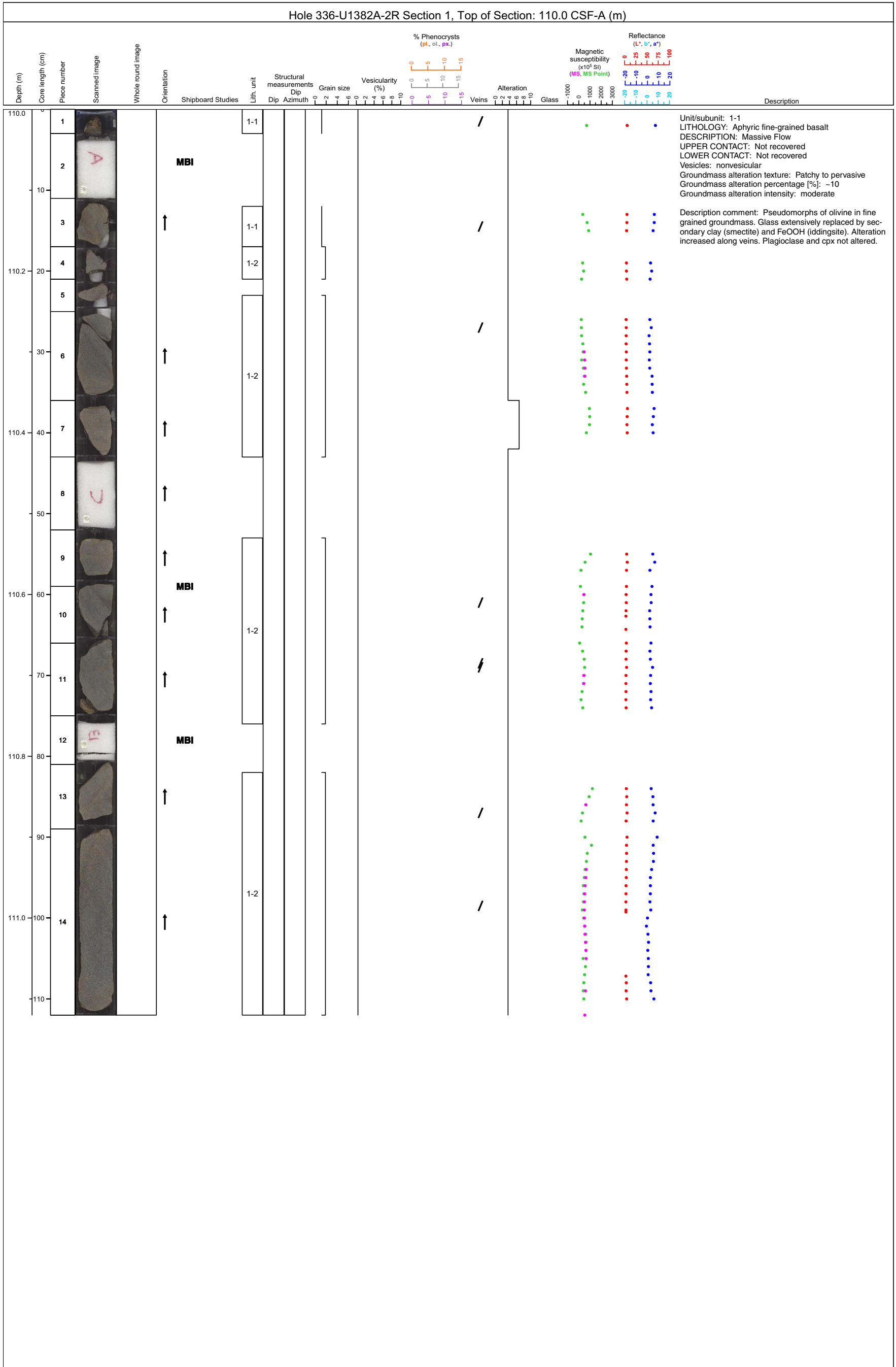
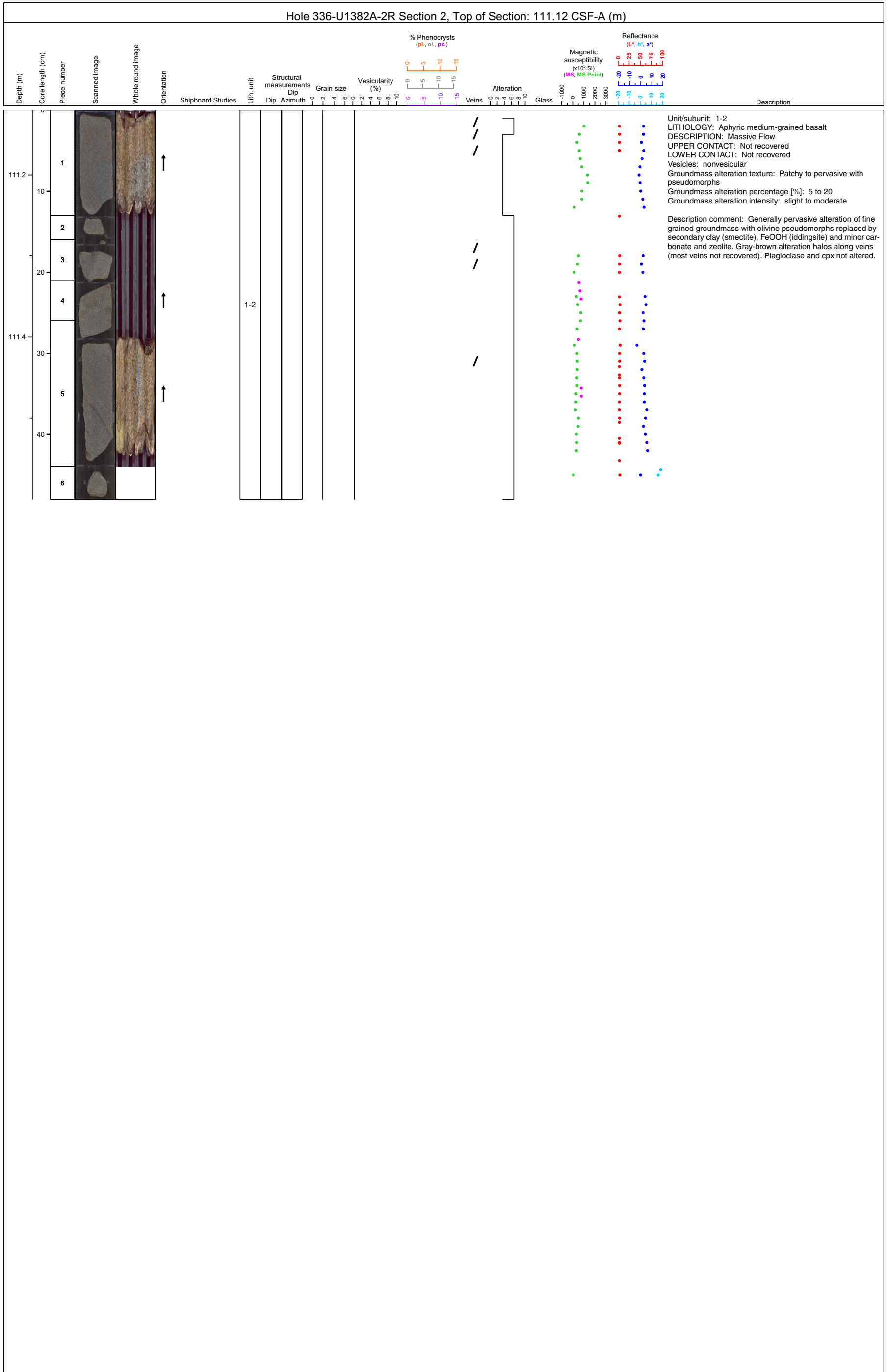


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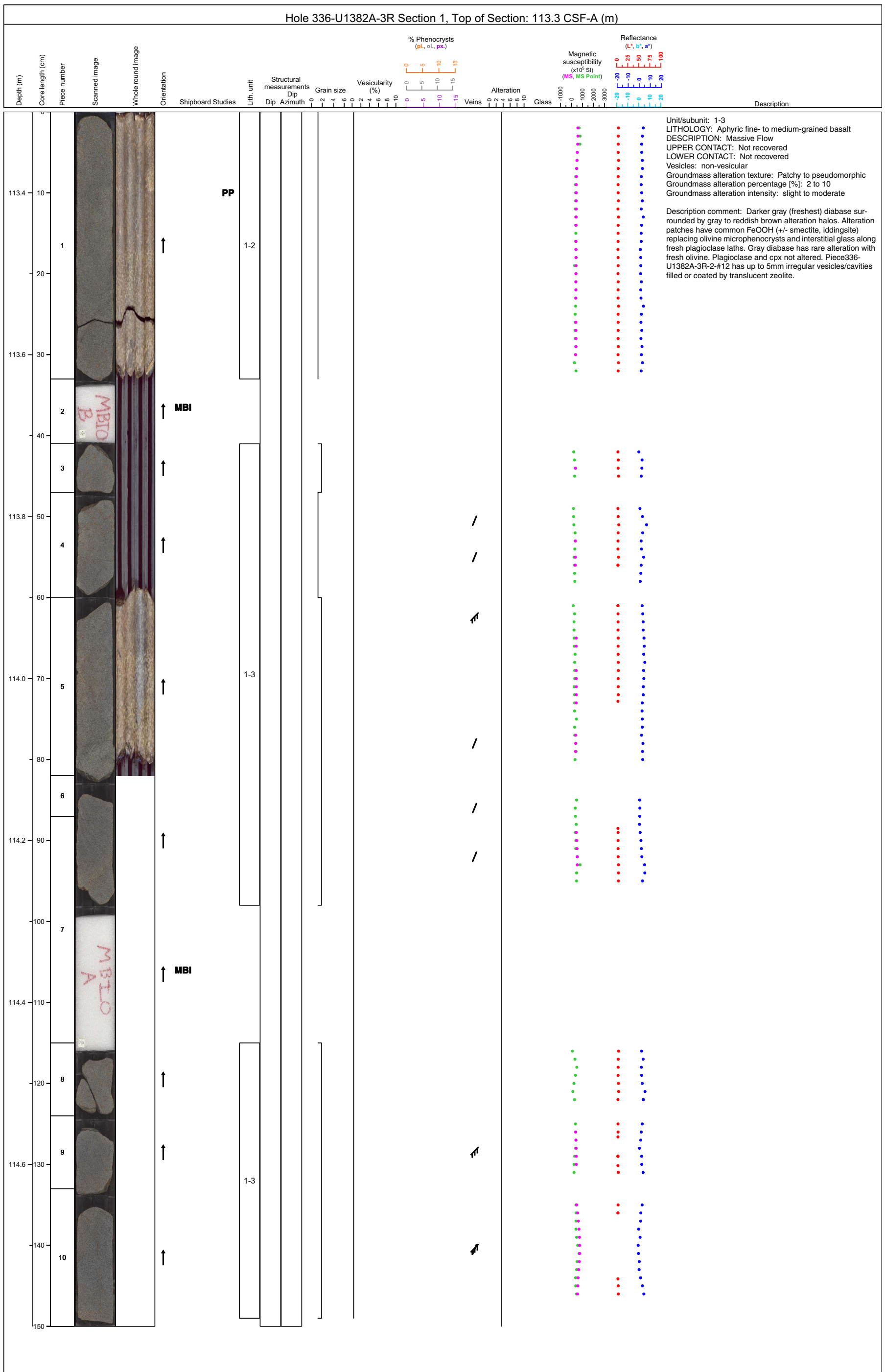
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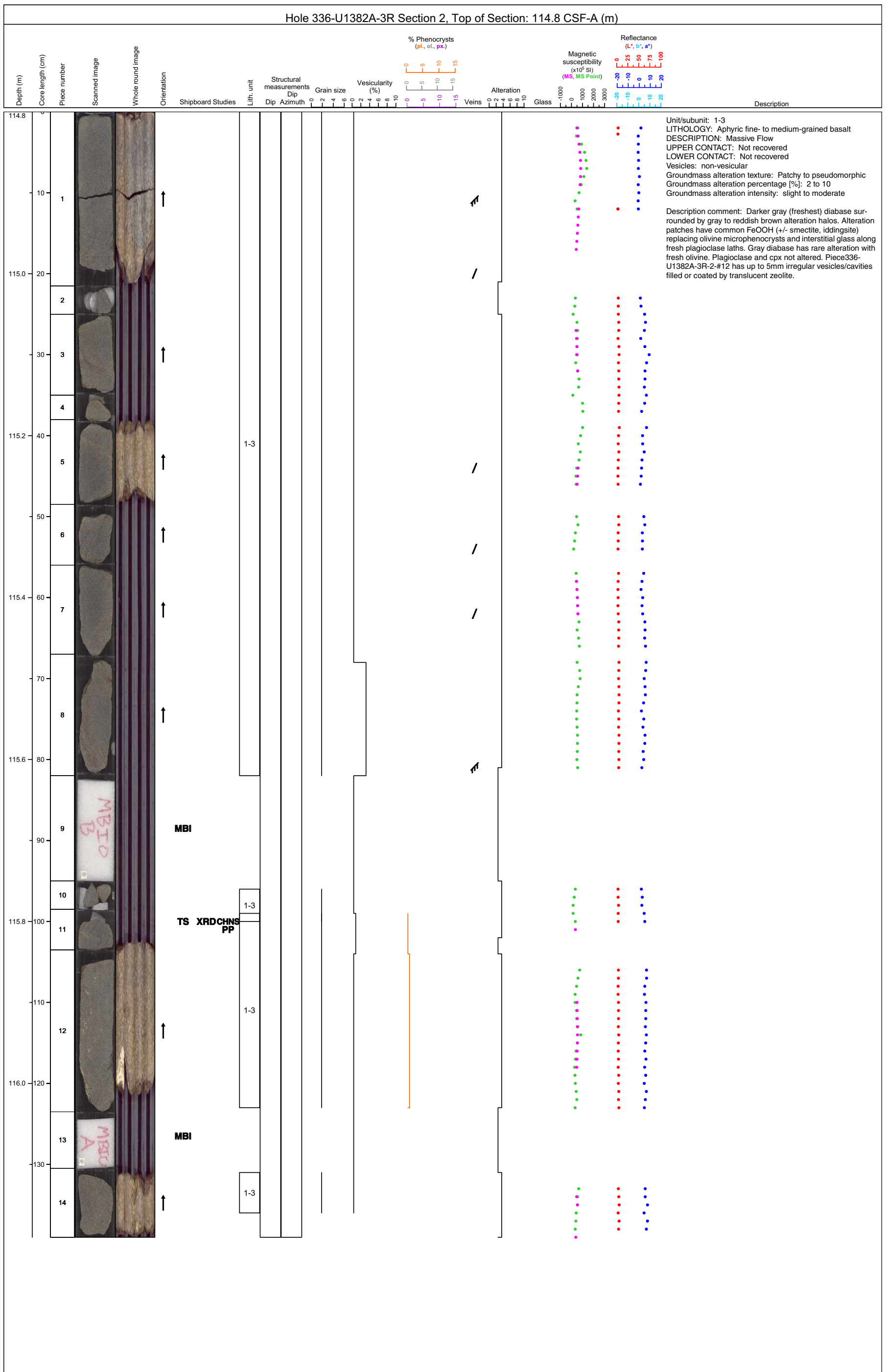
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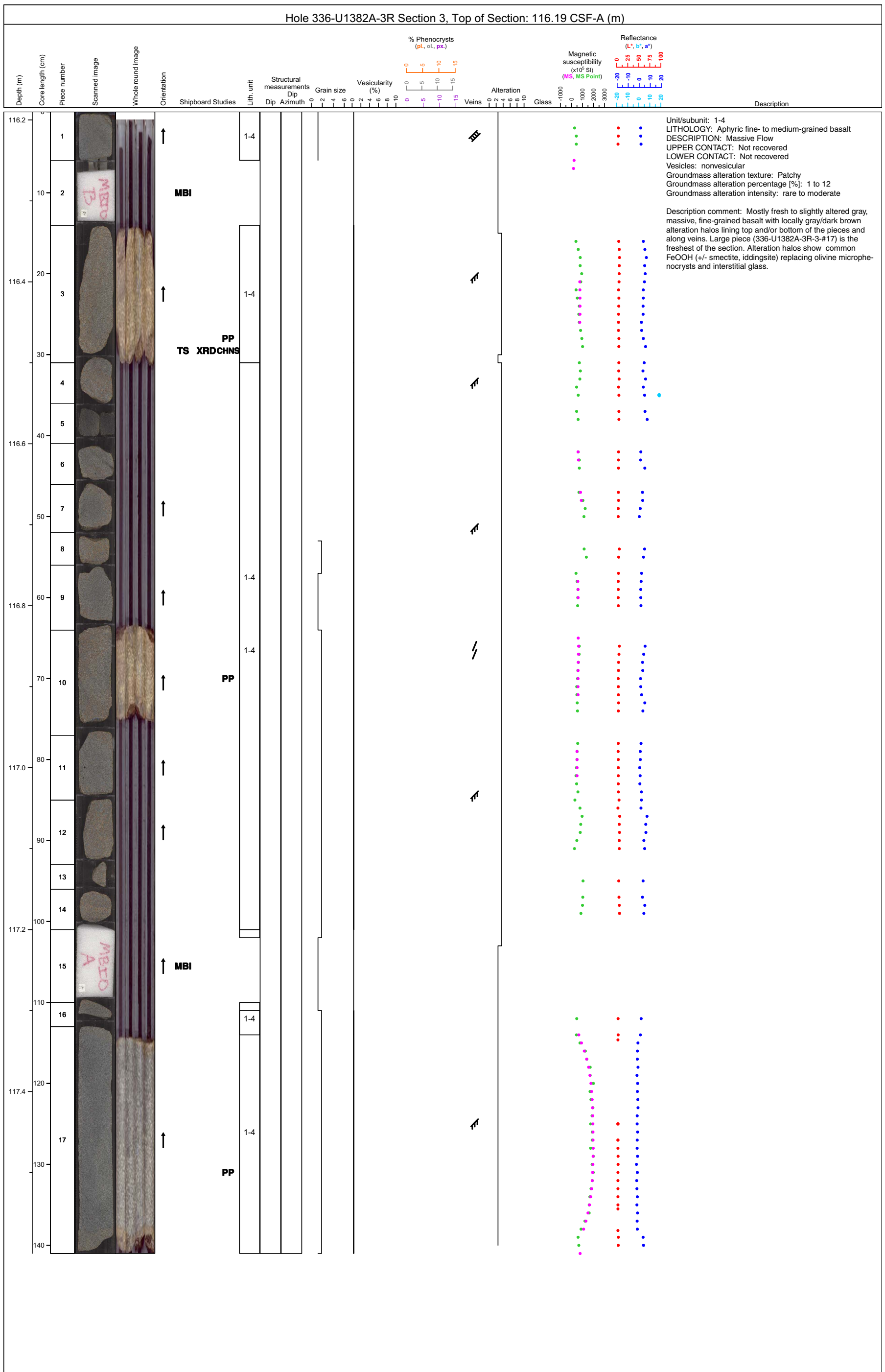
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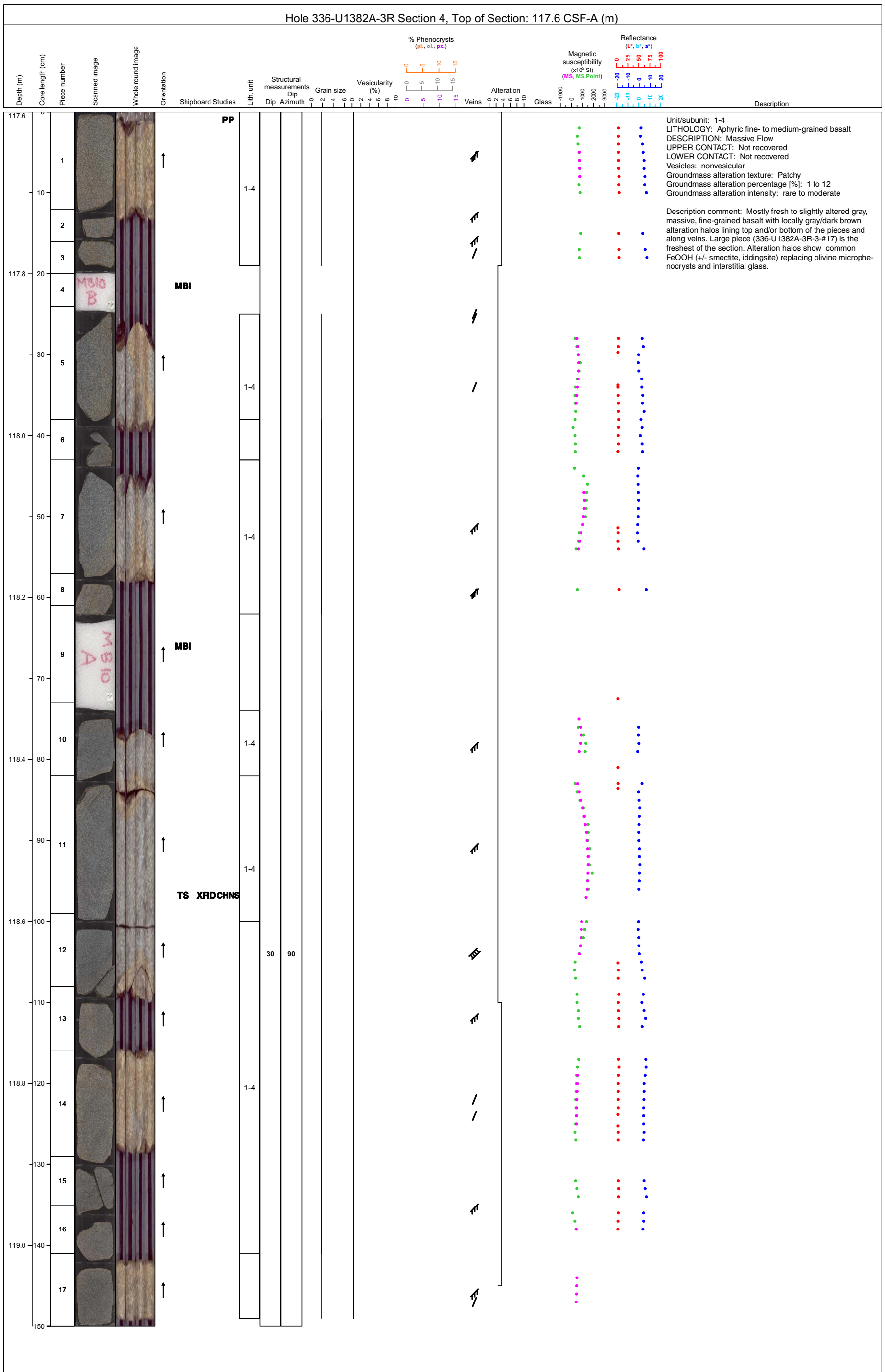
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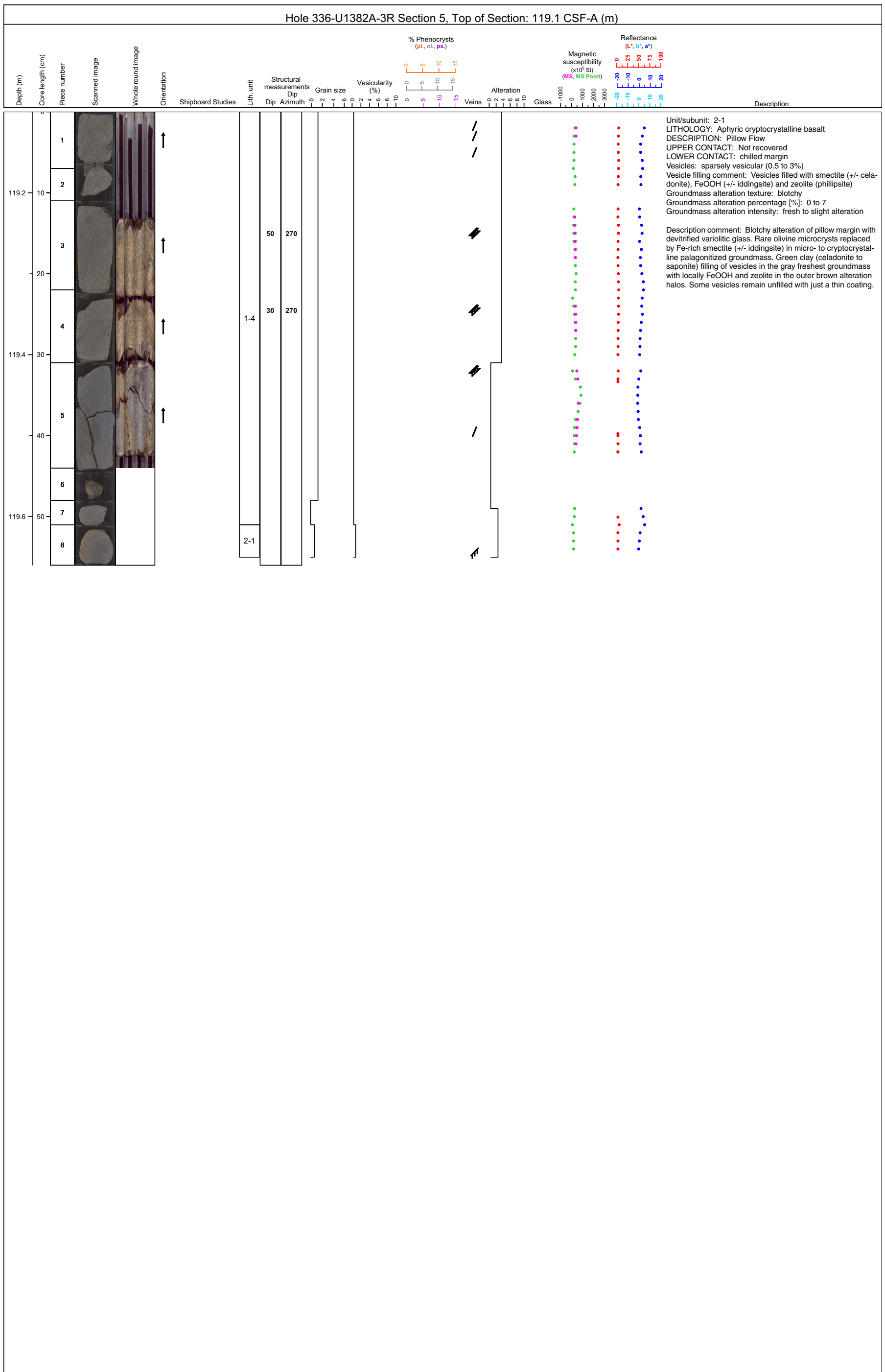
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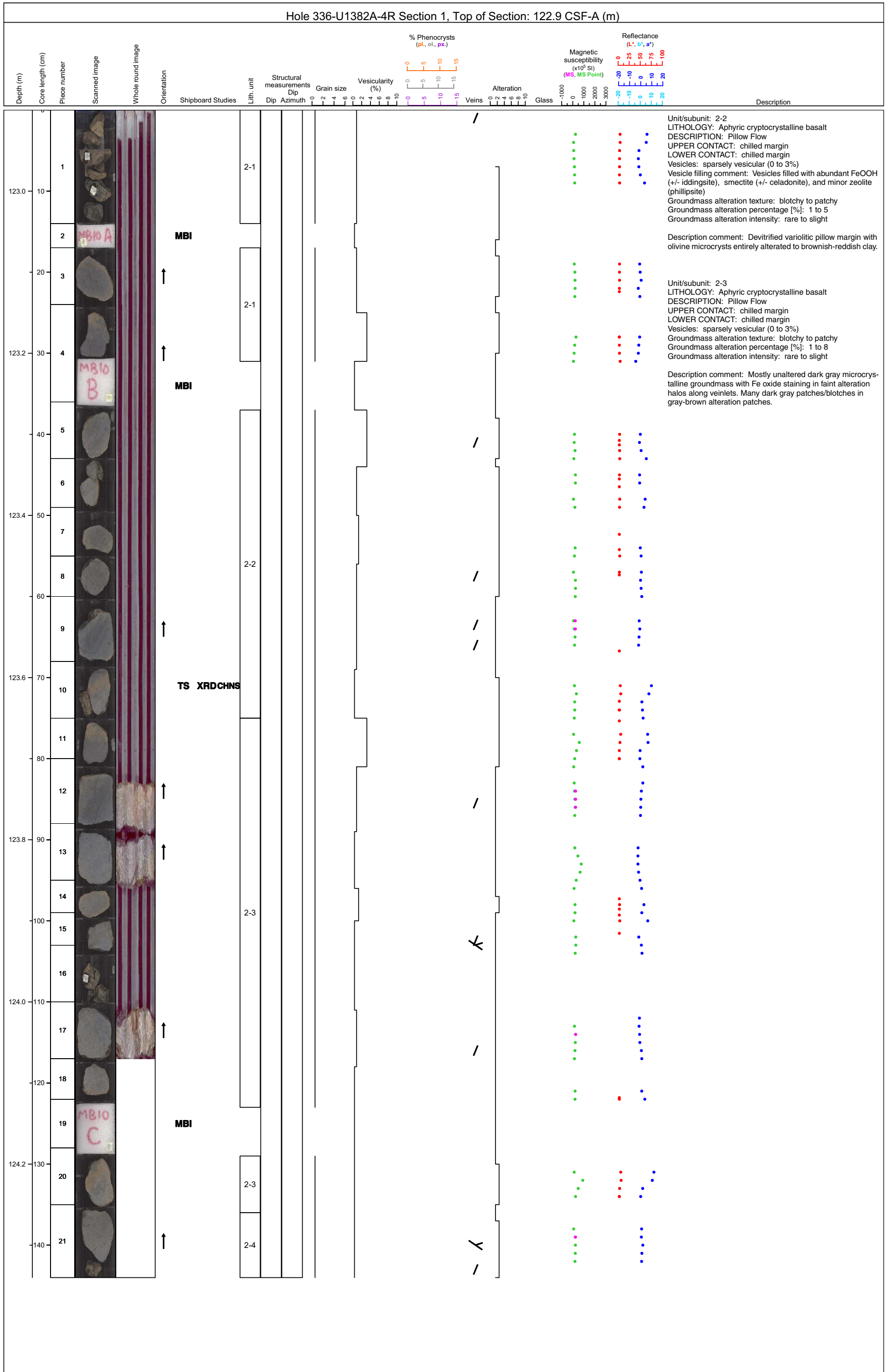
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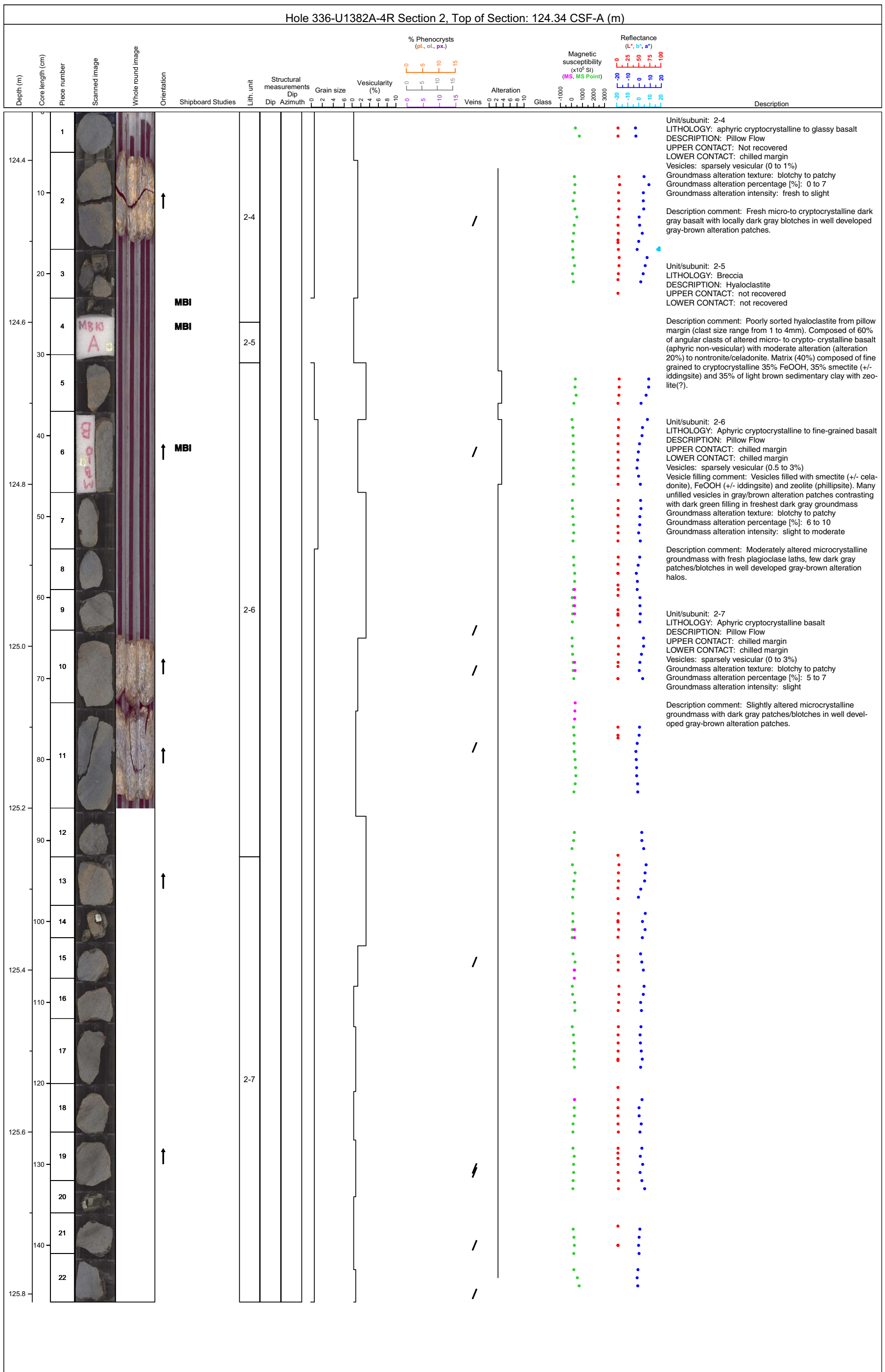


