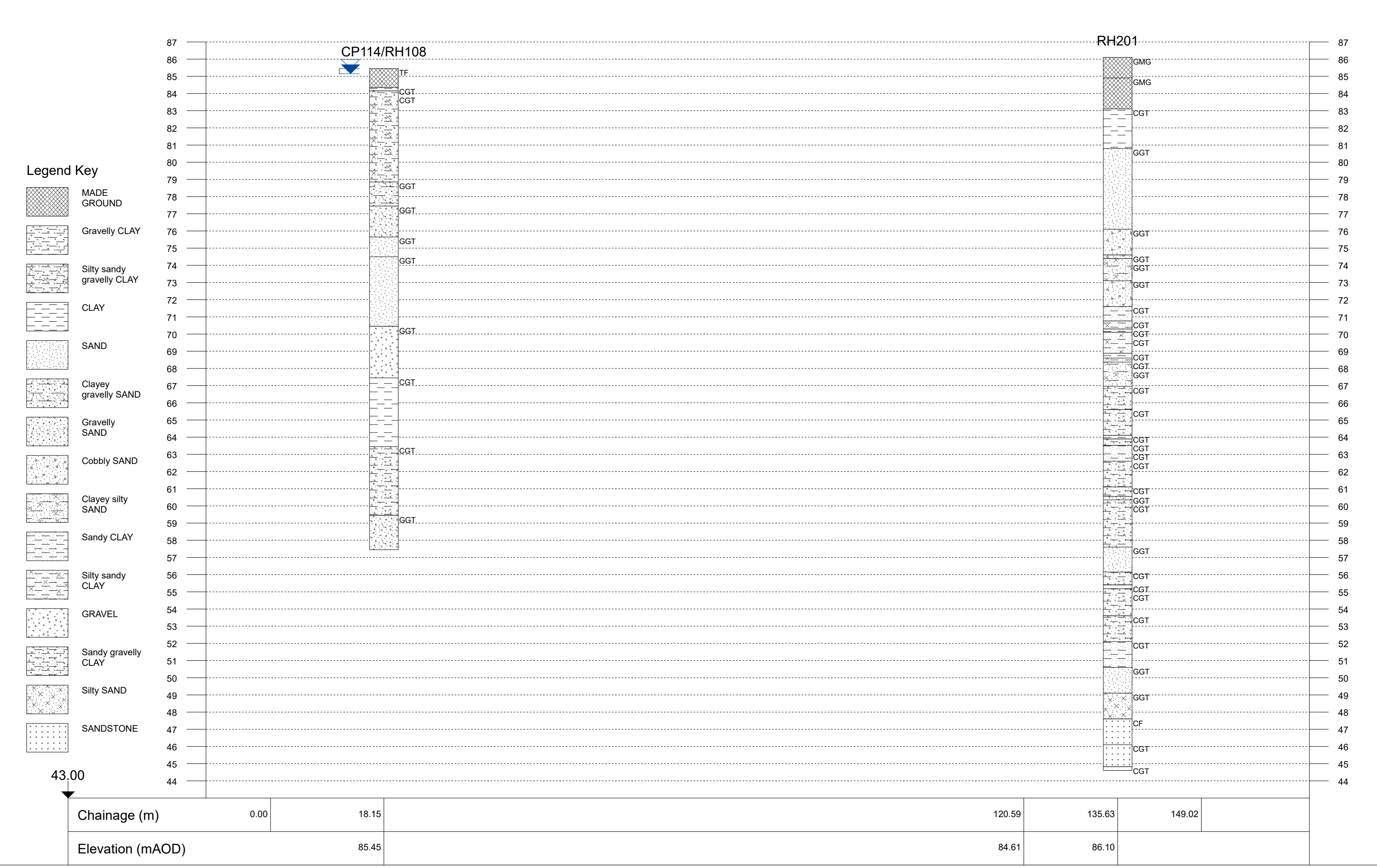
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 12
Vertical Scale: 1:202
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Engineer: Wardell Armstrong LLP



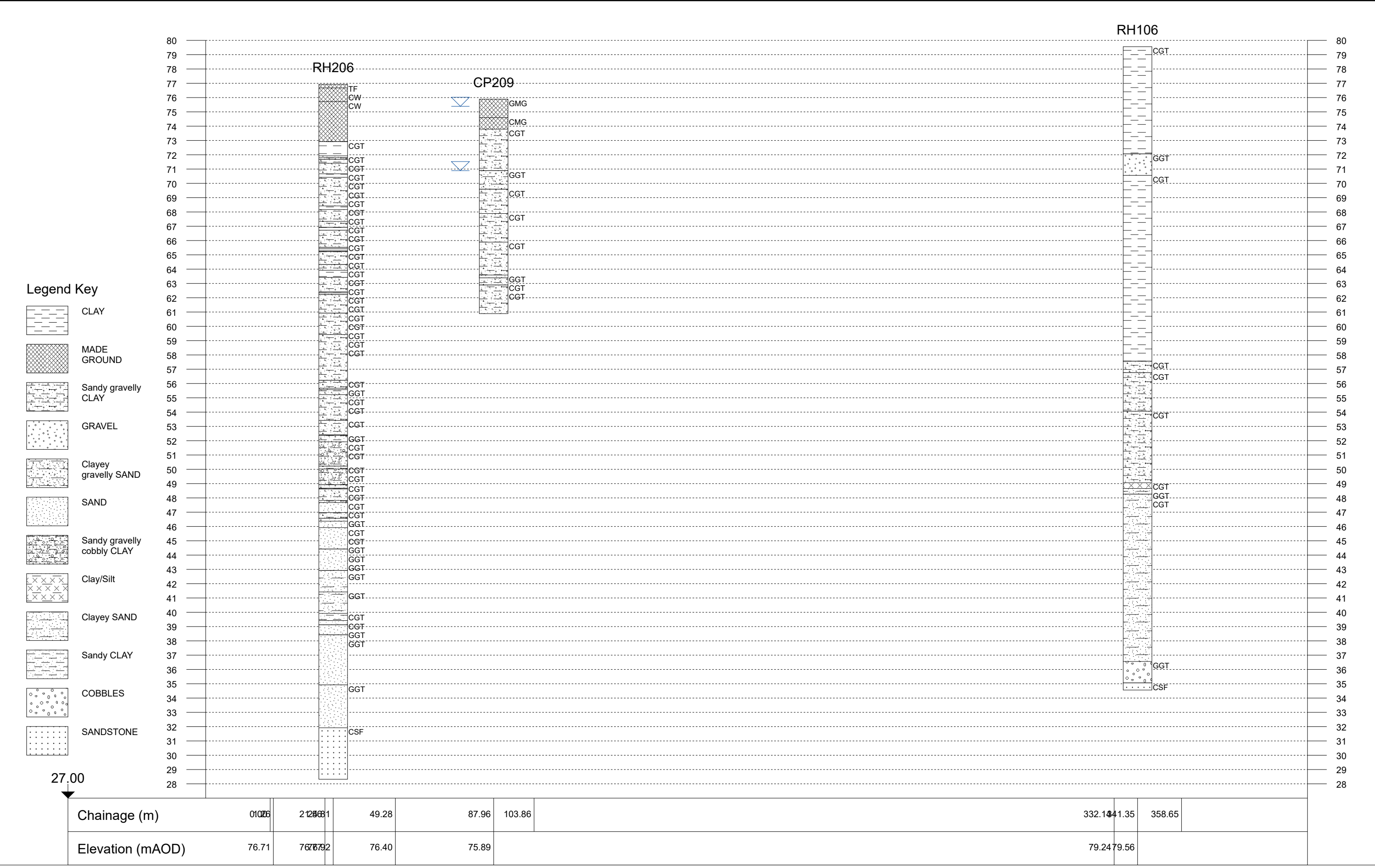
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 13
Vertical Scale: 1:200
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Engineer: Wardell Armstrong LLP



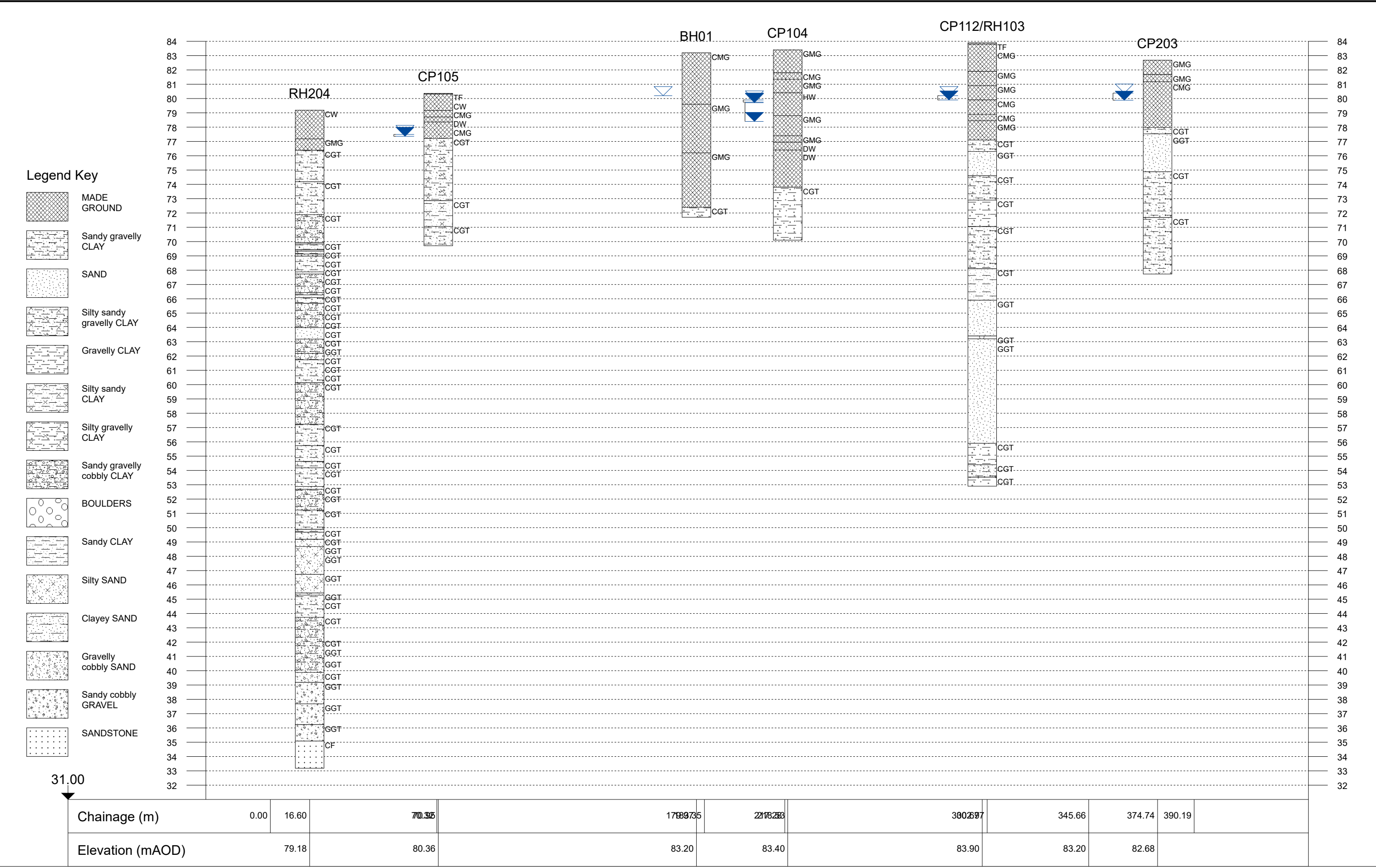
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 14
Vertical Scale: 1:240
Horizontal Scale: 1:1350
Engineer: Wardell Armstrong LLP



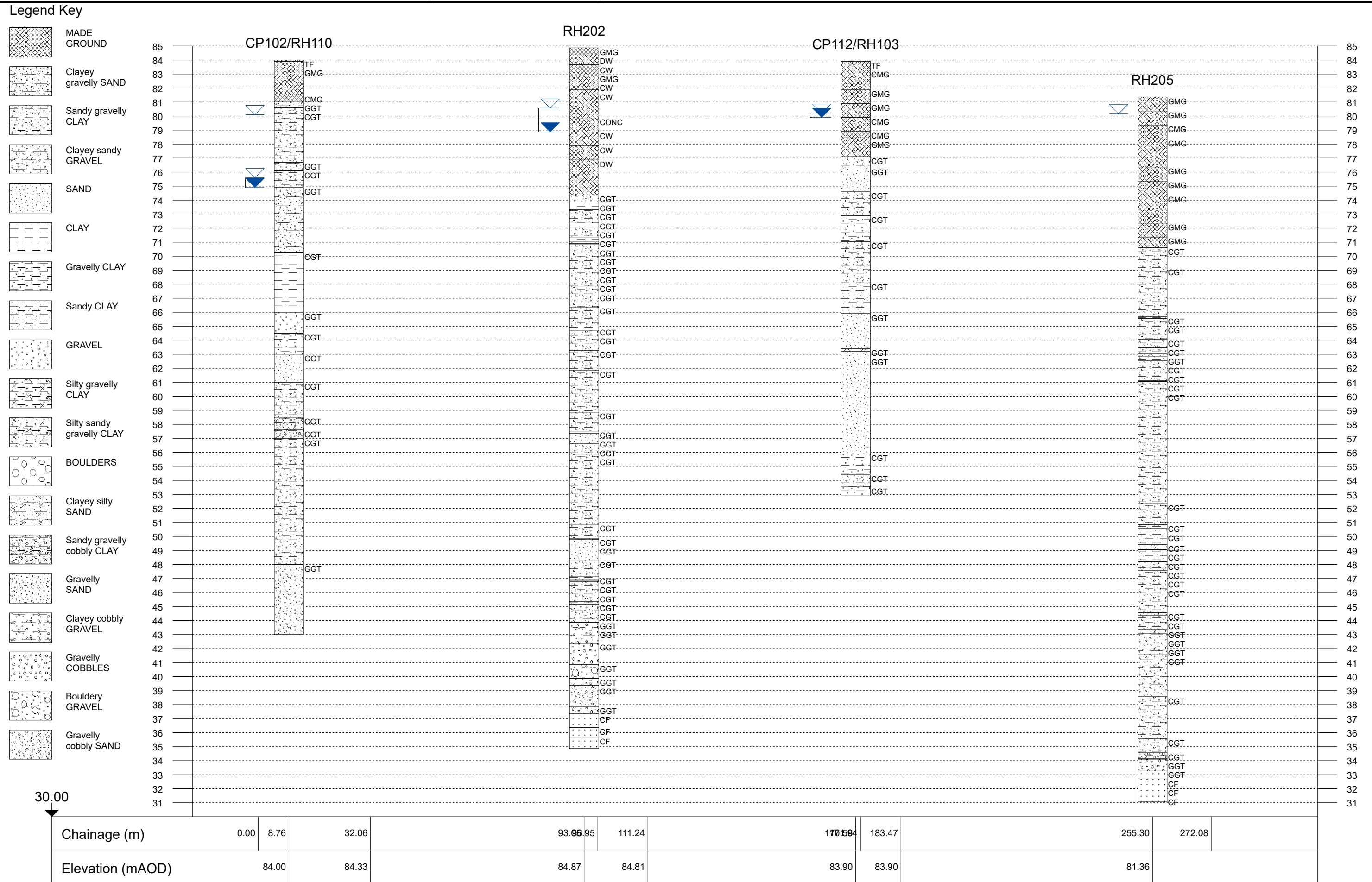
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 15
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Horizontal Scale: 1:1450
Engineer: Wardell Armstrong LLP



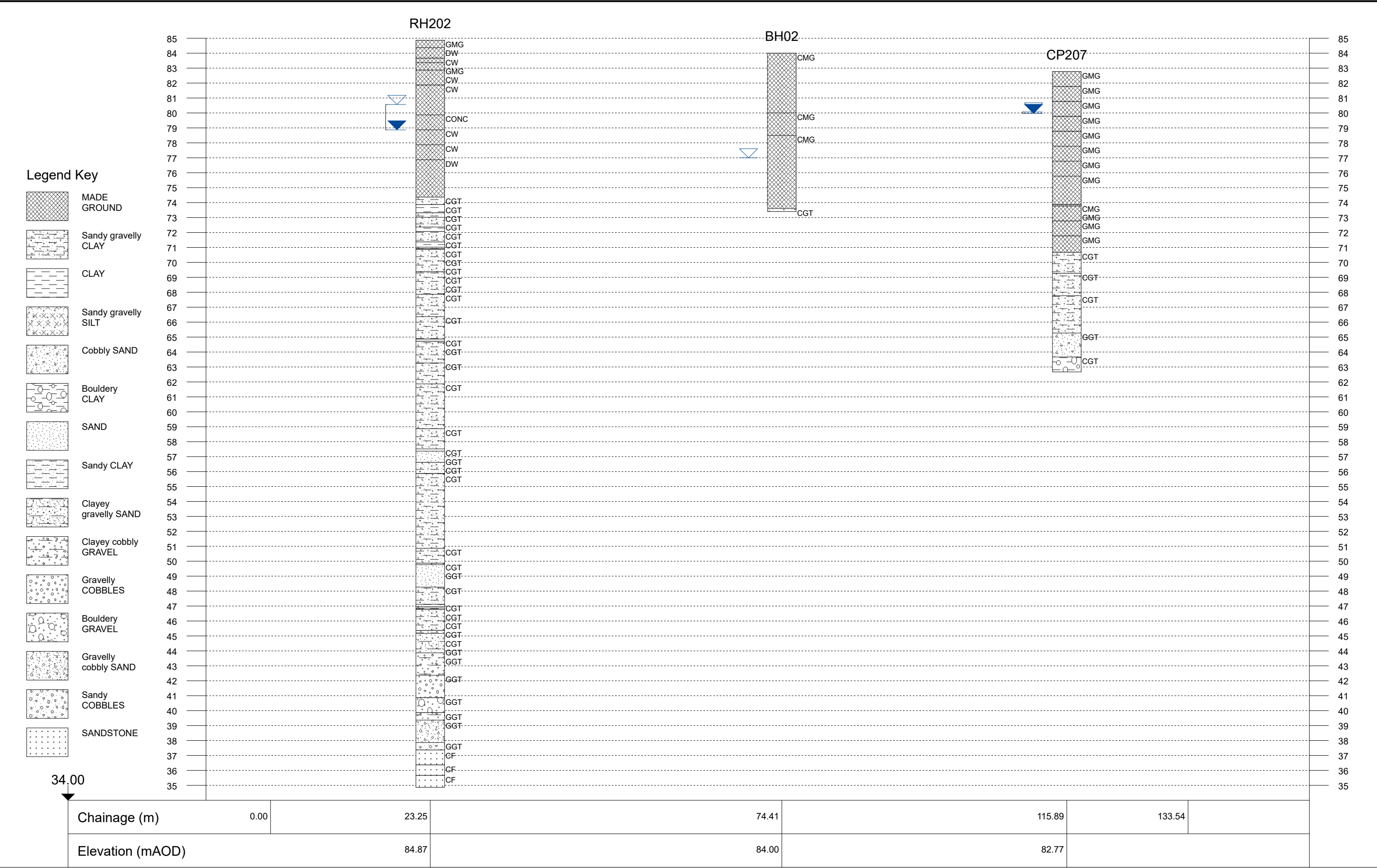
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 16
Vertical Scale: 1:250
Horizontal Scale: 1:1000
Engineer: Wardell Armstrong LLP



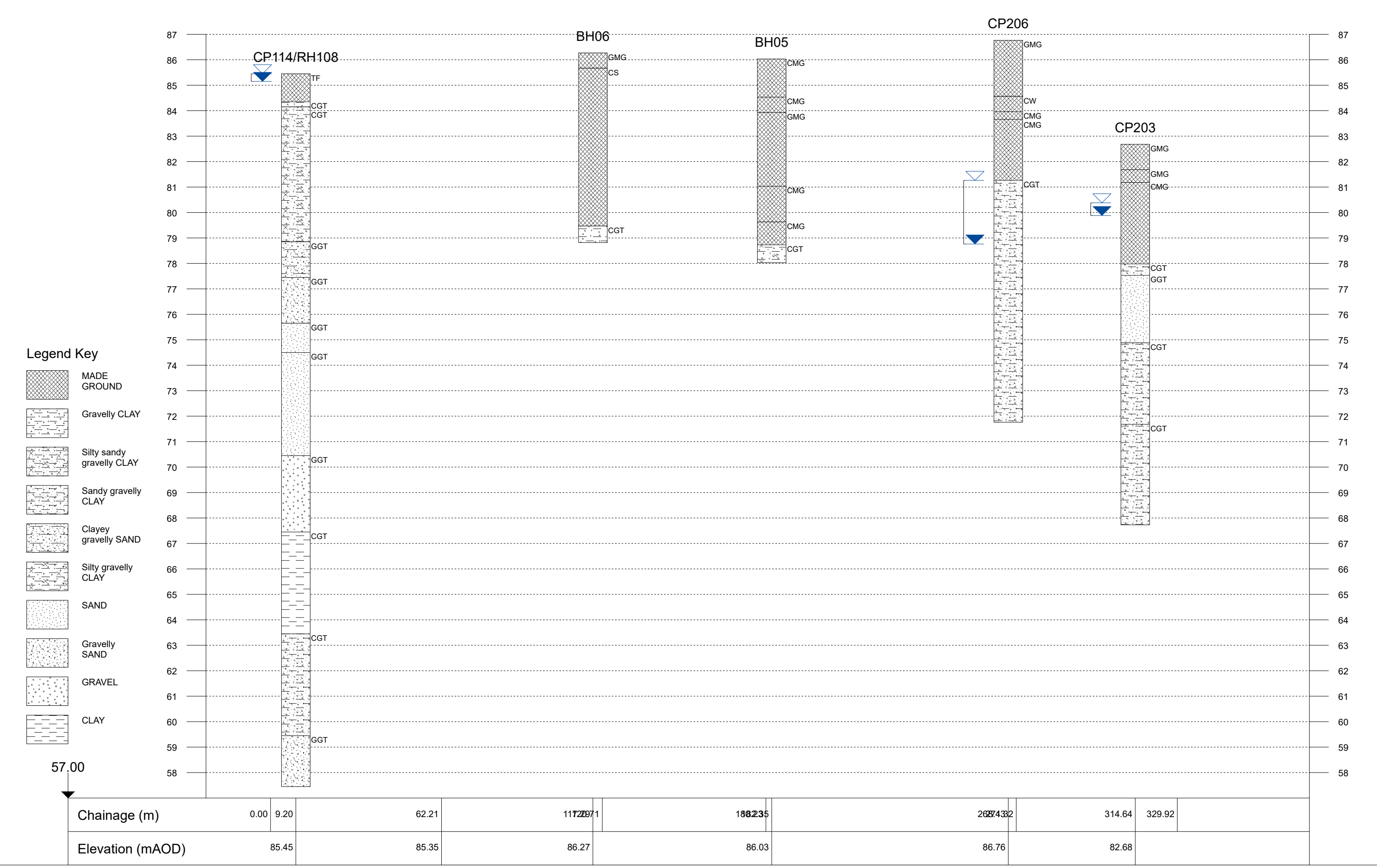
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Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 17
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Horizontal Scale: 1:500
Engineer: Wardell Armstrong LLP



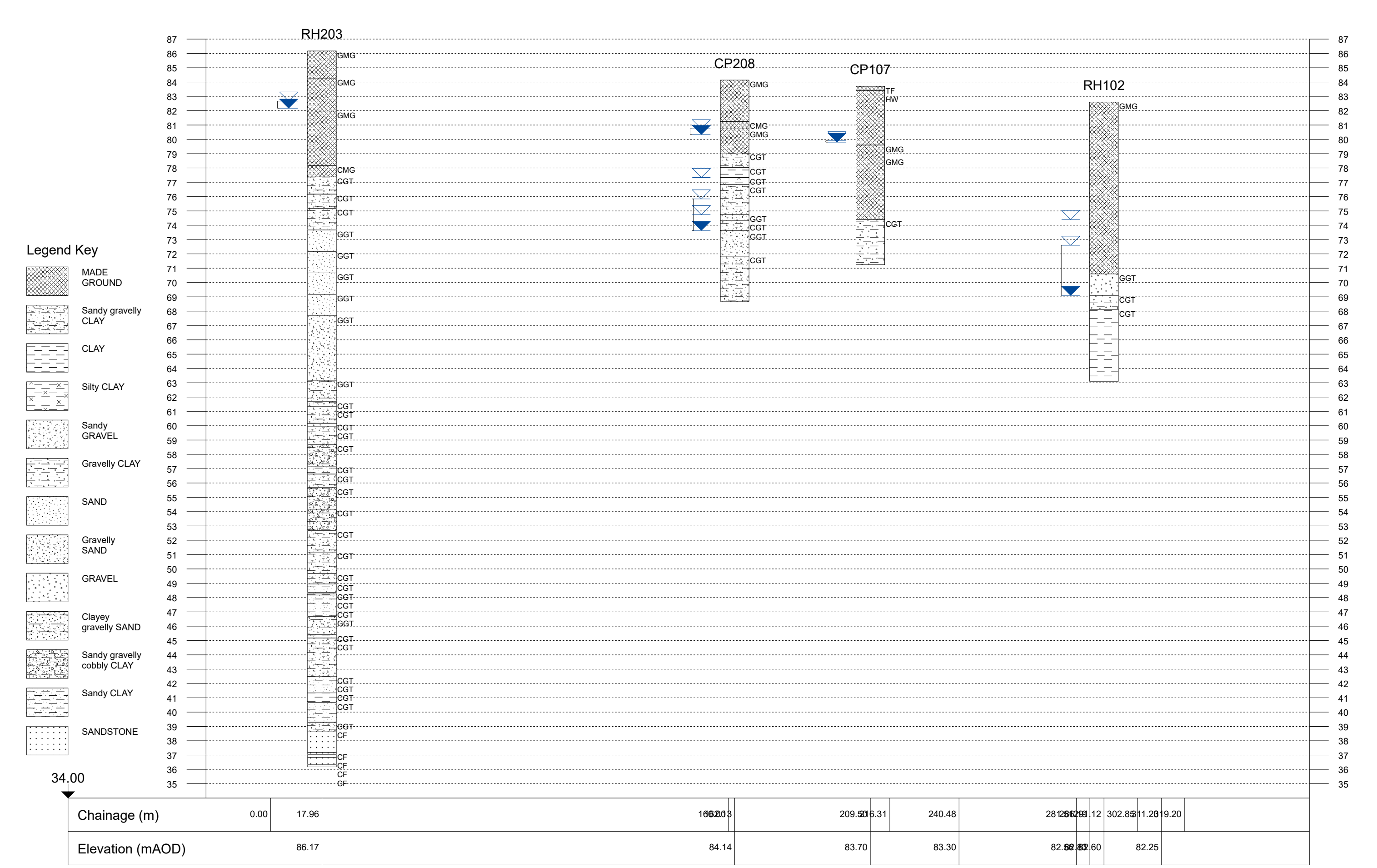
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Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 18
Vertical Scale: 1:135
Horizontal Scale: 1:1250
Engineer: Wardell Armstrong LLP



Project Id: LD10385
Project Title: Ten Acres Lane
Location: Newton Heath
Client: NUVU Developments Ltd

Title: Section line 19
Vertical Scale: 1:240
Horizontal Scale: 1:1200
Engineer: Wardell Armstrong LLP



A P P E N D I X O

SPT Plots

SPT N Value v Depth

Borehole No.

ALL

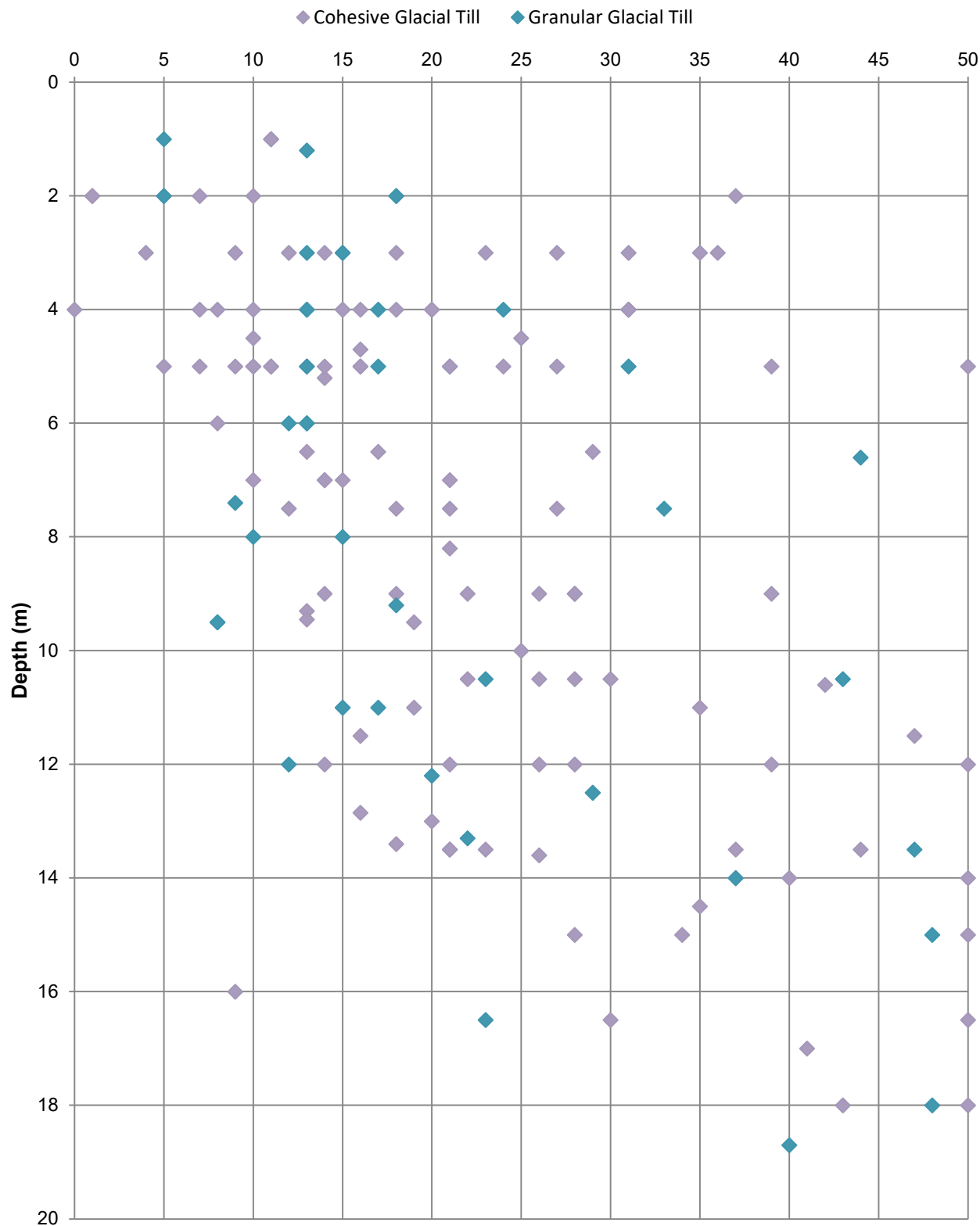
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**


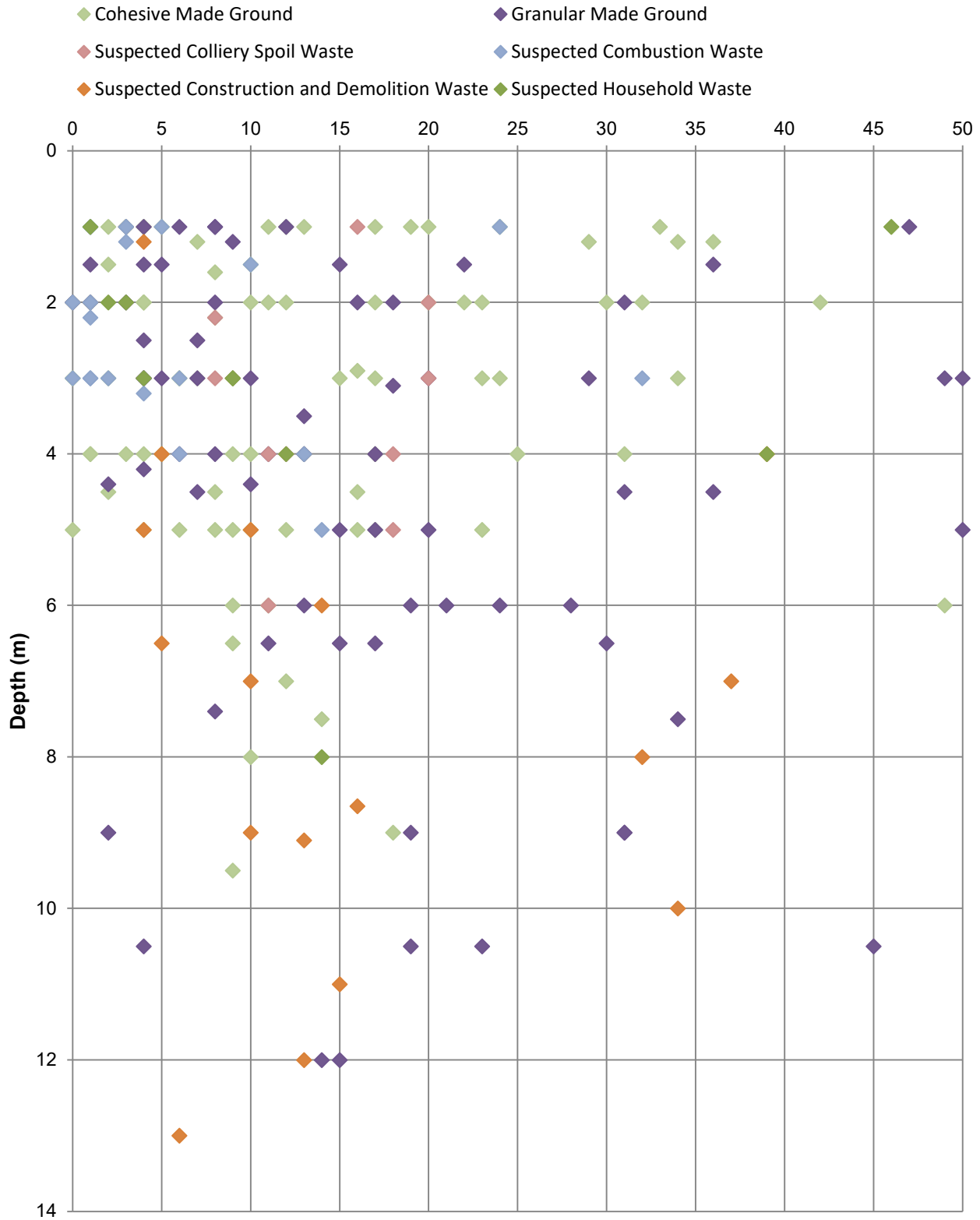
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

SPT N Value v Depth

Borehole No.

ALL

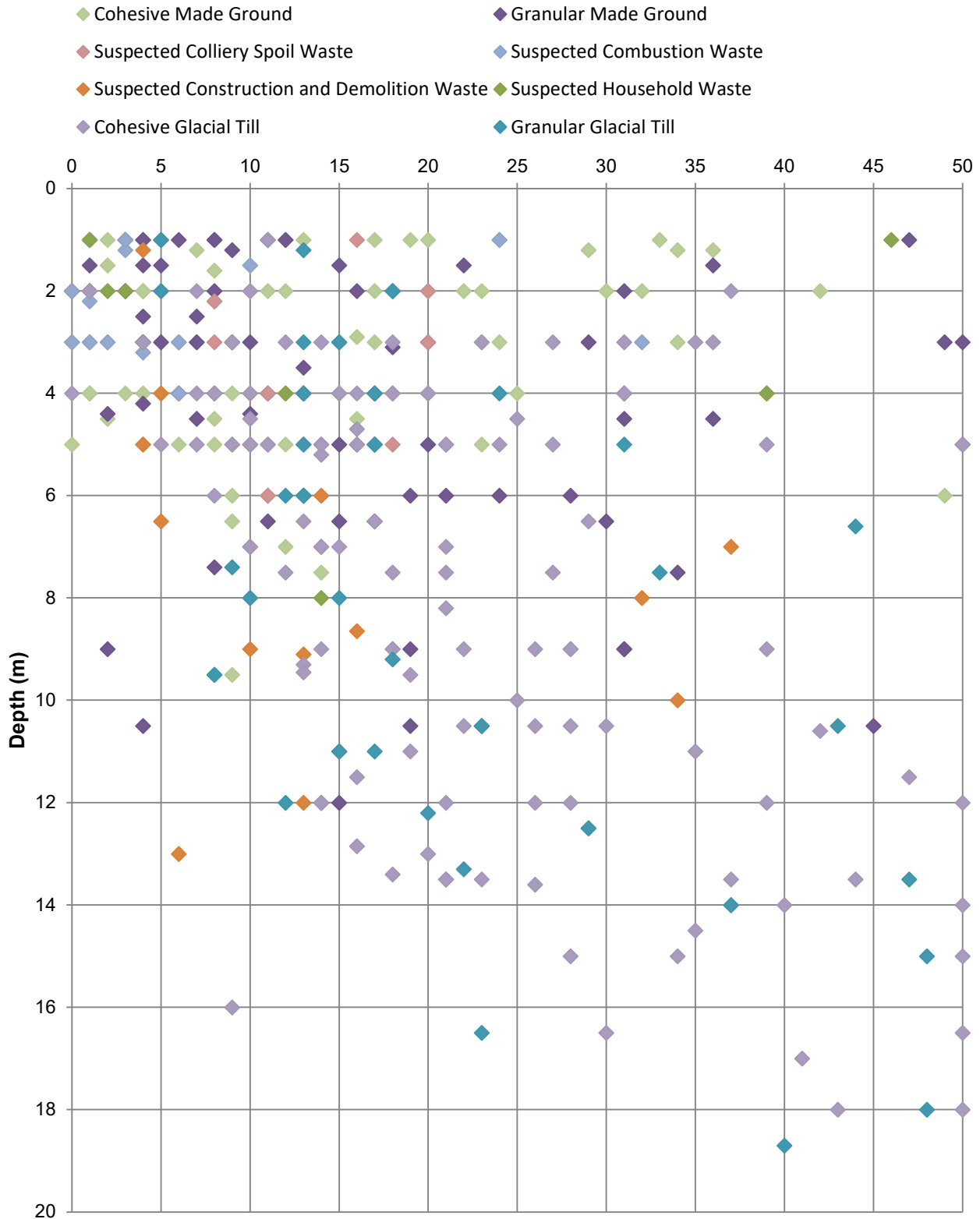
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**


SPT N Value v Depth

Borehole No.

All

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

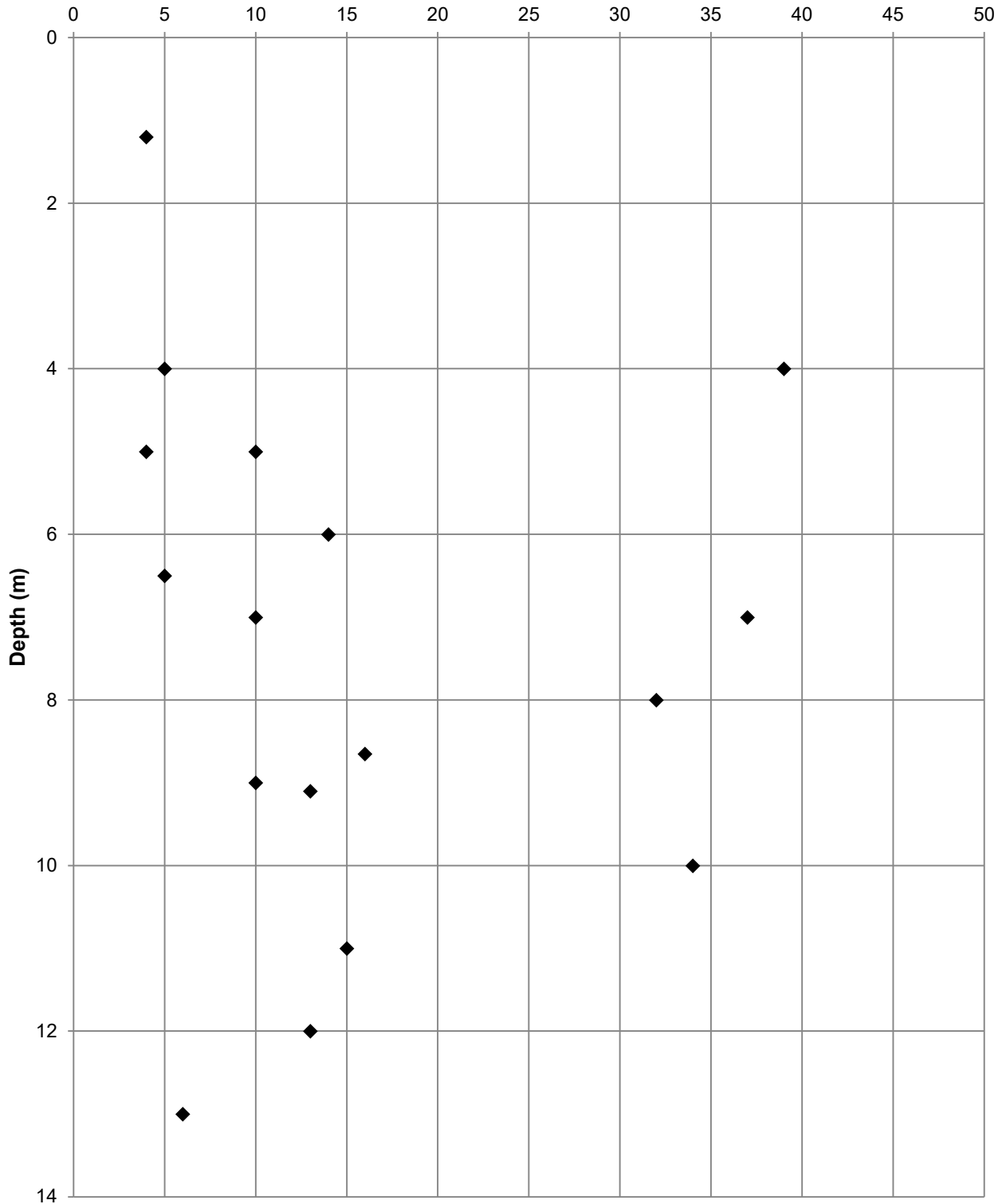
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Suspected Construction and Demolition Waste



Date Reported: **24/08/2022**

Data Status: **FINAL**

SPT N Value v Depth

Borehole No.

ALL

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

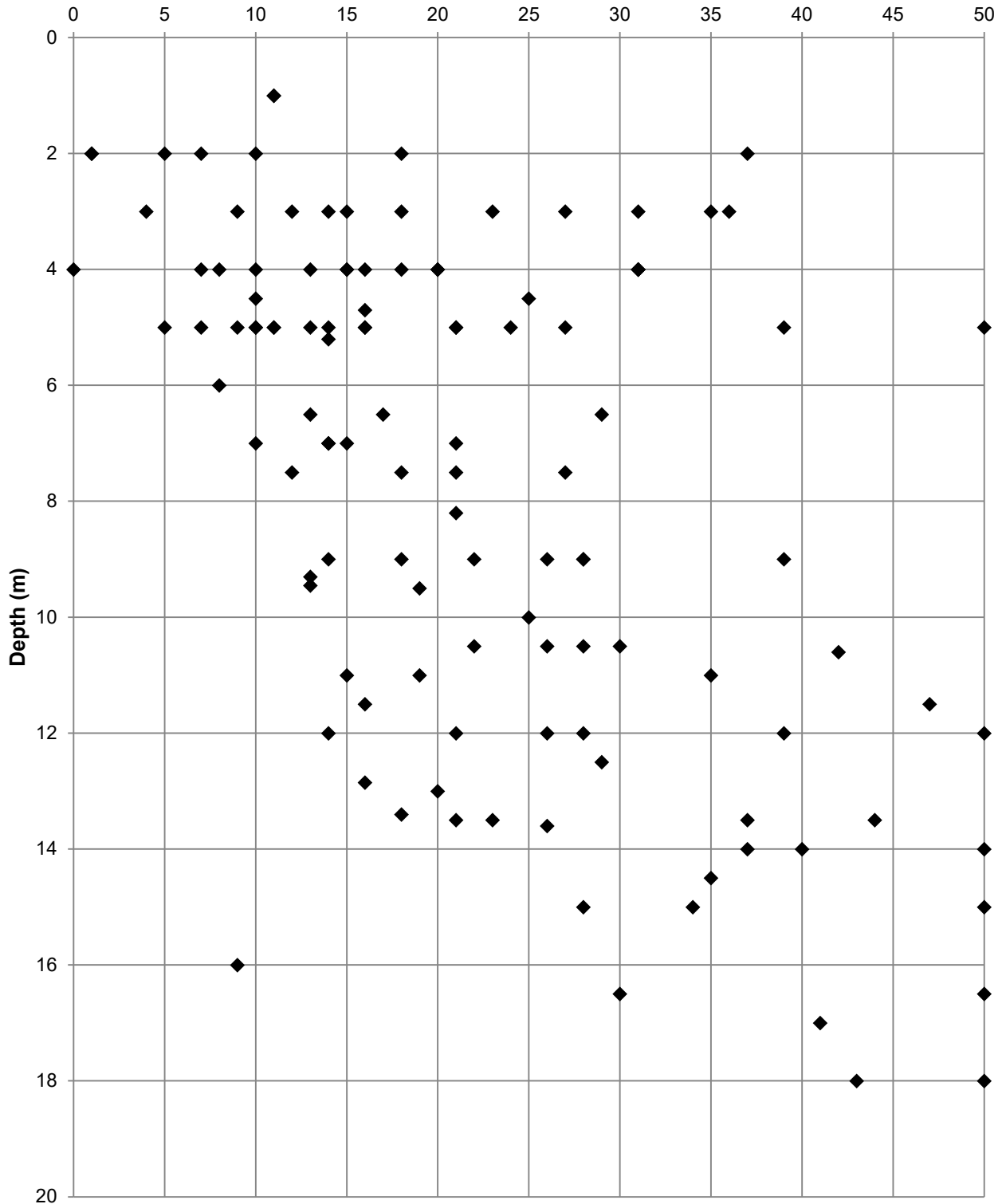
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Cohesive Glacial Till



SPT N Value v Depth

Borehole No.

ALL

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

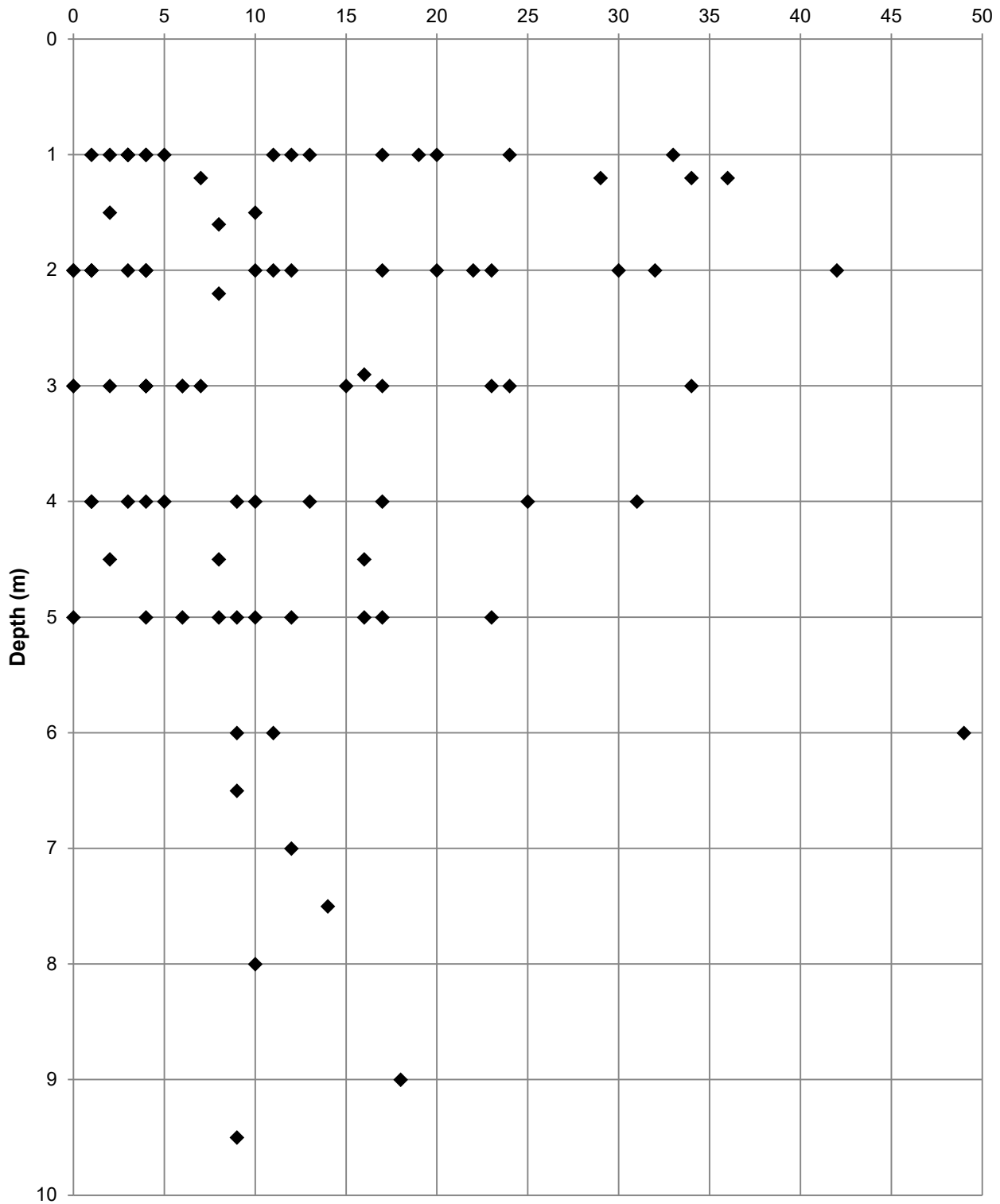
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Cohesive Made Ground



SPT N Value v Depth

Borehole No.

ALL

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

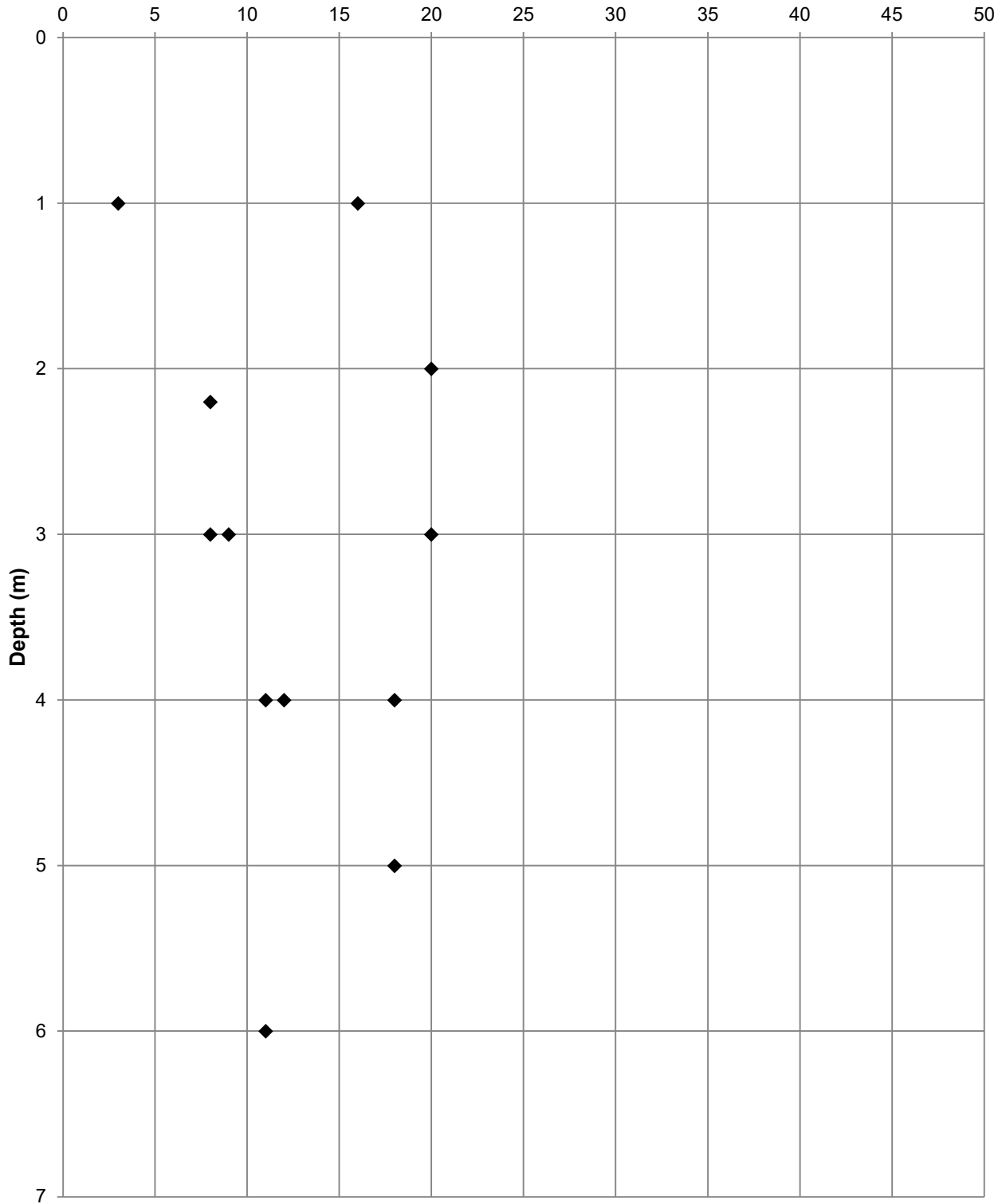
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Suspected Colliery Spoil



Date Reported: **24/08/2022**

Data Status: **FINAL**

SPT N Value v Depth

Borehole No.

All

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

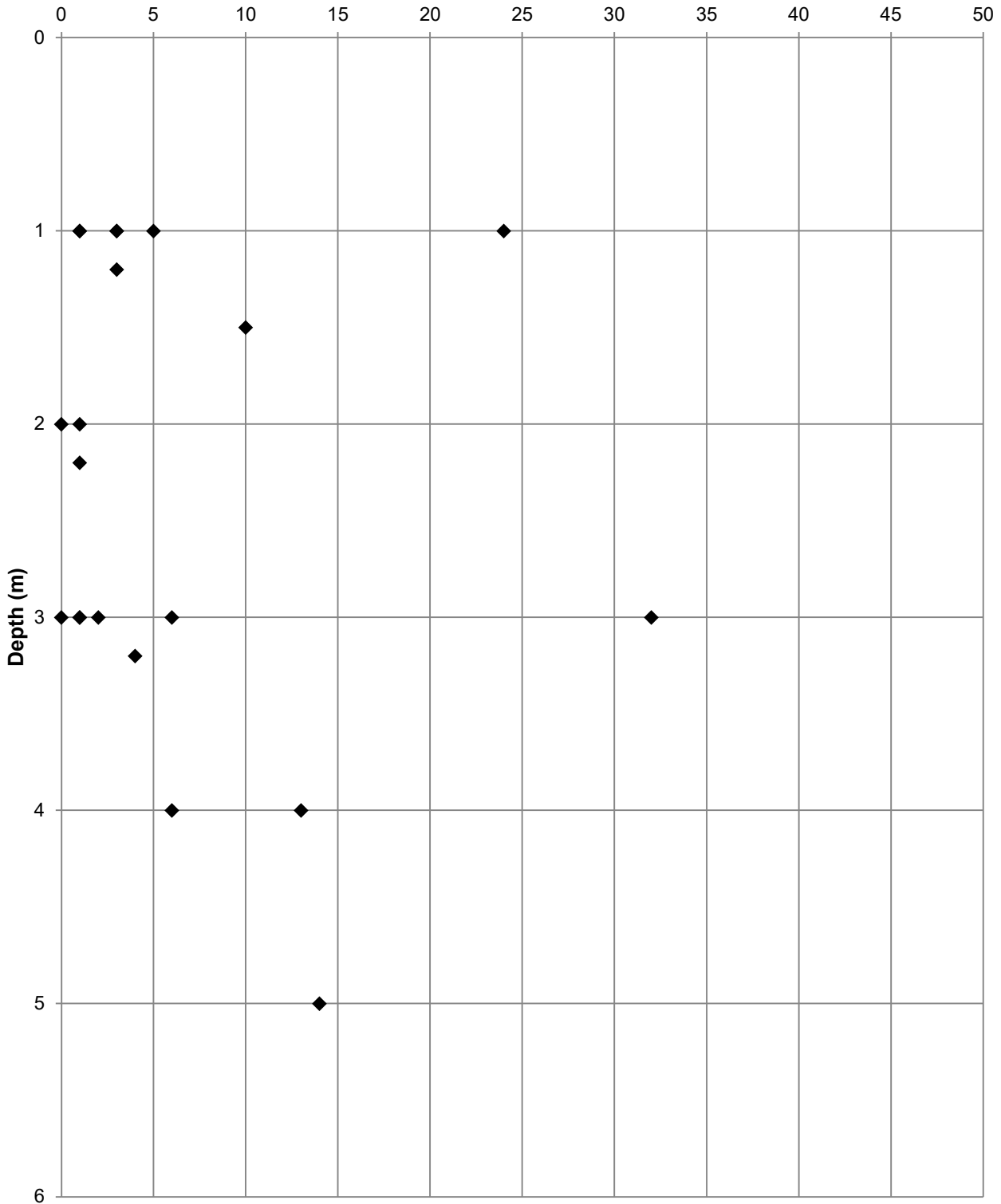
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Suspected Combustion Waste



SPT N Value v Depth

Borehole No.

All

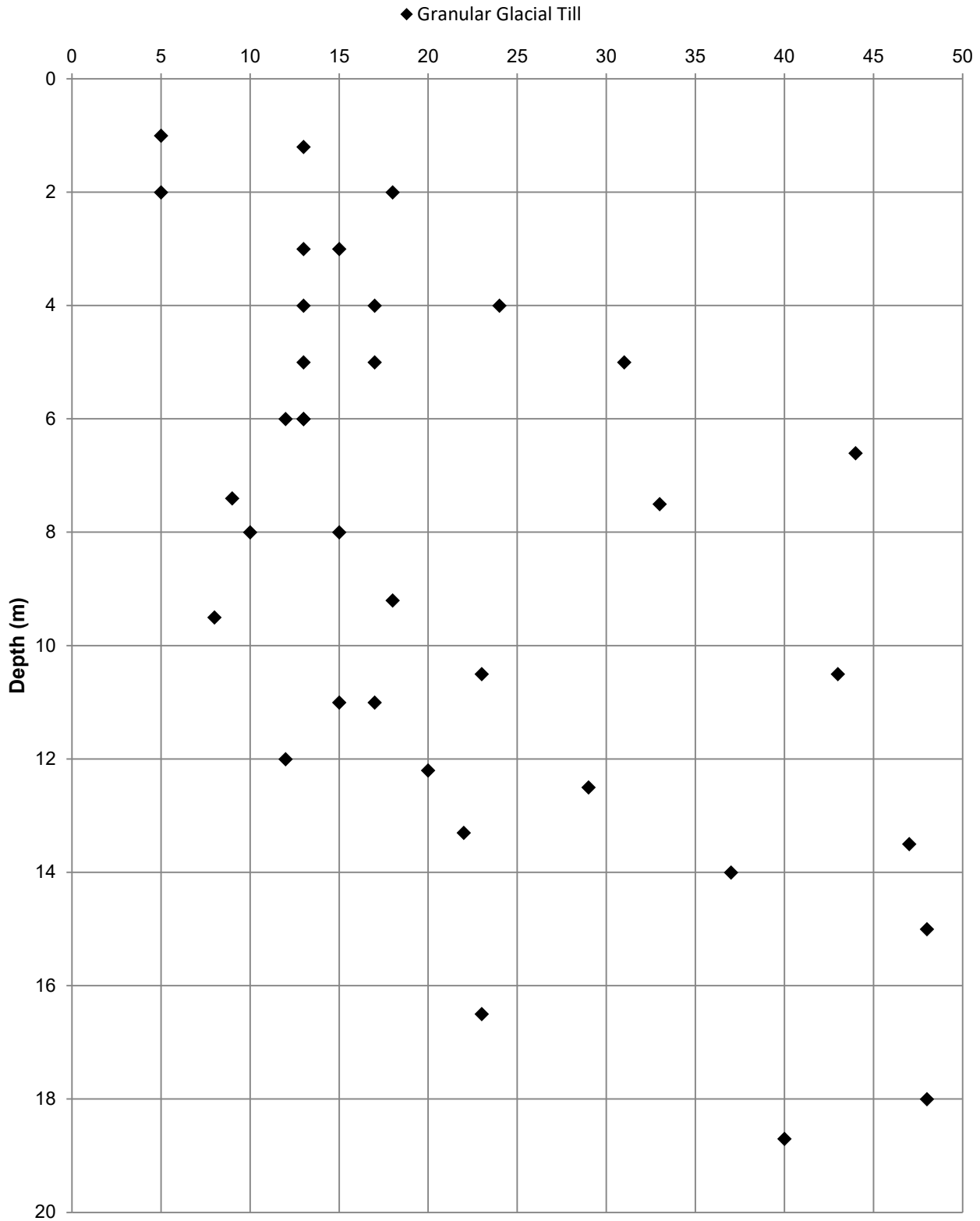
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**


SPT N Value v Depth

Borehole No.

All

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

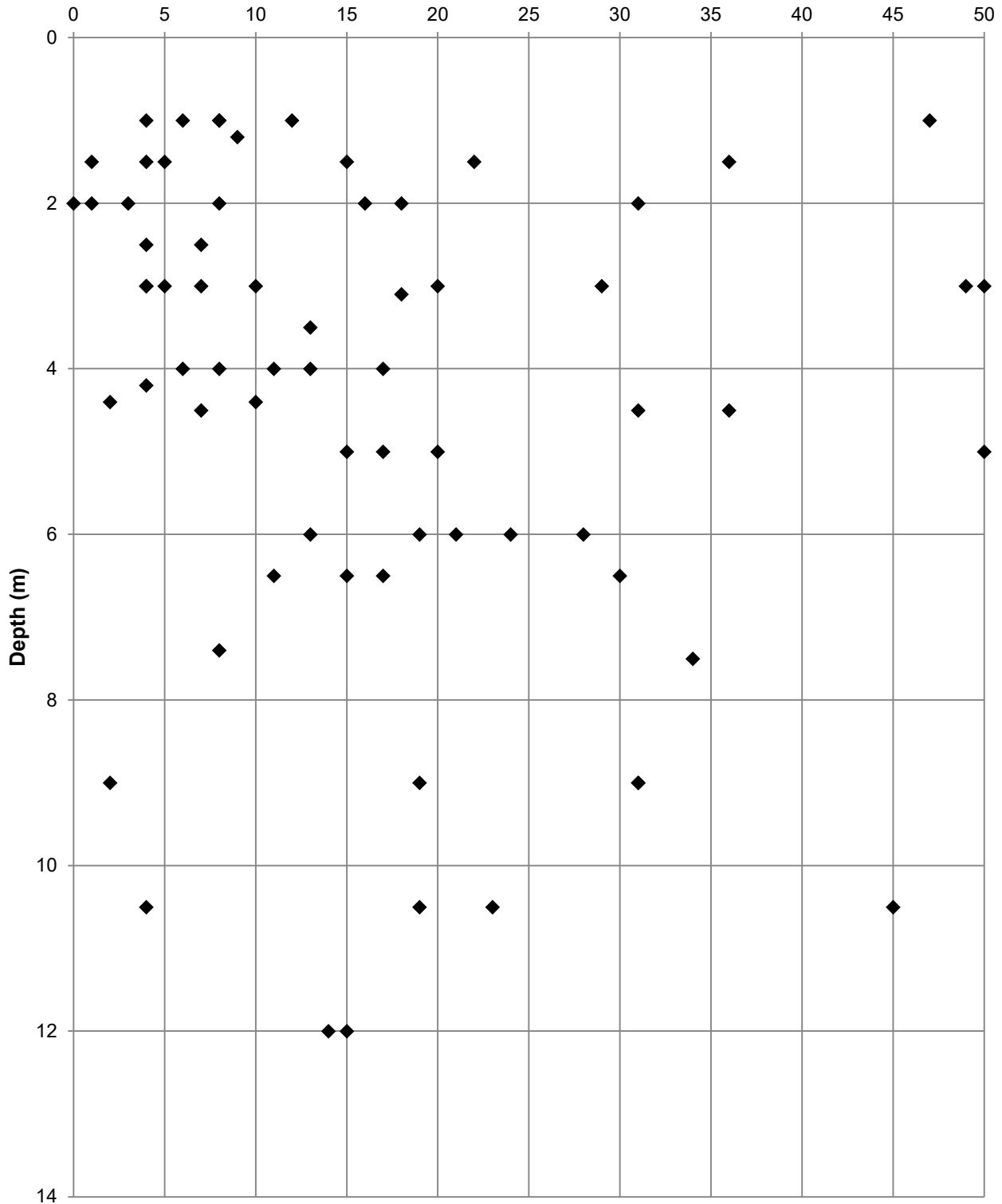
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Granular Made Ground



SPT N Value v Depth

Borehole No.

All

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

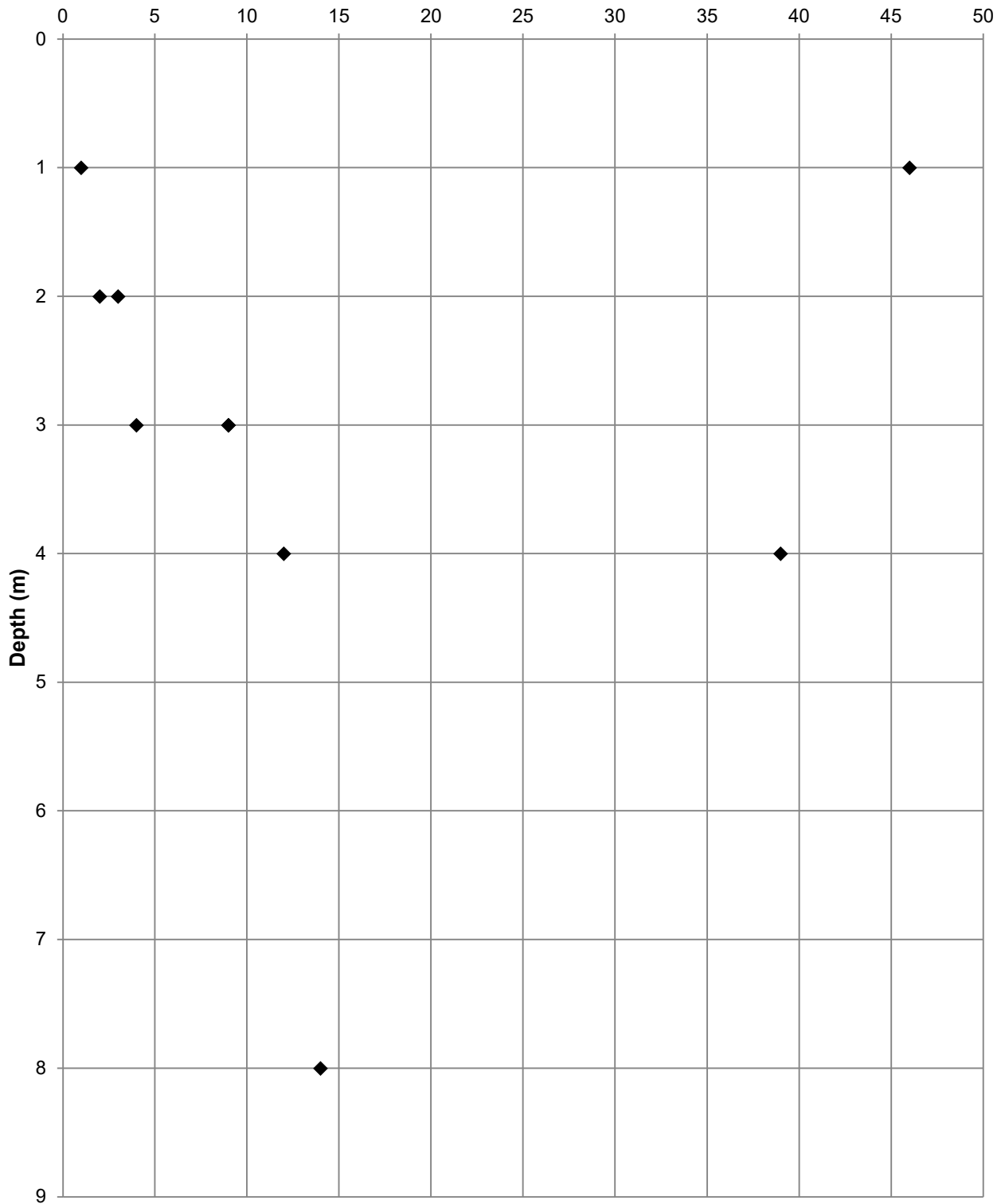
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Suspected Household Waste


Date Reported: **24/08/2022**

Data Status: **FINAL**

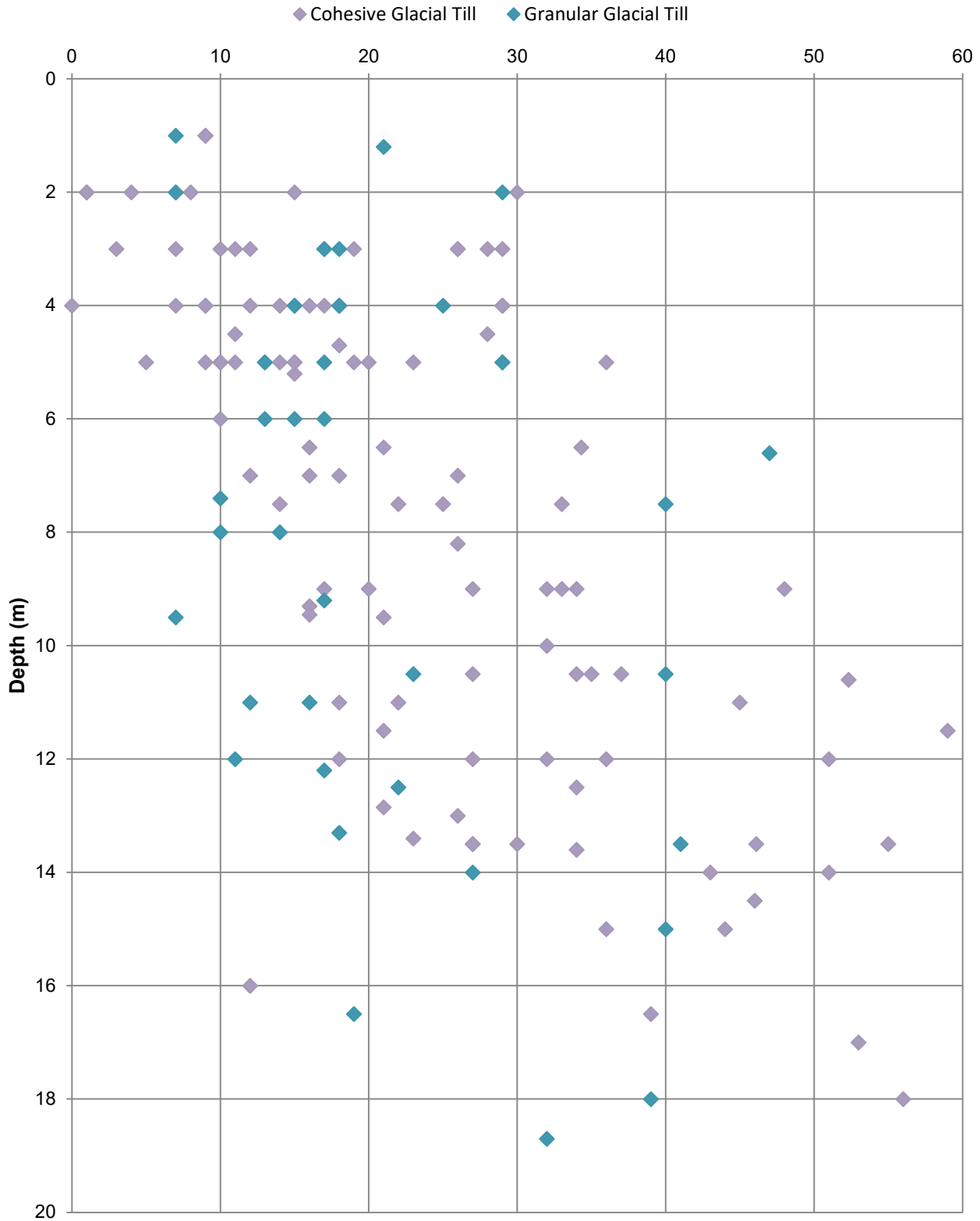
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**




ALL

Date Drilled: **N/A**

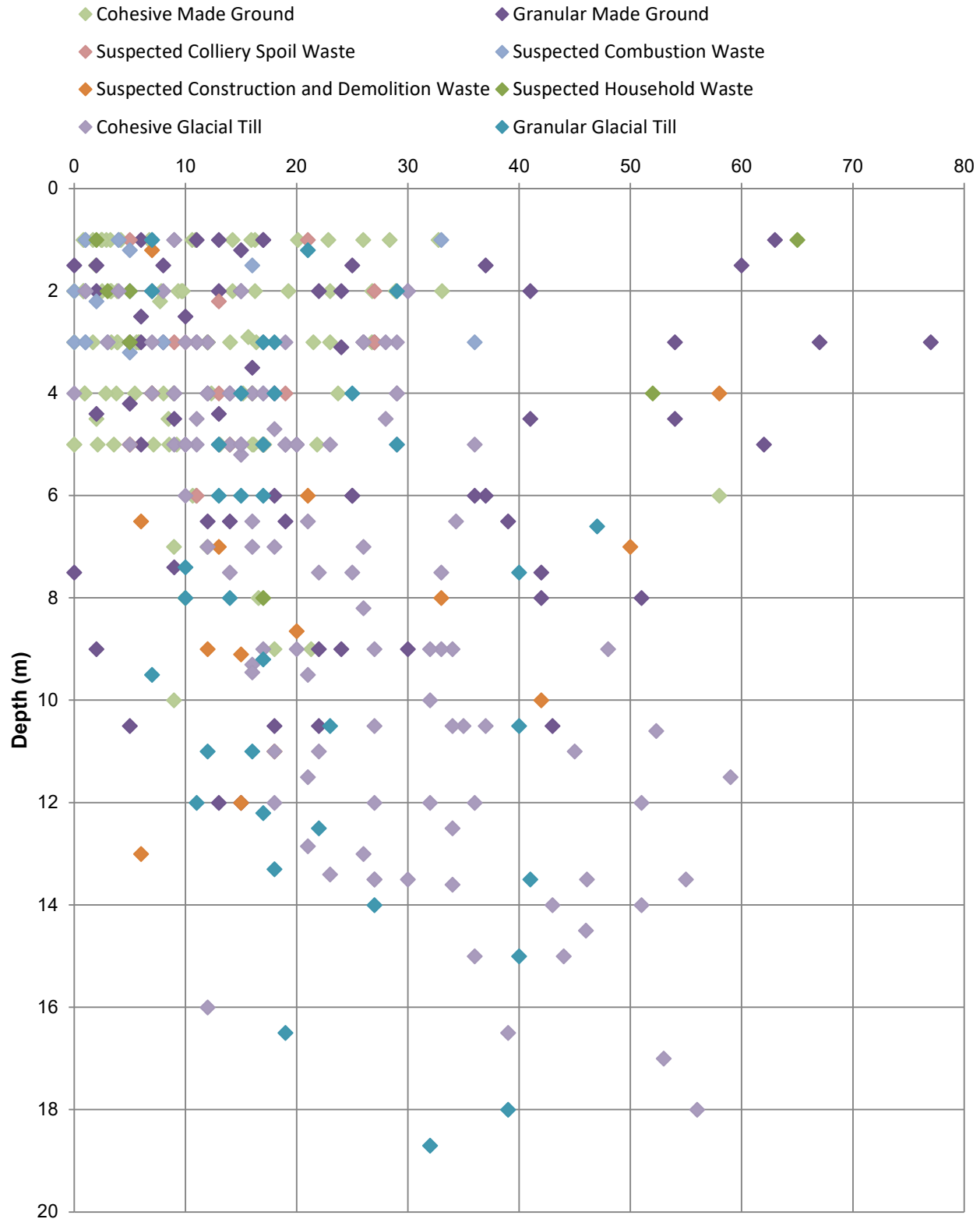
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**


SPT N60 Value v Depth

Borehole No.

