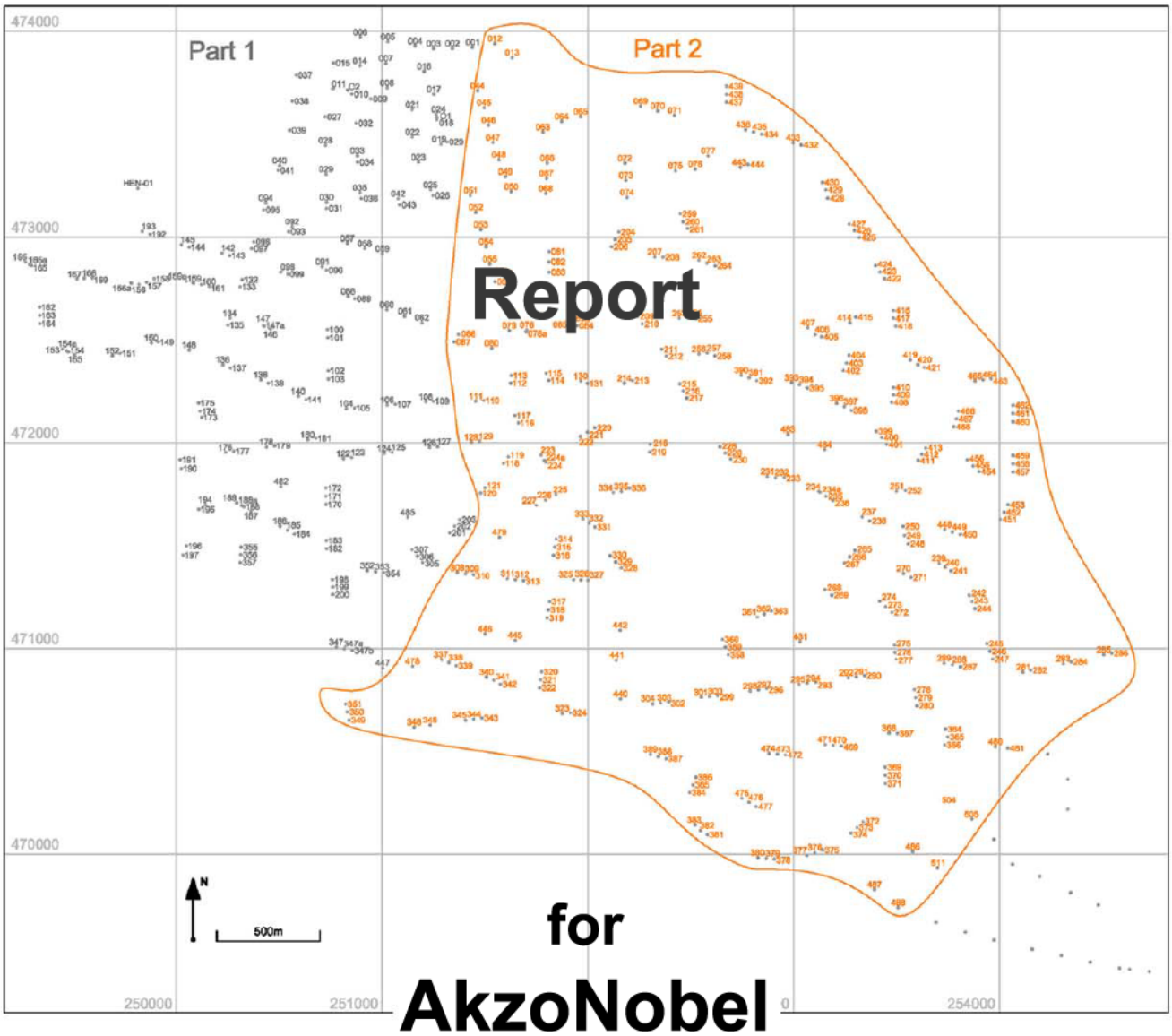
Detailed Geology of the Hengelo Solution Mining Area Part 2



Report

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A. General
   A1 Location map with wells and boundaries of tectonic areas
   A2 Tectonic areas and fault zones
   A3 Location of correlation panels
B. Isochore/Thickness maps B-1 to B-53
C. Depths and Subcrop Maps C-1 to C-9
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F. Final Well Logs 1 : 500
G. Updated logs, part 1
H. GL11901 Database (digitally on CD-ROM)

CD-ROM with report and attachments

1. Introduction

The project 'Detailed Geology of the Hengelo Solution Mining Area' is reported in two phases. In 2010, the west part of the area (part 1) was studied and the results were presented in report GL10.101. The current report, although it is named part 2, encompasses the entire TWR area with the exclusion of the south part of the Usseler Es area. The results of part 1 have been fully integrated with the newly evaluated data from wells of the part 2 area.

The report is especially directed to the structural setting. The stratigraphic and sedimentological details have been described in earlier reports, and are summarized in the 'compilation report' GL08.502. For the geology of the larger area is referred to the 'Geological Atlas of the Subsurface of The Netherlands, Map sheet X' (TNO-NITG).

The objective of the project is the identification of tectonically stable areas, and the localisation of faults which may have a potential influence on cavern development. Within the stratigraphic range of interest, up to six tectonic phases have played a role, each of which have acted differently (fig. 1.1). This means that the recognition of the existence of a fault alone is not sufficient, but the assignment to a specific phase is as important as well.

The approach for the current study was the same as for the part 1 study. Stratigraphic boundaries of all lithological units were evaluated from the Gamma Ray logs by means of detailed correlation of each unit, and faults were identified. Isochore maps of all formal and informal stratigraphic units have been included. For each map faulted units have been excluded. The thickness map of the producing Upper Röt Evaporite Member has been prepared with 2m isochore lines and the faults present at top Solling Formation and/or top Main Röt Evaporite Member levels have been indicated. To show the differential preservation below the unconformities, the relevant faults have been added to the thickness maps of the Altena Group and the Niedersachsen Group.

Depth maps with 2m isolines have been constructed for the main stratigraphic units with faults indicated. Subcrop maps below the unconformities at base Altena Group, base Niedersachsen Group and at base North Sea Supergroup have been added, also with relevant faults indicated. On the latter contour lines have not been edited to the faults.

A total number of 336 wells is located in the study area of part 2; of 268 wells a Gamma Ray log of the total trajectory was available, of 43 wells a log over the evaporite sequence only was available. A total of 25 wells has not been logged at all. No new sample material was studied. In the absence of a Gamma Ray log, data have been used which originate from the 'boorboek', original well log / 'boorprofiel', and/or statussheet. Available sample and core descriptions were integrated. A reference list of available earlier studies has been included in chapter 6.c.

The stratigraphies encountered in the wells have been graphically displayed using two different formats. Of 148 wells a final well log on a scale of 1:500 was constructed and of 188 wells well data sheets were made on a scale of 1:2500. For more details see chapter 8, Procedures.

A number of correlation panels at a vertical scale of 1:1000 has been made which illustrate the acting of the various faults and the different tectonic phases. When

interpreting the panels, it should be realized that they are not always perpendicular to the strike. For the northern part of the area, several correlation panels have been made displaying the evaporite sequence only. For a number of well series a panel has been prepared on a true scale, which makes them comparable with the cavern echo's.

The entire dataset used has been added in a spreadsheet format.

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figure 1.1; Stratigraphic summary

Chronostratigraphy		Lithostratigraphy Mid - Eastern Netherlands regional codes			Formation/Member	facies	tectonic phase
		N			North Sea Supergroup	marine	
Quaternary	Pleistocene	NU					
Tertiary	Pliocene		NUOT		Oosterhout Fm.		
	Miocene		NUBA	NUBAS	Upper Breda Sand Mb.		
				NUBAC	Lower Breda Clay Mb.		Savian
	Oligocene	NM	NMRF		Rupel Fm.		Pyrenean
	Eocene	NL	NLFF	NLFFB	Asse Clay Mb.		
				NLFFM	Brussels Marl Mb.		
				NLFFS	Brussels Sand Mb.		
				NLFFY	Ieper Clay Mb.		
				NLFFT	Basal Dongen Tuff Mb.		
	Paleocene		NLLF		Landen Fm.		Laramide
Cretaceous	Upper Cret.	CK	CKGR		Ommelanden Chalk Fm.		Sub-Hercynian
			CKTX		Texel Chalk Fm.		
		KN	KNGL	KNGLU	Upper Holland Marl Mb.		
				KNGLM	Middle Holland Shale Mb.		
				KNGLL	Lower Holland Marl Mb.		
	Lower Cret.		KNNC		Vlieland Claystone Fm.		
			KNNS		Vlieland Sandstone Fm.	marine coastal	
		SK			Niedersachsen Gp.		
			SKCF		Coevorden Fm.	lagoonal	
Jurassic	Malm		SKWF		Weiteveen Fm.		Late Kimmerian
		AT	ATBR		Brabant Fm.		
	Dogger		ATWD		Werkendam Fm.		Mid Kimmerian
	Lias		ATPO		Posidonia Shale Fm.		
			ATAL		Aalburg Shale Fm.		
Triassic	Keuper		ATRT		Sleen Shale Fm.	lagoonal	
		RN	RNKP	RNKPU	Keuper Fm.		Early Kimmerian
				RNKPD	Dolomitic Keuper Mb.		
				RNKPR	Red Keuper Claystone Mb.		
				RNKPE	Red Keuper Evaporite Mb.		
				RNKPM	Mid Keuper Claystone Mb.		
				RNKPS	Main Keuper Evaporite Mb.		
				RNKPL	L. Keuper Claystone Mb.		
	Muschelkalk		RNMU		Muschelkalk Fm.	coastal	
				RNMUE	Muschelkalk Evaporite Mb.		
				RNMUL	Lower Muschelkalk Mb.		
	Buntsandst.		RNRO	RNROU	Upper Röt Claystone Mb.	coastal plain	
				RNRO2	Upper Röt Evaporite Mb.	coastal sebkha	
				RNROM	Intermediate Röt Clayst. Mb.	coastal plain	
				RNRO1	Main Röt Evaporite Mb.	coastal sebkha	
			RNSO	RNSOU	U. Solling Claystone Mb.	coastal plain	
				RNSOS	Solling Sandstone Mb.		
							local hiatus

2. Main Conclusions and Recommendations

This report is based on well data and thus on actual facts. All data that was considered unreliable has been omitted (see also chapter 8).

Main conclusions on geology

A. The stratigraphy and stratigraphic subdivisions established in previous studies can be recognized in the entire study area. Lateral stratigraphic variation evaluated from thickness maps is generally minor. Within the Triassic strata differentiation decreases in an upward direction. Slight variations in the thickness of the Niedersachsen Group units indicate some synsedimentary tectonic influences. The considerable increase in thickness of the Tertiary strata is related to tilting and synsedimentary Mid Eocene to Oligocene tectonics.

B. Variations in salt thickness are related to tectonics. A sedimentary origin of the variations in thickness can be excluded because of substantial and abrupt changes in thickness distribution. Also, evaluation of the thickness maps of the units overlying the salt do not suggest any parallel development.

C. A large tectonically relatively undisturbed area (area 2, map A-1) is present in the central and eastern part of the TWR license area. Salt thicknesses are fairly evenly distributed with not too much variation. The thicknesses of the Main Röt Evaporite Member in this area is in the order of 68m to 80m, which may represent the original (non disturbed) stratigraphic thickness.

D. North/northwest and south/southeast of area 2, two areas are defined, which are tectonically more influenced, named area 1 and 3 respectively. In these areas variations in salt thickness due to flow across faults are considerable.

E. The structural model presented in the part 1 study has been further refined and applied to the entire area. Kimmerian faults have offsets at top Solling Formation level. This caused salt flow towards the downthrown fault block and the faults did often not penetrate into the strata overlying the salt. During the subsequent Sub-Hercynian phase, earlier faults were re-activated, often with reverse directions, which again caused salt movement. The present day situation is primarily the result of these two major phases, to which also the Early Kimmerian phase and Tertiary faulting have contributed.

F. In 33 of the 268 wells, which were logged to surface in the study area of part 2, one or more faults were identified. Additionally, eleven faults have been identified between wells within well series. All faults are normal faults, no indications for reverse faulting were found (See figure 2.1 for faults identified in wells and well series).

Main conclusions on cavern development

G. Proven faults within well series are expected to influence cavern development to a certain degree. Generally, Kimmerian faults that only cut through the base of the salt but do not penetrate into higher strata, constitute much less hazard for cavern migration compared to Kimmerian and Sub-Hercynian faults that cut through the strata overlying the salt.

H. Mechanical strength of the pay zone overburden will have an impact on cavern development. In report GL08.502 a relatively more competent behavior of the Muschelkalk Formation-B compared to the underlying Muschelkalk Formation-A was suggested. Occurrence of these units and variation in thickness are mainly the result of erosion.

I. Cavern migration, which is found in a number of cases in the northern and northwestern part of the TWR area has partly a geological cause. This area 1, is severely faulted with major offsets. In addition, especially in the northernmost part, much of the Muschelkalk Formation, which is considered one of the more competent strata, has been eroded.

J. In the southwestern part (area 3), especially in the Molenveld area, complex inversion tectonics will probably lead to instable caverns with ongoing production. Northeast from this zone, potential instability of caverns decreases rapidly with increasing distance from the Boekelo fault zone.

K. The tectonically largely undisturbed central and eastern area (area 2) is considered the most stable area for cavern development within the TWR area. This especially in the western and southern part, where most of the more competent Muschelkalk Formation-B is preserved.

Recommendations

A. Recognition of faulted sections within well trajectories requires a Gamma Ray log over the full well bore. In the TWR area many unlogged wells remain which are not plugged back. It is recommended that all wells be logged whenever there is an opportunity.

B. When asymmetrical cavern development is concluded from the echo, evaluation of the Gamma Ray logs is necessary to identify possible faults.

C. Differential movement of the salt of the various units within the Main Röt Evaporite Member has been observed, but the Evaporite sequence has not been studied in detail. Detailed thickness maps of the individual salt units with bounding faults indicated, will better show the spatial thickness distribution of the productive salt units.

figure 2.1; faults identified in wells and well series in TWR area

Series part1 part2	Well name name	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
19	19	x					
	20	x					
	25	x					
	26	x					
35	35	x					
	36	x					
	46	x					
	47		x	<--	- x -	-->	
	48		x	<--	- x -	-->	
	49		x				
	50	x					
	51		x				
57	57	x					
	58		x				
	59	x					
66	66		x				
	67	x					
	68	x					
72	72		x				
	73	x					
	74	x					
75	75	x					
	76		x				
	77	x					
96	96		x		3		
	97		x	2	2		
142	142		x	1	2		
	143	x	x	1	1		
144	144		x	1	2		
	145		x	2	1		
156	156		x	2			
	156a		x	1	1		
	157		x	3	1		
	158		x	2	1		
159	159a	x					
	159	x					
	160		x				
	161	x					
165	165		x	3			
	165a		x	5	1		
	166		x	3	1		
167	167		x	3	3		
	168		x	4	3		
	169		x	1	4	RNROM	

figure 2.1cont.; faults identified in wells and well series in TWR area

Series part1 part2	Well name name	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
182	182		x	1			
	183		x	1			
187	187		x				
	188		x		1		
	188a		x				
	189	x					
194	194		x				
	195		x	1			
196	196	x					
	197		x	1	1		
234	234	x					
	234a		x		1		
	235		x		3		
	236		x	1			
308	308		x	1			
	309		x	1			
	310		x				
337	337		x	2			
	338		x	1			
	339		x		1		
343	343		x	2	1	RNROM	
	344		x	1	1	RNROM	
	345		x		1	RNROM	
346	346		x	1	1	RNRO1	
	348		x	2	1	RNRO1	
347	347	x		1	1	RNROM	
	347a		x		2		
	347b	x			2		
349	349		x		1	RNROU-OM	
	350		x	1	1	RNROM	
	351		x	3	1	SK/KN, OM	
355	355		x	1			
	356	x					
	357	x			2		
358	358		x	1			
	359		x	1			
	360		x	2			
378	378		x				
	379	x					
	380	x				RNROM	
381	381		x	1			
	382		x	1			
	383	x					

figure 2.1cont.; faults identified in wells and well series in TWR area

Series part1 part2	Well name name	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm.			in series
				RNMU	RNROU	other	
384	384		x			RNROM	
	385		x		1		
	386		x	1			
434	434	x					
	435		x				
	436		x				
437	437	x					
	438		x				
	439		x		1		
443	443		x		1		
	444		x		1		
472	472		x				
	473		x				
	474		x	1			
488	488		x	1			
511	511		x		1		

3. Geological summary

Please note that the stratigraphic summary, including facies and tectonic phases, is given in figure 1.1. Stratigraphic and sedimentological detail is discussed in the Compilation Report, Geological framework TWR area (GL08.502).
Please see the maps A-1 and A-3 for the subdivision of the area and the location of the correlation panels. The main tectonic elements identified in this study are indicated on the depth maps and on the isochore maps of the Altena Group, Niedersachsen Group and Main Röt Evaporite Member (Attachments C and B-1, B-43, B-44). In addition, a quantification of the present day offsets within the fault zones has been indicated on map A-2.