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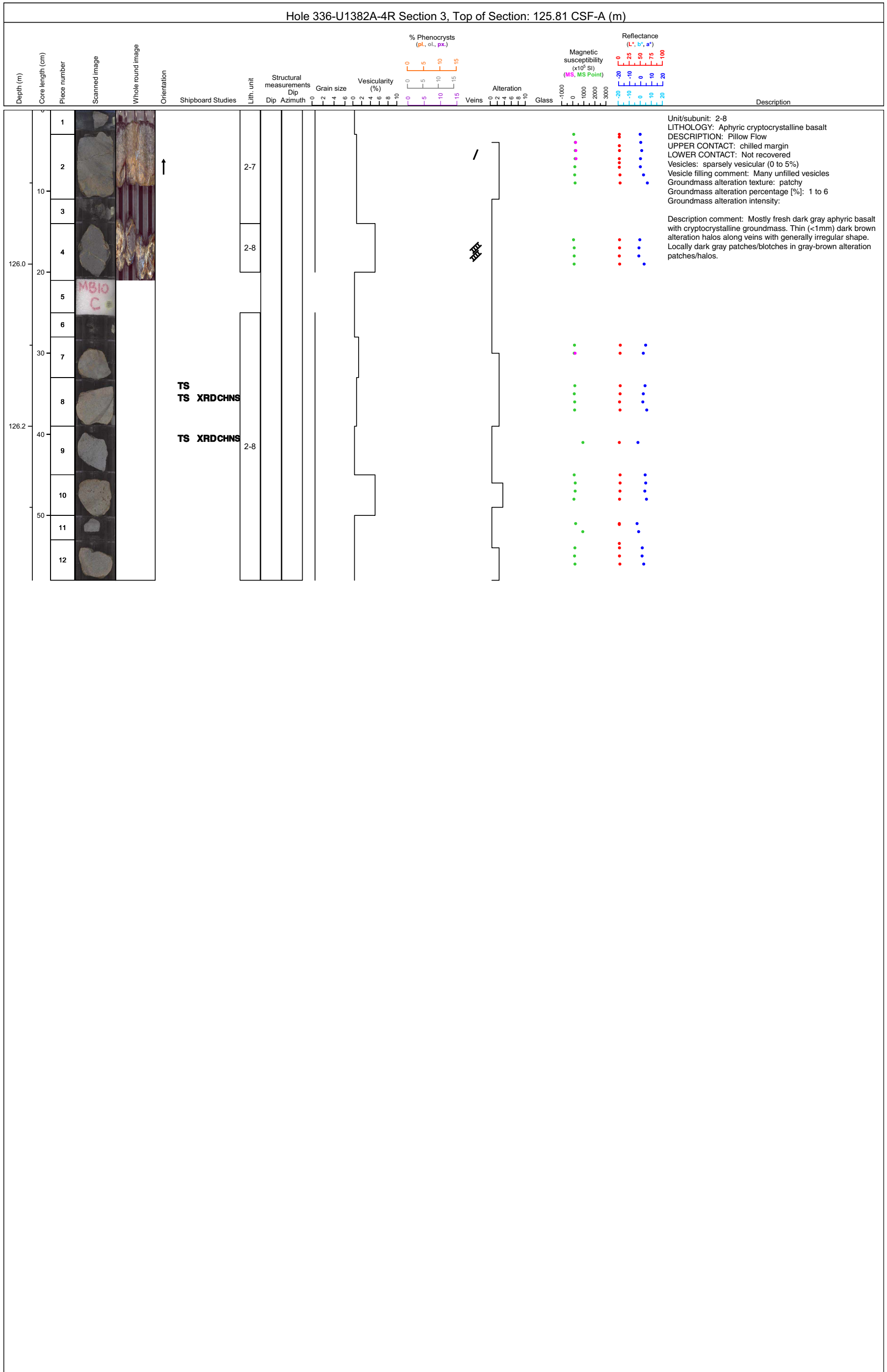




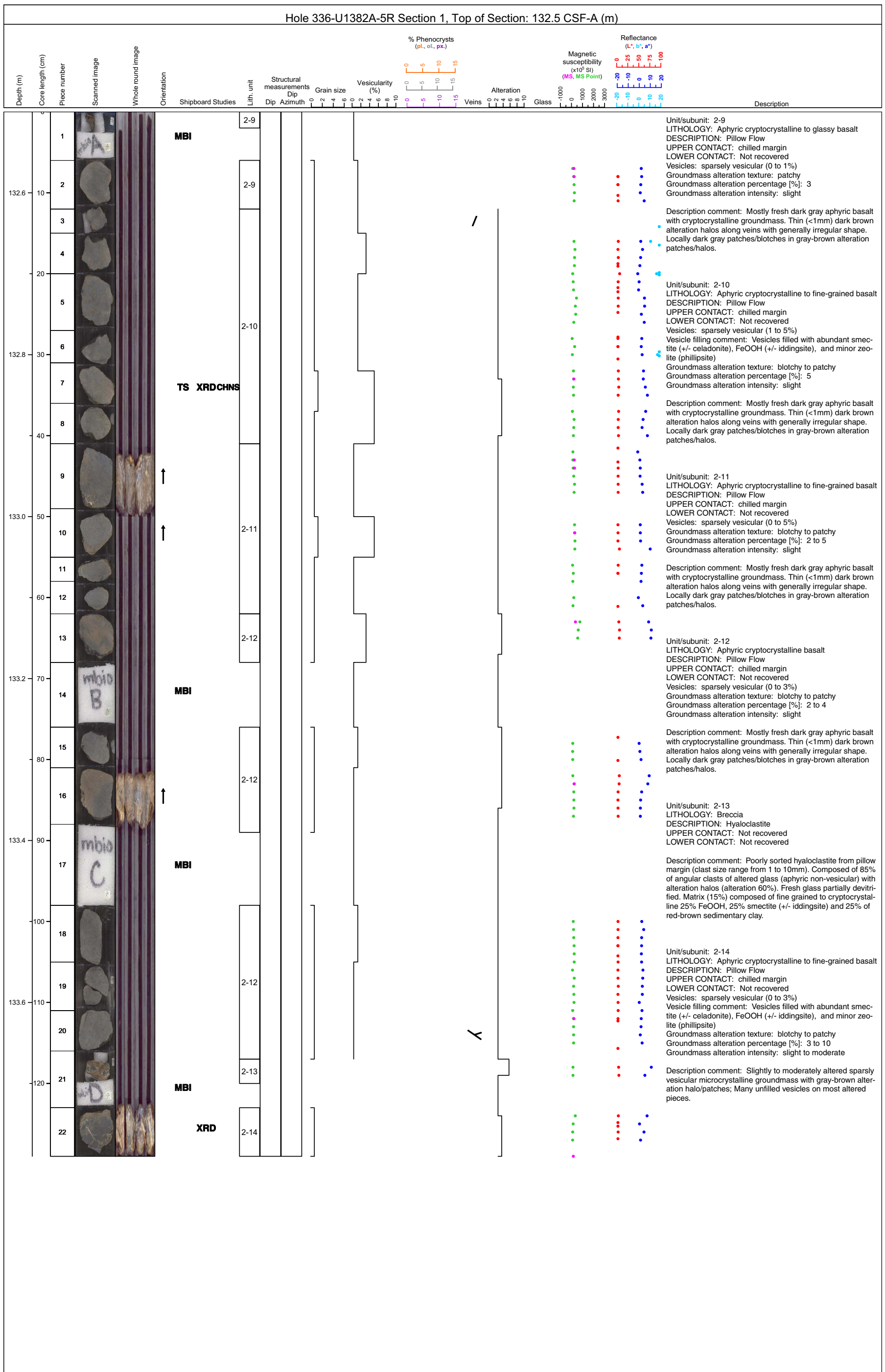
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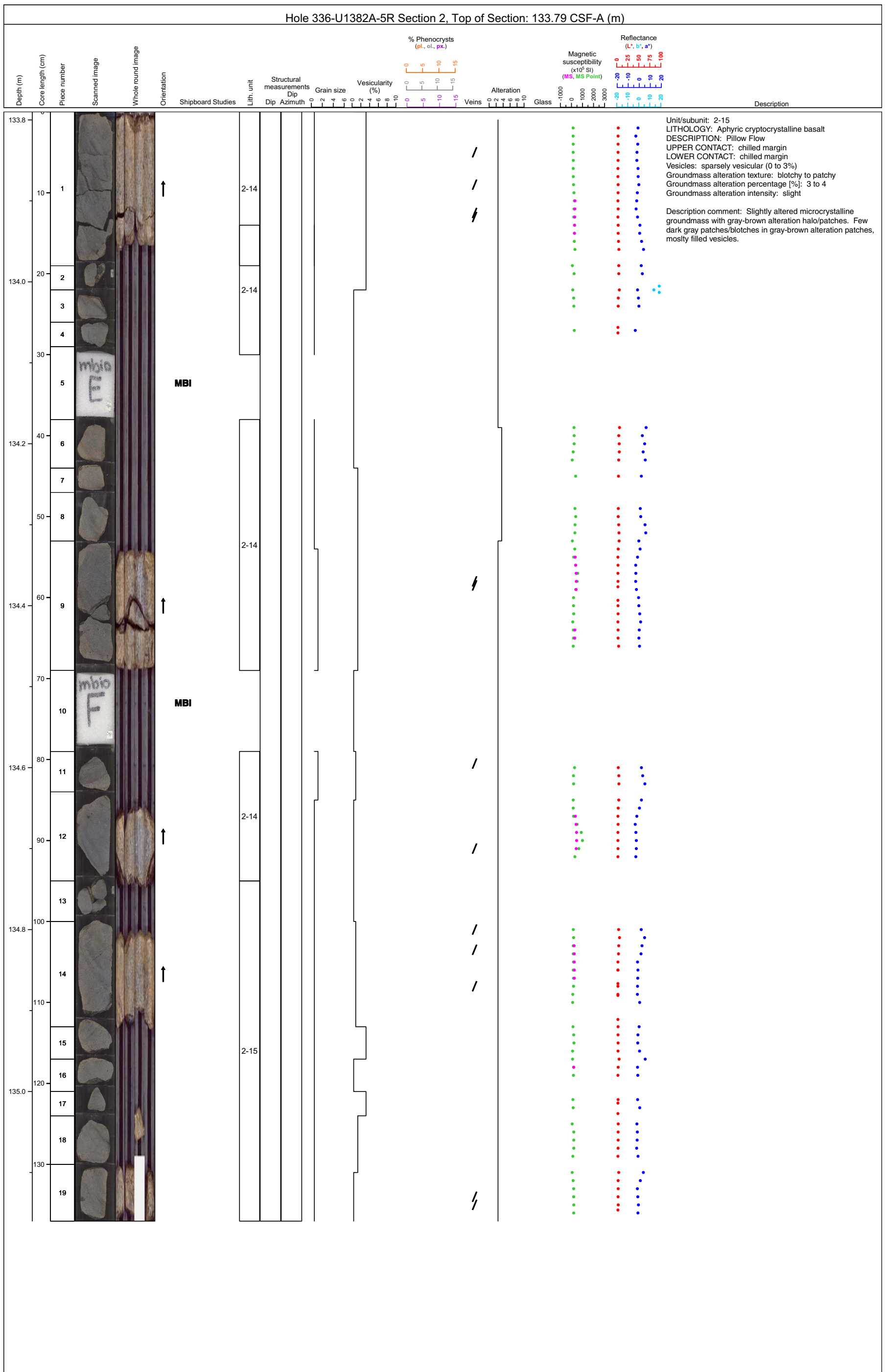
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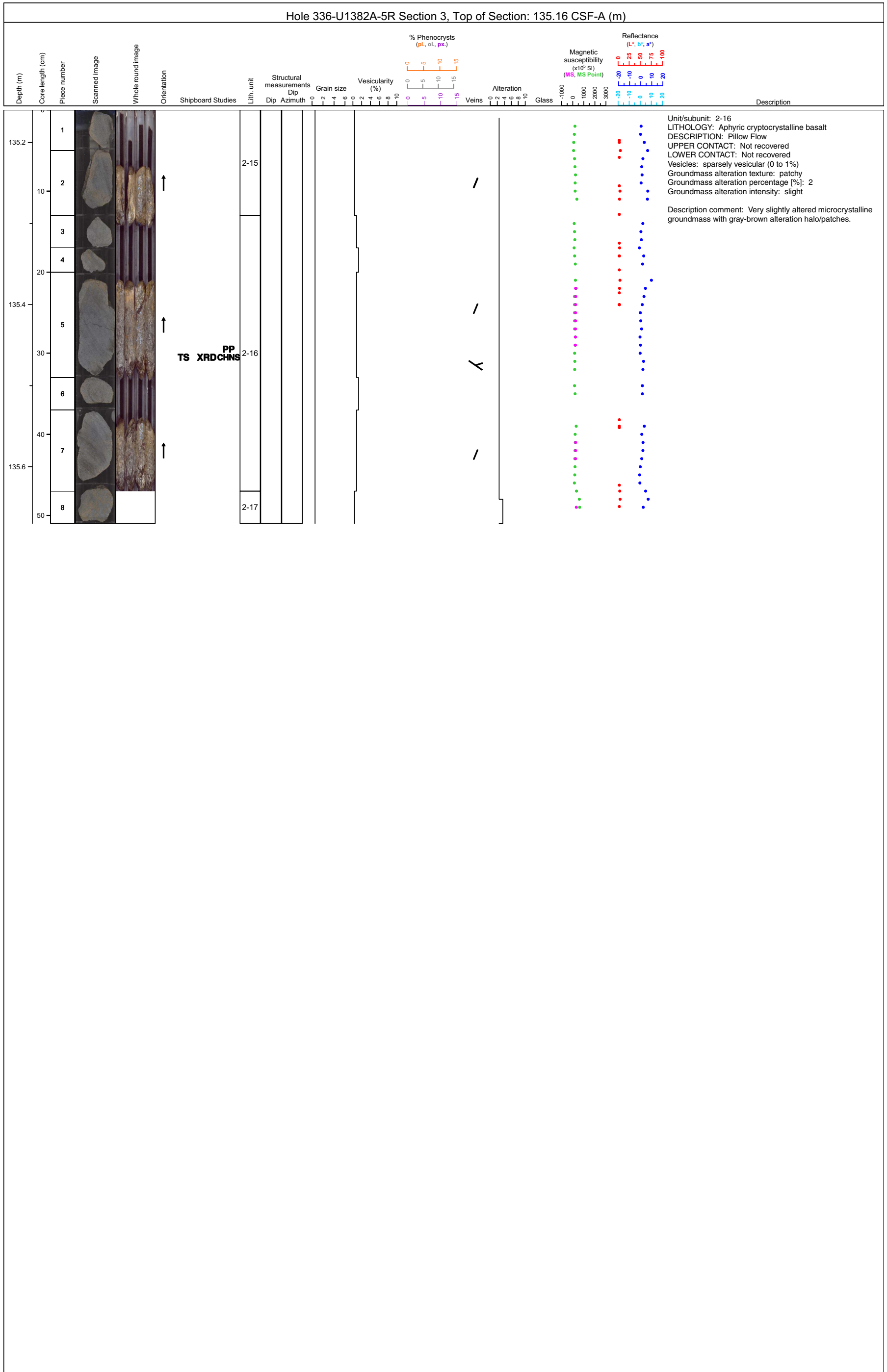
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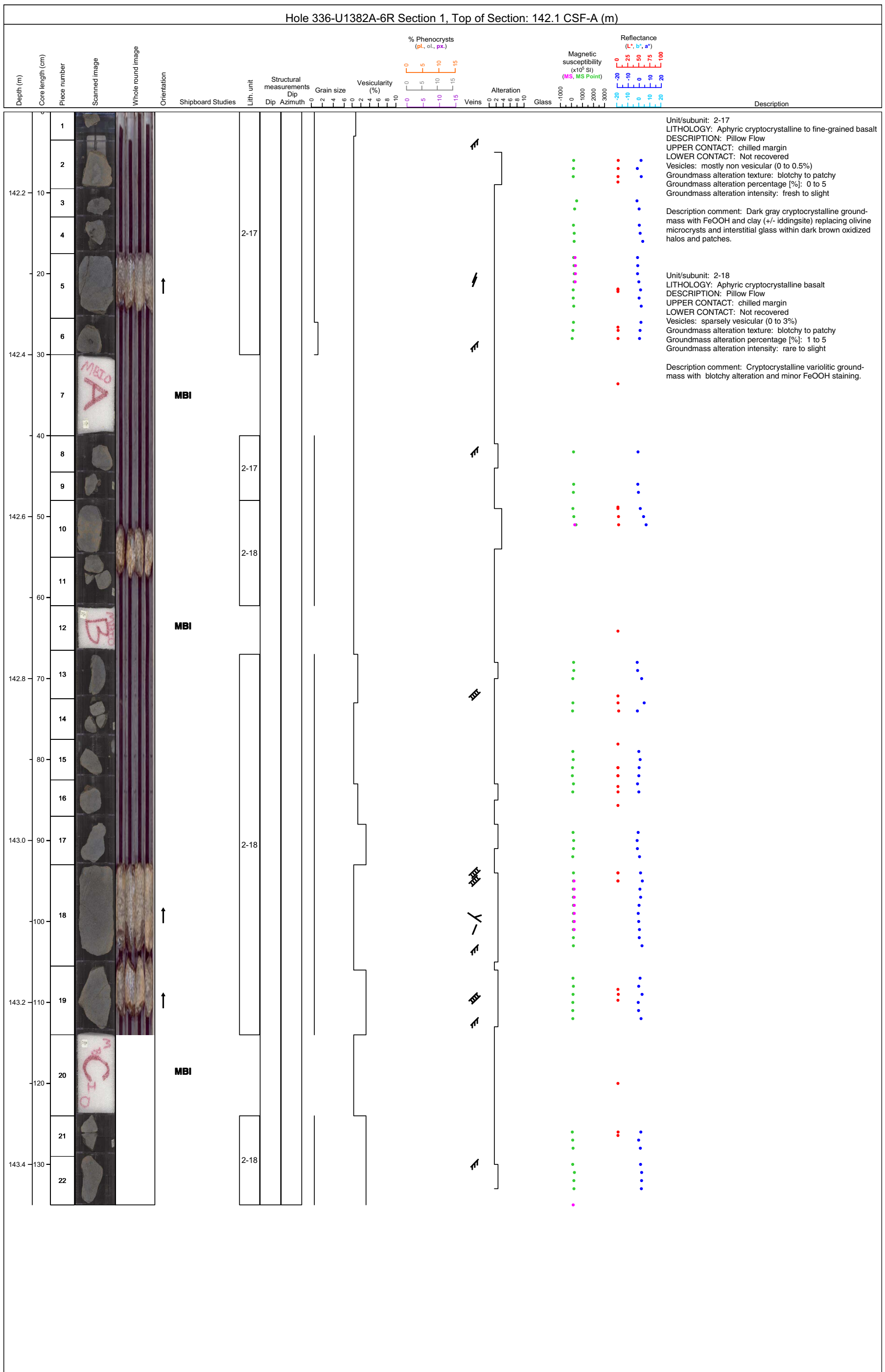
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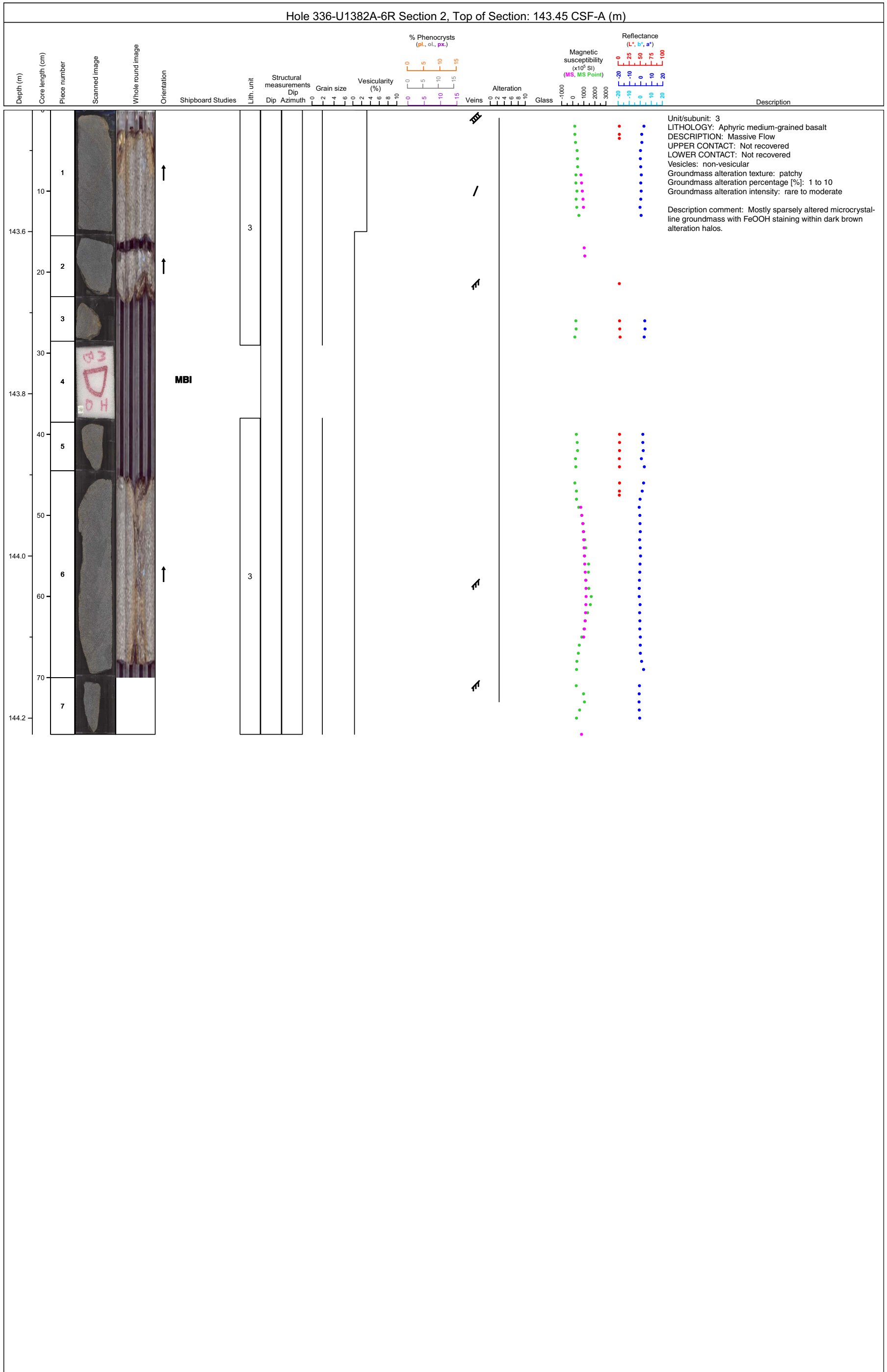
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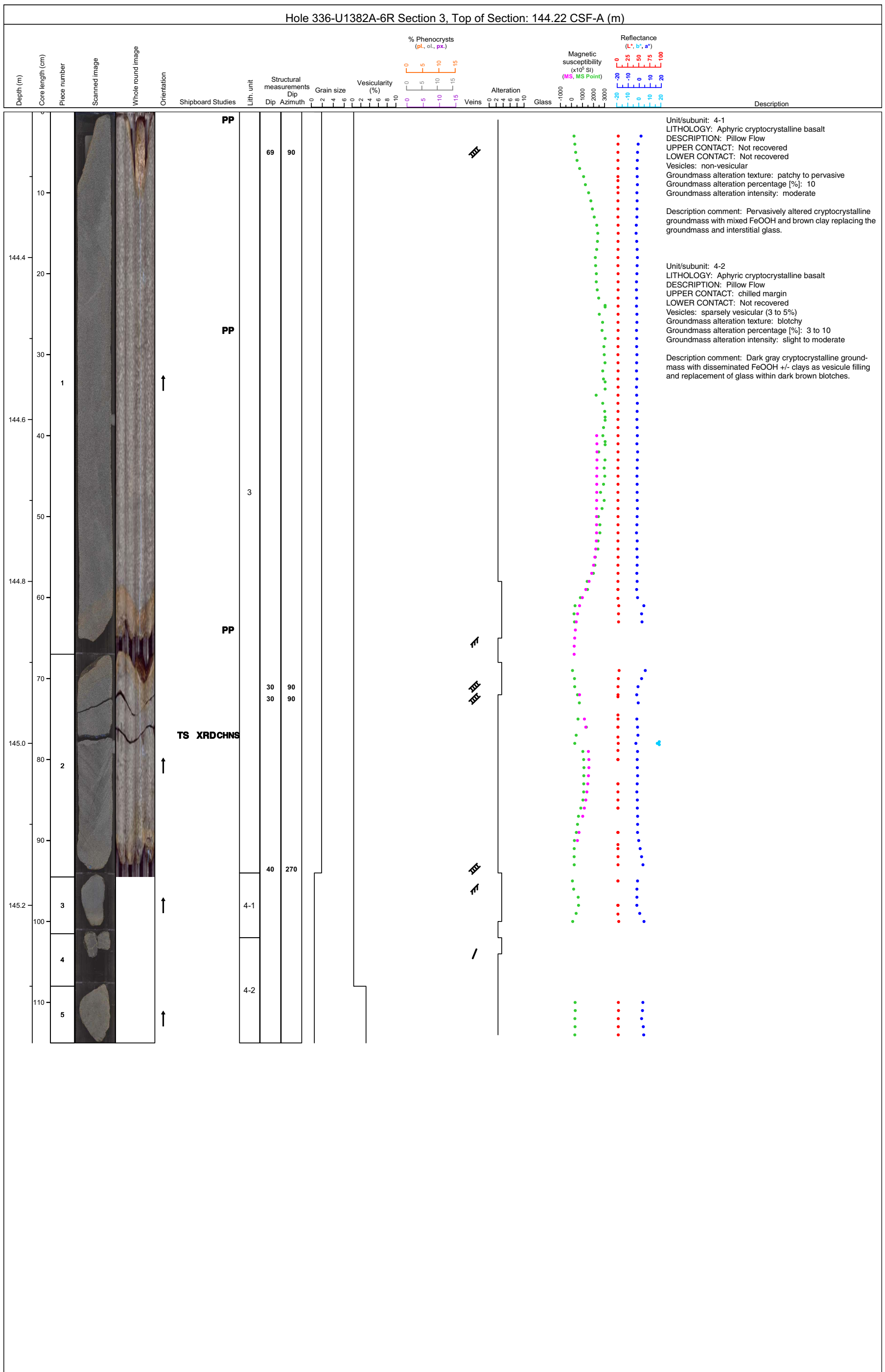
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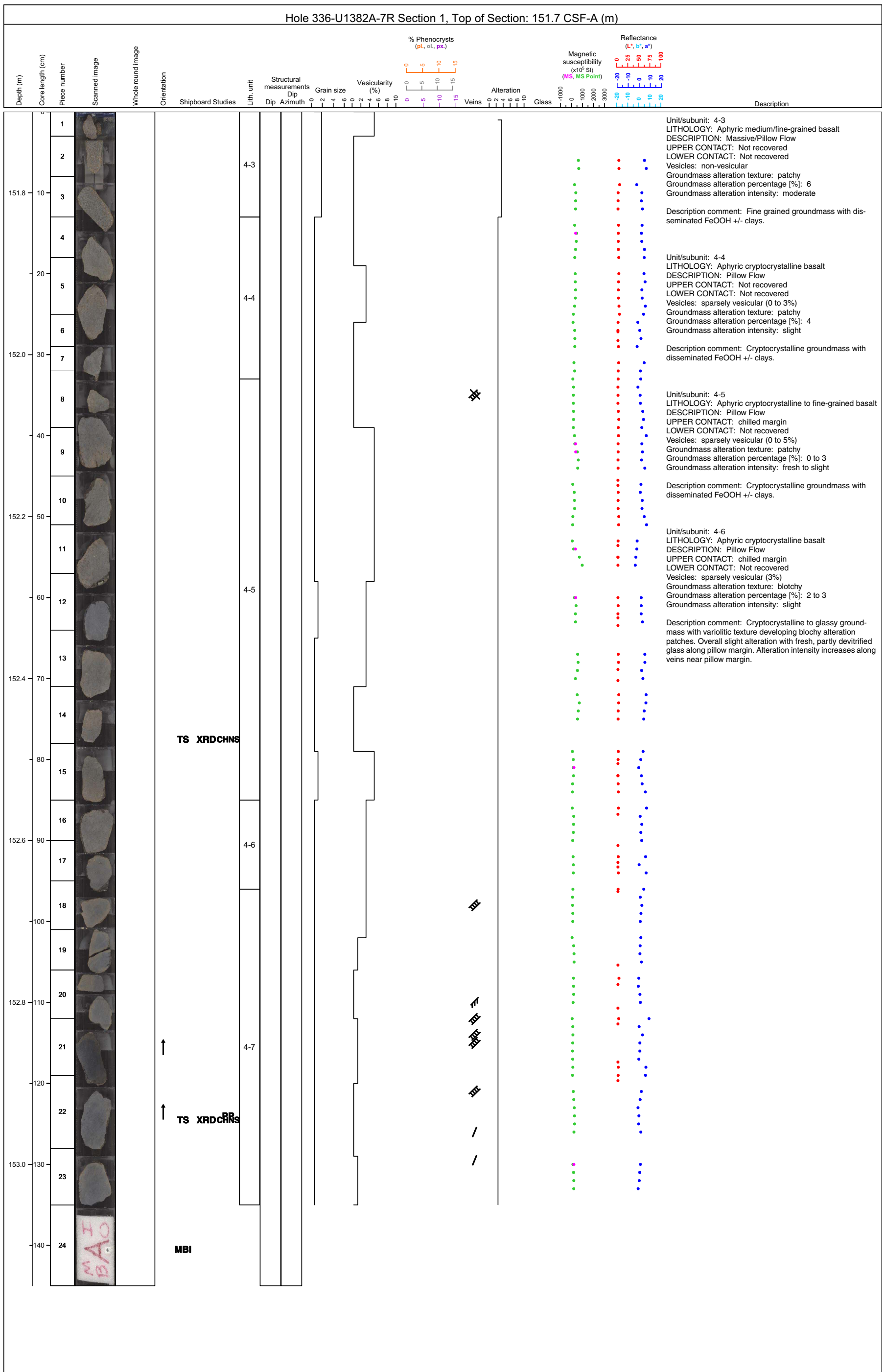