ALL

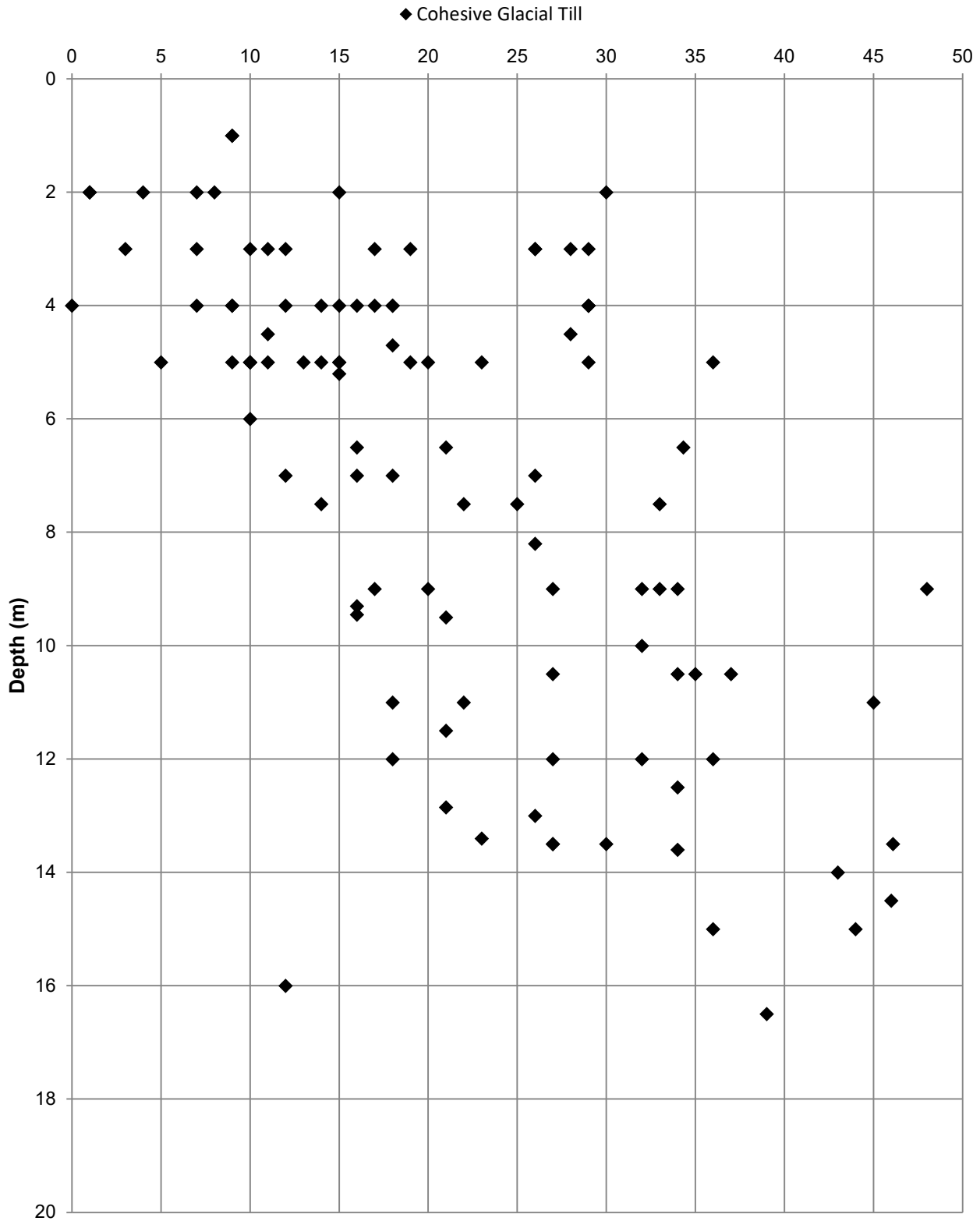
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**


SPT N60 Value v Depth

Borehole No.

ALL

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

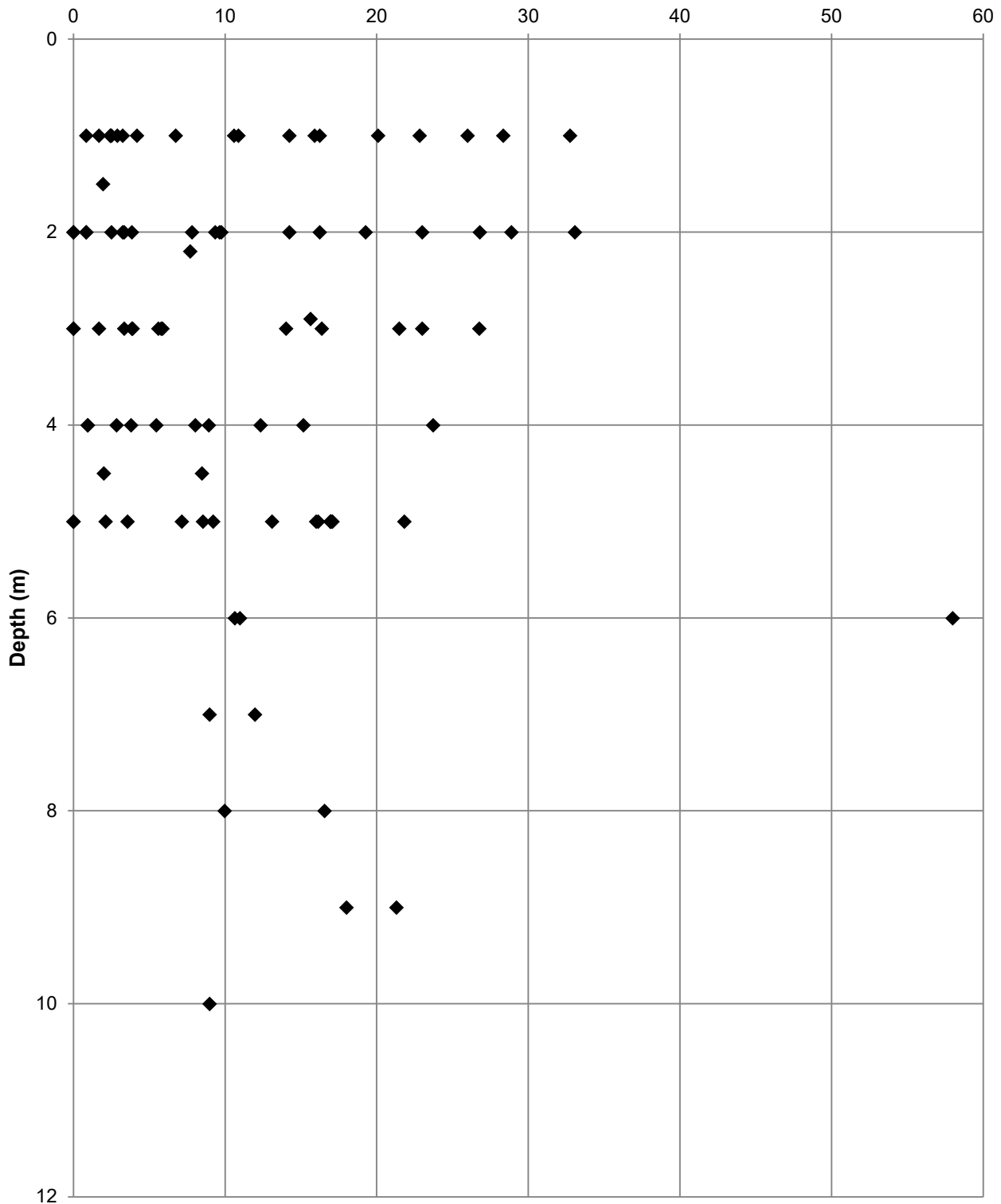
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Cohesive Made Ground



SPT N160 Value v Depth

Borehole No.

All

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

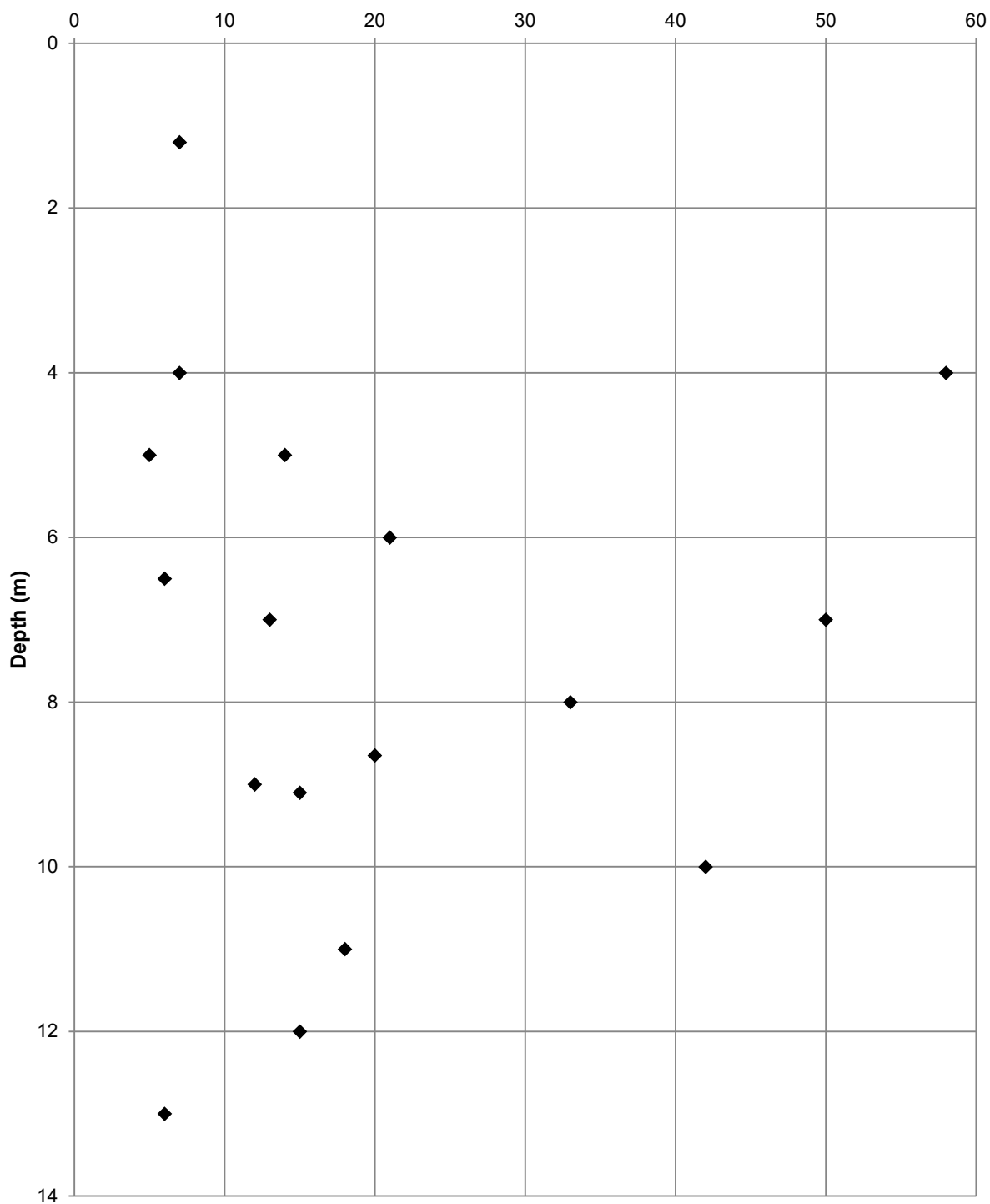
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Suspected Construction and Demolition Waste



Date Reported: **24/08/2022**

Data Status: **FINAL**

SPT N160 Value v Depth

Borehole No.

ALL

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

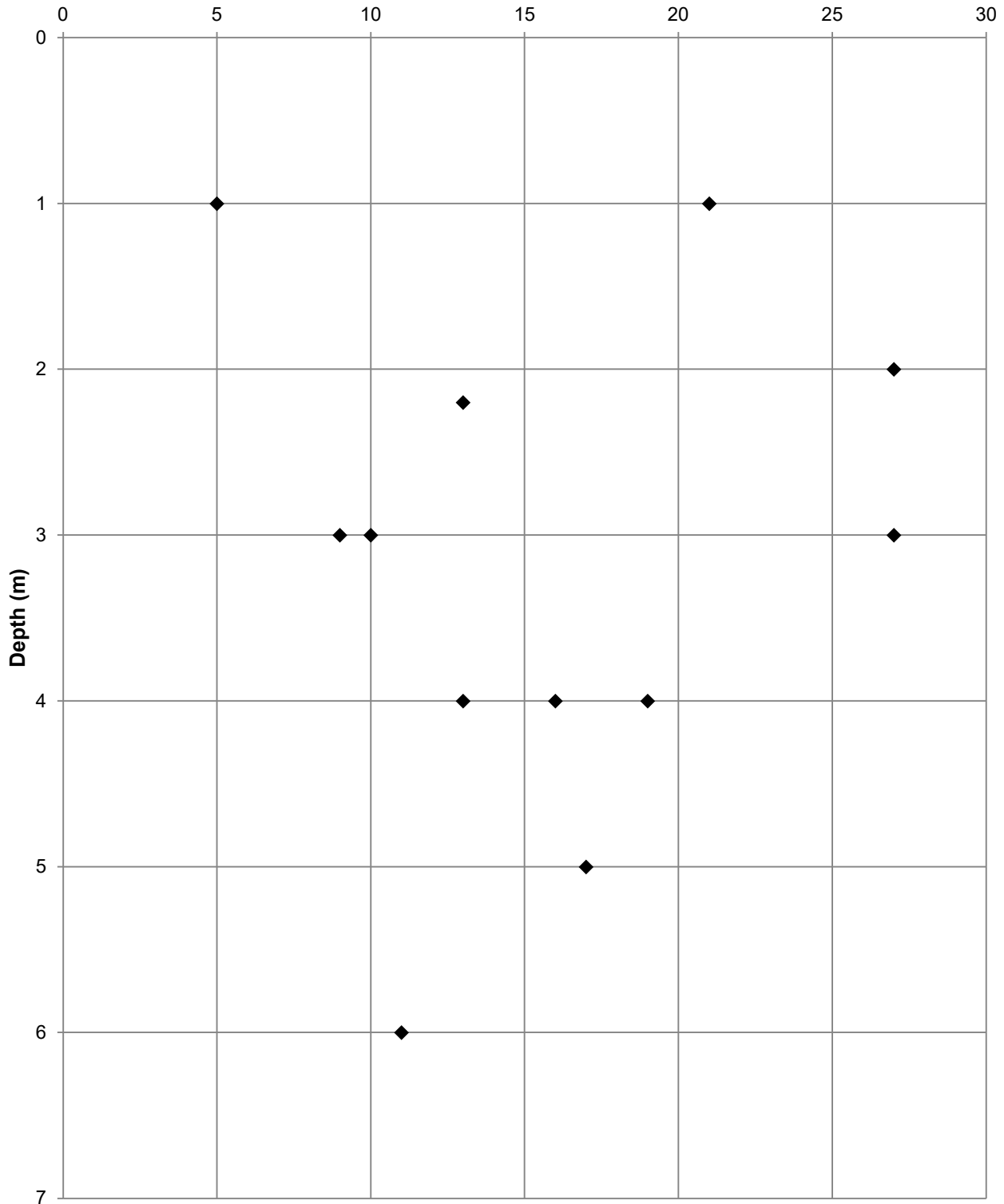
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Suspected Colliery Spoil


Date Reported: **24/08/2022**

Data Status: **FINAL**

SPT N160 Value v Depth

Borehole No.

All

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

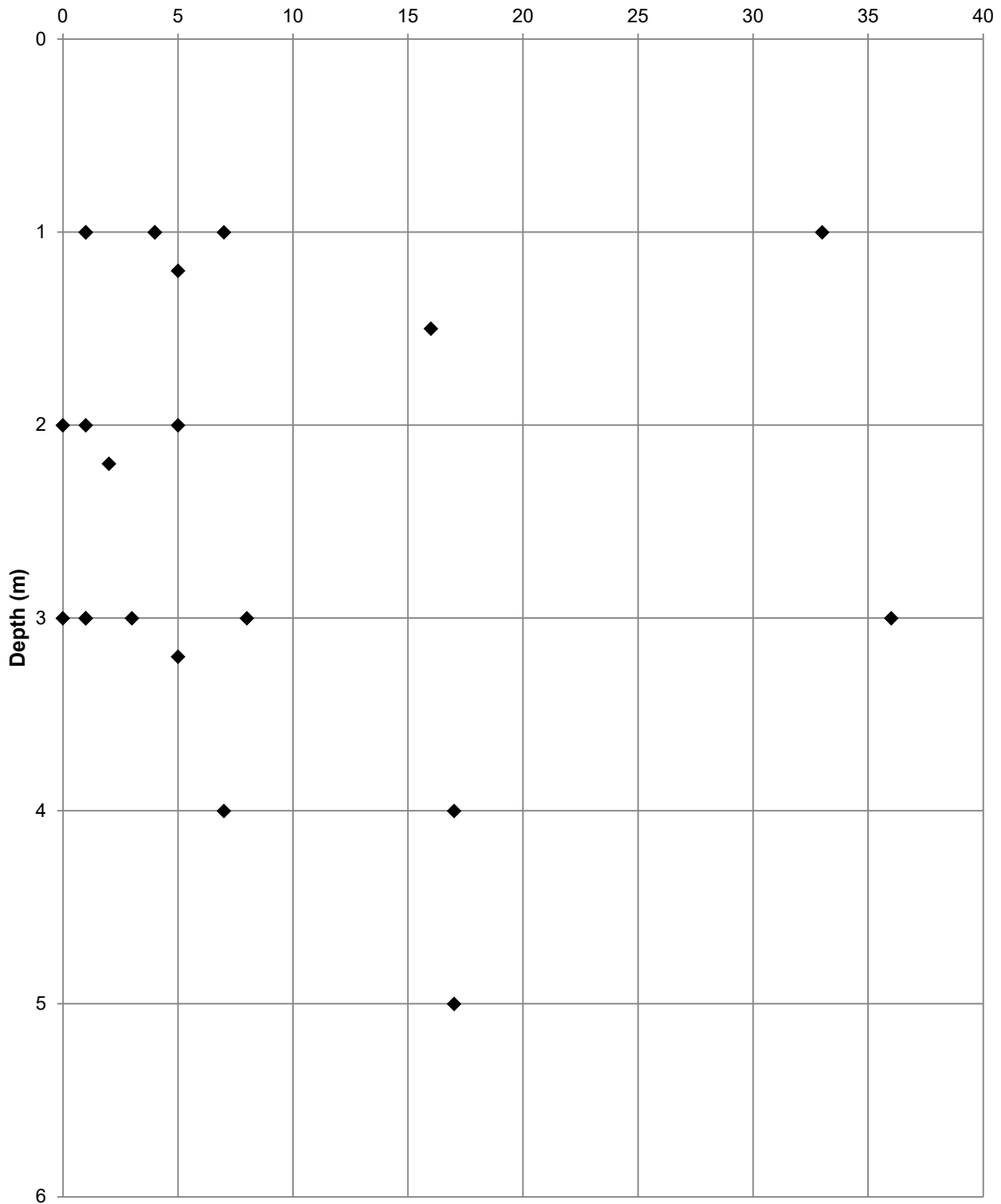
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Suspected Combustion Waste



Date Reported: **24/08/2022**

Data Status: **FINAL**

SPT N160 Value v Depth

Borehole No.

All

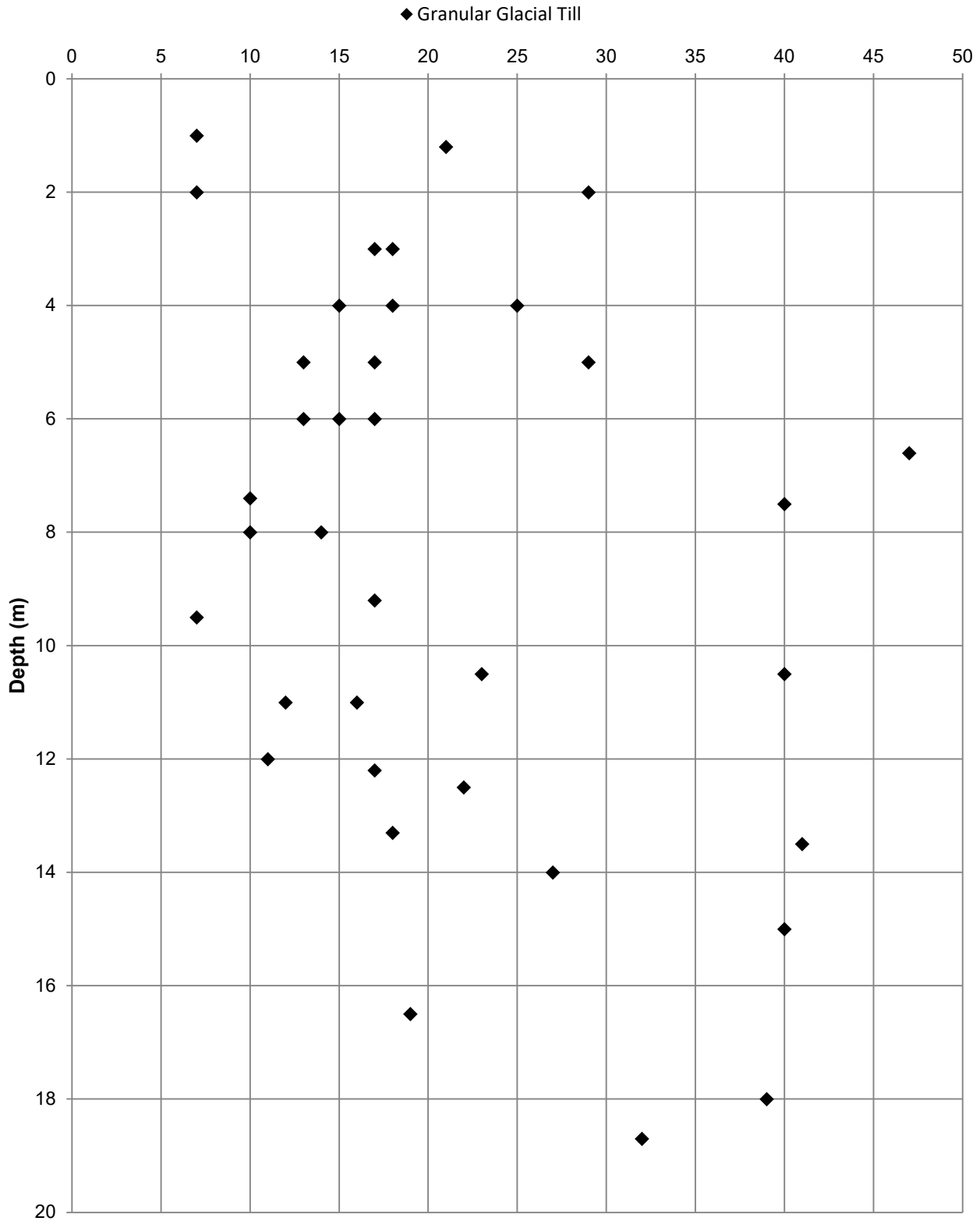
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

Date Reported: **24/08/2022**

Data Status: **FINAL**

SPT N160 Value v Depth

Borehole No.

All

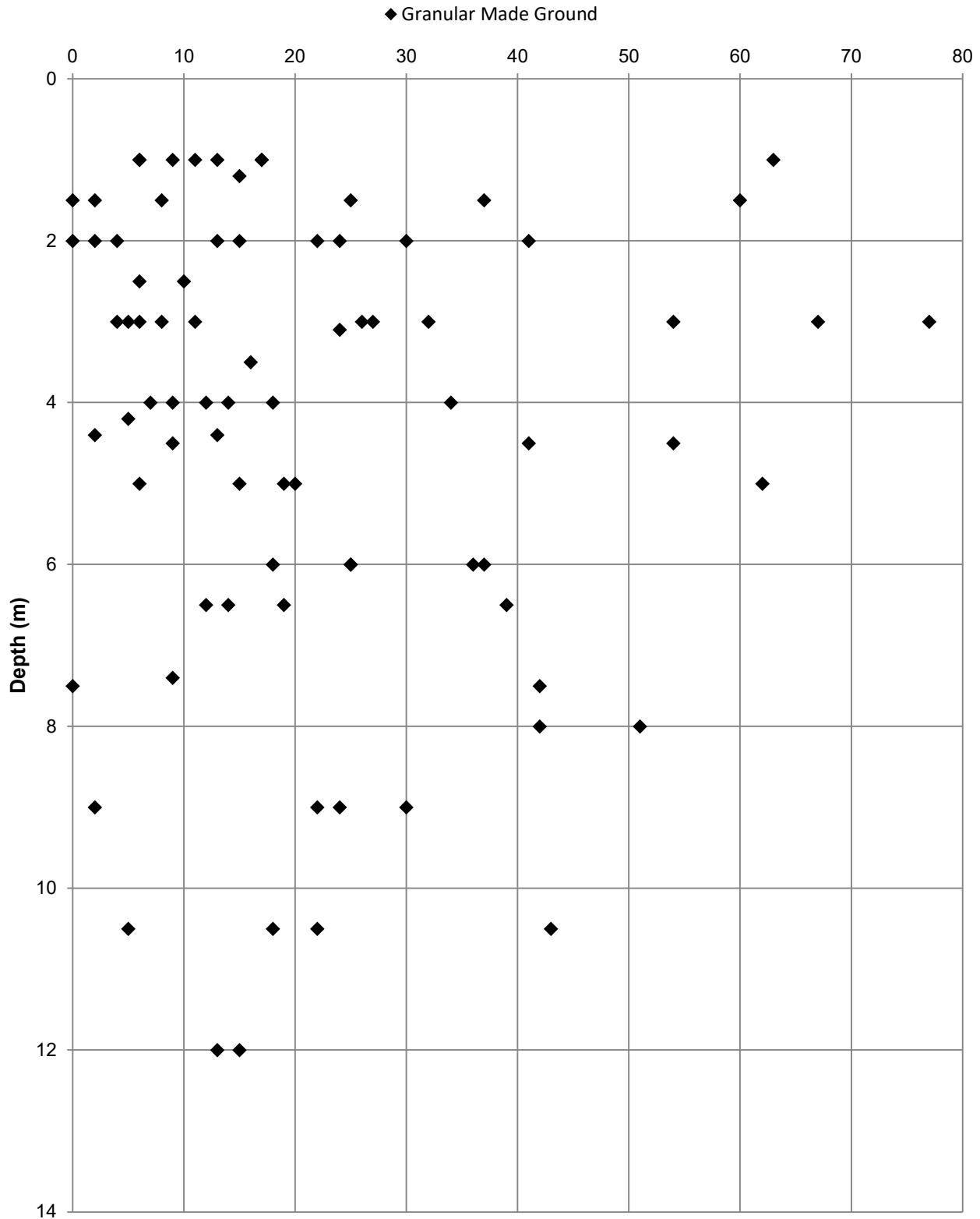
Project ID: **LD10385**

Project Title: **Ten Acres Lane**

Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**


SPT N Value v Depth

Borehole No.

All

Project ID: **LD10385**

Project Title: **Ten Acres Lane**

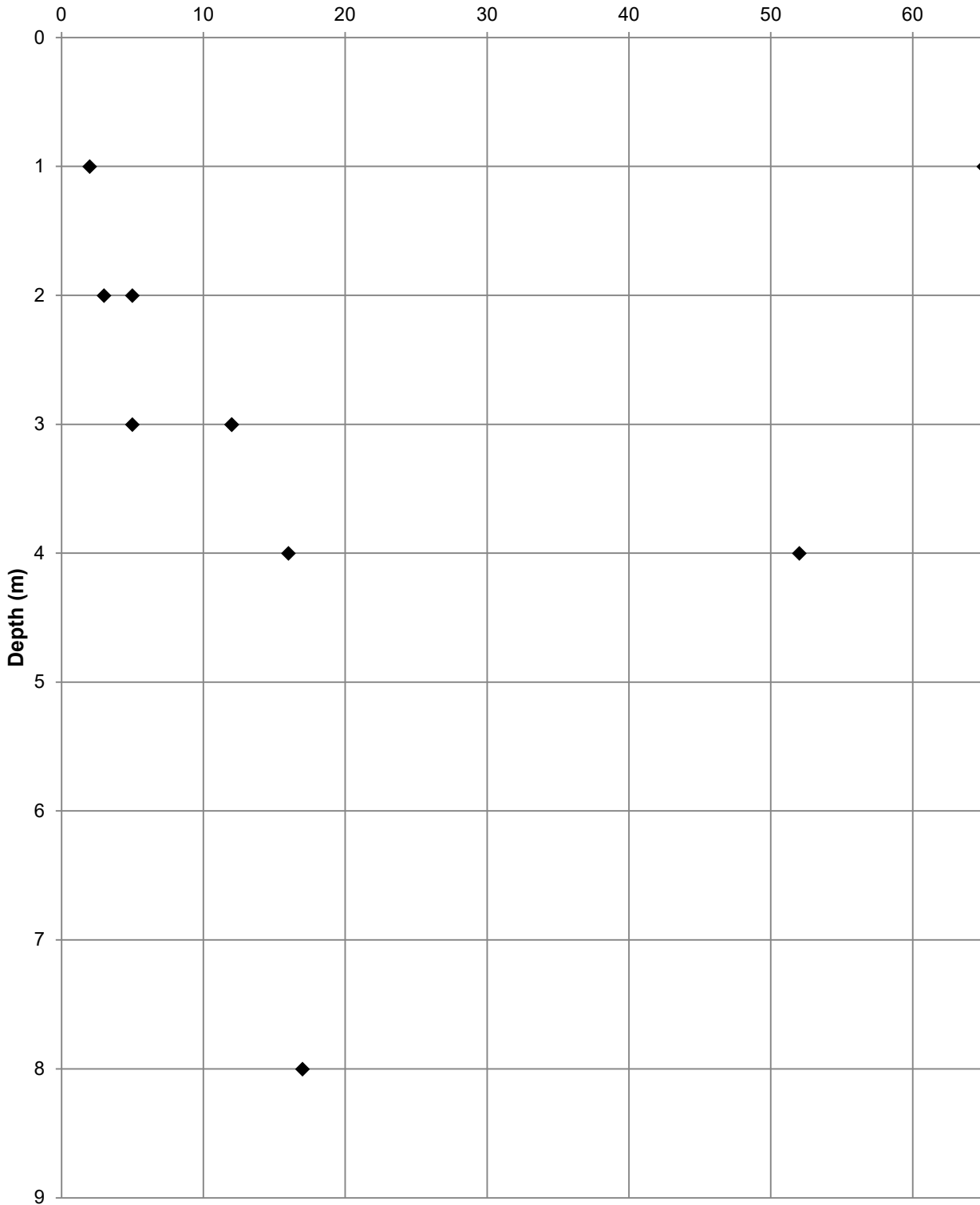
Final Depth: **N/A**

Client: **NUVU Developments Ltd**

Location: **Newton Heath**

Date Drilled: **N/A**

◆ Suspected Household Waste



Date Reported: **24/08/2022**

Data Status: **FINAL**

A P P E N D I X P

Calibration Certificates

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: AR2152
Test Date: 10/09/2021
Report Date: 10/09/2021
File Name: AR2152..spt
Test Operator: JL

Instrumented Rod Data

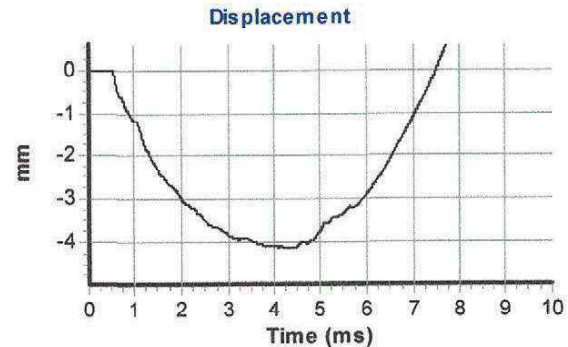
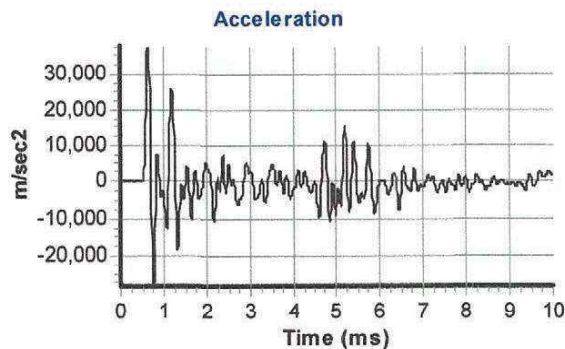
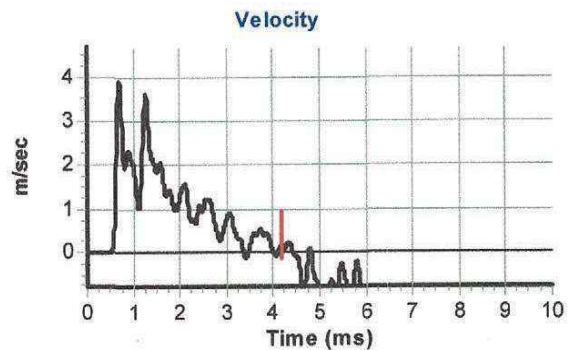
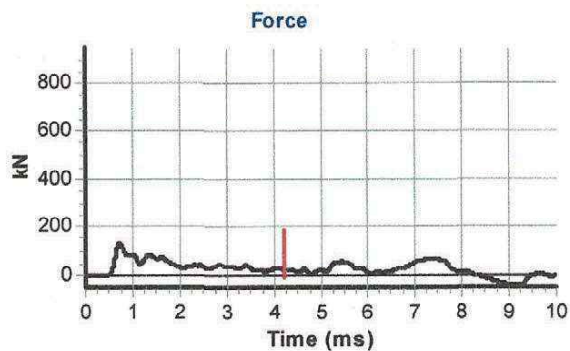
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

GEOTRON - 77196



Calculations

Area of Rod A (mm^2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 307

Energy Ratio E_r (%): **65**

Signed: J.LOCK
Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: AR3710
Test Date: 16/07/2021
Report Date: 16/07/2021
File Name: AR3710.spt
Test Operator: JL

Instrumented Rod Data

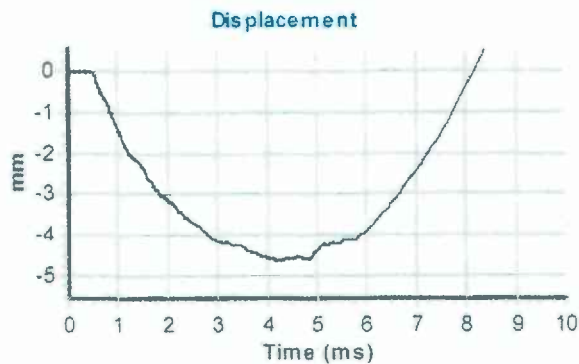
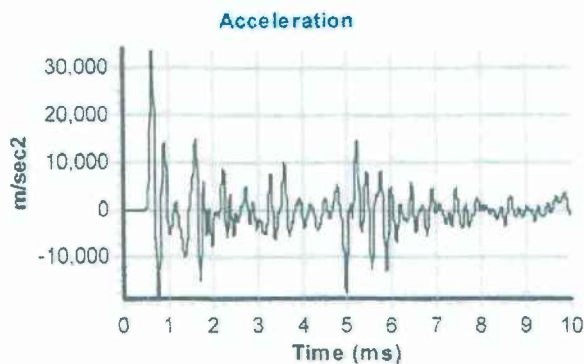
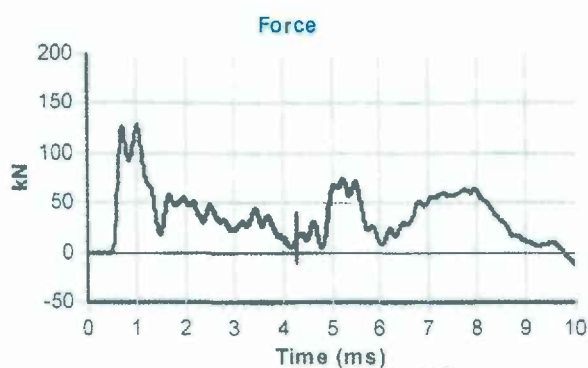
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

GEOTRON / 76464



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 321

Energy Ratio E_r (%):

68

Signed: C. McCluskey

Title: FITTER

The recommended calibration interval is 12 months

CERTIFICATE OF CALIBRATION

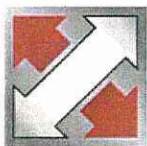
Issued By Pullman Instruments (UK) Ltd.

Date of Issue 14 October 2019

Certificate Number
1455564

Page 1 of 2 Pages

Approved Signatory



Pullman Instruments (UK) Ltd.
Chatsworth House,
Chatsworth Terrace,
Harrogate, HG1 5HT
Tel 01423 720360 Email info@pullman.co.uk

☐ J.Stacey ☐ M.Collins ☐ C.Johnson ☐ A.J.Cox ☒ M. Conboy

Customer : WARDELL ARMSTRONG LLP
36 PARK ROW, LEEDS

Date Received : 09 October 2019

Instrument :	System ID :	DR2040	Job Number :	458674-1
	Description :	Shear Vane Tester	Ref. Number :	DR2040
	Manufacturer :	PILCON	Site :	
	Model Number :	DR2526	Location :	
	Serial Number :	DR2040		
	Procedure Version :	19333v1		

Environmental Conditions

Temperature : 20°C +/- 2°C
Relative Humidity : 50% +/- 15%

Mains Voltage : 230V +/- 20V
Mains Frequency : 50Hz +/- 1Hz

Comments

No calibration adjustments or repairs were made to unit.
Measurements traceable to national standards.
Unit tested to manufacturers specification.

Traceability Information

Instrument description	Serial number	Certificate number	Cal. Date	Cal. Period
CM38 - NORBAR 43228 Torque Tester	60556	0256/224255	08/01/2019	52
CM183 - NORBAR 25Nm Transducer	103925	0256/224253	10/01/2019	52

Calibrated By : G.Bance

Date of Calibration : 14 October 2019

This certificate provides traceability of measurement to recognised National Standards, and to the units of measurement realised at the National Physical Laboratory or other recognised National Standards laboratories.
Copyright of this certificate is owned by the issuing laboratory and may not be reproduced except with the prior written approval of the issuing laboratory.
This certificate complies with the requirements of BS EN ISO 10012:2003.

CERTIFICATE OF CALIBRATION

Certificate Number
1455564

AS FOUND RESULTS

Page 2 of 2 Pages

Test Title	Tolerance	Applied Value	Reading	Pass/Fail
Impact Shear Vane Tester.				
Reading on Instrument	Amount Of Applied Torque (Nm)			
4	0.3			
8	1.1			
12	1.6			
16	2.2			
20	2.8			
24	3.2			
28	3.6			
end of test				

Uncertainties

Low Torque +/- 0.02% rdg (0-25N)

ARCHWAY ENGINEERING
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: AR2462
Test Date: 16/09/2020
Report Date: 16/09/2020
File Name: AR2462.spt
Test Operator: JL

Instrumented Rod Data

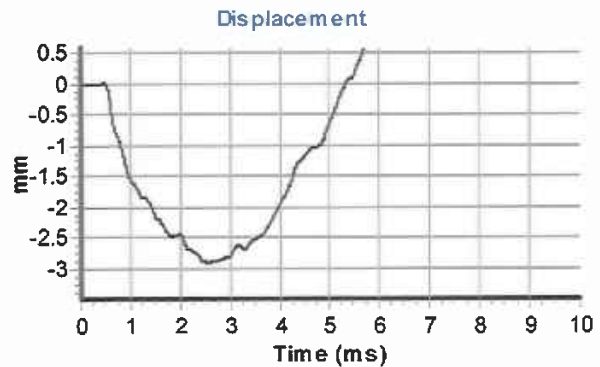
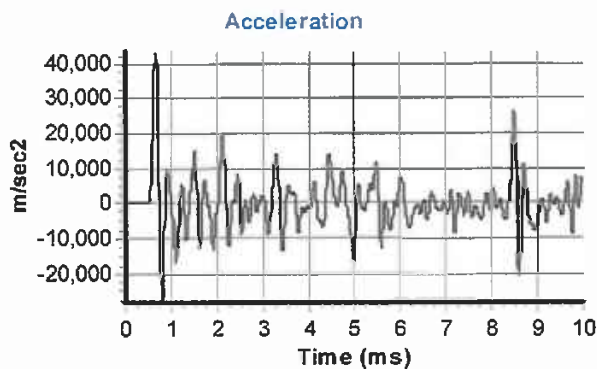
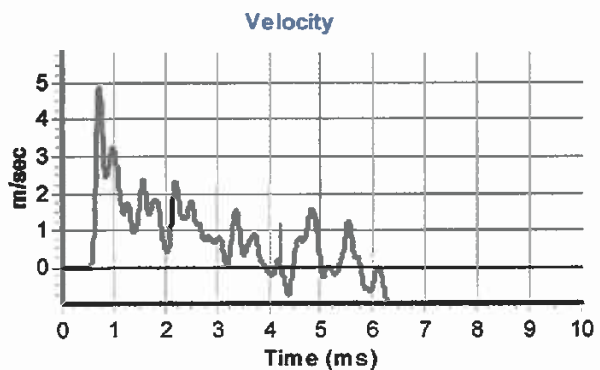
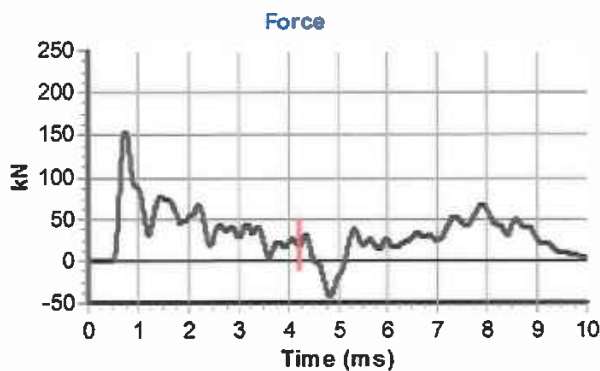
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.3
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

GEOTRON



Calculations

Area of Rod A (mm^2): 944
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 317

Energy Ratio E_r (%): **67**

Signed: J.LOCK
Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: AR95
Test Date: 07/08/2020
Report Date: 07/08/2020
File Name: AR95.spt
Test Operator: CM

Instrumented Rod Data

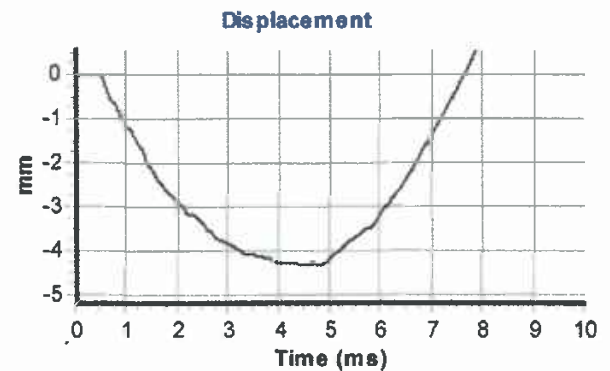
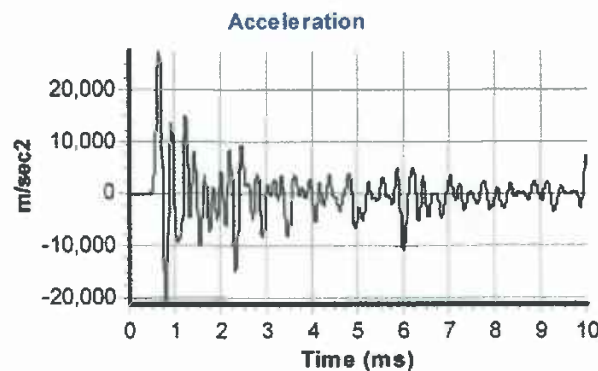
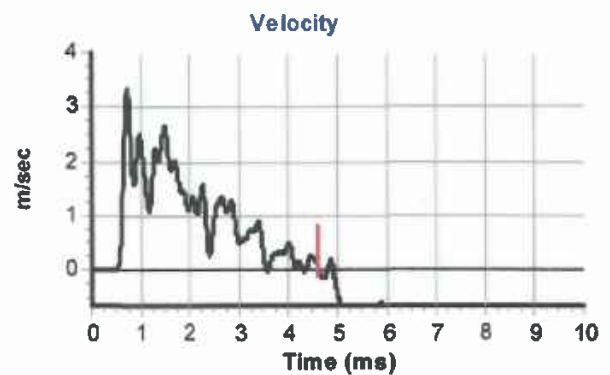
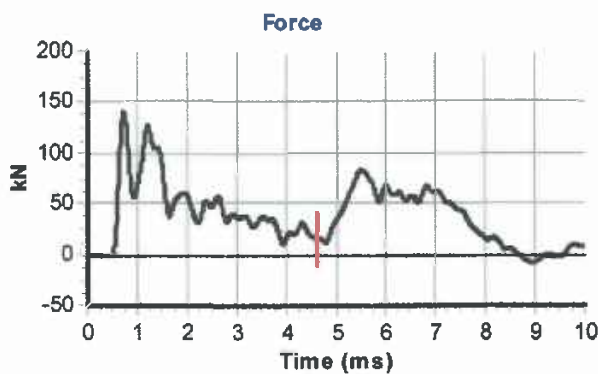
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.6
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

GEOTRON UK/71750



Calculations

Area of Rod A (mm²): 983
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 316

Energy Ratio E_r (%): **67**

Signed: C. McCLUSKEY
Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: DART511
Test Date: 21/01/2022
Report Date: 21/01/2022
File Name: DART511.spt
Test Operator: MT

Instrumented Rod Data

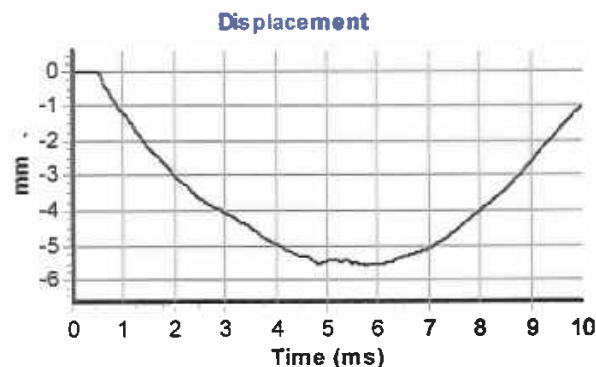
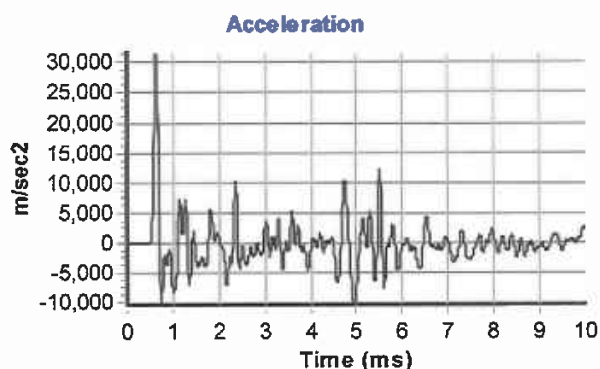
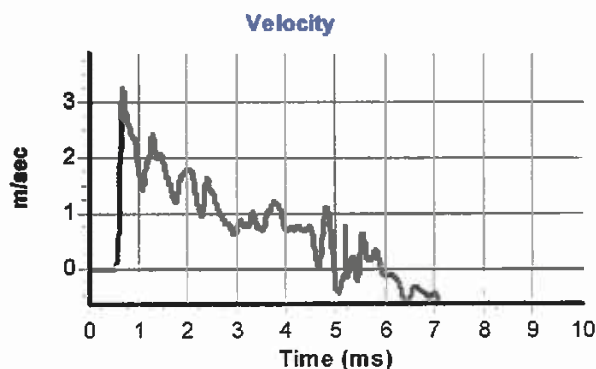
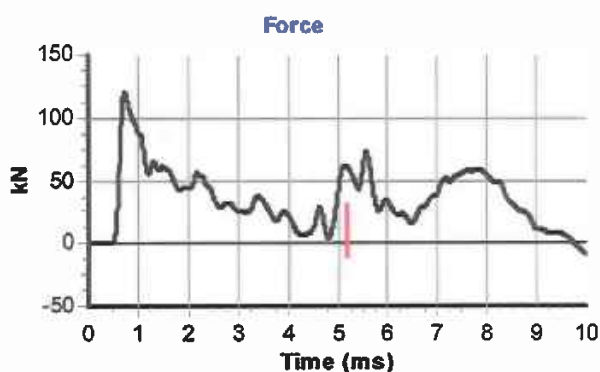
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

GEOTRON UK LTD - 78859



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 319

Energy Ratio E_r (%)

67

Signed: M.TONER

Title: TRAINEE FITTER

The recommended calibration interval is 12 months

TEST DATE AND CONDITIONS			
Date		15/02/2022	
Atmospheric Pressure		984	mB
Ambient Temperature		21.1	°C
EnviroNics Serial No.		5089	

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD

Unit 4, Fairfield Court

Seven Stars Estate

Wheler Rd

Coventry

CV3 4LJ

Tel 02476303311



GAS DATA

LISTEN - ANALYSE - INFORM

Fax 02476307711

Customer	Wardell Armstrong LLP
Certificate Number	123016
Order Number	330347

Serial Number	12237
Software Version	G436-00.0027/0009

Recalibration DUE Date
15/02/23

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	500	Accept > 200 cc/min	Pump Flow @ -200mB	300	Accept > 200 cc/min
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	60.8	60	40.5	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	5	5	5	5	6	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N2	0	0	0	0	0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H2S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0
CO	2000	1000	0	Accept ±0.0	1002	Accept ±5.0
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0

Cross Gas Effects									
Applied Gas (ppm)		Instrument Readings (ppm)							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	1500	1500		0		0			
CO	1000	40		1002		0			
Hexane	2.0%	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		984	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200 mB	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30.3	Accept ± 3.0	-421	-431	Accept ± 50
-3	-3	Accept ± 1.0	-19	-19	Accept ± 6.0
0	0	Accept ± 0.0	0	0	Accept ± 0.5
3	3	Accept ± 0.5	16	16	Accept ± 3.0
30	30	Accept ± 3.0	360	358	Accept ± 50
60	59.8	Accept ± 6.0	1092	1088	Accept ± 130
90	90.9	Accept ± 9.0	2141	>>>>	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading °C	
Applied Temperature °C		
-10	-10	Accept ± 2.0
0	0	Accept ± 1.0
30	30	Accept ± 1.0
60	60	Accept ± 1.0
100	100	Accept ± 1.0

Technician:
Jack Rutland

Date Tested:
16/02/2022

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated.

The results displayed on the instrument at each stage are recorded above.

Gas Data Ltd is certified to BS EN ISO9001:2015, BS EN ISO14001:2015, BS EN ISO45001:2018.

TEST DATE AND CONDITIONS			
Date	15.2.22		
Atmospheric Pressure	984	mB	
Ambient Temperature	2.1	°C	
EnviroNics Serial No.	5089		

GAS DATA LTD
Unit 4
Fairfield Court
Seven Stars Estate
Coventry
CV3 4LJ
UK
+44 (0)24 7630 3311



GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
330347	GFM436	12237 G436-27/09	123516

Calibration Technician *[Signature]*

Date 15.2.22

Inspection Technician *[Signature]*

Date 16.2.22

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)	INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P	Instrument		✓
	Keyboard Test (All Keys)	P	Leather Case		X
	Backlight	P	Instrument Strap		✓
	Clock Set / Running	P	AC Battery Charger (UK)		✓
	Comms Test	P	AC Battery Charger (EURO)		X
	Pump Flow Test (In & Out)	P	AC Battery Charger (US)		X
	Overall Leak Test (30mB)	n/a	AC Battery Charger (AUS)		X
	Battery Charge Test	P	Gas Sample Pipe - (new issue)		✓
	Service Date set to?	15.2.23	Flow Sample Pipe - (new issue)		✓
Channel Tests	Data Logging Enabled?	P	Hard Carry Case		✓
	Verify CH4/LEL/Hexane/PID	P	Spares Pot		X
	Verify CO2	P	Allen Key		X
	Verify O2	P	Temperature Probe		X
	Verify H2S	P	Vane Anemometer		X
	Verify CO	P	USB Cable		✓
	Verify LEL	P	USB Memory stick		X
	Verify 1 st Option Gas	N/A	SM V5 Software	Ver 6.05	X
	Verify Atmospheric pressure	P	Internal Filter Pack	Qty	X
	Verify differential pressure	P	External Filter Pack	Qty	X
	Verify flow	P	Field Guide		X
	Verify temperature probe input	P	Extra Items: <i>Sample Tube</i>		
	Verify vane anemometer input	P			
	Jobcard(s) completed and signed	P			
	Jobcard(s) booked off database	P			
DataBase Checks	Calibration certificate completed	P	Comments:		
	Complete & print QI record	n/a			
	No. of Calibration label fitted	GDC 11360			
	MCERTS label displayed	P			
Label Checks	Warranty label fitted	P			
	H2S Range from Sales Order	5000			
	H2S Range from Cal Cert	5000			
	Over-range value correct?				

TEST DATE AND CONDITIONS			
Date		08/02/2021	
Atmospheric Pressure Ambient Temperature EnviroNics Serial No.		988	mB
		21.9	°C
		5089	

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD

Unit 4, Fairfield Court

Seven Stars Estate

Wheler Rd

Coventry

CV3 4LJ

Tel 02476303311

Fax 02476307711



Customer	Wardell Armstrong LLP
Certificate Number	122297
Order Number	327797

Serial Number	12237
Software Version	G436-00.0027/0009

Recalibration DUE Date
08/02/22

Instrument Checks			
Keyboard	✓	Display Contrast	✓
Pump Flow In	400 Accept > 200 cc/min	Pump Flow @ -200mB	250 Accept > 200 cc/min
Clock Set / Running	✓	Labels Fitted	✓

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	60	60	40	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	5	5	5	5	6	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N ₂	0	0	0	0	0	0
	Accept ±0.0		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H ₂ S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0
CO	2000	1000	0	Accept ±0.0	1002	Accept ±5.0
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0

Cross Gas Effects									
Applied Gas (ppm)		Instrument Readings (ppm)							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	1500	1500		0		0			
CO	1000	0		1002		0			
Hexane	2.0%	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		988	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200mB	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30.2	Accept ± 3.0	-548	-560	Accept ± 50
-3	-3	Accept ± 1.0	-21	-21	Accept ± 6.0
0	0	Accept ± 0.0	0	0	Accept ± 0.5
3	3	Accept ± 0.5	17	17	Accept ± 3.0
30	30	Accept ± 3.0	392	390	Accept ± 50
60	60	Accept ± 6.0	1217	1217	Accept ± 130
90	90.5	Accept ± 9.0	2415	2415	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading $^{\circ}\text{C}$	
Applied Temperature $^{\circ}\text{C}$		
-10	-10	Accept ± 2.0
0	0	Accept ± 1.0
30	30	Accept ± 1.0
60	60	Accept ± 1.0
100	100	Accept ± 1.0

Technician:
<i>Jack Rutland</i>

Date Tested:
<i>09/02/2021</i>

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

TEST DATE AND CONDITIONS	
Date	8.2.2021
Atmospheric Pressure	955 mB
Ambient Temp	21.9 °C
EnviroNics Serial No.	5589

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GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
327797	GFM436	12237 9436-27/01	122297

Calibration Technician *[Signature]*

Date 8.2.2021

Inspection Technician *[Signature]*

Date 9.2.21

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)		INSTRUMENT PACKING LIST		Tick if included	
Function Tests	Dust Caps Fitted	P		Instrument		✓	
	Keyboard Test (All Keys)	P		Leather Case		✓	
	Backlight	P		Instrument Strap		✓	
	Clock Set / Running	P		AC Battery Charger (UK)		✓	
	Comms Test	P		AC Battery Charger (EURO)		x	
	Pump Flow Test (In & Out)	P		AC Battery Charger (US)		x	
	Overall Leak Test (30mB)	n/a		AC Battery Charger (AUS)		x	
	Battery Charge Test	P		Gas Sample Pipe - (new issue)		x	
	Service Date set to?	8-2-22		Flow Sample Pipe - (new issue)		x	
Channel Tests	Data Logging Enabled?	P		Hard Carry Case		✓	
	Verify CH4/LEL/Hexane/PID	P		Allen Key		x	
	Verify CO2	P		Spares Pot		✓	
	Verify O2	P		Temperature Probe		x	
	Verify H2S	P		Vane Anemometer		x	
	Verify CO	P		USB Cable		✓	
	Verify LEL	P		USB Memory stick		x	
	Verify 1 st Option Gas	N/A		SM V5 Software	Ver 6.5	x	
	Verify Atmospheric pressure	P		Internal Filter Pack	Qty	x	
	Verify differential pressure	P		External Filter Pack	Qty	x	
	Verify flow	P		Field Guide		x	
	Verify temperature probe input	P		Extra Items: Sample Tubes			
	Verify vane anemometer input	P					
		P					
DataBase Checks	Jobcard(s) completed and signed	P		Comments:			
	Jobcard(s) booked off database	P					
	Calibration certificate completed	P					
	Complete & print QI record	n/a					
Label Checks	No. of Calibration label fitted	GDC	11107				
	MCERTS label displayed	P					
	Warranty label fitted	P					
H2S Range	H2S Range from Sales Order	5000	ppm				
	H2S Range from Cal Cert	3000	ppm				
	Over-range value correct?	P					

TEST DATE AND CONDITIONS			
Date		18/02/2020	
Atmospheric Pressure		997	mB
Ambient Temperature		22.6	°C
EnviroNics Serial No.		5089	

**GFM436 Final Inspection & Calibration
Check Certificate**

GAS DATA LTD

Unit 4, Fairfield Court

Seven Stars Estate

Wheler Rd

Coventry

CV3 4LJ

Tel 02476303311

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Customer	Wardell Armstrong LLP
Certificate Number	121609
Order Number	325219

Serial Number	12237
Software Version	G436-00.0027/0009

Recalibration DUE Date
18/02/21

Instrument Checks					
Keyboard	✓		Display Contrast	✓	
Pump Flow In	500	Accept > 200 cc/min	Pump Flow @ -200mB	300	Accept > 200 cc/min
Clock Set / Running	✓		Labels Fitted	✓	

Gas Checks						
Sensor	CH ₄		CO ₂		O ₂	
	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %	Instrument Gas	True Gas Value %
	Readings %		Readings %		Readings %	
	60	60	40	40	20.9	20.9
	Accept ±3.0		Accept ±3.0		Accept ±0.5	
	5	5	5	5	6	6
	Accept ±0.3		Accept ±0.3		Accept ±0.3	
Zero Reading 100% N2	0	0	0	0	0	0
	Accept ±0.6		Accept ±0.0		Accept ±0.1	

Optional Gas Checks						
Applied Gas & Range		Concentration Tested @ (ppm)	Instrument Readings (ppm)			
Gas Type	Range (ppm)		Zero Reading		Instrument Gas Reading	
H2S	5000	1500	0	Accept ±0.0	1500	Accept ±5.0
CO	2000	1000	0	Accept ±0.0	996	Accept ±5.0
Hexane	2.0%	2.0%	0	Accept ±0.0	1.99	Accept ±10.0

Cross Gas Effects									
Applied Gas (ppm)		Instrument Readings (ppm)							
Gas Type	Concentration	Toxic 1:	H2S	Toxic 2:	CO	Toxic 3:	HEX		
H2S	1500	1500		0		0			
CO	1000	50		996		0			
Hexane	2.0%	0		0		1.99			

Pressure Checks			
Atmospheric Pressure [AP] (mB)			
Current Atmospheric Pressure (mB)		Instrument Atmospheric Pressure Reading (mB)	
AP Open Ports		997	Accept ± 2.0
AP Port (Internal)	+800 mB	800	Accept ± 5.0
	+1200 mB	1200	Accept ± 5.0

Flow Checks					
Borehole Flow			Differential Pressure		
Applied Reading (l/h)	Instrument Reading (l/h)		Applied Pressure (Pa)	Instrument Reading (Pa)	
-30	-30	Accept ± 3.0	-436	-436	Accept ± 50
-3	-3	Accept ± 1.0	-19	-20	Accept ± 6.0
0	0	Accept ± 0.0	0	0	Accept ± 0.5
3	3	Accept ± 0.5	17	17	Accept ± 3.0
30	30	Accept ± 3.0	384	384	Accept ± 50
60	60	Accept ± 6.0	1182	1179	Accept ± 130
90	90.6	Accept ± 9.0	2358	>>>>	Accept ± 250

Temperature Checks		
Calibration Temperature	Instrument Temperature Reading $^{\circ}\text{C}$	
Applied Temperature $^{\circ}\text{C}$		
-10	-10	Accept ± 2.0
0	0	Accept ± 1.0
30	30	Accept ± 1.0
60	60	Accept ± 1.0
100	100	Accept ± 1.0

Technician:
Jack Rutland

Date Tested:
19/02/2020

The instrument identified by the serial number stated above has been tested by Gas Data personnel for calibration accuracy on the date and under the ambient conditions stated. Gas Data Ltd internal BS EN ISO9001:2015 compliant workshop procedures were followed to apply known calibration test gases, gas flow rates, pressures and temperatures of the values stated. The results displayed on the instrument at each stage are recorded above.

TEST DATE AND CONDITIONS	
Date	18.2.20
Atmospheric Pressure	997 mB
Ambient Temp	22.6 °C
EnviroNics Serial No.	5087

GAS DATA LTD

Unit 4, Fairfield Court
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Coventry
CV3 4LJ

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GFM436-1 OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS			
SO Number	Instrument Type	Instrument Serial Number + SW Version	Job Number(s)
323219	GFM 436	12237 G436-27/09	121609

Calibration Technician

Date 18.2.20

Inspection Technician

Date 19.2.20

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable (NA)	INSTRUMENT PACKING LIST		Tick if included
Function Tests	Dust Caps Fitted	P	Instrument		✓
	Keyboard Test (All Keys)	P	Leather Case		✓
	Backlight	P	Instrument Strap		✓
	Clock Set / Running	P	AC Battery Charger (UK)		✓
	Comms Test	P	AC Battery Charger (EURO)		X
	Pump Flow Test (In & Out)	P	AC Battery Charger (US)		X
	Overall Leak Test (30mB)	n/a	AC Battery Charger (AUS)		X
	Battery Charge Test	P	Gas Sample Pipe - (new issue)		✓
	Service Date set to?	18.2.21	Flow Sample Pipe - (new issue)		✓
Channel Tests	Data Logging Enabled?	P	Hard Carry Case		✓
	Verify CH4/LEL/Hexane/PID	P	Allen Key		X
	Verify CO2	P	Spares Pot		✓
	Verify O2	P	Temperature Probe		X
	Verify H2S	P	Vane Anemometer		X
	Verify CO	P	USB Cable		✓
	Verify LEL	P	USB Memory stick		✓
	Verify 1 st Option Gas	N/A	SM V5 Software	Ver 6.05	✓
	Verify Atmospheric pressure	P	Internal Filter Pack	Qty	X
	Verify differential pressure	P	External Filter Pack	Qty	X
	Verify flow	P	Field Guide		X
	Verify temperature probe input	P	Extra Items: Sample Tubes		
	Verify vane anemometer input	P			
DataBase Checks	Jobcard(s) completed and signed	P	Comments:		
	Jobcard(s) booked off database	P			
	Calibration certificate completed	P			
	Complete & print QI record	n/a			
Label Checks	No. of Calibration label fitted	GDC 08819			
	MCERTS label displayed	P			
	Warranty label fitted	P			
H2S Range	H2S Range from Sales Order	5000	ppm		
	H2S Range from Cal Cert	5000	ppm		
	Over-range value correct?	P			

CERTIFICATE OF CALIBRATION

Issued By Pullman Instruments (UK) Ltd.

Certificate Number 1534875

Date of Issue 20 January 2022



www.pullman.co.uk

Pullman Instruments (UK) Ltd.

**Chatsworth House,
Chatsworth Terrace,
Harrogate, HG1 5HT**

Tel 01423 720360 Email info@pullman.co.uk

Page 1 of 2

Approved Signatory

J.Stacey ☐

M.Collins ☐

C.Johnson ☐

A.J.Cox ☐

M. Conboy ☒

Customer : WARDELL ARMSTRONG LLP
36 PARK ROW,
LEEDS, LS1 5JL

Date Received : 18 January 2022

Instrument : System ID : DR2040
Description : Shear Vane Tester
Manufacturer : PILCON
Model Number : DR2526
Serial Number : DR2040
Procedure Version : 22413v1

Job Number : 484355-1
Ref Number : DR2040
Site :
Location :

Environmental Conditions

Temperature : $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$
Relative Humidity : $50\%\text{RH} \pm 15\%\text{RH}$

Mains Voltage : $230\text{V} \pm 20\text{V}$
Mains Frequency : $50\text{Hz} \pm 1\text{Hz}$

Comments

No calibration adjustments or repairs were made to unit.
Measurements traceable to national standards.
Unit tested to manufacturers specification.

Traceability Information

Instrument Description	Serial Number	Certificate Number	Cal. Date	Cal. Period
50591.IND STATIC TRANSDUCER	103925	0256/254777	12/12/2020	104
43228 Torque Tool Tester	60556	0256/256288	19/02/2021	52

Calibrated By : G.Bance

Date of Calibration : 20 January 2022

This certificate provides traceability of measurement to recognised National standards, and to the units of measurements realised at the National Physical Laboratory or other recognised National standards laboratories. Copyright of this certificate is owned by the issuing laboratory and may not be reproduced except with the prior written approval of the issuing laboratory.

This certificate complies with the requirements of BS EN ISO 10012:2003.

CERTIFICATE OF CALIBRATION

Certificate Number
1534875

Page 2 of 2

AS FOUND RESULTS

Test Title	Tolerance	Applied Value	Reading	Pass / Fail
------------	-----------	---------------	---------	-------------

Start of test

Impact Shear Vane Tester. 33mm Vane

Overall Condition	---	---	---	PASS
-------------------	-----	-----	-----	------

Reading on Instrument	Amount Of Applied Torque (Nm)
-----------------------	-------------------------------

2	0.3
4	0.6
6	0.9
8	1.1
10	1.4
12	1.7
14	2.0
16	2.3
18	2.7
20	3.0
22	3.4
24	3.7
26	3.9
28	4.1

End of test

END OF TEST DATA

Uncertainties

Low Torque : +/- 0.02% rdg (0-25N)

Pullman Instruments (UK) Ltd.
Pullman Instruments (UK) Ltd.
Chatsworth House,
Chatsworth Terrace,
Harrogate, HG1 5HT
Tel 01423 720360 Email info@pullman.co.uk

DESPATCH NOTE

Page 1 of 1

ZOE HOLMES
WARDELL ARMSTRONG LLP
36 PARK ROW
LEEDS

. LS1 5JL

Tel : 0113 831 5533

If undelivered please return to :
Pullman Instruments (UK) Ltd. Pullman Instruments (UK) Ltd. Chatsworth
House,

DESPATCH REF. T109308

DATE 20/01/2022

ORDER No. LD2460

ACCOUNT No. WAR501

CARRIAGE VIA POST

Qty	Description	List Price	Discount %	Net Amount
1	Standard Certificate For Soil Shear Vane Tester PILCON DR2526 Shear Vane Tester Serial No. : DR2040 , Job No.: 484355-1 , Cert No.: 1534875 , Cust Ref.: DR2040 Accessories : Case,Vanes,	xxxxx	xxxxx	xxxxx

We are starting to implement a new automated invoicing system. In future delivery notes will not show prices, but invoices should be issued within two working days of your delivery. If you require prices before the invoice is received please e mail accounts@pullman.co.uk giving the order number or job reference and a copy of the invoice can be emailed to you when issued. Thank you for your co operation

Received By

Signature

Print Name

Date

CERTIFICATE OF CALIBRATION

Issued By Pullman Instruments (UK) Ltd.

Certificate Number 1489661

Date of Issue 19 October 2020



www.pullman.co.uk

Pullman Instruments (UK) Ltd.