As discussed in the compilation report on the geological framework, deposition of the Triassic sediments overlying the Hardegsen unconformity took place in a coastal plain to coastal sebkha environment without tectonic interruption. Lateral facies changes are very slight during deposition of the Röt Formation and Muschelkalk Formation-A, and absent during Muschelkalk Formation-B sedimentation. These deposits represent the progradational infill of the basin.

The first discontinuity occurred after deposition of the Muschelkalk and Keuper sediments. This Early Kimmerian phase eroded the Keuper Fm. and part of the Muschelkalk Fm. Differentially, however, this phase had little effect in the study area; truncation of the Muschelkalk Fm. below the base Altena unconformity varies on a meter scale only. Sedimentation continued with the deposition of the Altena Group sediments until Dogger times when it was terminated by the Mid Kimmerian tectonic phase. Up to some 300m of section was subsequently eroded, leaving remains of the basal part of the Altena Gp. only, which comprises the Sleen Fm. and locally possible lowermost parts of the Aalburg Fm. Preserved sections of AT in the study area have thicknesses up to 20m in the southwestern part of the area.

On a regional scale, the Kimmerian phase is of an extensional nature and related to the opening of the Atlantic Ocean which started in Late Triassic times. Most of the faults indicated on the top Solling Fm. map can be assigned to this phase.
In the absence of preserved younger Jurassic formations of Dogger age in the area, the Mid Kimmerian phase can not be separated from the Late Kimmerian phase, and in this report is generally referred to the Kimmerian phase, which excludes the Early Kimmerian phase. Kimmerian faults are found mainly in area 1 with a WSW – ENE strike and in area 3 with a WNW – ESE strike.
Locally, Late Kimmerian phases can be recognized; they have been specified early Late and late Late Kimmerian (LK1 & LK2). The latter is only recognized in area 3A, where the Bentheim Sandstone Mb. of the Vlieland Sandstone Fm. is preserved.

In the strata overlying the evaporite sequence, effects of Kimmerian faults are locally less pronounced. Especially in area 1, the Röt salts have accommodated much of the created space.

During the Kimmerian phase, erosion created a flat topography, over which the Niedersachsen Gp. sediments were deposited in a restricted marine environment. Only in the southwestern part of the area, towards the Sluitersveld / Boekelo zone, individual units of the Niedersachsen Group become slightly thicker which points to some Late Kimmerian synsedimentary effects.

After the Kimmerian phase, sedimentation continued with the marine deposits of the Rijnland (KN) and Chalk Groups (CK) until Upper Cretaceous Coniacian times (TNO-NITG, Map sheet X).

Sedimentation was terminated by the Sub-Hercynian tectonic phase which was of a compressional nature and related to the formation of the Alps. Locally, the older Kimmerian structures were re-activated, often with reversed offset directions. Unlike the Kimmerian phase, many of the effects of the Sub-Hercynian phase are visible in the strata overlying the salt, which acted as a decollement surface. Especially in area 3A, the thicker salt sections are now found in the higher fault blocks. All faults encountered in the wells are normal faults, no indications for reverse faulting are found. Also during this phase, the area was tilted towards the SW with a gradient of 0.6 – 0.7 m/10m.

Post Sub-Hercynian erosion removed all of the Chalk and Rijnland Groups, but in area 3A, locally deposits of Bentheim Sandstone Mb. and Vlieland Claystone Fm. are preserved. In the entire area 3, Niedersachsen Gp. sediments are progressively preserved in a SW direction with thicknesses of up to 127m. In area 1A, Niedersachsen Gp. sediments are preserved on the downthrown side of the main inversion fault with thicknesses up to 57 m.

In Early Tertiary times, sedimentation continued over a flat topography until Mid Eocene times. Tectonic activity from Mid Eocene to Oligocene caused a WNW tilting of the area, possibly accompanied by some faulting with a N – S orientation. The depth map of the base of the North Sea Supergroup, however, does not show indications for N – S faults. Locally, Tertiary faults developed with meter scale offsets. An important Tertiary fault is found in area 3A which has an offset of up to 15m.

4. Structural Setting

4.a General

In part 1, the study area was subdivided into three subareas, named 1, 2, and 3. In this report, which comprises the entire TWR area, five areas have been defined, 1A, 1B, 2, 3A, and 3B (See map A-1).

As can be seen from map A-1; subarea 1 from part 1 has now been renamed area 1A; for the description of this area is referred to report GL10.101.

Area 1B, is composed of subarea 2 from part 1, with an extension in an ENE direction. Fault systems identified in part 1 continue in that direction with a doglegged offset towards the south. Variations in salt thickness due to flow across faults are considerable, but not on the scale of that in area 1A.

The newly defined area 2 comprises a large part of the total area and it is relatively undisturbed tectonically. Salt thicknesses are fairly evenly distributed with not too much variation. Salt thicknesses in area 2 probably represent the original stratigraphic thickness.

Area 3 in the south, is subdivided in 3A and 3B. The former comprises the Molenveld area with an extension towards the northwest. This area is characterized by severe faulting which is related to the Sluitersveld / Boekelo fault zone. Salt thicknesses vary considerably as a result of flow across faults, both towards high ranges as towards low ranges. The southern part of the Marssteden area forms area 3B. Here, faulting and the accompanying variation in salt thickness, is moderate.

The exact direction of the individual faults which are encountered in wells is unknown. The combination of Kimmerian tectonics and subsequent Sub-Hercynian tectonics, which partly re-activated earlier faults, have generally resulted in fault zones rather than single fault planes. Attempts have been made to plot the individual fault planes, but often no coherent picture could be reconstructed. Especially in area 1A the faults indicated on the maps represent the boundaries of complex fault zones.

The following applies to the position of the faults on the maps. If the offset of a normal fault encountered in a well was of similar magnitude as that concluded from the depth contours, the fault was indicated through the well or well series. If the offset evaluated from the depth maps was considerably more than that found in the well, the fault line was indicated somewhat removed from the well, at a place which best fitted the contour lines, and the fault in the well trajectory was interpreted as a side effect of the larger fault. If a fault was concluded solely from the contour lines, it was indicated halfway the data points on the depth map, or where it best fitted the anomaly in the contour lines. All fault planes are assumed to be sub-vertical.

A map illustrating the fault zones, including major faults originating from different levels, has been constructed (map A-2). The maximum offset has been indicated in three categories: faults with offsets less than 5m, with offsets between 5 and 20m, and with offsets larger than 20m. This maximum offset refers to present day offset, displacements may have been larger in inversion zones. The position of most faults indicated on this map originates from the maps of the top Solling Fm. and the top Main Röt Evaporite Mb.

The position of the faults at, for instance, base Muschelkalk Fm., may be different. For the position and offset direction of specific faults at the different levels, is referred to the depth maps.

In the next chapters tectonic detail is discussed per tectonic area. Please use depth and subcrop maps in Attachment C and the correlation panels in Attachment E, as reference.

4.b The northern and northwestern part, area 1

General
The main structural elements recognized in the northern part of the part 1 study area continue in a north easterly direction with a doglegged offset towards the south. Faults and fault systems have the same WSW – ENE orientation.

At top Solling Fm. level, fault offsets are substantial; at top RNRO1 level, most of the individual elements can be recognized, but fault offsets are often less or negligible. Faults and fault systems have not always the same position and throw direction at top Solling and at top RNRO1 levels, but the strike of these systems is generally the same at both levels.

Because of the difference in position and acting of the faults at base and top RNRO1 levels, the thickness distribution of RNRO1 (map B-1) is the resultant of the depth maps of top Solling and top RNRO1. Strong variations in thickness occur in the vicinity of faults.

The strike of the faults in area 1 is WSW – ENE in general, but locally, small NW – SE and NNW – SSE faults are found. The structural dip is 0.7 – 0.8m / 10m towards the SW for the Triassic strata. Muschelkalk Fm. is deeply eroded in this area and even absent in the northeastern extremity.

Area 1B
In the range of wells from B044 to B050 (correlation panel E-10), faults are present at top RNSO level (map C-1) between the wells B049 and B050 and between B046 and B047 with from B049 and B047 in the downthrown position. Also, between B047 and B048 a fault is present with a northerly throw. The B048 well trajectory encountered the fault plane somewhere in the section of Röt claystones where it cuts out approximately 10m. The exact position of the fault plane could not be established due to poor log quality. The fault between B050 and B049 has an offset of some 14m and it continues in an ENE direction where it has an offset of 20m between the wells B067 and B066 (correlation panel E-11). The fault between B046 and B047 has an offset of some 13m and can be extrapolated in an ENE direction, where it has an offset of approximately 8m. These faults are of presumed Kimmerian origin.

At top RNRO1 level, the effects of these faults have partly disappeared. Small scale faults are present between B046 and B047 and between B048 and B049, with reversed offset directions compared to those at top Solling Fm. level (correlation panel E-10). Analogous to the system present in area 1A, these faults may be of Sub-Hercynian origin.

The depth map of the base of the Muschelkalk Fm. (map C-3) shows the same isoline patterns as the map of top RNRO1. Especially in the northernmost part the former has less

resolution, because base Muschelkalk Formation can only be recognized in wells which are logged. Of course, where there are no data, the map remains featureless. The faults that cut through the sections of Röt claystones of B047 and B048 do not sufficiently explain the situation at various levels, which indicates that the system is of a more complex nature.
A fault is present between the wells B012 and B001, and also between the wells B002 and B003. The faults have a WSW – ENE strike and an offset of 14m and 10m repectively (correlation panel E-9). Associated salt movement to the lower fault block accommodated the space and at top RNRO1 level these faults can not be recognized. On correlation panel E-9, faults have also been interpreted between B012 and B013 and between B003 and B004, which are not indicated on the top Solling Fm. depth map.

Further to the east, in the Beatrixweg – Havenweg area, a similar system is found with the same directions and associated salt movement (map B-1). It comprises the well series 72 and 204 in the SW to well series 432 and 437 in the NE. Much of this system also has a good expression at top RNRO1 level (map C-2). Within the well series 72, between the wells B072 and B073, the fault offset is approximately 12m towards the NW at top Solling Fm. (correlation panel E-12). At top RNRO1 level, the fault is positioned more to the northwest, but with a similar offset of 12m towards the NW. Within the well series 437, a fault is present in the B439 trajectory with a cut-out of approximately 5m, and a similar offset is found at top RNSO and at top RNRO1 levels and with a throw towards the SE at both levels.

A relatively large scale fault with a northeasterly offset at top RNSO level is present in the well series 434; this fault also caused substantial differences in thickness between the individual salt units, e.g. Salt A is 14.7m thick in B434, whereas it is only 2.8m in B436.

In the east of area 1B, a fault system is present which extends from well series 204 in an ENE direction towards Series 432. At top RNSO level the system has northwesterly offsets in the northeast and southeasterly offsets in the SW. At top RNRO1 level, only the NE part of this fault system can be recognized with northwesterly offsets. The well trajectories of B443 and B444 penetrated part of this fault system with cut-outs of approximately 6m in both wells. Additionally, a small fault with a SSW throw of some 14m at top Solling Fm. level separates Series 259 from the Series 207 and 262. This fault did not affect the top RNRO1 and base Muschelkalk levels.

The Muschelkalk Fm. has been eroded completely in the northeasternmost part of this area. Here, the Muschelkalk Formation is only found preserved in downthrown fault blocks (map C-3).

Although the expression of the fault systems in the NW and N of area 1B is much less at top RNRO1 level compared to top RNSO level, the base N subcrop (C8) map still reflects the same main elements. This map has to be interpreted with care because it has a limited data density; especially in the NW part of the area many wells remain unlogged. Also, the isolines are interpolations between the data points, and the distance between the isolines is related to the thickness of the lithological unit. For these reasons, the map is presented in a raw form only and the isolines have not been edited to the fault lines. Existing faults have been indicated as a reference only.

Tertiary faults, and fault systems that were re-activated in Tertiary times are found mainly in the NW area (depth map base N, C-9). The WNW - ESE fault located just north of B024 and B014 which has an offset of 2 – 3m towards the north, belongs to an old system

which was re-activated with a reverse throw in the Tertiary. This fault, or side effects thereof may have caused the complications in the B018 – ON-1 – B024 cavern. The Tertiary fault between B067 and B068 is based on drilling data, but the fault has the same strike as older faults in this part of the area which may justify its existence.

Especially in the Beatrixweg – Havenweg area, the base N contour patterns resemble the top RNSO anomalies, although on a much smaller scale, and some minor Tertiary re-activation cannot be excluded.

4.c The central and eastern area, area 2

South and east of the large scale tectonic system which characterizes area 1, a large relatively undisturbed area is present which is bounded in the south by the Sluitersveld / Boekelo fault zone related area 3. Area 2 has relatively uniform dips of approximately 0.6m / 10m towards the SW for the Triassic strata.

In the southeastern part of area 2, gradients become less, and the strikes are more W – E. This transition does not seem fault bounded, although again further S, an Early Kimmerian element is present with a WSW – ENE strike and a NW offset (See map C-5), which underwent Sub-Hercynian inversion with southeasterly offsets (See e.g. map C-4, B-44). Further north of this fault line, tertiary erosion truncated SK and AT, which indicates that at least at this location no fault is present (map C-8).

Furthermore, only a few isolated faults are found in the area.
In the well series 416, a fault is present between B416 and B417 at top RNSO with a NNW throw of some 5m. The fault does not occur within the trajectory of one of the wells.
In Series 112, a fault is present between B112 and B113 at top RNSO, also with a NNW throw of approximately 4m. This fault is also not found within the well trajectories.
In Series 234, a fault is present in the Upper Röt Claystone and basal Muschelkalk sections of the three wells with a throw of 6 – 7m. The offset is towards the SW. This fault cuts through top RNRO1.
In Series 84, a fault is present between B084 and B085a with a SSE throw of approximately 6m at base Muschelkalk level and 2m at top RNRO1 level.

In the south part of the area, a fault is present in the Muschelkalk sections of all three wells of Series 358. Because SK has been eroded here, it cannot be specified if the fault is of Kimmerian and/or Sub-Hercynian origin (see also panel E-4). The fault does not seem to have influenced the top RNRO1 contours, but it may be related to the change in strike and dip in this part of the area. If this is the case, the fault has to be placed on the depth map of top RNSO as well.

The distribution of RNRO1 thicknesses is rather uniform. In the northern part, thicknesses are around 70m, gradually increasing in a southerly direction to some 74 – 75m and up to 85m in the eastern Marssteden area.

4.d The southern and southeastern part, area 3

The northern boundary of area 3 is laid where the influence of the Sluitersveld / Boekelo fault zone becomes noticeable. The entire area 3 is characterized by a number of parallel WNW – ESE faults, which are related to this fault zone. Structurally, this part of the

area can be subdivided in a west part (area 3A) and an east part (area 3B); the two parts are separated by a N-S fault line situated just west of the wells B440 – B442.