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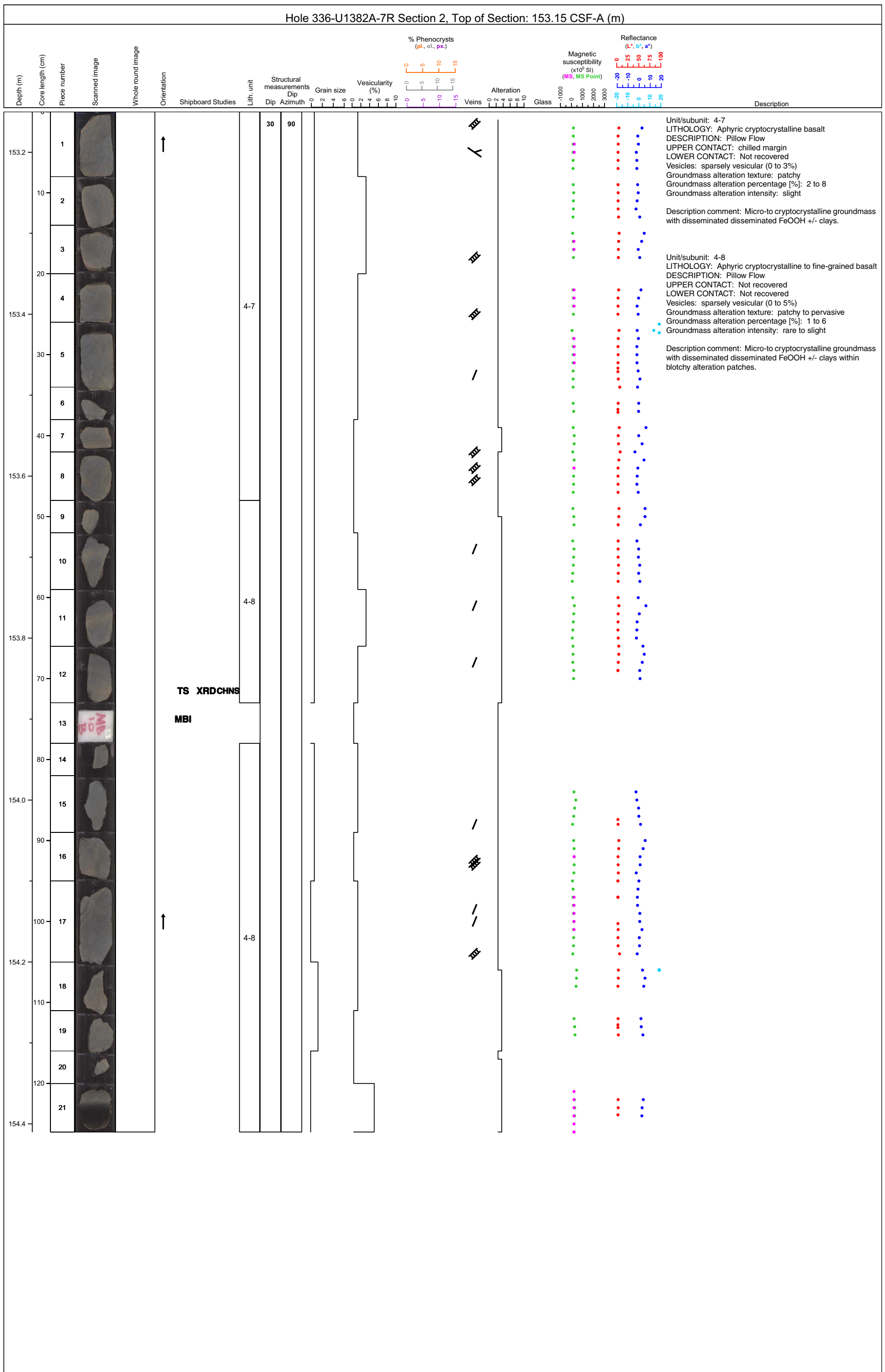




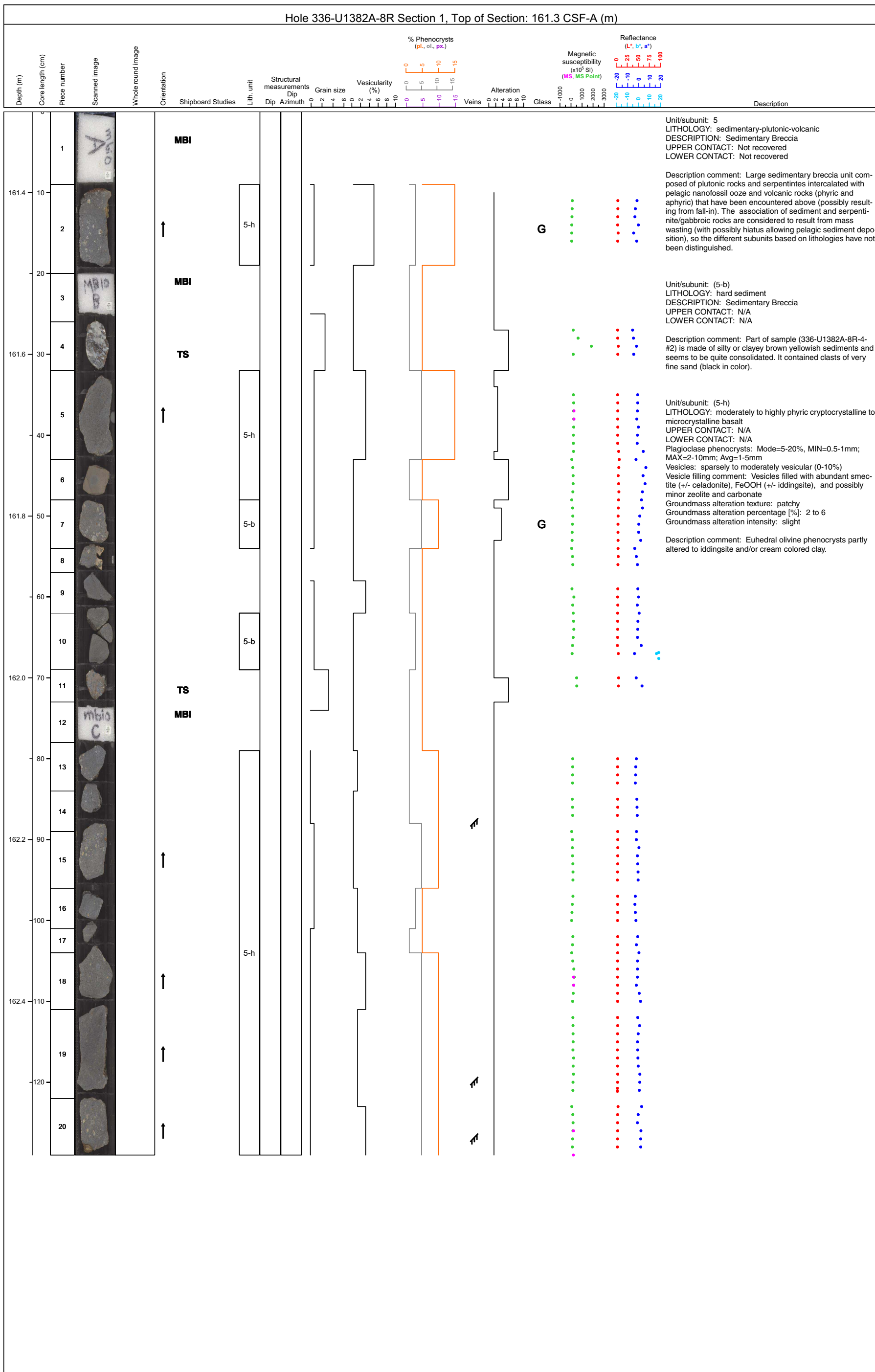
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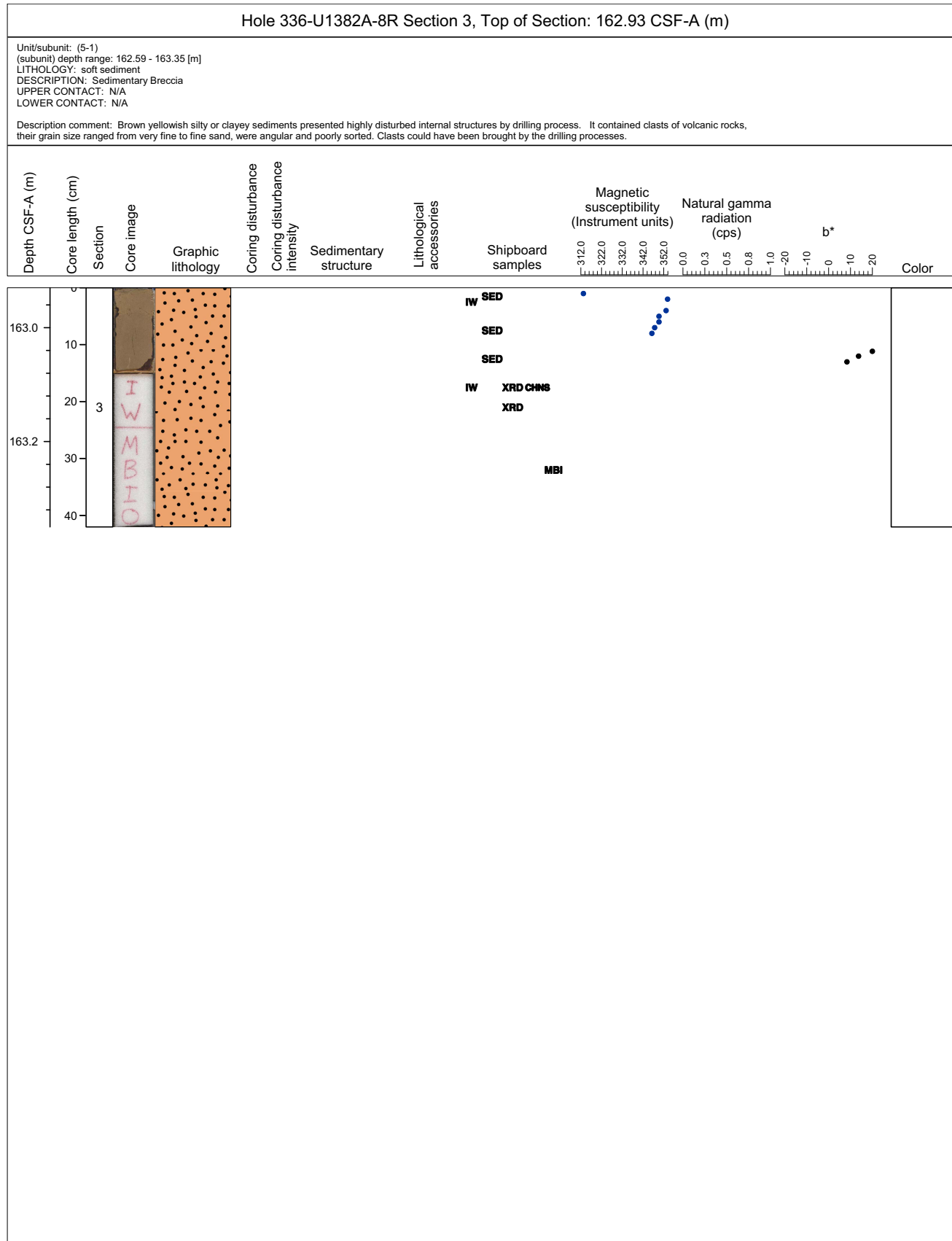