**Chatsworth House,
Chatsworth Terrace,
Harrogate, HG1 5HT**

Tel 01423 720360 Email info@pullman.co.uk

Page 1 of 2

Approved Signatory

J.Stacey ☐

M.Collins ☐

C.Johnson ☐

A.J.Cox ☐

M. Conboy ☒

Customer : WARDELL ARMSTRONG LLP
36 PARK ROW,
LEEDS, LS1 5JL

Date Received : 14 October 2020

Instrument :	System ID :	DR2040	Job Number :	469326-1
	Description :	Shear Vane Tester	Ref Number :	DR2040
	Manufacturer :	PILCON	Site :	
	Model Number :	DR2526	Location :	
	Serial Number :	DR2040		
	Procedure Version	22413v1		

Environmental Conditions

Temperature : $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$
Relative Humidity : $50\%\text{RH} \pm 15\%\text{RH}$

Mains Voltage : $230\text{V} \pm 20\text{V}$
Mains Frequency : $50\text{Hz} \pm 1\text{Hz}$

Comments

No calibration adjustments or repairs were made to unit.
Measurements traceable to national standards.
Unit tested to manufacturers specification.

Traceability Information

Instrument Description	Serial Number	Certificate Number	Cal. Date	Cal. Period
CM38 - NORBAR 43228 Torque Tester	60556	0256/245796	30/01/2020	52
CM183 - NORBAR 25Nm Transducer	103925	0256/245799	30/01/2020	52

Calibrated By : G.Bance

Date of Calibration : 19 October 2020

This certificate provides traceability of measurement to recognised National standards, and to the units of measurements realised at the National Physical Laboratory or other recognised National standards laboratories. Copyright of this certificate is owned by the issuing laboratory and may not be reproduced except with the prior written approval of the issuing laboratory.

This certificate complies with the requirements of BS EN ISO 10012:2003.

ARCHWAY ENGINEERING (UK) LTD
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: DART387
Test Date: 28/04/2020
Report Date: 28/04/2020
File Name: DART387.spt
Test Operator: CM

Instrumented Rod Data

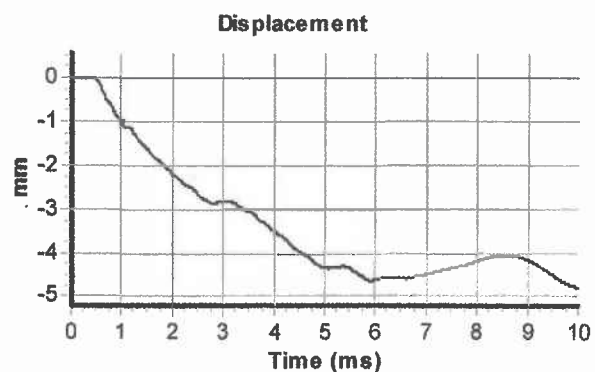
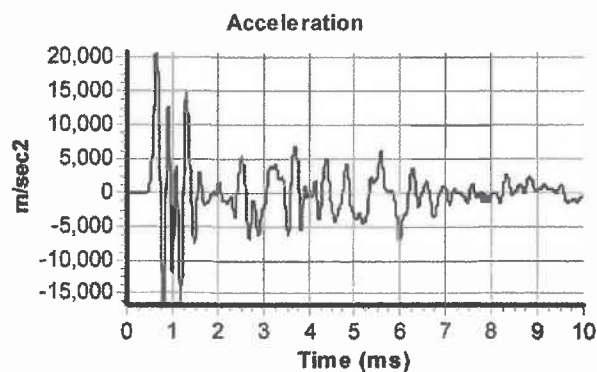
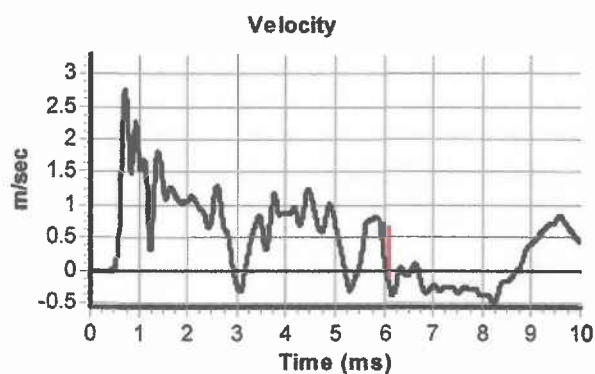
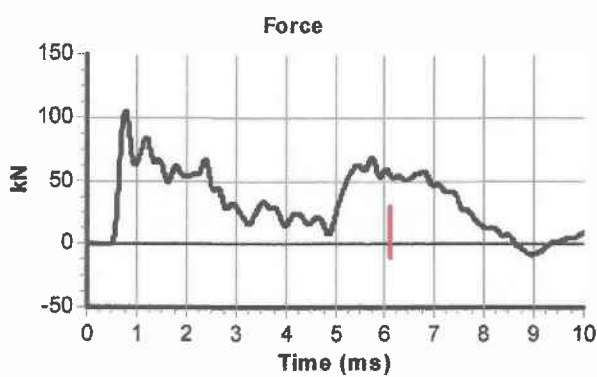
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

EXPLORATION/



Calculations

Area of Rod A (mm^2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 308

Energy Ratio E_r (%): **65**

Signed: C. McCLUSKEY
Title: FITTER

The recommended calibration interval is 12 months

A P P E N D I X Q

OIP & MIP Testing

IN SITU

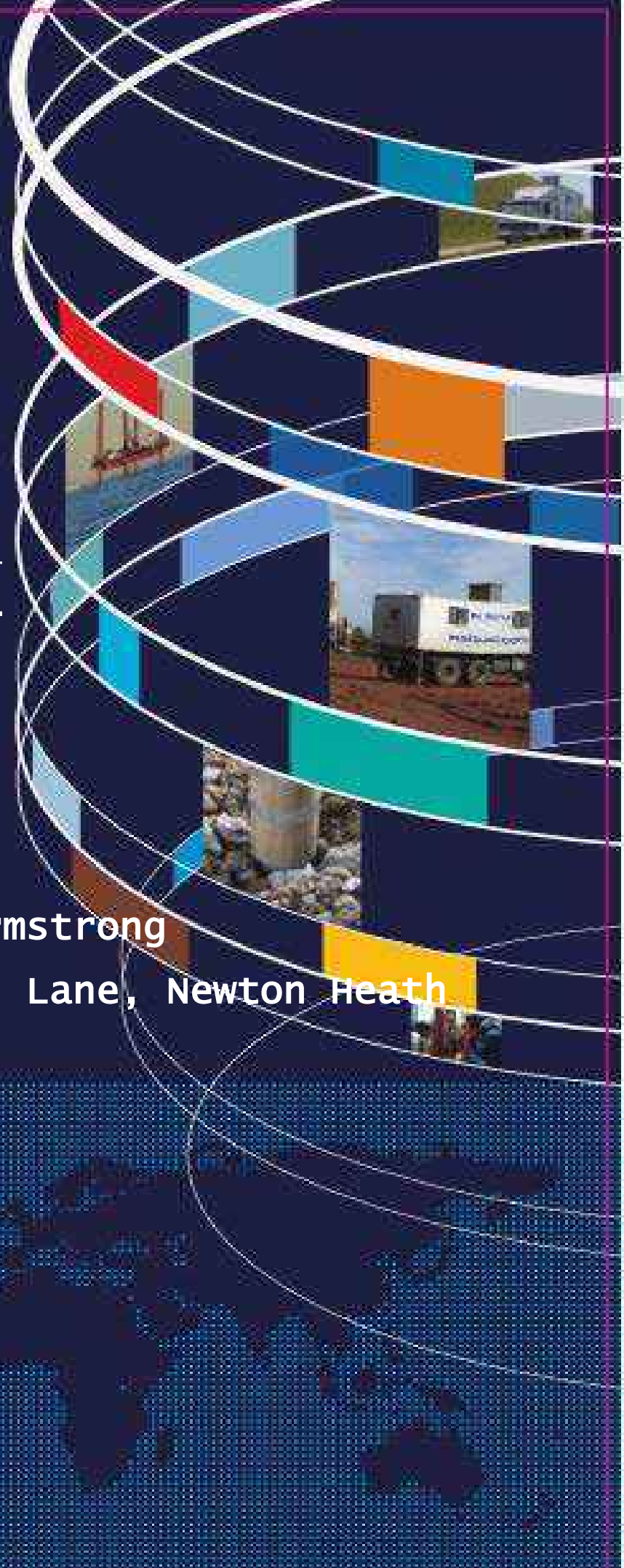
SITE INVESTIGATION

STATIC CONE PENETRATION TEST

FACTUAL REPORT

CLIENT: Wardell Armstrong

PROJECT: Ten Acres Lane, Newton Heath



Project	Ten Acres Lane, Newton Heath
Project No.	1210414
Client	Wardell Armstrong
Address	Sir Henry Doulton House, Forge Lane, Etruria, Stoke-on-Trent, ST1 5BD

Attention: Mr Jonathan Currie

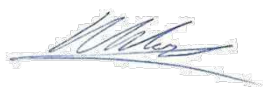
Dear Mr Currie,

We have pleasure in providing a digital copy of our report and data for the above project.

We hope that you are satisfied with the performance of our staff, equipment and reporting on this project. If you should have any queries about any aspect of the works carried out, please do not hesitate to contact us. We look forward to being of service to you in the future.

Yours faithfully,

In Situ Site Investigation Limited



Darren Ward

Director

Report Issue

Issue	Date	Prepared	Sign	Checked	Sign	Approved	Sign
01	24/08/2021	Alistair Gray		Luisa Dhimitri		Darren Ward	

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1.0 INTRODUCTION

In Situ Site Investigation (ISSI), was contracted by Wardell Armstrong to perform several membrane interface profiling tool (hereby MIP) and Optical Interface Probing (hereby OIP) test holes at their site, Ten Acres Lane, Newton Heath (hereby Site).

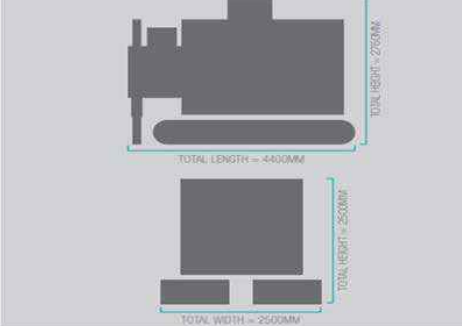
Through the period of 2nd August 2021 – 6th August 2021, ISSI completed 12 MIP and 48 OIP tests at selected locations throughout the site.

ISSI was made aware that the site had several contaminants of concern including free phase hydrocarbon compounds, dissolved phase hydrocarbons, and volatile organics.

2.0 EQUIPMENT DESCRIPTION

2.1 PUSHING EQUIPMENT

During this project a direct (static) push rig was utilised. A 20-tonne tracked crawler rig was supplied by ISSI.

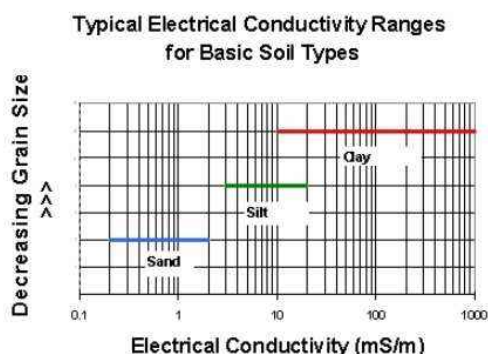
CPT RIG DETAILS		CPT RIG DIMENSIONS	
DRIVE SYSTEM	TRACKED RIG		
TOTAL WEIGHT	20 TONNES		
GROUND BEARING PRESSURE	36KPA		
CPT RAM THRUST CAPACITY	20 TONNES		
MAXIMUM PENETRATION	20-40M DEPENDING ON THE GROUND CONDITIONS.		
PERFORMANCE RATES	100-150M OF TESTING A DAY, DEPENDING ON ACCESS TO POSITIONS.		
TYPICAL SITES FOR THIS RIG	SOFT, BOGGY SITES. LOW GROUND BEARING PRESSURE.		

2.2 MIP



The MIP is an interface between contaminants in the soil and the detectors at ground surface. It is a mapping tool used to find the depth at which contamination is located, but is not used to determine concentration of the compound. Two advantages of using the MIP are that it detects contamination in situ and can be used in all types of soil conditions. The MIP is a logging tool used to make continuous measurements of VOCs in soil. Volatile compounds outside the probe diffuse across a membrane and are swept from the probe to a gas phase detector at ground surface. A log is made of detector response versus probe depth. In order to speed diffusion, the probe membrane is heated to approximately 121°C. Along with the detection of VOCs in the soil, the MIP also measures the electrical conductivity of the soil to give a probable lithology of the subsurface. This is accomplished by using a dipole measurement arrangement at the end of the MIP probe so that both conductivity and detector readings may be taken simultaneously. A simultaneous log of soil electrical conductivity is recorded with the detector response.

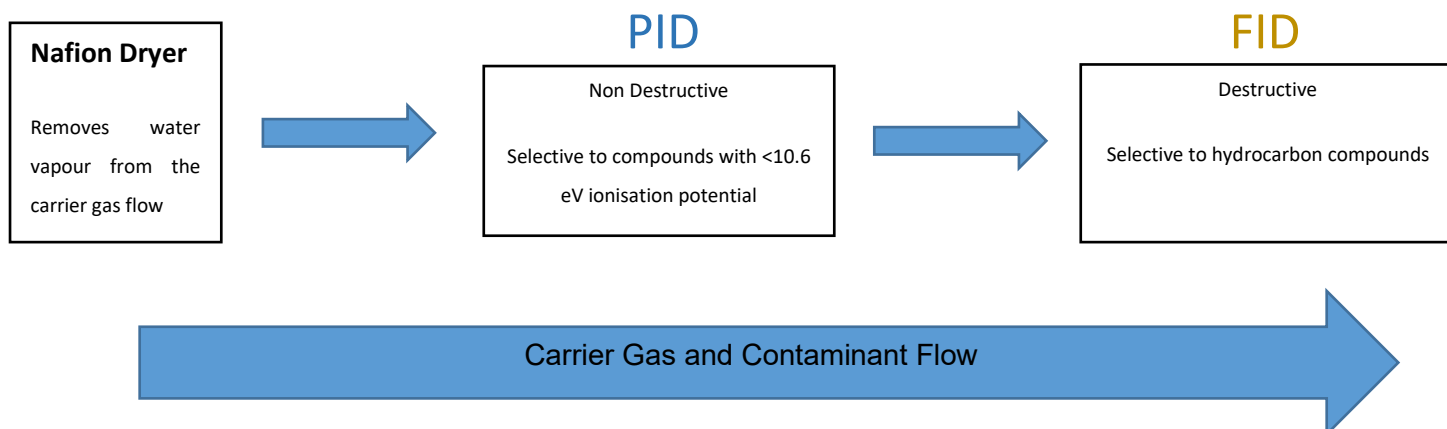
The MIHP probe also includes an electrical conductivity (EC) measuring device housed close to the end of the probe, and a continuous profile of EC is logged alongside the MIP and HPT logs. Soil conductivity and resistivity (the inverse of conductivity) have long been used as tools

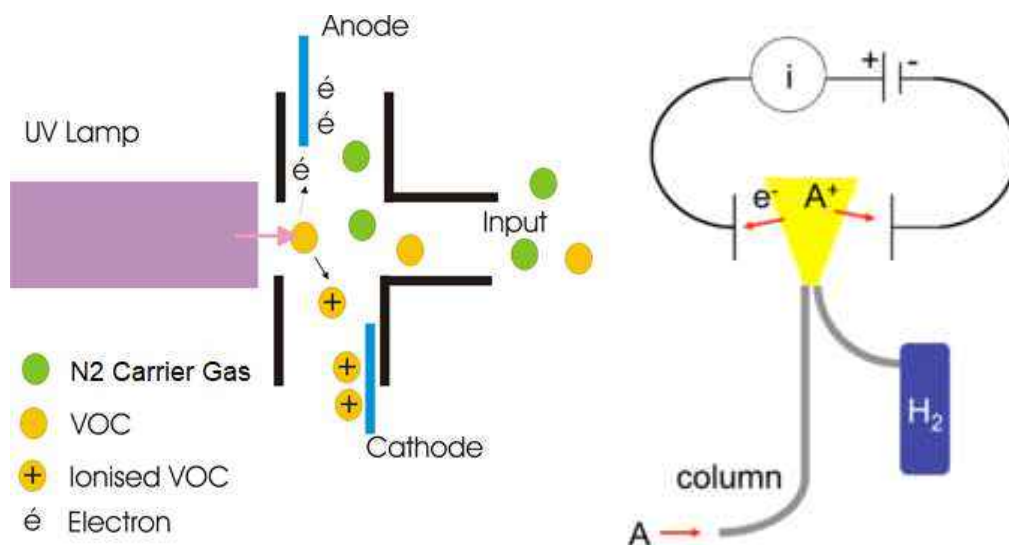


to classify soils. The power of this tool stems from the fact that, in general, silts and clays exhibit higher electrical conductivity readings than sands and gravels. The conductance of the soil is based upon its parent mineralogy as well as the conductance of the pore fluids within the formation.

2.3 GC Detector Array Information

The gas chromatography equipment can be configured with several different detector types. During this project FID & PID detectors were chosen and utilised due to their robust detection capabilities and sensitivities to the specified target compounds. The differential responses between detector types can be used to investigate the presence of multiple target compounds with differing properties. When the N2 carrier gas exits the trunkline, it takes the following path:





PID System Setup

Main Photon Energy 10.6eV

Fill Gas Kr

Window Material MgF₂

Comments: Specific to compounds with an ionisation potential of <10.6eV. PID detectors can be susceptible to quenching by compounds such as methane, ethane, some acid gasses etc.

FID System Setup

Carrier Gas N₂

Fuel Gas H₂

Compressor Gas Air

Comments: Destructive, Specific to H-C bonds within molecules.

2.4 OIP



The OIP (Optical Image Profiler) is a direct push tool used for the delineation of non-aqueous phase liquid (NAPL) hydrocarbon fuels and oils. The OIP-UV probe is designed with UV and visible light sources which are directed out a sapphire window. As the probe is advanced into the subsurface, the UV light source will induce fluorescence of the fuel polycyclic aromatic hydrocarbons (PAHs). This fluorescence is captured by an onboard camera which operates at 30 images per second. Images are saved throughout the advancement of the log and still photos are taken using UV and visible light sources each meter as well as at operator chosen depths. Soil fluorescence images (20 per ft) are saved throughout the log

3.0 SITE SET UP

The MIHPT probe, OIP Probe and Detection equipment, pump and flow controllers, data logger and gas chromatograph were instated into the CPT pushing rig at the start of this project and remained in-situ during the works. An inverter was used to power the data logger, whilst all other electrical power was taken from a dual generator setup attached to the outside of the pushing rig. All electrical equipment was earthed to the chassis of the pushing rig.

The following set points were used during the course of this project:

MIP Heater Temperature: **121°C**

MIP Flow: **35-45 ml/min**

MIP Carrier: **Nitrogen**

MIP Pressure: **40 kPa**

HTL (Heated Trunkline) Used: **YES**

MIP Reference Compound(s): **Toluene**

MIP Response Test Concentration Toluene: **10ppm**

MIP Response Test Matrix Toluene: **Water, Methanol**

Detector Array: **FID (H₂), PID (10.6 eV)**

PID Gain used: **LOW**

FID Gain used: **LOW**

OIP Light Filter: **275UV**

OIP Reference Compound 1: **Diesel**

OIP Reference Compound 2: **Synthetic 5W-30 Oil**

The MIP probe was advanced into the ground at a rate of approximately 1.6m/min, and was paused every 30cm in order to maintain heater temperature and allow volatile collection. The pause time is equal to that of the trip time once the heater block has reached a stable temperature. The OIP Probe was advanced at a rate of 2cm/s and an additional optical image was collected ever 1m, or when significant detector response was observed.

4.0 PRE/POST LOG PERFORMANCE INFORMATION

Performance checks of each component of the MIP system are undertaken pre and post test. If the system is found to be performing inadequately, then it should not be used until the source of the performance issue has been rectified and the system tested again.

EC:

The electrical conductivity sensor is tested at a high and low load, using a 2-pin connector of known load. The acceptable Δ (deviation from expected value of 55 (mS/m) in the low test, 290 (mS/m) in the high test) is 10%. All pre-and post EC system checks have been examined and found to conform to this parameter.

Chemical Standards Preparation

The choice of the chemical for the preparation of the Standard is project-specific, and it is recommended to be similar to the contaminant of concern at that project. Further, the concentration of the chemical in the Standard Test should cover the range of concentrations that could be encountered in the subsurface to assess the MIP instrumentation responses to different concentrations. The rationale behind the chemical standard response test is to ensure consistency and repeatability of the detector response over the course of the MIP logging. This detector response needs to be both visible and significant. As no information was given about the nature of the contamination on site, toluene at 10ppm was chosen as the response standard.

Chemical standard preparation was performed by the MIP probe operator prior to and during the testing phase of the project when required.

Detector Response:

Detector responses to the chemical standard test are dependent on the physical and chemical properties of the chemical used and the operation of the detector. For example, when toluene is used as a standard, both FID and PID will yield a clear response. If the chemical standard used has a higher ionisation potential than the energy of the lamp (in this case 10.6ev) then the compound will not be detected by the PID. This can be used to assess the degradation pathway of some chemicals in the subsurface, via the differential response in the detectors.

The rationale for the Standard Test is to ensure the proper detector response and the repeatability of such response during the actual MIP logging operation. Further, this

response must be identifiable, i.e. that it is a noticeable significant peak above the baseline, which requires a steady low baseline response. A signal to noise ratio calculation can be performed to calculate the significance of the target compound peak.

All pre and post test detector response logs are included in this report.

Response Time Assessment:

Response time is defined as the time required for the nitrogen carrier containing the first liberated volatiles from the probe head to travel through the MIP system trunk-line to the detector array on the surface. Trip time assessment is an important factor in the correct use of the MIP probe, as this measurement is paired to the depth readings to plot the detector response at the correct depths across the log. Measurement of the trip time during the chemical response tests before and after each MIHPT test ensures that the carrier gas system is intact and has not succumbed to drift. All chemical response tests are included in this report with each individual MIHPT profile..

5.0 MIP DATA QUALITY CONTROL AND USEABILITY

ISSI conducted all recommended quality assurance checks and calibration as described below, and in accordance with ISSI operating procedure. A brief explanation of each parameter that is monitored and assessed for QC purposes is outlined. A summary of each individual log and the QC associated with it can be found in parts 6.0 and 7.0 of this report.

Response Time

The average response times for all pushes were in the range of 60-100 seconds. Some variation in trip time between pre and post log response testing was observed.

Detector Response

The Detector responses pre and post log can be found after each individual log in section 14 of this report.

Electrical Conductivity

The electrical conductivity sensor is tested at a high and low load, using a 2-pin connector of known load. The acceptable Δ (deviation from expected value - 55 (mS/m) in the low test, 290 (mS/m) in the high test) is 10%.

MIP Flow

Under optimal conditions the MIP flow rates will be between 40-50ml/min. The MIP flow is monitored by the MIP controller inside the rig. Pre/Post log testing gas flows are measured independently by a hand held flow meter.

MIP Pressure

MIP Pressure is monitored during the probes advancement into the ground, a raise in pressure indicates a possible blockage, where a significant drop in pressure indicates a leak in the gas flow system.

No significant drops or raises in pressure were observed during individual pushes.

MIP Temperature

The temperature of the membrane is monitored across the push to ensure that the heater remains at a suitable temperature during probe advancement.

The heater operation is controlled by a thermocouple in the probe. Loose connections can occur during normal operation of the probe, especially if the probe is advanced or hammered into dense material. No issues with MIP temperature occurred during this project.

OIP Visual Target Testing

The Visual light camera is tested using a visual target including several different colours.

OIP Black Box Testing

The OIP lens in UV mode is covered with a “black box”, and the level of fluorescence should be 0.1 or below. This test is undertaken to ensure that no contamination is behind the OIP window.

OIP Diesel Reference

The OIP window is exposed to a cuvette containing diesel. Recorded fluorescence levels should be greater than or equal to 65%.

OIP Motor Oil Reference

The OIP window is exposed to a cuvette containing motor oil. Recorded fluorescence levels should be greater than or equal to 65%

OIP Optical Power

Power to the downhole cameras is monitored using a downhole sensor, encased in the OIP probe connection tube. Some change in the power to the camera array is to be expected (for example when taking a visual image when in UV mode) however, significant changes in the optical power could indicate an issue with the camera array.

6.0 OIP LOG QC SUMMARY TABLE

Location	Black Box Test Acceptable (<=0.1%)	Visible Light Test Acceptable	Diesel Fluorescence Test Acceptable (>65%)	Motor Oil Fluorescence Test Acceptable (>65%)	Comments
OIP01	Yes	Yes	Yes	Yes	
OIP02	Yes	Yes	Yes	Yes	
OIP03	Yes	Yes	Yes	Yes	
OIP04	Yes	Yes	Yes	Yes	
OIP05	Yes	Yes	Yes	Yes	
OIP06	Yes	Yes	Yes	Yes	
OIP07	Yes	Yes	Yes	Yes	
OIP08	Yes	Yes	Yes	Yes	
OIP09	Yes	Yes	Yes	Yes	
OIP10	Yes	Yes	Yes	Yes	
OIP11	Yes	Yes	Yes	Yes	
OIP12	Yes	Yes	Yes	Yes	
OIP13	Yes	Yes	Yes	Yes	
OIP14	Yes	Yes	Yes	Yes	
OIP15	0.2	Yes	Yes	Yes	Possible internal or black box contamination
OIP17	Yes	Yes	Yes	Yes	Contamination of lens – adjust baseline
OIP18	Yes	Yes	Yes	Yes	
OIP19	Yes	Yes	Yes	Yes	
OIP20	Yes	Yes	Yes	Yes	
OIP21	0.2	Yes	Yes	Yes	Possible internal or black box contamination
OIP22	N/A	N/A	N/A	N/A	Tests bypassed by DH
OIP23	Yes	Yes	Yes	Yes	
OIP24	Yes	Yes	Yes	Yes	
OIP25	Yes	Yes	Yes	Yes	
OIP27	Yes	Yes	Yes	Yes	
OIP28	Yes	Yes	Yes	Yes	
OIP29	Yes	Yes	Yes	Yes	
OIP31	Yes	Yes	Yes	Yes	
OIP31A	Yes	Yes	Yes	Yes	
OIP33	Yes	Yes	Yes	Yes	
OIP33A	Yes	Yes	Yes	Yes	
OIP34	Yes	Yes	Yes	Yes	
OIP35	Yes	Yes	Yes	Yes	
OIP36	Yes	Yes	Yes	Yes	
OIP37	Yes	Yes	Yes	Yes	
OIP38	Yes	Yes	Yes	Yes	
OIP40	N/A	N/A	N/A	N/A	Tests bypassed by DH
OIP42	Yes	Yes	Yes	Yes	
OIP43	Yes	Yes	Yes	Yes	
OIP44	0.2	Yes	Yes	Yes	Possible internal or black box contamination

OIP45	Yes	Yes	Yes	Yes	
OIP46	Yes	Yes	Yes	Yes	
OIP47	Yes	Yes	Yes	Yes	
OIP48	Yes	Yes	Yes	Yes	
OIP49	Yes	Yes	Yes	Yes	
OIP49A	Yes	Yes	Yes	Yes	
OIP49B	Yes	Yes	Yes	Yes	
OIP50	Yes	Yes	Yes	Yes	

7.0 MIHPT LOG QC SUMMARY TABLE

Location	MIP Temp >100 for log duration	MIP Pressure	MIP Flow	Comments
MIP02	Yes	Significant Δ	Significant Δ	Pressure increases after 2mbgl
MIP04	95 @3mbgl	Acceptable	Acceptable	
MIP06	Yes	Acceptable	Acceptable	
MIP10	Yes	Acceptable	Acceptable	
MIP13	Yes	Acceptable	Acceptable	
MIP15	Yes	Significant Δ	Significant Δ	Pressure increases after 4.8mbgl
MIP17	Yes	Acceptable	Acceptable	
MIP18	Yes	Acceptable	Acceptable	
MIP20	Yes	Acceptable	Acceptable	
MIP38	Yes	Acceptable	Acceptable	
MIP46	Yes	Significant Δ	Significant Δ	Pressure decrease to setpoint after 0.95mbgl
MIP48	Yes	Acceptable	Acceptable	

8.0 MIHPT DETECTOR RESPONSE SUMMARY TABLE

Location	Response Tests FID	Response Test PID	Signal To Noise	Response Time Variation	Comments
MIP02	See Section 15	See Section 15	Acceptable	Acceptable	
MIP04	See Section 15	See Section 15	Acceptable	Acceptable	
MIP06	See Section 15	See Section 15	Acceptable	Acceptable	
MIP10	See Section 15	See Section 15	Acceptable	Acceptable	
MIP13	See Section 15	See Section 15	Acceptable	Acceptable	
MIP15	See Section 15	See Section 15	Acceptable	Acceptable	
MIP17	See Section 15	See Section 15	Acceptable	Acceptable	
MIP18	See Section 15	See Section 15	Acceptable	Acceptable	
MIP20	See Section 15	See Section 15	Acceptable	Acceptable	
MIP38	See Section 15	See Section 15	Acceptable	Acceptable	
MIP46	See Section 15	See Section 15	Acceptable	Acceptable	
MIP48	See Section 15	See Section 15	Acceptable	Acceptable	

9.0 MIHPT/OIP TERMINATIONS

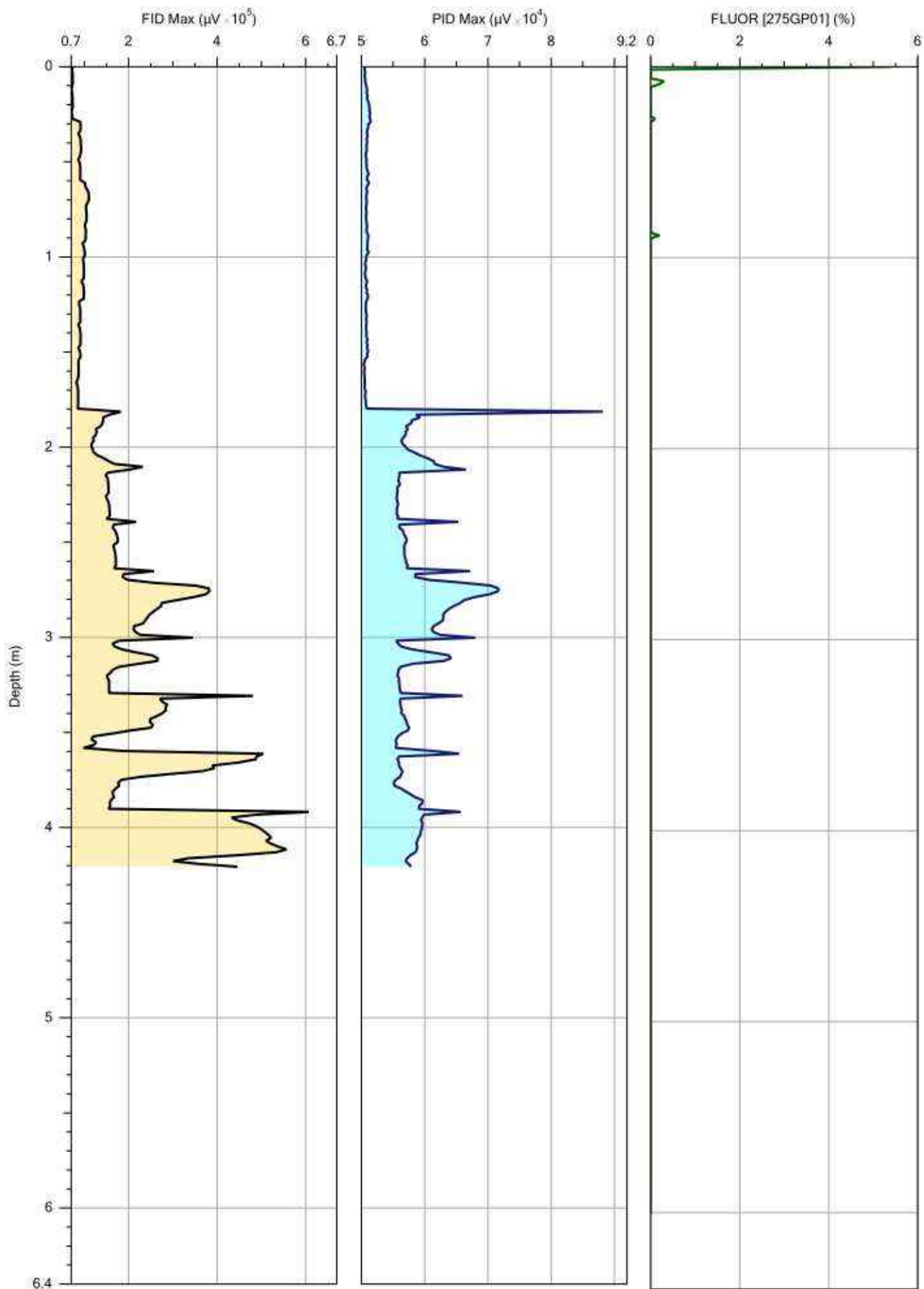
Location	MIP (Membrane) Depth	MIP Termination Reason
MIP02	4.206	Maximum Force Reached
MIP04	7.803	Maximum Force Reached
MIP06	4.206	Maximum Force Reached
MIP10	6.005	Maximum Force Reached
MIP13	3.307	Maximum Force Reached
MIP15	6.020	Maximum Force Reached
MIP17	4.542	Maximum Force Reached
MIP18	4.770	Maximum Force Reached
MIP20	5.197	Maximum Force Reached
MIP38	2.118	Maximum Force Reached
MIP46	5.425	Maximum Force Reached
MIP48	4.115	Maximum Force Reached

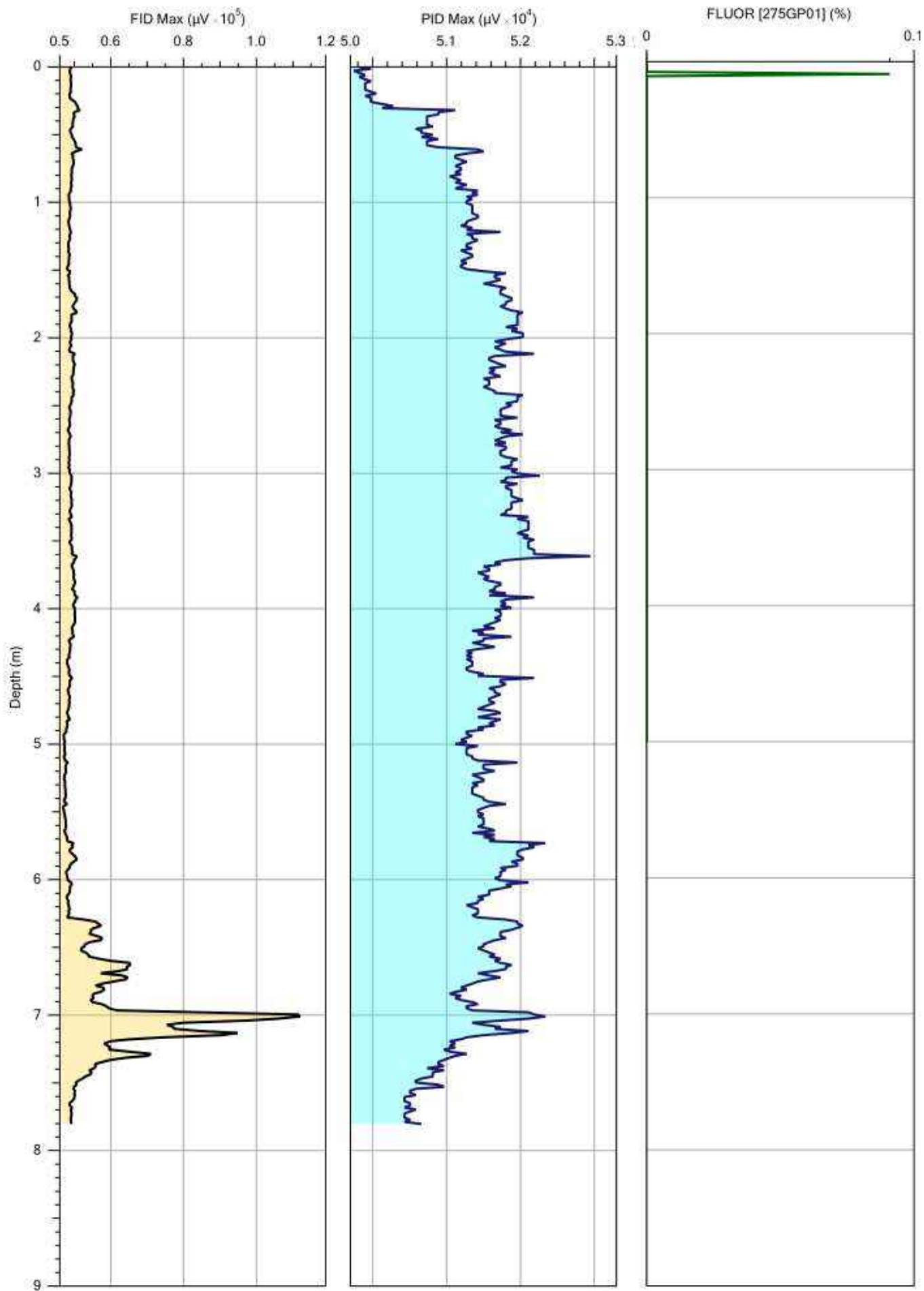
Location	OIP (Lens) Depth	OIP Termination Reason
OIP01	4.999	Maximum Force Reached
OIP02	6.005	Maximum Force Reached
OIP03	4.999	Maximum Force Reached
OIP04	4.999	Maximum Force Reached
OIP05	7.010	Maximum Force Reached
OIP06	6.020	Maximum Force Reached
OIP07	4.907	Maximum Force Reached
OIP08	5.410	Maximum Force Reached
OIP09	7.513	Maximum Force Reached
OIP10	6.507	Maximum Force Reached
OIP11	3.932	Maximum Force Reached
OIP12	5.989	Maximum Force Reached
OIP13	4.008	Maximum Force Reached
OIP14	10.241	Maximum Force Reached
OIP15	5.502	Maximum Force Reached
OIP17	4.907	Maximum Force Reached
OIP18	8.976	Maximum Force Reached
OIP19	4.496	Maximum Force Reached
OIP20	5.197	Maximum Force Reached
OIP21	2.515	Maximum Force Reached
OIP22	0.122	Maximum Force Reached
OIP23	0.579	Maximum Force Reached
OIP24	3.505	Maximum Force Reached
OIP25	10.119	Maximum Force Reached
OIP27	7.986	Maximum Force Reached
OIP28	5.822	Maximum Force Reached
OIP29	0.000	Refusal

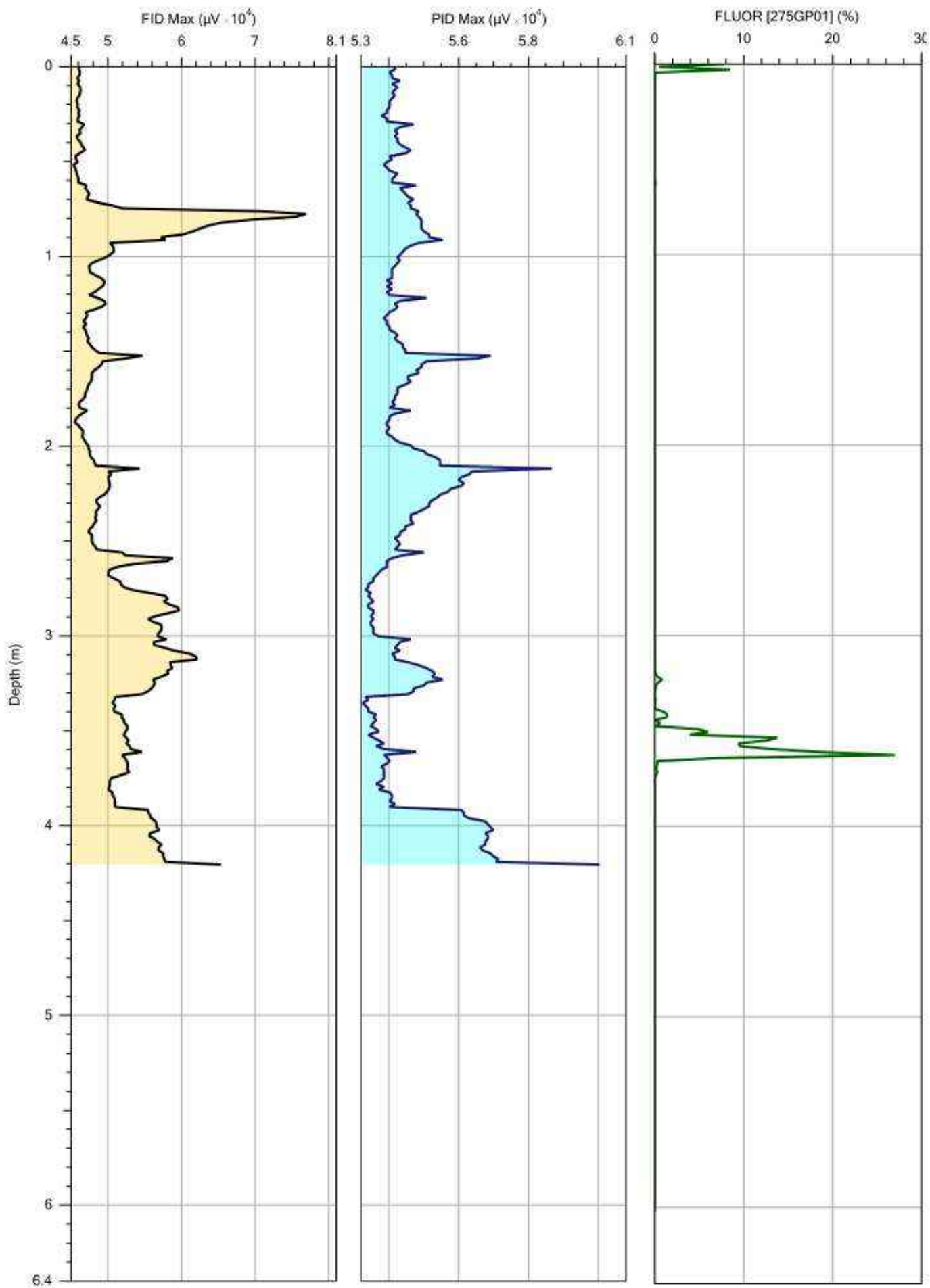
OIP31	0.564	Maximum Force Reached
OIP31A	5.166	Maximum Force Reached
OIP33	1.544	Maximum Force Reached
OIP33A	2.484	Maximum Force Reached
OIP34	0.579	Maximum Force Reached
OIP35	4.008	Maximum Force Reached
OIP36	2.012	Maximum Force Reached
OIP37	6.081	Maximum Force Reached
OIP38	2.515	Maximum Force Reached
OIP40	6.888	Maximum Force Reached
OIP42	3.490	Maximum Force Reached
OIP43	0.229	Maximum Force Reached
OIP44	6.005	Maximum Force Reached
OIP45	6.005	Maximum Force Reached
OIP46	6.005	Maximum Force Reached
OIP47	3.871	Maximum Force Reached
OIP48	3.901	Maximum Force Reached
OIP49	1.326	Maximum Force Reached
OIP49A	1.219	Maximum Force Reached
OIP49B	4.008	Maximum Force Reached
OIP50	2.042	Maximum Force Reached

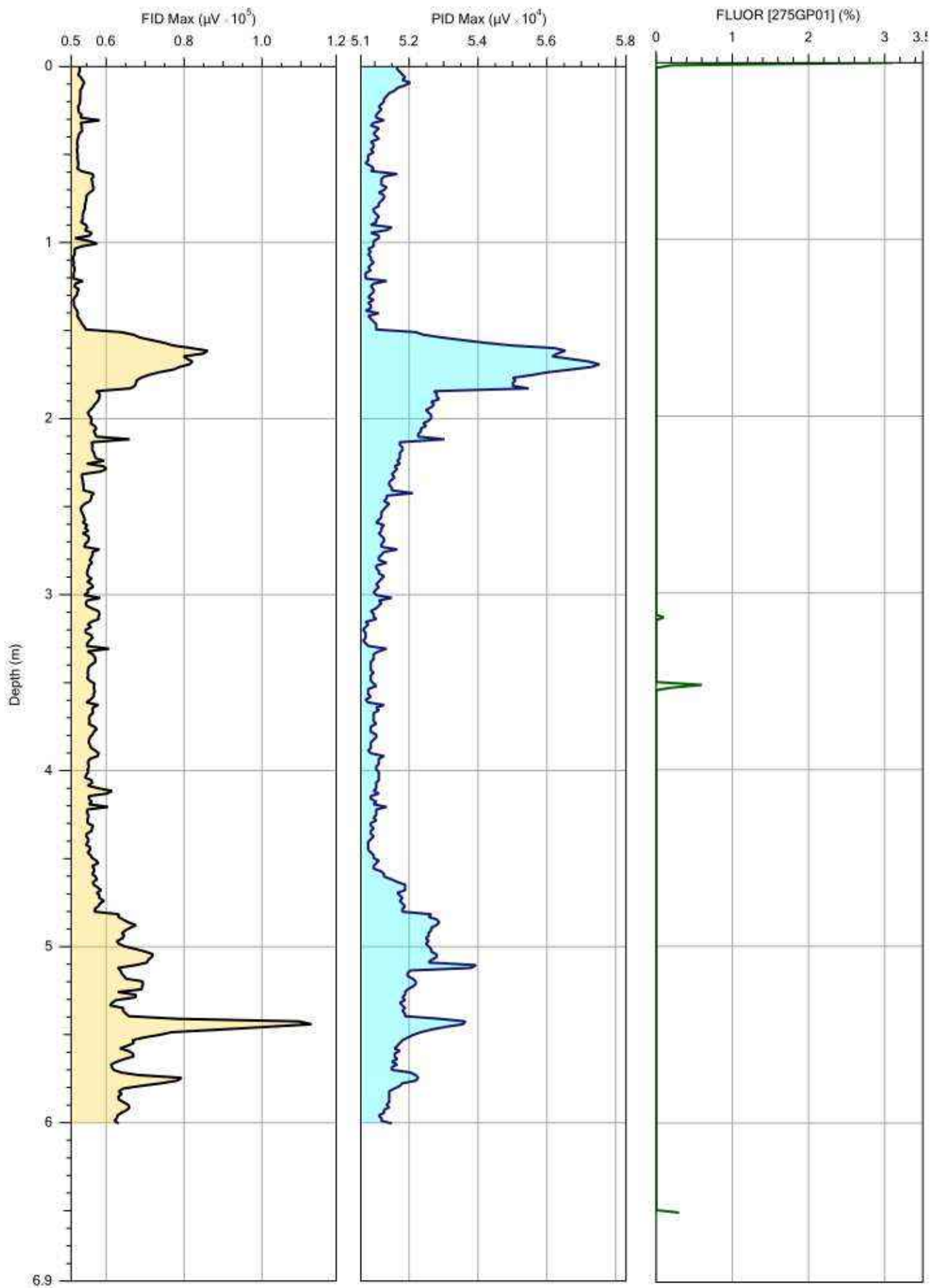
10.0 MIP/OIP DETECTOR PLOTS

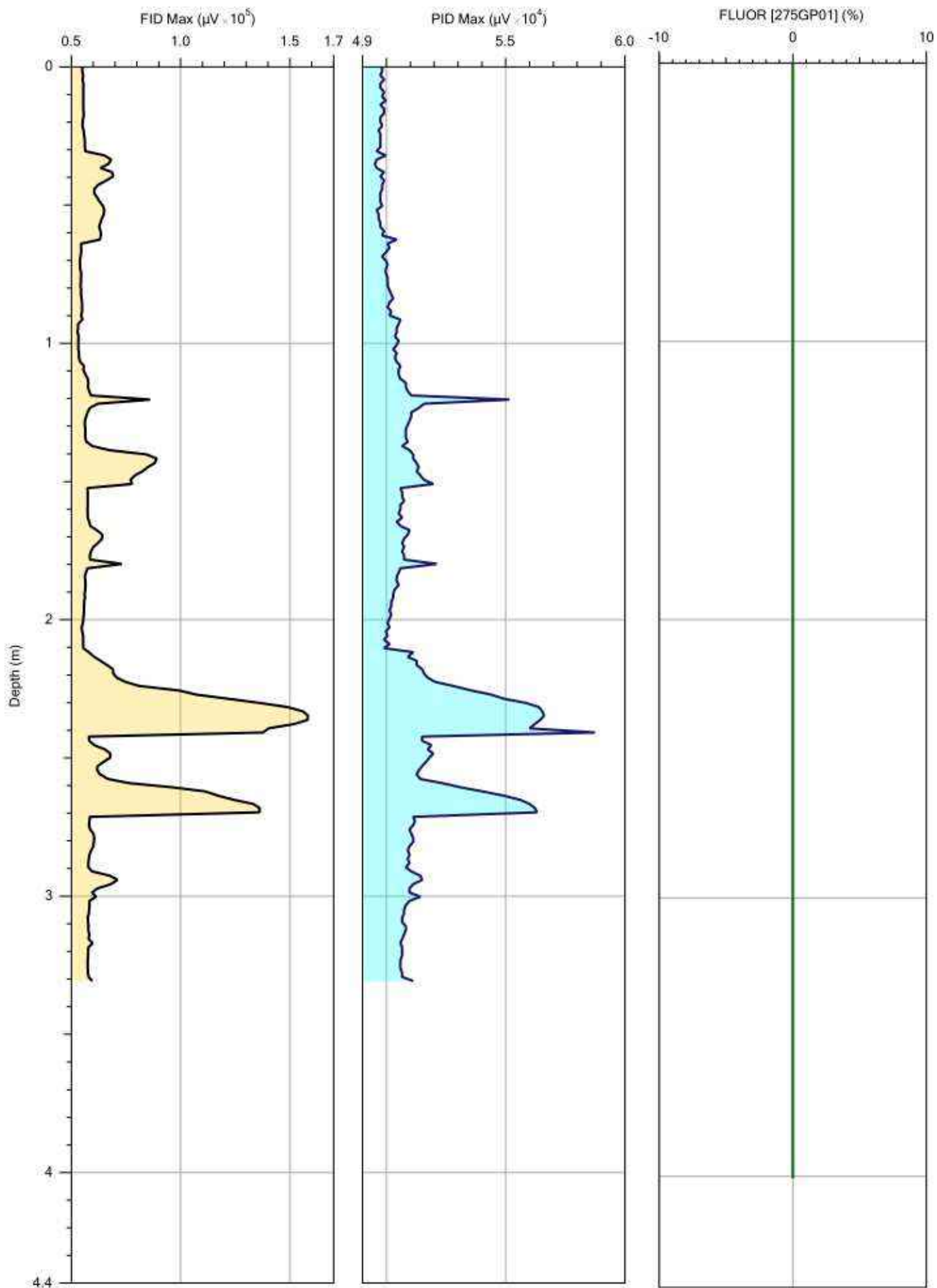
Where an MIP and OIP log have been performed in the same location detector responses from both probes are shown.