Structural dips of the Triassic strata in area 3A form a continuation of the central area 2 with a gradient of 0.6 - 0.8m / 10m to the southwest. In area 3B, strata are subhorizontal to synform, while in the SW Marssteden part, dips are approximately 0.6m / 10m. towards the southwest.

Sections of Niedersachsen Gp. deposits are progressively preserved in a SW direction below the Sub-Hercynian unconformity, locally, thicker sections are preserved across Sub-Hercynian faults (map B-44).

On the various depth maps, isolines have been interpolated between the well series 381 and 349 which may not be realistic because of lack of data.

Area 3A

The main boundary fault with the Sluitersveld / Boekelo fault zone lies SW of the well series 347 and 343. In this Molenveld area, which comprises the well series 346 and 349, also Vlieland Sandstone Fm. and Vlieland Claystone Fm. are preserved in a complex setting of Early to Late Kimmerian, re-activated Sub-Hercynian and re-activated Tertiary faults (correlation panels E-1a, E-1b, E-2, E-3).

Early Kimmerian faults are recognized by the occurrence of differentially preserved sections of Muschelkalk Fm. below sections of Sleen Fm. between the B346 and B348 wells (map C-5, correlation panel E-3).

The well series 349 and well B348 have sections of Lower Cretaceous deposits preserved, which illustrates the complexity of the inversion tectonics in the area. When looking at the top Solling Formation depth map of this part, not much differentiation is seen. At base N level differences are more pronounced, but still not more than in the order of 15m. When only looking at these two levels, one might assume the presence of one small fault with this 15m offset. It must however be realized that up to 132m of Lower Cretaceous sediments is preserved in Series 349 and well B348, which is missing in the neighbouring wells. This can only be caused by placing these wells first in a higher and subsequently in a lower fault block than the wells in Series 347 and well B346, respectively.

In B347a, B348 and B346 some 15m of Sleen Fm. is preserved, indicating these wells to have been in a lower early Late Kimmerian (LK1) fault block than Series 349. Also during the late Late Kimmerian phase (LK2) well B348 was positioned in a lower fault block relative to the B349 and B346 locations, preserving significantly more SK compared to the neighbouring wells in Series 349, and also 15m more than in B346.
During the Sub-Hercynian phase, the system inversed and Series 349 were in the lowermost fault block, preserving the Vlieland sections. B348 is positioned in a slightly higher fault block and here only 30m of the Vlieland Sandstone Formation is preserved. B346 and B347a are positioned in again higher fault blocks and, as in the remainder of the area, no Lower Cretaceous sediments are preserved at all.

The above interpretation remains tentative; GR log quality is not very good in the wells of Series 349 and sample material is lacking altogether, but it gives a good impression of the complex nature of the fault zone which is in line with the regional geology of the Central Netherlands basin.

Extrapolation of the strike of the main boundary fault in a WNW direction would position it some 170m SSW of Series 196. The fault between B196 and B197 is an inversion fault as well, but has smaller offsets which are comparable with those of the fault SW of Series 337 and 340. Extrapolation of the main boundary fault in an ESE direction brings it into the southwest Marssteden area where it definitely is not present. This implies either that the fault has disappeared in that direction, which is unlikely for such a large system over a distance of about 1km, or that it occurs further SW with a doglegged offset.

Three N – S faults are present in this area, which are prominent on most depth maps and on the thickness map of SK (B-44), which indicates the faults to be Sub-Hercynian. The thickness map of AT (B-43) shows that the western and the eastern faults had a slight Lower Kimmerian component as well.

The northern boundary with area 2 is arbitrary because fault action diminishes in a north and northeasterly direction. Within area 3A, also many well series are present which do not have indications for faulting.

The distribution of salt thicknesses in the area is very irregular, again with abrupt thickness changes across faults (map B-1). Salt thicknesses increase generally in a SW direction towards the larger fault zone and have reduced thicknesses in the fault zone.

Area 3B

Area 3B comprises the southern part of the Marssteden area and the northern part of the Usseler Es. This area is characterized by moderate Kimmerian to Sub-Hercynian faulting with minor salt movement. Thicknesses of the individual salt units however show an irregular distribution in the vicinity of fault lines (see report GL10.121, Geological Analysis of the Marssteden Area, Twente Region).

The main fault line in this area lies south of Series 475. Extending this fault to area 3A connects it with the fault lying just SW of the well series 337 and 340. The acting of this fault line, however is not always the same at different levels in the two areas. The faults in area 3B are of a similar nature as those in the entire area, Kimmerian faults were re-activated and inverted during the Sub-Hercynian stage. The moderate degree of fault action is further illustrated by the correlation panels E-4, E-5 and E-8.

4.e Tectonic Phases

. Kimmerian faults

Kimmerian faults comprise the results of the Early Kimmerian stage, the Mid Kimmerian stage and two Late Kimmerian stages. The Early Kimmerian stage is of an early most Rhaetian age and it is found at the base of the Sleen Fm. For this reason and because of lithological similarities, the Sleen Fm. is regionally included in the Altena Gp. which is of a Jurassic age whereas the Rhaetian stage belongs to the uppermost Triassic. Effects of the Early Kimmerian phase are indicated by differentially preserved sections of Muschelkalk Fm. below the base Sleen Fm. unconformity. Early Kimmerian faults are indicated on the subcrop map Base AT Unconformity (map C-5). Fault offsets are only minor, in the order of 5 - 7m. Early Kimmerian faults are also indicated on the correlation panels E-2, E-3 and E-5.

The Mid Kimmerian phase occurred in Mid Jurassic, Dogger times. Because of the absence of any preserved Mid Jurassic deposits in the area, this phase can not be recognized but only be interpreted.

The Late Kimmerian phase consists of two successive phases, an early one in Late Portlandian – earlymost Ryazanian times (LK1), which is found at the base of the Niedersachsen Gp. and a later one (LK2) in Early Valanginian times which is present at the base of the Bentheim Sandstone Mb. Effects of the early Late Kimmerian phase (LK1) can be recognized by differentially preserved sections of Altena Gp. and Muschelkalk Fm. sediments below the base Niedersachsen Group unconformity. Where Niedersachsen Group is absent due to erosion, the phase can only be interpreted. Exclusive Late Kimmerian faults can be recognized on the isochore map of the Altena Group (map B-43) and on the subcrop map of the base of the Niedersachsen Group unconformity (map C-6). Fault offsets are around 5 – 8m, however, it must be realized that much of the fault action has been compensated for by the salt. Late Late Kimmerian faults (LK2) are indicated by the occurrence of differentially preserved sections of Niedersachsen Gp. sediments below the base Bentheim Sandstone Member unconformity as in Series 349 and well B348 (correlation panel E-3).

. Sub-Hercynian faults

The thickness SK map (B-44) illustrates the faults that influenced the preserved thicknesses. In the near absence of Late Kimmerian synsedimentary tectonics, these effects are Sub-Hercynian. On the other hand, fault systems that do not have an effect on the thickness distribution of the Niedersachsen Gp. sections are Tertiary.

. Tertiary faults

Tertiary faults, or fault systems that were re-activated in Tertiary times are found mainly in the Molenveld area 3A and in the northwest of the study area.

An important Tertiary fault with a throw of up to 15m to the SW is present along the Sluitersveld / Boekelo zone between the wells B345 and B346 and between B347 and B351 with a WNW – ESE strike.

The fault just N of B024 and B014, also with a WNW – ESE strike, belongs to an old system which was re-activated with a reverse throw in the Tertiary (T6 in part 1).

The Tertiary fault between B067 and B068 is based on drilling data, but the fault has the same strike as older faults in this part of the area which justifies its existence.

During the Pyrenean phase the entire area was tilted towards the west and WNW. This, together with possible synsedimentary faulting, caused the thickening of the N2 unit.

5. Stratigraphy and lateral variation

5.a General

All stratigraphic units designated in previous studies are recognized in this area and correlation proved to be excellent in general. These informal units are defined on the basis of lithological studies of cuttings samples together with the Gamma Ray log and each unit has its own typical lithology and Gamma Ray pattern (see report GL08.502 for an extensive description of stratigraphy and reference sections).

In order to show lateral stratigraphic variation, thickness maps have been constructed for all units (see Attachment B). Thickness of subsurface strata of course refers to apparent thickness and not to stratigraphic thickness. Sections with recognized faults and partly eroded sections are not included in the dataset that defines the isochore lines. Especially in known fault zones, slightly thinner sections may occur on the isochore maps which are still due to faulting. For the Cretaceous sediments of the Rijnland Group, no thickness maps have been constructed. These formations are only found in Series 349 and well B348.

Relevant faults have been added to the maps of AT (map B-43) and SK (map B-44). All faults that are present on the depth maps of top RNSO and RNRO1 have been indicated on the thickness map of RNRO1. Zero lines resulting from Early Tertiary erosion have been found by interpolation of the units present below the unconformity (map C-8), and these have been subsequently transferred to the various thickness maps. Zero lines of Altena Gp. and of Niedersachsen Gp. have been found by interpolation and extrapolation.

A table has been added (figure 5.1) which states the minimum, maximum and average thicknesses per unit.

5.b Conclusions

The depositional setting of the Röt and Muschelkalk formations is in a coastal plain to coastal sebkha environment. In view of the small size of the area in relationship to the size of the basin and the remoteness of the source areas it is unrealistic to draw any paleogeographic conclusions from the thickness distribution maps. However, a few consistent trends seem to be present which may allow for some general remarks.

The more clastic parts of the Röt Fm. are the transgressive and lower progradational parts; they show a thickening towards the east. The most argillaceous unit C-2, which represents the maximum flooding surface becomes thicker in a north and northwesterly direction which suggests that, at least locally, the sediment supply is not from that direction. The upper progradational parts which are richer in evaporites, become thicker in a northeasterly direction which is the general trend for the entire Röt Claystone section as well.

The thickness distribution of the more argillaceous units in Muschelkalk –A shows a thickening trend towards the NE, similar to the Upper Röt Claystone Mb. The cleaner dolomites of Muschelkalk-B and in Muschelkalk-A, do not show any trend in thickness

distribution. They are to be placed in the uppermost progradational parts, and have thicknesses related to the shallow water depths during sedimentation.

Altena Group / Sleen Formation
Sections of Sleen Fm. are preserved below the base Niedersachsen Gp. unconformity. In area 3A, maximum thicknesses are around 20m and in the east part in well series 281, the maximum thickness is 18m.

Niedersachsen Group
The top of the Niedersachsen Gp. sections is truncated by Tertiary erosion in most of the area; only in the Molenveld area, Niedersachsen Gp. sediments are unconformably overlain by Bentheim Sandstone Mb. The individual units A, B and C show a slight thickening trend in a southwesterly direction towards the Sluitersveld / Boekelo fault zone, which is an indication for synsedimentary Late Kimmerian tectonics. Variations are on a meter scale only. Data for unit D are too scarce to draw any conclusions about thickness distribution. Unit E is erosive.

Rijnland Group
Based on regional correlation with wells located outside of the TWR area, the ill documented sections found present in Series 349 & well B348, were assigned to the Bentheim Sandstone Mb. of the Vlieland Sandstone Fm. and to the Vlieland Claystone Fm. (see also report GL09.402).

North Sea Supergroup
The thickness distribution of unit N1 is rather uniform which suggests that sedimentation was in a relatively flat topography; these sections represent marine silty to sandy clays. The increasing thicknesses of unit N2 in a W and WNW direction have been caused by synsedimentary tectonics in Mid Eocene to Oligocene times.

5.c Discussion per Map

Main Röt Evaporite Mb. (RNRO1); map B1
The isochore map has been made at a 2m interval. Faults, which have acted at top Solling Fm. level, at top RNRO1 level, and at both levels, have been indicated with different symbols. In the large central area (area 2) which has not or hardly been affected by faults, thickness differences are only slight and trends are gradual. In areas which underwent (severe) faulting, differences in thickness are large and abrupt, caused by salt flow across faults. Thicknesses in the central area will probably reflect the original sedimentary thickness, which is in the category of approximately 68 – 80m. The thickness distribution of the individual salt units has not been mapped out separately, as was done for the Marssteden area (report GL10.121). Detailed maps of the thickness distribution of each salt unit will indicate differential salt flow within the RNRO1 Mb. For instance, in Series 434, the largest and abrupt changes are in the thicknesses of the salts A and B, whereas the thickness of salt C is more or less the same in the three wells.

Main Röt Evaporite Mb. unit Anhydrite-E (RNRO1-E); map B-2
Thickness variations are relatively small, and changes are gradual. Sections in the northern part of the area are slightly thicker compared to those in the southern part. Significantly thinner sections occur in fault zones in the west and southwest parts of the area.

Röt Claystones (RNROM + RNRO2 + RNROU); map B-3
The entire package thins towards the SW. Thinner occurrences around B192 and in the W and SW part of the area are in fault zones and they may represent subordinate unrecognized faults.

Intermediate Röt Claystone Mb. (RNROM); map B-4
The sections gradually thin towards the SW. Thinner sections in the extreme W and NW are in fault zones.

Intermediate Röt Claystone Mb. unit A (RNROM-A); map B-5
The thickness distribution is fairly uniform with a slight thinning trend towards the SW. The thinner section in B175 may be due to GR log quality and the thinner section in B166 may be caused by faulting.

Intermediate Röt Claystone Mb. unit B (RNROM-B); map B-6
The unit gradually thins towards the SW. Thinner sections in the extreme W and NW are in fault zones.

Upper Röt Evaporite Mb. (RNRO2); map B-7
This Member is a thin Anhydrite bed which is represented by low GR readings. From this level and up, GR readings more or less gradually increase. The official definition of this Member includes the lowermost part of the Upper Röt Claystone Mb. as well and the upper boundary may be as high as the top of RNROU-A, or even the top of RNROU-B. For this study an arbitrary boundary was undesirable and the top of the Member has been laid at the top of the sharp GR peak. Still some variation in thickness occurs which is caused by GR quality and minor reading errors. Taking this into account, the thickness distribution can be considered quite even.

Upper Röt Claystone Mb. (RNROU); map B-8
The entire section of Upper Röt Claystones shows a thinning trend towards the SW. Thinner sections around B192 and in the WSW part of the area are in or near fault zones.

Upper Röt Claystone Mb. unit A (RNROU-A); map B-9
Slightly thinner sections are found in the W part of the area. The relatively thin section in B145 is probably caused by faulting.

Upper Röt Claystone Mb. unit B (RNROU-B); map B-10
No particular trend can be recognized, although occurrences in the W part are slightly thinner. Again thinner sections in that area, in the S Marssteden area and in B443 may be related to faulting.

Upper Röt Claystone Mb. unit C (RNROU-C); map B-11
RNROU-C is the most argillaceous part of the Upper Röt Claystone section and as such it represents the maximum flooding. From this unit and up, the progradational infill begins. The unit C is subdivided in the subunits C1 – C3, of which C2 is again the most argillaceous part. Unit C is thinning in a SW direction. Relative thin occurrences in the W most and SW most parts are fault zone related.

Upper Röt Claystone Mb. subunit C1 (RNROU-C1); map B-12
Sections of C1 are thinning towards the W and SW

Upper Röt Claystone Mb. subunit C2 (RNROU-C2); map B-13

Thicker occurrences of subunit C2 are found in the W and NW parts of the area. Local relative thin sections are related to fault zones.

Upper Röt Claystone Mb. subunit C3 (RNROU-C3); map B-14
Thicker occurrences are in the central and E parts. Local relative thin sections in the W most part are fault related

Upper Röt Claystone Mb. unit D (RNROU-D); map B-15
Thinner sections occur locally in the SW part of the area, but there is no consistent trend. Relative thin sections around Series 347 may be fault related.