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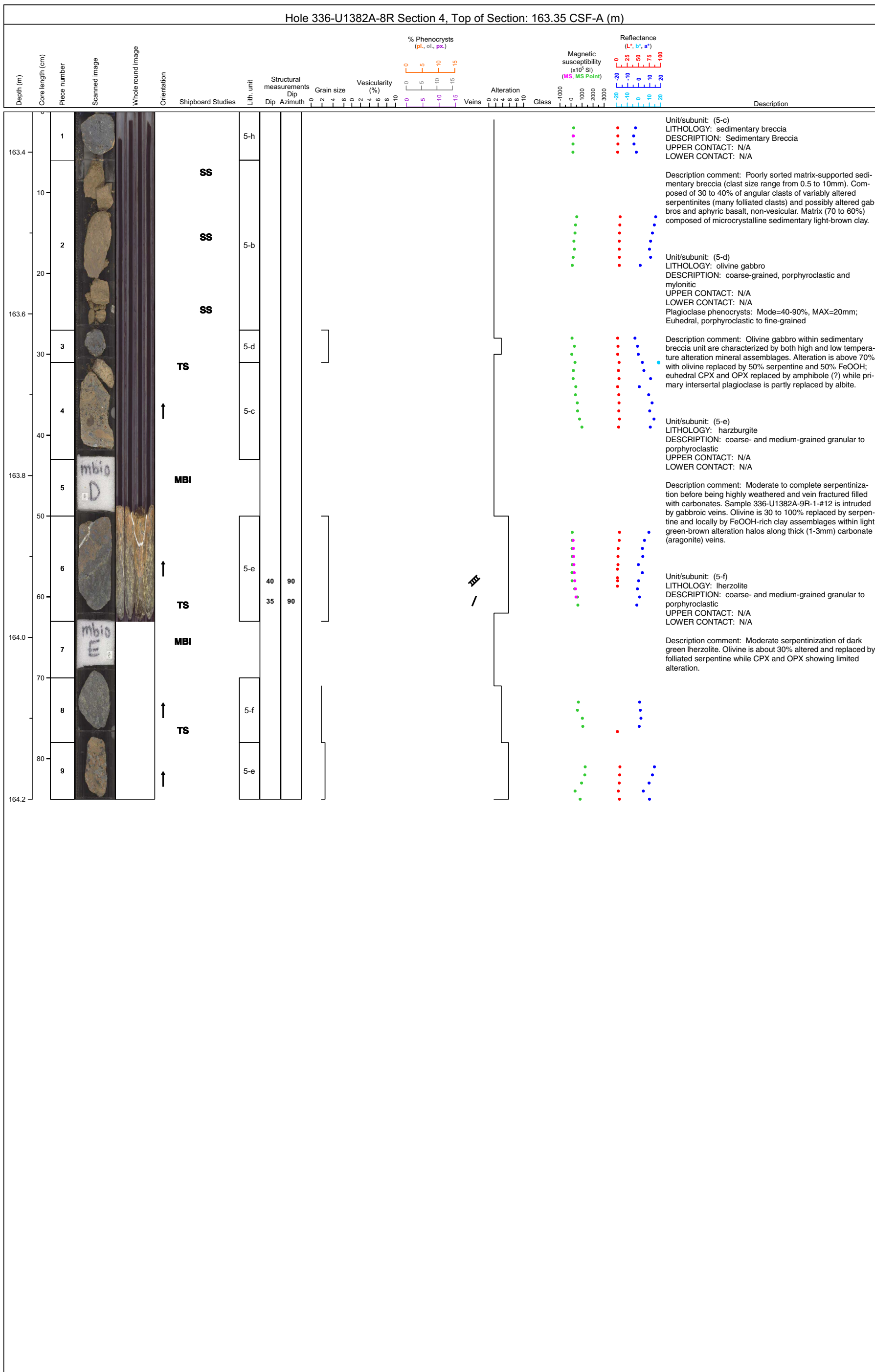




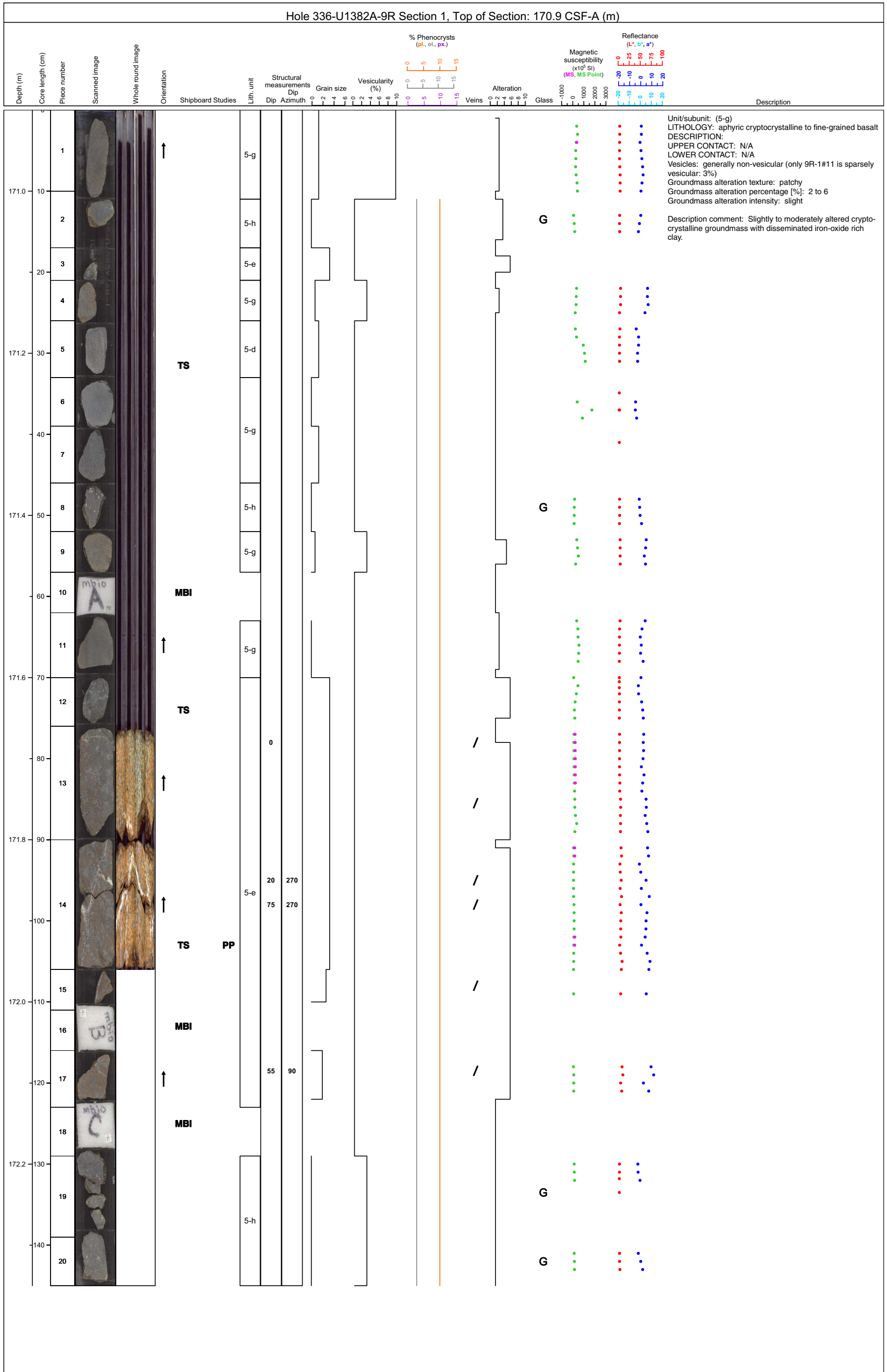
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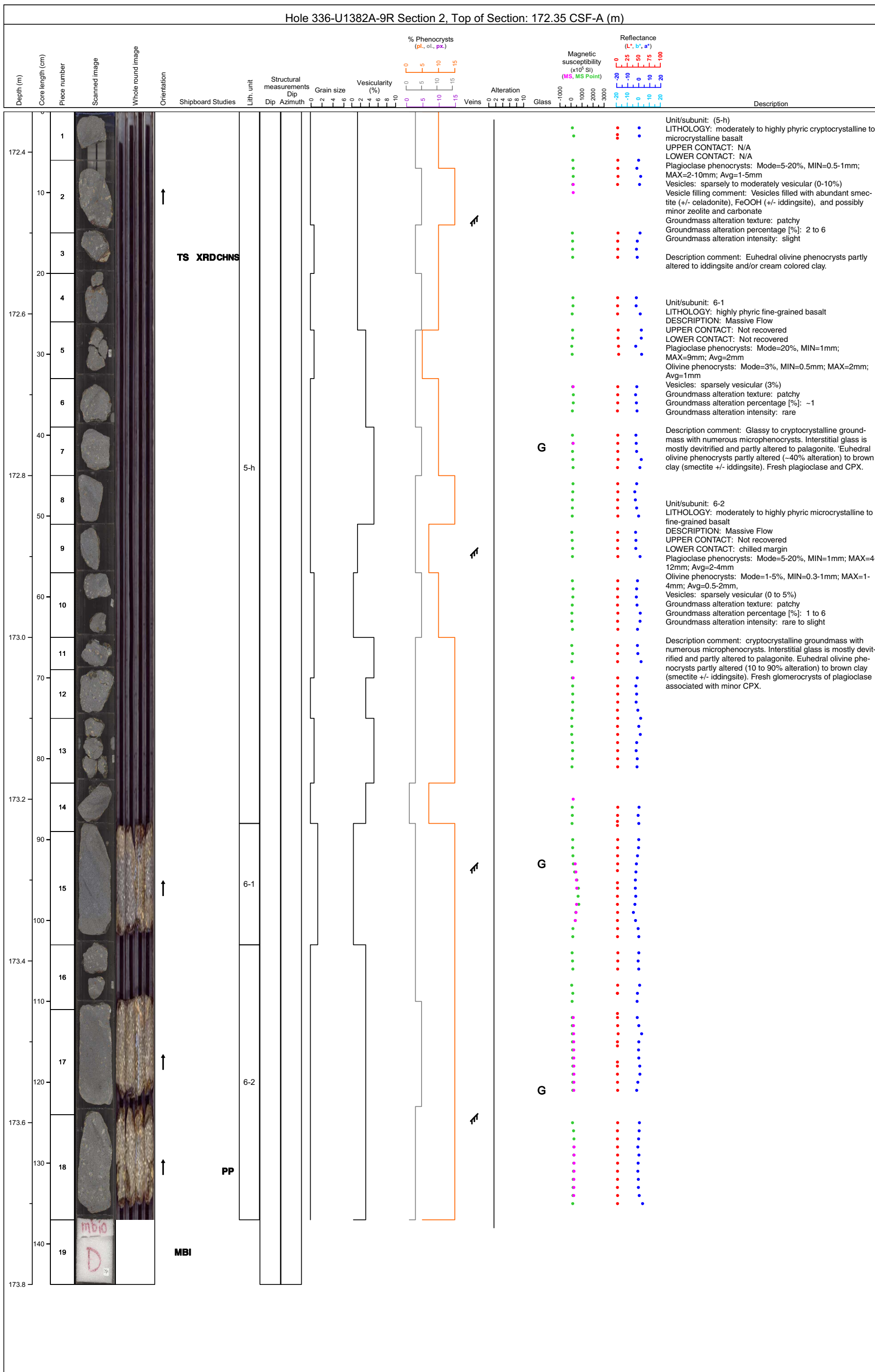
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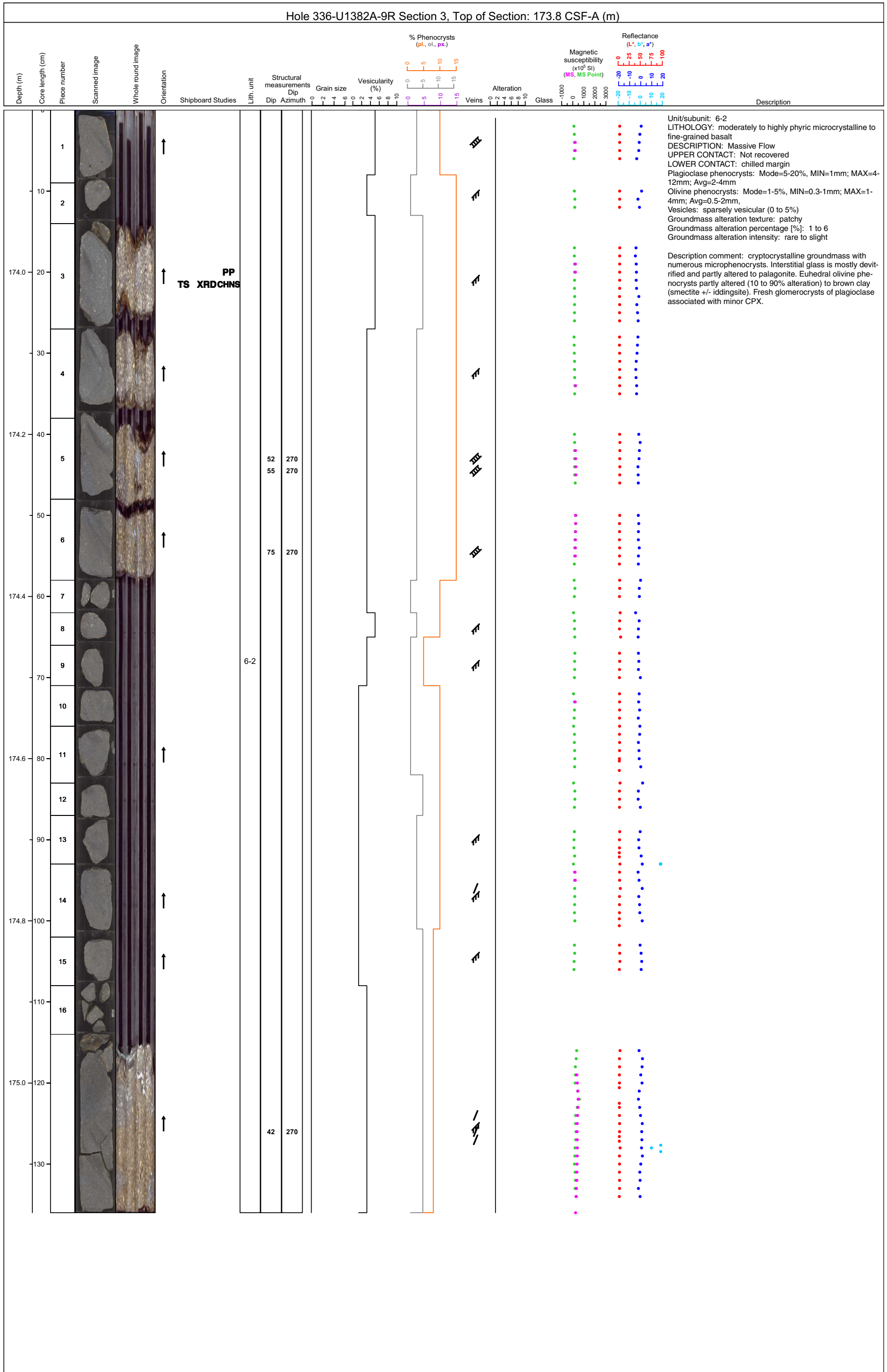


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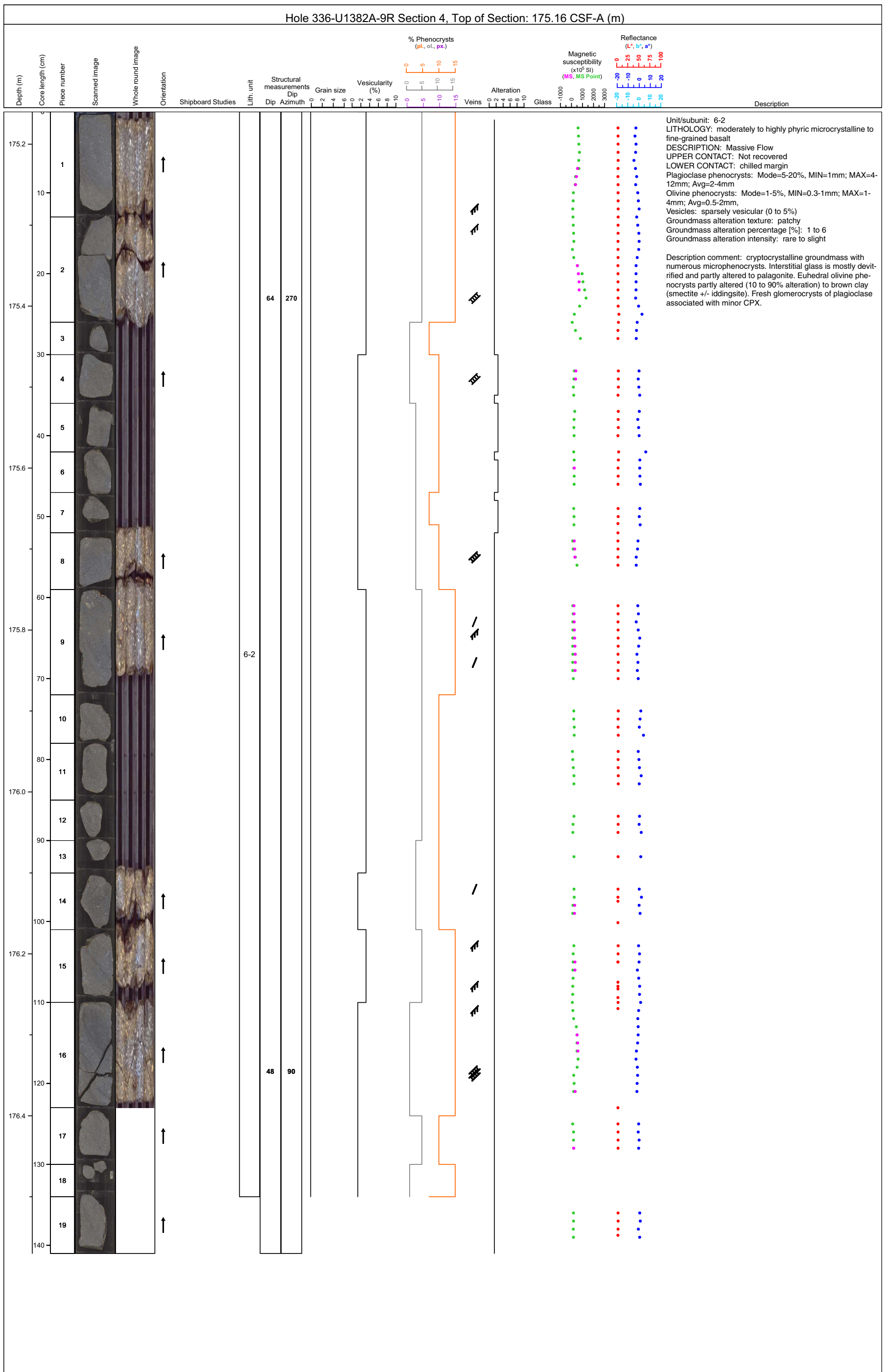