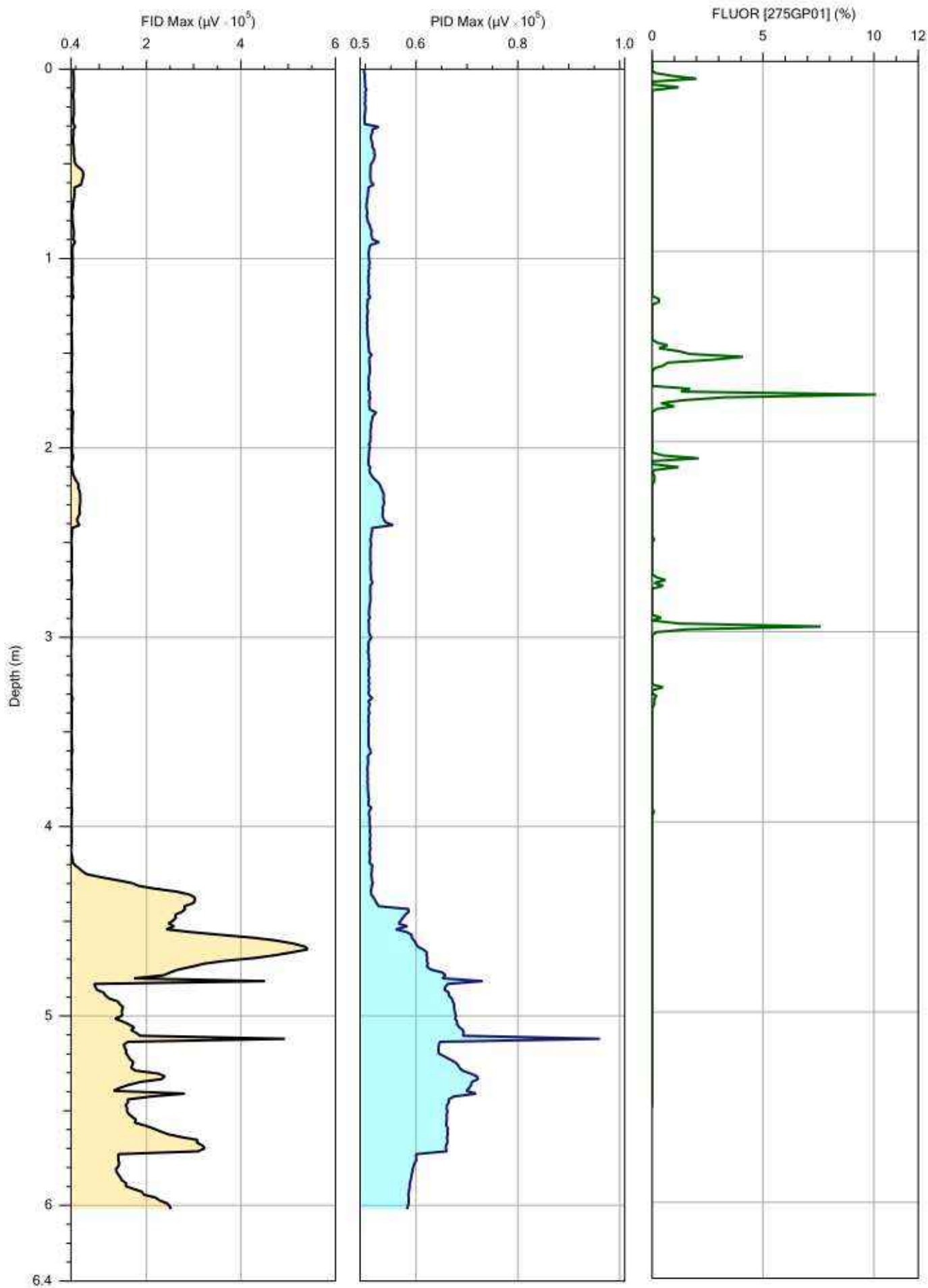


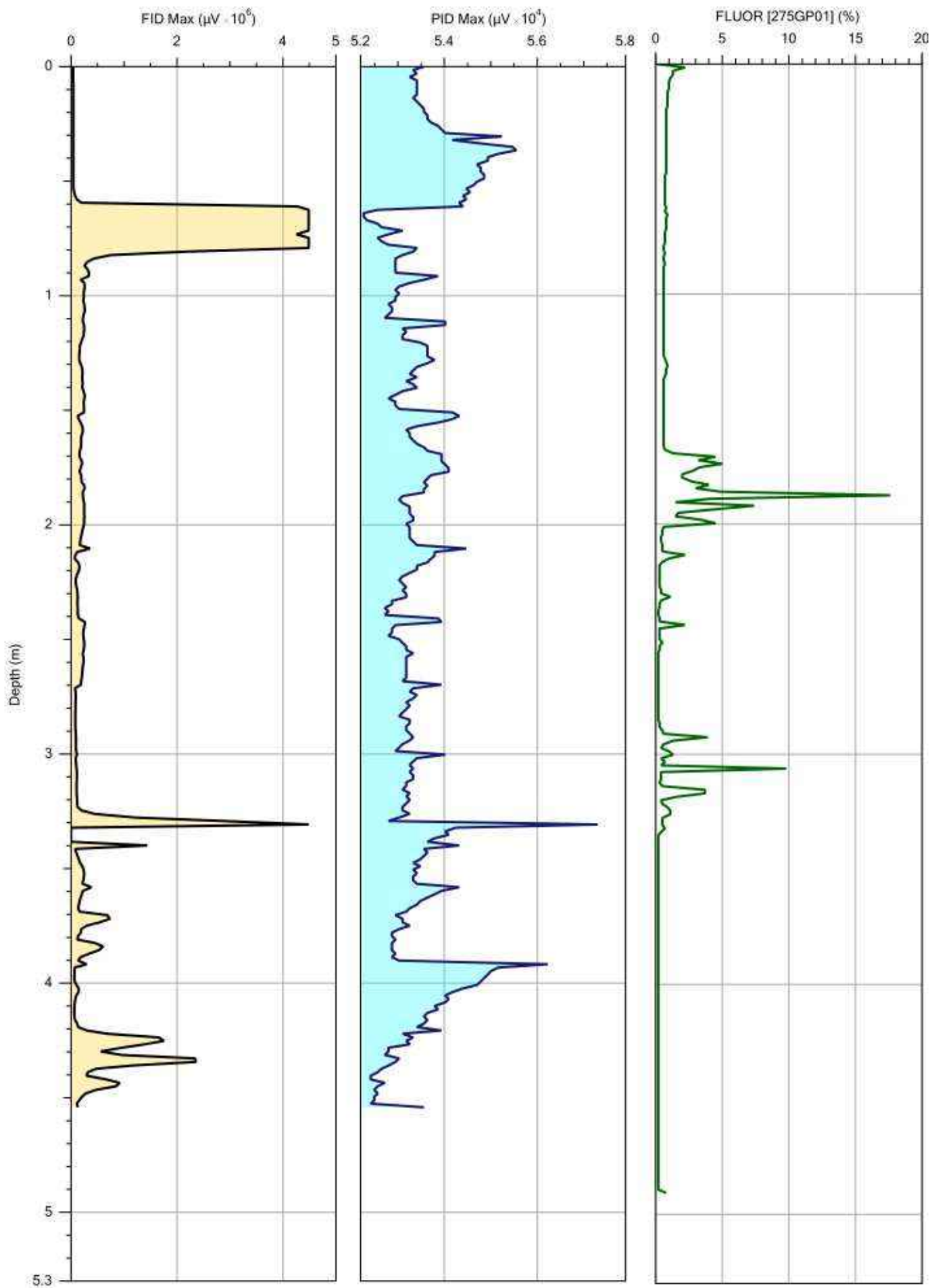


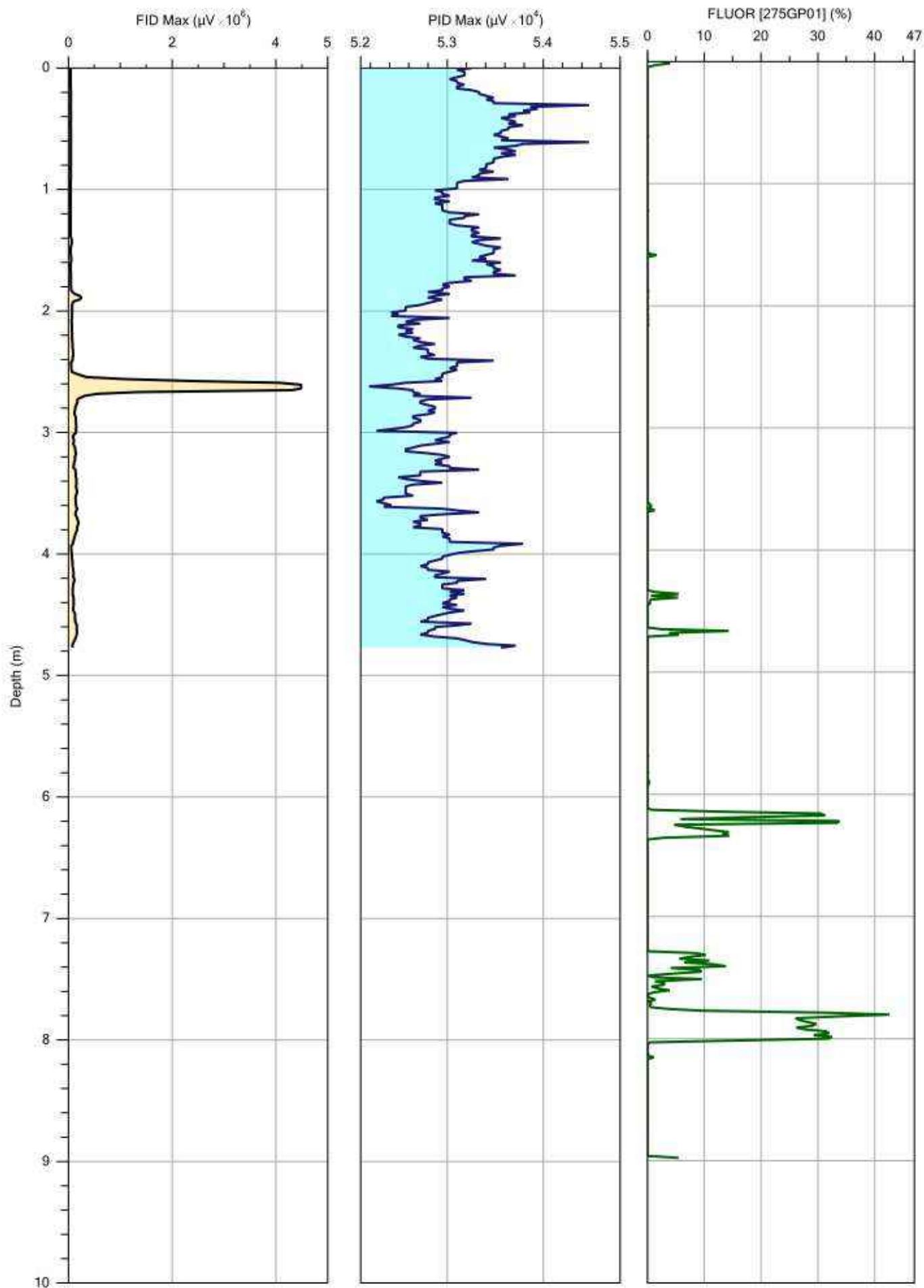


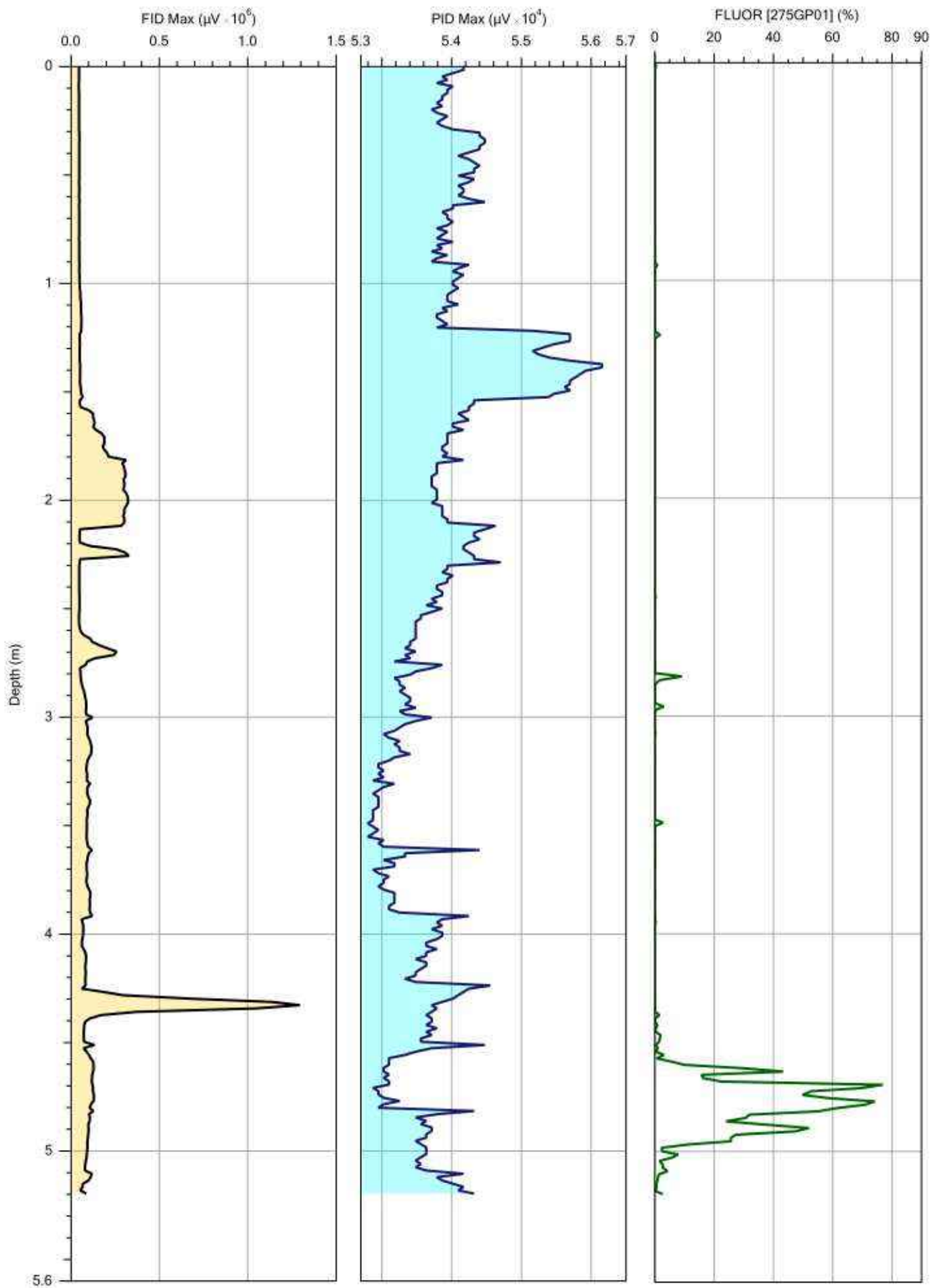


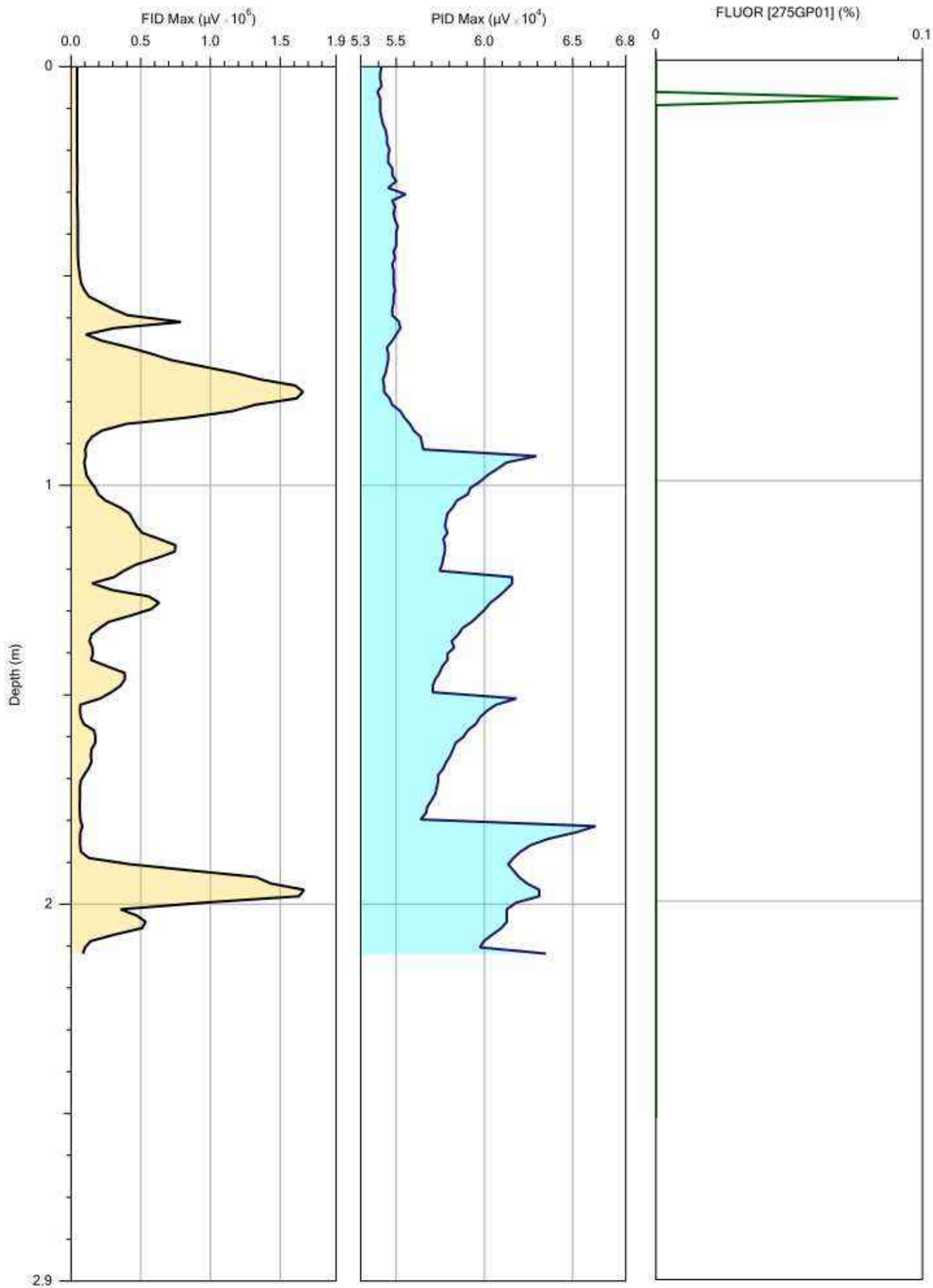


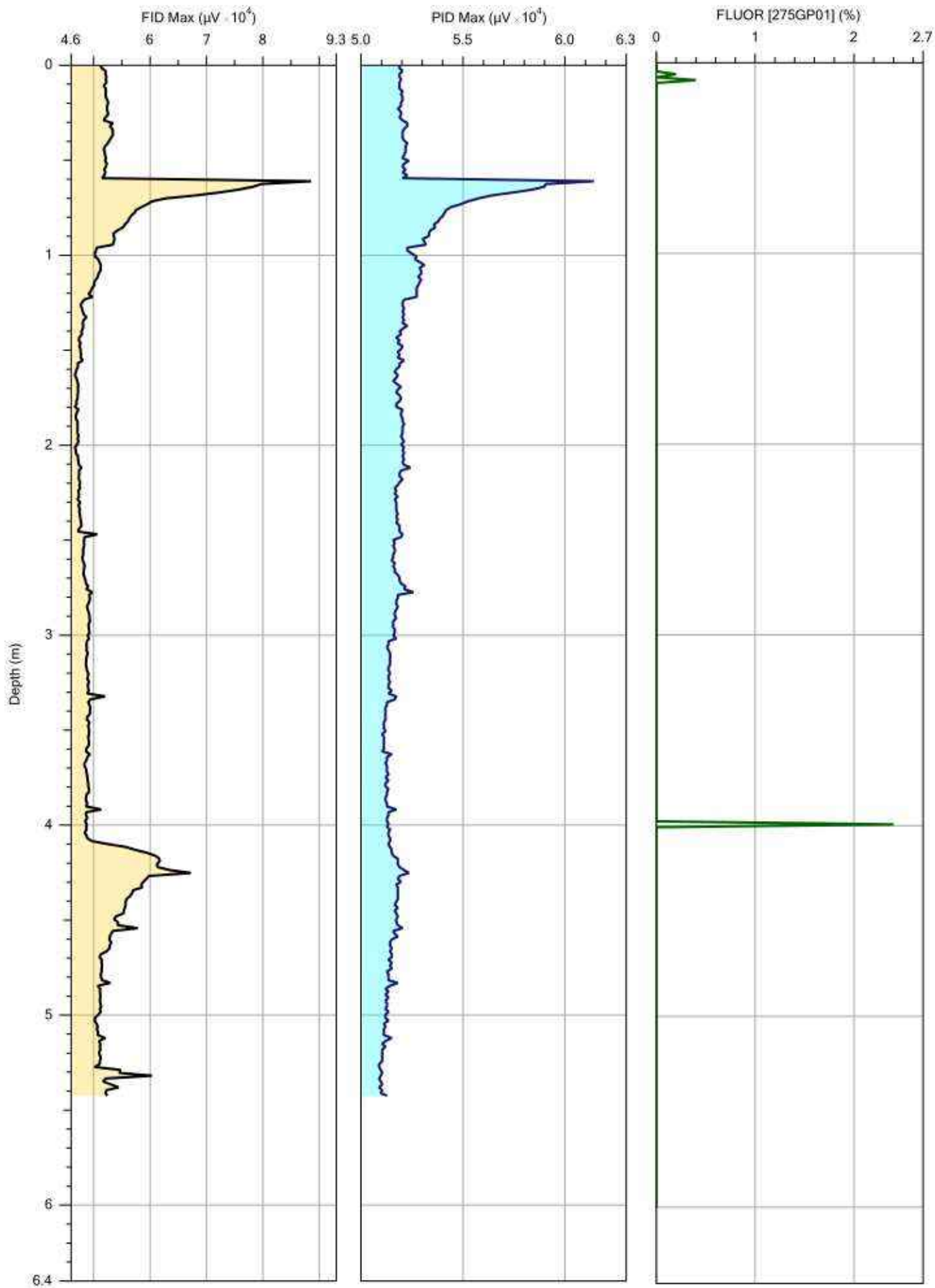


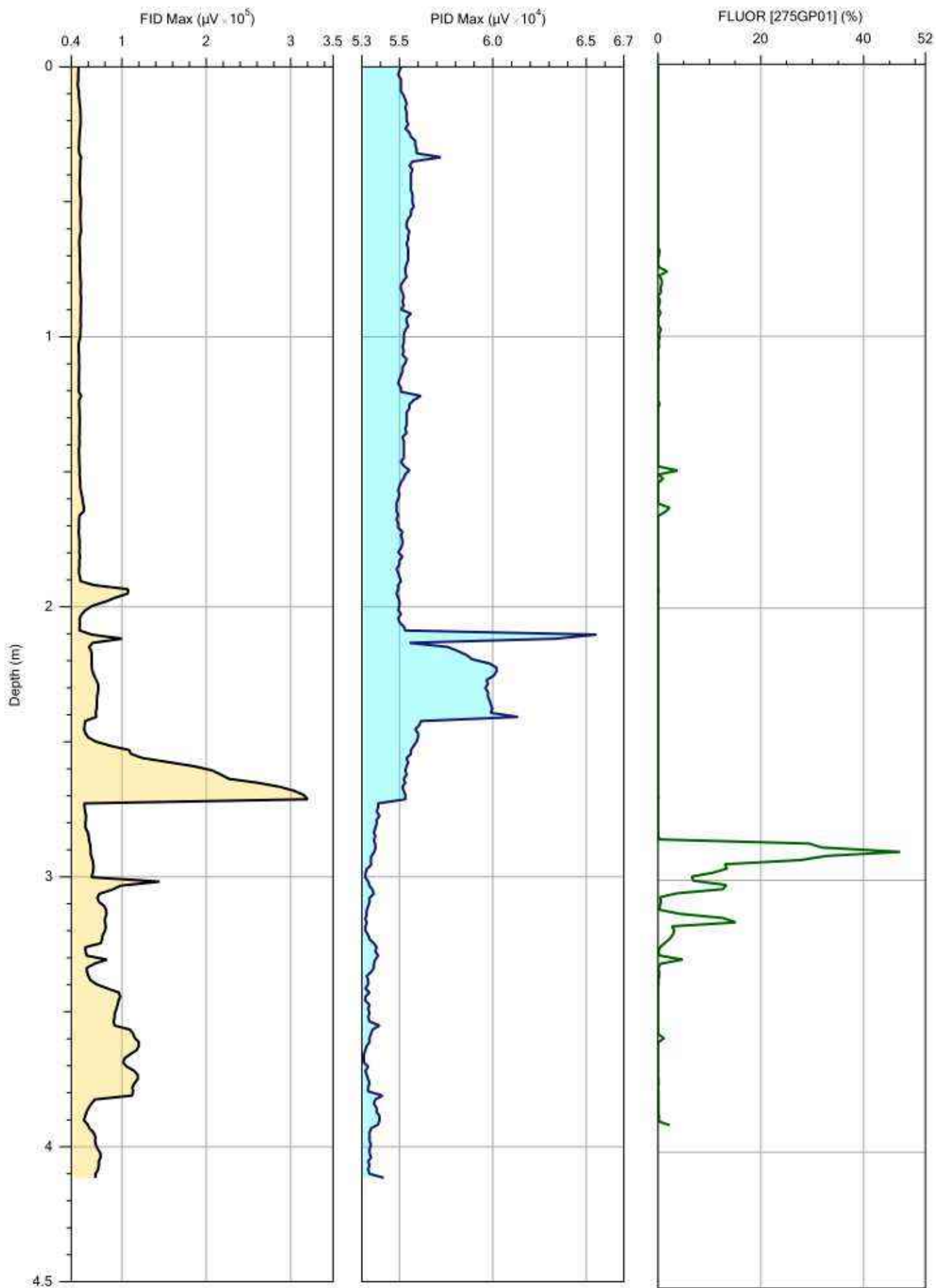






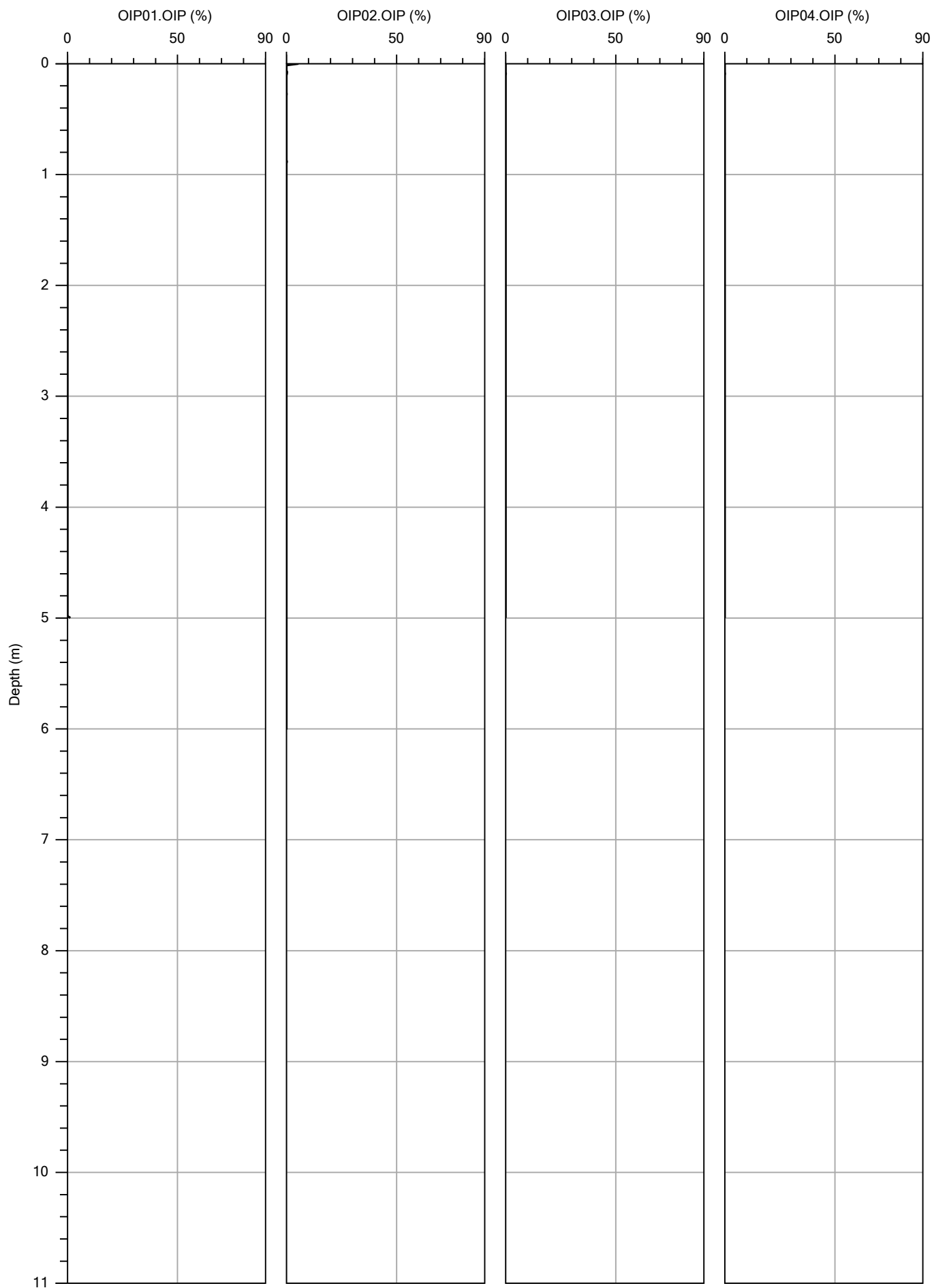


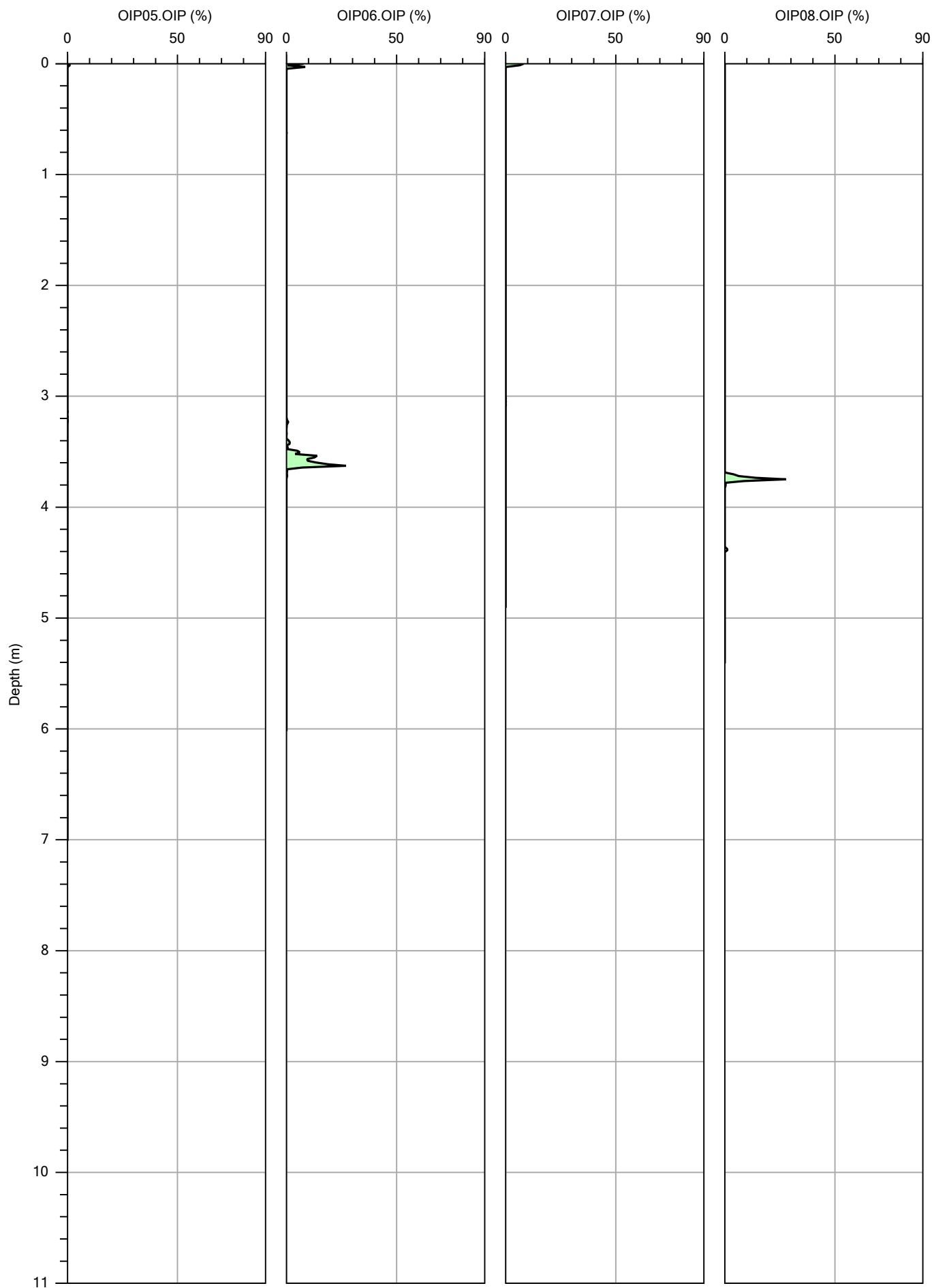


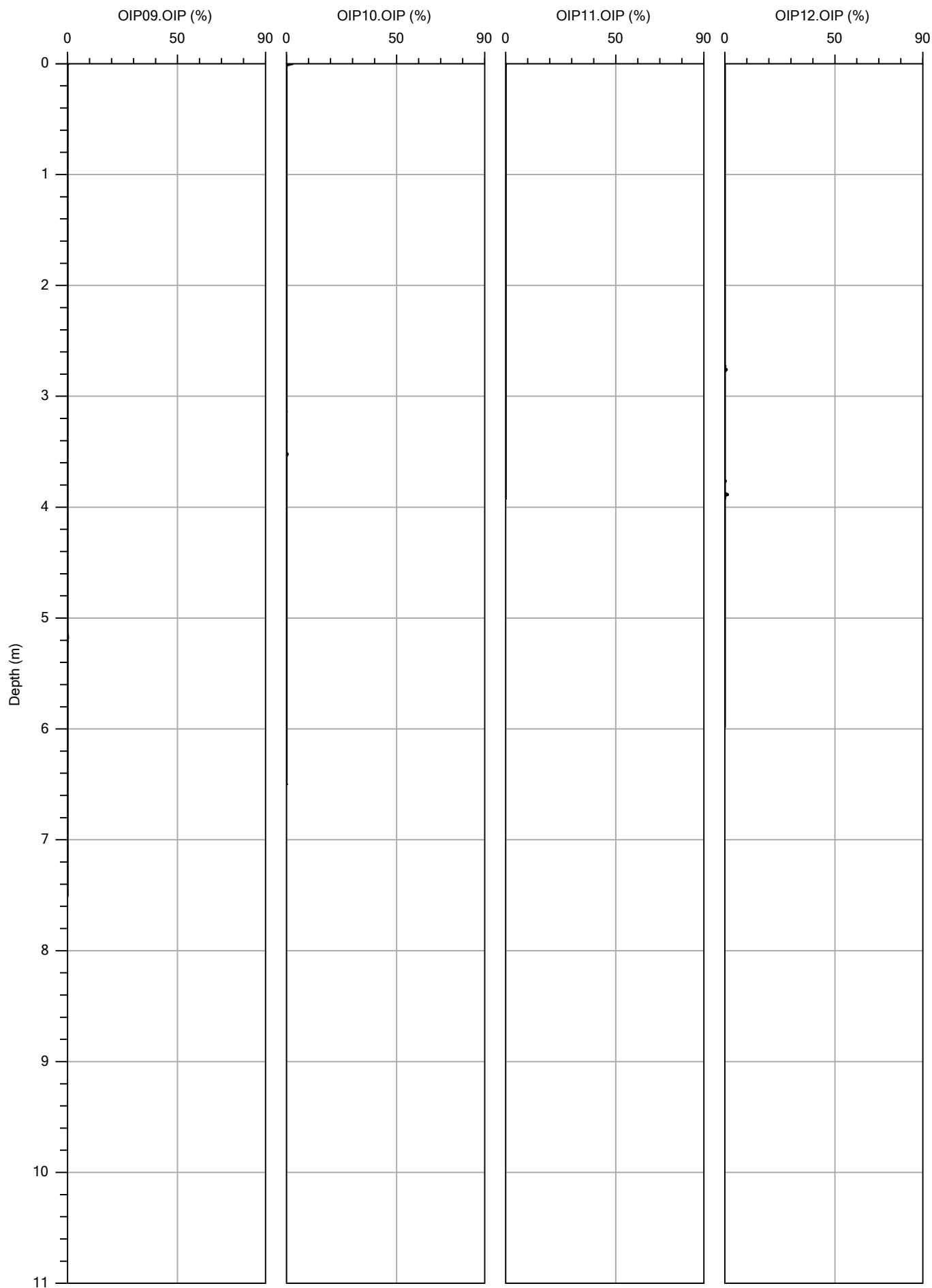


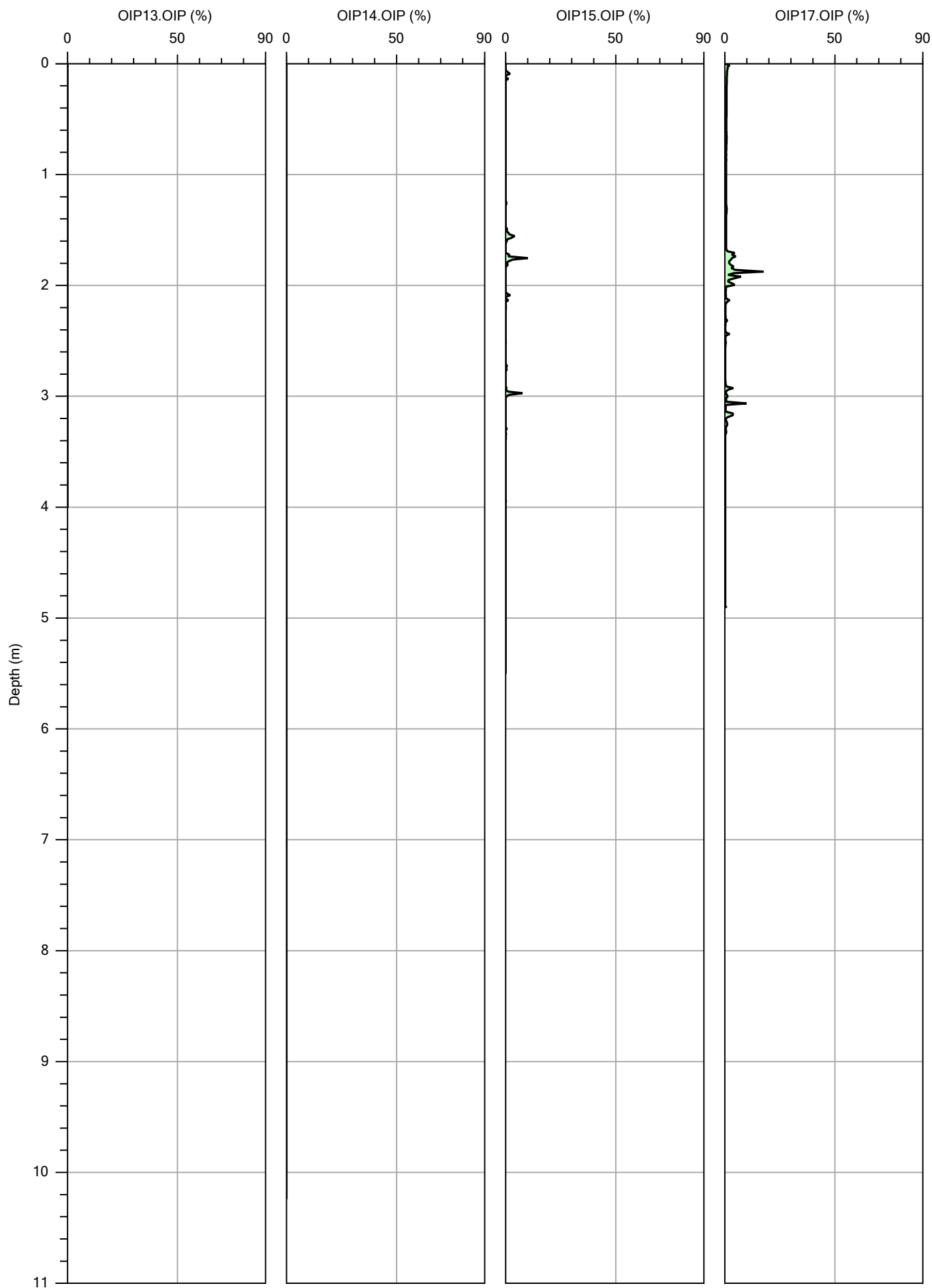
11.0 OIP CROSS SECTIONS

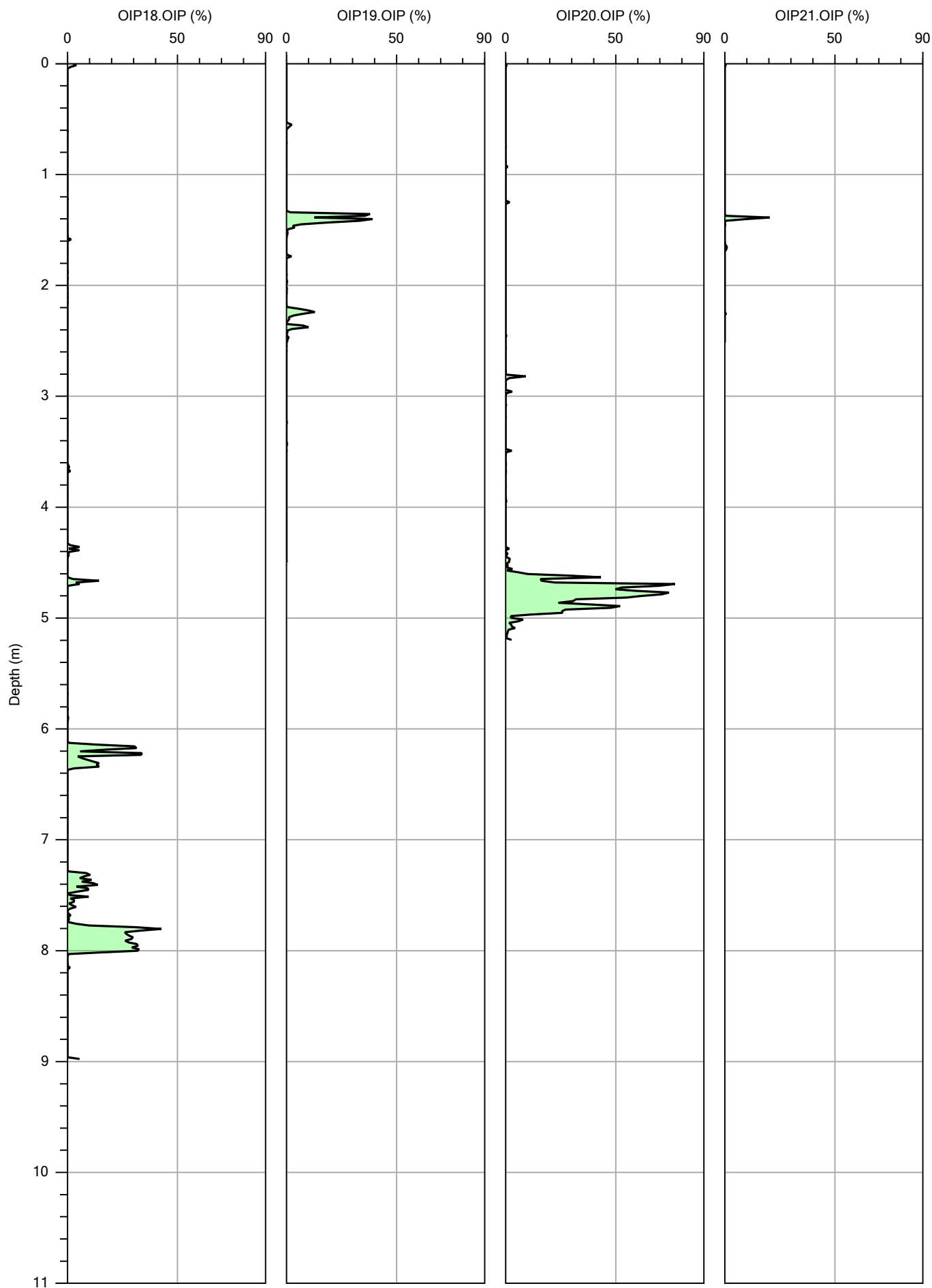
Please note that all optical images captured during this project are included with this report as a zip file.

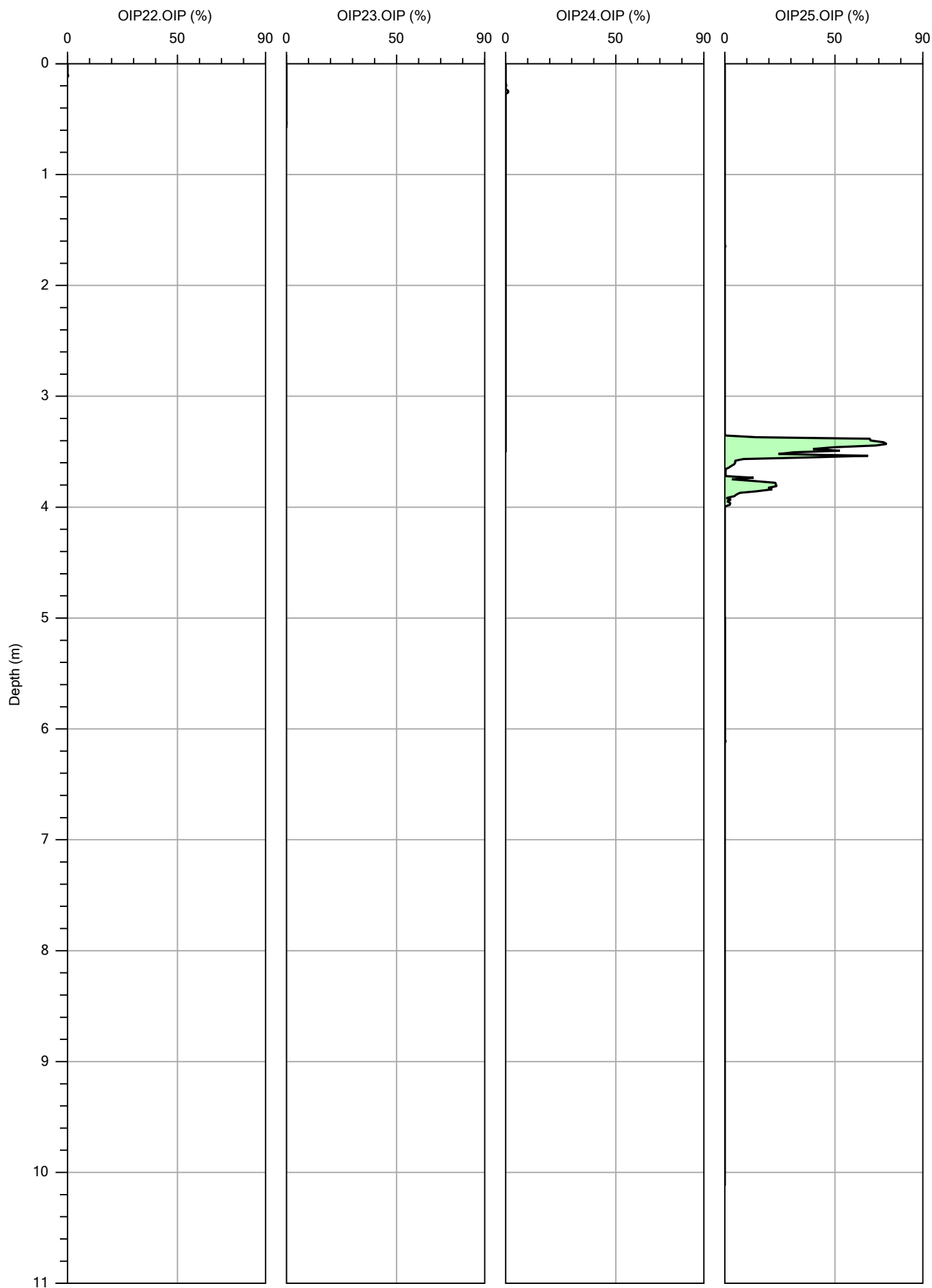


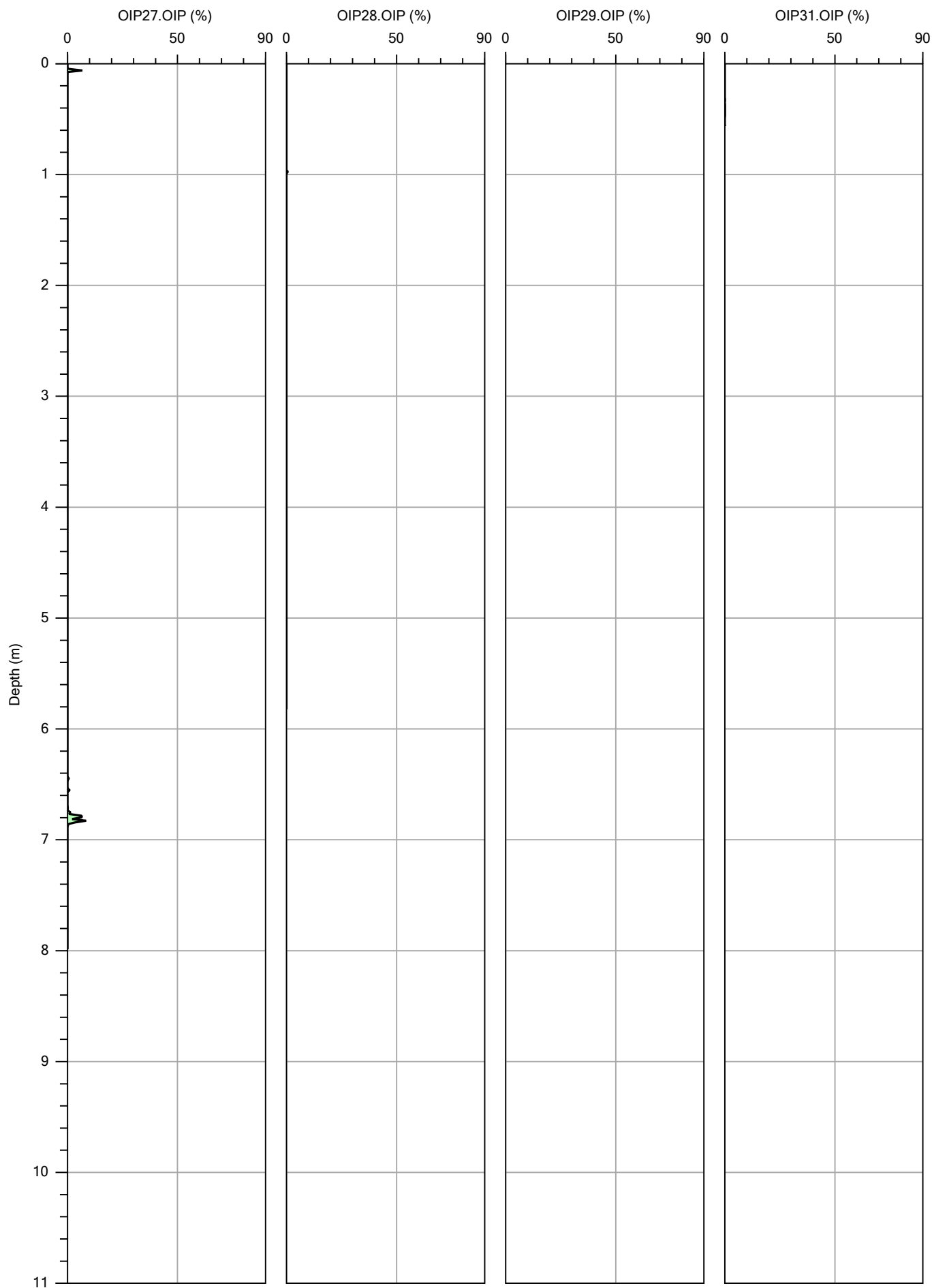


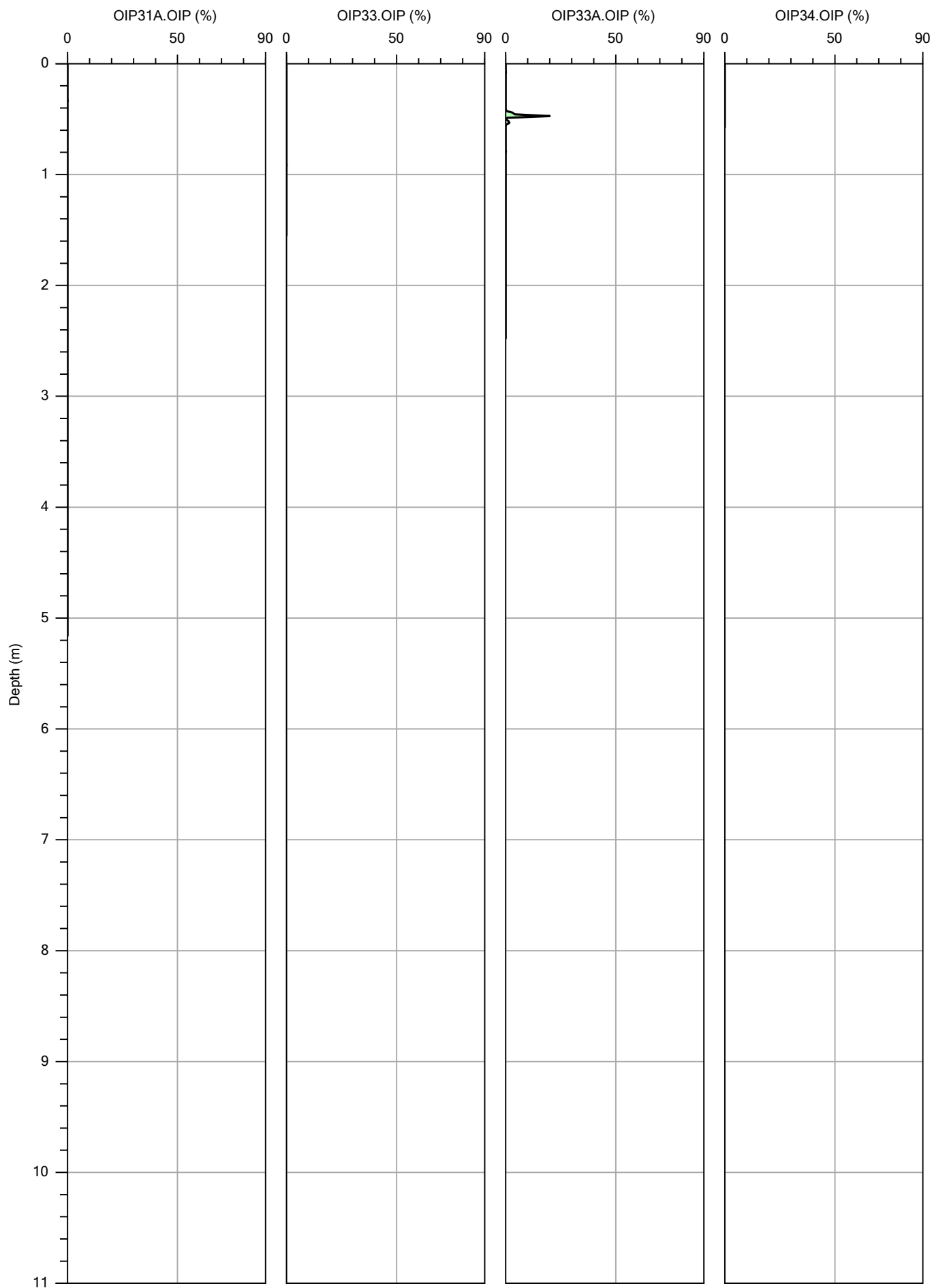


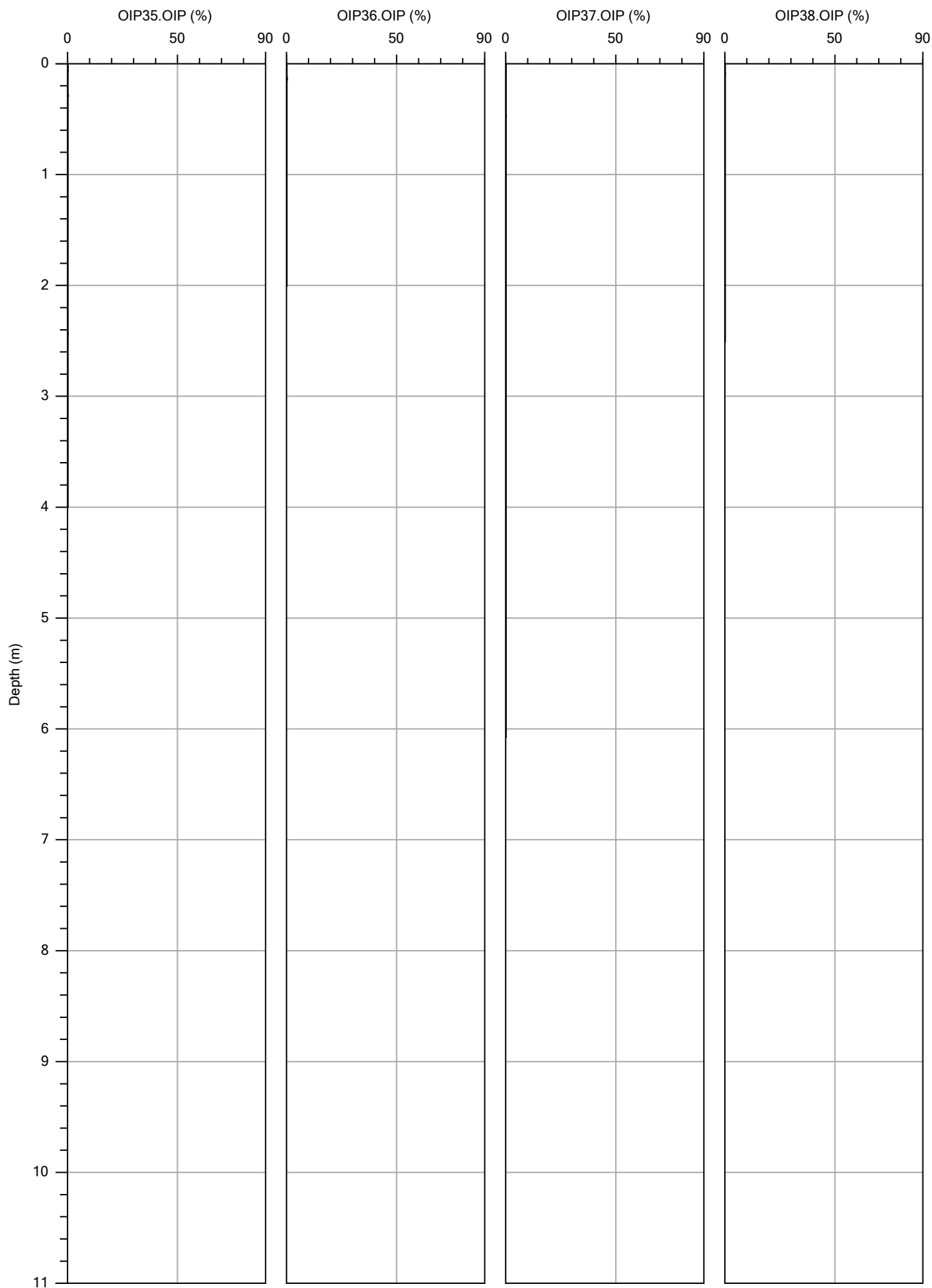


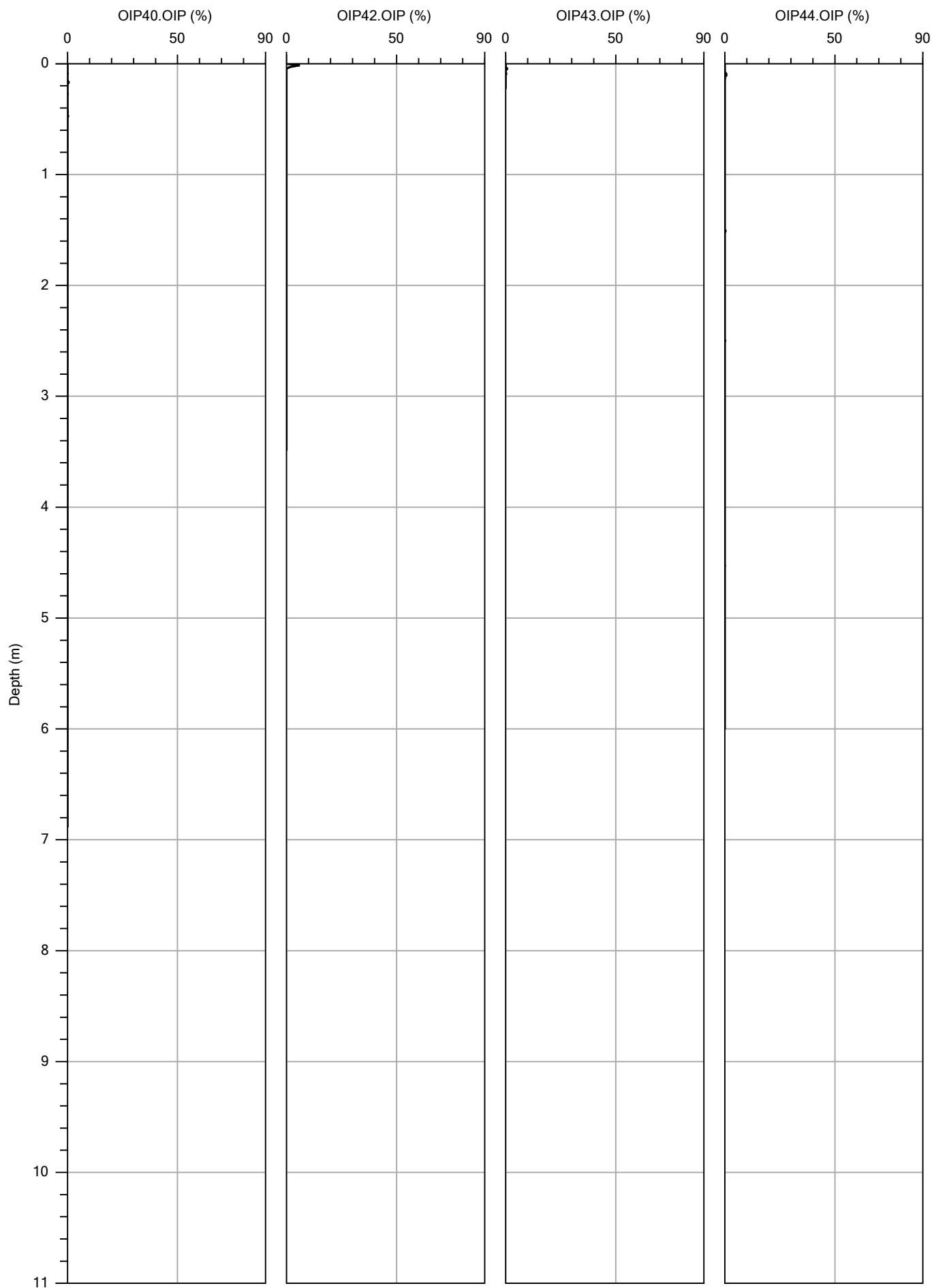


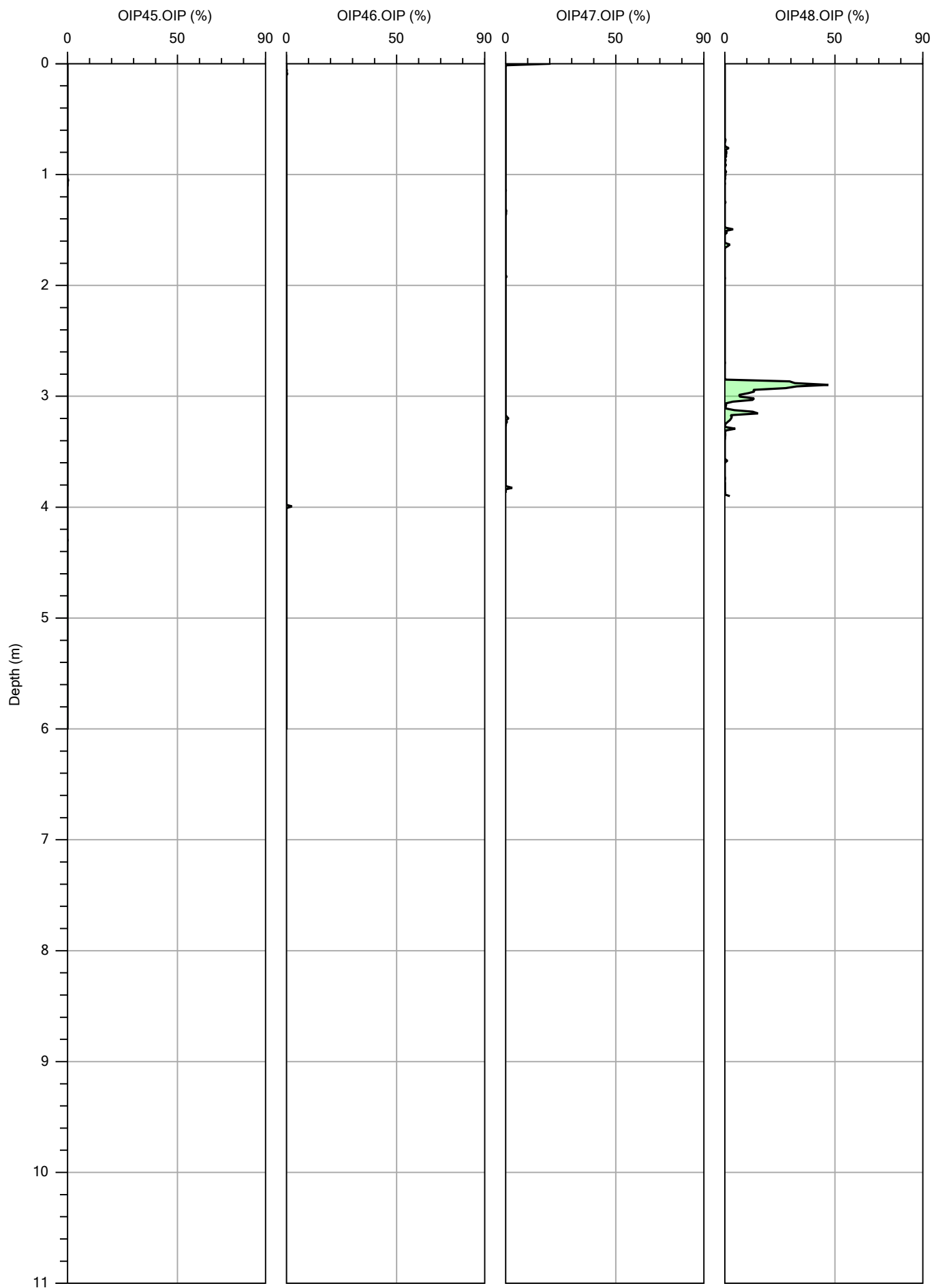


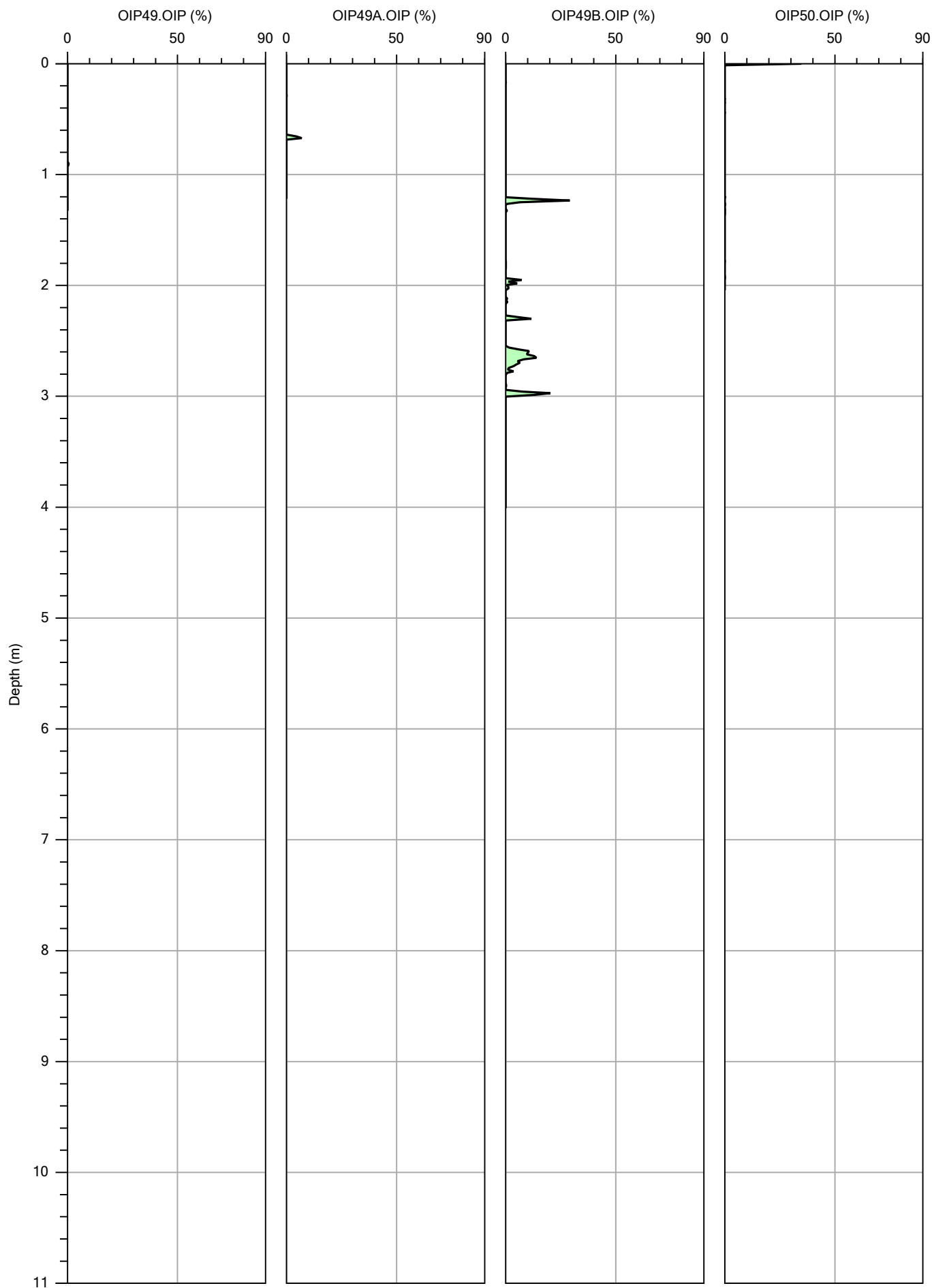




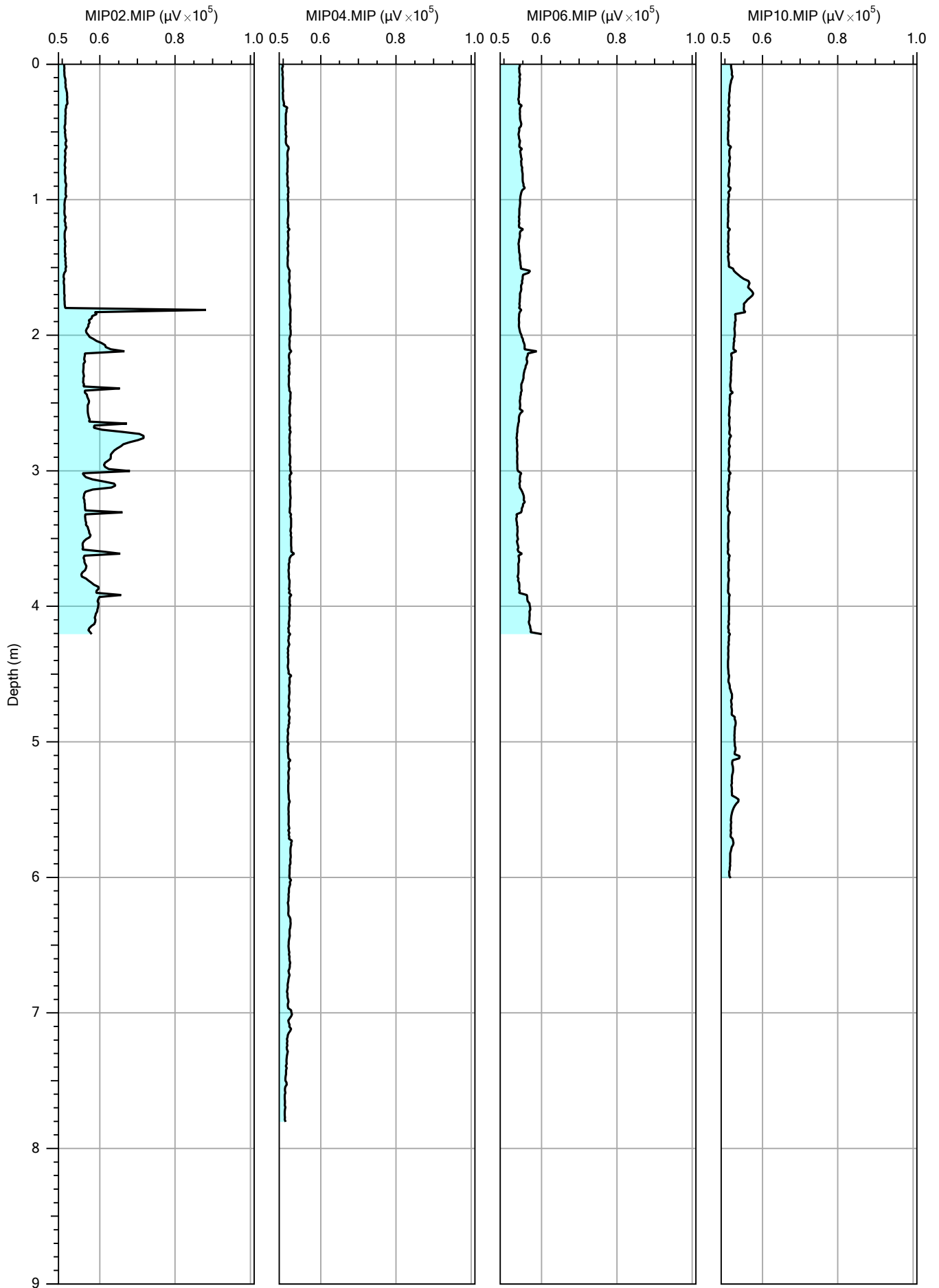


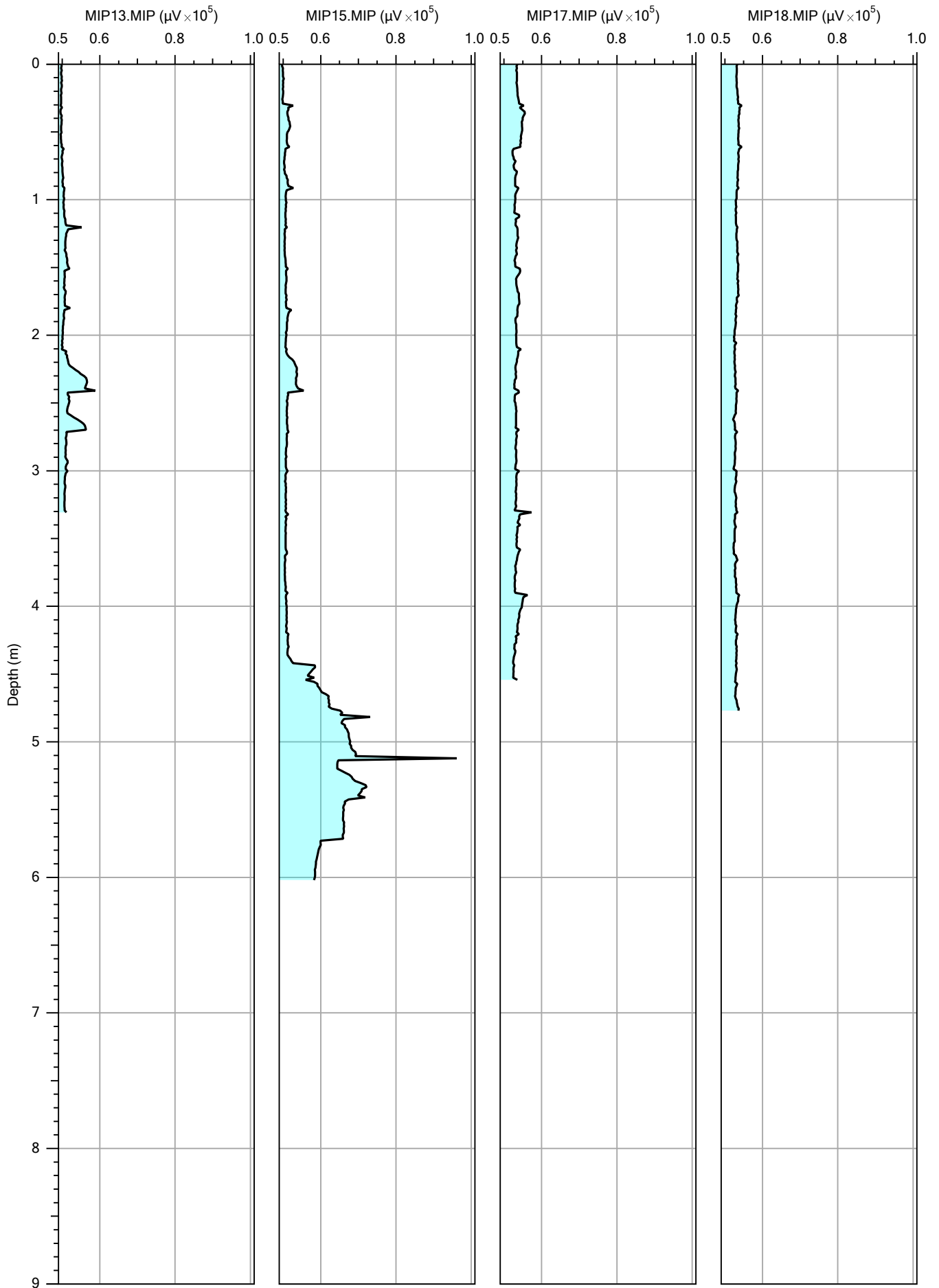


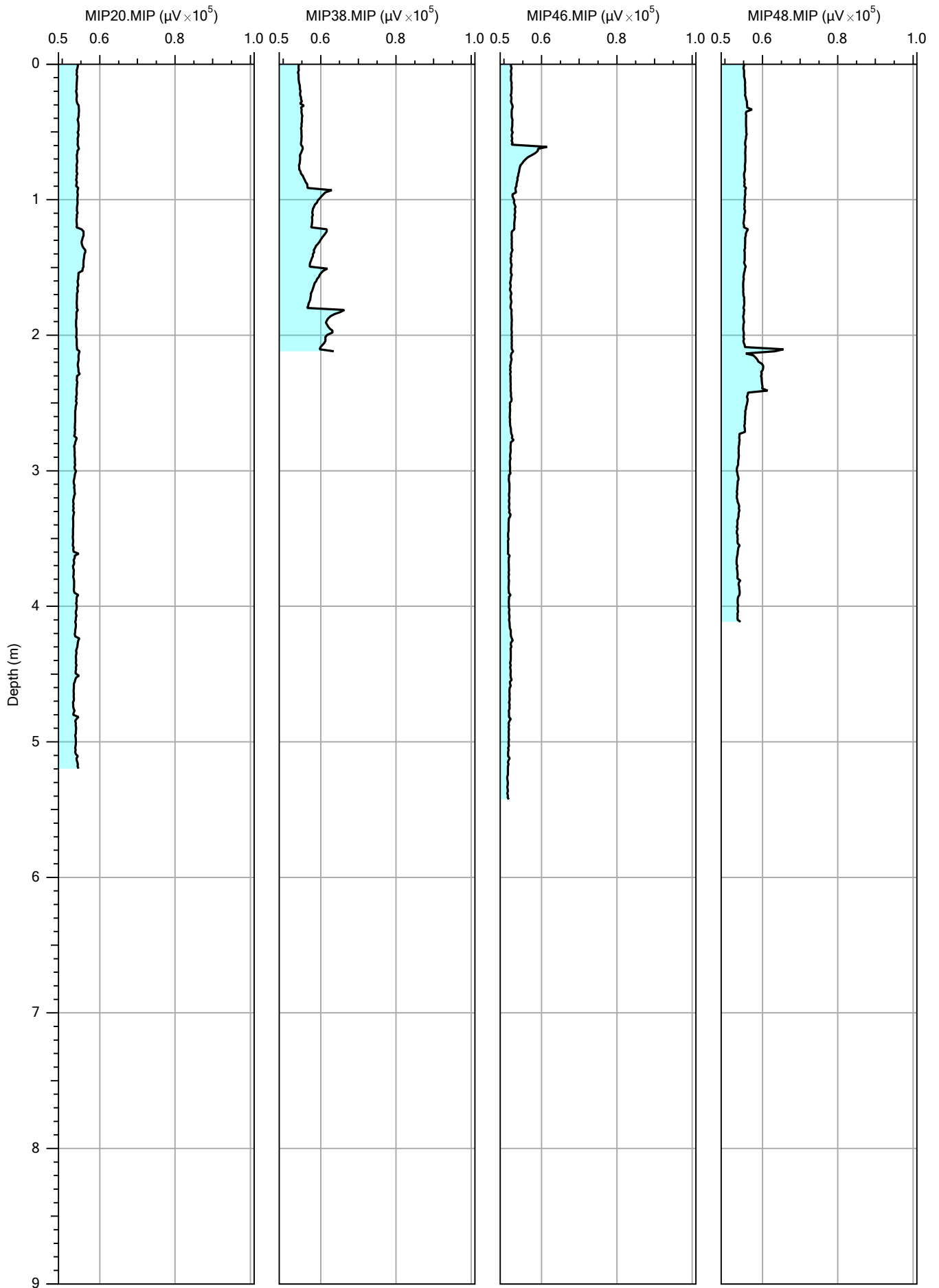




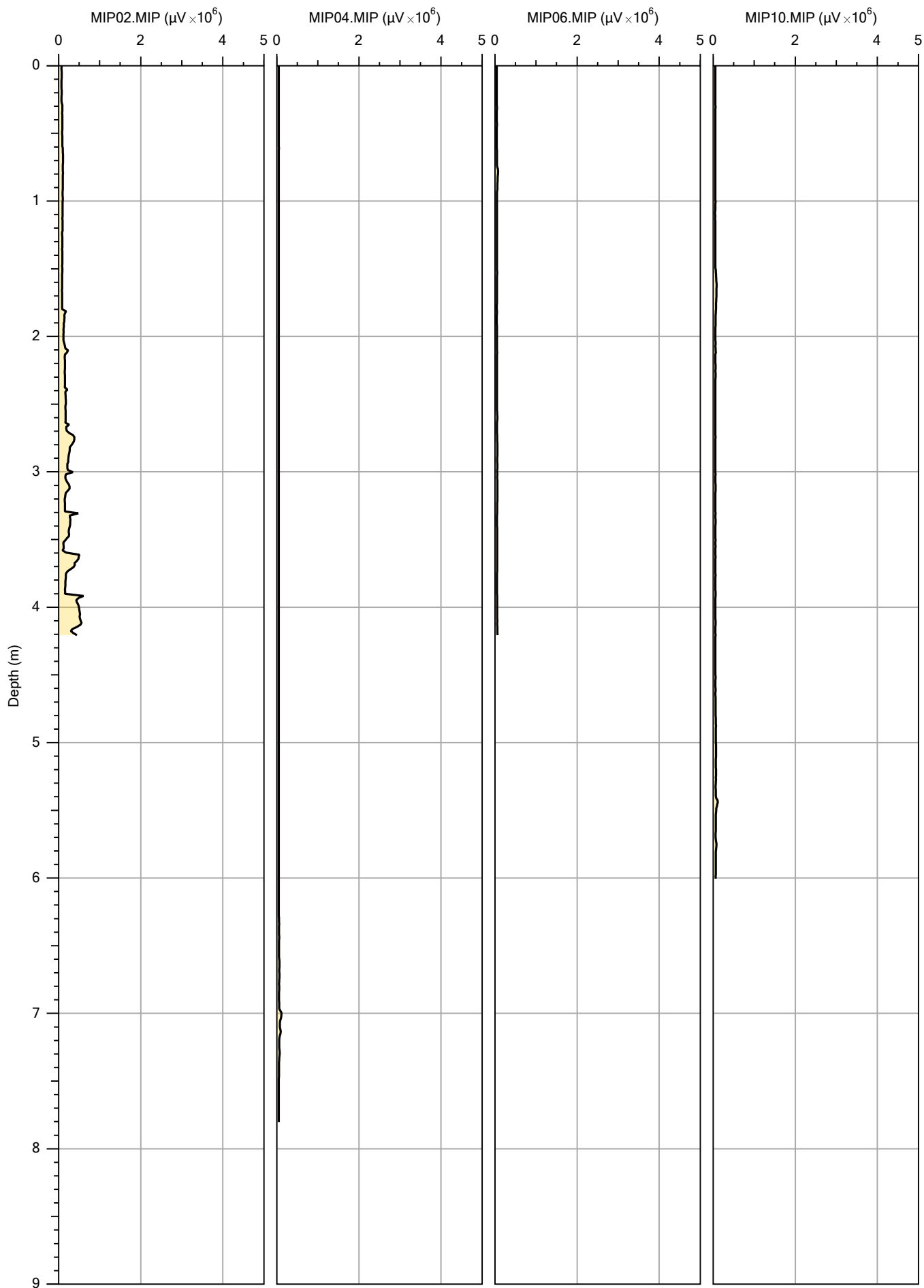
12.0 MIHPT PID CROSS SECTIONS

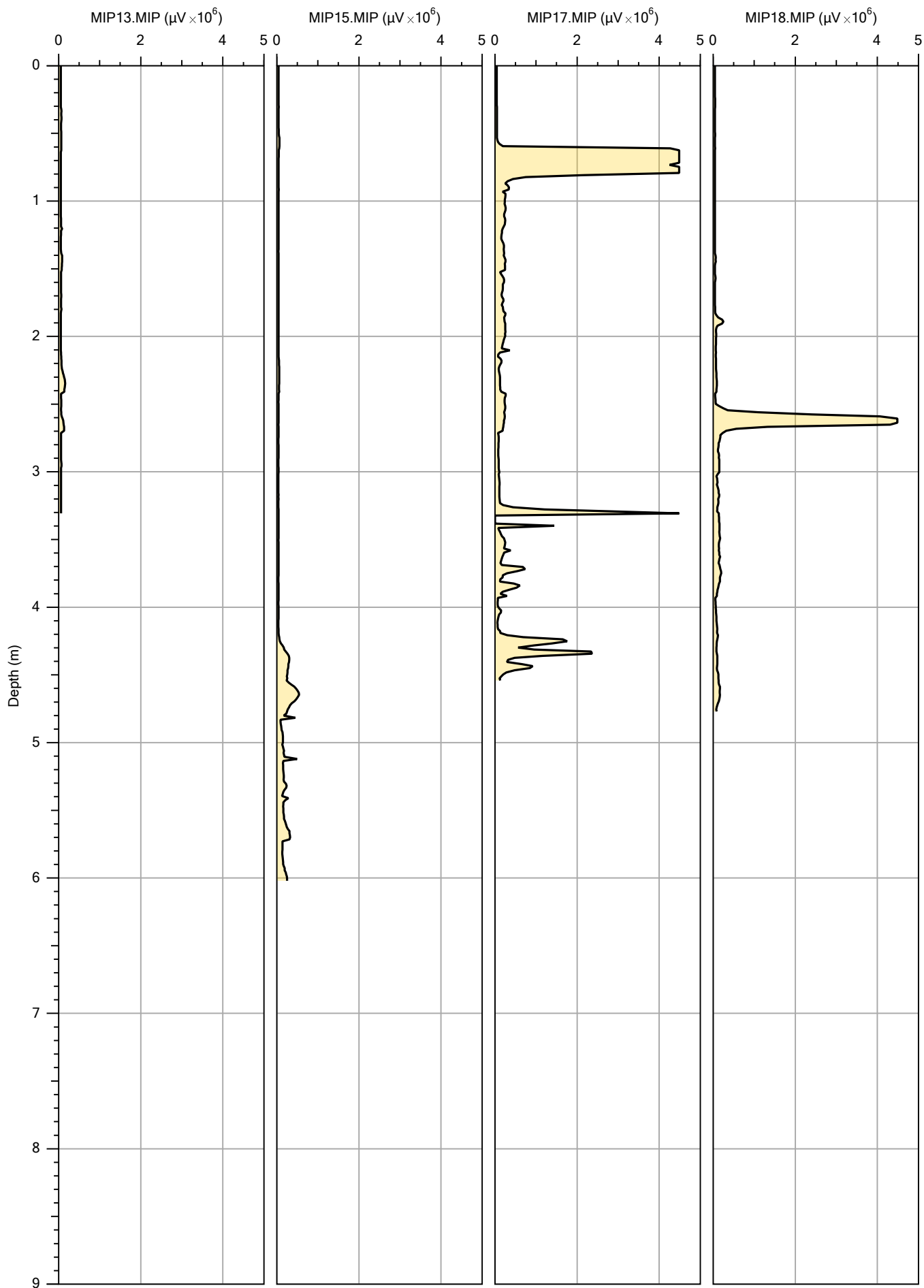


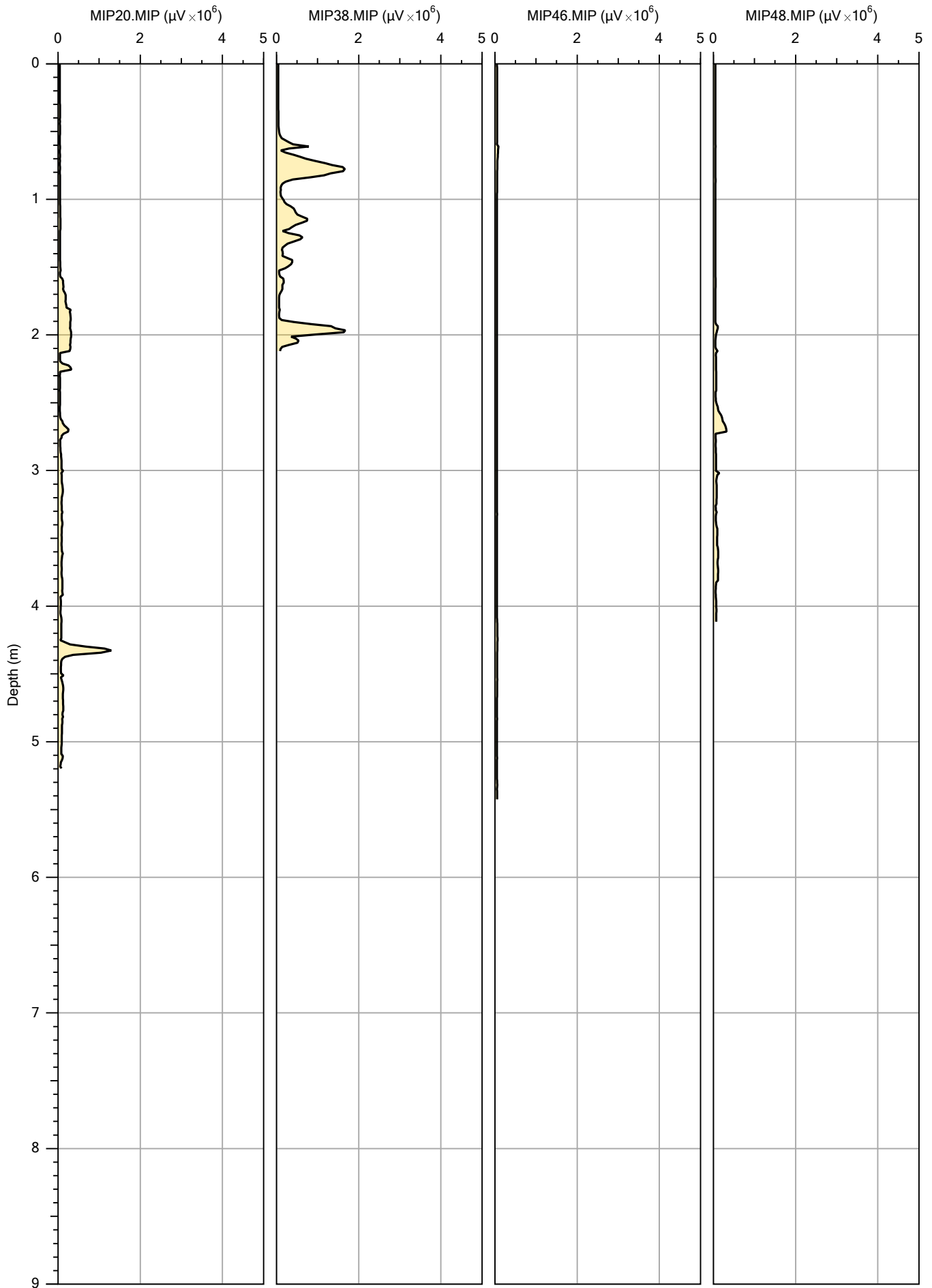




13.0 MIHPT FID CROSS SECTIONS







14.0 OIP PROFILES

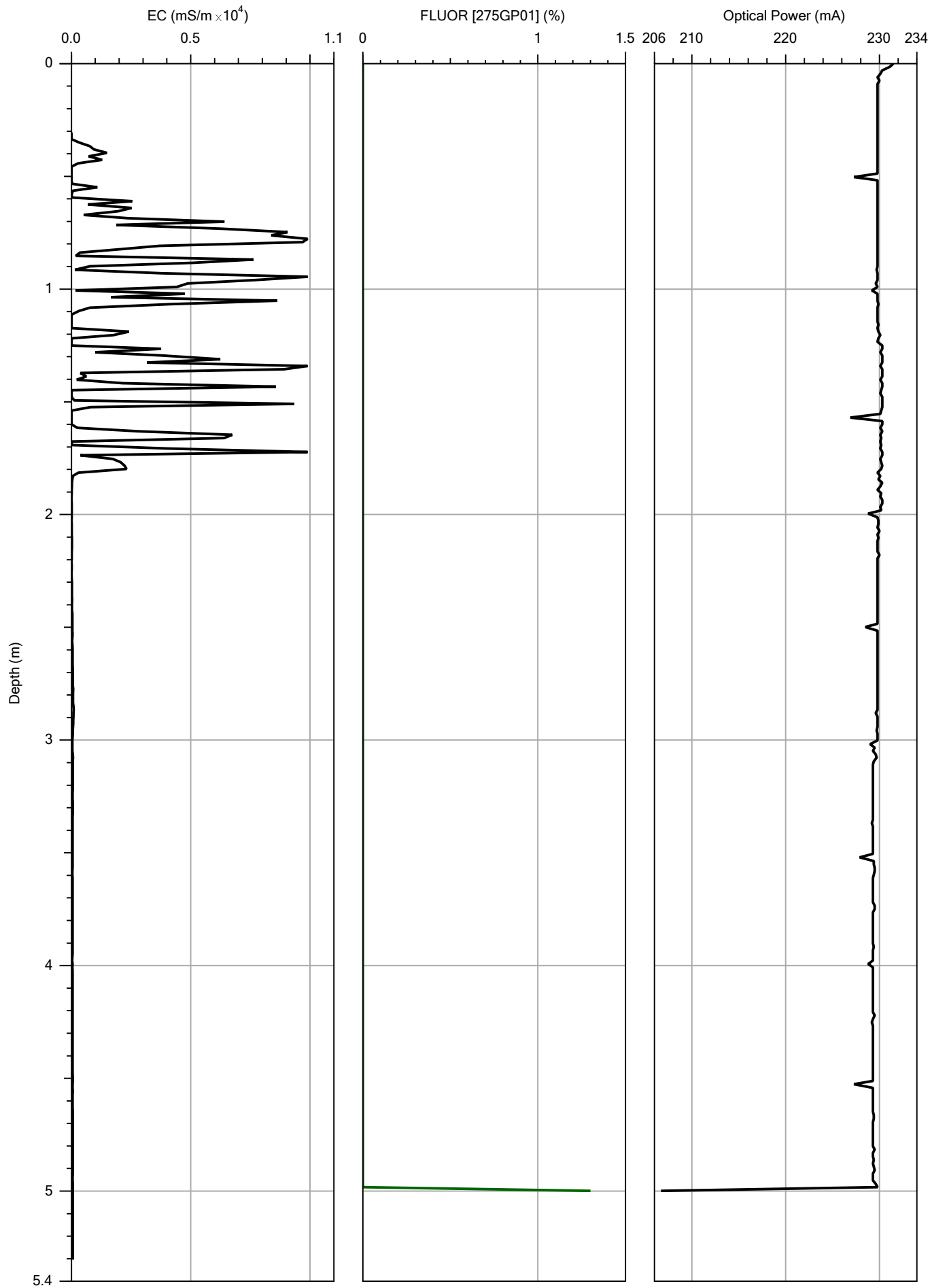
All OIP visual, UV and reference check images are included alongside this report in individual ZIP files.