Upper Röt Claystone Mb. unit E (RNROU-E); map B-16
Also unit E does not show a consistent trend, although thinner sections are concentrated in the SE part of the area

Upper Röt Claystone Mb. unit F (RNROU-F); map B-17
Thicker occurrences of unit F are found in the N part, but also locally in the S and SW parts.

Upper Röt Claystone Mb. unit G (RNROU-G); map B-18
Thinner sections occur in the W part of the area

Upper Röt Claystone Mb. unit H (RNROU-H); map B-19
Unit H is an excellent marker horizon throughout the area. The unit thins in a SW direction

Upper Röt Claystone Mb. unit I (RNROU-I); map B-20
Unit I is the uppermost unit of the Röt Claystone section and it is rich in anhydrite intercalations. The upper boundary of the unit forms the base of the Muschelkalk Fm. and the unit is well defined on GR logs. The thickness distribution of unit I shows a thinning towards the SW.

Muschelkalk Fm. (RNMU); map B-21
The top of the Muschelkalk Fm. is unconformable in all cases and sections of the Formation become progressively more eroded towards the north and northeast. In the north and central parts of the area the top is formed by the base North Sea Supergroup unconformity which ranges in age from Coniacian to early most Tertiary. In the south and central parts it is formed by the early Kimmerian unconformity which has an early most Rhaetian age and it is overlain by deposits of the Altena Gp. In the southeastern part, in the Marssteden area, the unconformity is Late Kimmerian which eroded the Altena Gp. deposits, and Muschelkalk Fm. is overlain by Niedersachsen Gp. sediments. Contour patterns follow the fault lines, but they have been left unedited on this map, and also on the maps of the individual units (see also the depth and subcrop maps in attachment C).

Muschelkalk Fm. unit A (RNMU-A); map B-22
The thickness distribution of RNMU-A is rather uniform; the unit becomes thinner in a westerly and southwesterly direction. Thinner sections in the west most part are in fault zones and these may not be original.

Muschelkalk Fm. unit A1 (RNMU-A1); map B-23
The basal unit A consists of interbedded dolomites which are rich in anhydrite nodules and minor claystone. The unit does not show any particular trend.

Muschelkalk Fm. unit A2 (RNMU-A2); map B-24
The map does not show much differentiation; the thicker sections occur in the central and eastern parts. Thinner sections are found in the south and western parts. Local thin occurrences in the west most part may be the result of faulting.

Muschelkalk Fm. subunit A2a (RNMU-A2a); map B-25
This subunit is one of the more argillaceous parts in Muschelkalk-A. Slightly thicker sections are in the eastern part and slightly thinner sections occur in the western part, although the latter are partly in fault zones.

Muschelkalk Fm. subunit A2b (RNMU-A2b); map B-26
These sections are dominated by dolomites; the thickness distribution does not show a specific trend. The thinner sections in the west most part are in fault zones.

Muschelkalk Fm. subunit A2c (RNMU-A2c); map B-27
This subunit is also more argillaceous, comparable to A2a. The thickness map does not show any trend

Muschelkalk Fm. unit A3 (RNMU-A3); map B-28
The unit is composed of argillaceous dolomites. Sections of A3 become thinner in a westerly direction. The two thicker occurrences in the northwestern part remain unexplained, but they are in or near fault zones

Muschelkalk Fm. unit A4 (RNMU-A4); map B-29
Unit A4 represents the main progradational part of Muschelkalk-A. Slightly thicker occurrences are found in the western and southwestern part.

Muschelkalk Fm. subunit A4ab (RNMU-A4ab); map B-30
Because the subunits A4a and A4b cannot always be separated, a map has been constructed for the two subunits together. A4ab is the argillaceous base of A4. The subunit A4a is a thin claystone bed at the very base of the section. The thickness distribution of A4ab illustrates a thickening towards the West.

Muschelkalk Fm. subunit A4c (RNMU-A4c); map B-31
A4c is a section of relative clean dolomites. The thickness distribution does not show any trend, although slightly thinner sections are found in the western part of the area

Muschelkalk Fm. subunit A4d (RNMU-A4d); map B-32
Subunit A4d also consists of relative clean dolomites but it has a thin claystone bed at its base. The thickness distribution shows a thinning in a westerly direction. Thin occurrences in the west most part are in fault zones.

Muschelkalk Fm. subunit A4e (RNMU-A4e); map B-33
A4e represents a thin claystone bed. Its thickness distribution does not show any apparent trend.

Muschelkalk Fm. subunit A4f (RNMU-A4f); map B-34
A4f is a dolomitic subunit without any particular trend in thickness distribution.

Muschelkalk Fm. subunit A4g (RNMU-A4g); map B-35

Subunit A4g consists of argillaceous and calcareous dolomites. The subunit becomes thinner in a westerly and southwesterly direction.

Muschelkalk Fm. subunit A4h (RNMU-A4h); map B-36
A4h is a thin claystone bed at the top of Muschelkalk-A. There is no apparent trend in its thickness distribution.

Muschelkalk Fm. unit B (RNMU-B); map B-37
As it was discussed for the entire Muschelkalk section, the top of RNMU-B is erosional in the entire area. The map also has data in the southwesterly Molenveld area which are not on the thickness map of the entire Muschelkalk Fm. Erosion in the area of Series 349 is Mid to Late Kimmerian. Muschelkalk-B sections consist of relative clean dolomites with only a few claystone intercalations. The units B4 and B5 are slightly more argillaceous, but in addition they often contain much mica.

Muschelkalk Fm. unit B1 (RNMU-B1); map B-38
Sections of RNMU-B1 do not show much variation in thickness and a certain trend is not apparent. A few local thinner and thicker sections in the west most part and in the Molenveld area are in fault zones.

Muschelkalk Fm. unit B2 (RNMU-B2); map B-39
The Thickness distribution of unit B2 is rather uniform. Slightly thinner occurrences in the west most and in the south western part are in fault zones.

Muschelkalk Fm. unit B3 (RNMU-B3); map B-40
The unit does not show any specific trend in thickness distribution. Local thicker and thinner sections in the western part and in the Molenveld area are in fault zones.

Muschelkalk Fm. unit B4 (RNMU-B4); map B-41
No particular trend can be seen in the thickness distribution. Thinner occurrences in the western part and in the Molenveld area are in fault zones or in the vicinity thereof.

Muschelkalk Fm. unit B5 (RNMU-B5); map B-42
The upper boundary of unit B5 is an unconformity in the entire area.

Altena Gp. Sleen Fm. (ATRT); map B-43
The thickness map of the Altena Gp. illustrates the preserved thicknesses below the Late Kimmerian unconformity. Locally, greater thicknesses are preserved across Late Kimmerian faults. Erosion in the northern and central areas is Mid Kimmerian to early most Tertiary. Erosion in the southern part of the Marssteden area is Mid Kimmerian to Late Kimmerian. Here, Muschelkalk Fm. is overlain by Niedersachsen Gp. sediments. The zero AT lines are obtained by extrapolation.

Niedersachsen Gp. (SK); map B-44
The isochore map of the entire Niedersachsen Gp. sediments indicates the preserved thicknesses below the base N unconformity. Locally, thicker sections are preserved at the downthrown side of faults. Isochore lines in the southern part, south of the main fault lines and between the Marssteden and the Molenveld areas, have been fault by interpolation between these areas. This interpolation may be unrealistic. Also, isochore lines in the Molenveld fault zone are mainly found by extrapolation and they should be interpreted with care. For the individual units, isochore lines have not been edited to the fault lines and the original interpolation is displayed.

Niedersachsen Gp. unit A (SK-A); map B-45
The isochore map illustrates a slight thickening towards the fault zone in the southwest, which can be an indication for synsedimentary tectonics. Partial erosion of SK-A has only been found in well B289, and the line which indicates partial erosion could not be specified.

Niedersachsen Gp. unit B (SK-B); map B-46
Slightly thicker sections occur in the southwestern part, around Series 355

Niedersachsen Gp. unit C (SK-C); map B-47
Sections become slightly thicker in a southwesterly direction

Niedersachsen Gp. unit D (SK-D); map B-48
Only four data points are present where the section is not eroded.

Niedersachsen Gp. unit E (SK-E); map B-49
Sections of SK-E are only preserved in the Molenveld area in well series 343 and in well B346

North Sea Supergp. (N); map C-9
The thickness of the entire North Sea Supergroup is reflected on the depth map of base N, which is below NAP. The boundary between the units N1 and N2 is somewhat arbitrary, which is the reason that small Tertiary faults do not show up on the thickness map of N2.

North Sea Supergp. unit 1 (N1); maps B-50, B-51, B-52
Unit 1 is subdivided in a thin basal unit N with a sandy lithology and an argillaceous unit N1b. The thickness maps of both units do not show any specific trend.

North Sea Supergp. Unit 2 (N2); map B; map B-53
Lithologies of this unit are predominantly sandy. The thicknesses indicated on the map is relative to groundlevel (CF/GL/MV). These deposits thicken in a northwesterly direction. The isochore lines have not been edited to the fault lines but the effects of the Tertiary faults in the Molenveld area are well illustrated.

Fig. 5.1; Summary Thickness Maps (min/max/avg values per map)

Map	Unit	remarks	minimum (m)	maximum (m)	average (m)	isochores (m)
B1	RNRO1		22	113	72	1
B2	E		9.3	13.9	12.0	0.25
B3	OM+O2+OU		146	175	164	1
B4	RNROM		19.5	27.5	25.5	0.5
B5	A		9.4	13.5	12.0	0.25
B6	B		8.9	15.9	13.3	0.25
B7	RNRO2		0.2	1.8	0.7	0.1
B8	RNROU		122	147	138	1
B9	A		5.1	9.8	7.6	0.25
B10	B		5.0	9.3	6.9	0.25
B11	C		37.3	50.1	44.5	0.5
B12	C1		12.4	20.8	16.0	0.5
B13	C2		8.0	16.5	12.4	0.5
B14	C3		10.0	20.0	15.9	0.5
B15	D		8.1	16.2	13.6	0.5
B16	E		10.7	15.7	12.7	0.25
B17	F		10.4	14.7	12.6	0.25
B18	G		7.0	11.4	9.1	0.25
B19	H		5.1	8.1	6.9	0.25
B20	I	*	18.8	26.8	22.3	0.5
B21	RNMU		2	125	90	5
B22	A	**	57.3	67.7	63.2	1
B23	A1	*	4.3	7.6	5.9	0.25
B24	A2	*	20.2	28.0	23.6	0.5
B25	A2a	*	7.8	14.3	10.0	0.25
B26	A2b	*	4.0	6.8	5.8	0.25
B27	A2c	*	6.2	9.0	7.8	0.25
B28	A3	*	4.6	8.6	6.7	0.25
B29	A4	*	24.7	28.3	26.7	0.5
B30	A4ab	*	3.4	6.5	4.6	0.25
B31	A4c	*	4.8	6.7	5.9	0.25
B32	A4d	*	1.7	4.4	3.5	0.1
B33	A4e	*	0.4	2.0	0.9	0.1
B34	A4f	*	3.7	6.9	5.8	0.25
B35	A4g	*	3.2	6.2	5.0	0.25
B36	A4h		0.3	1.4	0.9	0.1
B37	B	**	2	63	49	2
B38	B1	*	13.8	17.9	15.6	0.25
B39	B2	*	3.6	5.8	4.7	0.1
B40	B3	*	17.9	22.4	20.6	0.25
B41	B4	*	8.5	12.8	10.9	0.25
B42	B5	**	1.2	10.5	6.4	0.5

* excluding partly eroded units
** including partly eroded units
*** 4 data points only

Fig. 5.1; continued

Map	Unit	remarks	minimum (m)	maximum (m)	average (m)	isochores (m)
B43	AT					
B44	SK					
B45	A		3.7	8.0	5.5	0.25
B46	B		15.1	24.5	19.0	0.5
B47	C		19.8	24.7	22.0	0.5
B48	D	***	26.4	32.8	30.6	1.0
B49	E	***	1.6	37.4	15.3	5
	N					
B50	N1		12.1	22.2	16.3	0.5
B51	N1a		0.5	6.1	2.1	0.25
B52	N1b		8.6	19.6	14.0	0.5
B53	N2		52	135	93	3

* excluding partly eroded units
** including partly eroded units
*** 4 data points only

6 Remarks

In 6.a all significant remarks on the wells located in the study area of part 1 and of part 2 have been included. All changes made in wells of part 1 during the current study have been added to chapter 6.a and have been summarized in chapter 6.b. Subsequently, all well series and wells included in the 'Detailed geology of the Hengelo Solution Mining Area', have been added, in chapter 6.c, with availability of logs, log presentation format, and faults identified. The wells with faults identified have also been given in figure 2.1.

Please see map A1 for the location of the wells

6.a Remarks per Series

HEN-01 added RNRO1-D1

Wells B001 – B015, ON-2
Well ON-2, Onderzoeksboring 2, is also referred to as well O-2.
Normal faults at top RNSO level between B002 and B003, app. 8m, B003 downthrown and between B001 and B012, app.14m, B001 downthrown. Possible faults between B012 and B013, app. 6m, B012 downthrown and between B003 and B004, app. 5m, B003 downthrown. The latter two faults are not indicated on the Top Solling Fm. depth map. B005: Gamma Ray log across the entire RNROU section. Water gains at 136.65m (1.2m3/hr). B011: water gains at 134.6m. ON-2: good correlation RNMU and RNROU sections. B015: water gains 139-140m (1.5m3/hr). This kind of water gains encountered at or just below base N, may originate from N-1a.

Series 18-ON1-24
Well ON-1, Onderzoeksboring 1, is also referred to as well O-1.
ON-1 has an interpreted fault cut-out of 20m relative to B060 which is the nearest well with reliable data. The depths of the top of the Solling Fm. in B018 and B024 have a negligible offset (at a depth of 362.4m and 361.7m NAP respectively). The depths of the top of RNRO1 in B018 and B024 are also similar (at 300.7 and 298.8m NAP respectively, assuming a thickness of 12m for Anhydrite-E and a thickness of 4m for D1). Base N in ON-1 is at 109.4m NAP which is approximately 3m deep to B018 and B024. The surface location of ON-1 is halfway between B018 and B024 and 1.2m E of this line. Down hole coordinates are unknown for the three wells. ON-1 has a reliable GRlog across RNMU, and individual RNMU units correlate well with those of B023 and B011. Base RNMU plots at 175.7m CF (157.3m NAP). The original top RNRO1 is found by interpolation of B018 and B024 at 299.7m NAP (318.1m CF). The interpolated top RNSO is at 380.4m CF (362.0m NAP). This gives a thickness of 142.4m for the total of RNROU + RNRO2 + RNROM. This is 19.8m thinner compared to B060 (162.2m) which is interpreted as a fault cut-out. The NW – SE fault indicated at the top RNRO1 depth map directly S of B018 has an offset of approximately 10m towards the SW. At base RNMU level, a NW – SE fault is indicated directly N of B024 with a SW throw of approximately 14m. If it would concern one fault plane, the fault should be present in B018 and B024 as well, which is not the case. It can only be concluded that the three wells are situated in a complex fault zone without exact details specified.

Series 19 – 20
Top RNSO is 5.7m deeper in B020 compared to B019 which implies a fault at top RNSO level

Well B023
Water gains at 131m (11.8m3/hr)

Series 25 – 26
Top RNSO is 3.6m deeper in B025 compared to B026 which implies a fault at top RNSO level

Series 30-31
No GR
B031: water gains at 153m (14.5m3/hr)

Well B032
No GR, water gains at 136m (27m3/hr)

Series 33-34
No GR

Series 35 – 36
Top RNSO is 6.5m deeper in B036 compared to B035 which implies a fault at top RNSO level

Wells 37, 38, 39
B037: GR from lower part of RNROU and up, water gains at 144m

Series 40-41
No GR

Series 42-43
No GR

Wells 44-45-46
No GR. Thin A2 salts in status sheets

Wells 47-48-49-50
No GR in B050. Subdivision RNROU in B047, B048, B049 not possible. Kimmerian faults at top RNSO level between B050 and B049 and between B046 and B047. B047, B048, B049 in downthrown fault block. Thick A2 salts in these 3 wells compared to B050 and B046. B048 has anhydrite bed in A2 salt. Normal faults in RNROM – RNROU in B047 (cut-out 13m) and in B048 (cut-out 10m). Cut-outs relative to B049. Fault plane(s) not located due to poor GRlog quality. The fault in the trajectory of B048 does not seem to be part of a larger system and it has not been indicated on the top RNRO1 depth map. The fault between B046 and B047 has reversed directions at top RNRO1 and top RNSO levels (see also CP. E-7). The fault at top RNSO Fm. level can be interpreted as Kimmerian, which has been inverted during the Sub-Hercynian phase.