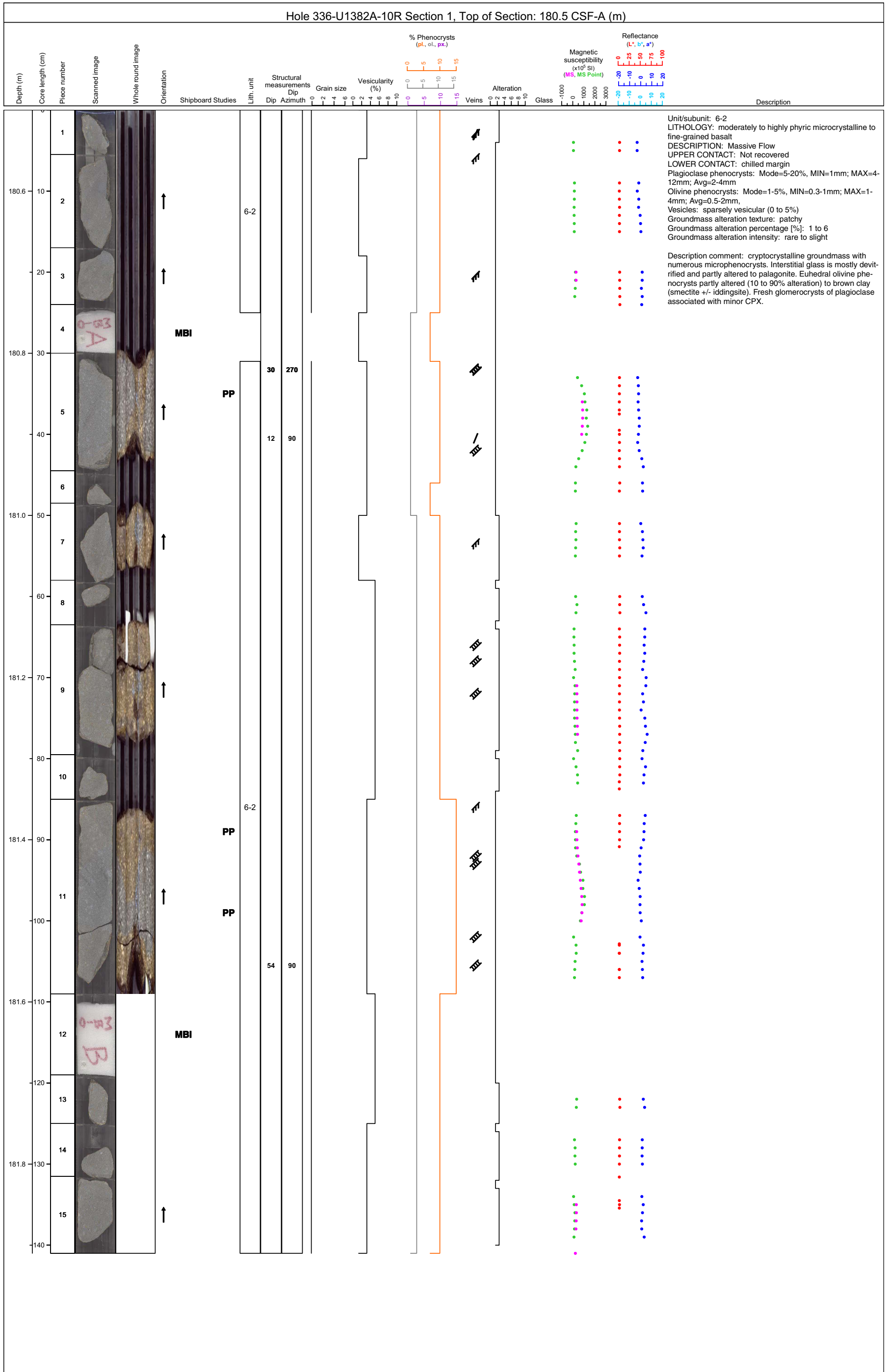
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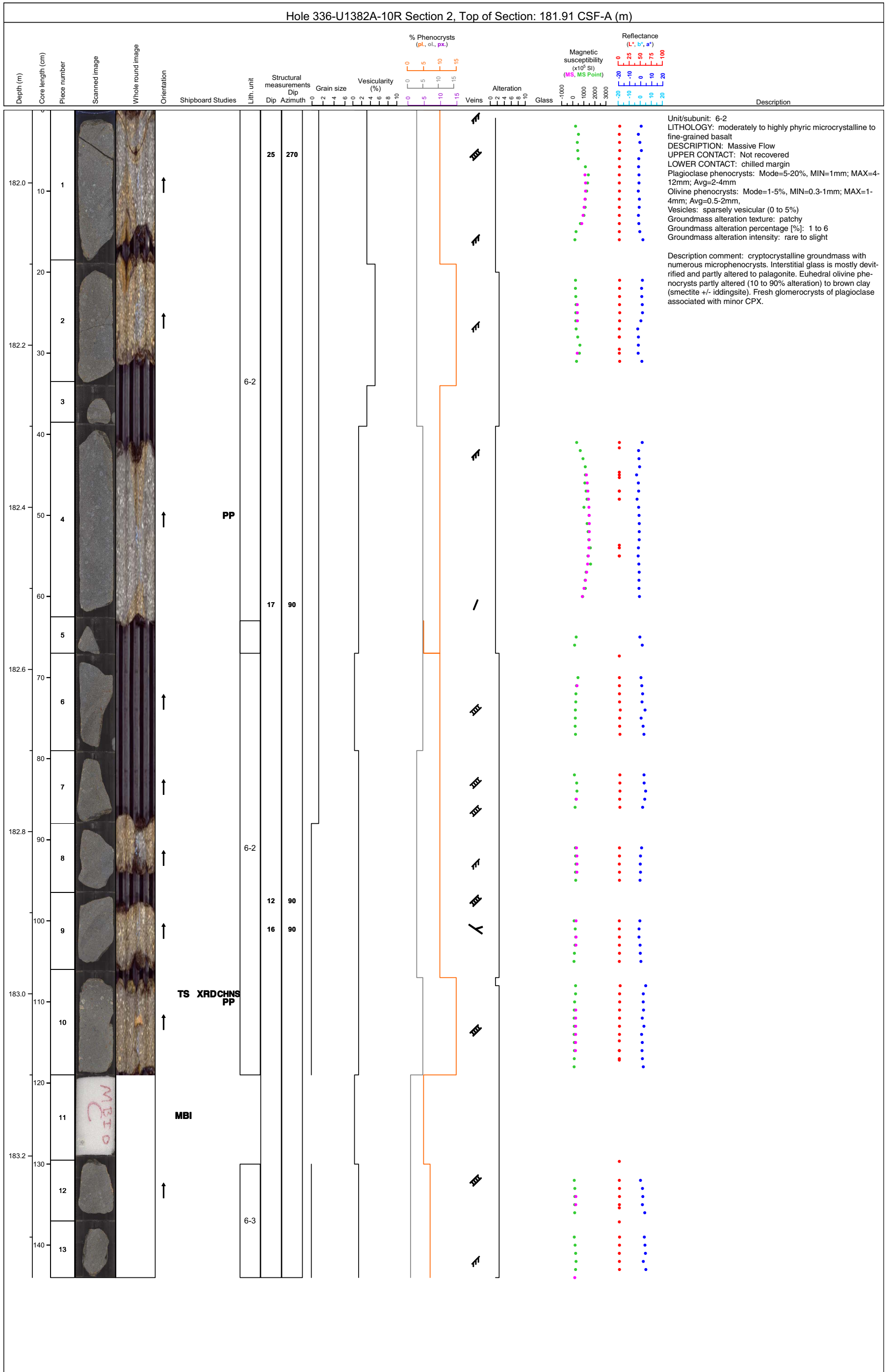
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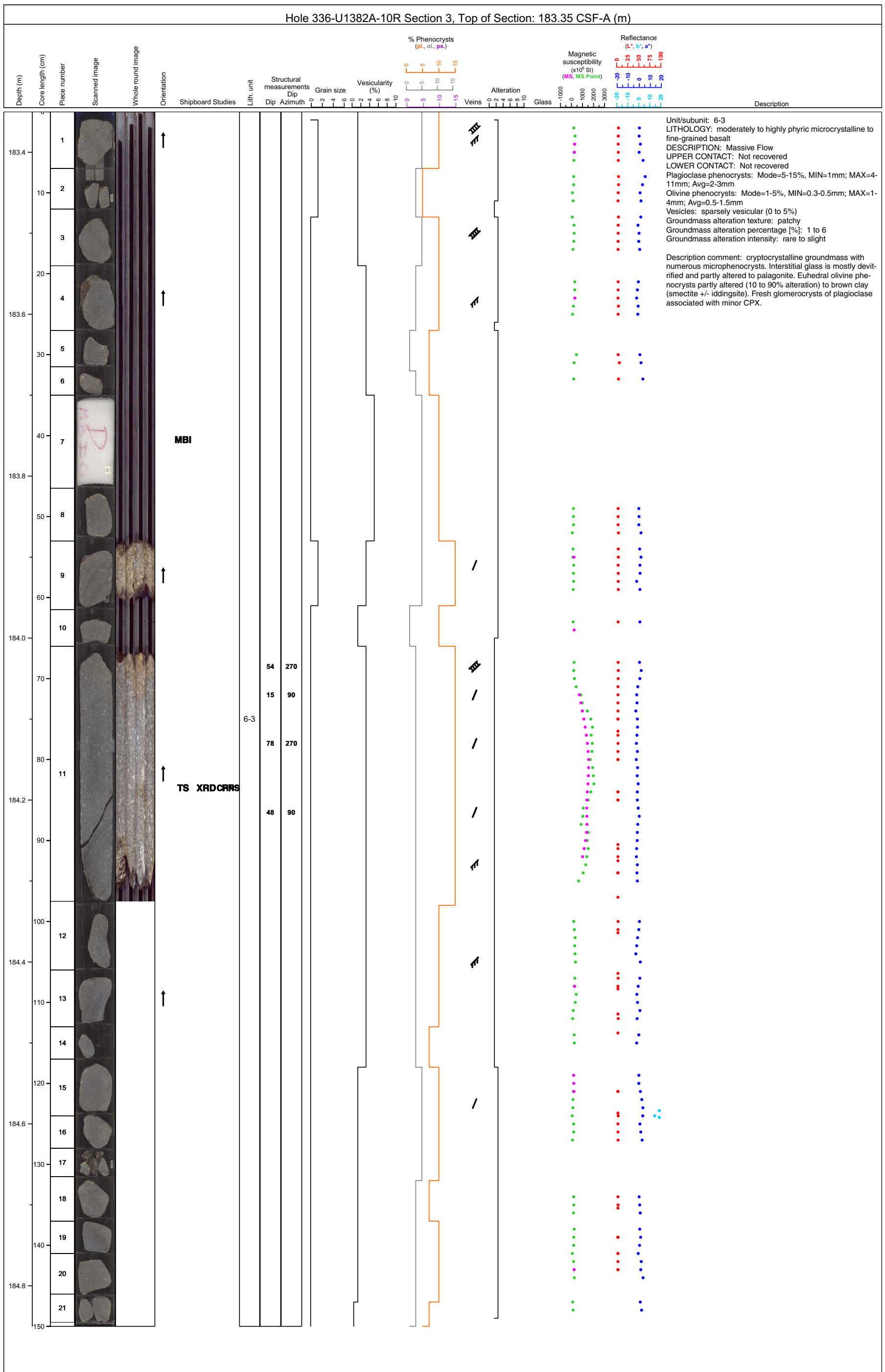
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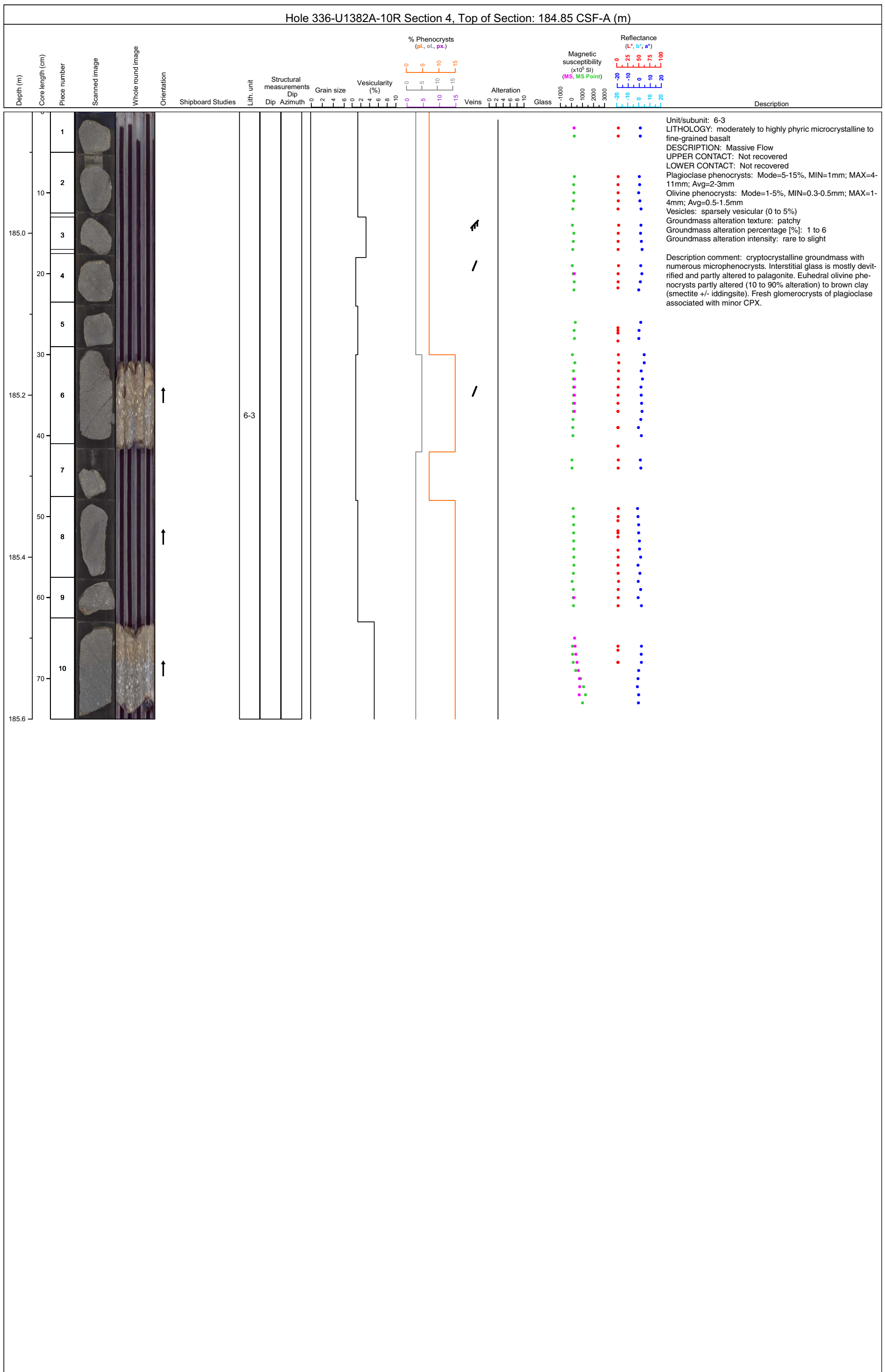
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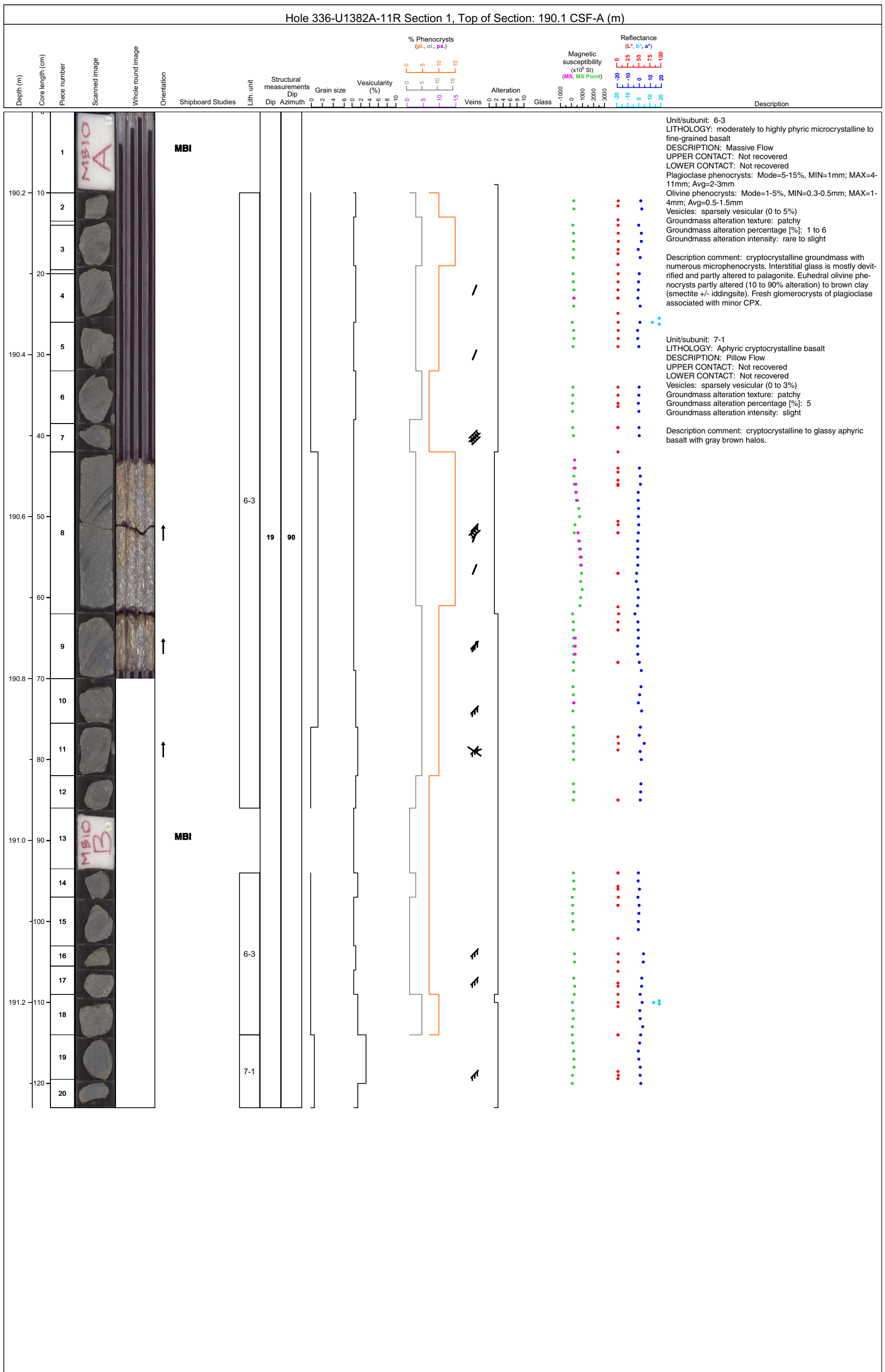
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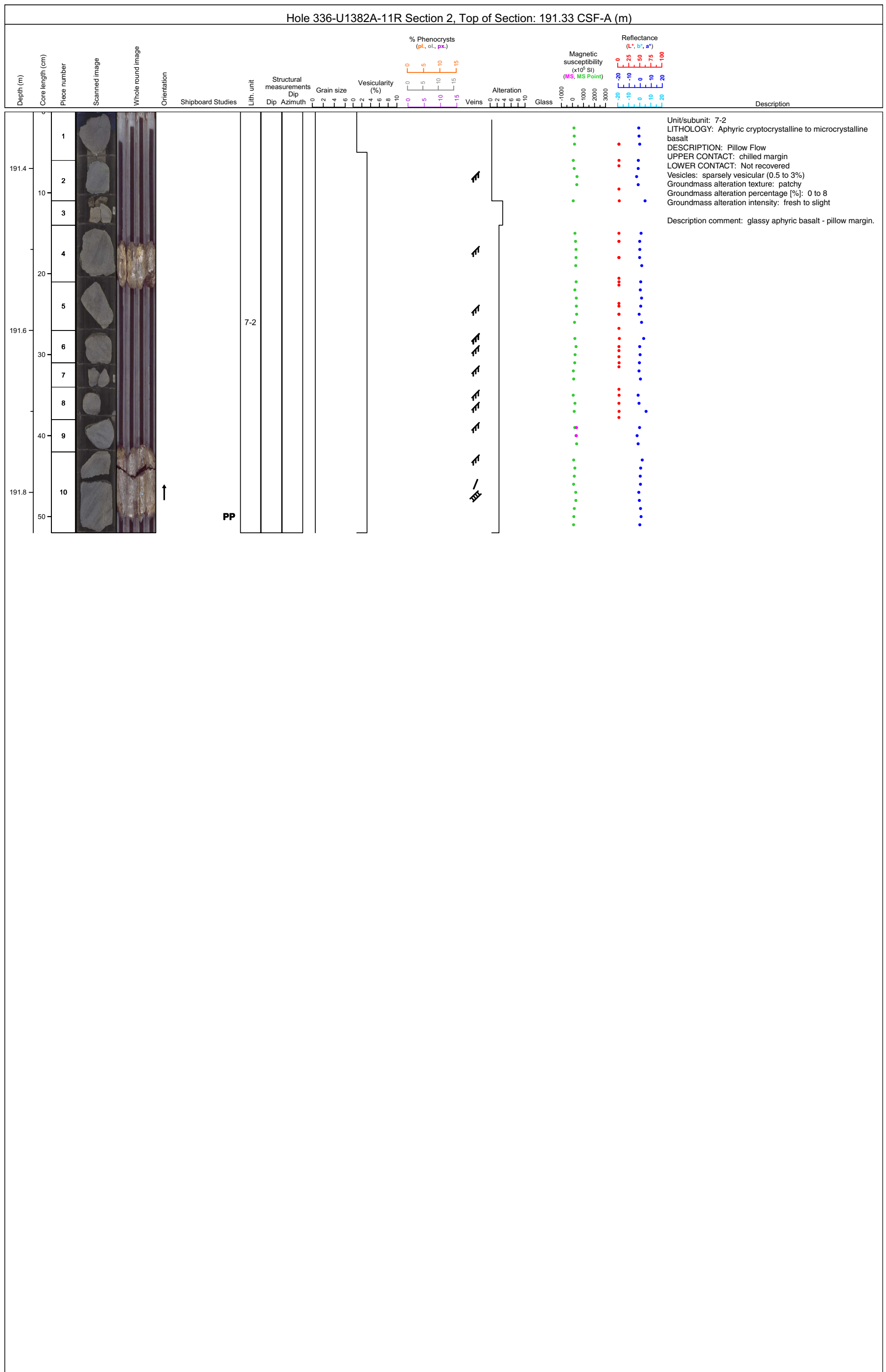
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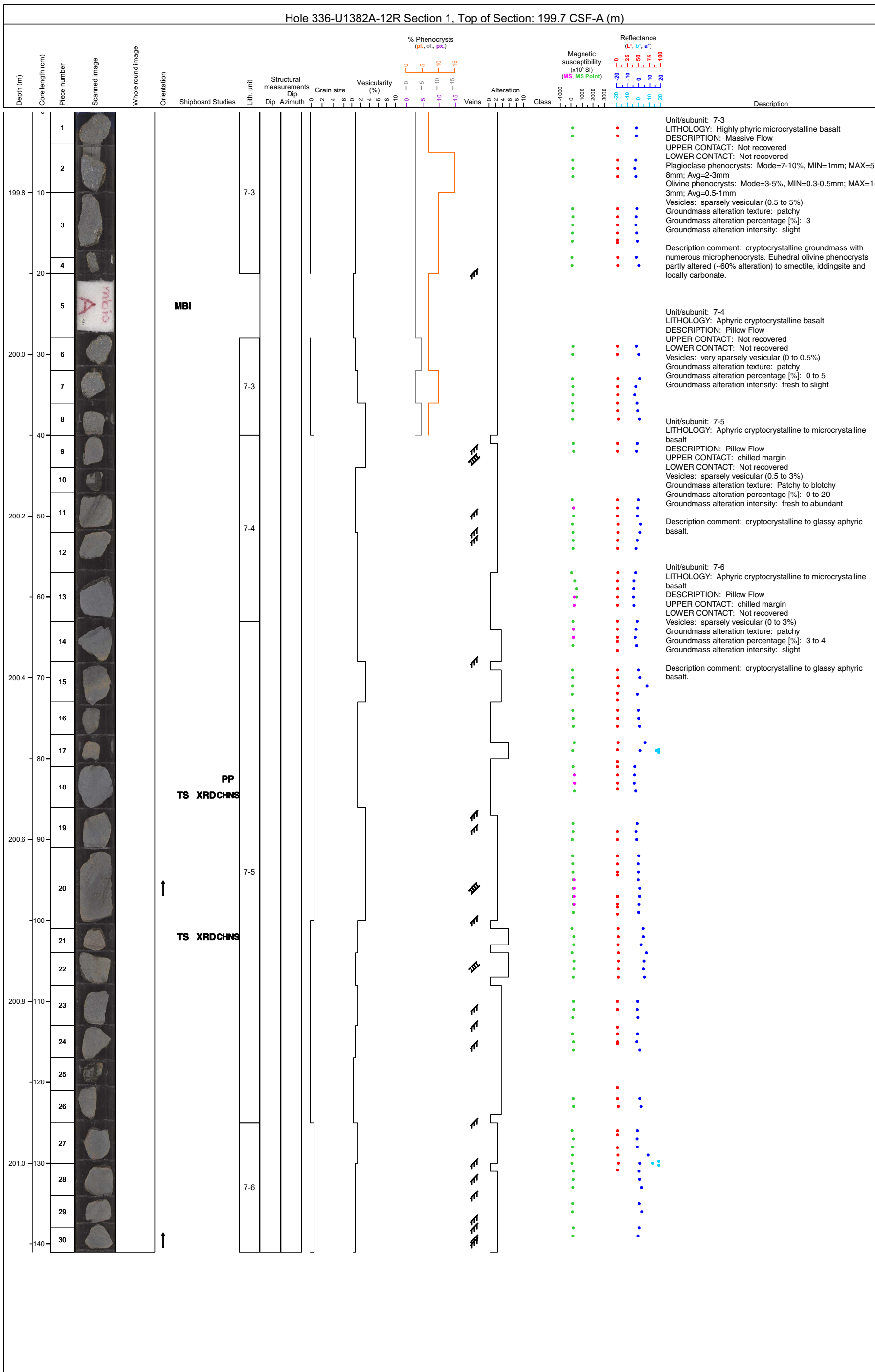


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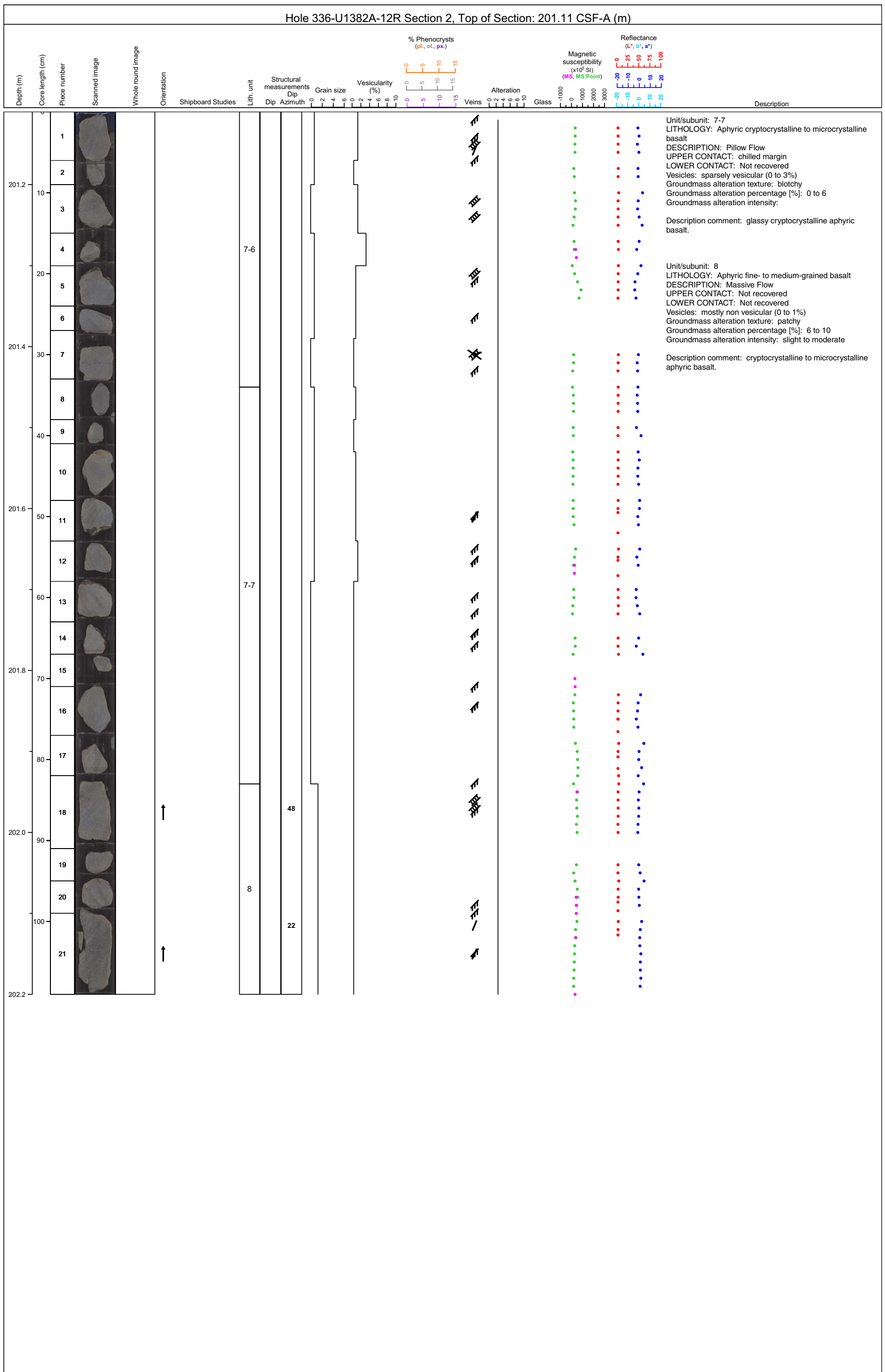