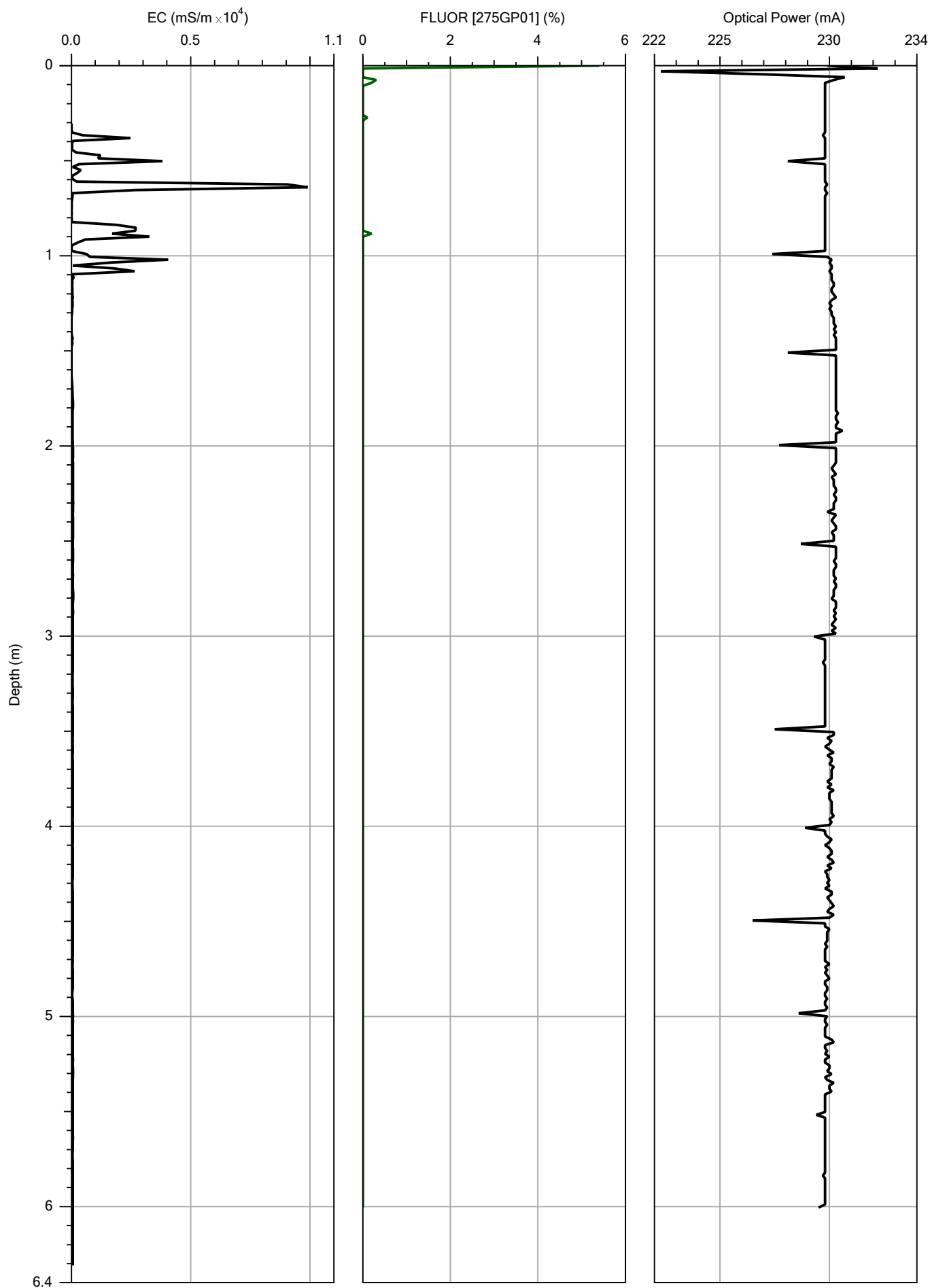
Please note:

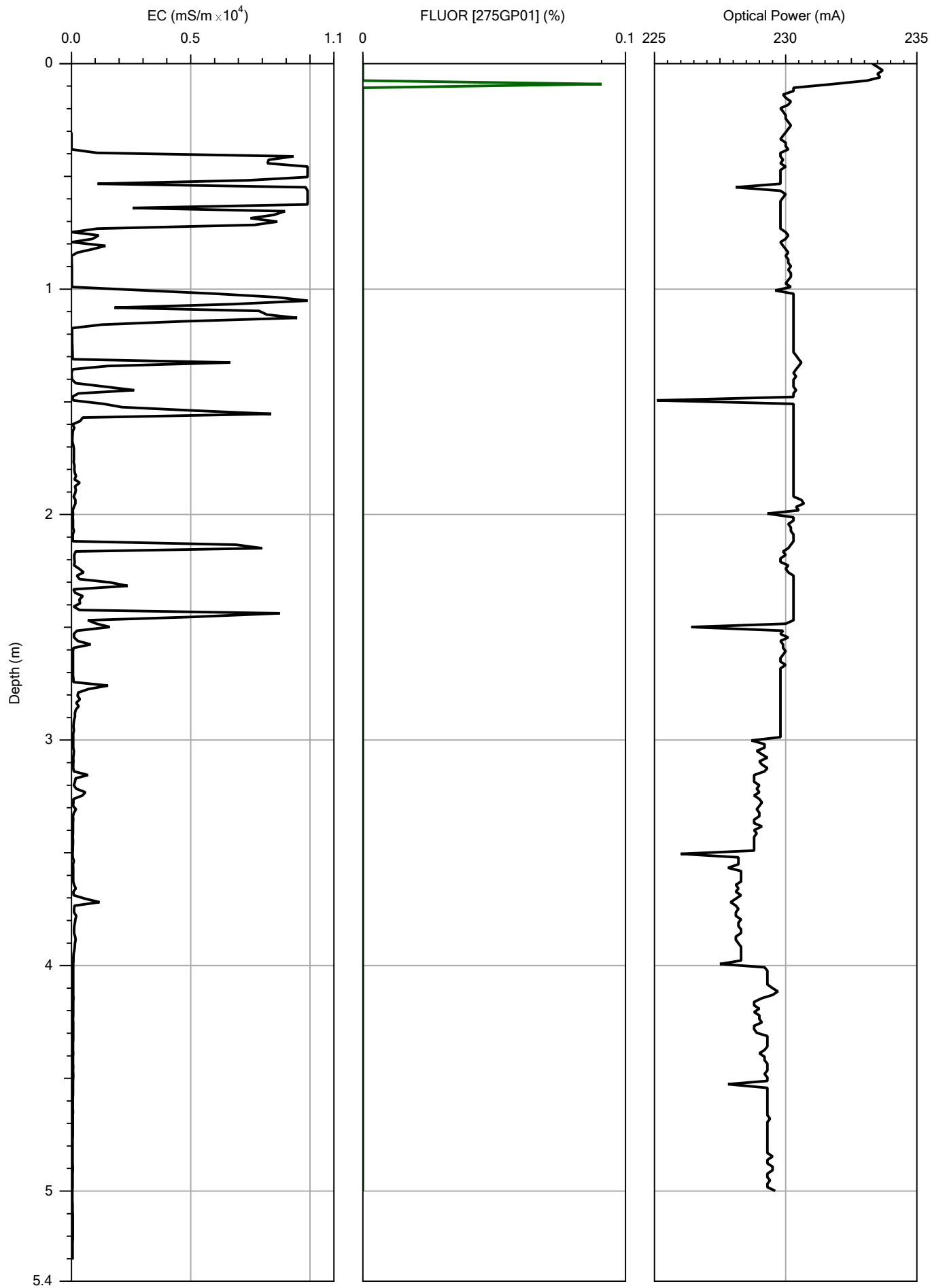
Images with the suffix .vis are optical light images

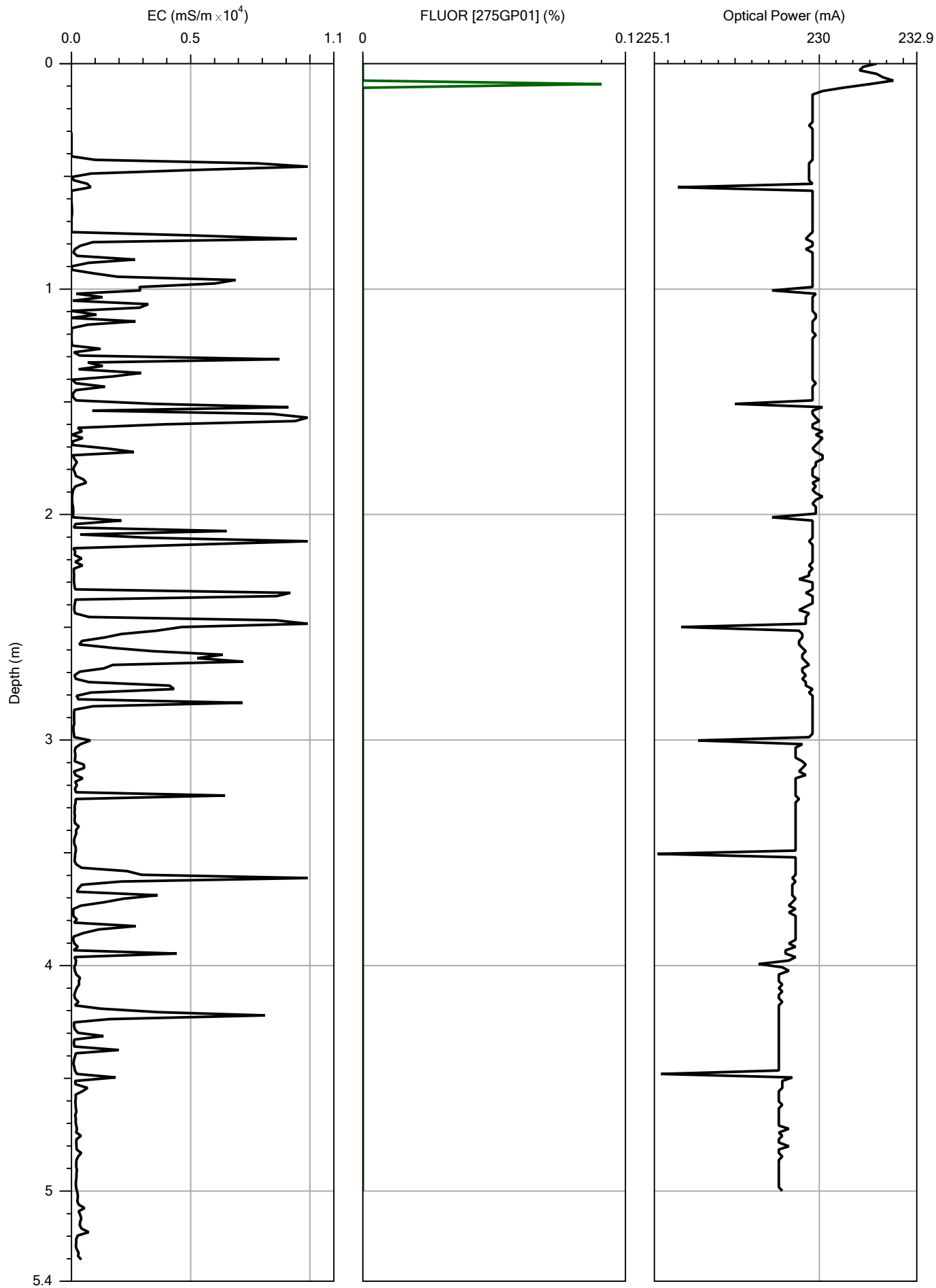
Images with the suffix .275 are UV stills

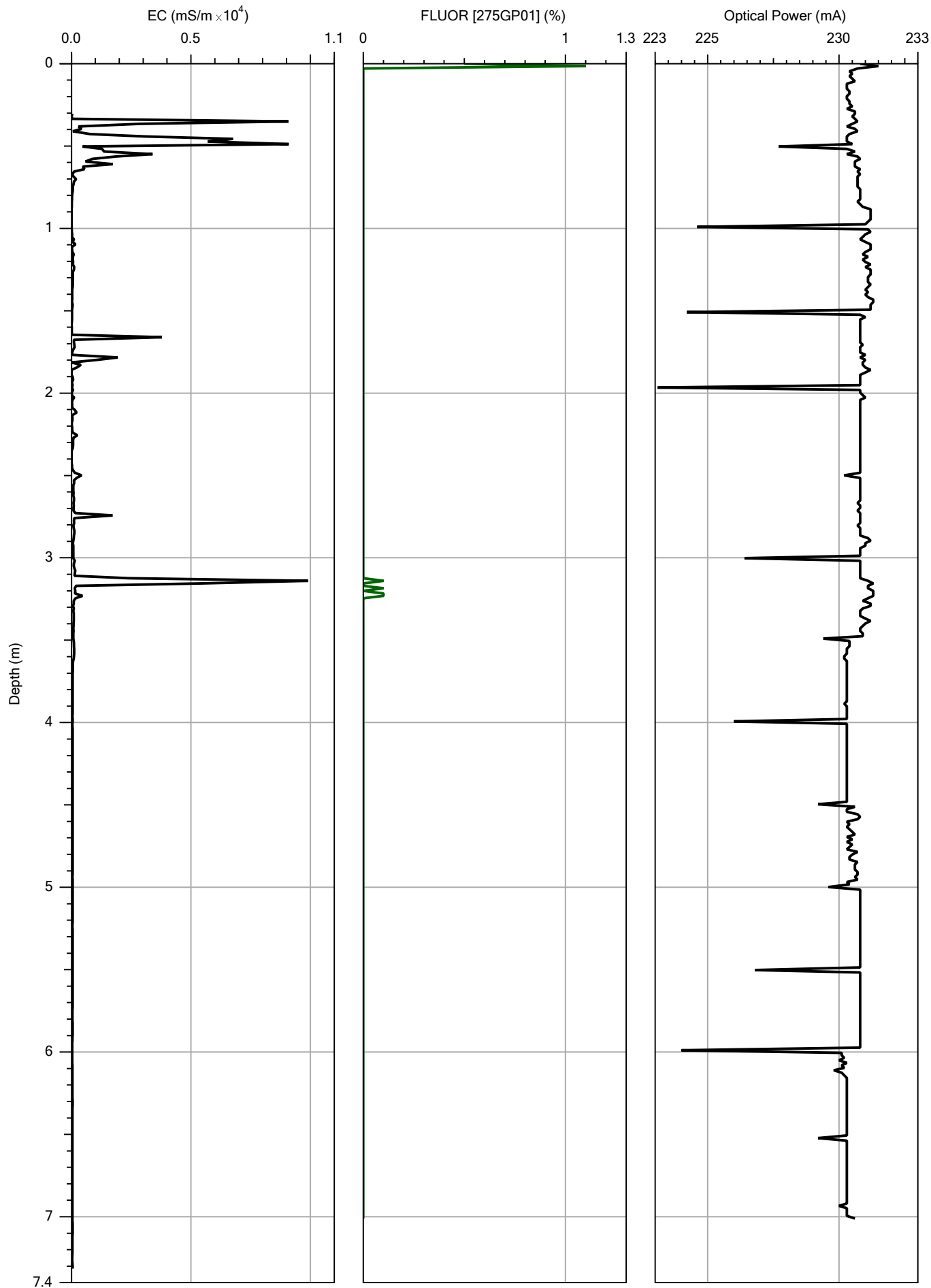
All depths recorded in the photos are in feet.