Wells 51-52-53-54-55-55a-56
No GR of B052 and B054. D2 salt in B055a questionable, not present in the other wells.

B054 core description: D1 locally fractured (probably cleavage), dips 0-10 deg and locally 45-60 deg, at top C2 dips 10 deg, at basal part C2 is 25 deg, at basal part C1 dips 20 deg, at B2 dips 15-20-25 deg, at basal part A2 dips 15-20 deg, at A1 dips 20-65 deg.
B055 core description: at basal part RNRO1-E locally fractures (probably cleavage), dips 15-30-35 deg, at D1 dips 5 deg, at top C2 dips 0 deg, at basal part C2 dips 5 deg, at lower part A2 dips 10-30 deg.
The cavern echo of Series 55 – 60 shows a very a-symmetrical development which is not explained by recognized faults in or between these wells. Echo's of the other caverns were not available.

Series 57 – 58 – 59
Top RNSO in B057 is 9.3m deeper compared to B058 which implies a fault; no logs were ran in the B057 well. B057: mud losses at 151m (1m3). B058 has 15.5m of RNMU-B preserved and B059 has 11.8m. At base RNMU level there is 5.3m offset between the two wells, at top RNRO1 level the difference is 1m. The GR log of B059 is of a very poor quality and cut-outs in the RNROU of B058 section can not be determined relative to B059. Top RNSO in B058 is 2.4m deep to B059. Top RNSO in B057 is 9.3m deep to B058 which indicates a fault between these wells. RNROU has a thickness of 135.9m in B058 and a thickness of 140.3m in B059. Mud losses in RNMU (2.5m3). B059: mud losses at 150m (2.5m3).

Wells 60-61-62
B060: GR to surface, mud losses 60 – 153m, severe losses at 167m, losses continue to 200m. B061: no GR. B062: poor quality Gamma Ray, readings are 5.7m shallow to B060 at top RNRO1 level and also at base RNMU level although the latter boundary is questionable due to log quality. Top RNSO is at 443.9m in B062 and at 445.3m in B060. Water gains 132 – 175m.

Wells 63-64-65
No GRs of all 3 wells. Varying salt thicknesses may point to the vicinity of a fault zone.

Wells 66-67-68
No logs of B067 and B068, plotted salt units and base N from historical lithologs. Kimmerian fault between B067 and B066, B066 down thrown. At base N, 4m offset between B067 and B068, B067 deeper.

Series 69-70-71
No logs of all 3 wells. Varying salt thicknesses may point to the vicinity of a fault zone.

Series 72-73-74
No logs of B073 and B074, plotted salt units from historical lithologs. B072 older blue GR curve reads 0.8m deeper than the red one at RNRO2 level; RNRO1 units originate from blue curve, offset neglected. Kimmerian fault at top RNSO level between B072 and B073, B072 down thrown.

Series 75-76-77
Plotted RNRO1 units from 'boorboek' data. Differences in salt thicknesses between B075 and B076-077 point to the existence of a fault. B077 has poor GR curve from base N down. Base RNMU not typical on all 3 logs, probably related to base N unconformity.

Series 78-78a-79-80
Plotted salt units of B078 and base salt –top RNSO of B079 and B080 from 'boorboek' data. In B079 and B080 the D2 salt is reported approximately 4m too high. GR log quality of B078 is very poor at top RNMU level and base N could not be established. B079 has a normal fault between RNMU-A4g and A4h (1.5m) Fault cut-out is relative to the B115 section. Faulted section is most obvious when looking at the total RNMU-A4 thickness which is 22.9m in B079. The RNROU sections of B078, B078a and B080 could not be subdivided due to log quality and the wells have not been presented on a 1:500 format.

Series 81-82-83
B083 has poor quality GR

Series 84-85a-85
B084 and B085 have poor GR quality at RNRO1 – RNROM levels; top RNRO1-E is inconclusive. B085a has a poor GR quality in general and no 1:500 log has been made. In B085, RNMU-A2a is too thick (12.6m). RNROU-I is too thick in B085 and in B085a (resp. 26.8 and 26.2m). The RNMU A3 – A4 section of B084 has not been subdivided due to poor GR quality, but is possibly faulted. A fault exists at base RNMU level and at top RNRO1 level between B084 and B085 – B085a, B084 downthrown. Details concerning cavern shape were not available for study.

Series 86-87
No GR of B087 present. B086 has GR across the basal part of RNROU down to salt A2. Of B086, salt D2 was reported too high, compare Series 78-78a-79-80, but top C2 salt found in place.

Series 88-89
B088: GR across RNRO1 – lower part of RNROU. B089: GR across RNRO1, RNROM, RNRO2 and lower part of RNROU and across base N; the latter is considered unreliable.

Series 90-91
B090: GR across salt section and Anhydrite. B091: GR across RNRO1, RNROM, RNRO2

Series 92-93
no GR

Series 94-95
no GR

Series 96-97
The two well are orientated in a NNE – SSW direction. Well B096 shows a total cut-out of 15m at different levels in the RNROU section. B097 has some 4m of RNMU section cut-out at two levels and 8m from RNROU. Fault cut-outs are determined relative to B160 for the RNROU sections. The RNMU cut-out in B097 is relative to the B096 section. B097: mud losses 166 – 227m

Series 98-99
B098: GR to surface. B099: GR to surface

Series 100-101
B100 has 5.8m of RNMU-B4 preserved and B101 9.3m

Series 102-103
B102: GR across upper part of salt section and part of Anhydrite-E. B103: GR across upper part of salt section and part of Anhydrite-E

Series 104-105
B104 has 10.6m of ATRT preserved and B105 8.8m

Series 106-107
B106 has 8.5m of RNMU-B5 preserved compared to 4.7m in B107

Series 108-109
B108 has 4.1m of RNMU-B4 preserved and B109 only 0.7m

Series 110-111
B110: no log
B111 has a poor quality GR across the upper part of RNRO1

Series 112-113
Plotted salt data from lithological log. B112 has a thicker B2 salt and a thinner C2 salt compared to B113. In B112, boundaries reported originate from the purple log. Between B112 and B113 a faults exists at top RNSO level, with B113 in the downthrown position.

Series 114-115
Plotted salt data from lithological log. B114 has thicker B2 salt and thinner C2 salt compared to B115, similar to Series 112-113. B114 has a GR across RNRO1-E to RNRO2 only. In B114, salt D2 from the lithological log plots too high on the GR curve: corrected.

Series 116-117
B116 has no GR. B116 core description: RNRO1-E locally cleavage and cm scale reverse faults, D1 locally fractured/cleavage, B1 locally fractured/cleavage, RNSO locally fractured/cleavage and dips 23 deg.

Series 118-119
B118 lacks GR across RNROM-RNROU. Plotted salt data from lithological log. B118 core description: RNRO1-E locally fractured / cleavage, dips 9-22 deg, D2 dips 12-26 deg, D1 locally fractured/cleavage, dips 0-10 deg. An additional claystone bed is present which is probably a repetition of C1. Top salt C originally reported is approximately 4m high to the GR curve.

Series 120-121
B121 has GR across basal part of RNROU down to salt A2. Depths of the salt units from the lithological log do not fit the GR. The lithological log of B120 mentions the presence of an anhydrite bed in the lower part of C2. The lithological log of B121 also suggests this anhydrite bed, which, however, is not visible on the GR. As a consequence, the anhydrite is either very clean, or it does not exist.

Series 122-123
B122: GR across salt section and part of Anhydrite-E. B123: GR across salt section and part of Anhydrite-E

Series 124-125
B124 has 2.5m more SK preserved compared to B125

Series 126 – 127
top RNSO in B126 is 4.7m deep to B127; at top RNRO1 level the offset is 2.6m. B126 has 5.4m of ATRT preserved compared to 1.6m in B127.

Series128-129
Both wells have GR curves across the upper part of RNRO1 only. Salt units from the lithological log are plotted to scale. Salts D and C are high to the GR log.

Series 130-131
B131 has a GR over the upper part of RNRO1 only. B130 core description: D1 locally fractured/cleavage, in upper part C2 fault plane 65 deg, dips 43 deg, in lower part C2 fractured anhydrite bed, dips 13 deg, C1 locally fractured/cleavage, B1 locally fractured/cleavage, dips 13 deg, lower part A2 dips 13 deg, A1 locally fractured/cleavage. RNMU-A2a is too thick in B130 (14.3m)

Series 132-133
B132: poor quality GR across RNRO1, RNROM, RNRO2. B133: poor quality GR across RNRO1, RNROM, RNRO2, Later GR across salt section reads 0.6m higher

Series 134-135
B134: GR across salt section and basal part of Anhydrite-E, mud losses at 221m (2.5m3).
B135: GR across salt section and Anhydrite-E.

Series 136-137
B136: GR across upper part of salt and Anhy-E, D1 is only 2.5m thick.
B137: no GR

Series B138 – B139
B138: GR across upper part of salt and Anhy-E, top Anhy-E not covered. B139: no GR. Top RNSO is 8.4m deeper in B139 compared to B138 which implies a fault. Top salt at similar depths in both wells. B139: mud losses 165.4-193m (15m3), 193-220.8m (5.5m3), 220.8-262.4m (2m3)

Series 140-141
B140: GR across RNRO1, RNROM, RNRO2 and lower part of RNROU. B141: GR across RNRO1 and part of RNROM, mud losses at 251m.

Series 142 – 143
B143: GR across salt section and part of Anhydrite-E. Well B142 encountered a small fault in the basal part of RNMU and a total amount of 18m of section was cut-out from RNROU at two levels. Fault cut-outs are determined relative to B160

Series 144 – 145
The two wells are on an approximate WNW – ESE line. Well B145 encountered two faults and B144 three faults which indicates a composite fault and not a single fault plane. Fault cut-outs are determined relative to B160.
B144: 40m, identified on log
B145: 42m, 34m identified on log
The echo shows an abrupt and near vertical termination of the cavern which is probably fault related

Series 146-147
B146: GR across salt section and Anhydrite-E.
B147: no GR

Well B148
B148: GR to surface

Series 149-150
B149: severe mud losses at 162.45m. GR to surface. B150: GR across RNRO1, RNROM and RNRO2

Series 151-152
B151: slight depth offset with B152, base N2 is 1.5m deeper in B152, gradually increasing to 3.7m at top RNRO1 level, possibly logging induced. Both wells GR to surface

Series 153-154a-154-155
B153: GR across top Salt C and another GR across Anhydrite-E – RNRO2, base Anhydrite-E not covered. 154a: GR to surface, added ATRT 156.3 – 158.3m. B154: GR across Salt C, RNROM and RNRO2. B155: GR to surface

Series 156a -156 - 157 – 158
All four wells have a poor quality GR across RNMU-B and higher through 2 strings of casing. The wells are in a roughly WSW – ENE direction, with B156 positioned slightly more to the south. Top RNSO in this well is some 20 – 30m deeper compared to the other wells which is the result of Kimmerian and Sub-Hercynian faulting. The top of the salt section is at comparable depths in the four wells and this illustrates the salt accommodating the created space.
Well 156a has 20.4m of RNMU-B4+B5 preserved and well B156 has only 6.6m of RNMU-B4 preserved which indicates a Kimmerian fault between the wells with B156a in downthrown position and a throw of 14m. Well B157 has 7.7m of RNMU-B4 which places the well in the same Kimmerian fault block as B156. B158 has 10.8m of RNMU-B4+B5 preserved indicating a Kimmerian fault with a throw of 3m and B158 in the downthrown position. B158 has 33.2m of SK section preserved and B157 41.4m which indicates a Sub-Hercynian inversion of 8m between the two wells. See also correlation panel CP VI
Fault cut-outs are determined relative to B160
B156a: 38m, identified on log
B156: 21m, 19m identified on log
B157: 25m, 19m identified on log
B158: 24m, 15m identified on log
The cross section with the echo shows W dipping beds around the B158 location which in fact is the Sub-Hercynian inversion fault between B157 and B158. Cavern development does not seem to be influenced by this fault but the available echo may not be the most recent one. Also, the faults at top Solling Fm. level between B156a, B156 and B157 do not show on the echo.

Series 159a – 159 – 160 – 161
All 4 wells GR to surface. B160: top RNSO 5.9m shallow to B159. B161: top RNSO at 494.7m which is 10.3m shallow to B159a and 12.6m shallow to B159. Possible faults exist at top Solling Fm. level between the wells B159 and B160 and between B160 and B161. Within the well trajectories no indications for faulting have been found.

Series 162-163-164
B162: GR across RNRO1 – lower part of RNROU and another GR from basal RNROU to surface. Poor or no correlation between the logs from 1997 and from 1988 across lower part of RNROU. Top Anhydrite-E is 2.3m shallower compared to B163. B163: GR across Salt C – RNROM. B163: GR to surface.

Series 165 - 165a – 166
All 3 wells have GR to surface. B165: possible cut-out in RNROM. Faults are present in RNMU-A and RNROU-C in all three wells at similar depths which suggests that two fault planes were penetrated with a strike following the orientation of the well series which is WNW – ESE. In addition, a Tertiary fault is present within the trajectory of B165 and between B165 and B165a with an offset of 7.2m. The B165 location is in the downthrown position. The total amount of section cut-out is determined relative to well B164.
B165: 38m cut-out, 35.5m identified on log
B165a: 27m cut-out, 25.5m identified on log
B166: 21m cut-out, 18m identified on log
The echo shows a dipping D1 bed towards B166 with a gradient of 1.4m / 10m. As an alternative, cavern development can be explained by assuming a fault between the wells 165 and 166. Apparently, the fault does not cut through C1 and B. The Tertiary fault in B165 offsets the cavern at 45m on the horizontal scale with some 8m which is the throw of the Tertiary fault.

Series 167 – 168 – 169
All 3 wells have GR logs to surface. Sections of RNROM, RNROU and RNMU are faulted and fractured in the three wells. Fault cut-outs are determined relative to well B164.
B167: 57m, 54m identified on log
B168: 56m, 55m identified on log
B169: 55m, 55m identified on log
The cross section of the echo shows W dipping B, C and D beds with a gradient of 1.9m / 10m. The original well logs give approximately the same depths for top salt in the three wells and the plot is considered erroneous. The anomalous cavern development around B168 is probably caused by faulting.

Series 170-171-172
B170: GR across part of the salt section. B170 and B171 have GR logs to surface.

Series 173-174-175
B173: GR across RNRO1 and part of RNROM. 174: GR across RNRO1 and lower part of RNROM and a neutron log to surface. B175: new GR to surface, changed RNRO2 to 411.2 – 412.3m.

Series 176-177
B176: GR across salt section, top Anhydrite-E not covered. B177: GR to surface.

Series 178-179
B178: GR across salt section, top Anhydrite-E not covered. B179: GR across salt section, top Anhydrite-E not covered.

Series 180-181
B180: GR across RNRO1, RNROM and RNRO2. A later GR run reads 1.9m shallower. B181: RNROU has a thickness of 130.7m which is 3.7m more than the section in B482; the

increase is more or less equally distributed over the section. This may be due to hole deviation or to logging conditions. Depth reference is the new (1997)R log which reads 1m shallow to the original one at RNRO2 level. The 1986 GR log has been shifted up 1.0m

Series 182 – 183
Both wells have GR logs to surface. Well B182 has a 6m fault cut-out in RNMU-B3-B4 and B183 has a 3.5m cut-out in RNMU-B1. Other horizons show negligible offsets which may suggest a N – S orientated fault.