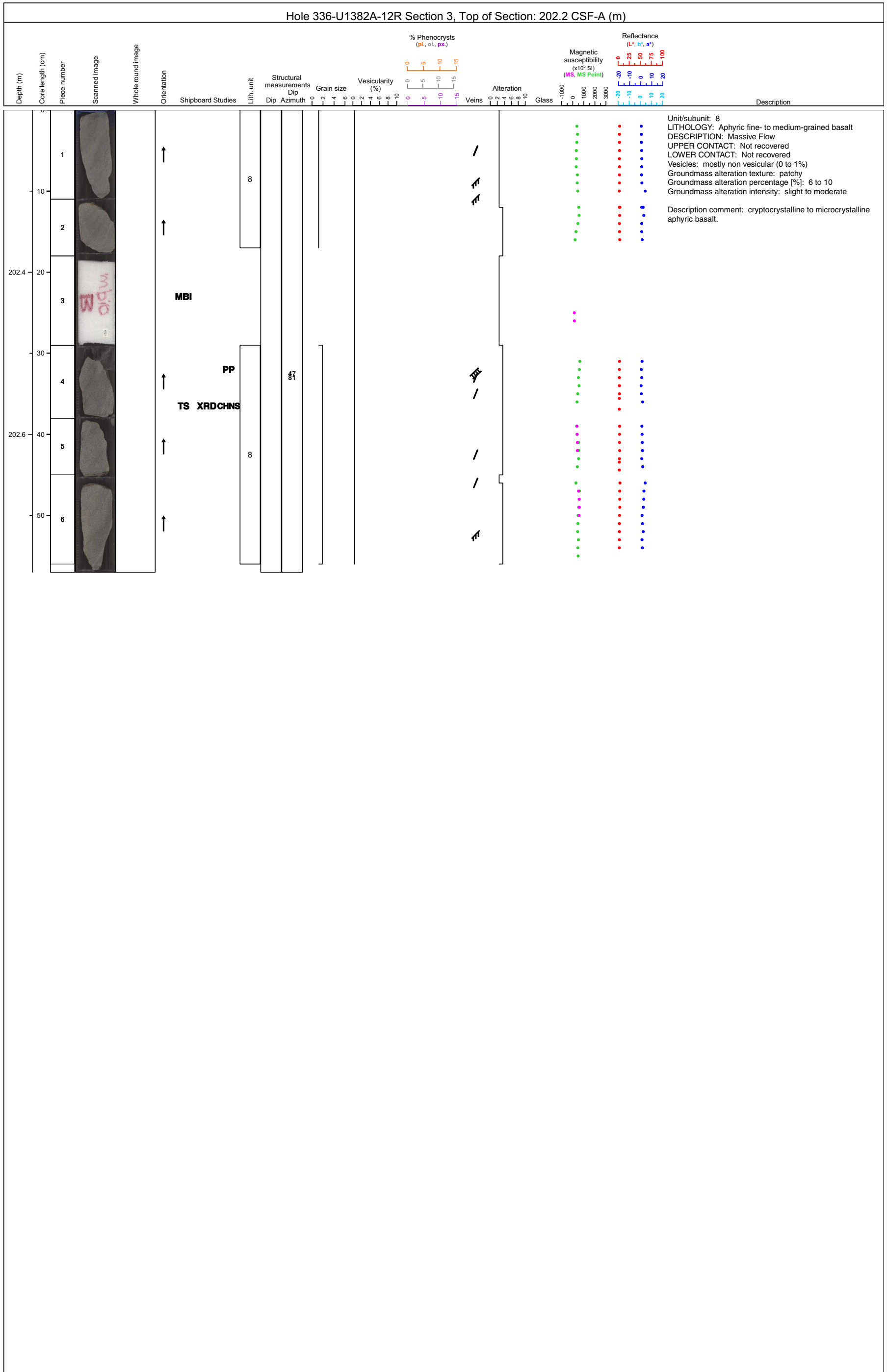
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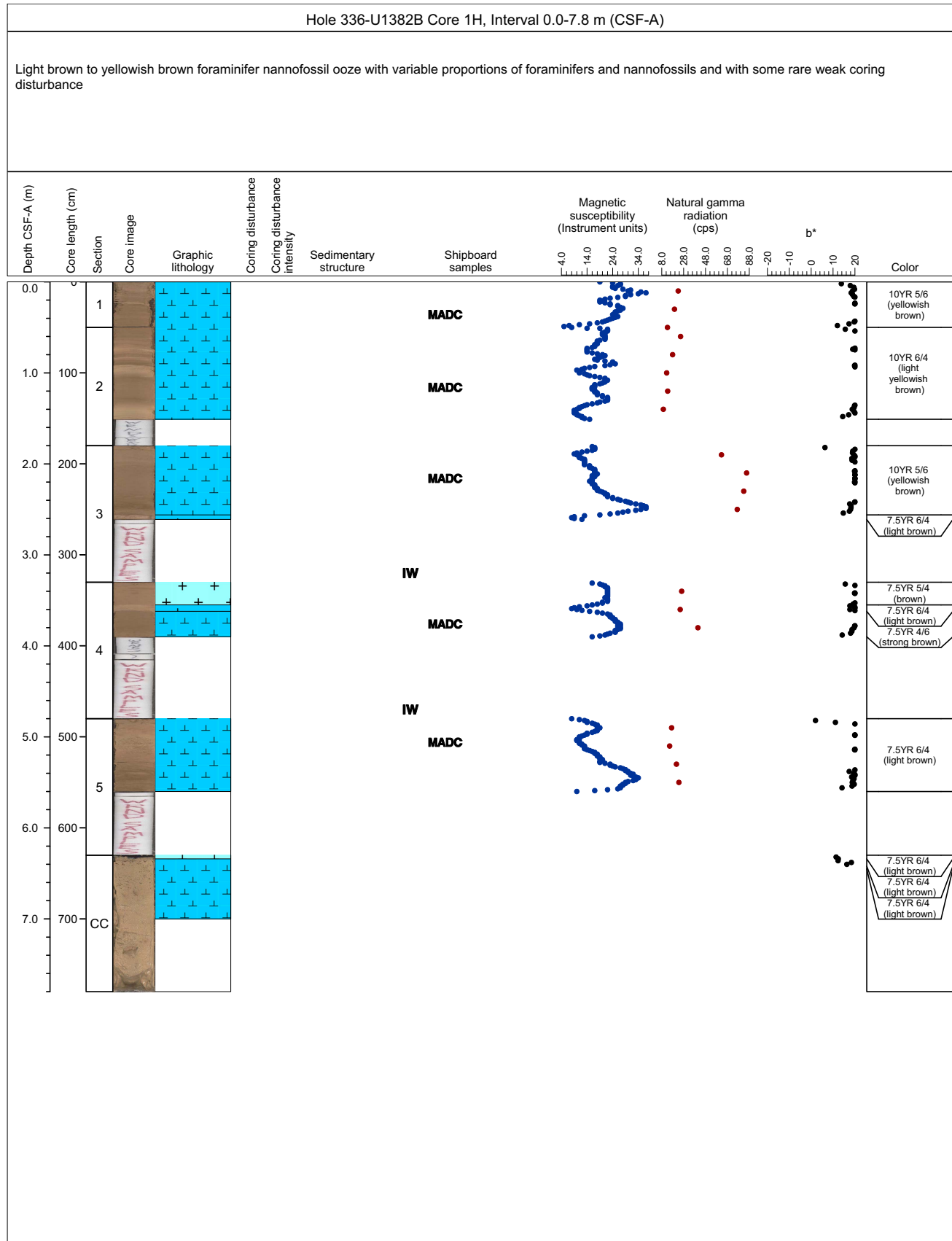
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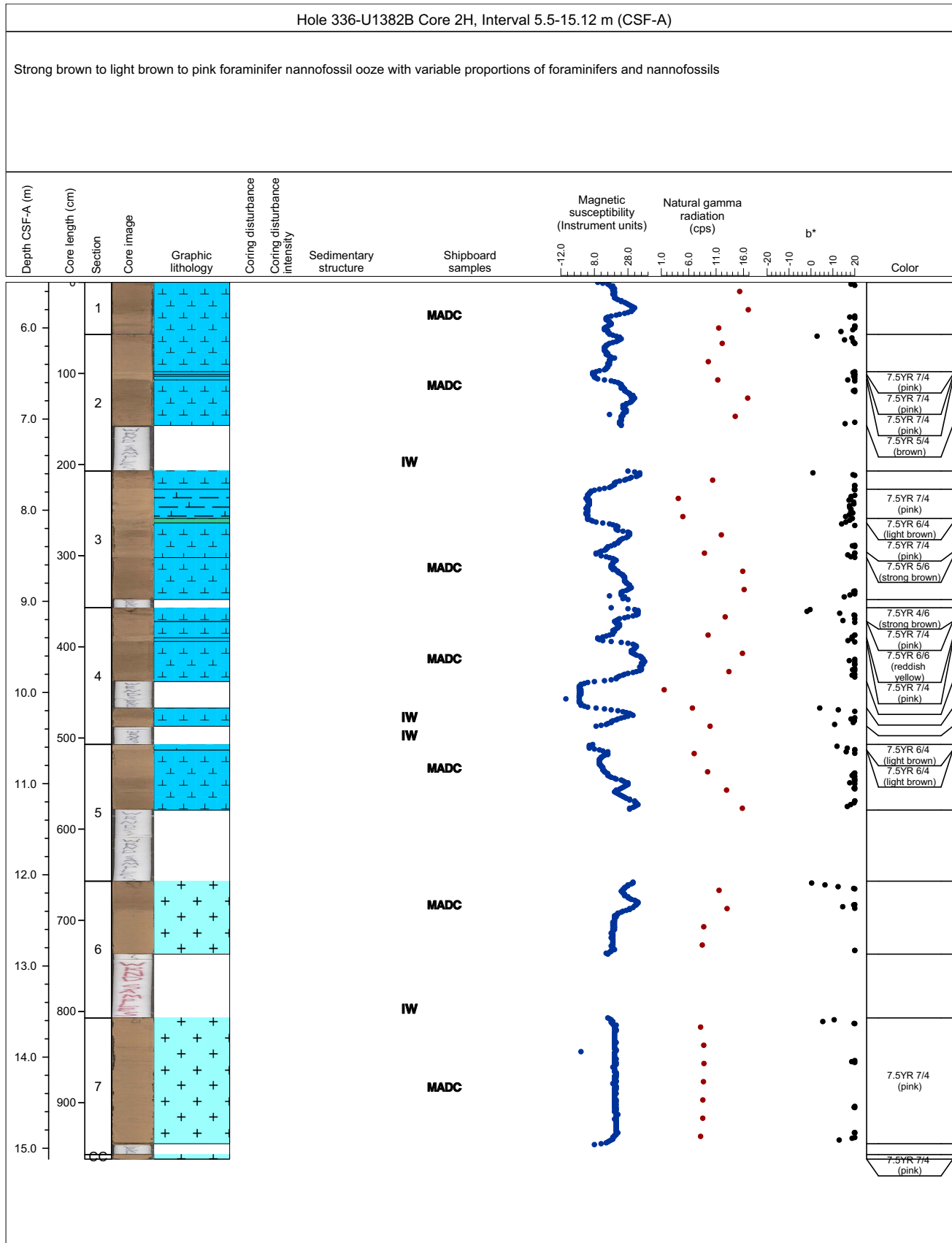
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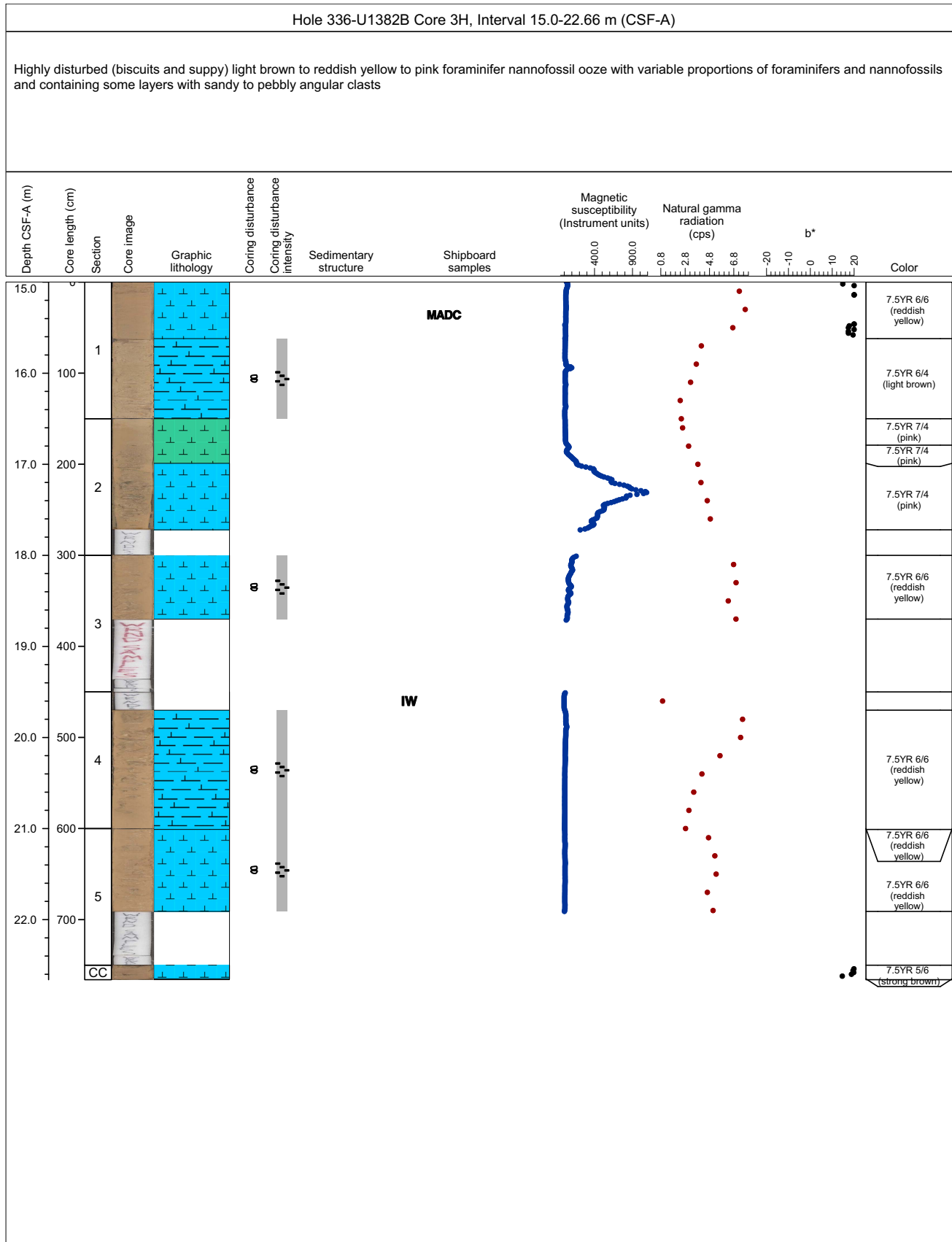
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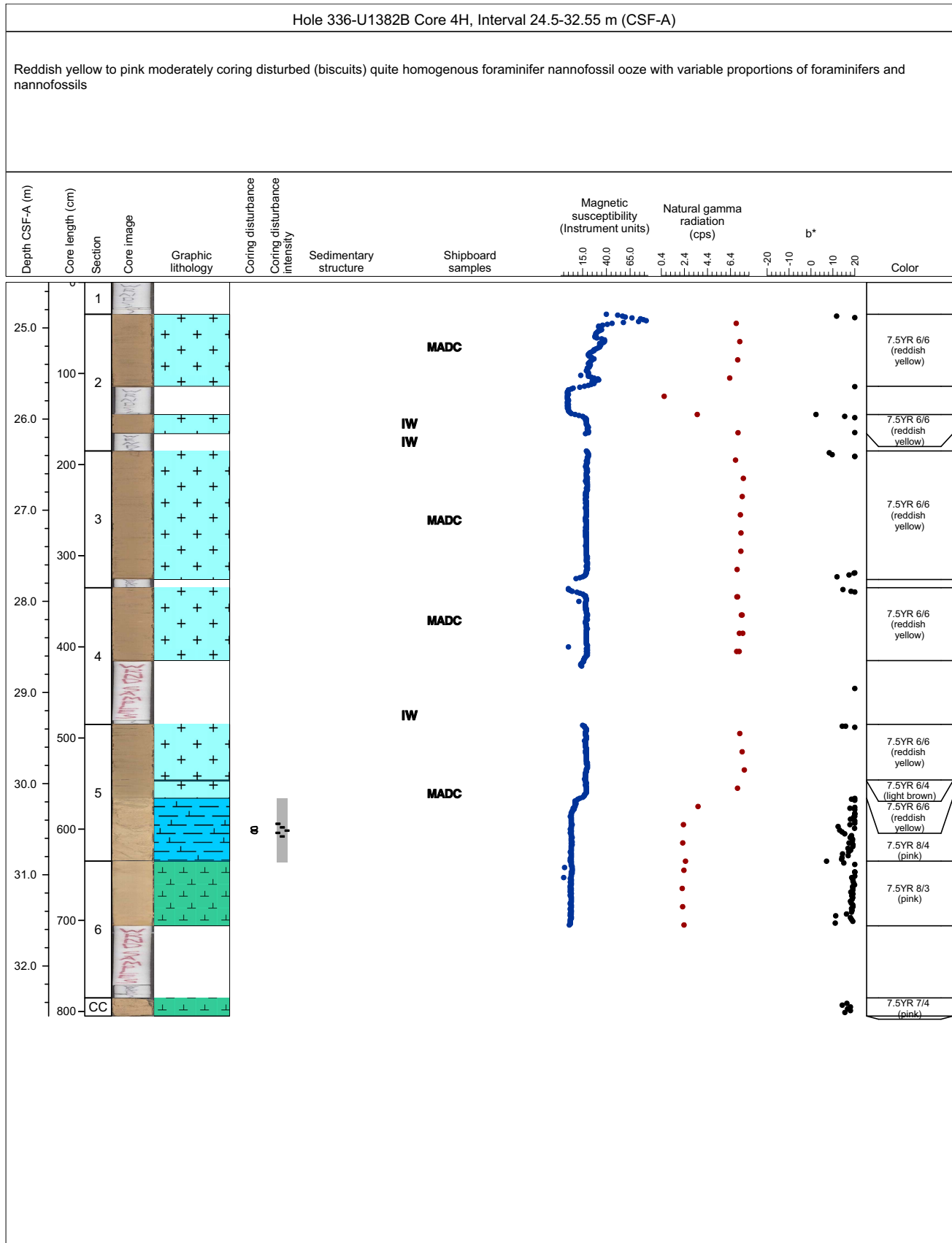
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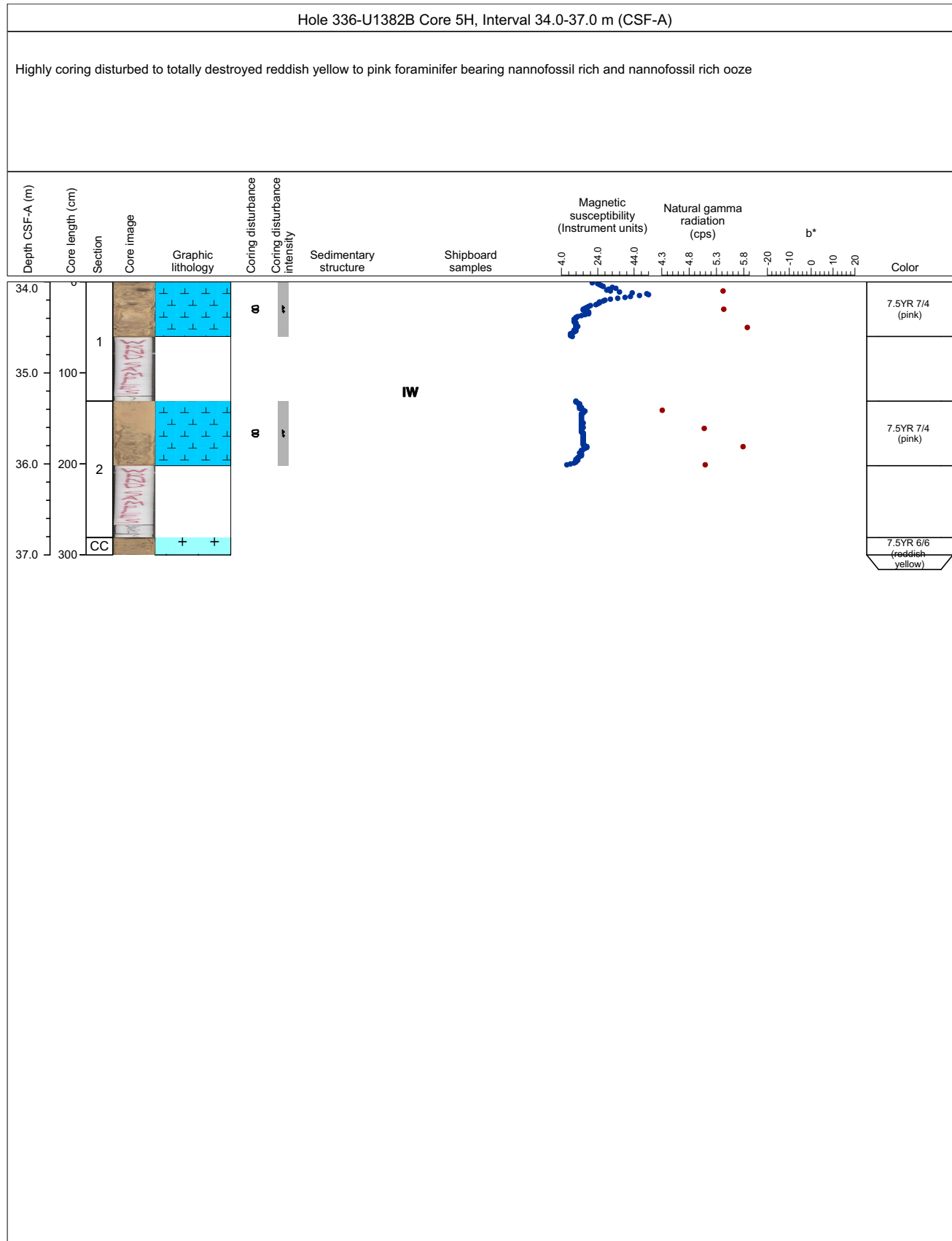
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### Core Photo

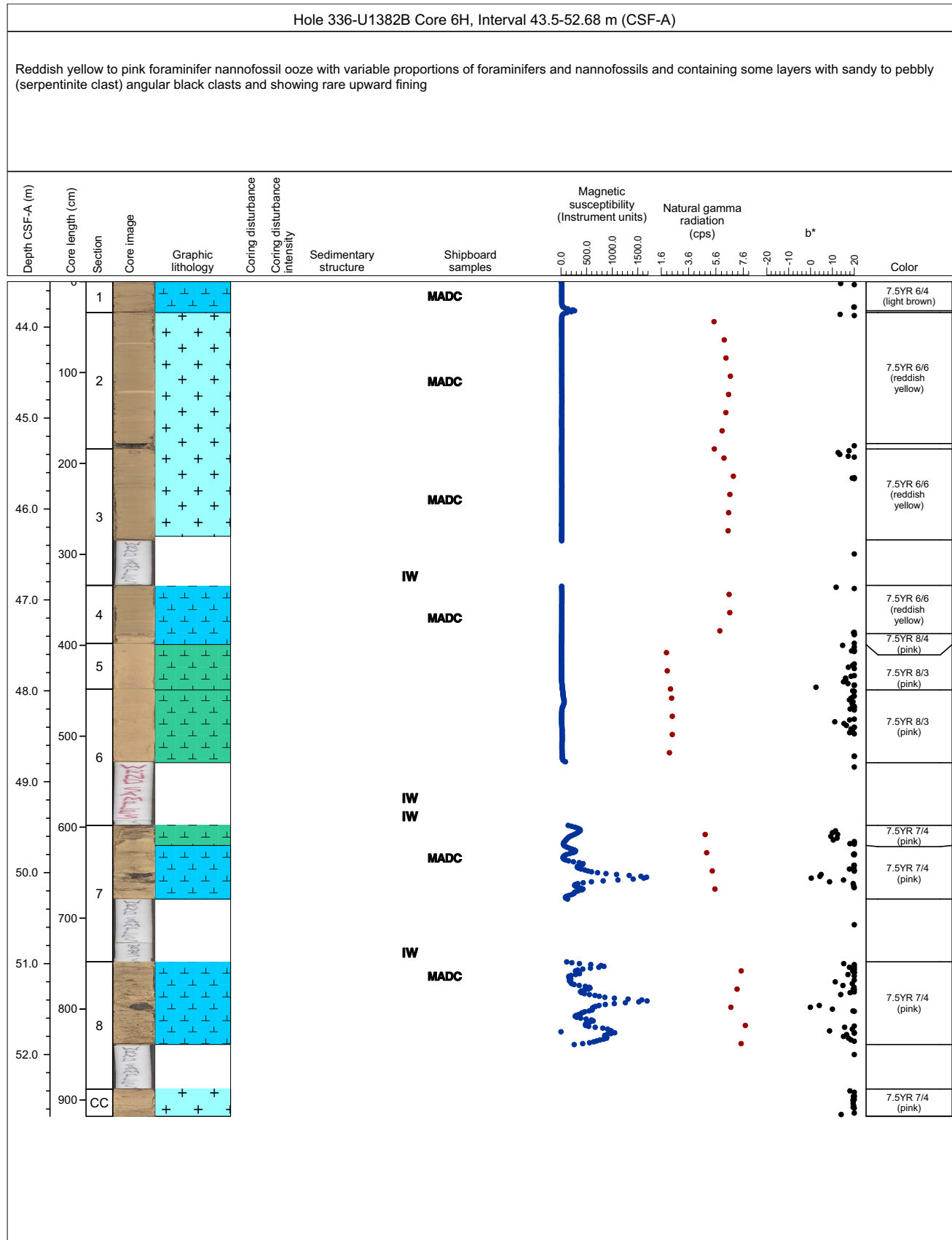


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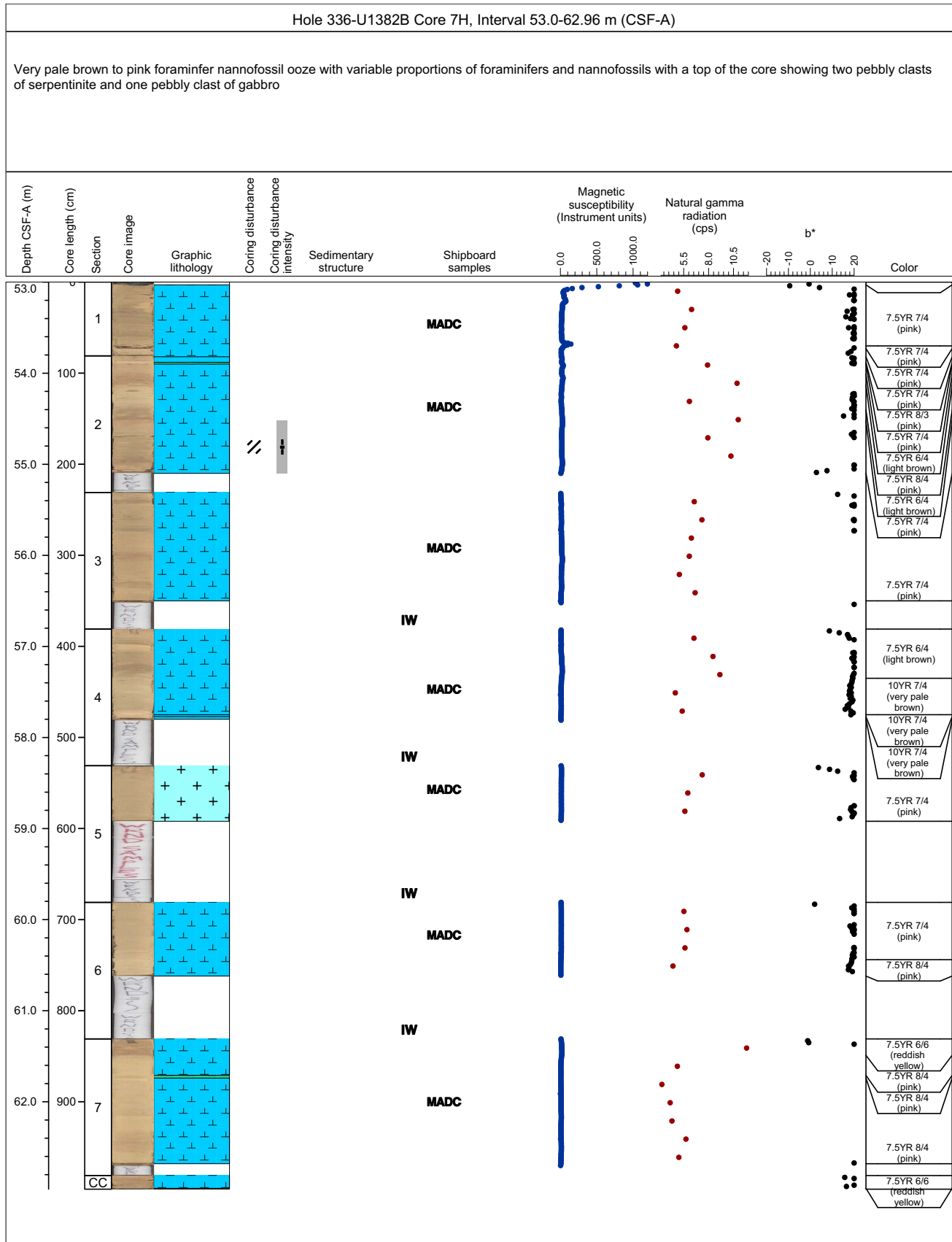