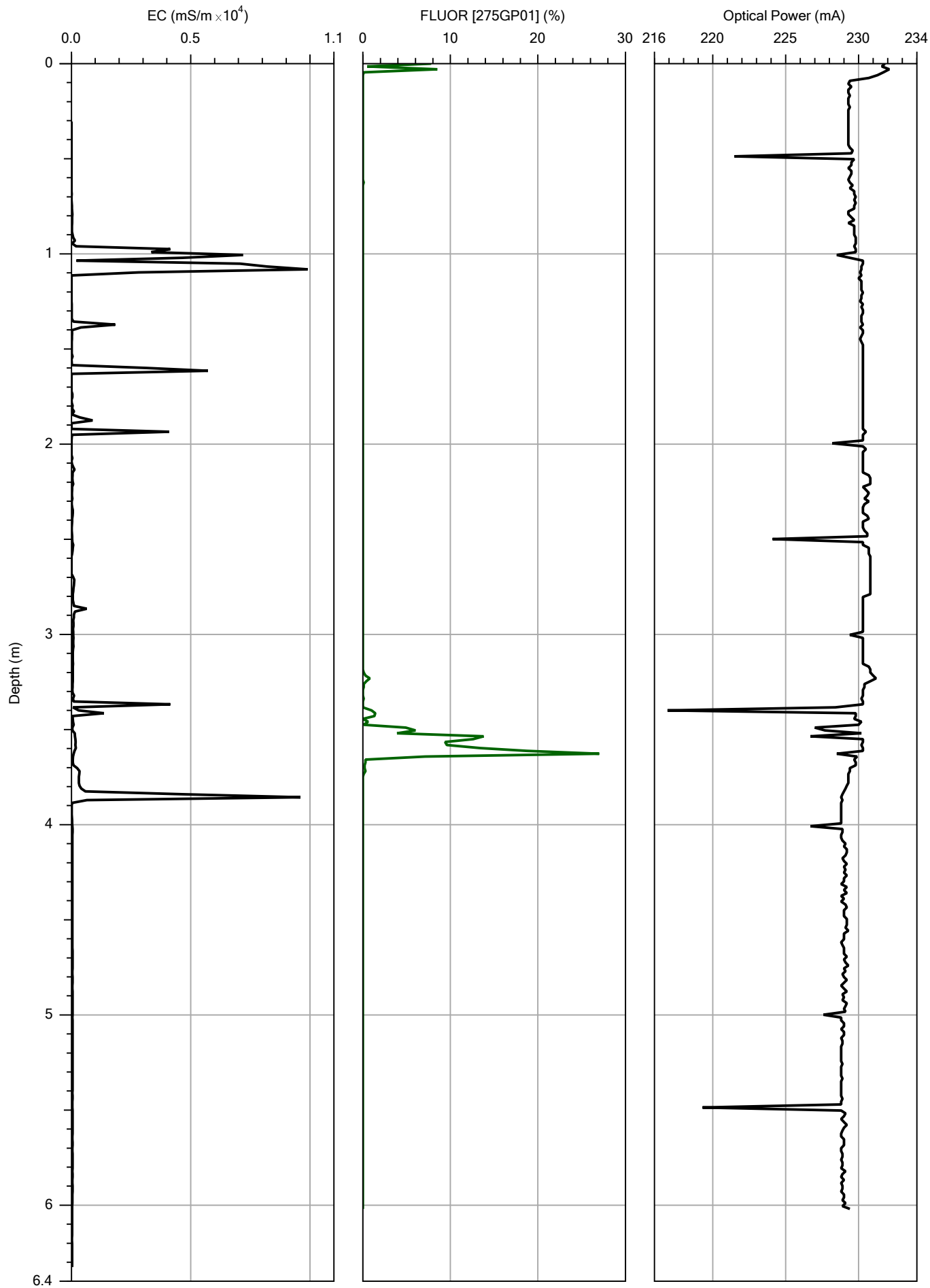


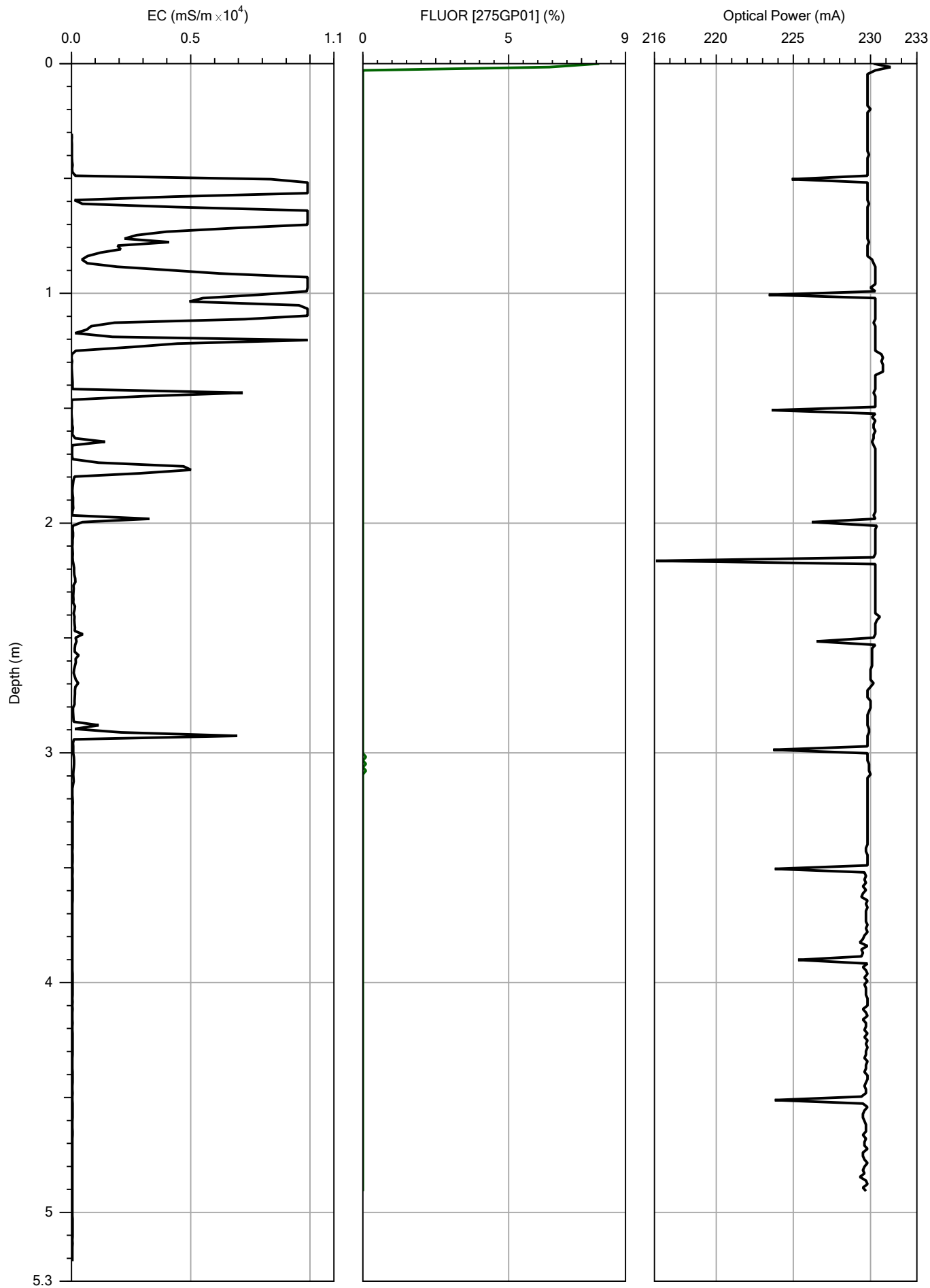


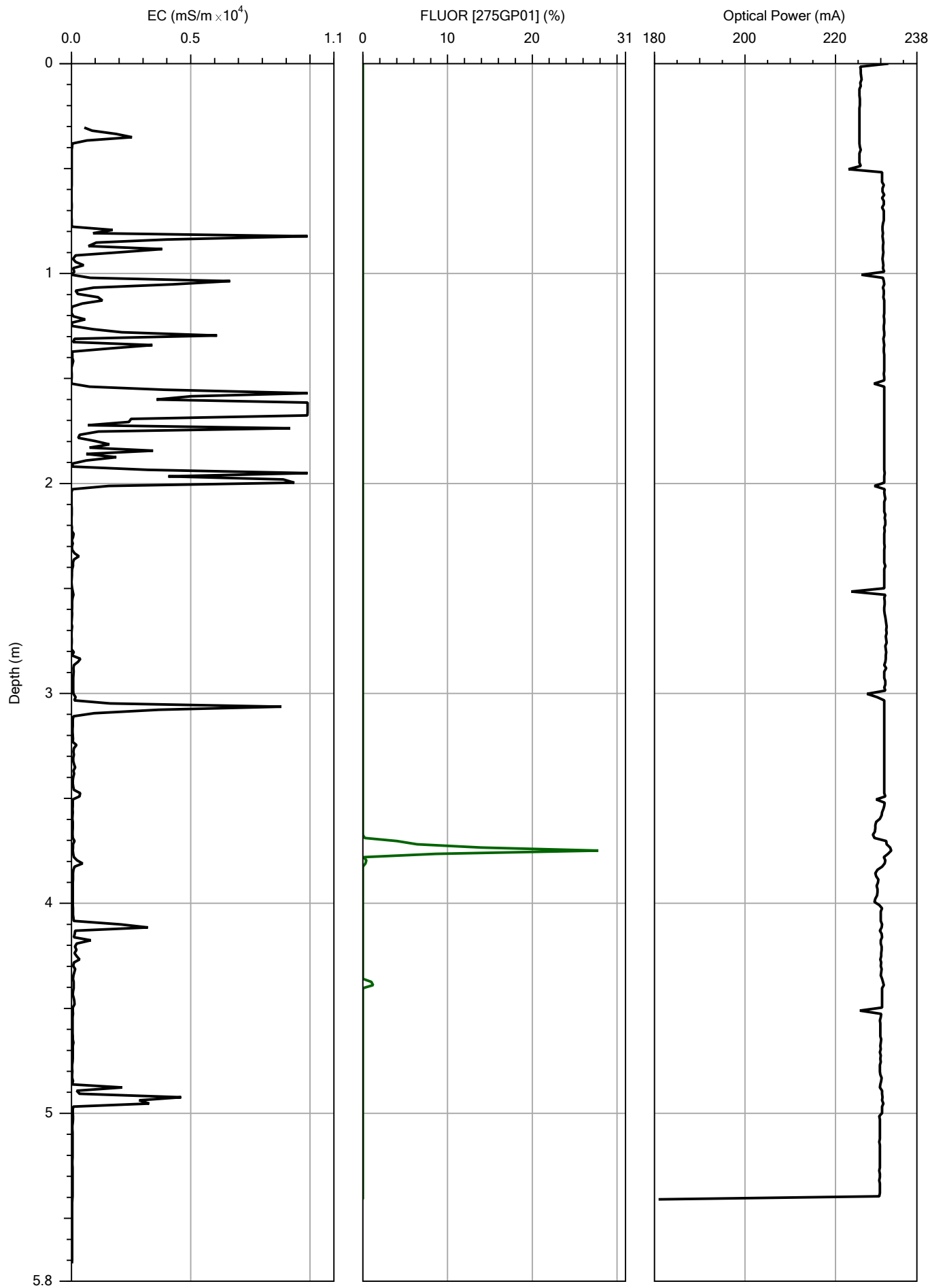


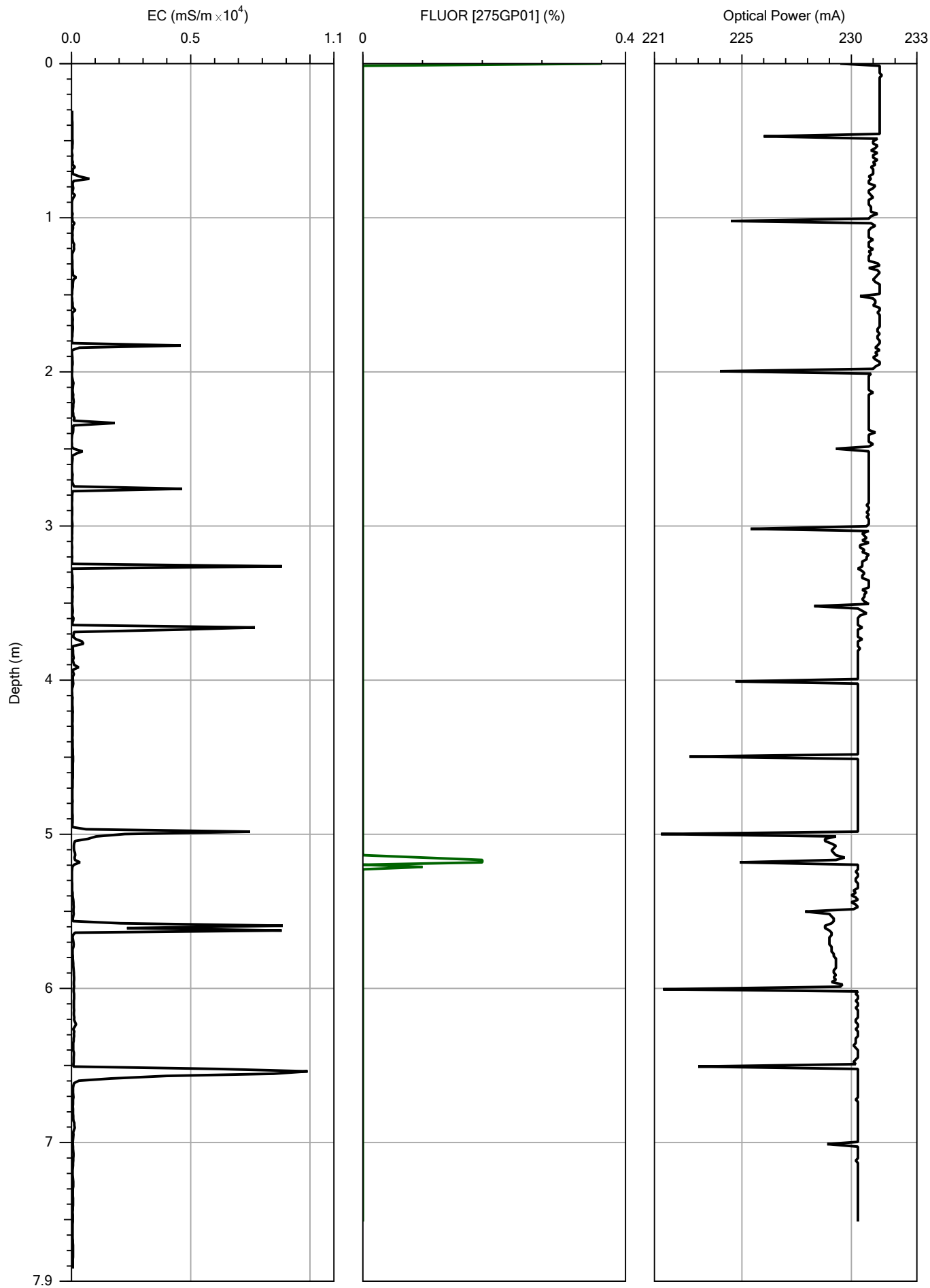


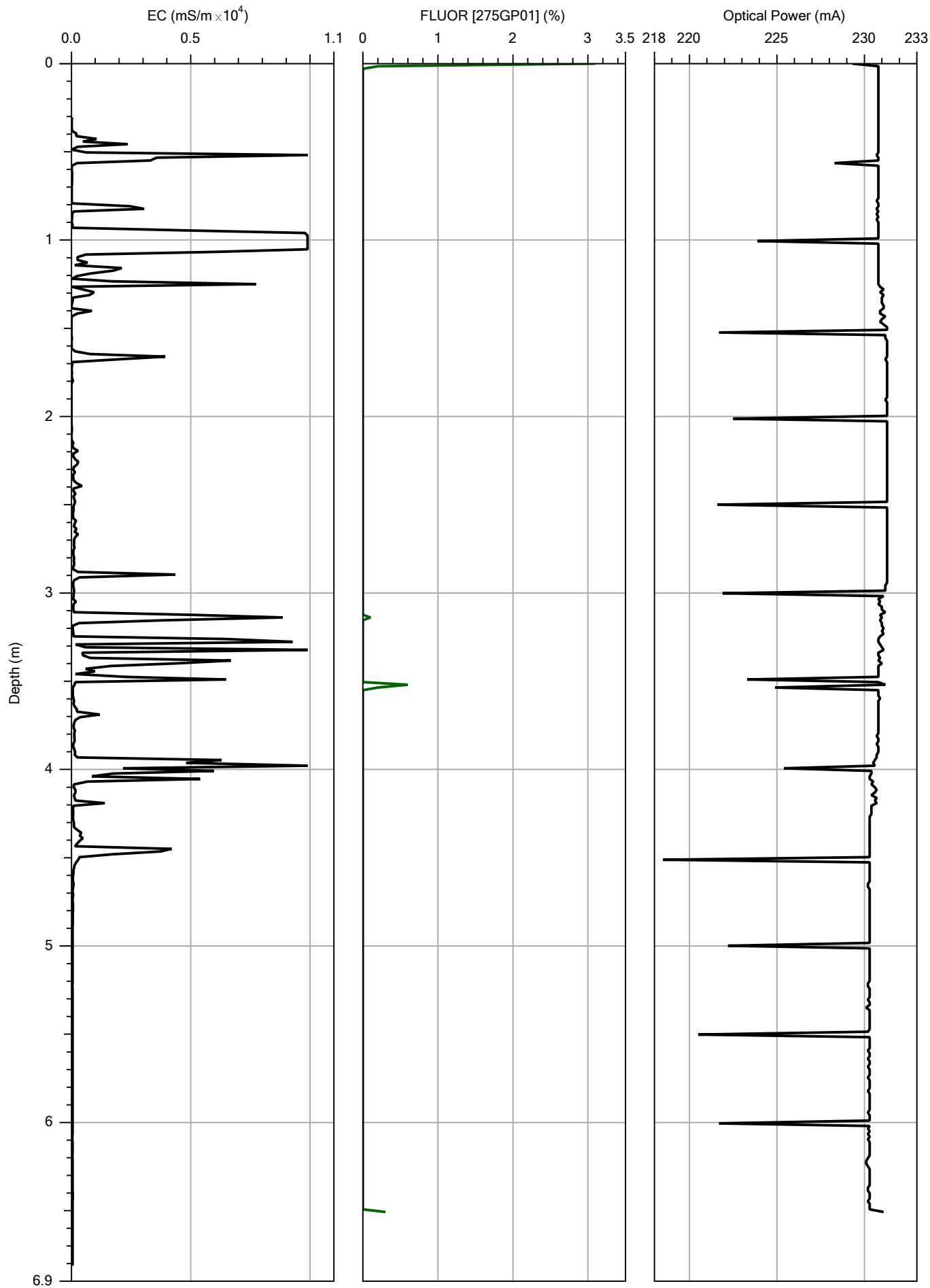


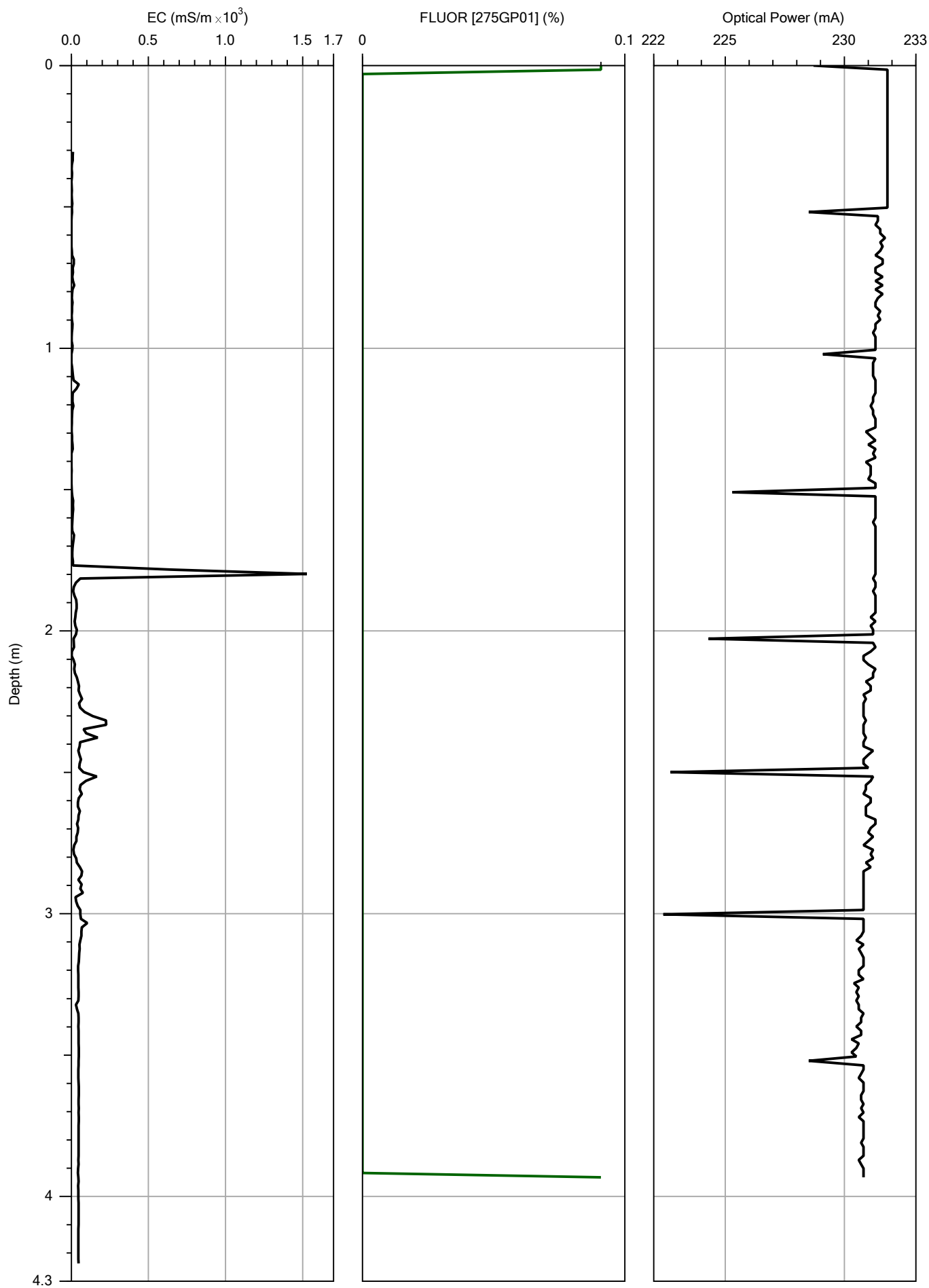


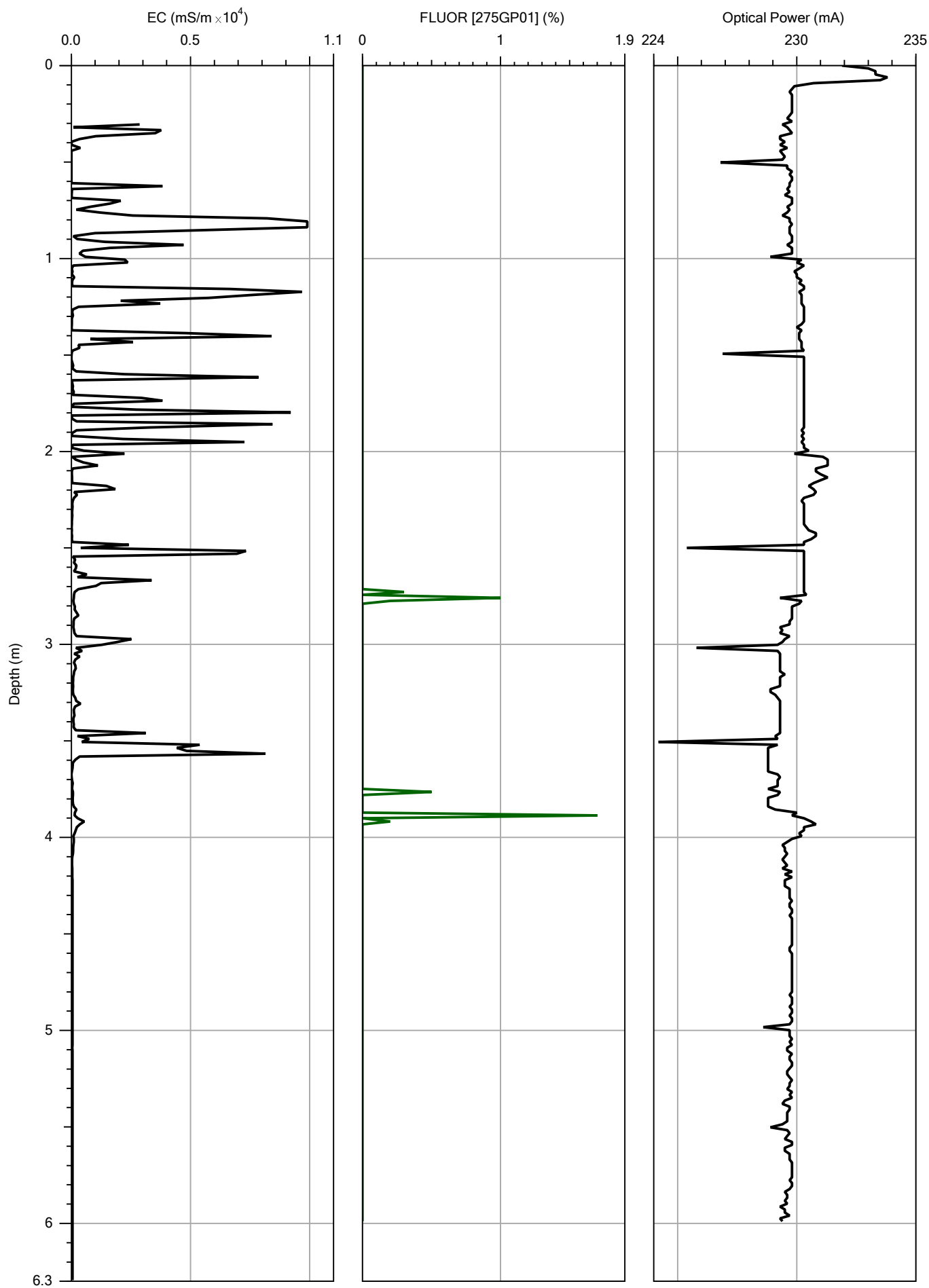


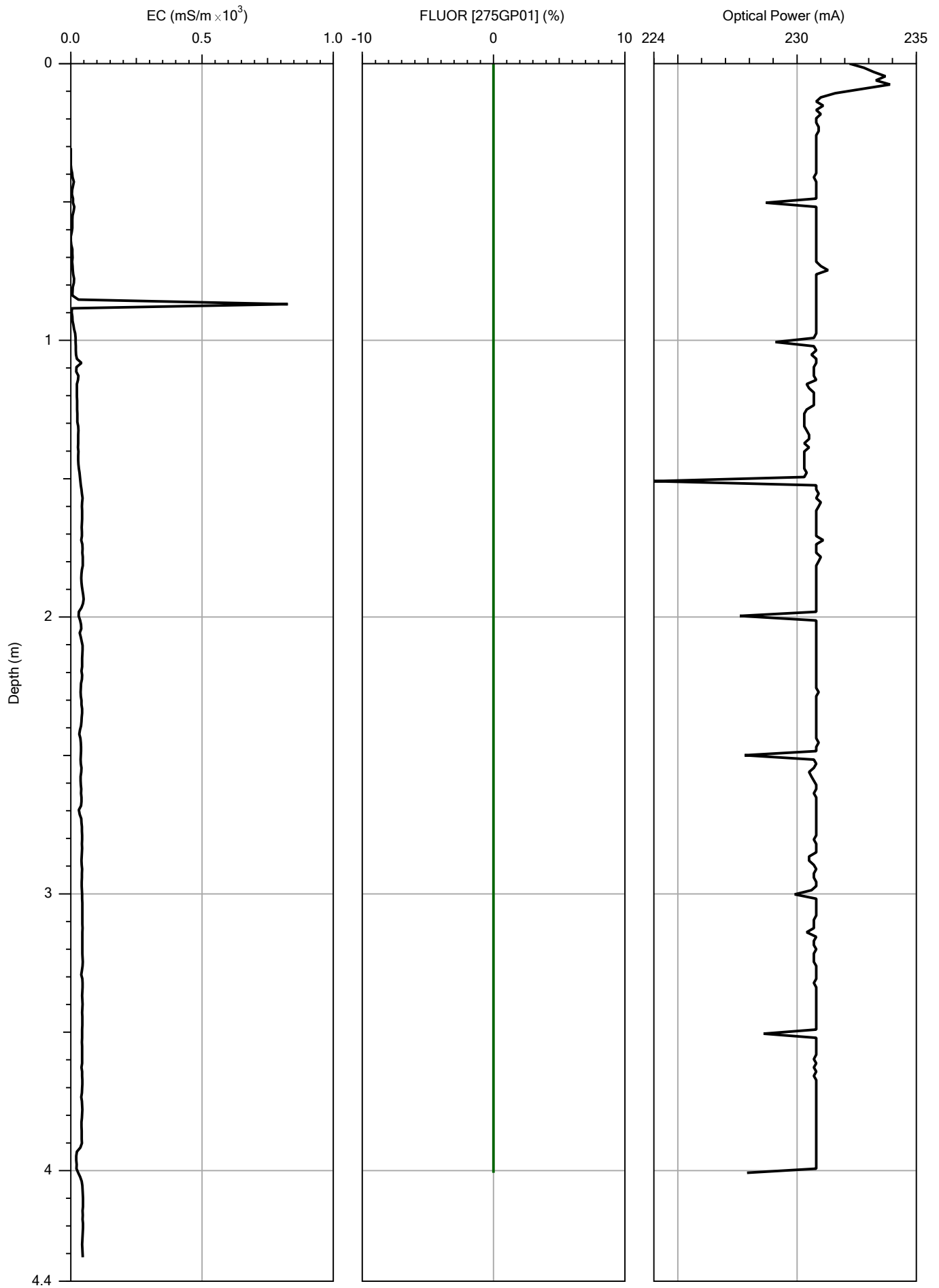


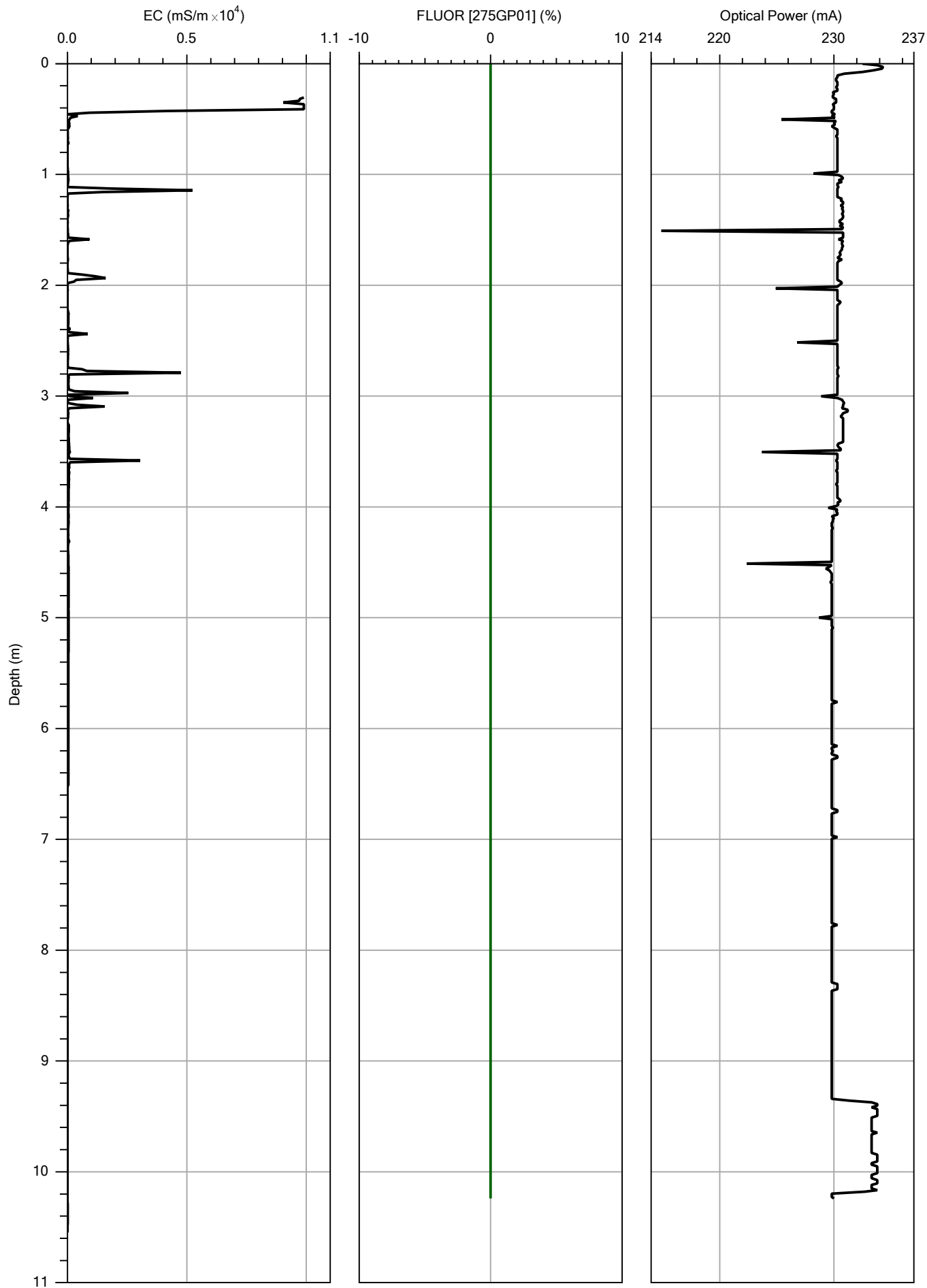


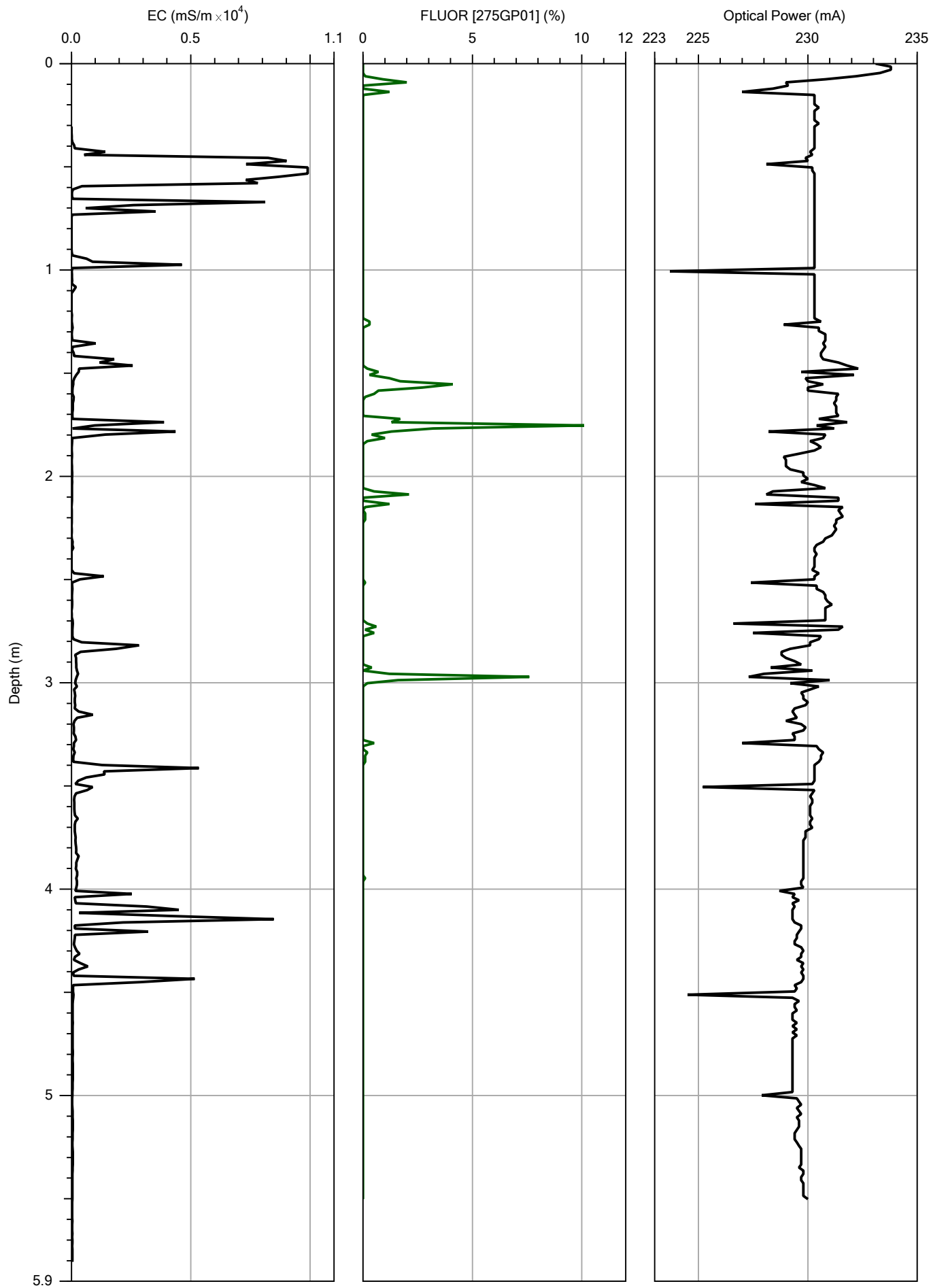


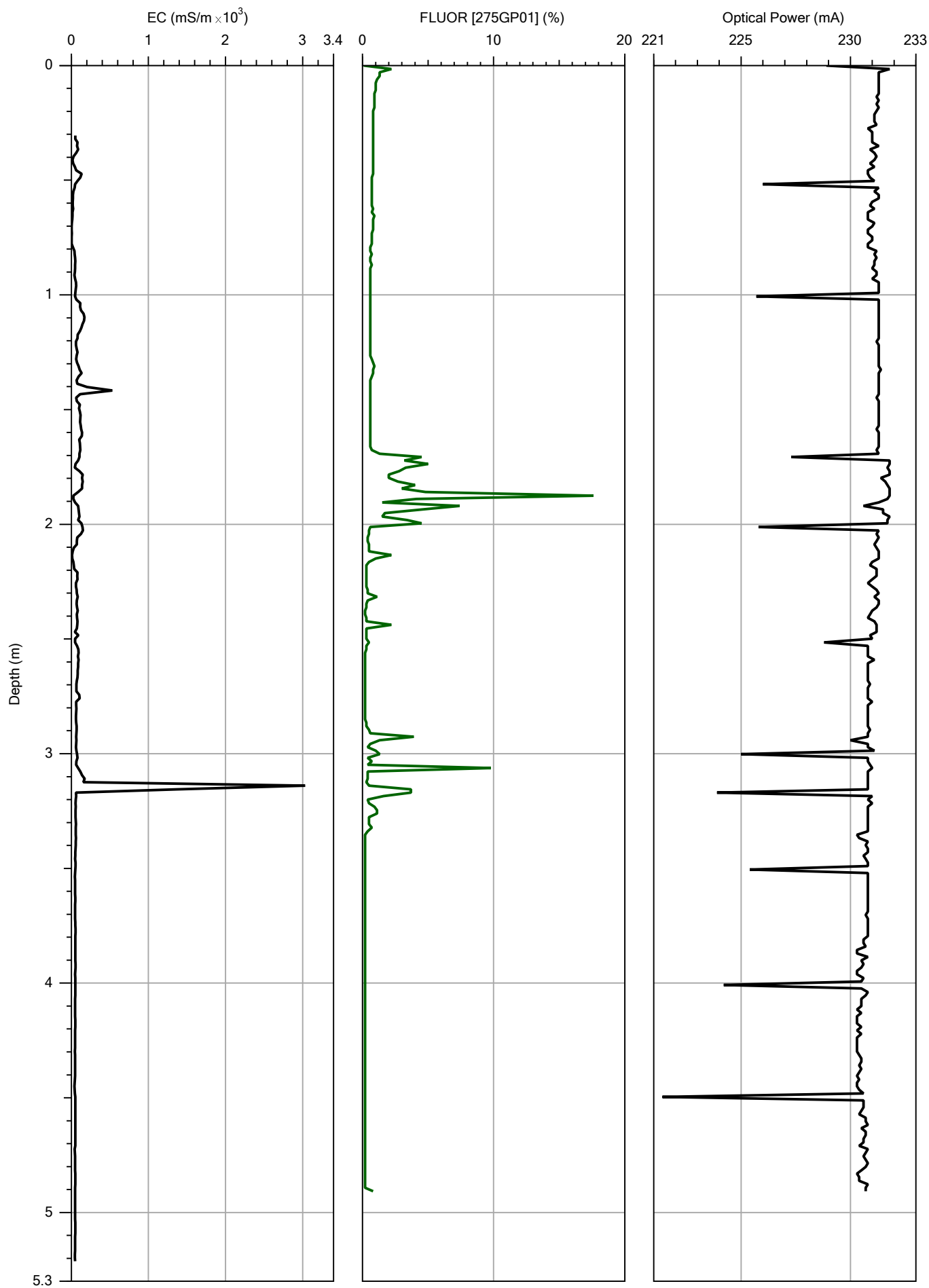


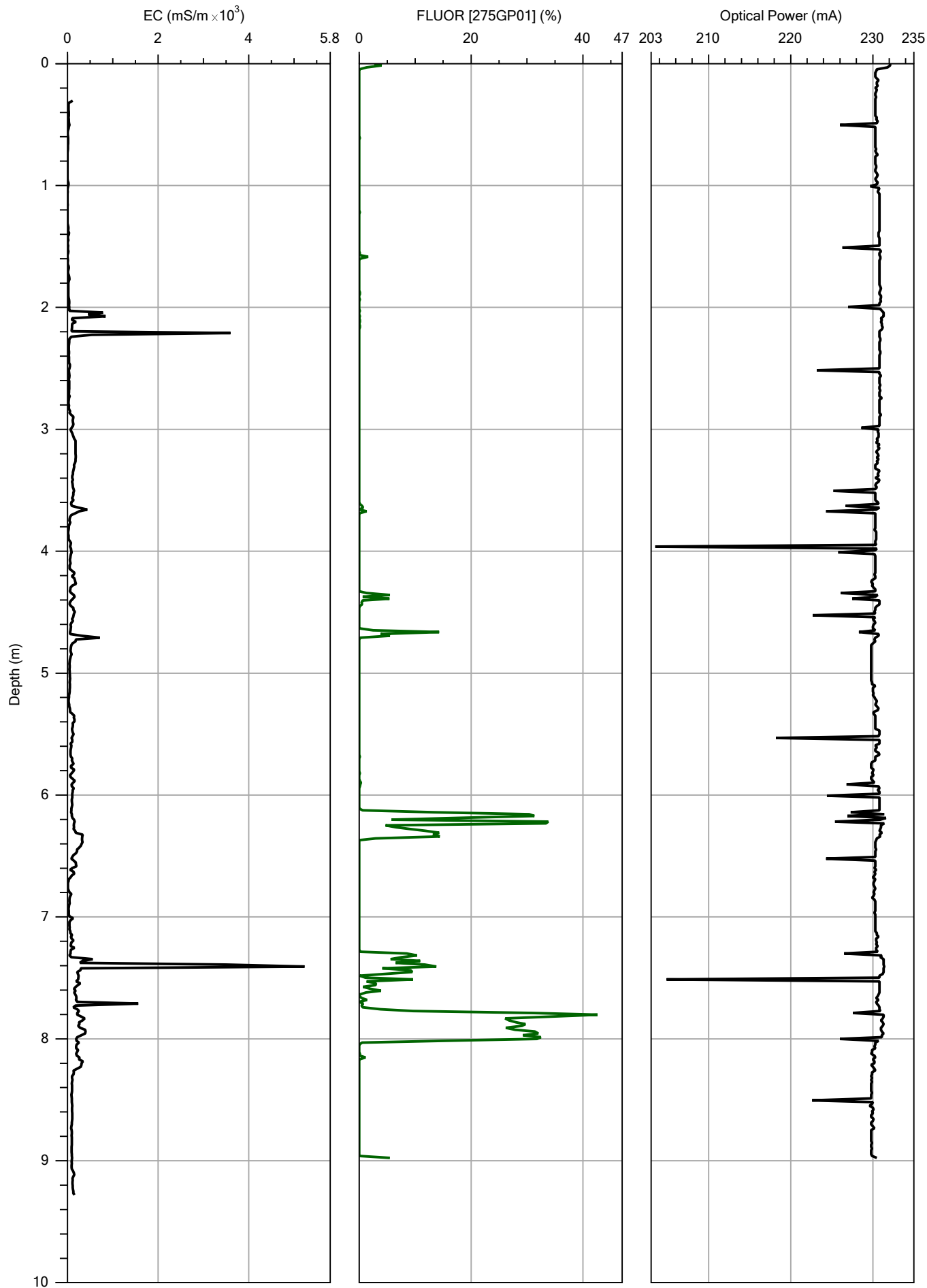


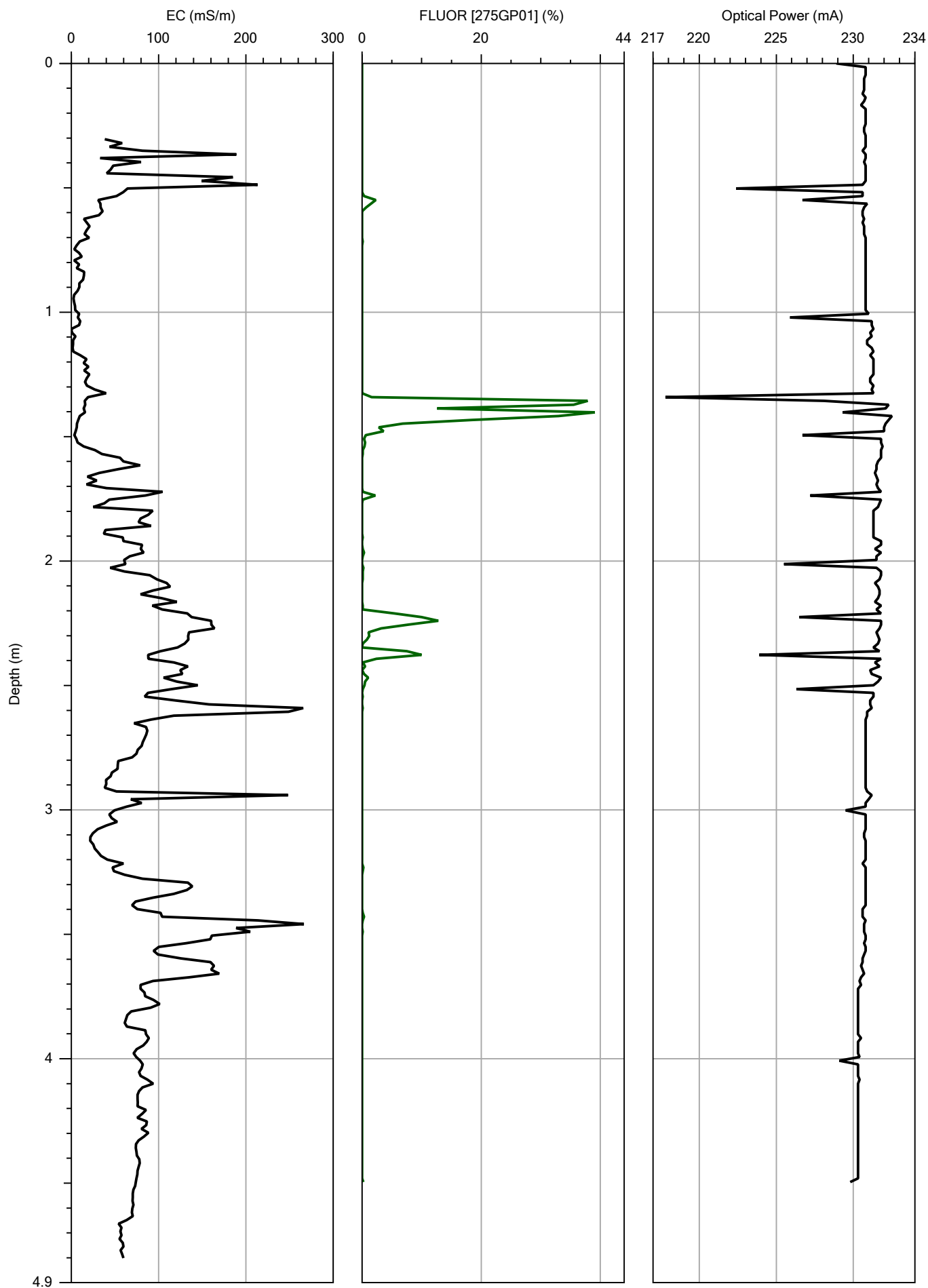


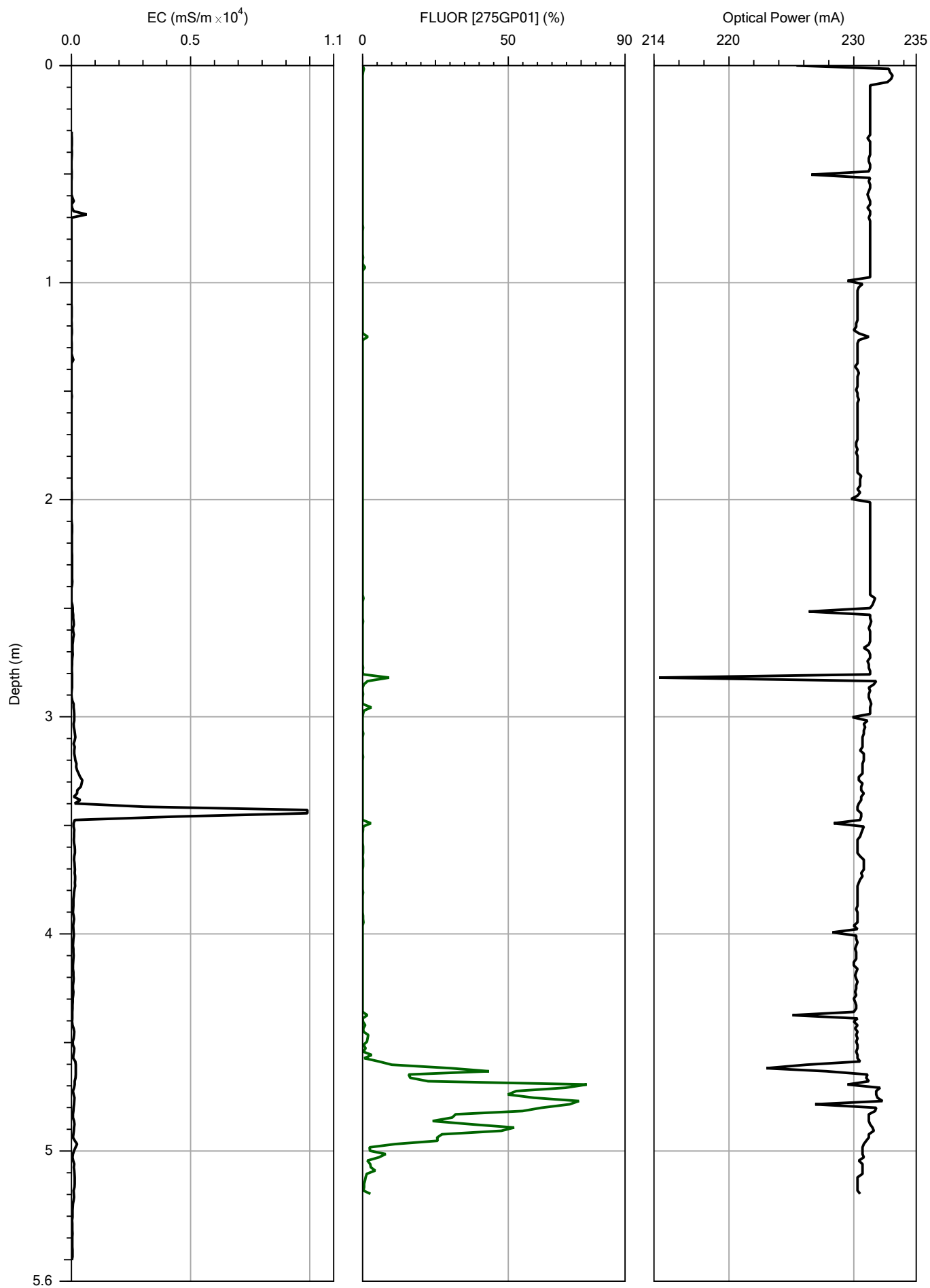


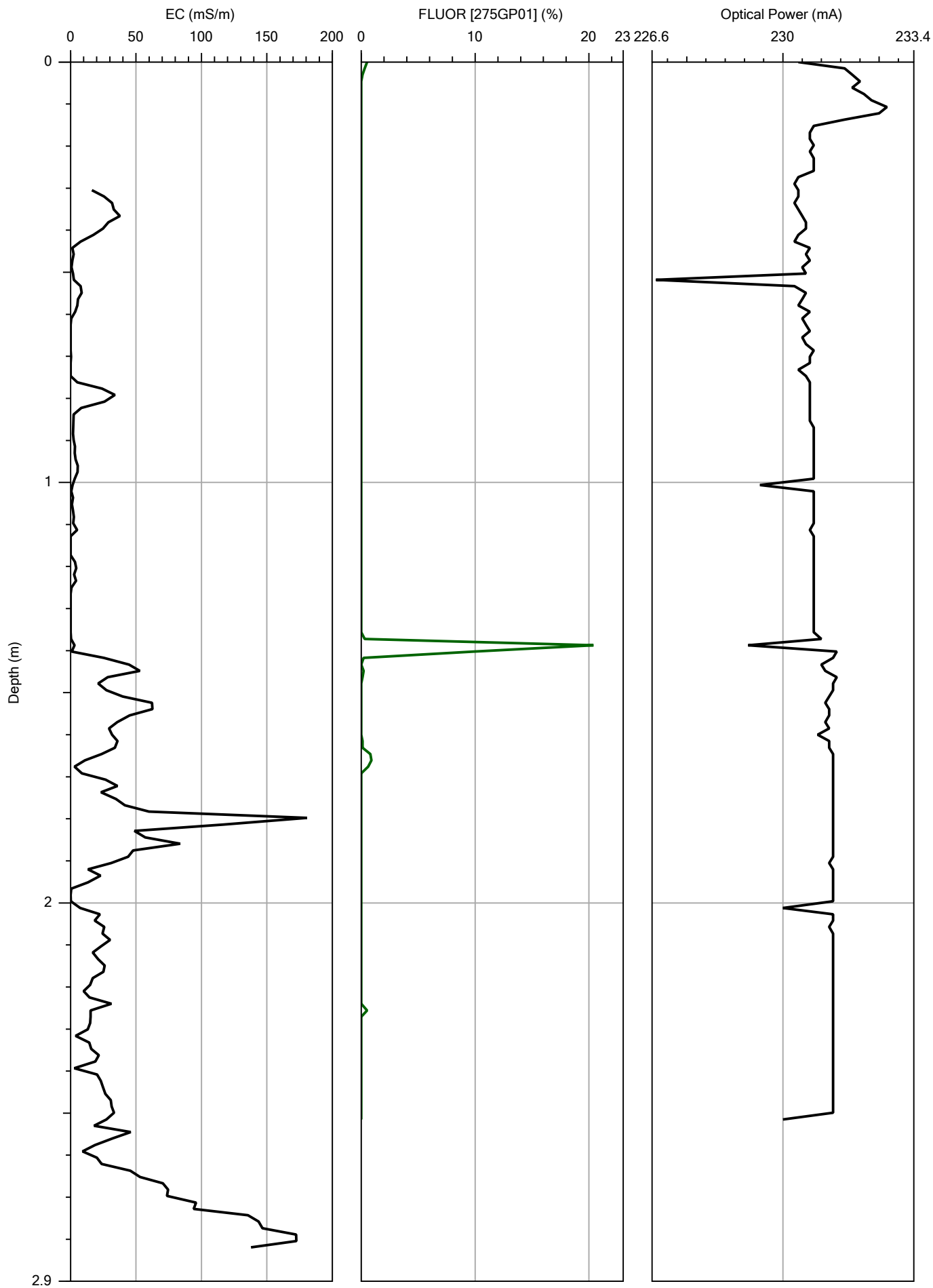


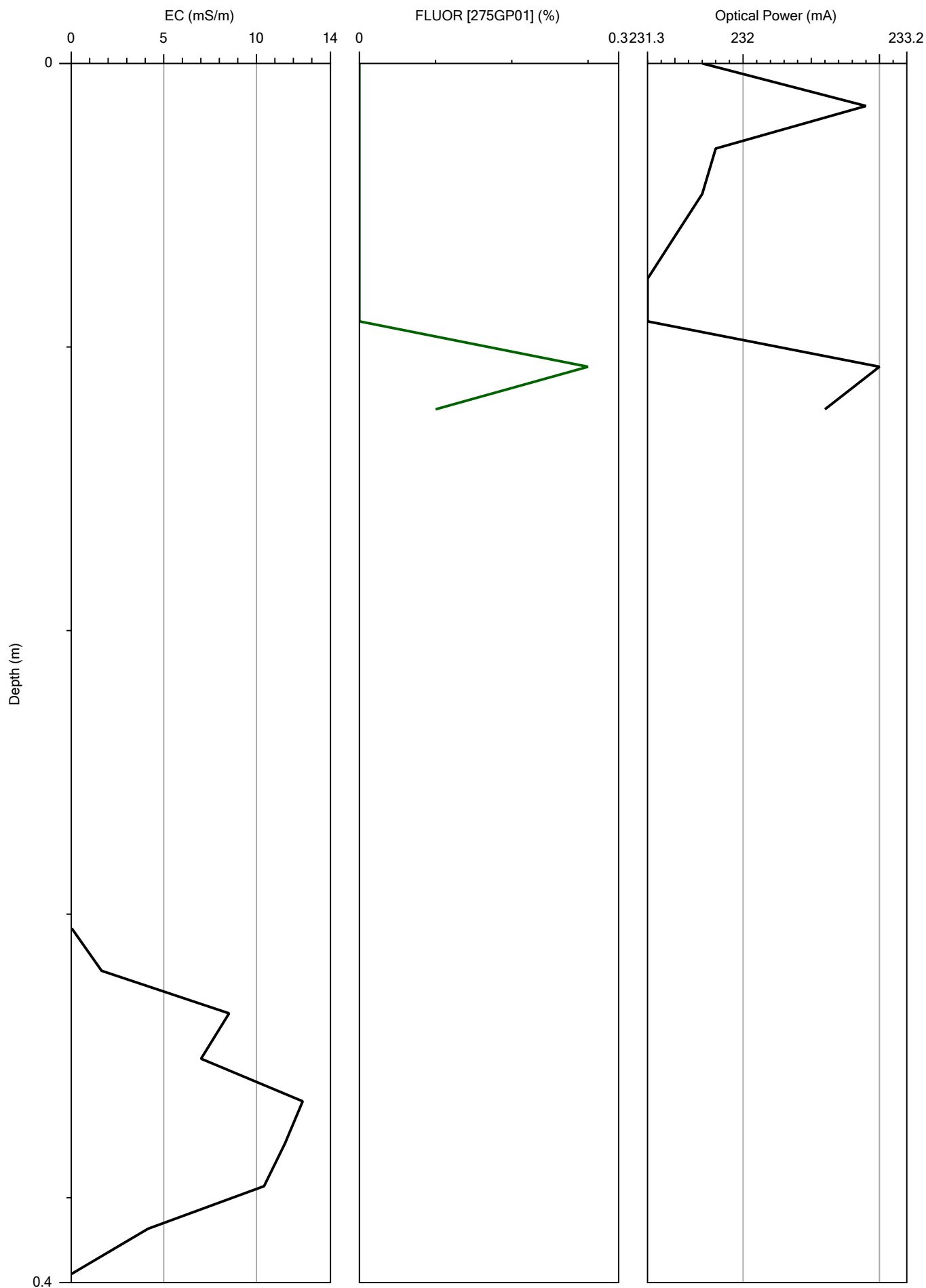


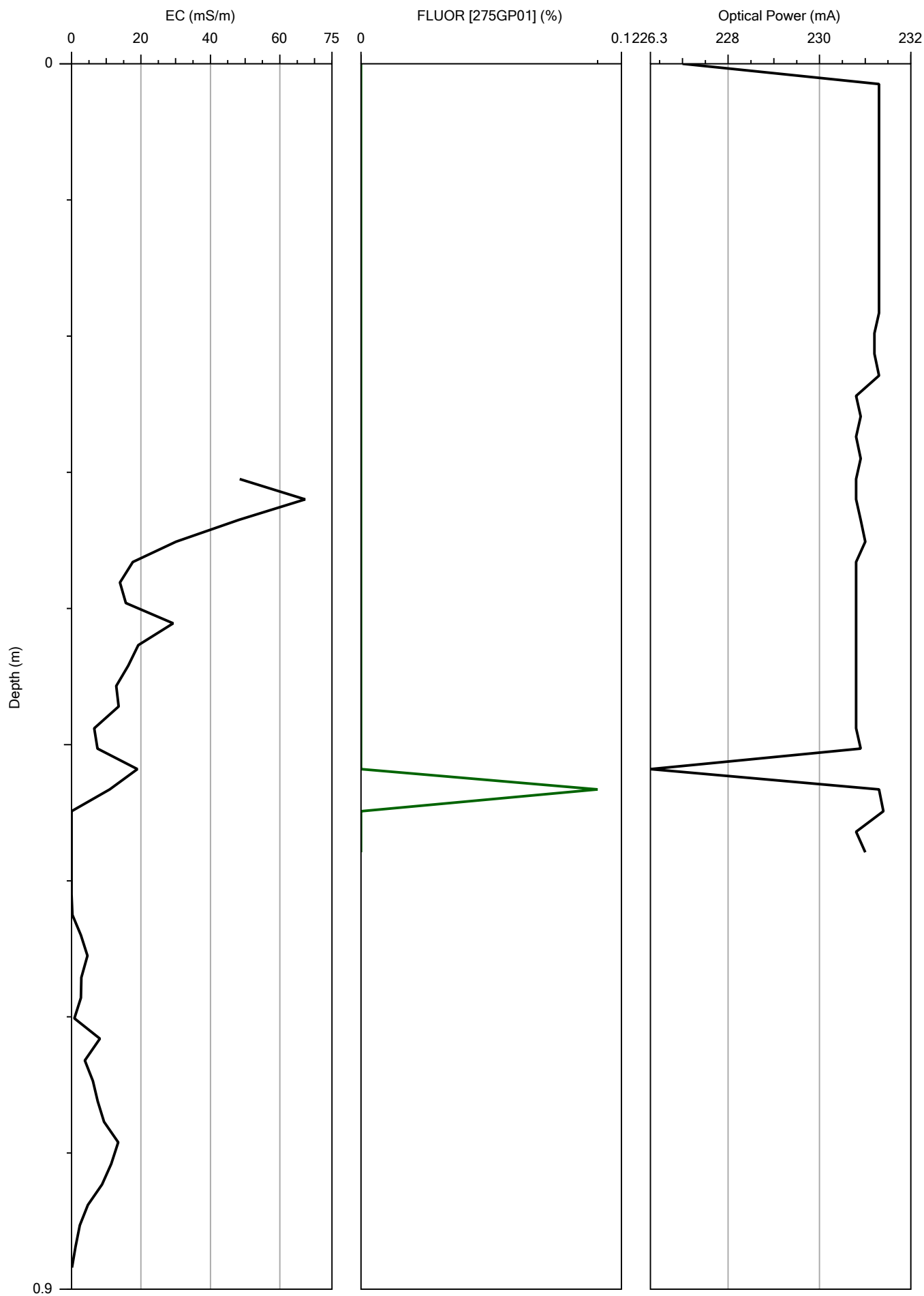


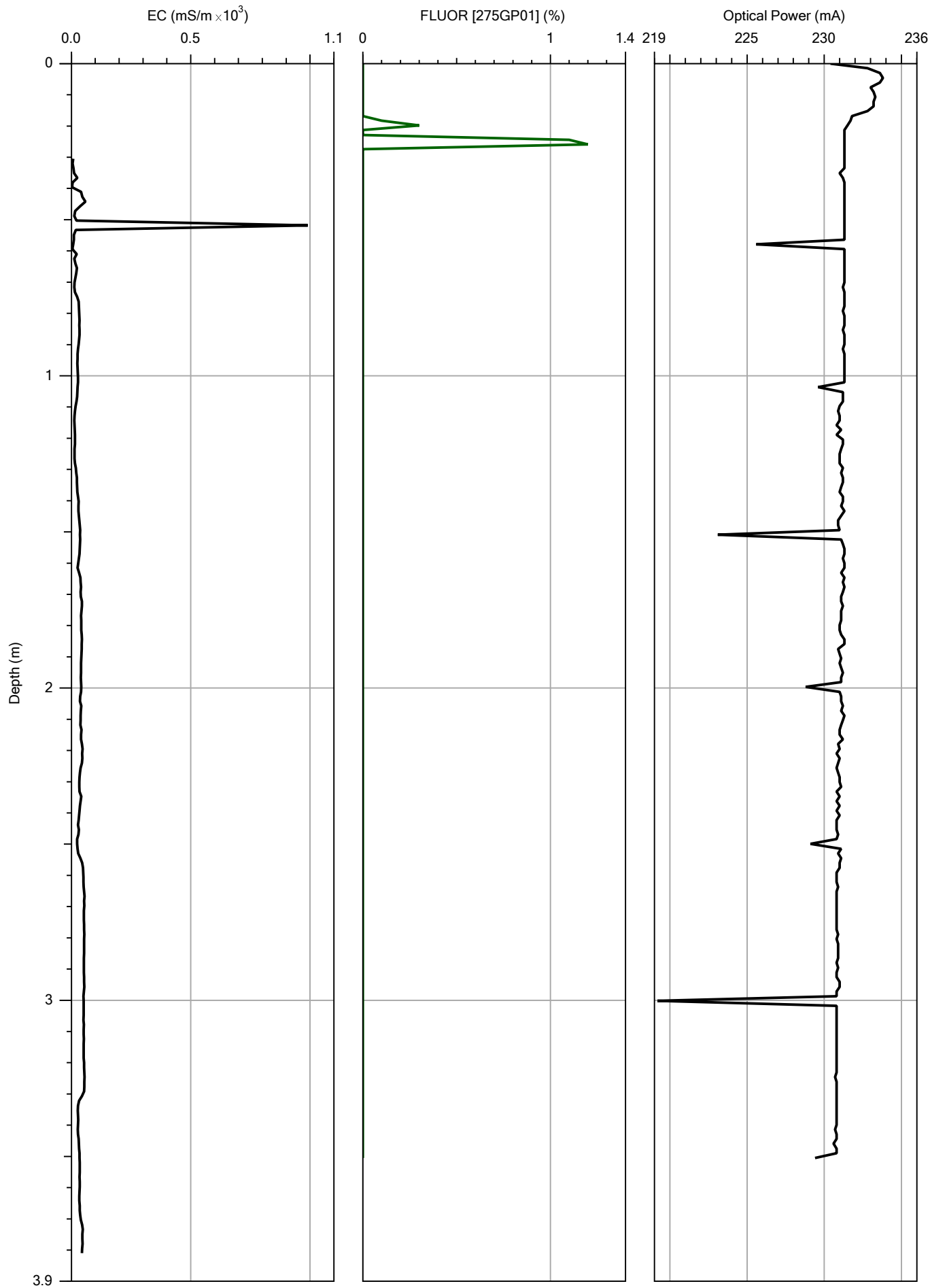


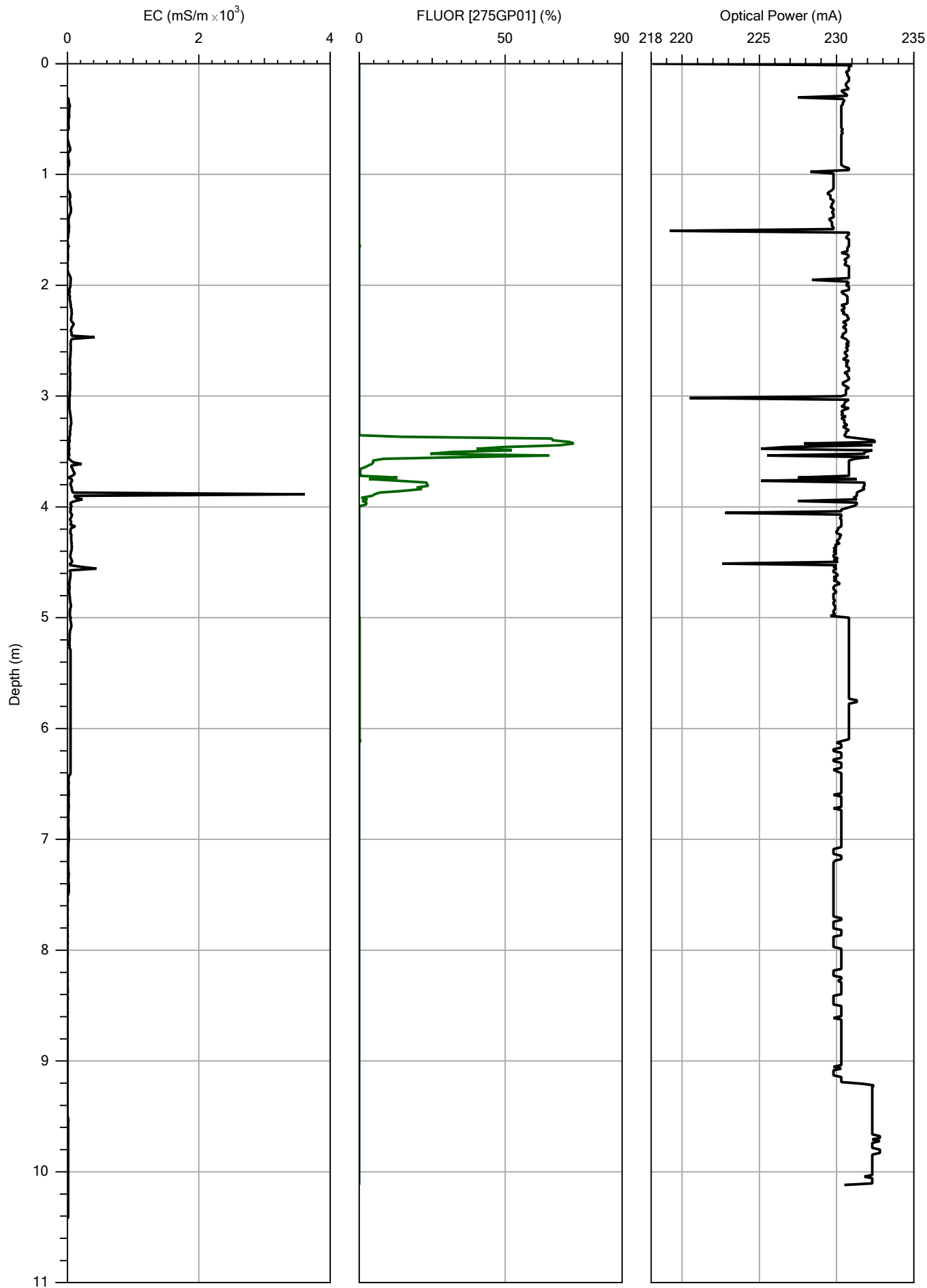


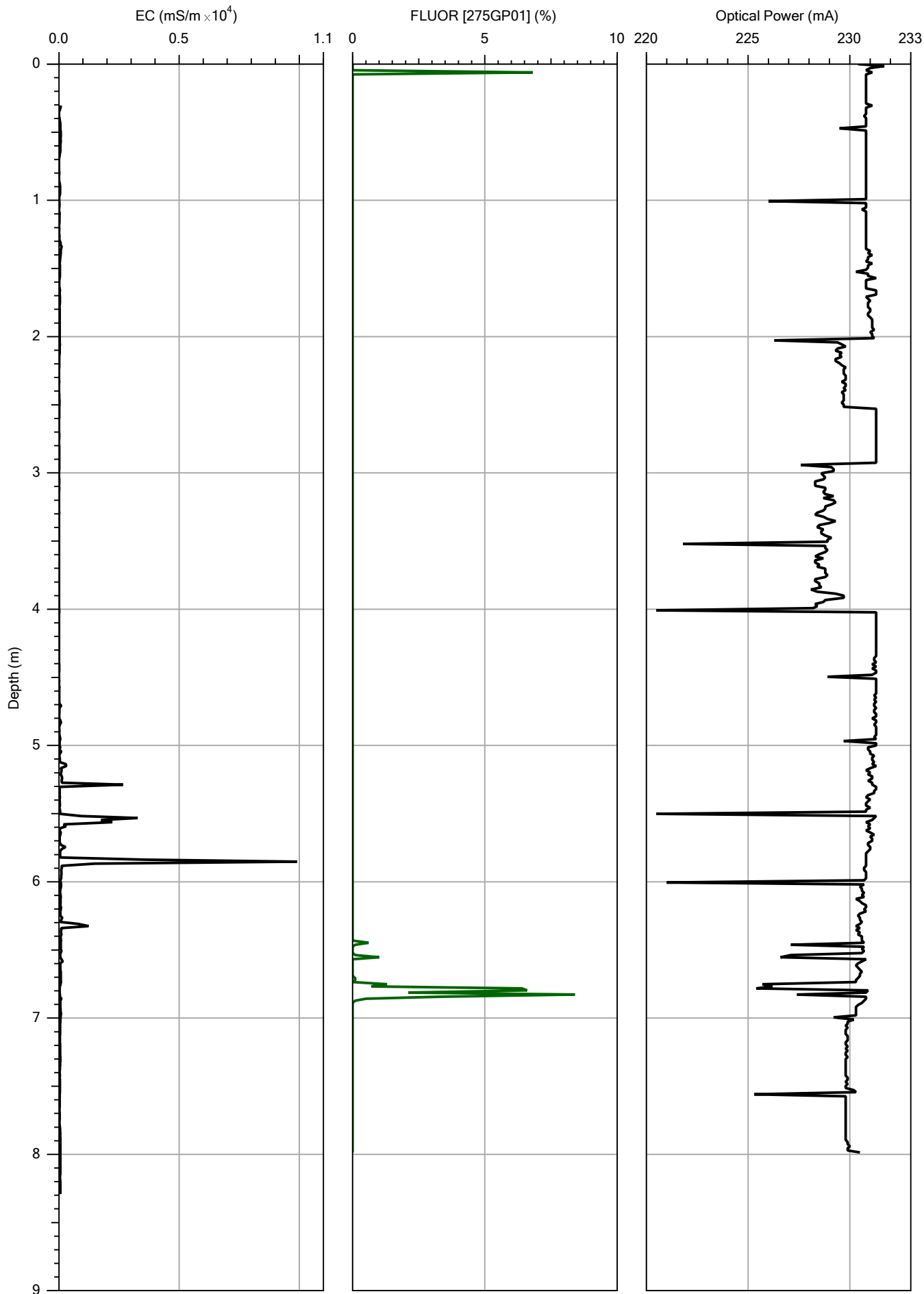


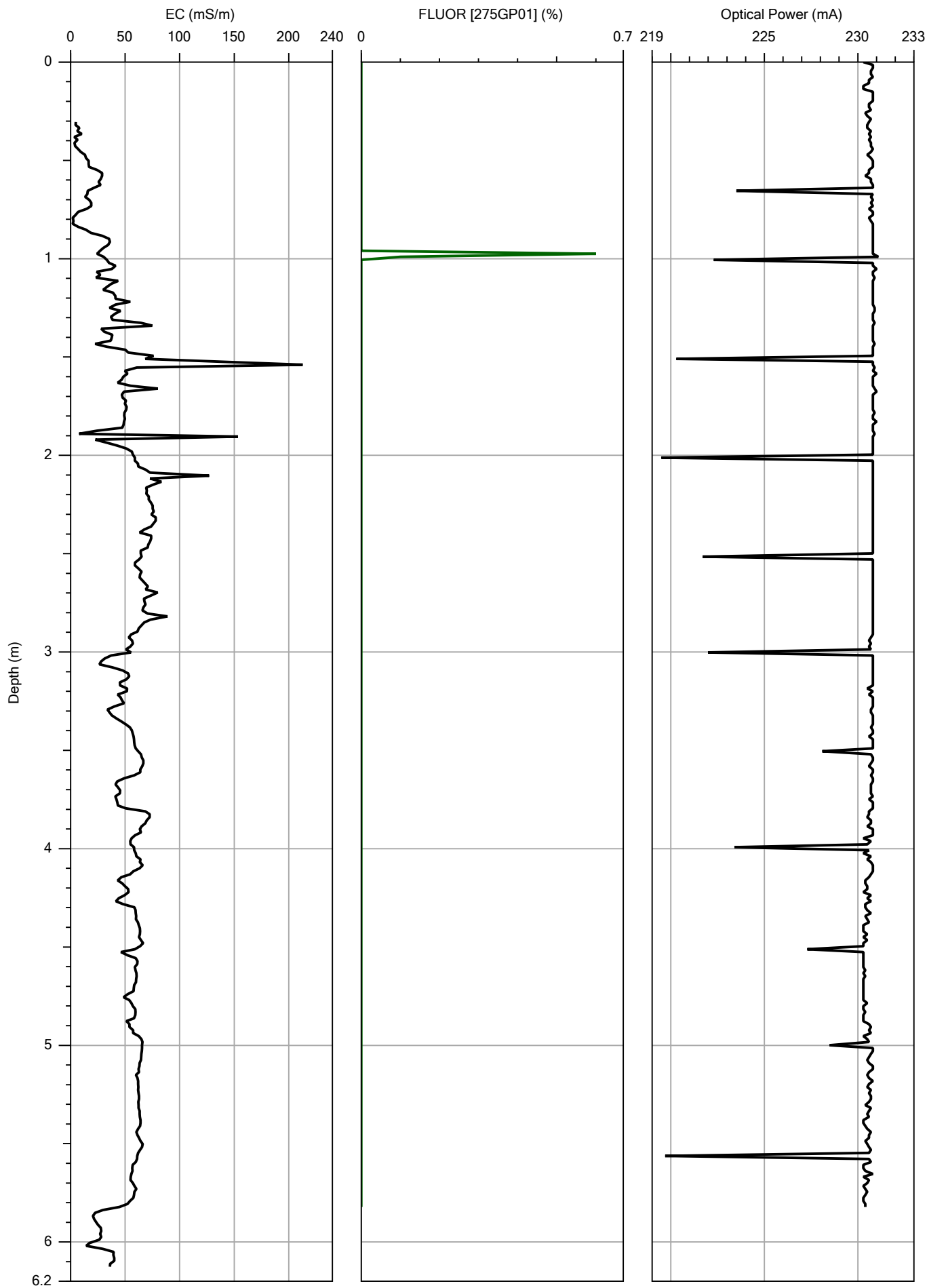


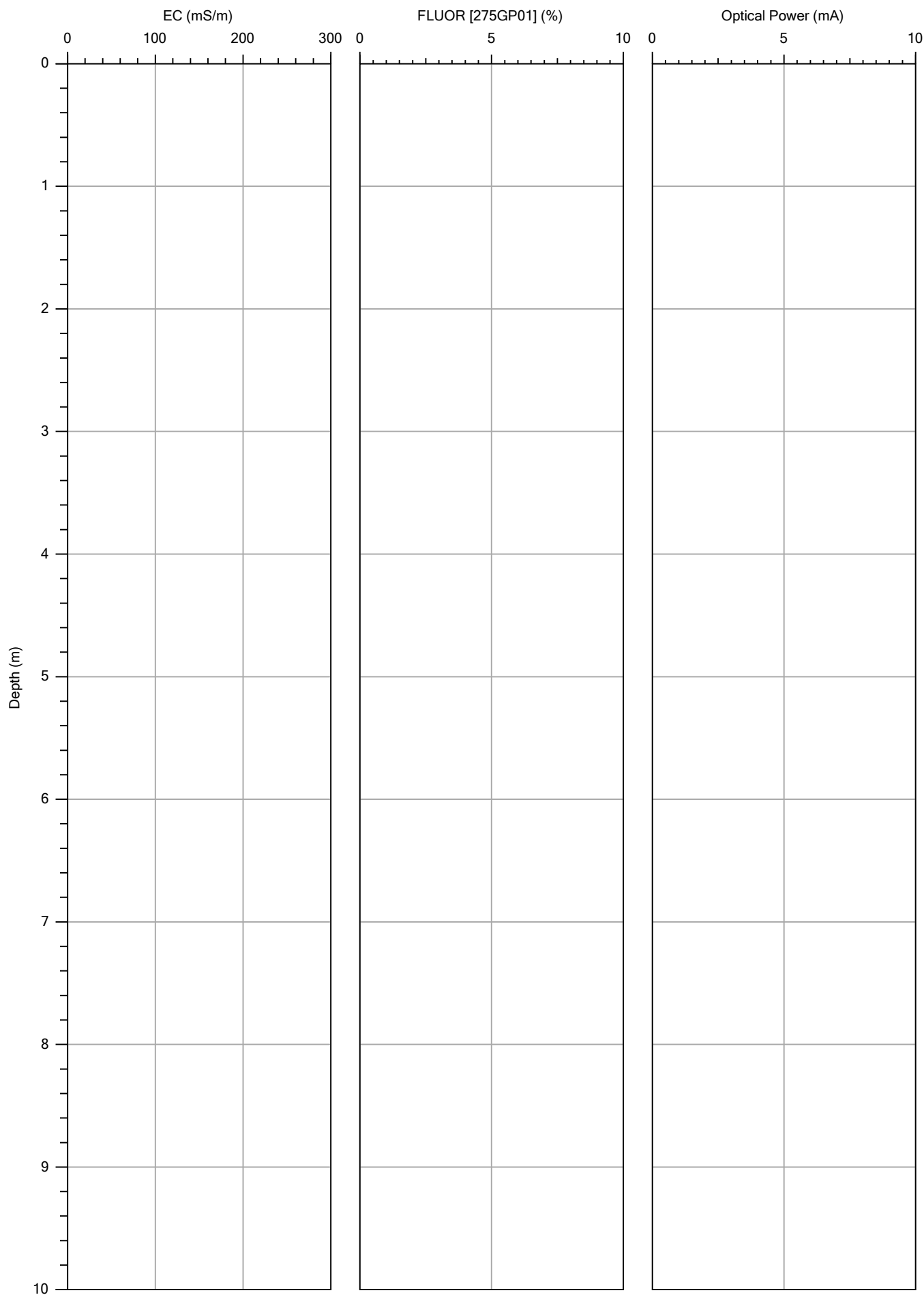


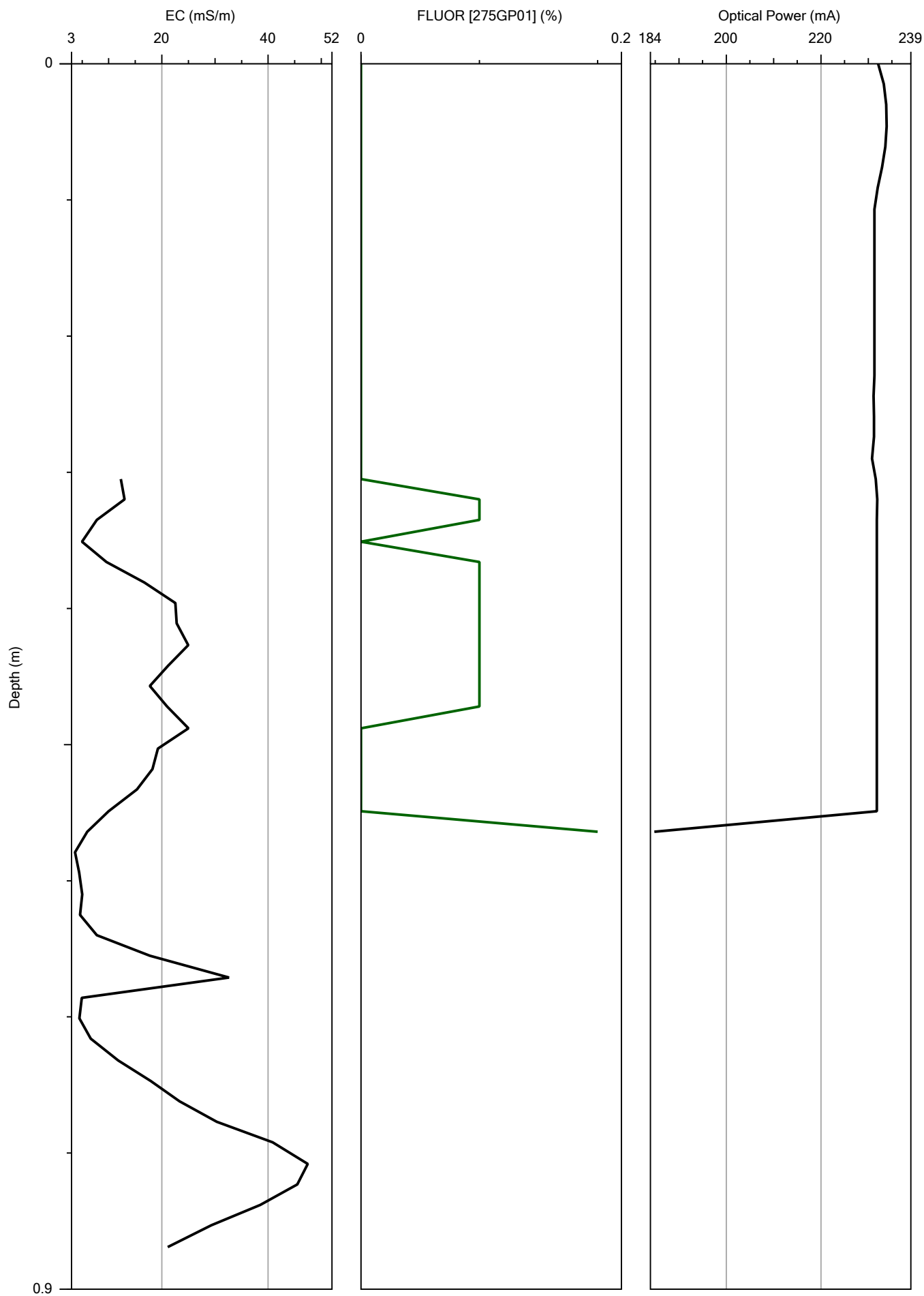


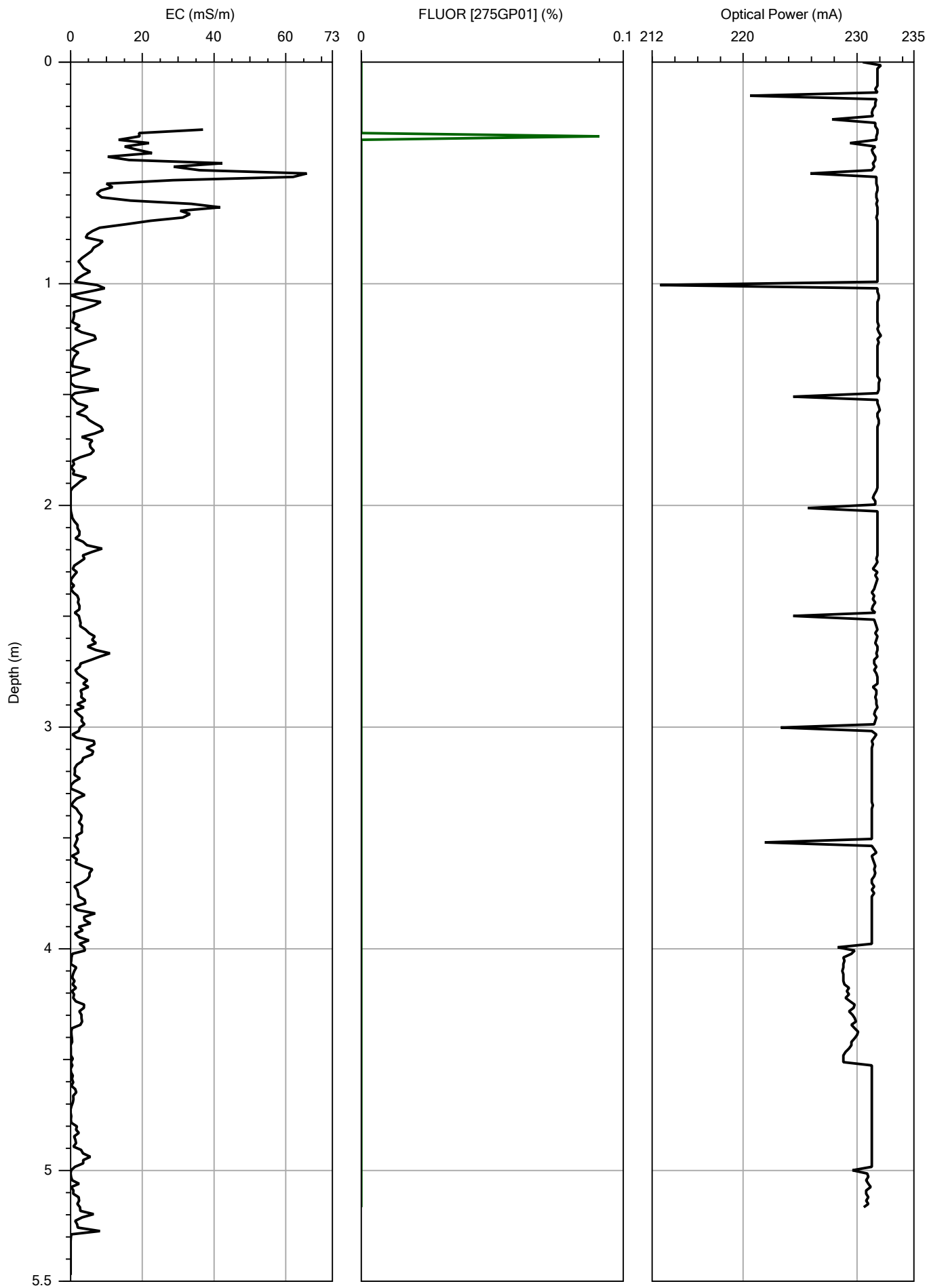


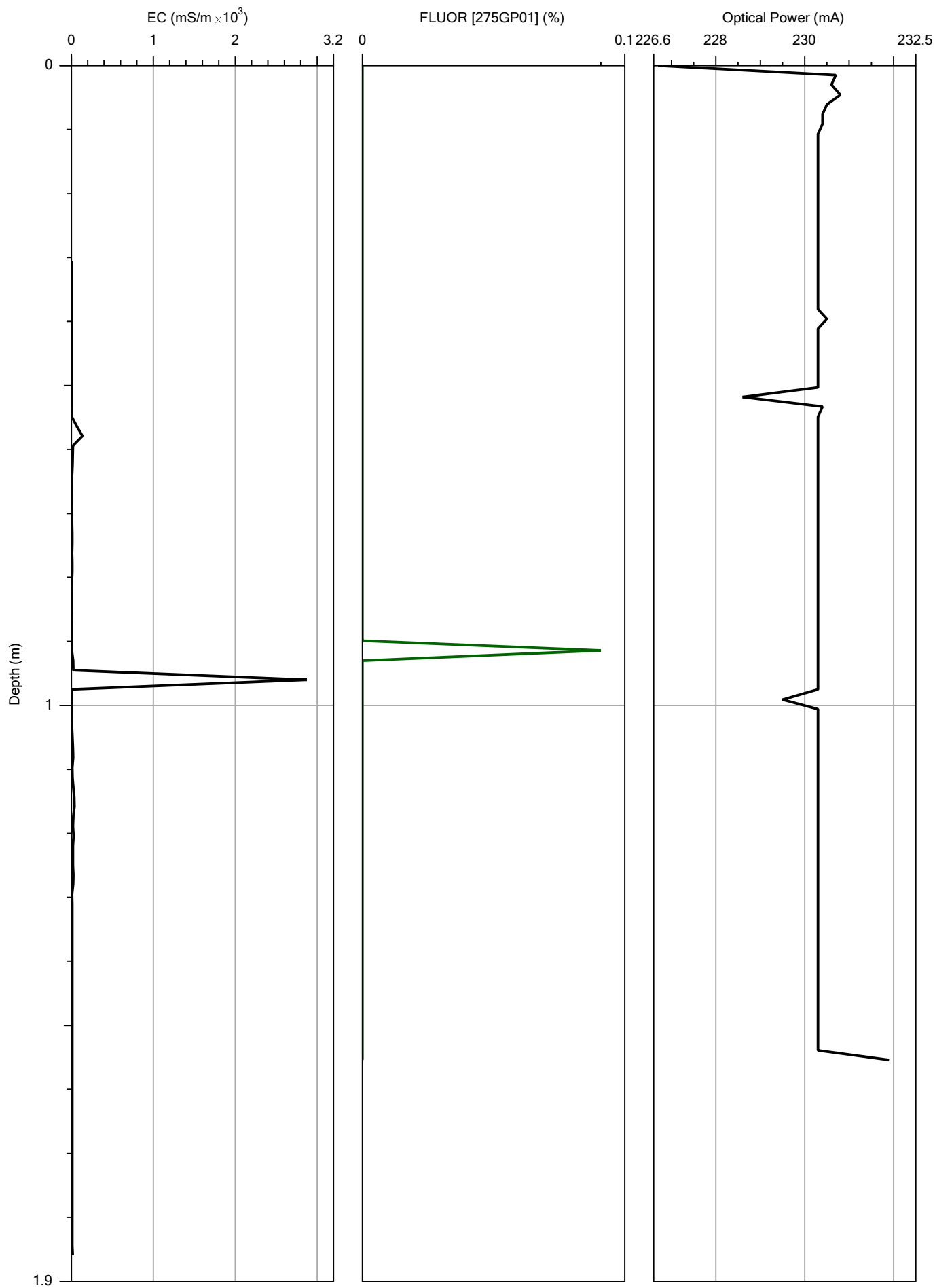