Series 184-185-186
B184: GR across salt section and lower part of Anhydrite-E. B185: GR across RNRO1 and basal part of RNROM. B186 has a GR log to surface.

Series B187 – B188 – B188a – B189
All four wells have GR logs to surface. A Tertiary fault is present between B188 and the other three wells which offsets base N and base N2 approximately 8m. The B188 trajectory penetrates the fault plane in the RNROU section where it cuts out some 7.5m. Top RNSO is similar in the four wells; see also correlation panel CP VII. The echo does not show indications for the vicinity of a fault.

Series 190-191
no GR

Series 192-193
B192: poor correlation RNRO sections with B193; base RNMU more or less similar, top RNRO1 is 6.2m shallower in B192; top RNSO similar in both wells. Somewhere fault in RNROU in B192? Not identified due to poor log quality. B193: changed ATRT to RNMU-B4, in line with B192, added RNRO1-D1 and D2; see B192.

Series B194 – B195
Both wells have GR logs to surface. Between the wells a Kimmerian fault is present with B195 in the downthrown position. This fault cuts out 3.9m of RNMU section in B195 of which 2.5m is identified. Well B195 has 14.7m of Altena Gp. section preserved; in B194 10.3m is present. B194: Two logs of 1996 covering the salt section show a depth offset of 2.2m. Mud losses 10m3.

Series B196 – B197
B196: GR across RNRO1 – RNRO2. B197 has GR to surface, upper part of ATRT section possibly ATAL equivalent. Top RNSO in B197 is 15.2m deeper compared to B196 due to probably Kimmerian faulting. The Kimmerian stage cannot be proven in the absence of a log of B196. Subsequent Sub-Hercynian inversion tectonics cut-out 7m of RNROU section and 3m of RNMU-B1 section in well B197. Problems with cavern development are illustrated by remarks in the 'boorboek' of B196 which reports 'bodem van de caverne was slecht te peilen, vermoedelijk glijdt de sonde een helling af richting B197'.

Series 198-199-200
B198: GR across RNRO1, RNROM and RNRO2. B199 and B200 have GR logs to surface.

Series 201-202-203
B201: GR log to surface. Total thickness of RNROU is 132m which is approximately 5m more compared to surrounding wells; unit I is 2m thicker. B202: GR across RNRO1 and lower part of RNROM. B203: GR across RNRO1 and lower part of RNROM.

Series 204-205-206
B206 plotted salt units on GR, Salt depths from B205 originate from the lithological log. Salt depths from B204 are from the GR down to C1, and deeper from the lithological log. B205 core description: RNRO1-E partly fractured/cleavage, C1 partly fractured/cleavage, at base C2 dips 5-10 deg, at base B2 dips 15 deg.

Series 207-208
B207 has a poor quality GR to surface. B208 core description: RNRO1-E partly fractured/cleavage, dips 0-10-15 deg, in upper part D1 dips 45 deg, basal part C2 dips 5-10 deg, C1 partly fractured/cleavage

Series 209-210
Both wells have poor quality GR to surface

Series 211-212
B211 core description: RNRO1-E partly fractured/cleavage, dips 0-5-10 deg, C2 dips 5 deg.

Series 213-214
B213 has GR over RNRO1, B214 has GR over RNRO1 – RNRO2. B214 core description: RNRO1-E partly fractured/cleavage, locally much cleavage, dips 0-5-10 deg, lower part C2 dips 10 deg, C1 partly fractured/cleavage, RNSO partly fractured/cleavage.

Series 215-216-217
B215 has GR from RNMU-A and down, B216 and B217 have GRs over RNRO1 – RNRO2. B215 core description: RNRO1 dips 5 deg, RNSO partly fractured/ cleavage.

Series 218-219
Both wells have GR logs across RNRO1 only. B219 core description: dips 0-5-15 deg.

Series 220-221-222
B220 and B221 have GR logs across the upper part of RNRO1, B222 has poor GR over RNRO1 – RNRO2. The 1985 logs have the CCL at ground level, corrected GR -1.15m.

Series 223-224a-224
B223 and B224a have logs to surface, B224 has GR across RNRO1 – RNRO2

Series 225-226-227
B226 has GR across RNRO1-RNRO2. A 1.15m shift is suggested on the original GR, the correction is applied. B226 core description of Muschelkalk Fm.: fault plane at 153.8m (60 deg), fractured formation: 154.5-155m, 156.5-158.0m, 166.2-166.3m, 168.8-169.0m, 175.6-175.8m, fault plane at 187.4m (75 deg), fractured formation: 189.3-189.4m, 190.3-190.5m. *Is this really tectonic deformation or sedimentary/early diagenetic, see also core description B495.* B227 core description: RNRO1-E partly fractured/cleavage, dips 0-3-5-10-35-45 deg

Series 228-229-230
All 3 wells GR over upper part of RNRO1 only.B228 core description: RNRO1-E dips 5 deg, RNSO partly fractured/cleavage.

Series 231-232-233
All 3 wells GR over RNRO1 only. B232 core description: basal part C2 dips 15-30 deg, C1 partly fractured/cleavage, dips 0 deg, basal part B2 dips 0-8-10 deg, lower part A2 dips 30 deg.

Series 234-234a-235-236
B234 has GR across RNRO1 only. The other wells have logs to surface. B234a has a normal fault between RNROU C1 and C2 with a cut-out of 5.7m. B235 has normal faults in RNROU-D to F with a total cut-out of 6.1m. B236 has a normal fault at the boundary RNROU – RNMU with a cut-out of 6.9m. Offsets are more or less similar and it may concern the same fault plane.
Anomalous cavern development may be related to faulting.

Series 237-238
Both wells GR's across RNRO1 only. B238: plotted top RNRO1-E on red curve and shifted boundaries 0.5m down to match the orange curve. B237 core description: RNRO1-E dips 8 deg, D1 dips 3 deg, basal part C2 dips 10 deg, B1 partly fractured/cleavage.

Series 239-240-241
All 3 wells GR across RNRO1 only. Shifted the original orange curves 1.2m up for CCL-GR correction (CCL was from ground level).

Series 242-243-244
B242 core description: RNRO1-E partly fractured/cleavage, basal part C2 dips 6 deg.

Series 245-246-247
All 3 wells GR across RNRO1 only. B247: original orange curve had CCL at ground level, GR has to be shifted up 1.2m? not corrected. B246: no reference depth given. B247 core description: RNROM – RNRO1-E locally fractured/cleavage, dips 0-5 deg, basal part C2 dips 10 deg, B2 dips 2 deg.

Series 248-249-250
B248 shifted original purple curve 3.8m down for ground level correction. B249: GR from RT, corrected. B250: GR was 0.5m above ground level, corrected.

Series 251-252
Both wells GR from RT, corrected -2.5m. B252 core description: RNRO1-E locally fractured/cleavage, dips 0-3-5 deg, basal part C2 dips 10 deg.

Series 253-254-255
B254: GR from RT, corrected. B254 has high GR peak in RNRO1-B2. B253 core description: RNRO1-E locally fractured/cleavage, dips 8 deg, C1 locally fractured/cleavage, basal part A2 dips 40 deg

Series 256-257-258
GR logs of B256 and B258 were from RT, corrected. All 3 wells GR logs across RNRO1. B256 and B258 also have GR logs from lower part of RNMU to surface

Series 259-260-261
B259 and B260 have GRs from RT, corrected. B261has GR 1.5m above ground level, corrected. B259 shows a repetition of the RNRO1-C1 beds

Series 262-263-264
Original (blue) GR logs of B262 and B263 are from RT, corrected. GR of B264 is from 30cm above ground level, corrected.

Series 265-266-267
GR logs of B266 and B267 are from RT, shifted curves up 2.5m.

Series 268-269
GR log of B269 is from RT, corrected 2.5m

Series 270-271
GR logs of both wells are from RT, corrected 2.5m

Series 272-273-274
All 3 wells have poor quality GR logs

Series 275-276-277
The 3 wells have GR to surface. B277 core description: no indications for fractures. A1 dips 30 deg.

Series 278-299-280
The 3 wells have GR to surface. B278 core description: RNRO1-E locally 45 deg cleavage, C1 dips 30 deg. The status sheet of B280 gives 470.3m for base Salt A2, the original lithological log states 473.7m which corresponds with the depth from the GR.

Series 281-282
Both wells have poor logs across the RNROU sections.

Series 283-284
Both wells have GR to surface.

Series 285-286
Both wells have GR to surface.

Series 287-288-289
All 3 wells have GR to surface.

Series 290-291-292
B290: GR to surface. B291: poor quality GR to surface. B292 has GR across RNRO1 – RNRO2. Salt units are indicated on the original purple GR curves. In B290 RNROU is relatively thin (135.1m) compared to B278 (139.0m), B275 (139.2m) and B293 (137.6m), possible fault somewhere in unit RNROU-C. RNRO1 in B290 is 4m thicker compared B291 which is due to a thicker Salt A.

Series 293-294-295
All 3 wells have GR logs to surface. Original analogous GR states that curve has to be shifted up 1.4m, corrected.

Series 296-297-298
B298 has very poor original GR log, salt units are indicated on the red curve, C1 not distinguished. B297 has very poor log quality at uppermost RNMU, ATRT, SK levels.

Series 299-300-301
B299: very poor quality GR to surface. B300: GR to surface. B301: GR across RNRO1.

Series 302-303-304
B302 and B303: very poor quality GR to surface, base SK and base N not established. B304: GR to surface. Shifted the GR curve of B303 1.2m down, see remarks on original GR log. Plotted base Salt A and top RNSO against the GR curves of the 3 wells.

Series 305-306-307
B305: very poor quality GR to surface. The Gamma Ray log shows a scale change between 396-400m; the section comprising the units RNMU-A4c-g can not be correlated with the offset wells; GR readings from a later run (2006) across the salt section are approximately 1m deeper compared to the original log. B306: GR across RNRO1, RNROM and RNRO2. B307: CR across RNRO1, RNROM and RNRO2.

Series 308-309-310
All 3 wells have GR logs to surface. Plotted base salt A and top RNSO on the GR curves. B308 has a normal fault in RNMU-A4g (3.3m). B309 has a normal fault in RNMU-A2a (2.0m).

Series 311-312-313
All 3 wells have very poor GR curves to surface, no 1:500 scale log made

Series 314-315-316
All 3 wells have GR logs to surface.

Series 317-318-319
B318 has GR over RNRO1 only. B317 and B319 have very poor GR curves over the RNROU and SK sections.

Series 320-321-322
B320: GR to surface. B321 has very poor quality GR curve to surface. B322: GR over RNRO1.

Series 323-324
Both wells have GR logs to surface.

Series 325-326-327
All 3 wells have GR logs to surface.

Series 328-329-330
All 3 wells have GR logs to surface. B328 original analogous GR suggests 1m shift downward, corrected.

Series 331-332-333
B331 has GR across RNRO1 only. B332 and B333 have GR logs to surface. B333 base RNMU poorly defined.

Series 334-335-336
B334 has GR across RNRO1 only. Reference for the salt units in B334 is the red GR curve. B335 has GR log to surface. B336: GR across Salt C – base Anhydrite-E.

Series 337-338-339
All 3 wells have GR logs to surface. B337 has normal faults between RNMU-A4a and A4b (2.6m) and in RNMU-A4g (2.3m). B338 has a normal fault between RNMU-A2b and A2c. B339 has a normal fault between RNROU-F and G (2.5m). Well B337 has been sampled at a 2.5m interval.

Series 340-341-342
All 3 wells have GR logs to surface. Of B340, also TNO analogous neutron, caliper, SP and resistivity logs are available. The neutron log has been digitized, but it shows response across the anhydrite and salt beds only.

Series 343-344-345
All 3 wells have GR logs to surface. B343 has normal faults in RNROM-A (4.5m), between RNROU-C3 and E (9.1m), in RNMU-B1 (4.5m). B344 has normal faults between RNROM-A and B (3.8m), between RNROU-B and C1 (3.8m), between RNMU-A1 and A2a (5.7m). B345 has normal faults between RNROM-A and B (8.3m), in RNROU-I (3.4m).

Series 346-348
Both wells have GR logs to surface. B346 probably has RNRO1-B1 and B2 salt, which assigns the lower salt to A2. The absence of C1 and C may be due to faulting, or to salt movement. The salt in B348 cannot be assigned to a particular unit, but the presence of D1 suggests C2 salt. A major fault, which is inverted later, is present between the wells. Presumed Bentheim Sandstone Mb. in B348 is also found in the well series 349-350-351. B346 has a fault cut-out in RNMU of 9.1m and in RNROU of 3.1m. B348 has a fault cut-out in RNMU of 4.3m and in RNROU of 22.6m. Both wells have abnormally thin salt sections (19.2m in B346 and 11.3m in B348) due to normal faulting or due to salt flow. Units RNMU-B1 and B3 in B346 are slightly thicker compared to B478, and in B348, B1 and B3 are slightly thinner compared to B478. Preserved RNMU-B5 in B346 indicates an Early Kimmerian fault between the wells with B346 in the downthrown position, offset 5.5m.

Series 347
The 3 wells have GR logs to surface. B347 has normal faults in RNROU (app. 7m) and in basal RNMU (1.5m). B347a has normal faults in RNROU (total app. 5m). B347b has normal faults in RNROU (total app. 7.5m)

Series 349-350-351
B349 has a normal fault and fractured formation in RNROU with a total cut-out of approximately 52m. B350 has normal faults in the Röt and Muschelkalk sections. The total cut-out amounts to 58m. B351 has normal faults in the Röt and Muschelkalk sections and also in the SK and KN sections with a total cut-out of approximately 106m. The normal fault at base KNNS level is based on correlation with the B349 and B350 sections. See also report GL09.402, Structural Setting of B346 – B351. B349, B350 and B351 have poor quality GR curves across the RNROU sections and the exact position of the faults could not be indicated. Fault cut-outs are relative to the B478 section. Please note that the depth of base N stated in report GL09.402 has been altered. In the 'boorboek' of B351 sandy formation was reported, but not described in detail.

Series 352-353-354
The 3 wells have GR logs to surface. B352: the break in the log at 71m represents a scale change which is also present on the original analog version; low GR readings 150-159m are also on the original analog version; although they occur in the basal part of the SK

section they are considered an artefact; similar phenomena have not been encountered in other wells.

Series 355-356-357

The 3 wells have GR logs to surface. B355 has a normal fault between RNMU-B3 and B4 (3m). The B356 log is of poor quality across the RNROU section. Also the GR log of B357 is not brilliant. B357 has normal faults between RNROU-C2 and C3 (5m) and between RNROU-F and G (1.5m).

Series 358-359-360

All 3 wells have GR logs to surface. B358 has a normal fault between RNMU-A3 and A4a (2.5m). B359 has a normal fault between RNMU-A2a and A2b (2.6m). B360 has a normal fault between RNMU-A2c and A3 (6.7m), RNMU-B2 is thicker than usual (8.0m compared to the average 5m) which may the result of a reverse fault, or it may be caused by higher dips in a fault zone. It is not clear whether it concerns one fault plane or a complex system of parallel faults. On the correlation panel E3 it is suggested the fault or part of the fault system is present SW of the series. On the relevant depth and thickness maps, the fault has been positioned NE of the series where its expression is most pronounced.

Series 361-362-363

All 3 wells have GR logs to surface.

Series 364-365-366

All 3 wells have GR logs to surface. In B364 and B365, GR log quality is poor across the ATRT and SK sections and boundaries could not be established.

Series 367-368

The original analogous GR of B368 indicates hat the curve has to be shifted up by 20cm, corrected. The basal part of the ATRT sections in both wells may have to be assigned to RNMU-B5; log quality is not very good.