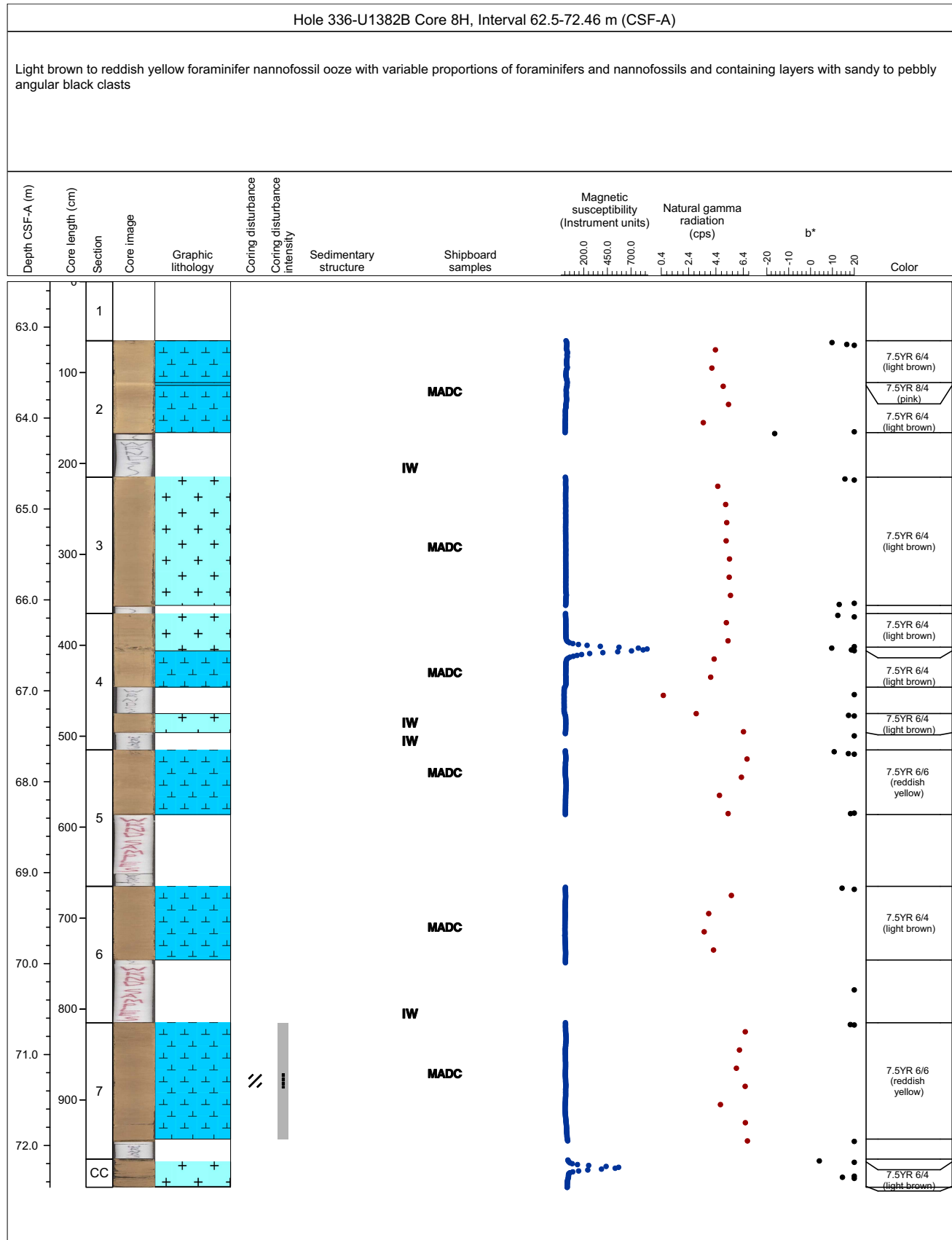
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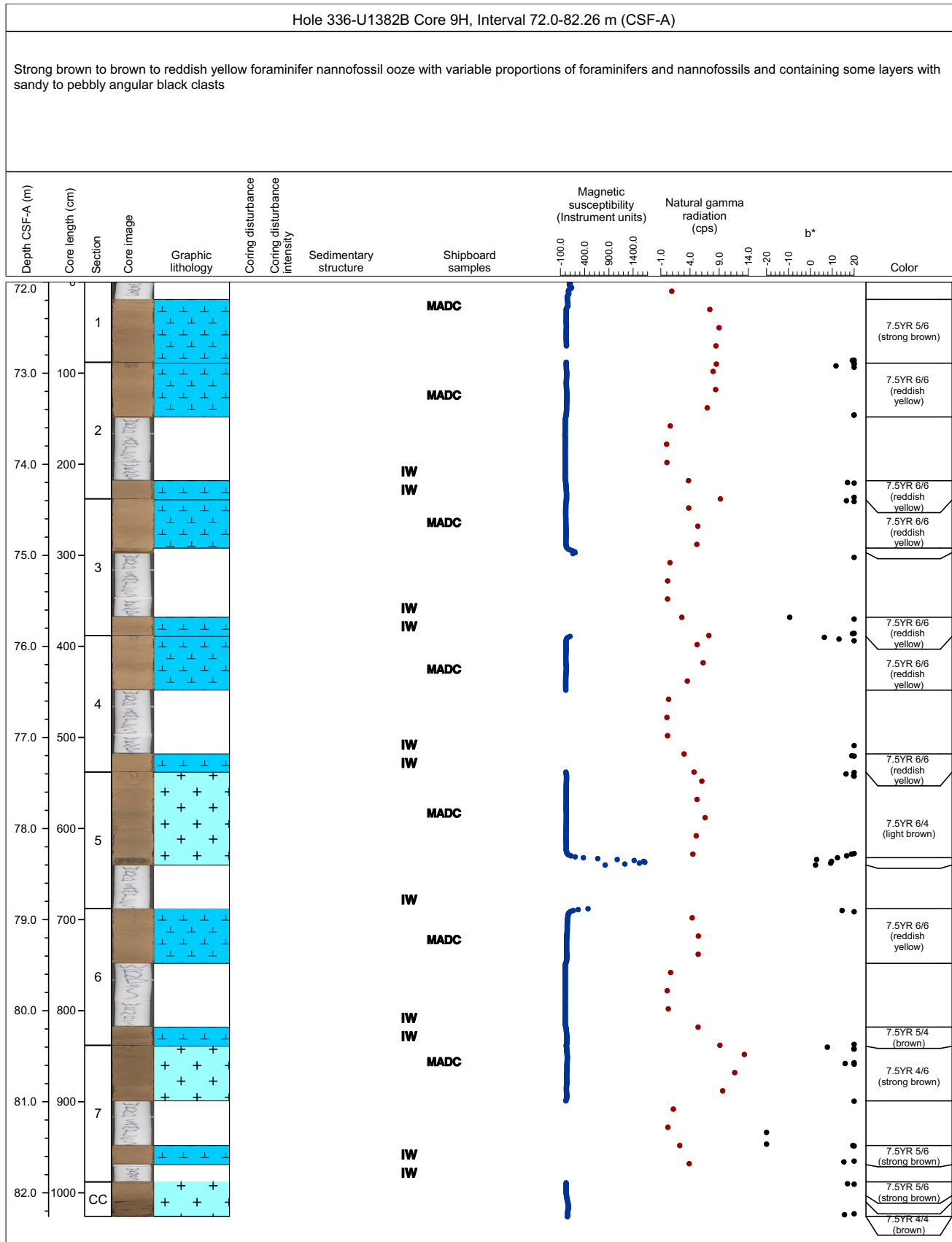
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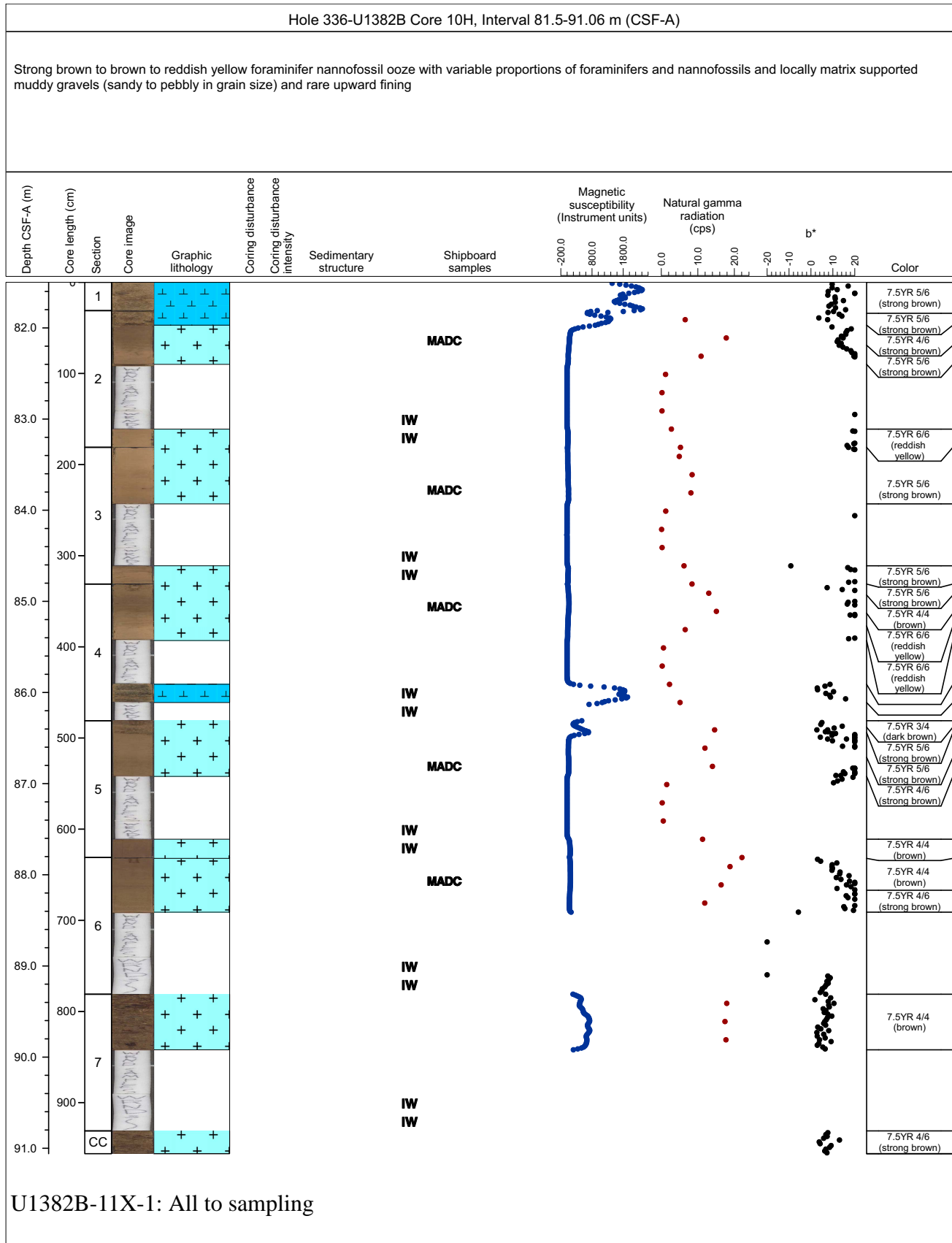
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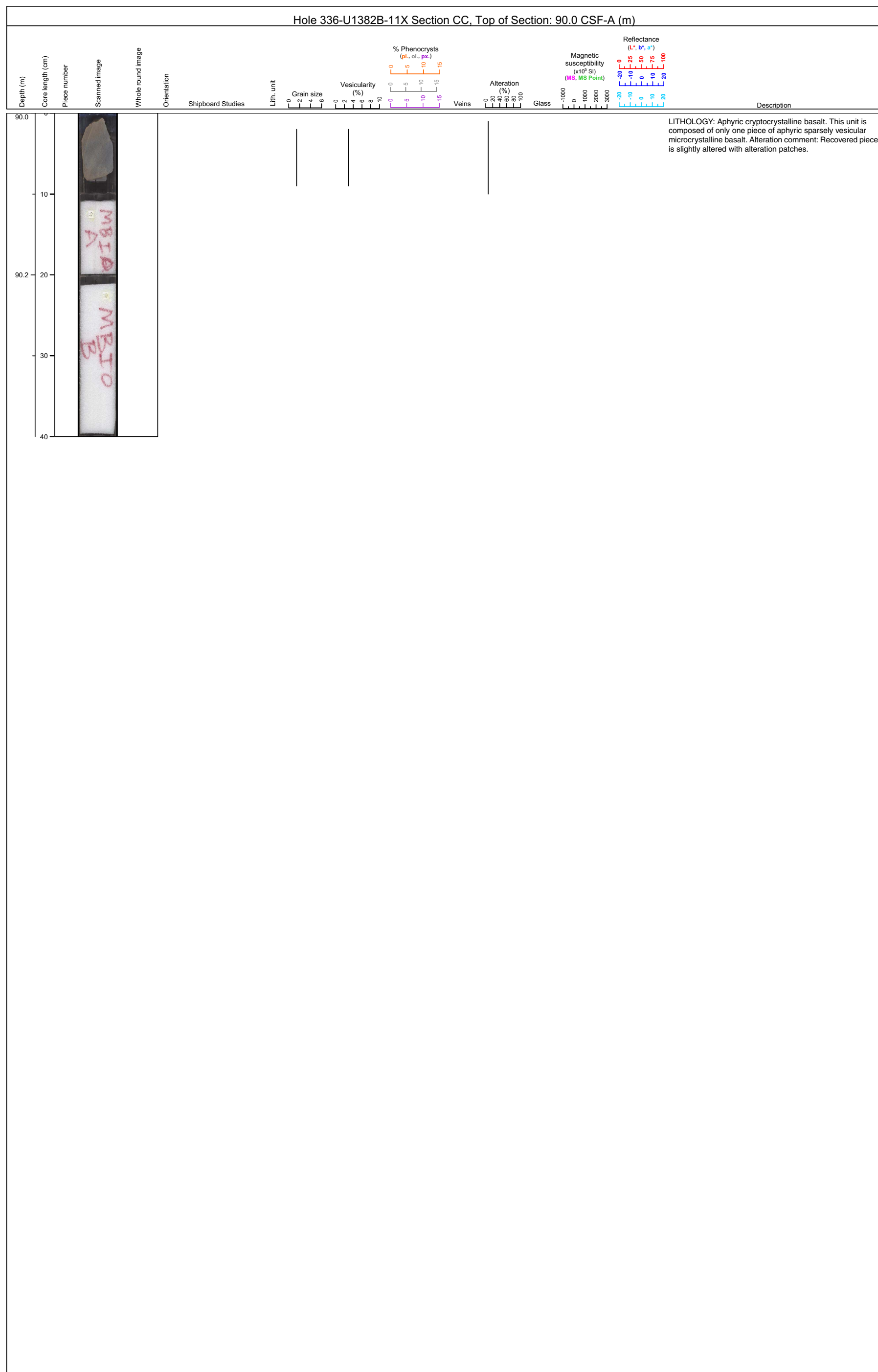
### Core Photo




### Core Photo



### Core Photo



Core Photo

Hole 336-U1382B-12X Section 1, Top of Section: 94.7 CSF-A (m)																
Depth (m)	Core length (cm)	Piece number	Scanned image	Whole round image	Orientation	Shipboard Studies	Lith. unit	Grain size	Vesicularity (%)	% Phenocrysts (pl., cl., pk.)	Alteration (%)	Veins	Glass	Magnetic susceptibility (x10 <sup>6</sup> SI) (MS, MS Point)	Reflectance (L*, b*, a*)	Description
94.8	10															LITHOLOGY: Serpentinite, talc-amphibolite. This unit is composed of mainly serpentinite and talc-amphibolite. All samples show pebble-sized and angular, subangular to subrounded shape, which they suffer serpentinization and oxidization. It appear to be hard to look for deformation feature due to small sample size. Talc-amphibolite show well-developed schistsity defined by the oriented talc and amphi-bole.





Sample	Top [cm]	Bottom [cm]	Top Depth [m]	Bottom Depth [m]	Sample domain where smear slide taken	Gravel texture [%]	Sand texture [%]	Silt texture [%]	Clay texture [%]	Glass [%]	Paleogonite [%]	Other mineral grains [%]	Calcareous nannofossils [%]	Benthic foraminifers [%]	Planktonic foraminifers [%]	Radiolarians [%]	Dinoflagellate, acritarch, prasinophyte [%]	Other microfossils [%]	Amorphous lump.siliceous [%]	Amorphous lump. calcareous [%]	Smear slide comment	Prefix	Principal lithology	Lithology complete name	Ship File Links	Shore File Links
336-U1382A-8R-2-IW-WR-IWSC-IWSC-SS10	16	17	162.920	162.930	inter-basalt	0	10	90	5	2	20	70	1	1	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-2-W 1/2-SS4	1	2	162.610	162.620	inter-basalt	0	10	90	5	2	20	70	1	1	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-2-W 13/14-SS6	13	14	162.850	162.860	inter-basalt	0	5	95	10	5	10	70	2	2	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-2-W 6/7-SS5	6	7	162.710	162.720	inter-basalt	0	10	90	5	2	20	70	1	1	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-3-IW-WR-IWSC-IWSC-SS11	22	23	163.280	163.290	inter-basalt	0	5	95	10	2	15	70	1	1	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-3-W 1/2-SS7	1	2	162.950	162.960	inter-basalt	0	10	90	10	2	10	75	1	1	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-3-W 12/13-SS9	12	13	163.170	163.180	inter-basalt	0	10	90	5	2	10	80	1	1	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-3-W 7/8-SS8	7	8	163.070	163.080	inter-basalt	0	5	95	10	2	10	75	1	1	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-4-W 15/16-SS2	15	16	163.650	163.660	inter-basalt	0	10	90	10	2	14	70	1	1	1	1					semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-4-W 24/25-SS3	24	25	163.830	163.840	inter-basalt	0	15	85	20	2	15	60	1	1	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		
336-U1382A-8R-4-W 37/38-SS12	37	38	164.090	164.100	inter-basalt	30	10	20	40	25	7	25	40	1	1	1					nannofossil-rich	polymictic	breccia	polymictic breccia		
336-U1382A-8R-4-W 7/8-SS1	7	8	163.490	163.500	inter-basalt	0	10	90	10	5	15	65	2	2	1						semi-consolidated	nannofossil	ooze	nannofossil ooze		





**Thin section:** 336-U1382A-3R-2-W 99/101-TSB#1-TS#1 99-101  
**Piece number:** 11  
**Depth CSF-A (m):** 115.790 - 115.810  
**Rock name:** aphyric sparsely vesicular basalt  
**Grain size:** medium grained  
**Texture:** subophitic to intersertal

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	3	8	0.1	0.6	0.3	euohedral, equant	clay, FeOOH and minor carbonate	often as inclusion in plagioclase
Plagioclase	40	42	0.2	4	2	euohedral, tabular	minor clay alteration	Large laths, minor needles in interstitial mesostasis
Clinopyroxene	35	36	0.2	2.5	1	anhedral	rare clay	interstitial between laths
Fe-Ti oxide	2	2	0.02	0.2	0.05	skeletal	fresh	
Sulfide	tr.	tr.						
Mesostasis	3	10						

Secondary mineralogy	Percent	Size			Replacing/filling	Comments
		min	max	mode		
Green clay	13				Olivine, plagioclase, mesostasis	
FeOOH	3				Olivine, filling vugs	pre-dates carbonate precipitation
Carbonate	1				filling vugs	rare after olivine

Vesicles	Present	Original	min	max	mode	Shape	Comments

**Total Alteration:** 17  
**Structure:** granular to intersertal  
**Comments:**



**Thin section:** 336-U1382A-3R-3-W 28/31-TSB#2-TS#2 28-31  
**Piece number:** 3  
**Depth CSF-A (m):** 116.470 - 116.500  
**Rock name:** aphyric avescicular basalt  
**Grain size:** medium grained  
**Texture:** subophitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	0	8	0.1	0.4	0.2	equant	clay, FeOOH and minor carbonate	
Plagioclase	43	45	1	5	3	tabular	minor clay alteration	
Clinopyroxene	35	37	0.1	2	1	anhedral	minor clay alteration	
Fe-Ti oxide						anhedral, elongate, skeletal		
Sulfide	tr.	2	0.05	0.2	0.1	anhedral		very rare , associated with Fe-oxide, porbably secondary origin in interstices
Mesostasis	3	10						
Secondary mineralogy	Percent		min	max	mode		Replacing/filling	Comments
Green clay	5						plagioclase, CPX	along cracks
Brown clay	10						mesostasis, olivine	reddish-brown isotropic clay (palagonite)
FeOOH	3						olivine	complete replacement of olivine with reddish color, and tortoise-shell structure of oxide
Vesicles	Present	Original	min	max	mode	Shape		Comments
<b>Total Alteration:</b> 18								
<b>Structure:</b> Avesicular, Subophitic								
<b>Comments:</b>								



**Thin section:** 336-U1382A-3R-4-W 95/99-TSB#3-TS#3 95-98.5  
**Piece number:** 11  
**Depth CSF-A (m):** 118.550 - 118.585  
**Rock name:** aphyric sparsely vesicular basalt  
**Grain size:** medium grained  
**Texture:** subophitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
							0.5% weak alteration of olivine replaced by clay along grain boundaries and cracks incipient alteration of plagio along cracks	often as inclusion in plagioclase
Olivine	6.5	7	0.1	0.5	0.2	equant		
Plagioclase	44	45	<0.1	3	1.5	tabular		
Clinopyroxene	40	40	<0.1	2	1	anhedral		intergrown with CPX
Fe-Ti oxide						sub to		intergrown with plagioclase
Sulfide	2	2	0.02	0.08	0.04	anhedral		leaf-like skeletal crystal spherical to elongate. Some inclusion of of sulfides in plagioclase
	tr.	tr.	<0.1	<0.1		globular		
Mesostasis	4	6					2% alteration of mesostasis by clay.	interstices between plagioclase laths

Secondary mineralogy	Percent	Size			Replacing/filling	Comments
		min	max	mode		
Green clay	3.5				Mesostasis, PLAG, Olivine	patchy alteration
Pyrite	tr.				cracks in plagioclase	

Vesicles	Present	Original	min	max	mode	Shape	Comments
V1	1	1	0.5	2	1	spherical	

**Total Alteration:** 3.5

**Structure:** Rock has subophitic texture. Oxide and sulfide enriched in mesostasis. Some sulfide inclusion in plagioclases, Ultratrace of secondary sulfide along crack in plagioclase.

**Comments:**



**Thin section:** 336-U1382A-4R-1-W 69/73-TSB#4-TS#4 69-73  
**Piece number:** 10  
**Depth CSF-A (m):** 123.590 - 123.630  
**Rock name:** aphyric avescicular basalt  
**Grain size:** crypto- to microcrystalline  
**Texture:** aphanitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
						Skeletal, hopper-type microphenocrysts	clay and minor FeOOH	linked-chain elongate aggregates of olivine microphenocrysts intergrown with CPX
Olivine	4.8	5	<0.01	0.25	0.05			
Plagioclase	20	20		0.1		needle anhedral, skeletal		
Clinopyroxene	10	10		0.1		equant anhedral		
Fe-Ti oxide	1	1		<0.001				in mesostasis
Sulfide	tr.	tr.		<0.005		equant		44% cryptocrystalline (buff-colored and black); 20% microcrystalline (needles of plagioclase and Cpx faintly discernable in mesostasis)
Mesostasis	63	64						

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Green clay	1				Olivine, crypto and microcrystalline mesostasis, vesicule and void fill	
Brown clay	tr.				hairline cracks	reddish- brown
FeOOH	tr.				hairline cracks	reddish- brown

Vesicles	Present	Original	min	max	mode	Shape	Comments
V1							

<b>Total Alteration:</b>	1.2
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Thin section has three domains : (1) cryptocrystalline groundmass with skeletal olivine microcrysts and rare varioles. (2) Variolitic part in the center with numerous varioles consisting of swords of plagioclase needles and linked-chain olivine in a buff matrix lacking varioles (3)microcrystalline part with faint variolitic texture and abundant sheafs of plagioclase needles. olivine microphenocryst contents are uniform. Zone (1) is separated from zone (2) along a sharp, micromiarolitic contact, which is somewhat more clay altered than the rest of the piece which is fresh.