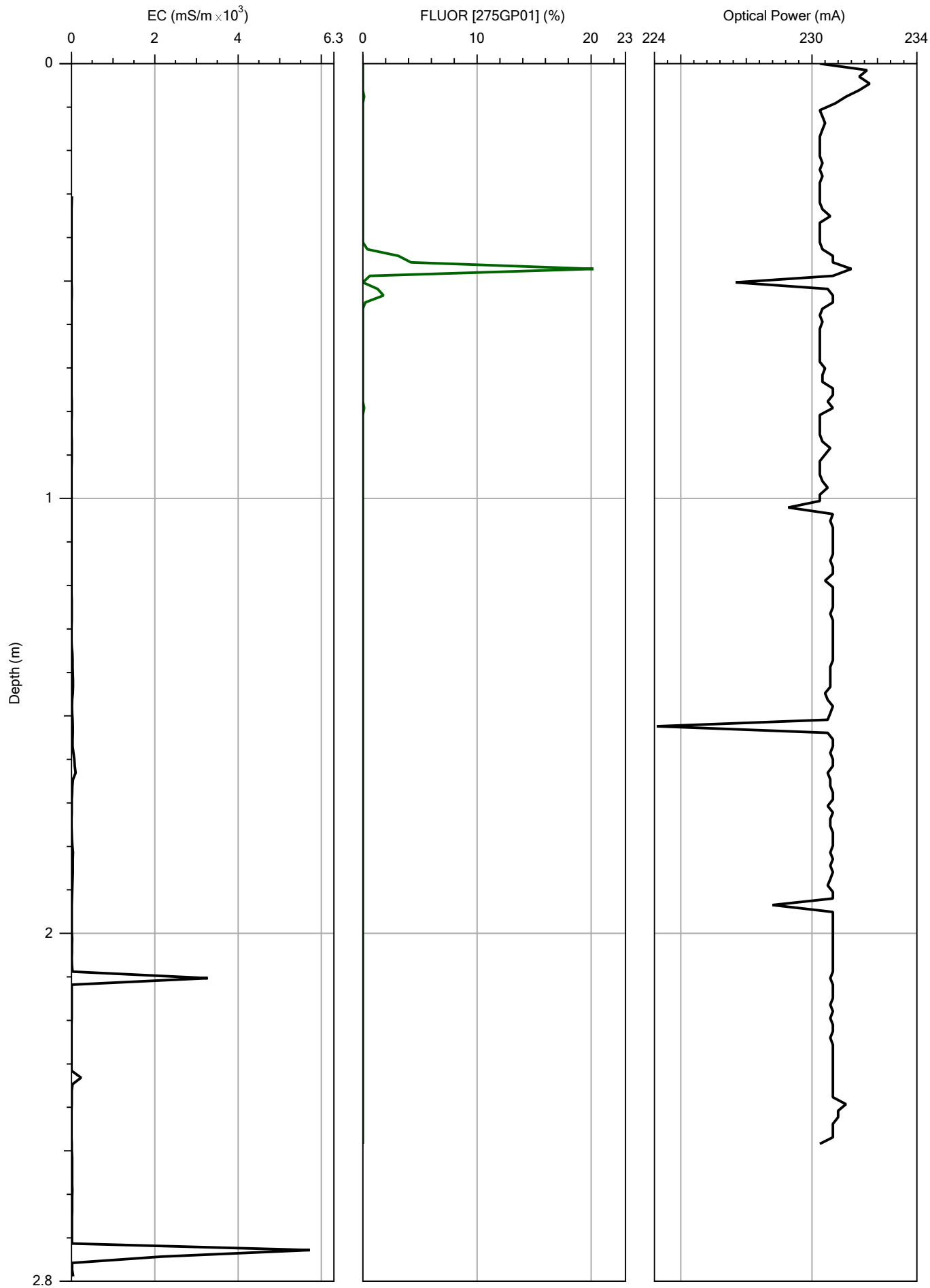


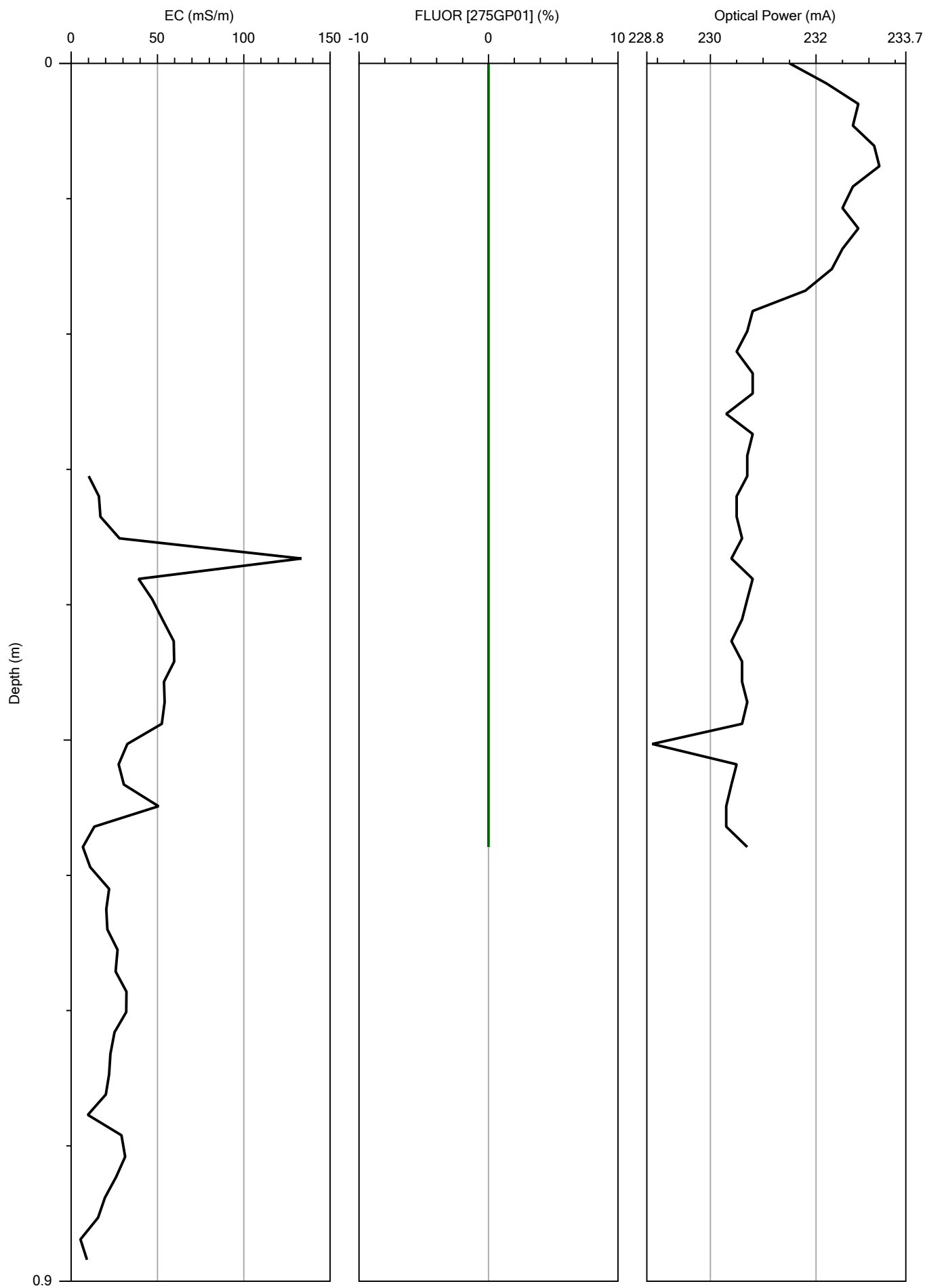


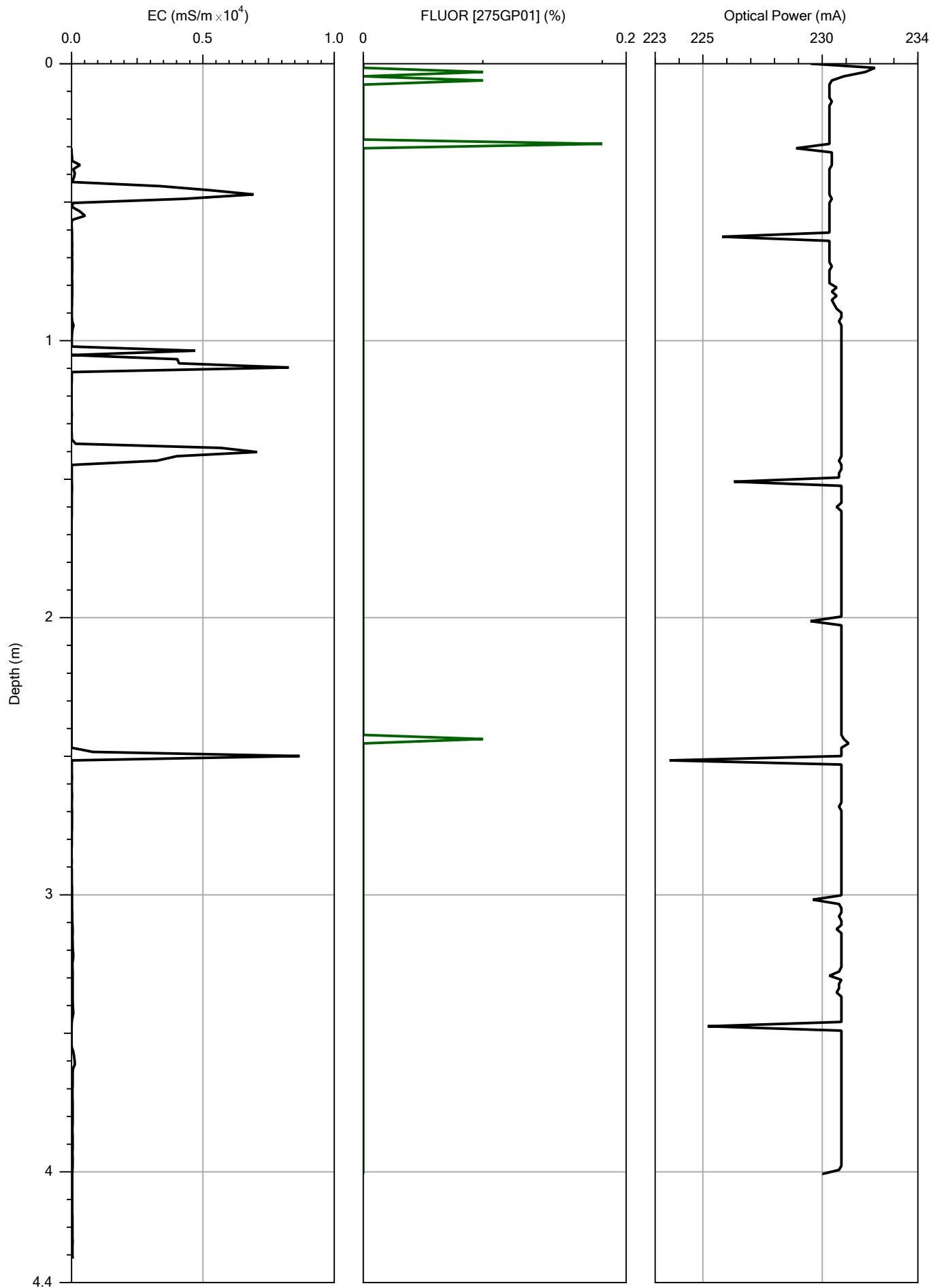


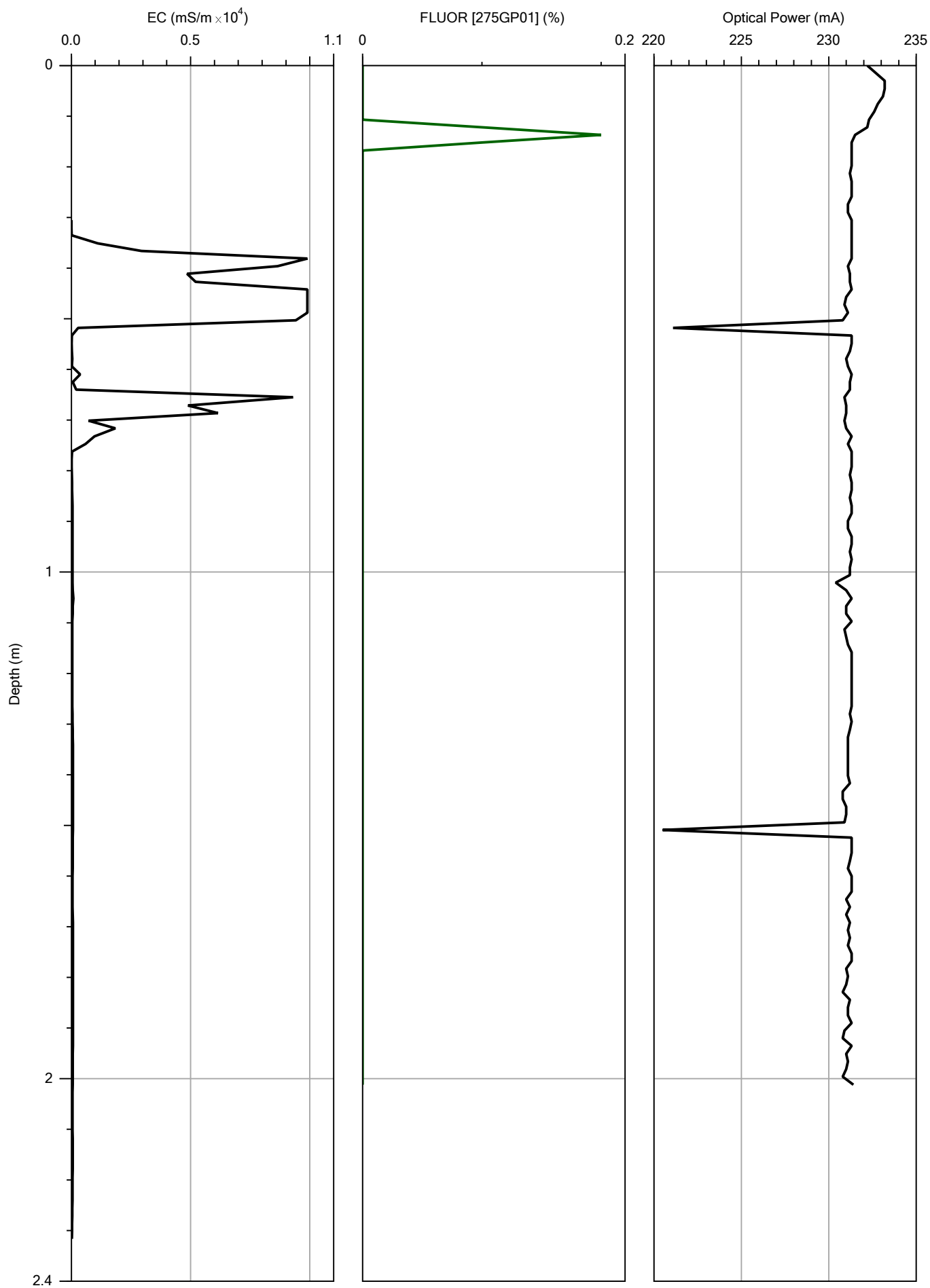


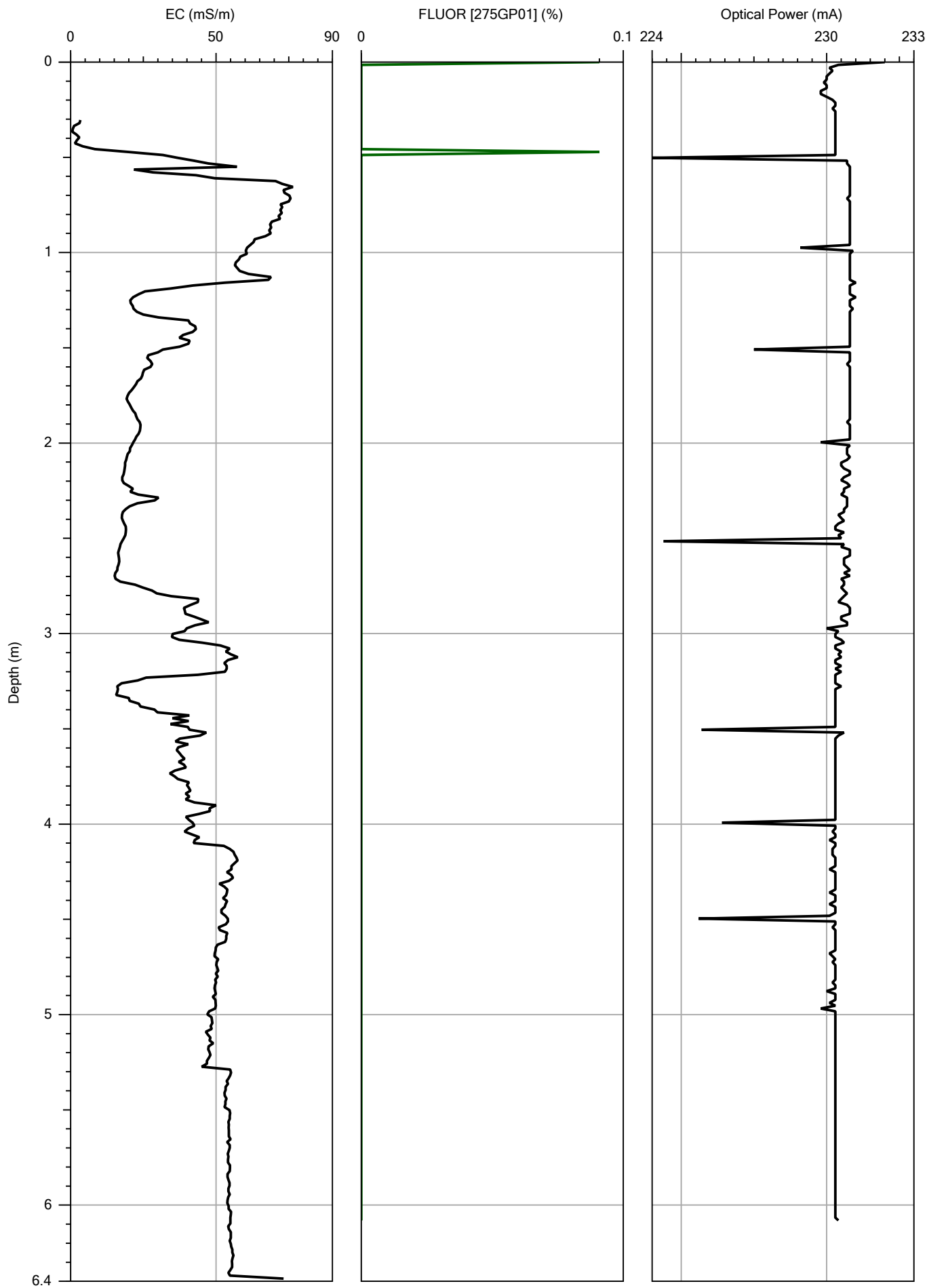


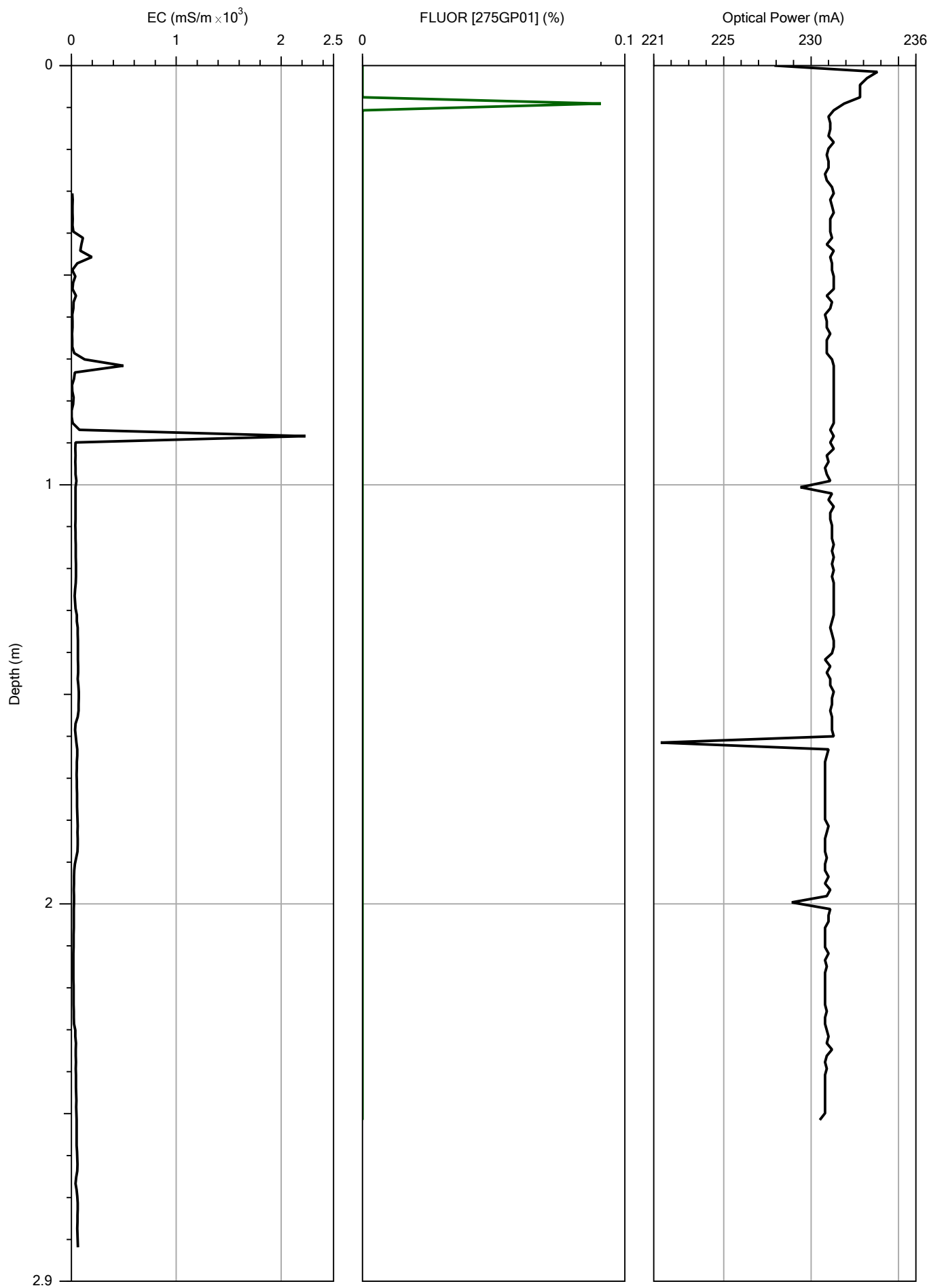


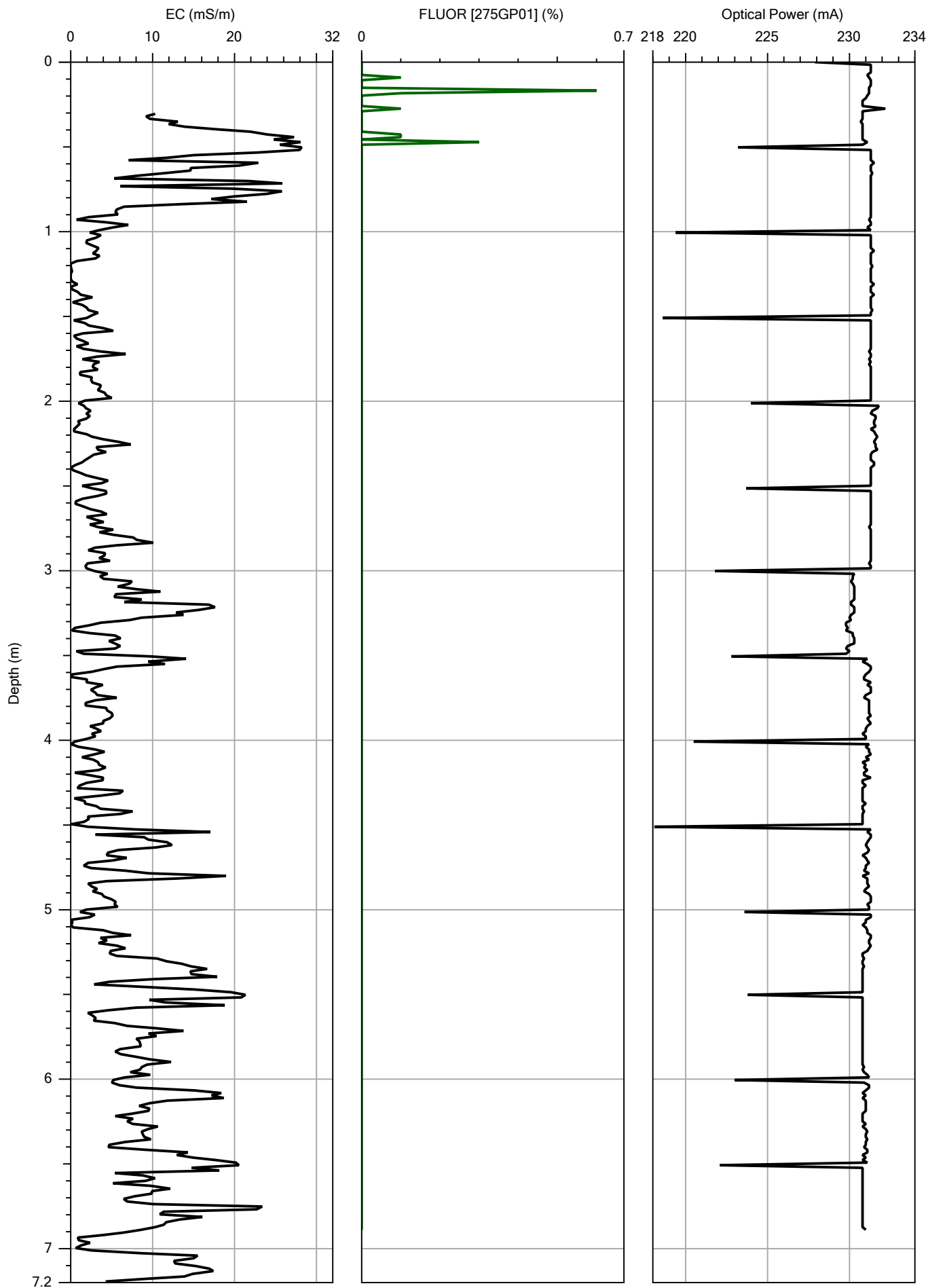


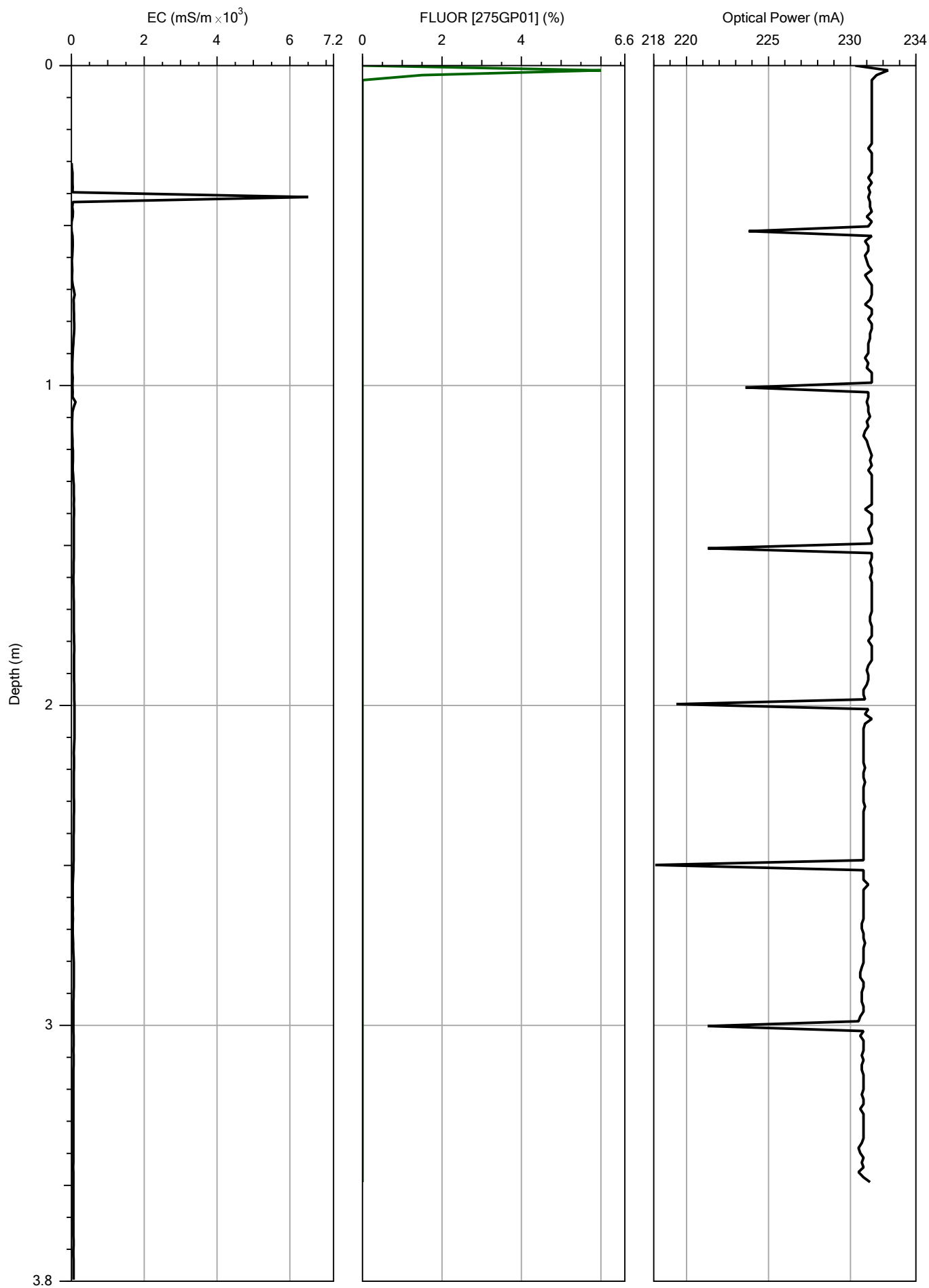


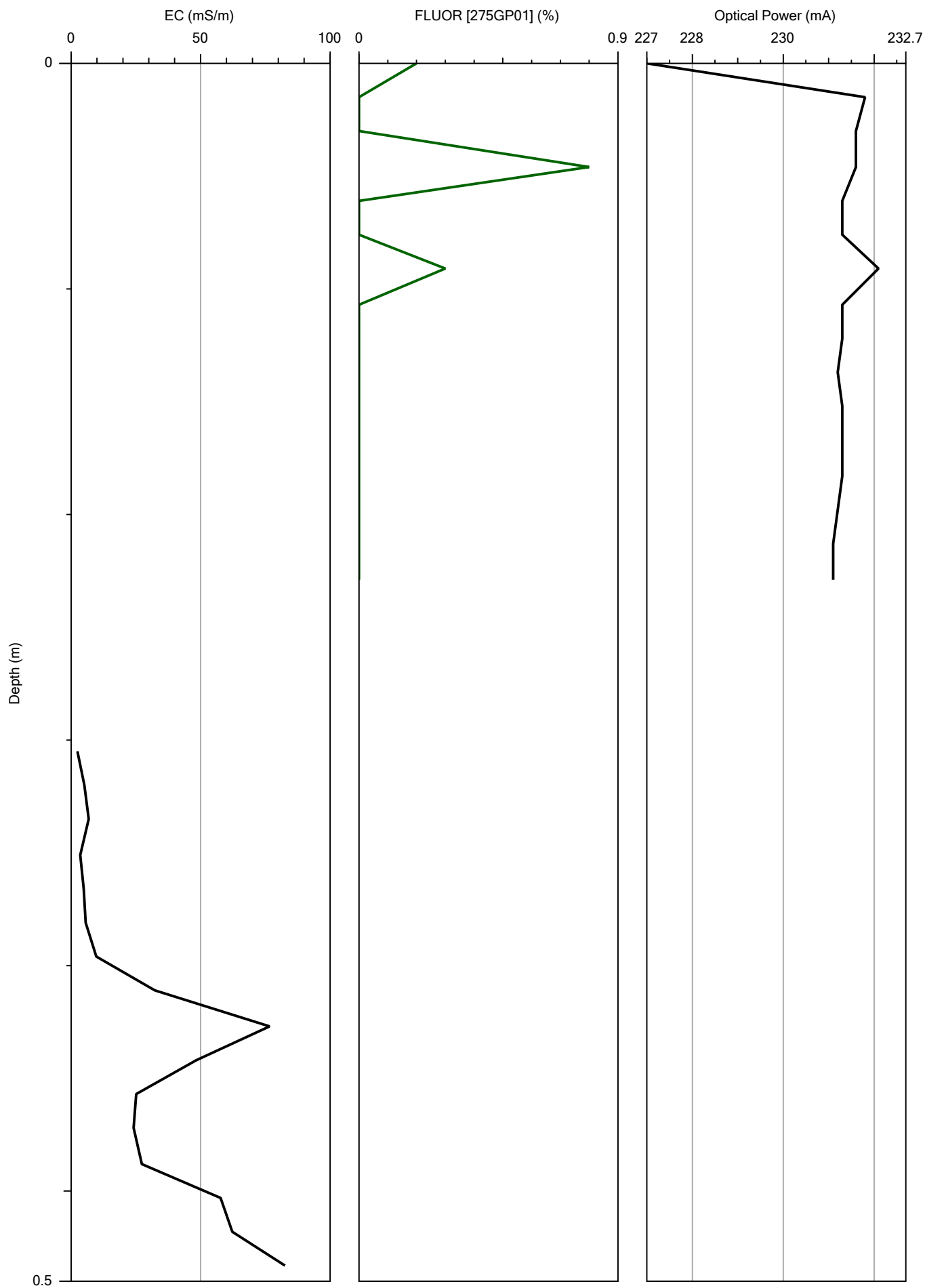


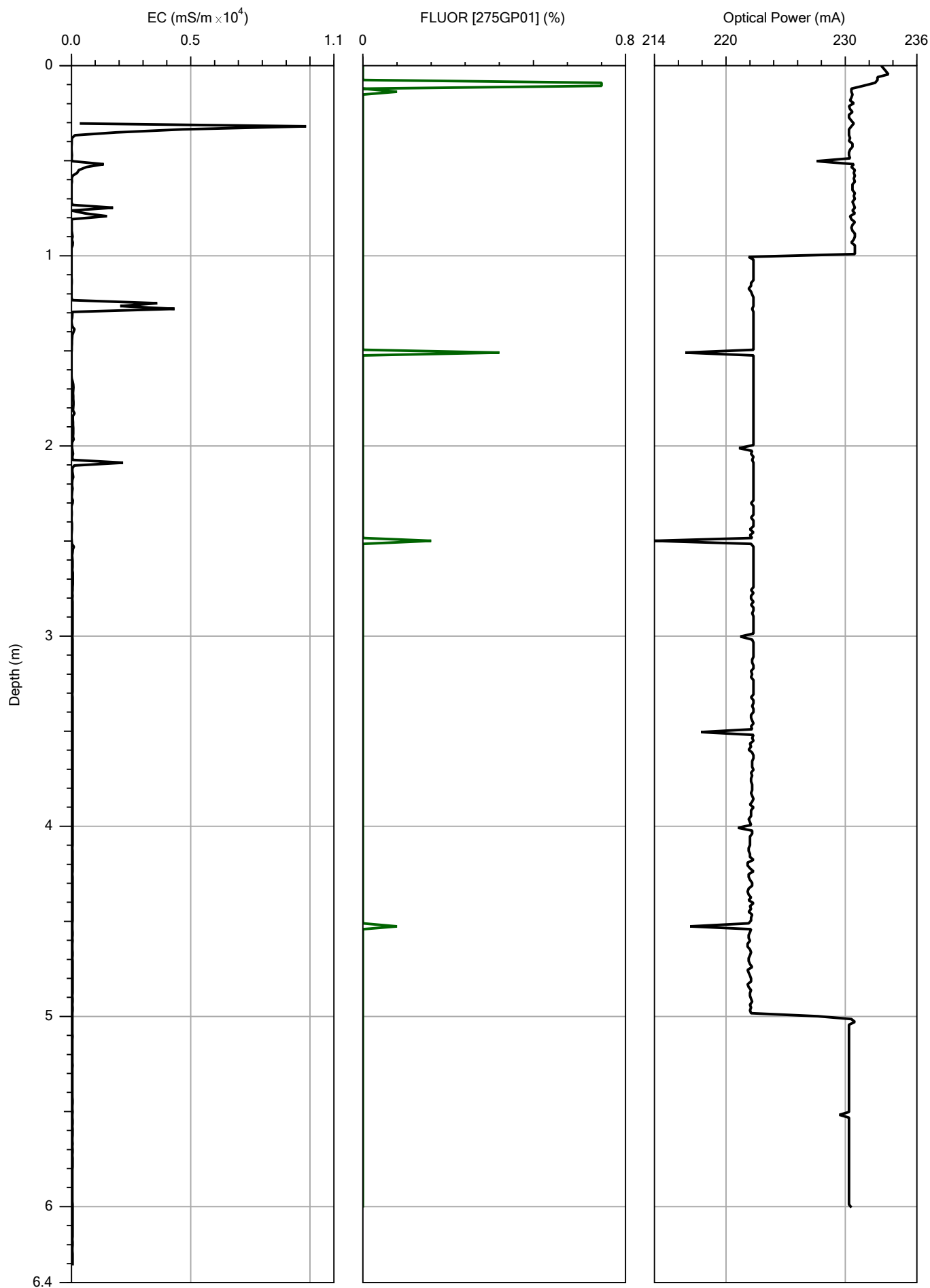


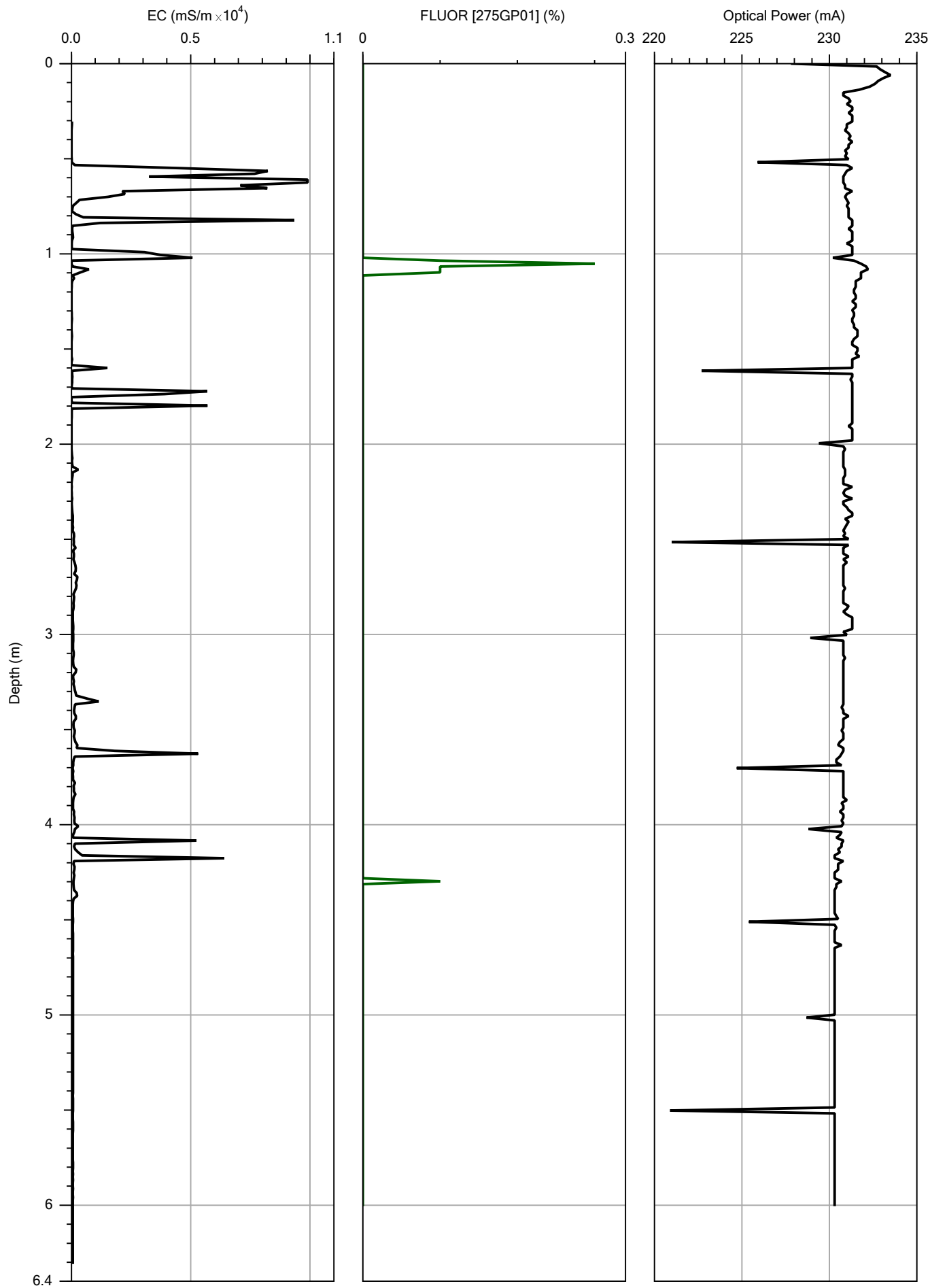


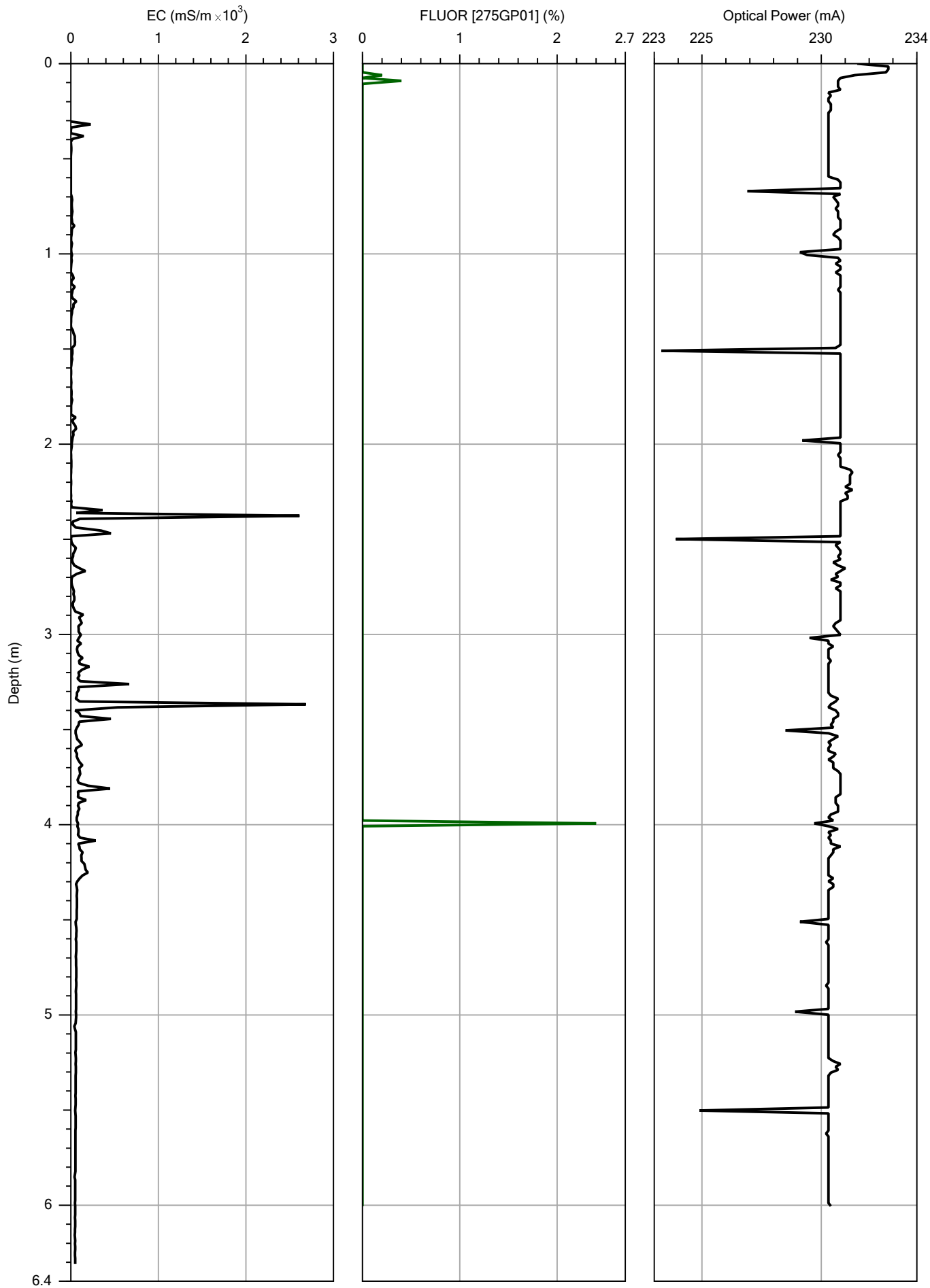


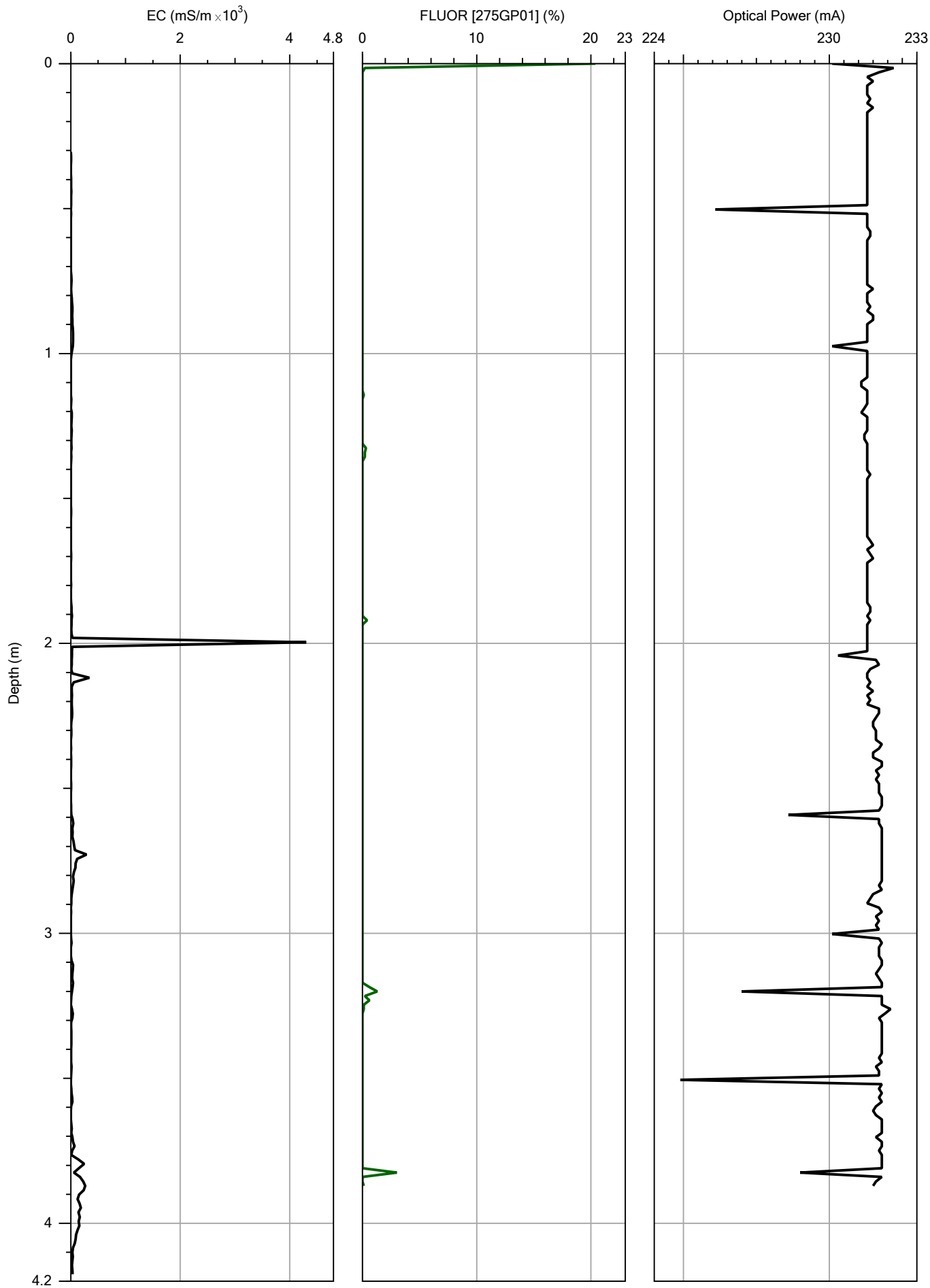


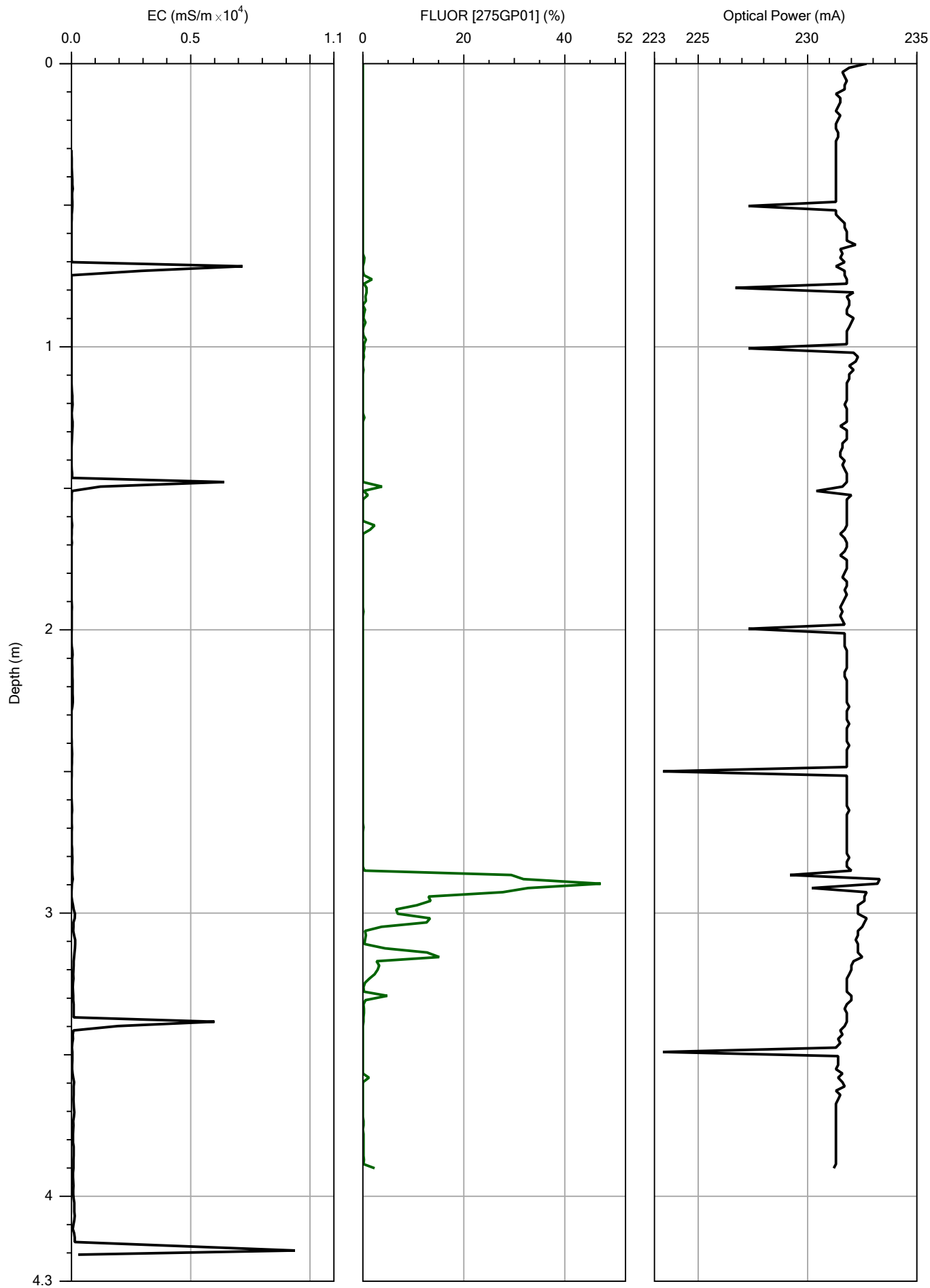


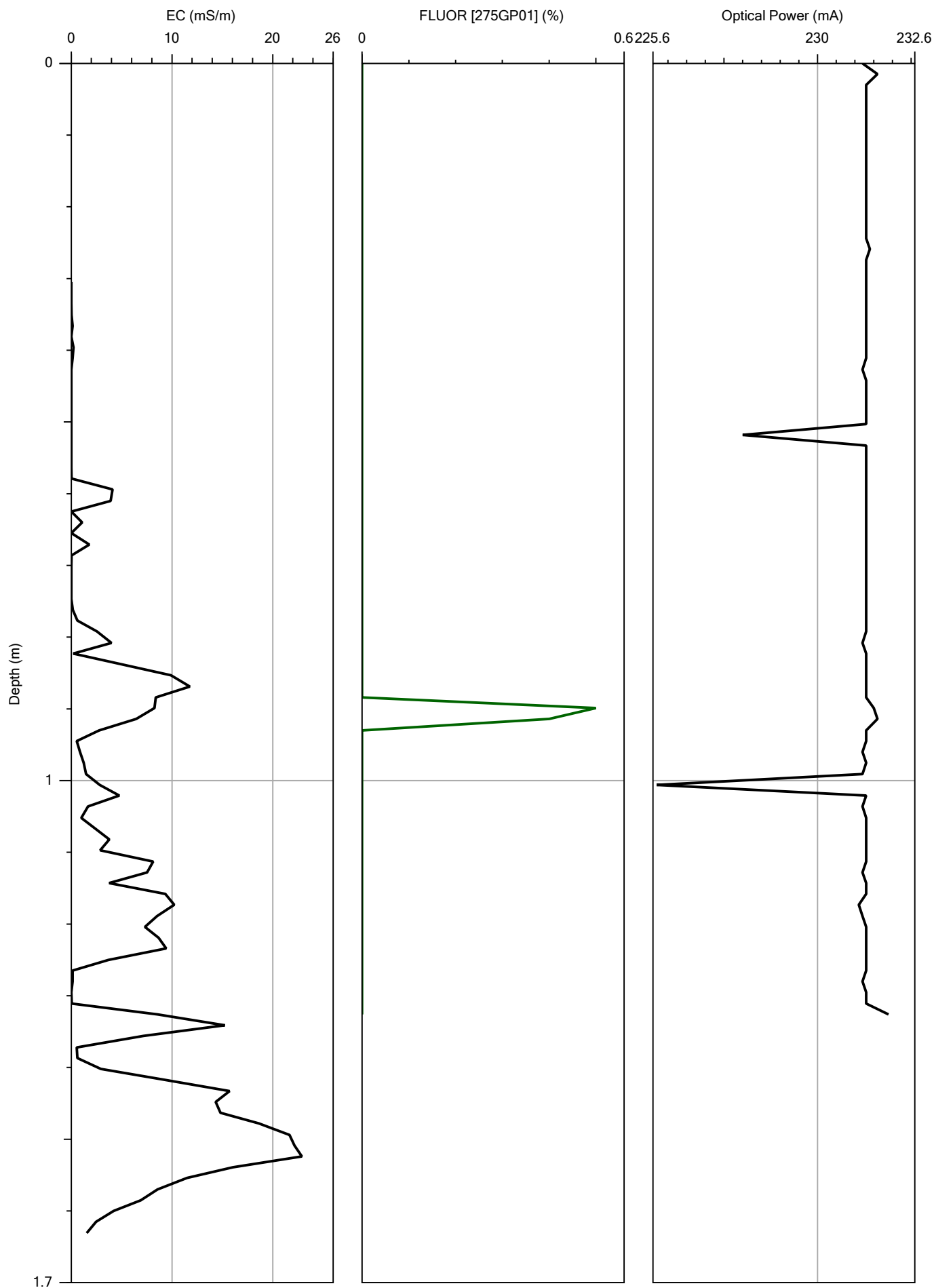


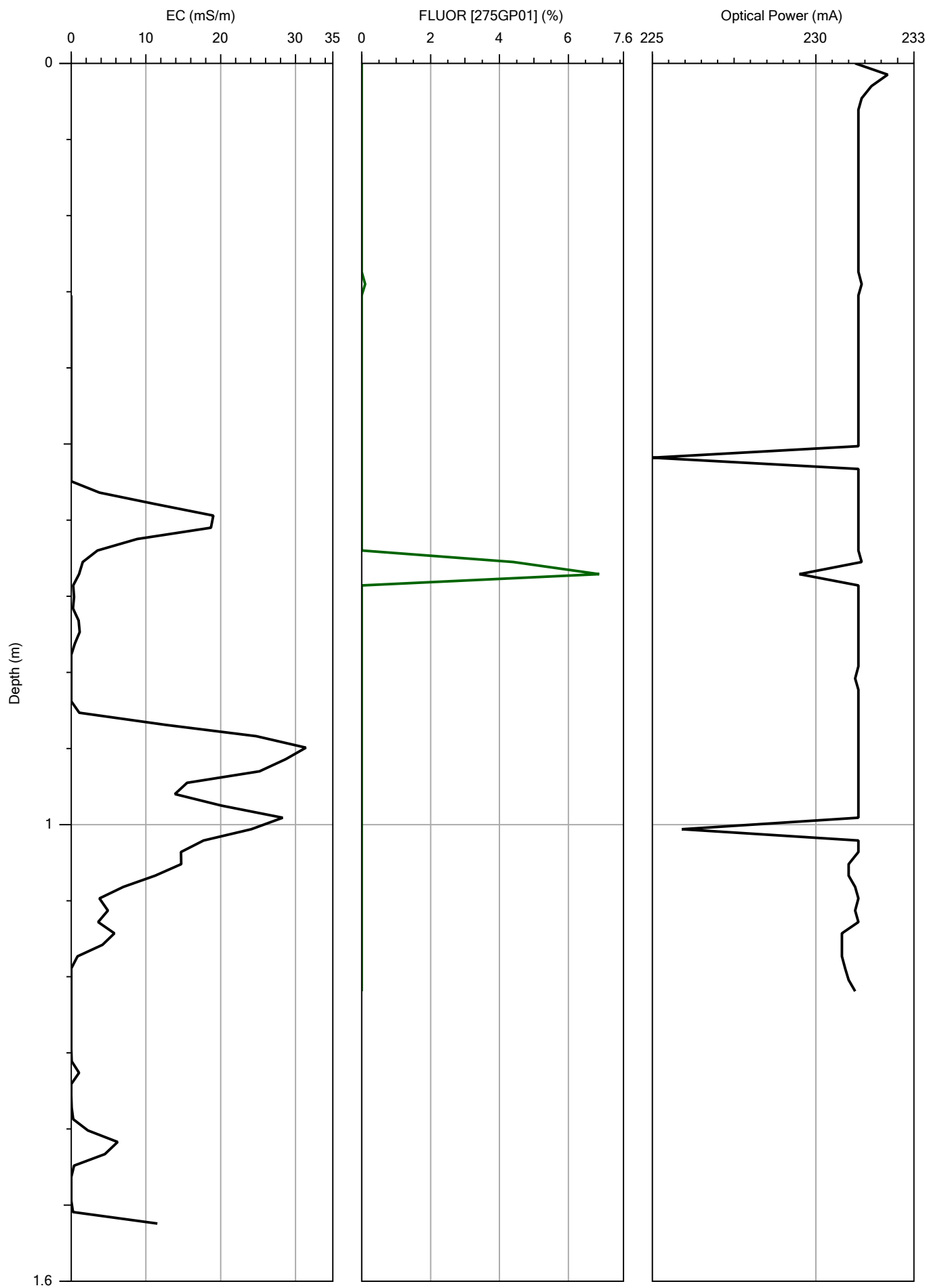


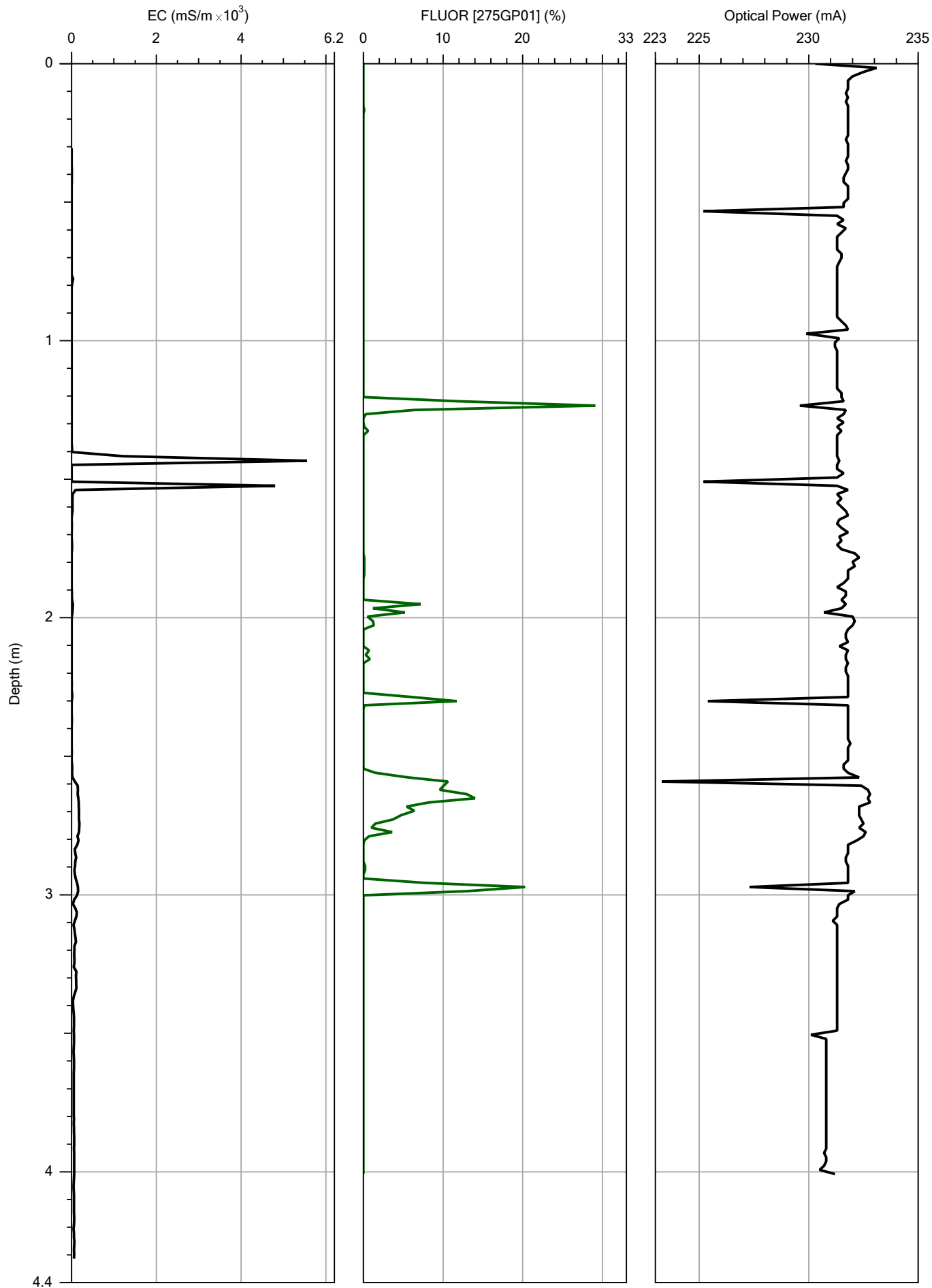


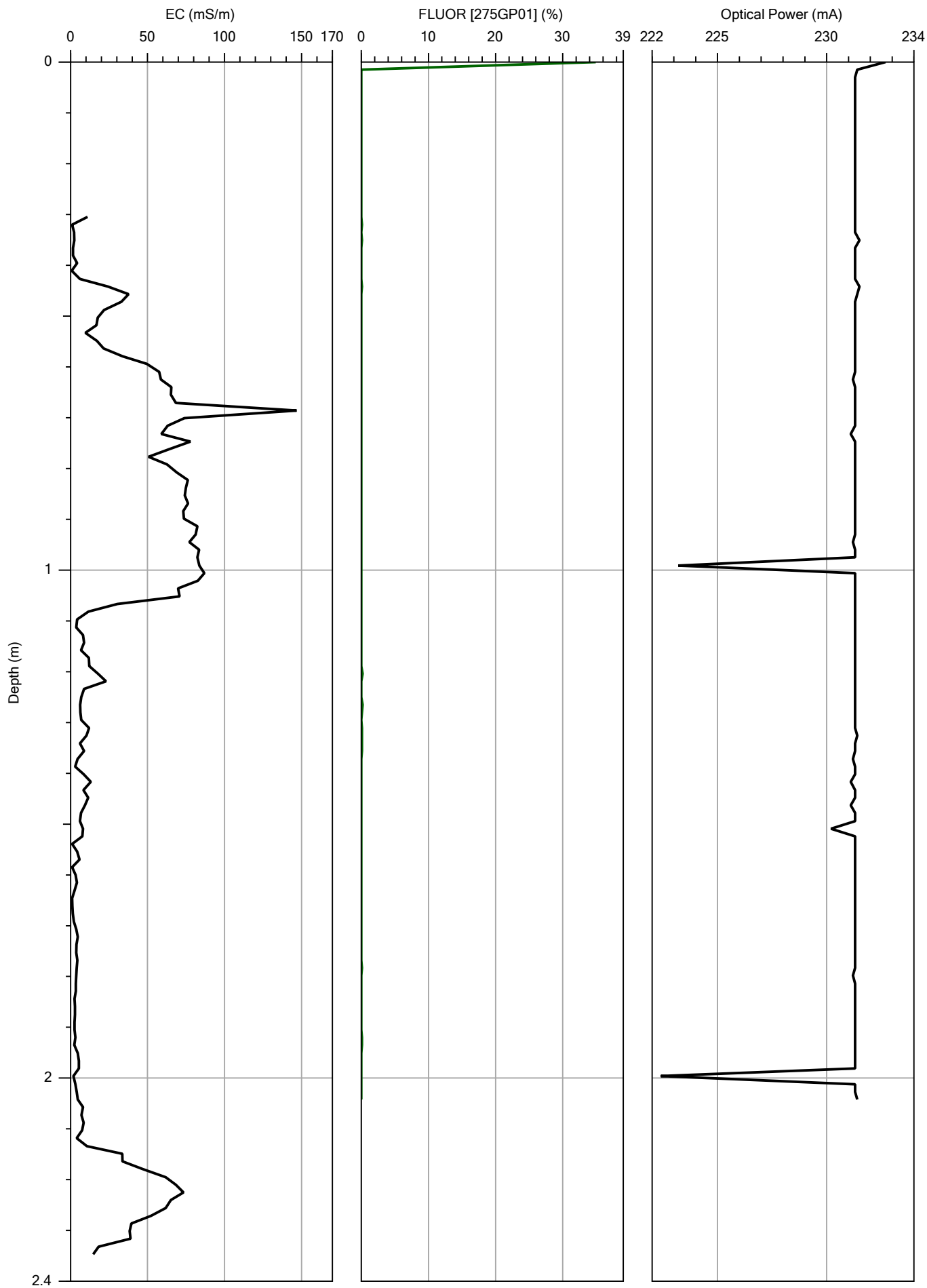




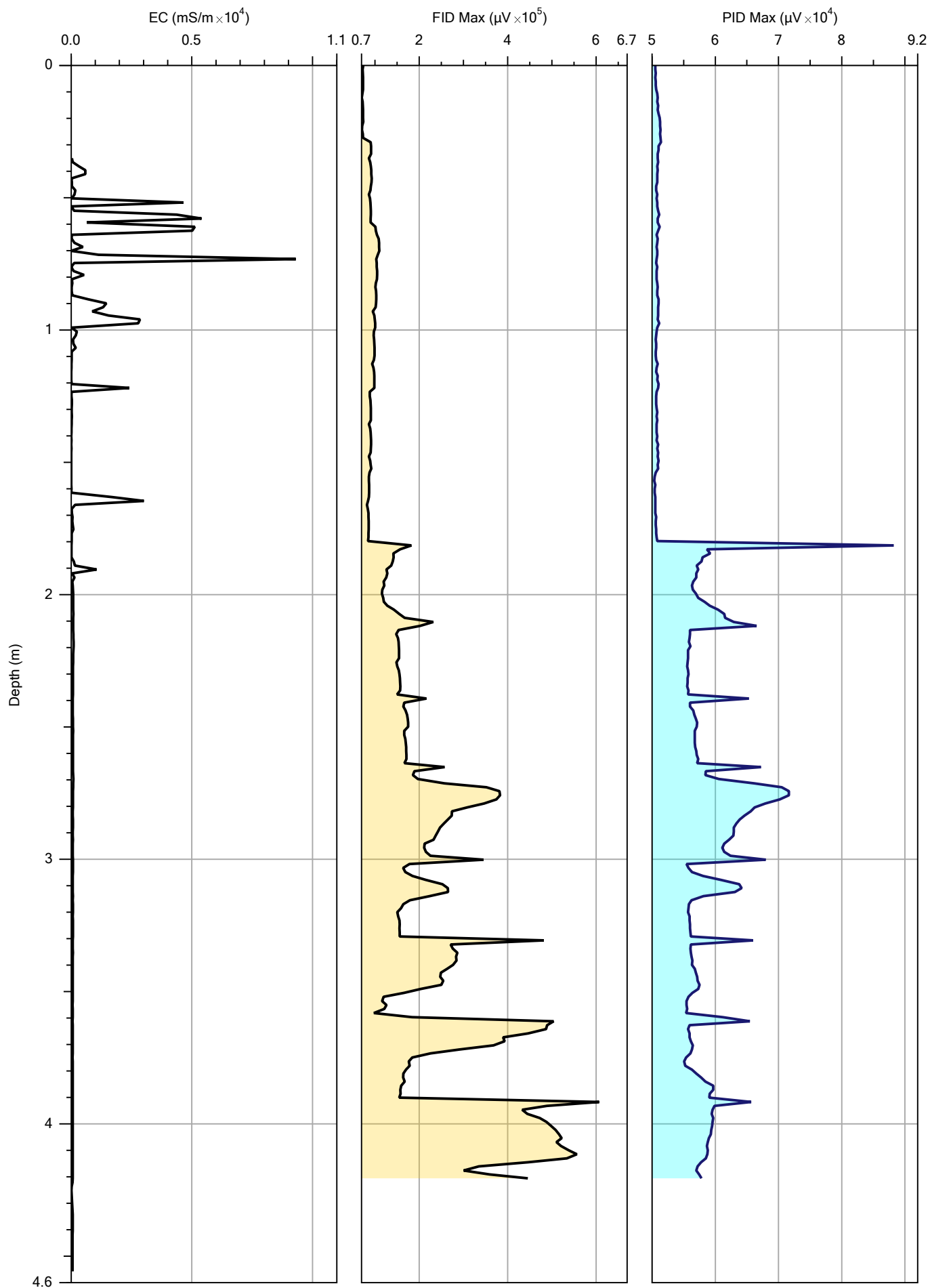


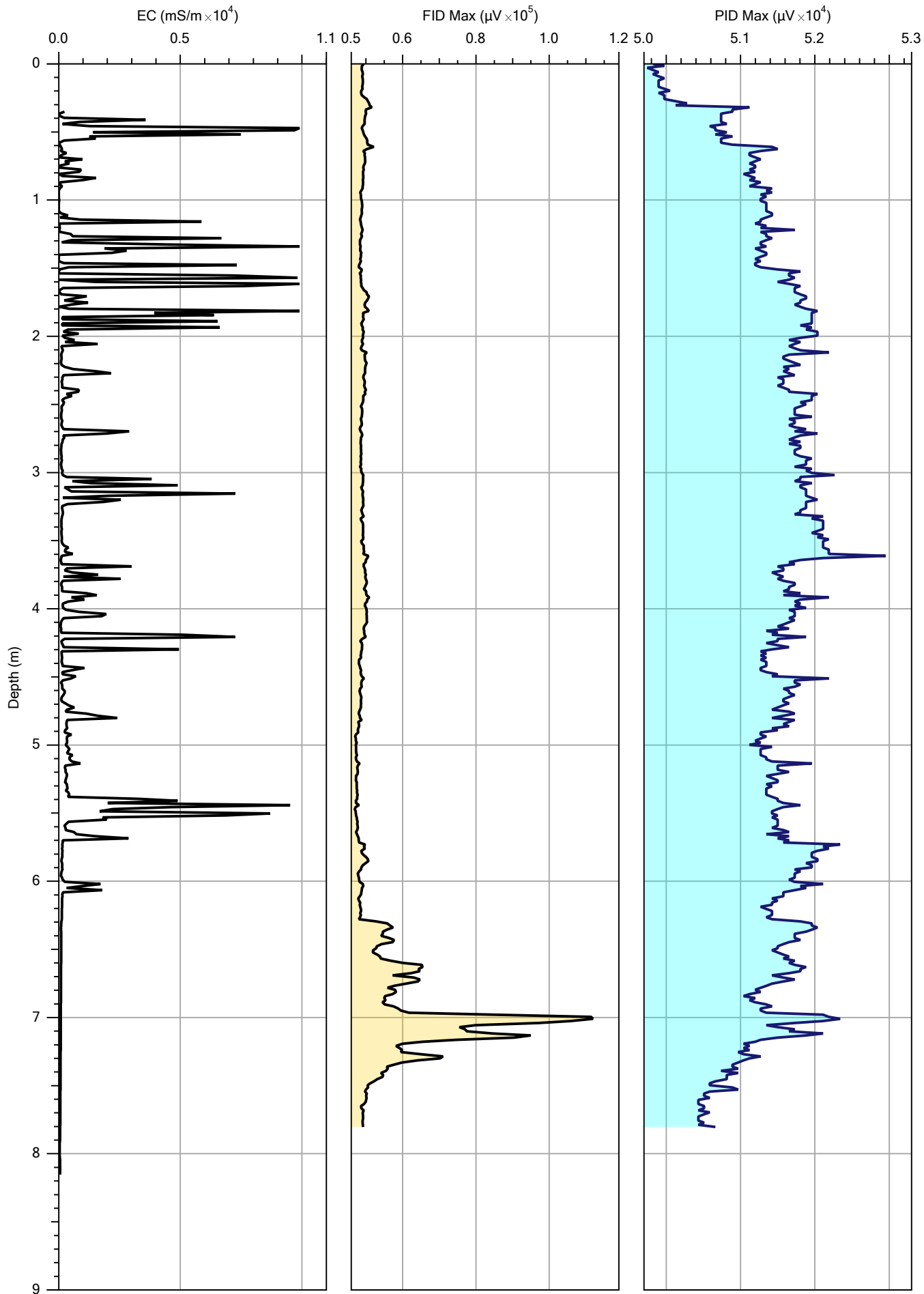


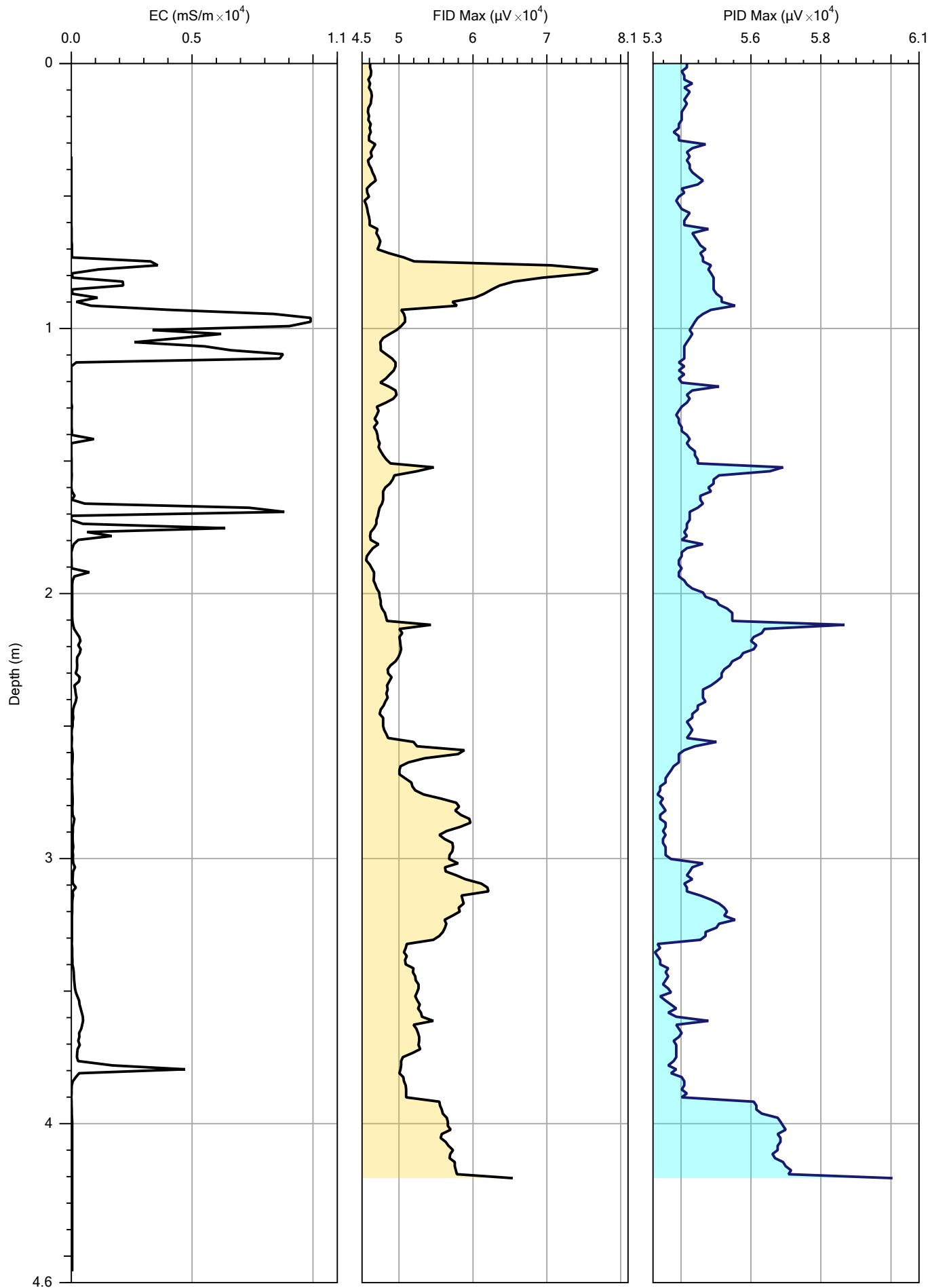


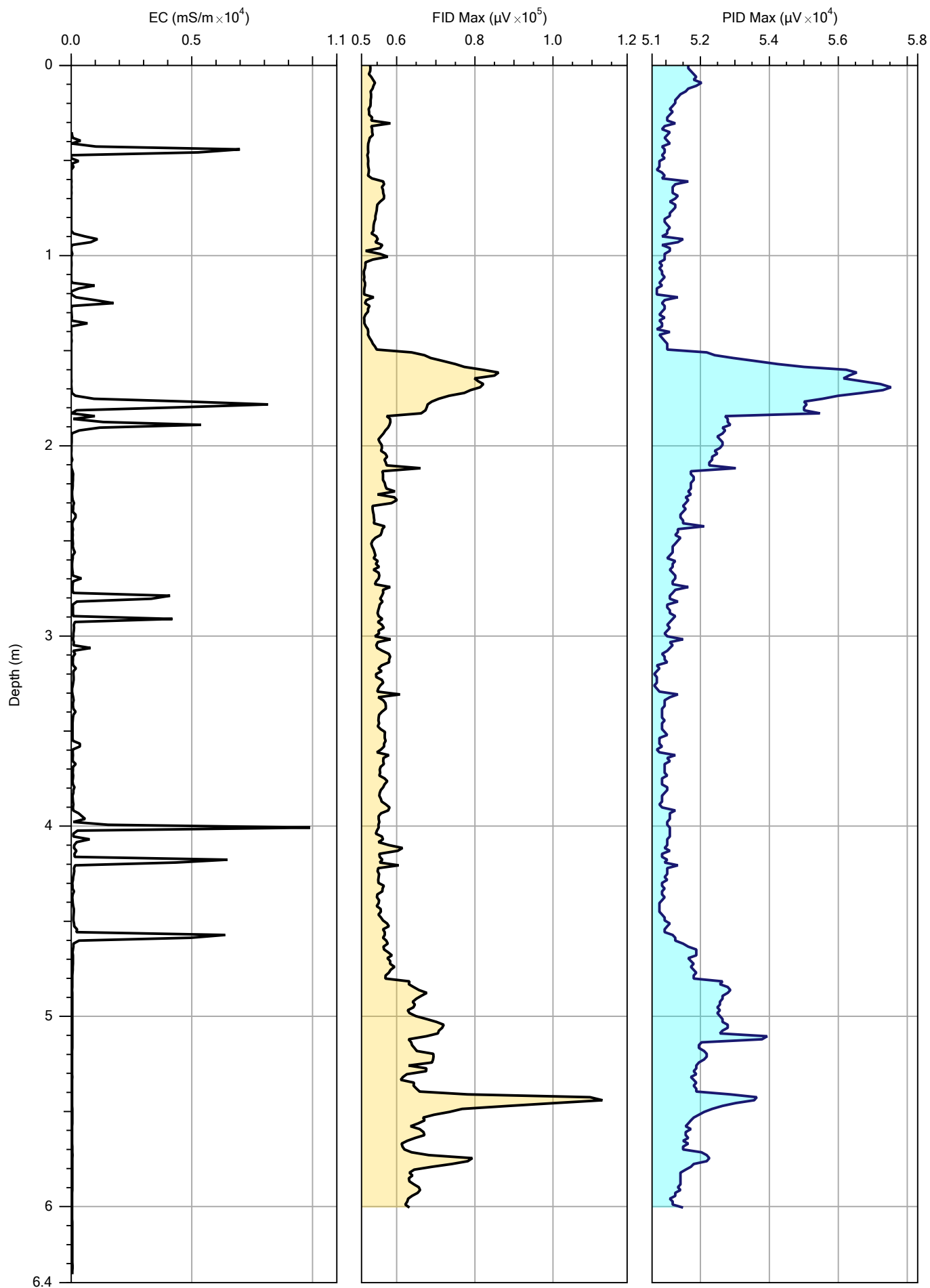


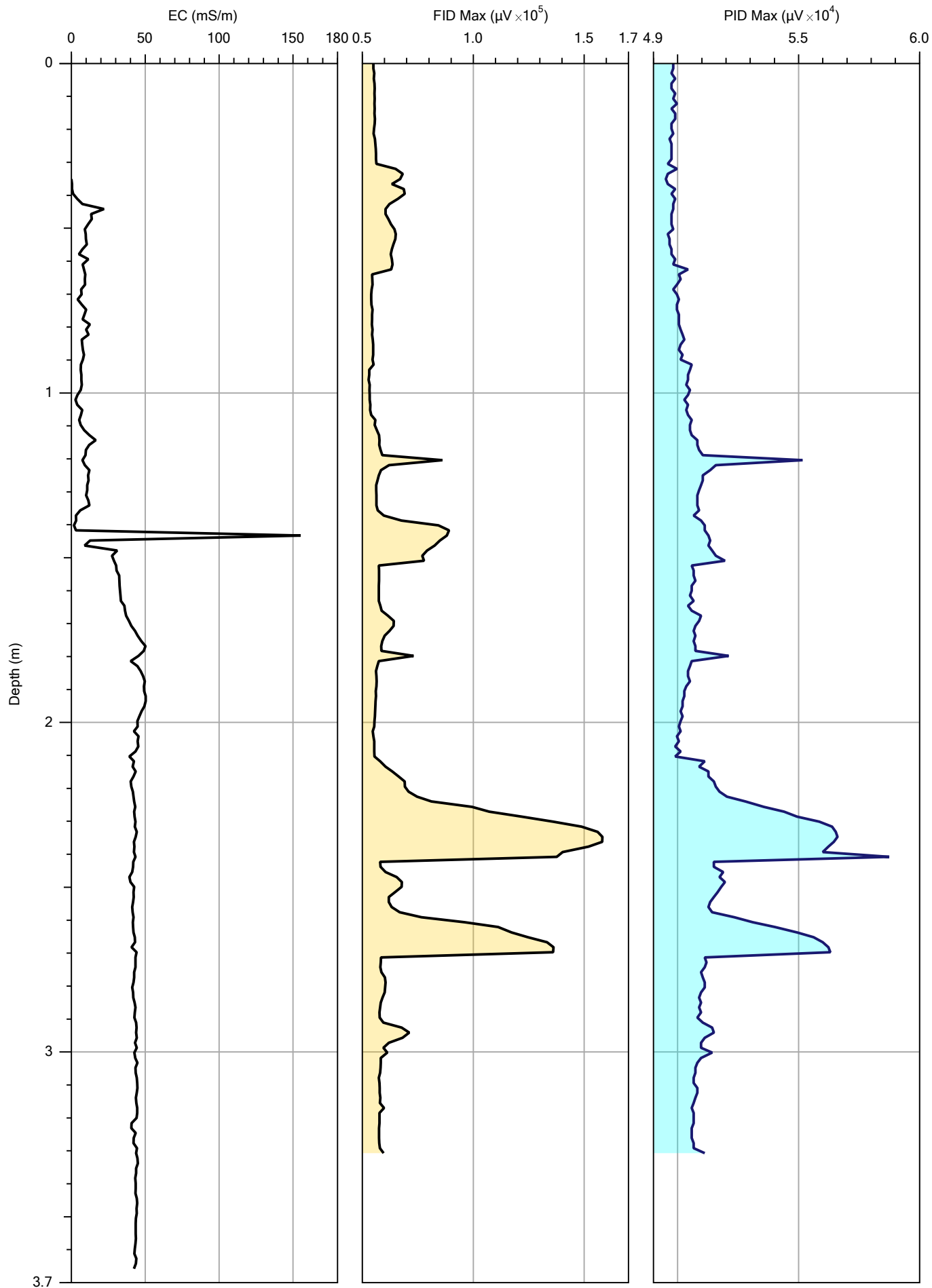
15.0 MIHPT PROFILES AND RESPONSE TESTING DATA