Series 369-370-371

The original analogous GR logs of B369 and B370 state that the curves have to be shifted up by 80cm, corrected.

Series 372-373-374

B373 has poor quality GR across the RNROU section.

Series 375-376-377

Salt A is significantly thicker in B375 (41.3m) compared to B376 (34.6m) and B377. Also, Salt D is absent in B375, whereas it is well developed in the other 2 wells.

Series 378-379-380

B380 has a normal fault in RNROM-A (3.0m). GR log quality is very poor in this well and it was decided not to make a 1:500 scale log. Possibly, a normal fault is present in the upper parts of RNMU-A, but log quality does not allow further specification.

Series 381-382-383

B383 has a GR curve over the RNRO1 section only. B381 has a normal fault in RNMU-A4f (2.1m). B382 has a normal fault between RNMU-A1 and A2a (1.7m).

Series 384-385-386
B385 has a normal fault between RNROU-E and F (4.8m). B386 has a normal fault between RNROU-I and RNMU-A (6.2m). B384 has a normal fault in RNROM-B (2.3m).
Series 387-388-389
All 3 wells have GR logs to surface.

Series 390-391-392
All 3 wells have GR logs to surface.

Series 393-394-395
All 3 wells have GR logs to surface. B393 has poor quality GR log. D2 salt in B395 is well developed but near to absent in the other 2 wells.

Series 396-397-398
All 3 wells have GR logs to surface.

Series 399-400-401
All 3 wells have GR logs to surface. B399 has an analogous density log which was digitized. The log gives a good definition of base N and of the Muschelkalk and evaporite units. Local low density readings in the RNROU section may be related to washed out hole.

Series 402-403-404
All 3 wells have GR logs to surface.

Series 405-406-407
All 3 wells have GR logs to surface.

Series 408-409-410
All 3 wells have GR logs to surface.

Series 411-412-413
B411 and B412 have GR curves across RNRO1 only. B412 and B413 have a bed with high GR reading in the lower part of RNRO1-C2. In B413, base N has been tentatively laid at 90.0m.

Series 414-415
The wells have GR logs to surface. Plotted base Salt A and top RNSO on the GR curves.

Series 416-417-418
All 3 wells have GR logs to surface. B418: no GR over upper part RNRO1-E and RNROM-A. A fault exists at top RNSO level between B416 and B417, B416 downthrown.

Series 419-420-421
All 3 wells have GR logs to surface. B419 has an original GR curve up to base RNMU. Readings are 2.4m high to the more recent Socon curve (2008). The original log may be from RT, although it states ground level as reference.

Series 422-423-424
All 3 wells have GR logs to surface.

Series 425-426-427
All 3 wells have GR logs to surface. Relative high GR readings in RNMU-A sections may be related to the unconformity.

Series 428-429-430
B430 has a GR over RNRO1 only. B428 and B429 have logs to surface. Base N in B428 is 2.4m deeper compared to B429. This offset is also found for the deeper horizons, possible Tertiary fault.

Well 431
GR to surface.

Series 432-433
Both wells have GR logs to surface.

Series 434-435-436
All 3 wells have GR logs to surface. Normal faults at top RNSO level between B435 and B434 and between B436 and B434, B434 downthrown. Strange GR patterns in RNMU possibly related to the unconformity. The AkzoNobel topo map suggests a location of B434 between the B435 and B436 locations. The order should be B436-B435-B434 from W to E.

Series 437-438-439
All 3 wells have GR logs to surface. B439 has a normal fault in RNROU-C1 (5.3m). B438 has a possible fault cut-out of approximately 3m in RNROM-A.

Wells 440-441-442
All 3 wells have GR logs to surface. Note sudden decrease of RNROU thicknesses S of B441. RNROU section of B440 correlates better with B480 than with B478.

Series 443-444
Both wells have GR logs to surface. B443 has a normal fault in RNROU-I (6.3m), B444 has a normal fault between RNROU-C and D (6.5m). Corrected several tops.

Wells 445-446
Both wells have GR logs to surface.

Series 448-449-450
All 3 wells have GR logs to surface.

Series 451-452-453
All 3 wells have GR logs to surface.

Series 454-455-456
All 3 wells have GR logs to surface.

Series 457-458-459
All 3 wells have GR logs to surface.

Series 460-461-462
All 3 wells have GR logs to surface. Base N in B460 is 2.3m deeper compared to base N in B461.

Series 463-464-465
All 3 wells have GR logs to surface.

Series 466-467-468
All 3 wells have GR logs to surface. B468 has a high GR bed in the lower part of RNRO1-C2 which resembles C1. Also in the lower part of the A2 salt a high GR peak is present (Boorboek: 'hier is dan een steenbankje van 389.4-390.4m').

Series 469-470-471
All 3 wells have GR logs to surface.

Series 472-473-474
All 3 wells have GR logs to surface. B474 has a normal fault in RNMU-B1 (3.3m).

Series 475-476-477
All 3 wells have GR logs to surface. B476 and B477 have very poor quality GR curves across RNROU-C and D, B475 has better curve across RNROU but less good at RNMU and SK intervals. B477 has a possible fault in RNROU with a cut-out of 2.2 – 2.9m relative to respectively B381 and B472. The exact position of the fault is not identified due to poor GR quality but should be in the RNROU- C-D section.

Well 478
See report GL07.101 for details.

Well 479
At presumed ATRT level relatively low GR readings due to washed out hole? Base N was originally plotted at 89.2m CF, but according to the depth map, the position should be much deeper, around 110m CF. A good position on the GR curve is at 111.0m, but this is contradictory with the samples at 90 and 100m which are from Niedersachsen Gp. sediments. The samples have been concluded as displaced, and base N has been shifted to 111.0m which leaves a much thinner package of SK.

Series 480-481
Both wells have GR logs to surface. B480 has been studied in detail (report GL06.0406).

Well 482
Changed base SK and top SK-B, added ATRT A,B.

Well 483
B483 was studied in detail, see report GL07.1001.

Well 484
GR log to surface.

Well 485
GR log to surface.

Well 486
GR log to surface.

Well 487
GR log to surface.

Well 488
GR log to surface. Normal fault between RNMU-A4b and A4c (2.0m).

Well 504
GR log to surface

Well 505
GR log to surface

Well 511
GR log to surface. Normal fault in RNROU-l (3.2m)

6.b Summary of changes to part 1

During the current study some new information became available on the previously studied area part 1. Furthermore, the boundary area with part 1 was re-evaluated, especially in the south where the southern fault zone is located. This resulted in some changes described below. These changes did not have an impact on the geological model presented in part 1. Updated logs are included in Attachment G.

. Small changes in unit boundaries
During the current study, results of the part 2 area were integrated with the previously studied wells in part 1. Some small changes were made in informal unit boundaries of several wells (see figure 7.1). Both the logs and the database have been updated, and the new data have been incorporated in all maps.

Figure 7.1; changes in unit boundaries of wells located in the study area of part 1

well	*Changes (depth part 1 – depth part 2)*		
B023	N1 – N2, 5m		
B097	RNMU A4f – A4g, -0.9m		
B100	RNMU A4f – A4g, 1.4m	RNROU E - F, -2.1m	RNROU C2 – C3, -3.1m
B151	RNROU A – B, -1.5m		
B175	RNMU B3 – B4, 1.0m	RNMU A4f – A4g, -1.5m	
B177	RNROU E – F, -2.1m		
B187	N1 – N2, 2.0m	RNMU A4f – A4g, 1.4m	
B188a	N1 – N2, 2.2m		
B353	N1 – N2, -2.4m	RNROU C – D, -2.3m	
B447	RNROU B – C, 2.2m		

. changes to faults
While studying the southern fault zone two faults were identified in the Röt Formation of B355 and one fault in the Muschelkalk Formation of B357. For both wells new final well logs at a 1 : 500 scale are included in this study, B357 was previously included as a WDlog on a 1 : 2500 scale.

Restudy of this southern fault zone also led to the recognition of faults within Series 347. For all wells new final well logs at a 1 : 500 scale are included in this study. Previously B347, and B347b were included as a Wdlog on a 1 : 2500 scale.

These changes do not have an impact on the geological model, though some minor changes had to be made to the maps in this boundary area.

When studying part 1, a fault was recognized at top Solling Fm. level in Series 138. This was based on an erroneous top RNSO in well B138. This fault was now omitted.

The Tertiary fault T4 described in the part 1 study, between B107 and B108, does not occur in the deeper strata. It was based on a deeper position of base N in the wells north of this fault line. Wells in this area have not been logged and data originate from the original drilling reports and the fault has not been indicated on the present base N depth map.

Fault T3 between B482 and 170, has a negligible affect and it was omitted.

. availability of GRlog

Since the study of part 1, Gamma Ray logs were ran over the entire trajectory of B143 and B173. For both wells a final well log is included, results are in line with the results of part 1. The data have been included in all maps.

In the trajectory of well B173 no tectonic disturbances were encountered.

In B143, faults were identified in the Muschelkalk Formation and the Röt Formation. These are in line with the results of B142.

6.c Studied wells and faults identified

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
	HEN01		x				
	ON1		x				
	ON2		x				
	1	x					
	2	x					
	3	x					
	4		x				
	5		x				
	6	x					
	7	x					
	8	x					
	9	x					
	10	x					
	11		x				
	12	x					
	13	x					
	14	x					
	15		x				
	16	x					
	17	x					
	18	x					
19	19	x					
	20	x					
	21	x					
	22	x					
	23		x				
	24	x					
	25	x					
	26	x					
	27	x					
	28	x					
	29	x					
30	30	x					
	31	x					
	32	x					
33	33	x					
	34	x					
35	35	x					
	36	x					
	37		x				
	38	x					
	39	x					

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
40	40	x					
	41	x					
	42	x					
	43	x					
	44	x					
	45	x					
	46	x					
	47		x	<--	- x -	-->	
	48		x	<--	- x -	-->	
	49		x				
	50	x					
	51		x				
	52	x					
	53		x				
	54	x					
	55	x					
	55a	**x**					
	56		x				
57	57	x					
	58		x				
	59	**x**					
60	60		x				
	61	x					
	62	**x**					
63	63	x					
	64	x					
	65	x					
66	66		x				
	67	x					
	68	x					
69	69	x					
	70	x					
	71	x					
72	72		x				
	73	x					
	74	x					
75	75	**x**					
	76		x				
	77	**x**					
78	78	**x**					
	78a	**x**					
80	80		x				

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
81	81		x				
	82	x					
	83	x					
84	84		x				
	85		x				
	85a	x					
86	86		x				
	87	x					
88	88	x					
	89	x					
90	90	x					
	91	x					
92	92	x					
	93	x					
94	94	x					
	95	x					
96	96		x		3		
	97		x	2	2		
98	98		x				
	99	x					
100	100		x				
	101	x					
102	102	x					
	103	x					
104	104	x					
	105		x				
106	106		x				
	107		x				
108	108	x					
	109		x				
110	110	x					
	111	x					
112	112	x					
	113		x				
114	114	x					
	115		x				
116	116	x					
	117		x				
118	118	x					
	119		x				
120	120		x				
	121	x					

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
122	122	x					
	123	x					
124	124		x				
	125	**x**					
126	126		x				
	127	**x**					
128	128	x					
	129	x					
130	130		x				
	131	x					
132	132	x					
	133	x					
134	134	x					
	135	x					
136	136	x					
	137	x					
138	138	x					
	139	x					
140	140	x					
	141	x					
142	142		x	1	2		
	143	x	x	1	1		
144	144		x	1	2		
	145		x	2	1		
146	146	x					
	147	x					
	147a		x				
148	148		x				
149	149		x				
	150	x					
151	151		x				
	152	**x**					
153	153	x					
	154	x					
	154a		x				
	155	**x**					
156	156		x	2			
	156a		x	1	1		
	157		x	3	1		
	158		x	2	1		
159	159	**x**					
	159a	**x**					
	160		x				
	161	**x**					

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
162	162	x					
	163	x					
	164		x				
165	165		x	3			
	165a		x	5	1		
	166		x	3	1		
167	167		x	3	3		
	168		x	4	3		
	169		x	1	4	RNROM	
170	170	x					
	171		x				
	172	x					
173	173	x					
	174	x					
	175		x				
176	176	x					
	177		x				
178	178	x					
	179	x					
180	180	x					
	181		x				
182	182		x	1			
	183		x	1			
184	184	x					
	185	x					
	186		x				
187	187		x				
	188		x		1		
	188a		x				
	189	x					
190	190	x					
	191	x					
192	192	x					
	193		x				
194	194		x				
	195		x	1			
196	196	x					
	197		x	1	1		
198	198	x					
	199		x				
	200	x					
201	201		x				
	202	x					
	203	x					

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
204	204	x					
	205		x				
	206	x					
207	207	x					
	208		x				
209	209		x				
	210	x					
211	211	x					
	212		x				
213	213	x					
	214		x				
215	215		x				
	216	x					
	217	x					
218	218	x					
	219	x					
220	220	x					
	221	x					
	222	x					
223	223		x				
	224	x					
	224a	x					
225	225		x				
	226	x					
	227	x					
228	228	x					
	229	x					
	230	x					
231	231	x					
	232	x					
	233	x					
234	234	x					
	234a		x		1		
	235		x		3		
	236		x	1			
237	237	x					
	238	x					
239	239	x					
	240	x					
	241	x					
242	242	x					
	243		x				
	244	x					

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
245	245	x					
	246	x					
	247	x					
248	248	x					
	249		x				
	250	x					
251	251		x				
	252	x					
253	253	x					
	254	x					
	255		x				
256	256		x				
	257	x					
	258	x					
259	259	x					
	260		x				
	261	x					
262	262	x					
	263	x					
	264		x				
265	265		x				
	266	x					
	267	x					
268	268	x					
	269		x				
270	270	x					
	271		x				
272	272	x					
	273		x				
	274	x					
275	275	x					
	276		x				
	277	x					
278	278	x					
	279		x				
	280	x					
281	281	x					
	282		x				
283	283	x					
	284		x				
285	285		x				
	286	x					

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
287	287	x					
	288		x				
	289	x					
290	290		x				
	291	x					
	292	x					
293	293	x					
	294	x					
	295		x				
296	296	x					
	297		x				
	298	x					
299	299	x					
	300		x				
	301	x					
302	302	x					
	303	x					
	304		x				
305	305		x				
	306	x					
	307	x					
308	308		x	1			
	309		x	1			
	310		x				
311	311		x				
	312	x					
	313	x					
314	314	x					
	315		x				
	316	x					
317	317		x				
	318	x					
	319	x					
320	320		x				
	321	x					
	322	x					
323	323		x				
	324	x					
325	325	x					
	326		x				
	327	x					
328	328	x					
	329	x					
	330		x				

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
331	331	x					
	332		x				
	333	x					
334	334	x					
	335		x				
	336	x					
337	337		x	2			
	338		x	1			
	339		x		1		
340	340	x					
	341		x				
	342	x					
343	343		x	2	1	RNROM	
	344		x	1	1	RNROM	
	345		x		1	RNROM	
346	346		x	1	1	RNRO1	
347	347	x		1	1	RNROM	
	347a		x		2		
	347b	x			2		
	348		x	2	1	RNRO1	
349	349		x		1	RNROU-OM	
	350		x	1	1	RNROM	
	351		x	3	1	SK/KN, OM	
352	352	x					
	353		x				
	354	x					
355	355		x	1			
	356	x					
	357	x			2		
358	358		x	1			
	359		x	1			
	360		x	2			
361	361		x				
	362	x					
	363	x					
364	364		x				
	365	x					
	366	x					
367	367	x					
	368		x				
369	369	x					
	370		x				
	371	x					

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm.			in series
				RNMU	RNROU	other	
372	372		x				
	373	x					
	374	x					
375	375	x					
	376		x				
	377	x					
378	378		x				
	379	x					
	380	x				RNROM	
381	381		x	1			
	382		x	1			
	383	x					
384	384		x			RNROM	
	385		x		1		
	386		x	1			
387	387	x					
	388		x				
	389	x					
390	390	x					
	391		x				
	392	x					
393	393	x					
	394		x				
	395	x					
396	396	x					
	397		x				
	398	x					
399	399		x				
	400	x					
	401	x					
402	402	x					
	403		x				
	404	x					
405	405	x					
	406		x				
	407	x					
408	408	x					
	409		x				
	410	x					
411	411	x					
	412	x					
	413		x				
414	414		x				
	415		x				

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
416	416	x					
	417		x				
	418	x					
419	419	x					
	420		x				
	421	x					
422	422	x					
	423		x				
	424	x					
425	425	x					
	426		x				
	427	x					
428	428	x					
	429		x				
	430	x					
431	431		x				
432	432		x				
	433		x				
434	434	x					
	435		x				
	436		x				
437	437	x					
	438		x				
	439		x		1		
440	440		x				
441	441		x				
442	442		x				
443	443		x		1		
	444		x		1		
445	445		x				
446	446		x				
447	447		x				
448	448	x					
	449		x				
	450	x					
451	451	x					
	452		x				
	453	x					
454	454	x					
	455		x				
	456	x					
457	457	x					
	458		x				
	459	x					

Series	Well	log 1 : 2500 GRlog entire well GRlog part of well no wireline log	log 1:500	faults identified in well trajectory faults per Fm. RNMU	RNROU	other	in series
460	460	x					
	461		x				
	462	x					
463	463	x					
	464		x				
	465	x					
466	466	x					
	467		x				
	468	x					
469	469		x				
	470		x				
	471		x				
472	472		x				
	473		x				
	474		x	1			
475	475	x					
	476	x					
	477		x				
478	478		x				
479	479		x				
480	480		x				
	481	x					
482	482		x				
483	483		x				
484	484		x				
485	485		x				
486	486		x				
487	487		x				
488	488		x	1			
504	504		x				
505	505		x				
511	511		x		1		

7. Formation boundaries

Most of the older wells in the northern part of the area have not been logged. Because detailed depth maps had to be produced for base N, top RNRO1 and top Solling Fm., boundaries at these levels have been evaluated using data from 'boorboek' and 'original well log'. All data which were considered unreliable have not been used.