**Structure:**  
**Comments:**



**Thin section:** 336-U1382A-4R-3-W 34/37-TSB#5-TS#5 34-37  
**Piece number:** 8  
**Depth CSF-A (m):** 126.150 - 126.180  
**Rock name:** aphyric avescicular basalt  
**Grain size:** microcrystalline  
**Texture:** aphanitic

		Size							
Primary mineralogy	Percent present	Percent original	min	max	mode	Shape	Replacing/ filling	Comments	
<b>Phenocrysts</b>									
Olivine									
Plagioclase									
Clinopyroxene									
<b>Groundmass/matrix</b>									
Olivine	2	10		0.5		equant to elongate		skeletal linked-chain needles, equant microphenocrysts	
Plagioclase	43	45		0.2		needle		in sheafs and swirls between olivine	
Clinopyroxene	40	42		0.1		anhedral equant		between plagioclase needles	
Fe-Ti oxide	3	3		0.06		anhedral equant			
Sulfide	tr.	tr.		0.01		equant grains			
		Size							
Secondary mineralogy	Percent		min	max	mode	Replacing/ filling		Comments	
Green clay	10					olivine, rare after plag+cpx			
						After olivine microphenocrysts sometimes			
FeOOH	2					structurally layered with clay			
Pyrite	tr.					after olivine			
Vesicles	Present	Original	min	max	mode	Shape		Comments	
V1									
<b>Total Alteration:</b>	12								
<b>Structure:</b>	Center of crescent-shaped piece is least altered. Margins are noticably altered and oxidized and FeOOH-enriched. Avesicular, minor vugs often filled with clay-FeOOH.								
<b>Comments:</b>									



**Thin section:** 336-U1382A-4R-3-W 39/42-TSB#6-TS#6 39-42  
**Piece number:** 9  
**Depth CSF-A (m):** 126.200 - 126.230  
**Rock name:** aphyric avescicular basalt  
**Grain size:** fine-grained  
**Texture:** intersertal

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine						subhedral to skeletal		
Plagioclase						needle		belt-buckle shaped, sieve textured
Clinopyroxene								acicular sheafs surrounding olivines interstitial between plagioclase needles
<b>Groundmass/matrix</b>								
Olivine	8	12	0.05	0.5	0.1	subhedral to skeletal		
Plagioclase	47	48	0.05	2	0.5	needle		
Clinopyroxene	36	36	-			anhedral		
Fe-Ti oxide	2	2	0.01	0.08	0.02	anhedral, equant		
Sulfide	tr.	tr.				equant		
Glass		2						interstitial and in center of sieve-textured olivine

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Green clay	6				olivine, rare plag	
FeOOH	1				olivine	
Pyrite	tr.				ultratrace after olivine	

Vesicles	Present	Original	min	max	mode	Shape	Comments
V1							

**Total Alteration:** 7  
**Structure:** Uneven distribution of extent of alteration  
**Comments:**



**Thin section:** 336-U1382A-5R-1-W 32/36-TSB#7-TS#7 32-36  
**Piece number:** 7  
**Depth CSF-A (m):** 132.820 - 132.860  
**Rock name:** aphyric avescicular basalt  
**Grain size:** microcrystalline  
**Texture:** aphanitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	tr.	8		1		elongated	brown to red clay, FeOOH	linked-chain skeletal crystals, strongly altered. rare microphenocrysts
Plagioclase	48	50		0.2		needle in between plag needles		acicular sheafs surrounding olivine
Clinopyroxene	39	40		0.1		elongate skeletal crystals in patches		mostly tiny equant crystal
Fe-Ti oxide	2	2		0.8				
Secondary mineralogy	Percent		min	max	mode	Replacing/ filling		Comments
FeOOH	1							replacing olivine and filling vesicles
Green clay	1						filling vesicles	some vesicles have clay rims and oxide centers
Brown clay	8						replacing olivine	occasionally with oxide
Clay	3							Replacing groundmass
Vesicles	Present	Original	min	max	mode	Shape	Comments	
V1	3.5	5	0.07	1	0.5	spherical	filled/lined with clay	
<b>Total Alteration:</b>	13							
<b>Structure:</b>	Sparsely vesicular							
<b>Comments:</b>								



**Thin section:** 336-U1382A-5R-3-W 29/32-TSB#8-TS#8 29-32  
**Piece number:** 10  
**Depth CSF-A (m):** 135.450 - 135.480  
**Rock name:** aphyric sparsely vesicular basalt  
**Grain size:** microcrystalline  
**Texture:** aphanitic

		Size						
Primary mineralogy	Percent present	Percent original	min	max	mode	Shape	Replacing/ filling	Comments
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	6	6	<0.04	0.5	0.1	equant to elongated, skeletal	clay and FeOOH	clusters of granular, euhedral olivine
Plagioclase	34	34	0.02	0.3	0.15	needles in sheafs		
Clinopyroxene	20	20		0.1		anhedral		interstitial between plagioclase, plumose pattern
Fe-Ti oxide	2	2		0.01		equant		
Mesostasis	38	40						cryptocrystalline mesostasis
		Size						
Secondary mineralogy	Percent		min	max	mode		Replacing/ filling	Comments
Green clay	2						in vesicles, veins, trace in vein halo, rare after olivine along cracks	some alteration of mesostasis possible
		Present	Original	min	max	mode	Shape	Comments
<b>Vesicles</b>								
V1	2	5	0.2	0.8	0.4	spherical		filled/lined with clay
<b>Total Alteration:</b>		2						
<b>Structure:</b>		0.1 wide clay vein; narrow very faint halo; some clay alteration of mesostasis inferred from color and pitting						
<b>Comments:</b>								





**Thin section:** 336-U1382A-6R-3-W 76/78-TSB#9-TS#9 76-78  
**Piece number:** 2  
**Depth CSF-A (m):** 144.980 - 145.000  
**Rock name:** aphyric avescicular basalt  
**Grain size:** fine-grained  
**Texture:** intersertal to ophitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
	7.5	8	0.05	0.4	0.15	euhedral		
Olivine	45	45	0.05	2	0.8	tabular, needles in mesostasis		
Plagioclase	35	35	0.05	1.5	0.5	anhedral	interstitial between plagioclase	
Clinopyroxene	2	2	0.005	0.1	0.05	anhedral, skeletal		
Fe-Ti oxide	tr.	tr.	0.002	0.006	0.004	globular		
Sulfide								
Mesostasis	9	10					microcrystalline mesostasis	

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Green clay	1.5				mesostasis, olivine	

Vesicles	Present	Original	min	max	mode	Shape	Comments
V1							

<b>Total Alteration:</b>	1.5
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**Structure:**  
**Comments:**



**Thin section:** 336-U1382A-7R-1-W 76/79-TSB#10-TS#10 76-79  
**Piece number:** 14, 15  
**Depth CSF-A (m):** 152.930 - 152.960  
**Rock name:** aphyric sparsely vesicular basalt  
**Grain size:** fine-grained  
**Texture:** subophitic to intersertal

		Size							
Primary mineralogy	Percent present	Percent original	min	max	mode	Shape	Replacing/ filling	Comments	
<b>Phenocrysts</b>									
Olivine									
Plagioclase									
Clinopyroxene									
<b>Groundmass/matrix</b>									
Olivine	3	7	0.01	0.4	0.1	euhedral stubby belt-buckle crystals			
Plagioclase	44	46	0.01	1	0.6		subparallel alignment in patches		
Clinopyroxene	30	30	0.01	0.5	0.3	anhedral anhedral to	interstitial between plagioclase		
Fe-Ti oxide	2	2	0.005	0.04	0.01	subhedral anhedral, equant	interstitial between plag		
Sulfide	tr.	tr.		0.02			very rare		
Mesostasis	6	15					cryptocrystalline mesostasis		
Spinel	tr.	tr.		0.15		euhedral	one single crystal		
Secondary mineralogy	Percent	Size					Comments		
		min	max	mode	Replacing/ filling				
Green clay	13				olivine, plag, mesostasis	filling vesicles			
FeOOH	1				olivine, filling vesicles				
Zeolite	1				vesicles	in center of vesicles			
Vesicles	Present	Original	min	max	mode	Shape	Comments		
V1	2	5	0.2	0.8	0.4	spherical	filled/lined with clay, FeOOH, and filled with zeolite		
<b>Total Alteration:</b>	15								
<b>Structure:</b>	irregular clay vein, 0.06mm wide - 1.5% vesicles up to 0.5mm in diameter. Filling (out-to-in) clay-FeOOH-Zeolite								
<b>Comments:</b>									



**Thin section:** 336-U1382A-7R-1-W 123/126-TSB#12-TS#12 123-126  
**Piece number:** 22  
**Depth CSF-A (m):** 152.930 - 152.960  
**Rock name:** aphyric sparsely vesicular basalt  
**Grain size:** microcrystalline  
**Texture:** intersertal

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	6	10	0.02	0.6	0.1	euohedral to elongate, needles in sheafs	skeletal linked-chain needles, equant microphenocrysts	
Plagioclase	28	28	0.02	0.04	0.03			
Clinopyroxene	24	25		0.3		anhedral, plumose equant, elongate	interstitial between plagioclase	
Fe-Ti oxide	2	2	0.002	0.05	0.01			
Mesostasis	32	35					microcrystalline mesostasis	
Secondary mineralogy	Percent		Size				Replacing/ filling	Comments
			min	max	mode			
Green clay	5						mesostasis, olivine, vesicle	
Brown clay								
FeOOH	3						vesicle, vein	
Vesicles	Present	Original	min	max	mode	Shape		Comments
V1			0.1	0.5	0.3	spherical		filled with clay, FeOOH
<b>Total Alteration:</b>		8						
<b>Structure:</b>								
<b>Comments:</b>								



**Thin section:** 336-U1382A-7R-2-W 70/73-TSB#11-TS#11 70-73  
**Piece number:** 12  
**Depth CSF-A (m):** 153.850 - 153.880  
**Rock name:** aphyric sparsely vesicular basalt  
**Grain size:** glassy to microcrystalline  
**Texture:** glassy to spherulitic to variolitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
						euohedral to elongate, skeletal needles in sheafs		
Olivine	4	4	0.04	0.3	0.1		linked-chain crystals in mesostasis	
Plagioclase	4	4	0.01	0.1	0.04			
Clinopyroxene								
Fe-Ti oxide	1	1	0.002	0.006	0.003	anhedral, equant		
Sulfide	tr.	tr.	0.002	0.008	0.005	anhedral		
Mesostasis	90	90					70% crypto- and 20% microcrystalline	

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Green clay	tr.				mesostasis along hairline cracks	

Vesicles	Present	Original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
V1	3	3	0.2	0.6	0.3	spherical	no fillings	

**Total Alteration:** <1

**Structure:** Thin section is zoned: glassy in uppermost part, spherulitic zone next, followed by a cryptocrystalline seam and finally a veriolitic zone. Hairline cracks with incipient alteration of mesostasis

**Comments:**



**Thin section:** 336-U1382A-8R-1-W 28/32-TSB#14-TS#14 28-32  
**Piece number:** 4  
**Depth CSF-A (m):** 161.580 - 161.620  
**Rock name:** Olivine gabbro  
**Grain size:** coarse medium grained  
**Texture:** porphyroclastic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine	10	30	<0.2	>1.6		granular, anhedral subhedral,	chlorite, prehnite and clinozoisite	twinning
Plagioclase	30	50	0.2	>2		granular		
Clinopyroxene	20	20	20	0.01	10	subhedral		lamella, CPX includes OL & PL as bleb
<b>Groundmass/matrix</b>								
Ilmenite	tr.	tr.			0.03	tabular		CPX grain includes Tabular ilmenite

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Prehnite	30				plagioclase network	distribution development of serpentinisation
Magnetite	tr.					
Serpentine	20				olivine	network, mesh texture

Vesicles	Present	Original	min	max	mode	Shape	Comments
V1							

**Total Alteration:** 50

**Structure:** CPX grains show seriated grain boundaries. There are CPX porphyroclasts in matrix. Crystal-plastic deformation structures ( PL : undulose extinction, deformation twin; CPX undulose extinction; subgrain boundary

**Comments:**



**Thin section:** 336-U1382A-8R-4-W 30/33-TSB#19-TS#19 30-33  
**Piece number:** 3, 4  
**Depth CSF-A (m):** 163.650 - 163.680  
**Rock name:** olivine gabbro  
**Grain size:** medium-grained  
**Texture:** porphyritic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	1	15				irregular granular to porphyroclast	tiny olivine grains remained, almost of all olivine replaced by clay	
Plagioclase	75	80	1	15	8	last	crystal-plastic deformation	
Clinopyroxene	4	5				subhedral		
Ilmenite	tr.	tr.				irregular, fine-grained		

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Chlorite	15				olivine, clinopyroxene	chlorite veins
Prehnite	5				plagioclase	veinlets
Magnetite	tr.				ilmenite	

Vesicles	Present	Original	min	max	mode	Shape	Comments
V1							

**Total Alteration:** 20

Although gabbro shows no foliation at macroscopic scale, weak crystal-plastic deformation occurs in plagioclase grains. PLAG grains contain porphyroclasts and fine-grained matrix (recrystallized grain) (porphyroclast = twinned deformation, subgrain boundary, undulose extinction, (1-5mm). matrix = 30-200um. The grain boundaries are often seriated from the bulging of the grain boundaries. CPX/OL grains show no deformation, chlorite veins develop throughout olivine gabbro ( chlorite as no pleochroism due to oxidation).

**Structure:**  
**Comments:**



**Thin section:** 336-U1382A-8R-4-W 60/62-TSB#18-TS#18 60-62  
**Piece number:** 6  
**Depth CSF-A (m):** 163.950 - 163.970  
**Rock name:** Harzburgite  
**Grain size:** coarse-grained  
**Texture:** coarse granular texture

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	54	64	1	>5		coarse-grained, granular	subgrain boundary	
Plagioclase								
Clinopyroxene	5	5	0.4	2		medium-grained, granular	lamella	
Spinel	1	1	0.2	2		irregular coarse-grained, granular	pale brown to black	
OPX	20	20	1.8	6			exsolution lamella	
Secondary mineralogy	Percent		Size				Replacing/ filling	Comments
Serpentine	10						olivine network	
Vesicles	Present	Original	min	max	mode	Shape		Comments
V1								
<b>Total Alteration:</b>	10							
<b>Structure:</b>	OPX grain shows deformation band							
<b>Comments:</b>								



**Thin section:** 336-U1382A-8R-4-W 75/78-TSB#20-TS#20 75-78  
**Piece number:** 8  
**Depth CSF-A (m):** 164.100 - 164.130  
**Rock name:** lherzolite  
**Grain size:** coarse-grained  
**Texture:** coarse granular

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	61	68	0.4	>10		coarse granular	kink-banded, undoluse extinction	
Plagioclase	0	1	0.2	0.6	0.4	subhedral		
Clinopyroxene	9	10	0.4	3	1.8	medium granular	exsolution lamella	
Spinel	1	1			0.1	irregular	dark brown color	
OPX	18	20	2	8	5	coarse granular	exsolution amella -> cpx, undoluse extinction	
Secondary mineralogy	Percent		Size				Replacing/ filling	Comments
Chlorite	1						plagioclase	
Magnetite	tr.						spinel	plag occurs along spinel grains
Serpentine	10						olivine	network
Vesicles	Present	Original	min	max	mode	Shape		Comments
V1								
<b>Total Alteration:</b>	11							
<b>Structure:</b>								
<b>Comments:</b>								





**Thin section:** 336-U1382A-9R-1-W 30/33-TSB#15-TS#15 30-33  
**Piece number:** 5  
**Depth CSF-A (m):** 171.200 - 171.230  
**Rock name:** Olivine gabbro mylonite  
**Grain size:** medium- to fine-grained  
**Texture:** mylonitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	5	5	0.2	0.5	0.35	equigranular	OL & CPX mix layer	
Plagioclase	70	70	0.05	3	1.5	porphyroblasts are equigranular		
Clinopyroxene	24	24	0.2	0.5	0.35	elongate		
Ilmenite	1	1	0.05	0.1	0.075	irregular	fine-grained ilm in grain boundaries	

Secondary mineralogy	Percent	Original	Size			Replacing/ filling	Comments
			min	max	mode		
<b>Vesicles</b>	<b>Present</b>	<b>Original</b>	<b>min</b>	<b>max</b>	<b>mode</b>	<b>Shape</b>	<b>Comments</b>

**Total Alteration:** 0

PL porphyroclast (1-3mm) : undulose extinction, deformation twin, subgrain, subgrain boundary. PL matrix (50um-150um) :weak undulose extinction, deformation twin.  
 OL gabbro develops foliation defined by plagio layer & OL & CPX layer. CPX shows weak undulose extinction. they are hree type of layering (1) polmineral layer by CPX & OL (2) mono mineral layer by plagio, (3) mixed layer by PL & CPX & OL. (all grains are fine grained & show polygonal shape).

**Structure:**  
**Comments:**



**Thin section:** 336-U1382A-9R-1-W 73/75-TSB#16-TS#16 73-75  
**Piece number:** 12  
**Depth CSF-A (m):** 171.630 - 171.650  
**Rock name:** lherzolite/gabbro  
**Grain size:** coarse- to medium-grained  
**Texture:** coarse granular texture

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	50	60	0.2	10	4.9	coarse granular	kink-bands in each grain	
Plagioclase	20	20	0.5	5	2.75	subhedral		
Clinopyroxene	9	10	0.5	8	4.25	medium granular	exsolution lamela -> creat OPX	
Spinel	1	1	0.2	1	0.6	irregular		
OPX	8	9	0.8	2.4	1.6	coarse granular	exsolution lamela	
Mesostasis								

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Pyrite	tr.				serpentine vein filling	
Carbonate	calcite: 3				in vein	
Magnetite	tr.				spinel	
Serpentine	10				develop whole section	
Secondary plagioclase	1				around spinel & olivine	irregular shape but develops twin
Mn oxide	tr.				carbonate vein filling	inside of carbonate vein

Vesicles	Present	Original	min	max	mode	Shape	Comments

**Total Alteration:** 14

**Structure:** lherzolite is intruded by gabbroic vein and has crack filled by calcite & manganese oxide. CPX has exsolution lamella. Inside of exsolution lamella shows orthopyroxene with sigmoidal inclusion normal to exsolution lamella. Several spinel grains are surrounded by secondary plagioclase.

**Comments:**



**Thin section:** 336-U1382A-9R-1-W 102/104-TSB#17-TS#17 102-104  
**Piece number:** 14  
**Depth CSF-A (m):** 171.920 - 171.940  
**Rock name:** Harzburgite  
**Grain size:** coarse grained  
**Texture:** coarse granular

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	40	65	1	5.6	3.3	granular, slightly elongated		wavy extinction, kink bands
Plagioclase						medium grained granular		
Clinopyroxene	5	5	1.2	2.8	2			exsolution lamella
Spinel	1	1	0.1	0.5	0.3	irregular, scattered		pale brown to dark brown
OPX	24	29	1	6	3.5	granular		exsolution lamella -> CPX inside
Secondary mineralogy	Percent	Size			Replacing/ filling		Comments	
Carbonate	calcite: 10					vein filling	fiber & polygonal - like grain shape	
Serpentine	30					olivine	network, mesh texture	
Secondary plagioclase	1					vein filling	subhedral, twin	
Mn oxide	10					vein filling	subrounded to rounded, partly elongate	
Vesicles	Present	Original	min	max	mode	Shape	Comments	
V1								
<b>Total Alteration:</b>	51							
orthopyroxene grains are slightly bent. Development of calcite vein has 2 stage : (1) open crack crossfiber calcite vein filled crack. Open crack sharply cutted OL&OPX grains, some OL & OPX shards remain into cross fiber calcite. (2) reopen crack & polygonal calcite with manganese filled crack, this polygonal calcite also includes some OL & OPX shard. There are also PL grains at calcite vin, where PL grains locate yhe boundary between crossfiber calite & manganese. ( distinction because different extinction between the 2 grain)								
<b>Structure:</b>								
<b>Comments:</b>								



**Thin section:** 336-U1382A-9R-3-W 20/23-TSB#22-TS#22 20-23  
**Piece number:** 3  
**Depth CSF-A (m):** 174.000 - 174.030  
**Rock name:** plagioclase phyric sparsely vesicular basalt  
**Grain size:** fine-grained  
**Texture:** intersertal

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine	2	3	0.3	0.8	0.5	subhedral euhedral to subhedral	30% of glomerocryst with plagioclase and olivine/Cpx	
Plagioclase	20	20	0.3	4	2	subhedral		
Clinopyroxene	1	1	0.3	0.8	0.5	subhedral	in glomerocryst with plagioclase	
<b>Groundmass/matrix</b>								
Olivine	3	4	0.08	0.5	0.2	equant, subhedral		
Plagioclase	32	32	0.05	4	0.1	tabular, needles in mesostasis		
Clinopyroxene	29	30	0.02	0.8	0.1	anhedral	intergrown with plagioclase	
Fe-Ti oxide	2	2	0.01	0.1	0.03	equant, elongate		
Mesostasis	7	8					microcrystalline mesostasis	
Secondary mineralogy	Percent		Size				Replacing/ filling	Comments
Green clay	3						olivine, cpx, mesostasis	
Carbonate	1						vesicles	
Vesicles	Present	Original	min	max	mode	Shape		Comments
V1	tr.	3	0.3	0.8	0.5	moderately spherical		filled with zeolite. Some vesicles seem filled with secondary melt
<b>Total Alteration:</b>	4							
<b>Structure:</b>								
<b>Comments:</b>								



**Thin section:** 336-U1382A-10R-2-W 107/111-TSB#23-TS#23 107-111  
**Piece number:** 10  
**Depth CSF-A (m):** 182.980 - 183.020  
**Rock name:** plagioclase-olivine-phyric sparsely vesicular basalt  
**Grain size:** crypto- to microcrystalline  
**Texture:** aphanitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine	tr.	7	0.06	2	0.5	euhedral	almost all olivine phenocrysts were replaced by secondary clay  50% of glomerocryst with plagioclase and olivine/Cpx	
Plagioclase	24	24	0.8	4	2	euhedral to subhedral		
Clinopyroxene	1	1	0.1	0.4	0.2	euhedral to subhedral		
<b>Groundmass/matrix</b>								
Plagioclase	13	14	0.05	0.5	0.3	long prism, tabular, needles		
Clinopyroxene	3	4	0.05	0.6	0.12	subhedral		
Fe-Ti oxide	1	1	0.001	0.008	0.003	equant, elongate		
Mesostasis	40	45						microcrystalline mesostasis
Glass	3	4						with/without variolitic/spherulitic texture
Secondary mineralogy	Percent		Size				Replacing/ filling	Comments
			min	max	mode			
Green clay	3						olivine, cpx	
Brown clay	12						mesostasis, vein,	
Pyrite	tr.						vesicle filling vesicle	
<b>Vesicles</b>								
	Present	Original	min	max	mode	Shape		Comments
V1	1	1	0.2	0.6	0.4	moderately spherical		lined with clay
<b>Total Alteration:</b> 15								
<b>Structure:</b>								
<b>Comments:</b>								



**Thin section:** 336-U1382A-10R-3-W 82/85-TSB#24-TS#24 82-85  
**Piece number:** 11  
**Depth CSF-A (m):** 184.170 - 184.200  
**Rock name:** Pl-Ol phyric sparsely vesicular basalt  
**Grain size:** fine-grained  
**Texture:** intersertal

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine	3	5	0.5	4	2	subhedral euhedral to subhedral	30% of glomerocryst with plagioclase and olivine	
Plagioclase	17	17	0.8	4	2			
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	2	3	0.15	0.5	0.3	euhedral		
Plagioclase	38	38	0.1	4	0.5	tabular to anhedral	intergrown with plagioclase	
Clinopyroxene	34	35	0.03	0.7	0.1			
Fe-Ti oxide	2	2	0.01	0.08	0.05	equant, skeletal		
Sulfide	tr.	tr.		0.006		equant		
Secondary mineralogy	Percent		Size				Replacing/ filling	Comments
Green clay	1						olivine, vein	pale green
Brown clay	3						vein, mesostasis	brownish
Carbonate	tr.						vein	only one vein filled with brownish clay rim and carbonate center
Vesicles	Present	Original	min	max	mode	Shape		Comments
V1	0.5	1	0.3	0.8	0.5	spherical		filled with clay
<b>Total Alteration:</b>	4							
<b>Structure:</b>								
<b>Comments:</b>								



**Thin section:** 336-U1382A-12R-1-W 83/86-TSB#25-TS#25 83-86  
**Piece number:** 18  
**Depth CSF-A (m):** 200.530 - 200.560  
**Rock name:** aphyric sparsely vesicular basalt  
**Grain size:** microcrystalline to fine grained  
**Texture:** intersertal

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine						euohedral, skeletal		
Plagioclase						tabular, needle		
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	8	9	0;05	0.5	0.1			
Plagioclase	45	45	0.05	2	0.5			
Clinopyroxene	34	35	0.01	0.3	0.05	anhedral	intergrown with plagioclase	
Fe-Ti oxide	2	2	0.005	0.05	0.01	equant, elongate		
Sulfide	tr.	tr.		0.001		equant		
Mesostasis	10	11					microcrystalline mesostasis	

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Green clay	1				veinlets	greenish
Brown clay	3				olivine, mesostasis, vesicle	
Pyrite	tr.				lining vesicles, replacing olivines, filling veins with clay	

Vesicles	Present	Original	min	max	mode	Shape	Comments
V1	1	3	0.2	0.6	0.4	spherical	filled with clay

**Total Alteration:** 4

**Structure:**

**Comments:**



**Thin section:** 336-U1382A-12R-1-W 100/104-TSB#26-TS#26 100-104  
**Piece number:** 20, 21  
**Depth CSF-A (m):** 200.700 - 200.740  
**Rock name:** aphyric sparsely vesicular basalt  
**Grain size:** fine-grained  
**Texture:** intersertal

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine	tr.	5	0.1	0.3	0.2	euhrdal tabular, needle in sheafs		mostly replaced by brown clay
Plagioclase	40	40	0.005	3	1			
Clinopyroxene	10	30	0.005	0.1	0.2	anhedral		interstitial between plagioclase in part plumose
Fe-Ti oxide	2	2	<0.01	0.01	0.01	equant, elongate		
Sulfide								very rare
Mesostasis	20	23						
Secondary mineralogy	Percent		Size				Replacing/ filling	Comments
			min	max	mode			
Green clay	5						lining and filling voids and veins	greenish yellow
Brown clay	23						olivine, clinopyroxene	brownish. One vesicle has yellow clay rim and brown clay center
Zeolite	2							
Vesicles	Present	Original	min	max	mode	Shape		Comments
V1	4	5	0.1	0.5	0.3	irregular		lined with clay
<b>Total Alteration:</b>		30						
<b>Structure:</b>								
<b>Comments:</b>								





**Thin section:** 336-U1382A-12R-3-W 35/38-TSB#27-TS#27 35-38  
**Piece number:** 4  
**Depth CSF-A (m):** 202.550 - 202.580  
**Rock name:** avescicular basalt  
**Grain size:** fine- to medium-grained  
**Texture:** subophitic

Primary mineralogy	Percent present	Percent original	Size			Shape	Replacing/ filling	Comments
			min	max	mode			
<b>Phenocrysts</b>								
Olivine								
Plagioclase								
Clinopyroxene								
<b>Groundmass/matrix</b>								
Olivine								
Plagioclase	43	43	0.08	3	1	tabular to subhedral		
Clinopyroxene	38	40	0.05	1	0.3	subhedral	intergrown with plagioclase	
Fe-Ti oxide	2	2	0.01	0.15	0.05	equant, elongate		
Mesostasis	8	10					microcrystalline mesostasis	

Secondary mineralogy	Percent	Size			Replacing/ filling	Comments
		min	max	mode		
Brown clay	4				olivine, clinopyroxene, mesostasis, vein	

Vesicles	Present	Original	min	max	mode	Shape	Comments

<b>Total Alteration:</b>	4
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<b>Structure:</b>	
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<b>Comments:</b>	
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