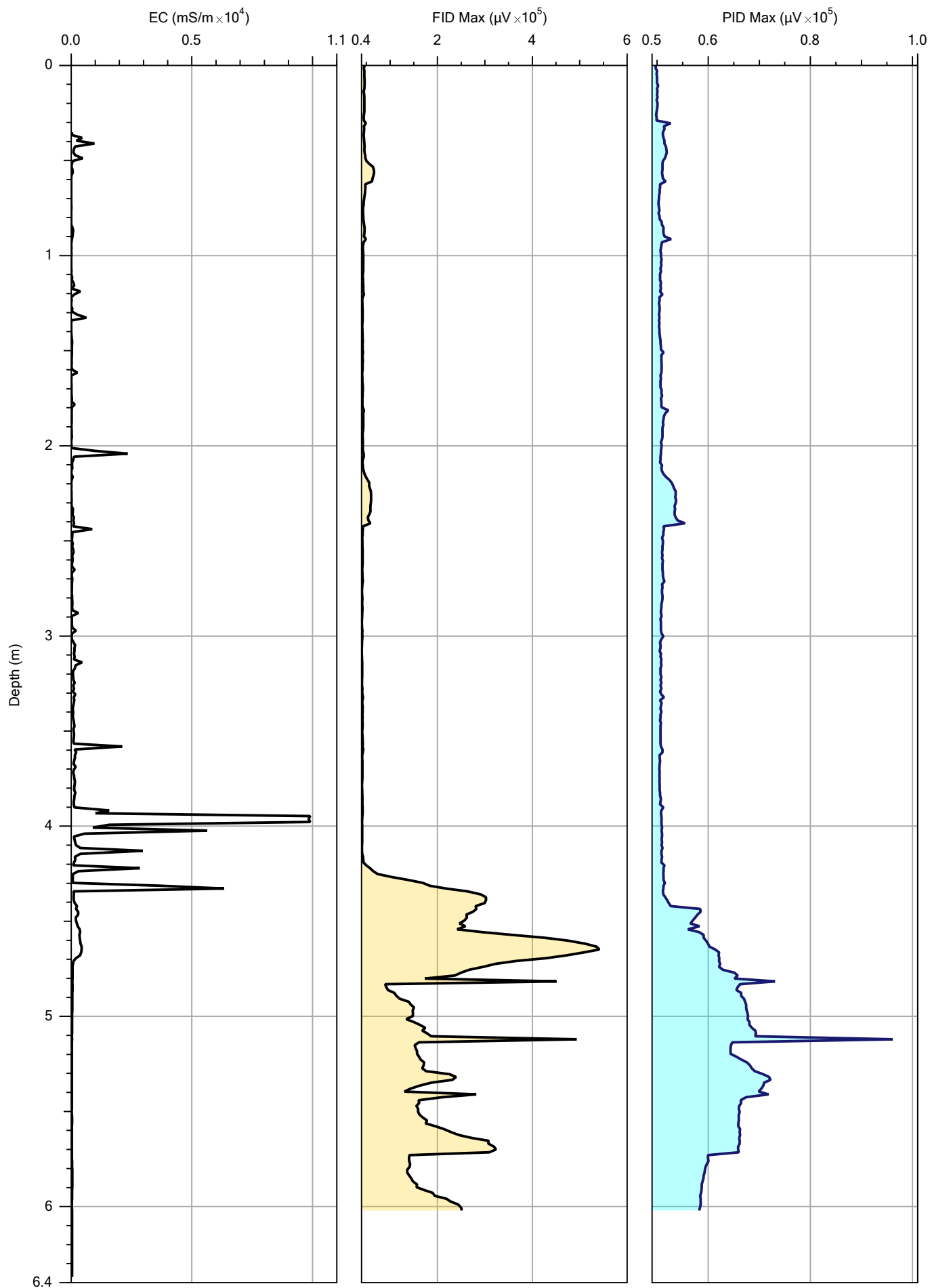


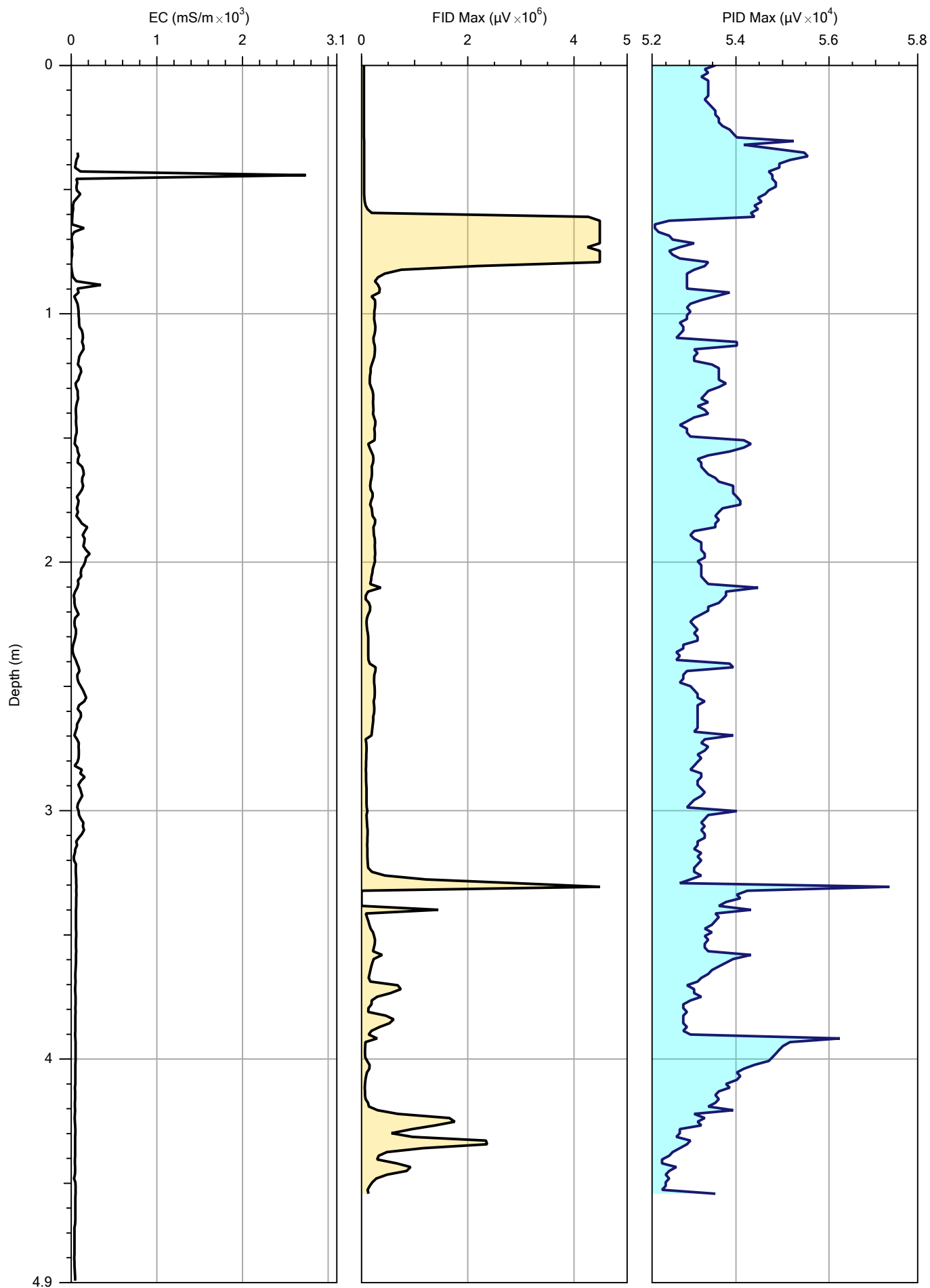


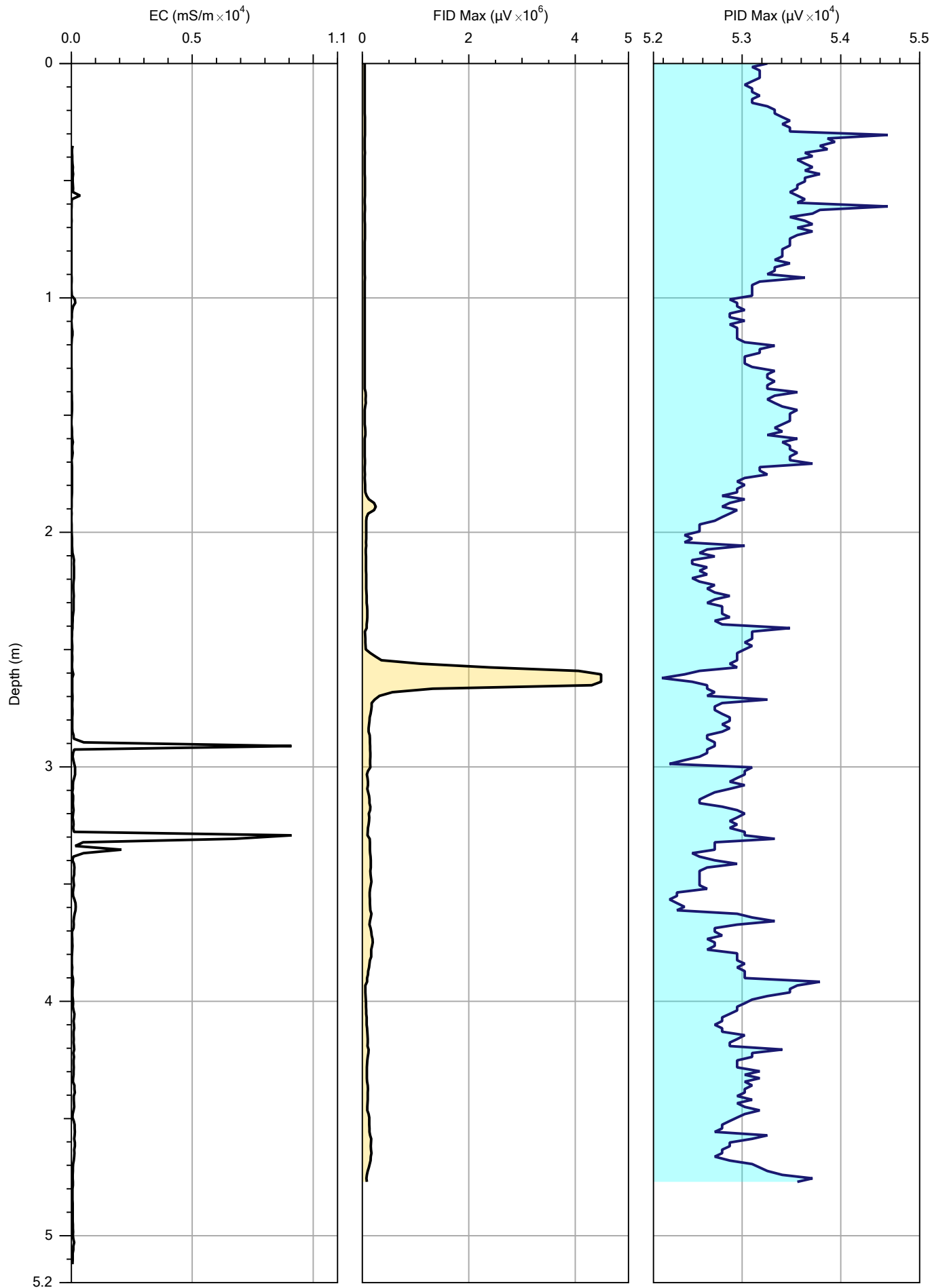


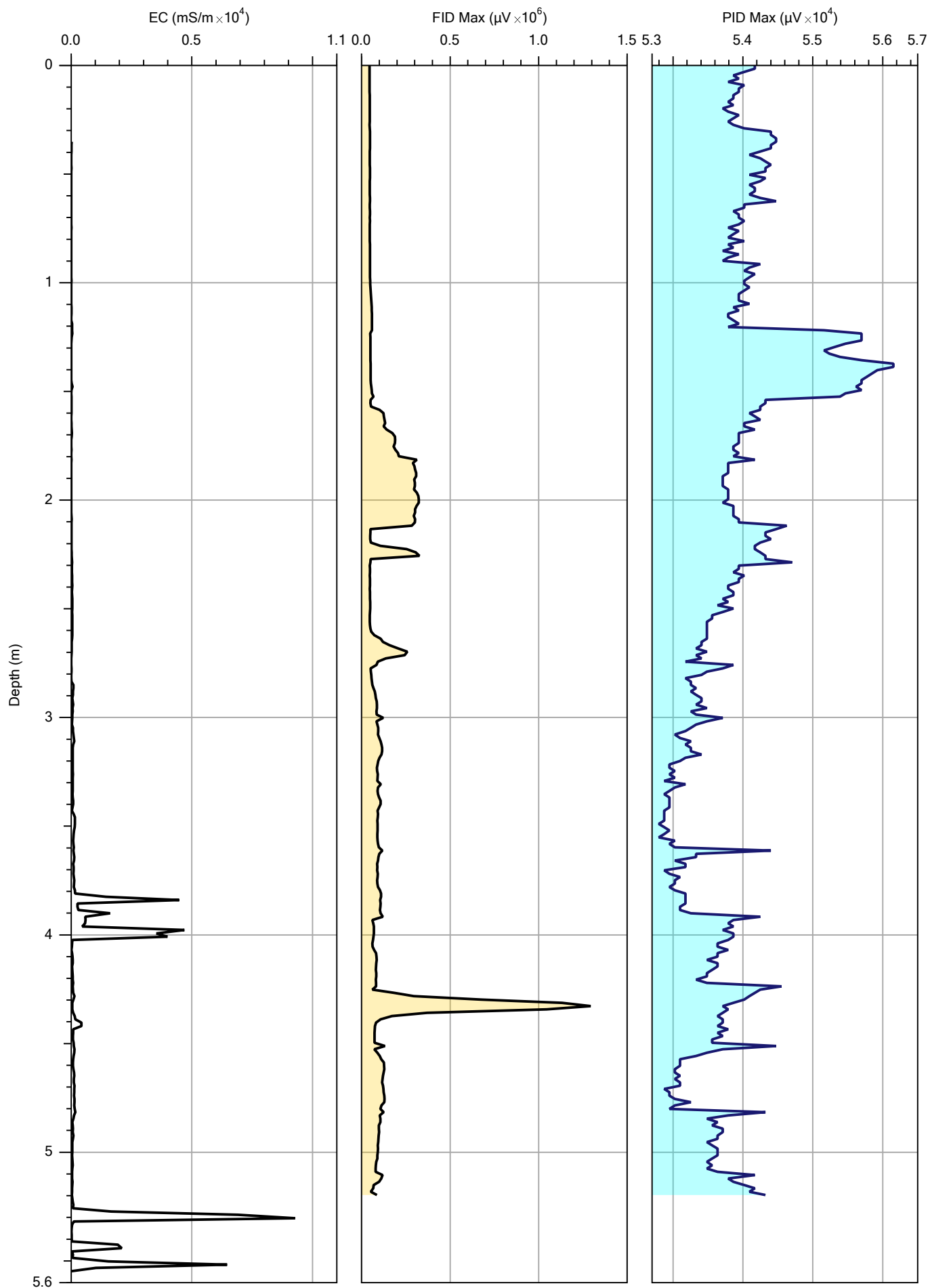


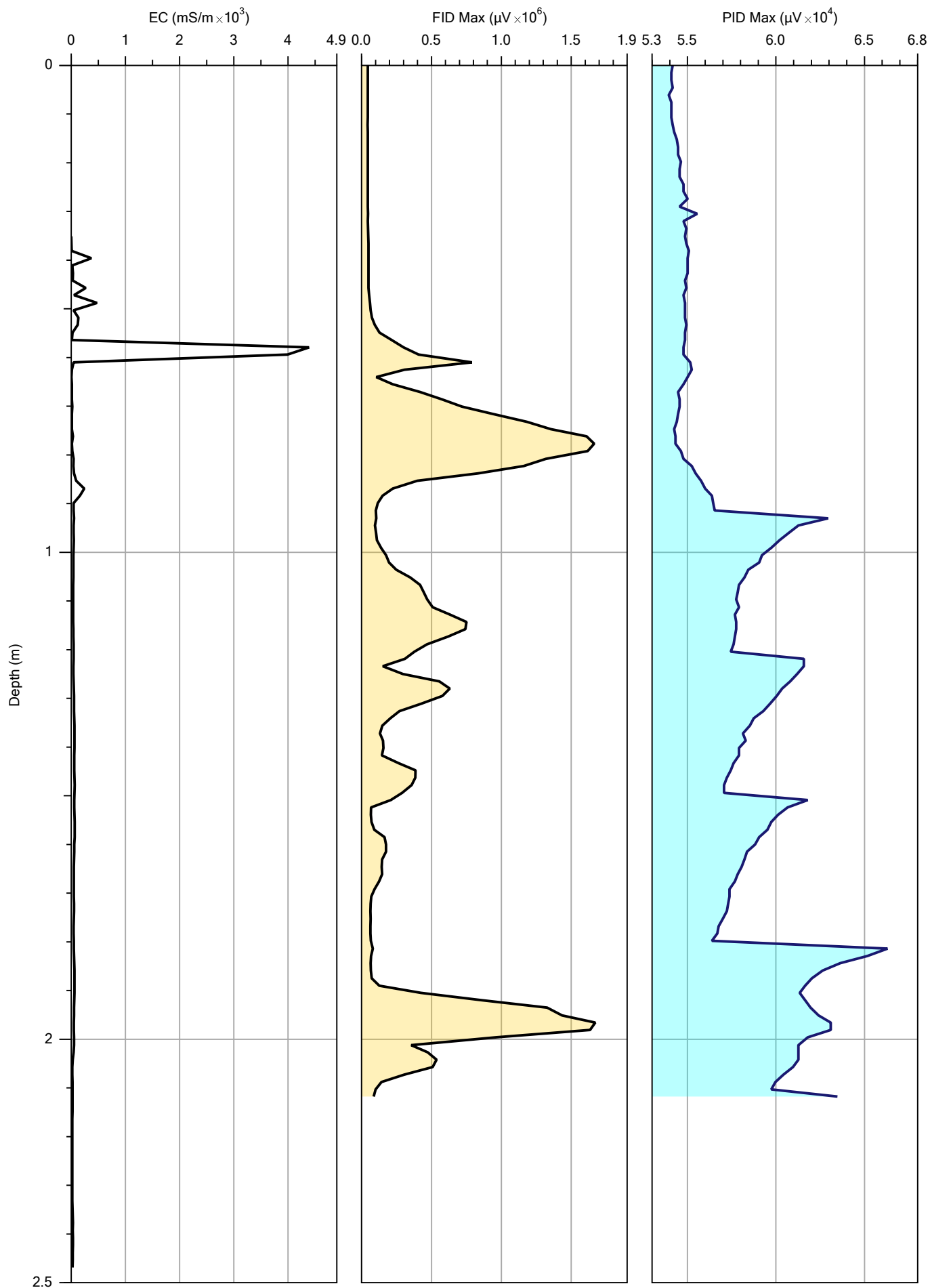


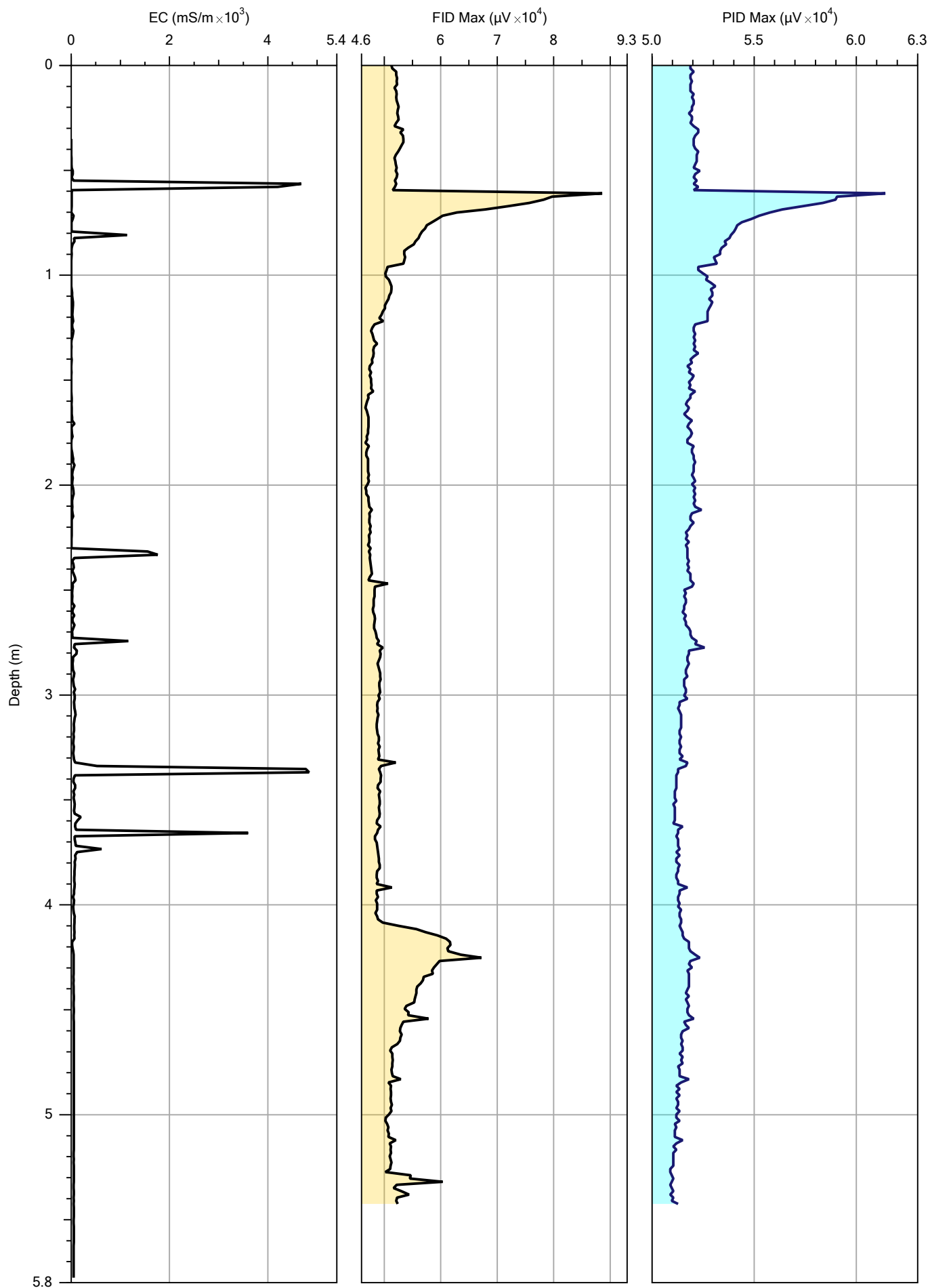


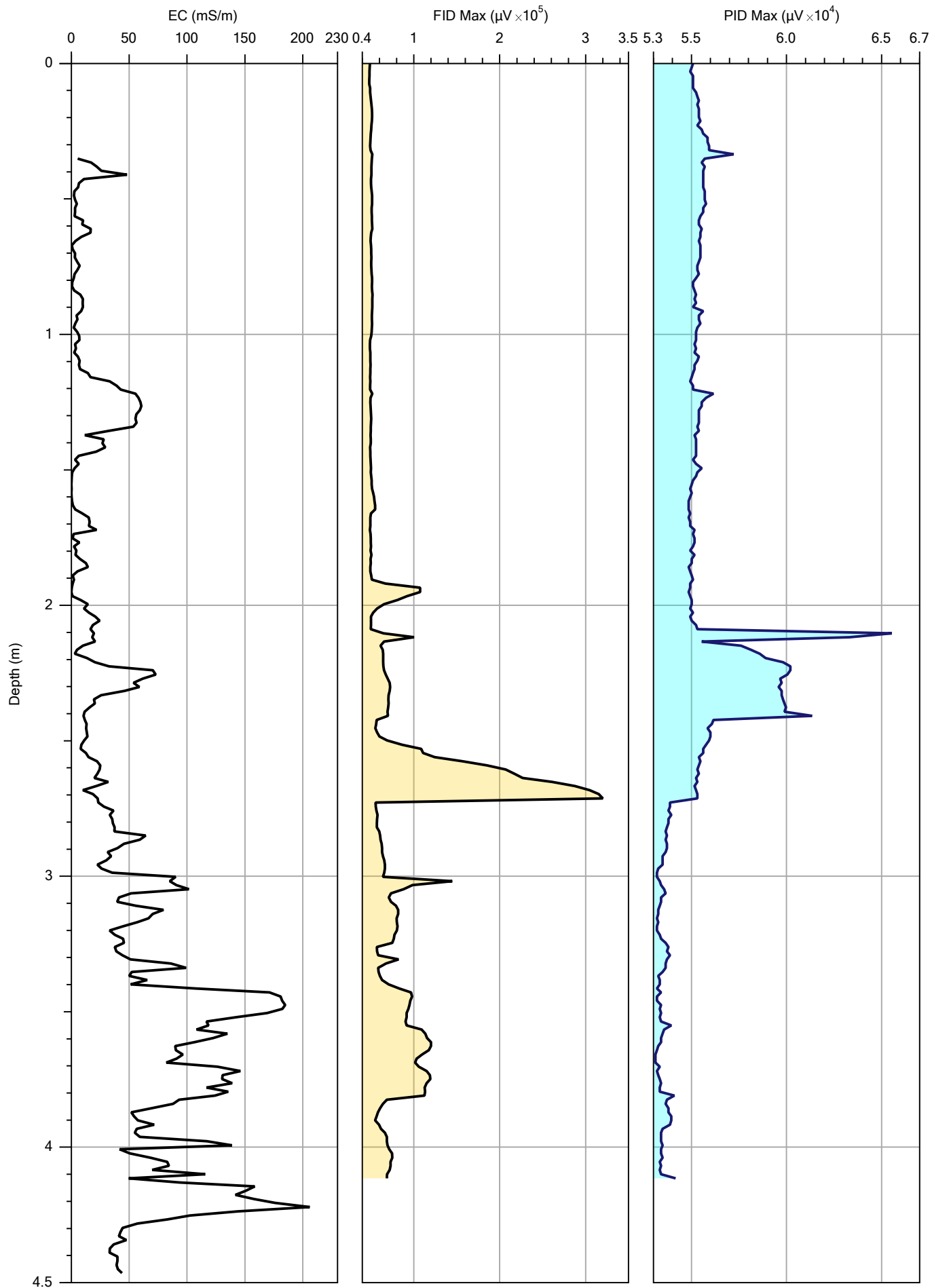


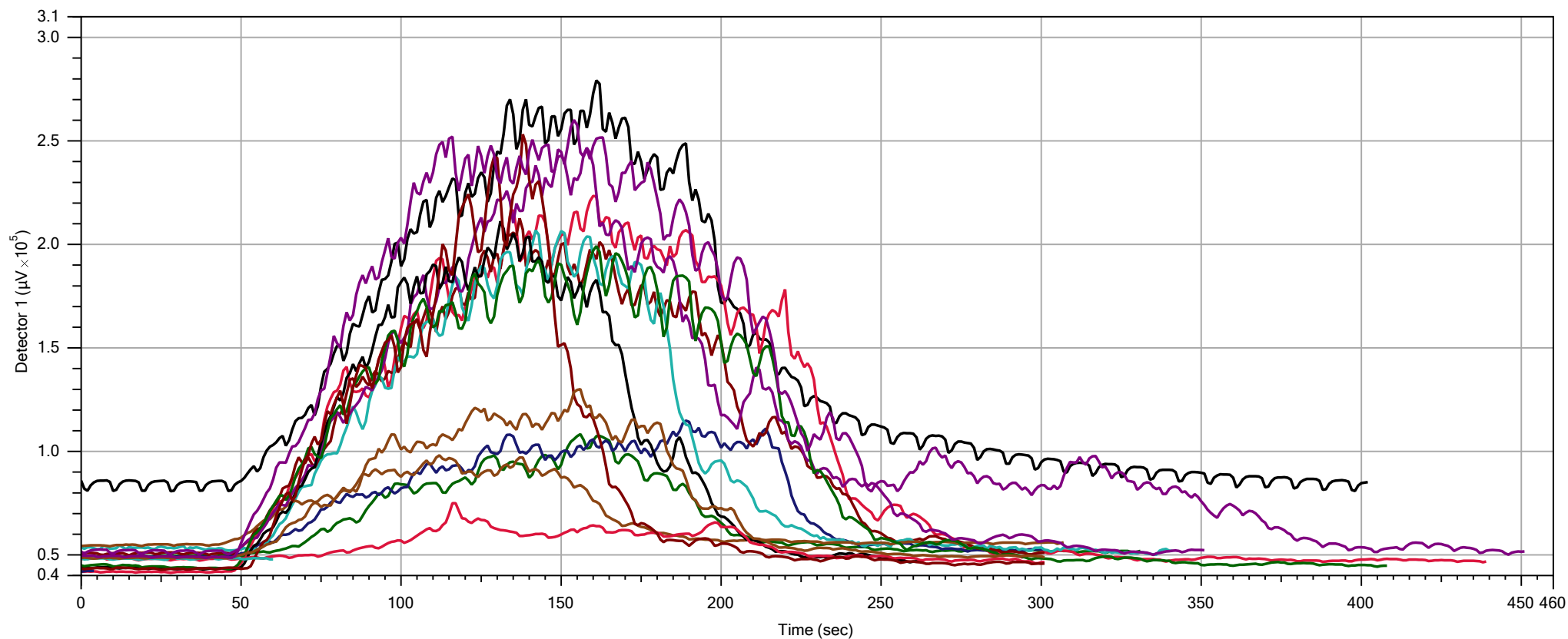










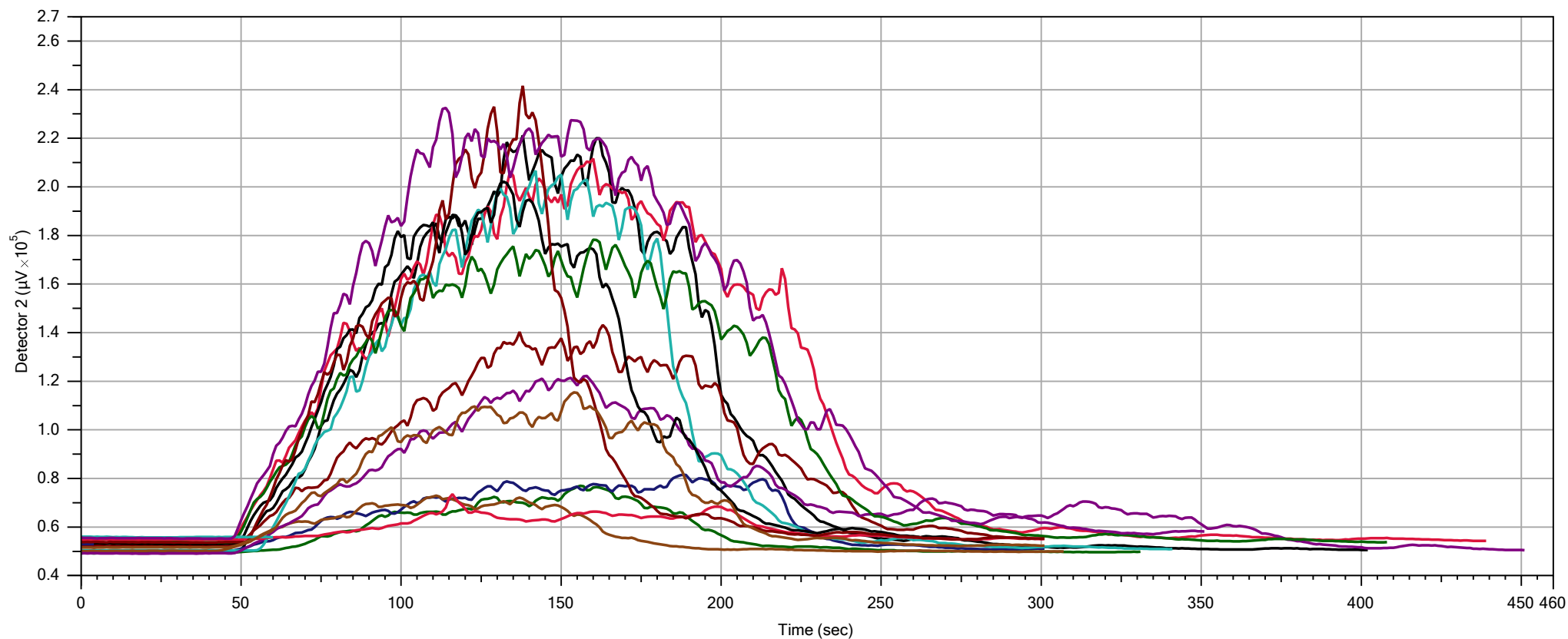


Filename	Date
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MIP04.PRE.TIM	06/08/2021
MIP04.POST.TIM	06/08/2021
MIP06.PRE.TIM	04/08/2021
MIP06.POST.TIM	04/08/2021
MIP10.PRE.TIM	06/08/2021
MIP13.PRE.TIM	06/08/2021
MIP15.PRE.TIM	04/08/2021
MIP17.PRE.TIM	04/08/2021
MIP18.PRE.TIM	04/08/2021
MIP18.POST.TIM	04/08/2021
MIP20.PRE.TIM	04/08/2021
MIP38.PRE.TIM	04/08/2021
MIP38.POST.TIM	04/08/2021
MIP46.PRE.TIM	06/08/2021
MIP48.PRE.TIM	04/08/2021

IN SITU
SITE INVESTIGATION

DETECTOR 1

Company:	In Situ Site Investigation	Operator:	Darren Hughes
Project ID:	1210414	Client:	Wardell Armstrong



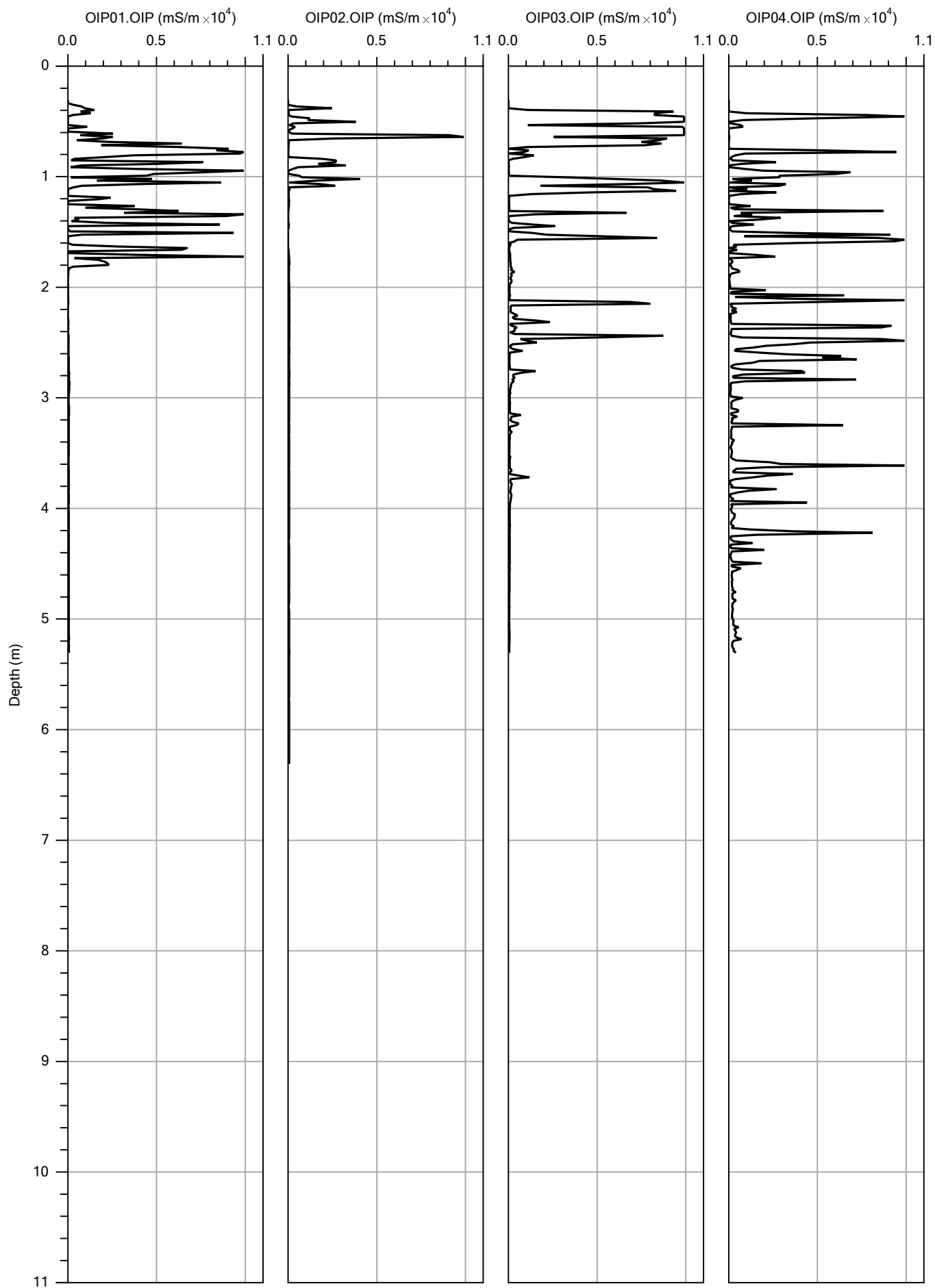
Filename	Date
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MIP06.POST.TIM	04/08/2021
MIP10.PRE.TIM	06/08/2021
MIP13.PRE.TIM	06/08/2021
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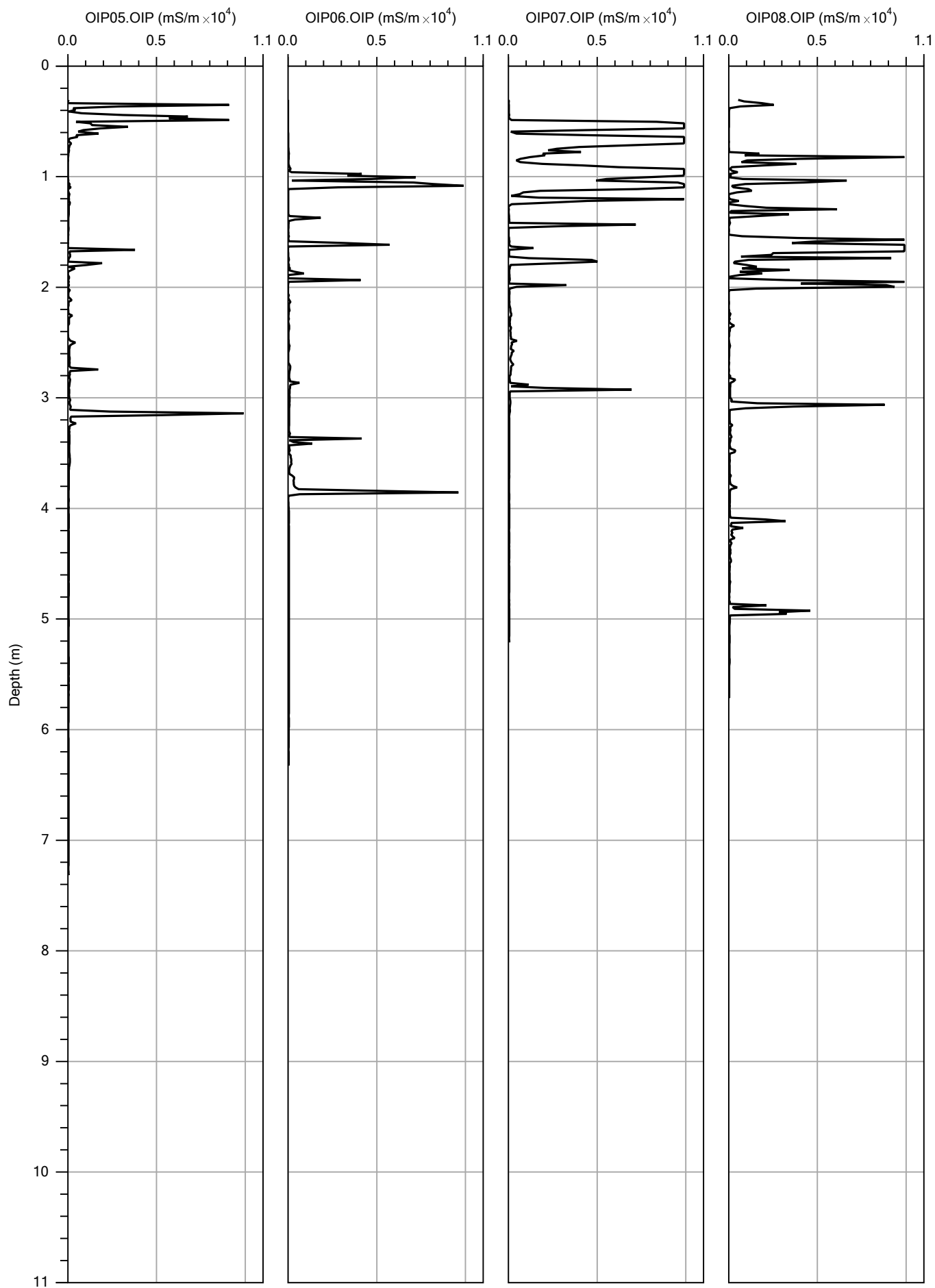
IN SITU
SITE INVESTIGATION

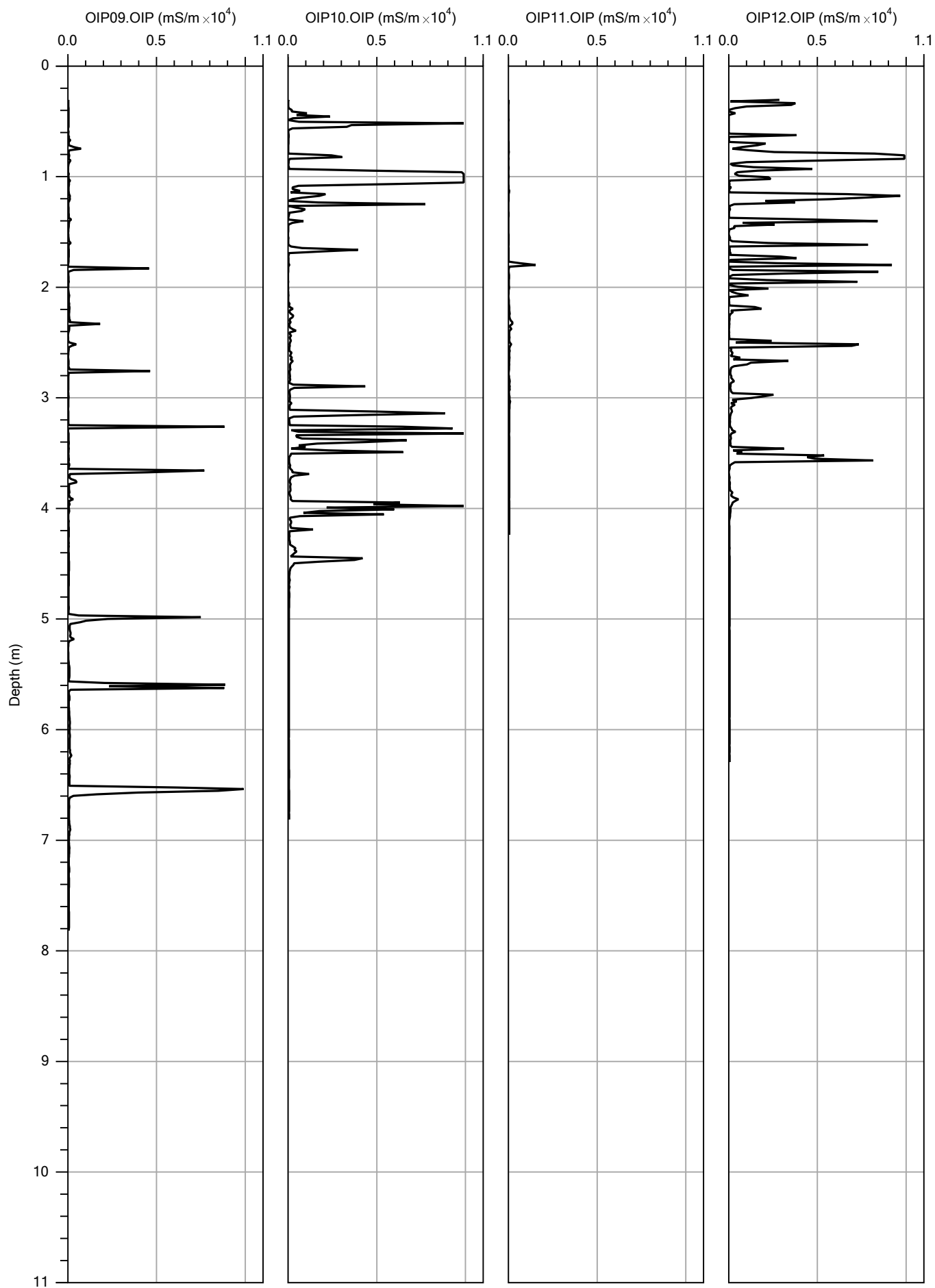
DETECTOR 2

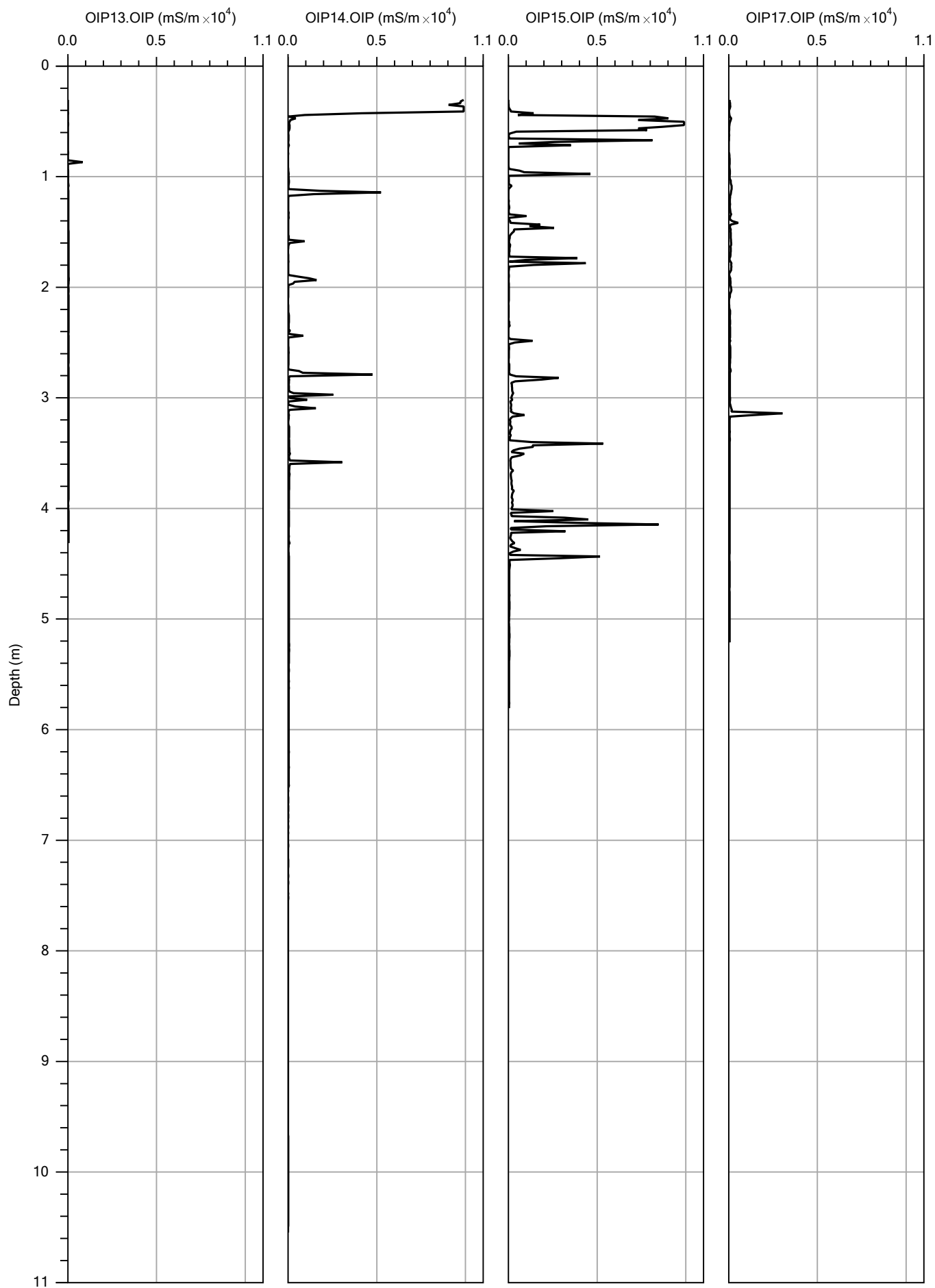
Company:	In Situ Site Investigation	Operator:	Darren Hughes
Project ID:	1210414	Client:	Wardell Armstrong

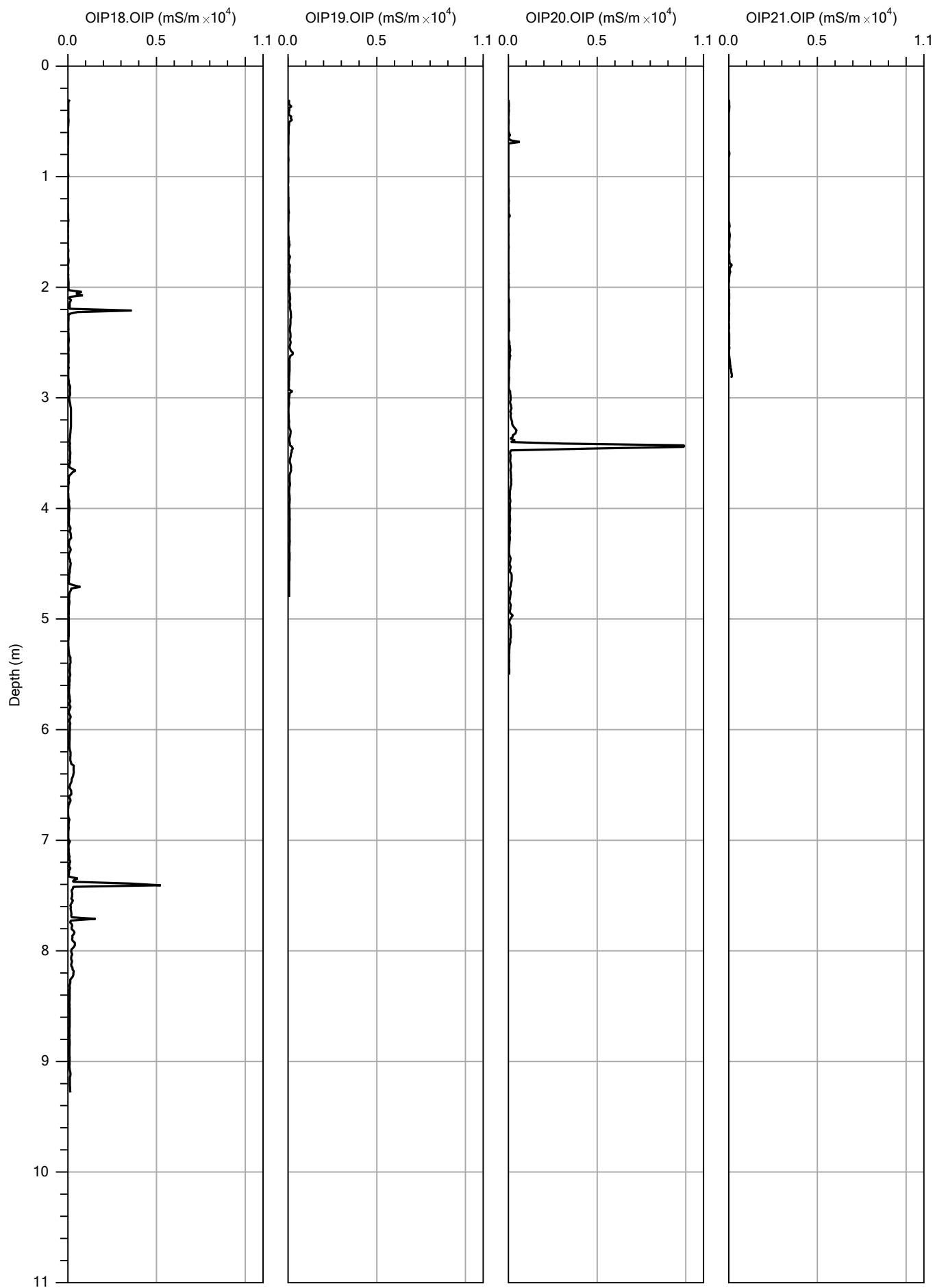
16.0 ELECTRICAL CONDUCTIVITY CROSS SECTIONS

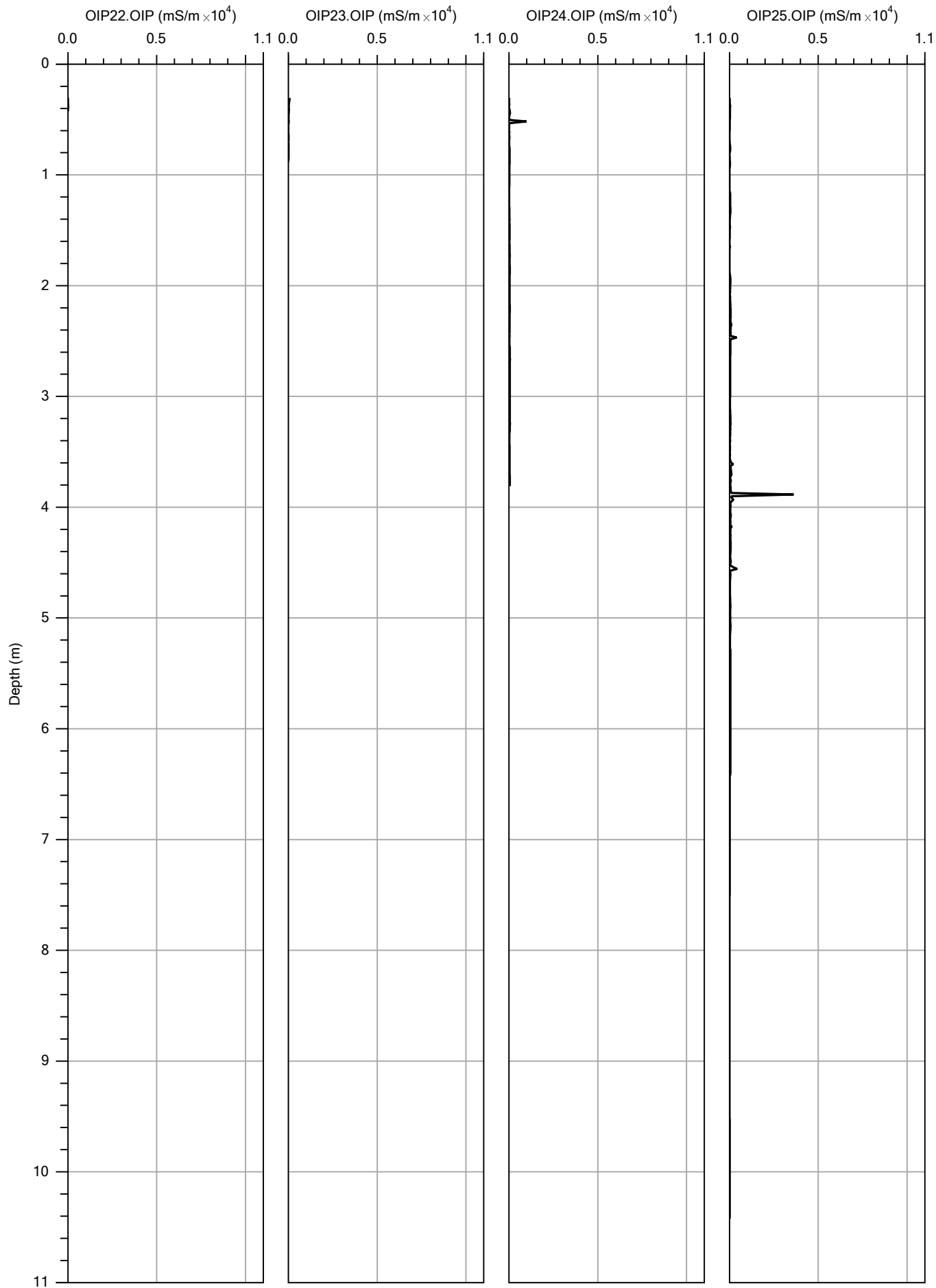


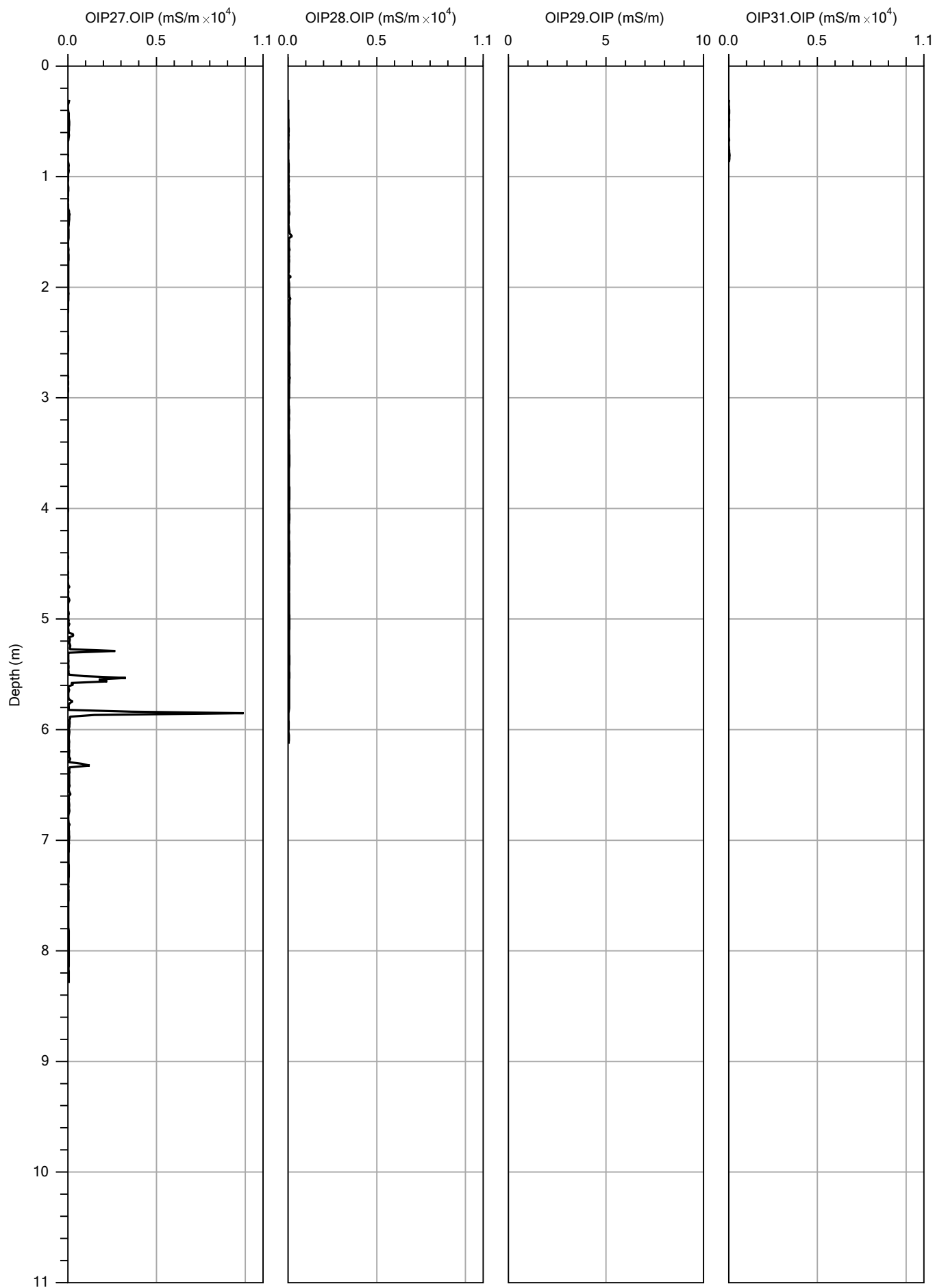


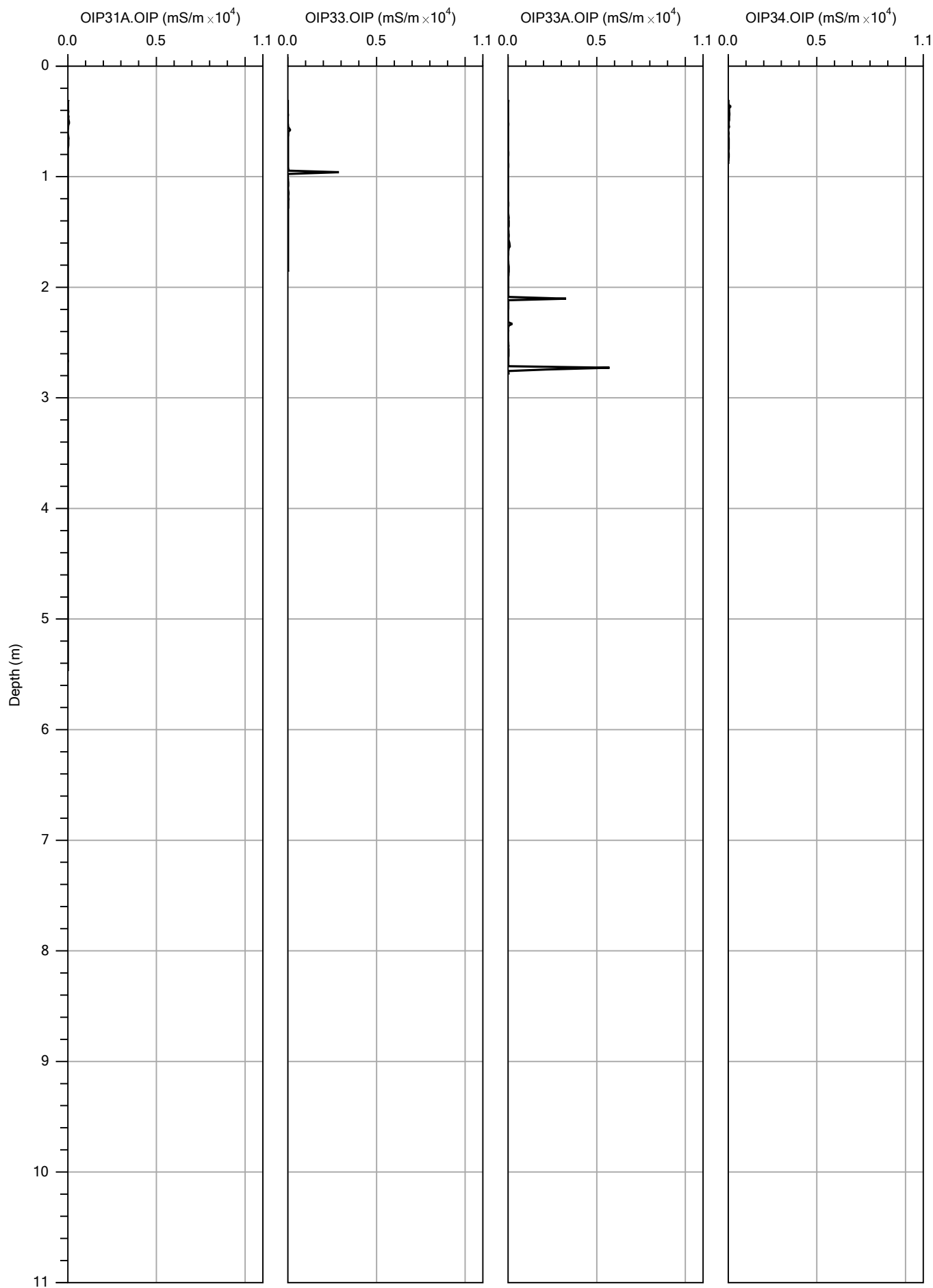


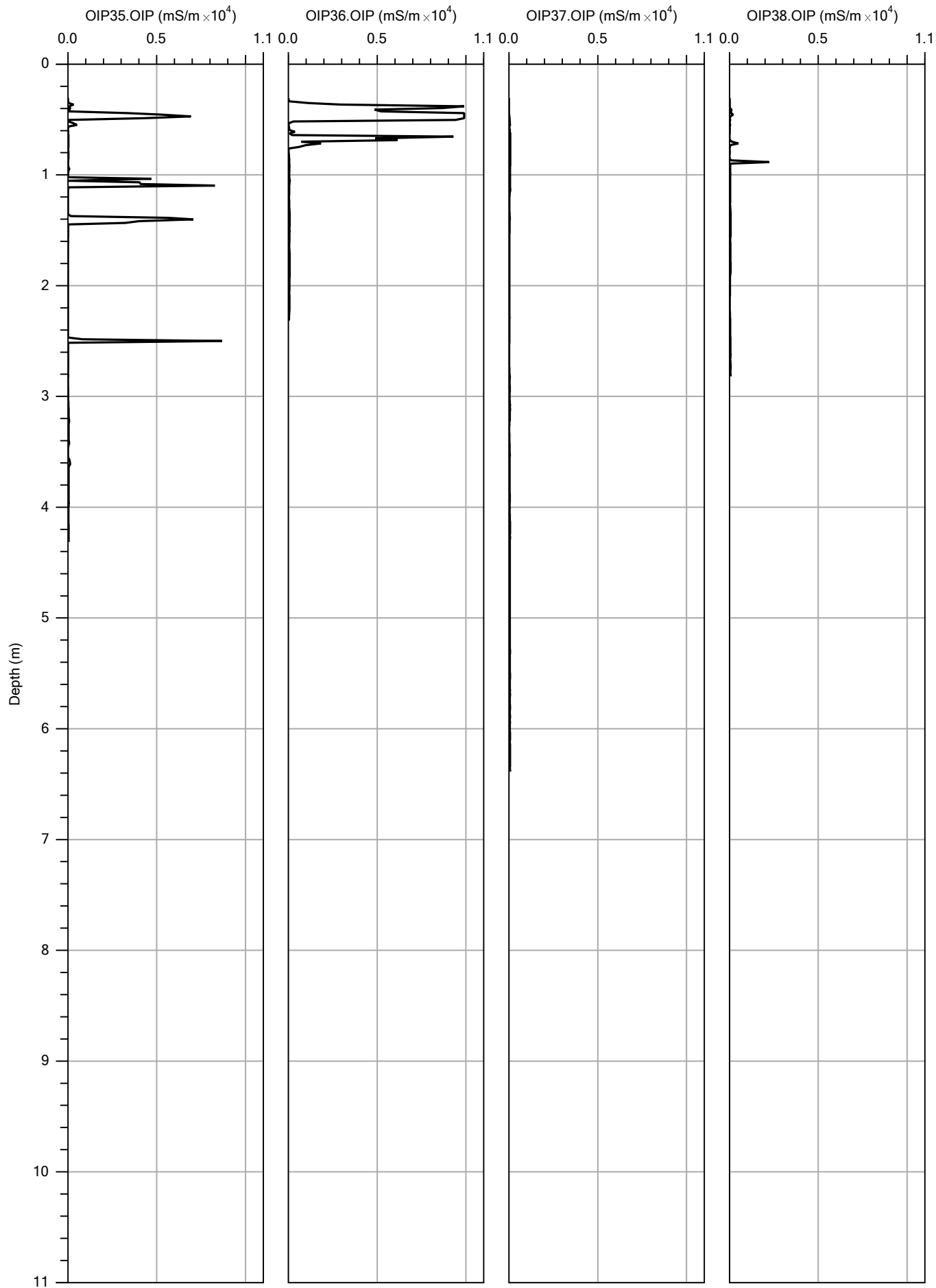


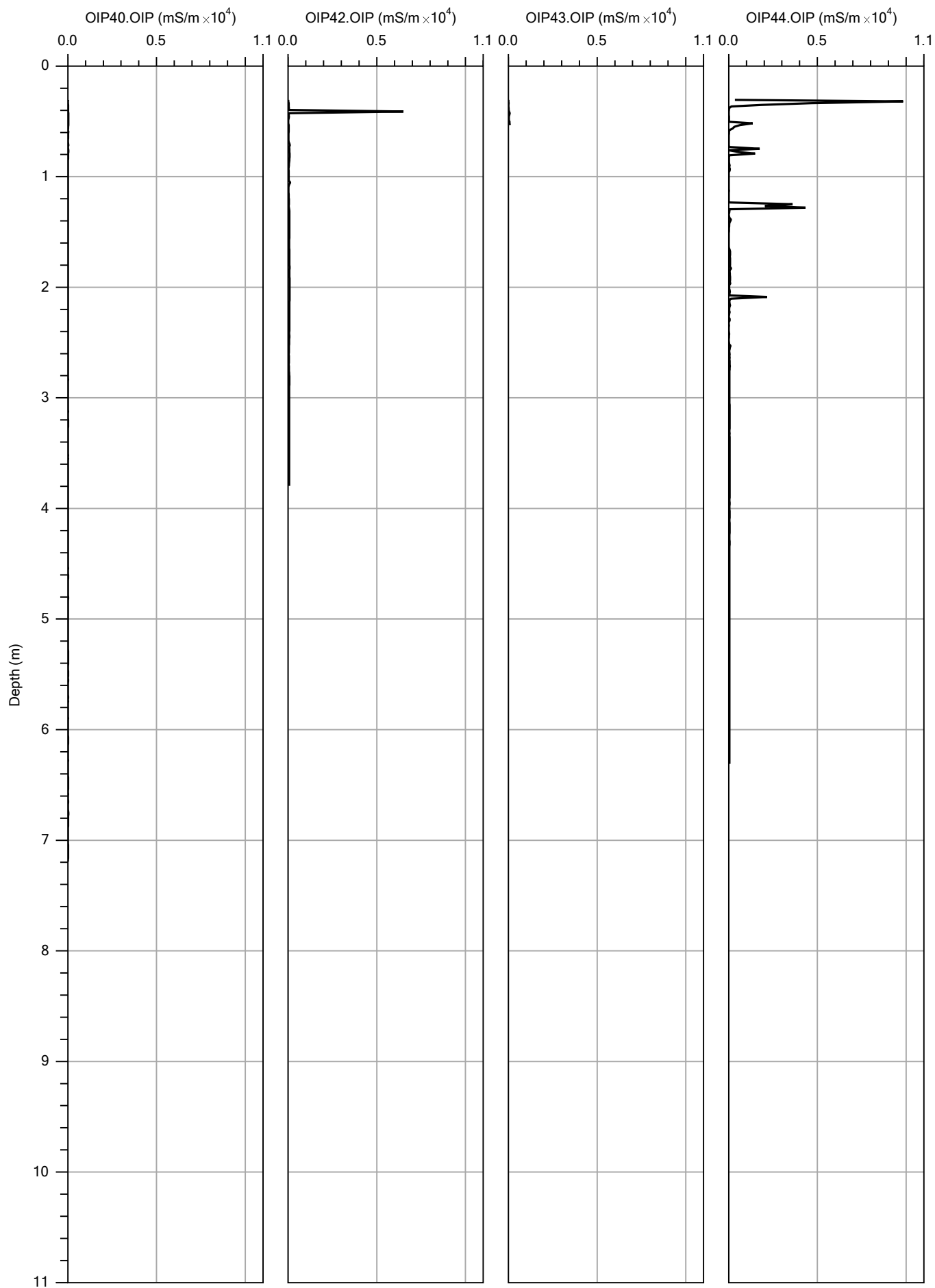


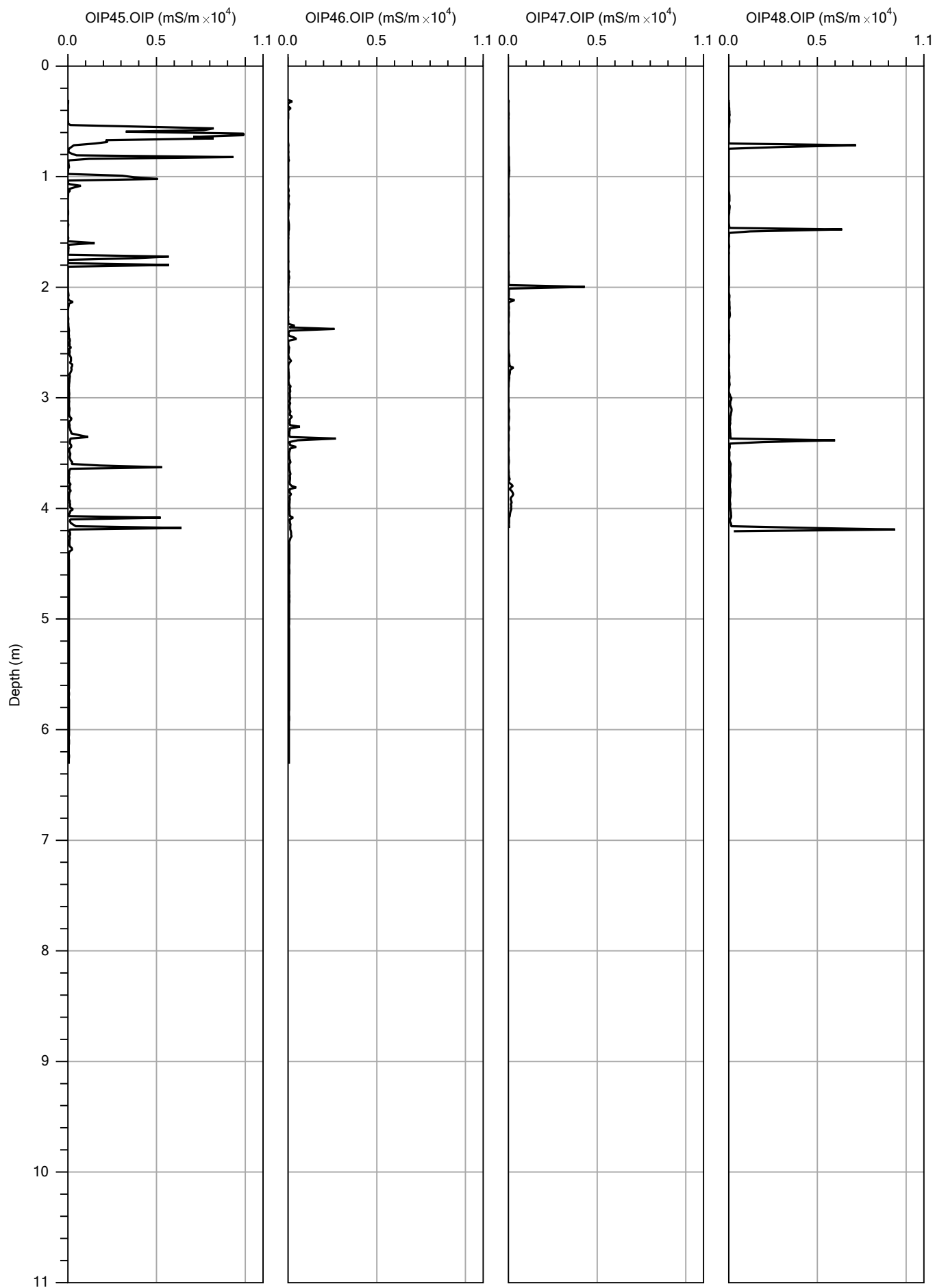


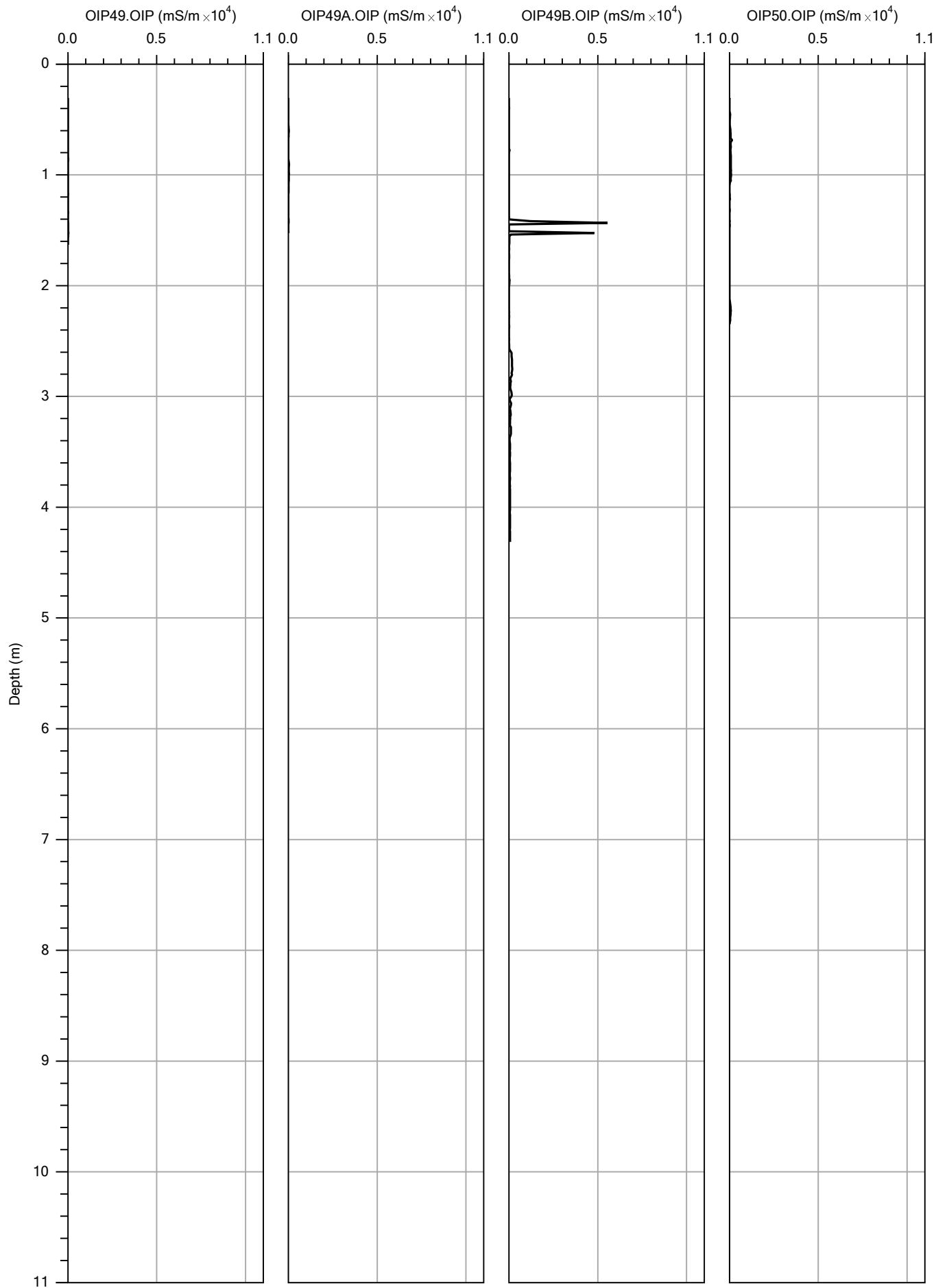












17.0 TABLE OF COMMONLY DETECTED COMPOUNDS BY MIP

Detectable Compounds by MIP

Wiki Website	Chemical Compound:	Boiling Point (oC)	Molecular Weight (g/mol)	Density (g/mL)	Ionization Potential (eV)	Solubility in Water g/L	Vapor Pressure kPa @25C	Analytes Detected By			
								PID* 10.6eV	FID**	XSD	ECD***
https://en.wikipedia.org/wiki/Methane	Methane	-161	16.0	.657 g/L	12.61	0.02	-	n	y	n	n
https://en.wikipedia.org/wiki/Dichlorodifluoromethane	Freon 12 (Dichlorodifluoromethane)	-29.8	120.9	1.486	12.31	0.3	568.0	n	y	y	LS****
https://en.wikipedia.org/wiki/1,2-Trichloro-1,2,2-trifluoroethane	Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)	47.7	187.4	1.564	11.78	0.17	285mm Hg	n	y	y	y
https://en.wikipedia.org/wiki/Vinyl_chloride	Vinyl Chloride (Chloroethene)	-13.0	62.5	0.910	10.00	2.7	2580mm Hg	y	y	y	LS
https://en.wikipedia.org/wiki/Bromomethane	Bromomethane	3.6	94.9	3.974	10.53	17.5	190.0	n	y	y	LS
https://en.wikipedia.org/wiki/Chloroethane	Chloroethane	12.3	64.5	0.901	10.97	5.74	134.6	n	y	y	LS
https://en.wikipedia.org/wiki/Trichlorofluoromethane	Freon 11 (Trichlorofluoromethane)	23.8	137.4	1.494	11.77	1.1	89.0	n	y	y	y
https://en.wikipedia.org/wiki/Acetone	Acetone	56.5	58.1	0.790	9.69	Miscible	30.6	y	y	n	n
https://en.wikipedia.org/wiki/1,1-Dichloroethene	1,1-Dichloroethene	32.0	97.0	1.213	9.65	0.04%	-	y	y	y	LS
https://en.wikipedia.org/wiki/Dichloromethane	Methylene Chloride (Dichloromethane)	40.0	84.9	1.327	11.35	17.5	57.3	n	y	y	y
https://en.wikipedia.org/wiki/Methyl tert-butyl ether	tert butylmethyl ether (MTBE)	55.2	88.2	0.740	9.24	42.0	-	y	y	n	n
https://en.wikipedia.org/wiki/1,2-Dichloroethene	trans-1,2-Dichloroethene	47.5	97.0	1.260	9.66	-	-	y	y	y	LS
https://en.wikipedia.org/wiki/1,1-Dichloroethane	1,1-Dichloroethane	57.2	96.7	1.213	11.06	0.6%	182mm Hg	n	y	y	LS
https://en.wikipedia.org/wiki/cis-1,2-Dichloroethene	cis-1,2-Dichloroethene	60.3	97.0	1.280	9.65	-	-	y	y	y	LS
https://en.wikipedia.org/wiki/2-butanone_(MEK)	2-butanone (MEK)	80.0	72.1	0.805	9.30	27.5	78mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/1,2-Dichloroethane	1,2-Dichloroethane	80.0	97.0	1.28	9.65	-	-	y	y	y	LS
https://en.wikipedia.org/wiki/Chloroform	Chloroform	61.0	119.4	1.480	11.37	8.1	25.9	n	y	y	y
https://en.wikipedia.org/wiki/Tetrahydrofuran	Tetrahydrofuran	66.0	72.1	0.889	9.54	Miscible	-	y	y	n	n
https://en.wikipedia.org/wiki/Bromochloromethane	Bromochloromethane	68.1	129.4	1.991	10.77	16.7	15.6	n	y	y	n
https://en.wikipedia.org/wiki/Diisopropyl ether	Diisopropyl ether	69.0	102.2	0.725	9.20	2.0	119mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/1,1,1-Trichloroethane	1,1,1-Trichloroethane	74.0	133.4	1.320	11.25	0.4%	100mm Hg	n	y	y	y
https://en.wikipedia.org/wiki/Carbon_tetrachloride	Carbon tetrachloride	76.7	153.8	1.899	11.28	0.8	11.9	n	y	y	y
https://en.wikipedia.org/wiki/Benzene	Benzene	80.1	78.1	0.879	9.25	1.8	12.7	y	y	n	n
https://en.wikipedia.org/wiki/1,2-Dichloroethane	1,2-Dichloroethane	83.7	99.0	1.253	11.04	8.7	-	n	y	y	LS
https://en.wikipedia.org/wiki/Trichloroethylene	Trichloroethylene	87.0	131.4	1.460	9.45	1.3	58mm Hg	y	y	y	y
https://en.wikipedia.org/wiki/Bromodichloromethane	Bromodichloromethane	90.0	163.8	1.980	10.77	4.5	-	n	y	y	LS
https://en.wikipedia.org/wiki/1,2-Dichloropropane	1,2-Dichloropropane	96.0	113.0	1.156	10.87	2.6	40mm Hg	n	y	y	y
https://en.wikipedia.org/wiki/Dibromomethane	Dibromomethane	96.9	173.8	2.47	10.49	12.5	4.65	y	y	y	n
https://en.wikipedia.org/wiki/1,4-Dioxane	1,4-Dioxane	101.0	88	1.217	9.20	Miscible	29mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/cis-1,3-Dichloropropene	cis-1,3-Dichloropropene	104.0	111.0	1.217	-	2.2	34.4mm Hg	y	y	y	LS
https://en.wikipedia.org/wiki/4-methyl-2-pentanone_(MIBK)	4-methyl-2-pentanone (MIBK)	117.5	100.2	0.800	9.32	19.0	16mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/Toluene	Toluene	110.6	92.1	0.867	8.82	0.5	2.8	y	y	n	n
https://en.wikipedia.org/wiki/trans-1,3-Dichloropropene	trans-1,3-Dichloropropene	112.0	111.0	1.224	10.87	2.3	23mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/1,1,2-Trichloroethane	1,1,2-Trichloroethane	115.0	133.4	1.435	11.00	0.4%	18mm Hg	n	y	y	y
https://en.wikipedia.org/wiki/Tetrachloroethylene	Tetrachloroethylene	121.1	168.8	1.622	9.32	0.15	14mm Hg	y	y	y	y
https://en.wikipedia.org/wiki/Dibromochloromethane	Dibromochloromethane	119.5	208.3	2.451	10.59	-	-	n	y	y	n
https://en.wikipedia.org/wiki/1,2-Dibromoethane	1,2-Dibromoethane	131.5	187.9	2.170	-	0.4%	1.6	y	y	y	n
https://en.wikipedia.org/wiki/Chlorobenzene	Chlorobenzene	131.0	112.6	1.110	9.07	0.5	9mm Hg	y	y	y	y
https://en.wikipedia.org/wiki/1,1,1,2-Tetrachloroethane	1,1,1,2-Tetrachloroethane	130.5	167.8	1.553	11.52	0.1%	14mm Hg	n	y	y	y
https://en.wikipedia.org/wiki/Ethylbenzene	Ethylbenzene	136.0	106.2	0.860	8.76	insoluble	9mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/m,p-Xylene	m,p-Xylene	138.5	106.2	0.860	8.50	insoluble	9mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/o-Xylene	o-Xylene	144.4	106.2	0.880	8.56	0.02%	7mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/Styrene	Styrene	145.0	104.2	0.910	8.47	0.03%	5mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/1,1,2,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	146.5	167.9	1.250	11.10	2.9	5mm Hg	n	y	y	y
https://en.wikipedia.org/wiki/Bromoform	Bromoform	149.0	252.7	1.590	10.48	3.2	670Pa	y	y	LS	n
https://en.wikipedia.org/wiki/Cumene	Isopropyl benzene (Cumene)	152.0	120.2	0.862	8.75	Negligible	8mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/Bromobenzene	Bromobenzene	156.0	157.0	1.500	8.98	0.41	4.18mm Hg	y	y	LS	n
https://en.wikipedia.org/wiki/Chlorotoluene	Chlorotoluene	162.0	126.6	1.072	8.83	Insoluble	-	y	y	y	n
https://en.wikipedia.org/wiki/1,3,5-Trimethylbenzene	1,3,5-Trimethylbenzene	164.7	120.2	0.864	8.39	2e-005	2mm Hg	y	y	n	n
https://en.wikipedia.org/wiki/1,2,4-Trimethylbenzene	1,2,4-Trimethylbenzene	170.0	120.2	0.876	8.27	-	-	y	y	n	n
https://en.wikipedia.org/wiki/1,3-Dichlorobenzene	1,3-Dichlorobenzene	173.0	147.0	1.250	9.12	Insoluble	-	y	y	y	LS
https://en.wikipedia.org/wiki/1,4-Dichlorobenzene	1,4-Dichlorobenzene	174.0	147.0	1.300	8.94	0.11	1.3mm Hg	y	y	y	y
https://en.wikipedia.org/wiki/1,2-Dichlorobenzene	1,2-Dichlorobenzene	180.5	147.0	1.460	9.07	0.01%	1mm Hg	y	y	y	LS
https://en.wikipedia.org/wiki/1,2,4-Trichlorobenzene	1,2,4-Trichlorobenzene	214.4	181.4	1.460	-	3e-005	1mm Hg	y	y	y	y
https://en.wikipedia.org/wiki/1,3,5-Trichlorobenzene	1,3,5-Trichlorobenzene	208.0	181.4	1.140	-	6.0	-	y	y	y	y
https://en.wikipedia.org/wiki/1,2,3-Trichlorobenzene	1,2,3-Trichlorobenzene	218.0	128.2	-	8.10	0.03	23.6Pa	y	y	y	n
https://en.wikipedia.org/wiki/Gasoline	Gasoline Range Organics (C6-C10)	60-220	Variable	Variable	Variable	Variable	Variable	y	y	n	n
https://en.wikipedia.org/wiki/Diesel	Diesel Range Organics (C10-C28)	170-430	Variable	Variable	Variable	Variable	Variable	y	y	n	n
Cannot be detected by MIP - These analytes are too large of molecules and/or have too high of a boiling points											
https://en.wikipedia.org/wiki/Polychlorinated_biphenyl	Polychlorinated biphenyl (PCBs)	340-375	291-361	1.18-1.57		n	n	n	n		
https://en.wikipedia.org/wiki/Perfluorooctanesulfonic_acid	Perfluorooctanesulfonic acid (PFOS)	133	500			n	n	n	n		
https://en.wikipedia.org/wiki/Perfluorooctanoic_acid	Perfluorooctanoic acid (PFOA)	190	414	1.8	9.5	n	n	n	n		

*Most common PID lamp electron voltage = 10.6eV. To respond on the PID, the analytes ionization potential must be below the lamp electron voltage.

**All compounds contain carbon and will burn in the FID if in high enough concentration

***An ECD response is variable depending upon the number of chlorine atoms on a molecule and molecular structure.

****LS = Low Sensitivity

Miscible is a property of two substances to mix in all proportions.

As the analyte boiling point increases the more difficult it is for the compounds to diffuse through the membrane. This will increase the amount of carryover

depending upon the MIP trip time that is used in the software. The analytes with the darker the color on this list essentially will not respond at the MIP detector

due to their high boiling points. Only the lightest portion of the diesel range organics will make it through the membrane and reach the detectors however the

higher boiling point compounds will cause high amounts of carryover.



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