For base N and top Solling Fm. boundaries are included in Attachment H / Excel database GL11901.

7.a Base North Sea Supergroup

In the more westerly positioned Part 1 many wells did not have a GR log. Therefore Base N was also taken from the 'boorboek'. In the 'boorboek' base N is indicated as the first occurrence of 'gesteente', or as top Muschelkalk or Buntsandstein Formation. These depths were checked against the depths from the Gamma Ray logs. Whenever North Sea Supergroup sediments were overlying the Muschelkalk Formation, the data given in the 'boorboek' were found to be quite accurate, because this gives a good negative drilling break. Occurrences of Niedersachsen Gp. or Altena Fm. sediments, though, were often missed or not recognized. This showed that 'boorboek' data for base N depth can not be used whenever there is a possibility that North Sea Supergroup sediments are overlying SK/AT. Also in later years the 'boorboek' data are not always conclusive. In part 1 therefore the 'boorboek' data have not been used for wells after B100.

In the current study more wireline logs are available and only a limited amount of wells without GR log is included. For only twenty wells up to B074, the data of the 'boorboek' were used. For wells up to B087 the depths given by the 'boorboek' / 'original well log' have been compared with the base N based from the GR log. No SK or AT sediments are present in these wells. From B072 and NE the North Sea Supergroup sediments are locally overlying RNROU. The data from the original well logs are generally the same as given in the 'boorboek'; only for B051 and B053 small differences occur, the 'boorboek' data are preferred, because this is the original source. From B056 onwards wells are drilled with a Rotary Table, differences between GRlog depth and 'boorboek' data for e.g. B056, B075, B076 may mean the 'boorboek' data are given relative to RT and have not been corrected to MV/CF. The GR log data are used.

Figure 8.1 shows the depth of base N as given in 'boorboek' , 'original well log' and GR log for wells up to B087. In Attachment H (database GL11901 the source of the data is indicated.

For B062 located in the area of part 1 a rather deep position of base N is given both in the 'boorboek' and on the original well log. The data point has now been interpreted erroneous.

Table 7.1; depth base N (m CF)

Well	USED	*'boorboek'*	original well log	GR log	Delta 'boorboek' - orig log	GR log - 'boorboek'
	base N	*base N*		base N		
12	*127.9*	*127.9*				
13	*126.0*	*126.0*	126.0		0	
44	*125.7*	*125.7*	125.7		0	
45	*124.8*	*124.8*	124.8		0	
46	*125.2*	*125.2*	125.2		0	
47	125.7	*125.0*	125.0	125.7	0	-0.7
48	125.8	*125.9*	125.9	125.8	0	0.1
49	126.0	*127.3*	127.3	126.0	0	1.3
50	*125.6*	*125.6*	125.6		0	
51	124.7	*124.5*	125.2	124.7	-0.7	-0.2
52	*122.7*	*122.7*	122.7		0	
53	120.7	*121.5*	121.4	120.7	0.1	0.8
54	*120.5*	*120.5*	120.5		0	
55	119.7	*119.7*	119.7	119.7	0	0.0
55a	119.2			119.2	0	
56	119.2	*122.0*	122.0	119.2	0	2.8
63	*123.3*	*123.3*				
64	*124.2*	*124.2*	124.2		0	
65	*123.0*	*123.0*	123.0		0	
66	125.0	*125.5*	125.5	125.0	0	0.5
67	*124.2*	*124.2*	124.2		0	
68	*120.3*	*120.3*	120.3		0	
69	*120.8*	*120.8*	120.8		0	
70	*118.5*	*118.5*	118.5		0	
71	*117.0*		117.0			
72	120.8		121.5	120.8		
73	*118.0*	*118.0*	118.0		0	
74	*115.0*	*115.0*	115.0		0	
75	112.8	*117.3*		112.8		4.5
76	112.9	*118.7*		112.9		5.8
77	113.8	*114.2*		113.8		0.4
78		*117.8*				
78a	119.3			119.3		
79	119.5	*119.6*		119.5		0.1
80	120.3	*120.0*		120.3		-0.3
81	120.3	*121.6*		120.3		1.3
82	121.5	*121.5*		121.5		0
83	121.6	*121.8*		121.6		0.2
84	115.6	*118.0*		115.6		2.4
85	115.8			115.8		
85a	115.0			115.0		
86	*119.5*	*119.5*				
87	*120.2*	*120.2*				

7.b Top Main Röt Evaporite Member

For most wells top RNRO1 is taken from the GR log. Only for a limited amount of wells in mainly the northwestern and central part of the study area, top RNRO1 has not been logged. In line with the proceeds of Part 1, Top RNRO1 was then derived from top Salt given in the status sheet and/or original well logs. These depths have been corrected for assumed thicknesses for the overlying informal units D1 and E, whenever applicable.

Both Anhydrite-E and RNRO1-D2 have a rather continuous thickness throughout the TWR area. From top Salt levels, 4m has been subtracted for RNRO1-D1 and 12m for unit Anhydrite-E , whenever applicable. See Table 7.2 for the derived depths of Top RNRO1 used in the thickness and depth maps. On the maps the source of the data is indicated.

Table 7.2; derived depth of top RNRO1

Well	Depth top Salt from status sheet (m NAP)		correction		Depth derived
	top Salt D	top Salt C	thickness RNRO1-D1	thickness RNRO1-E	top RNRO1
12		286.4	4	12	270.4
13		288.2	4	12	271.2
44		309.7	4	12	292.7
45		315.6	4	12	298.6
46		318.6	4	12	301.6
47		317.2	4	12	300.2
48		317.9	4	12	301.9
49		322.2	4	12	305.2
50		321.5	4	12	304.5
52		324.5	4	12	307.4
54		330.8	4	12	313.8
63		302.4	4	12	286.4
64		305.0	4	12	288.0
65		299.1	4	12	282.1
67		310.4	4	12	293.4
68		310.6	4	12	293.6
69	288.7			12	276.7
70		288.5	4	12	271.5
71		291.7	4	12	274.7
73	287.7			12	275.7
74		293.8	4	12	276.8
77		277.1	4	12	261.1
87	354.0			12	342.0
110	373.1			12	361.1
116	365.9			12	353.9
118	379.2			12	367.2
128	381.3			12	369.3
129	375.8			12	363.8
218	347.1			12	335.1
219	348.4			12	336.4
220	351.3			12	339.3
221	354.3			12	342.3
222	355.4			12	343.4

7.c Top Solling Formation

Depth top Solling Fm. is an important level for the interpretation of the tectonic history. It is furthermore easily recognized in cores, from drilling data and on wireline logs. Special attention has therefore been given to this boundary and, apart from GR logs, other sources have been used as well.

Data source for the depth of top Solling Fm. is firstly the Gamma Ray log, and secondly the original well log (if within the cored section). For wells B075 to B109 no original well log was available, here the data from the 'boorboek' had to be used. Thirdly base A2 data were used; primarily from the GR log and otherwise from the status sheet. In the database in Attachment H the depth is given. Colors indicate the source of the data.

On the GRlog the argillaceous top Solling is indicated by high GR readings below the low readings of the salt section. A similar effect can be seen when the tool is activated but still lying on the 'bottom' of the well before it is ran. Because TD is normally only a few decimeters to a meter into the Solling Formation, this could obscure the results.

Top Solling Fm. is stated on most of the 'original well logs' (B012 to B313) and has often been cored. Also in the geological summary in the 'boorboek' the Top Solling Fm. is given. Whenever within the cored section, the depth Top Solling Fm. is considered accurate. Differences with the Gamma Ray log data are probably due to difference between drillers depth – log depth, and/or handling of the cores.

Whenever Top Solling is not within the cored section (e.g. B052 - B054, and most wells drilled after B110), the source of the data is unclear, and the boundary is indicated with a dashed line on the wel logs, and italic in the database. It should be taken into account that for some wells the cored section may be longer than indicated in the 'boorboek'.

For wells drilled after B313, no original well logs are available and the base A2-Salt from the status sheet is used, when the section has not been logged. For some wells, e.g. for B112, B115, B117, B119, TD on the original well log lies in Salt A, and Top Solling is placed at base A2 from the status sheet. Also when TD on the original well log lies within A1, base A salt is used as an estimation of depth top Solling Formation. When Top Solling Fm. is placed at base Salt A, the boundary is 'dashed' on the well logs.

Wells with an 'a' number are normally drilled into the cavern (e.g. 78a, 85a, 224a). The salt and top Solling data on the status sheet have probably been derived from the neighbouring wells and have therefore been omitted from this study.

For the map, Depth Top Solling Formation, 0.5m has been added to the depth whenever base Salt A (A2) figures have been used. In this way a correction has been made for thickness A1.

8. Procedures

8.a Approach

A total of 336 wells are located in the study area of part 2, this includes all wells in the Marssteden area and six wells in the neighbouring Usseler Es area (see map A1).

Of all wells studied a graphical log has been made. Two types of log formats are used, a schematic log at a 1 : 2500 scale named 'Well Data' with geological boundaries at formation / member level and a 'Final Well Log' on a 1 : 500 scale, displaying the GR curve with geological boundaries at lithological unit level. Both formats also show permanent data, and information on e.g. cored sections, and mud losses/ water gains.

Most wells in the area are grouped into series which consist of two or three wells, forming one down hole cavern. The objective was to prepare one 1 : 500 log per cavern, and to represent the other wells on a schematic 1 : 2500 scale. Whenever a fault was identified within a well series, detailed final well logs were constructed of all of the wells involved.

To identify complications within a well series, for all wells the Gamma Ray logs had to be evaluated. For this purpose the LAS / ASCII files of the Gamma Ray logs were imported in the standard GL application. Lithological boundaries were evaluated in a consistent manner for all wells and the boundaries plotted on the log. Per well series, all relevant remarks on stratigraphy, faults identified, remaining issues and data quality are included in Chapter 7.

A detailed Final Well log has been constructed for 148 wells. These are added to the report in Attachment F, as separate PDF files named *2011mar (* representing well name, year 2011, month of march). Of the remaining 189 wells, data have been represented on a schematic 1 : 2500 log, with available geological boundaries given at formation and member level only; these Well Data also state permanent data, the reference well for the series, cored sections and other relevant information. Files are named *WD11 or *WDlog11, indicating the well name (*), the availability of a Gamma Ray log and the year 2011. These data sheets have been added in Attachment D.

See chapter 6.c for a list of wells included, with log format used, and identified faults. This list includes all wells from part 1 & part 2. In figure 2.1 only the wells with faults are given.

Thickness maps have been constructed for RNRO1, Anhy-E and all overlying formal and informal stratigraphic units. From these the lateral stratigraphical variation was evaluated. See attachment B for thickness maps and chapter 5 for the discussion thereof. Thickness maps at formation / member level are based on the available data of all wells, thickness maps at unit level are based on the wells studied in detail (1 : 500 logs). The thickness map of RNRO1 includes structural elements at Top Solling Fm. and Top RNRO1 levels.

Isochore lines are given every 0.1 up to every 5m depending on the average thickness and thickness variation of the unit. Isochore lines are divided into a maximum of six color categories, with a minimum of three isochore lines per category.

The 0.1m isochore intervals are used for the thinnest units with an average thickness of up to 5m. For unit N1a variation is relatively high and 0.25m isochores have been used. With

an average unit thickness of up to 15m generally isochores are given every 0.25m; again when variation is relatively high like that of unit N1b, or RNMU-B5 a wider spacing of 0.5m is used. Unit RNMU-B3 has an average thickness of 20.6m but with little variation and here a spacing of 0.25m could be used.
For units with an average thickness ranging from 15m to 30m spacing of 0.5m has been used, for thicker units a spacing of 1m applies.
RNMU and RNMU-B have a relatively wide spacing, with 5m and 2m respectively. These maps show the thickness of the entire formation / member below the unconformity including the partly eroded units. Also N2 has a relatively wide spacing of 3m.

The minimum, maximum, and arithmetic average value per unit are given in a separate table (fig. 5.1).

Iso depth maps have been constructed at top Solling Fm., top RNRO1, base and top Muschelkalk Formation, base Niedersachsen Gp. and base North Sea Supergroup (base Tertiary) levels. Faults and fault zones identified from wells and well series were added to the maps, taking into account the tectonic phases. Hereafter contour lines were re-calculated. Consistent isoline anomalies, which point to the existence of fault zones, were further evaluated and the procedure was repeated.
Furthermore, subcrop maps at base SK, base AT and base N levels have been included, showing the strata below the unconformities. See attachment C for depth and subcrop maps. All depths maps are in meters below NAP.

A large number of correlation panels was made during the evaluation process, from which the geological setting was reconstructed. A selection of 12 panels has been attached to the report (E-1 to E-12). Line-up is NAP for most of these panels. To better illustrate the system of inversion tectonics in the area, E-1b have been lined up at base SK and panel E-3 at base KN/ top SK level. In the northern part only limited information is available (see map A-1), here the salt boundaries of the original well logs were used to prepare correlation panels of the evaporite sequence only (E-9, E-10). A number of panels have been prepared of the evaporite sequence of a cavern series only (Series 66, 72, 469 & 472). Vertical and horizontal scale is 1 : 1000, and the correlation lines show the true dip. These panels have the same scale as the echo's, which enables comparison. For series 469 and 472 also a panel displaying the whole well trajectory with a NAP line-up. See map A2 for location of the panels.

8.b Available information

All available material from all TWR-wells located in the study area has been incorporated in this study. Available data generally include wireline logs, ROP, status sheet, 'boorboek', and an original well log (for the wells up to B313). Furthermore scans of the blueprints of the analogue logs, and a few descriptions of cored sections and cuttings samples were available.

. Status sheet

Of all wells an AkzoNobel status sheet is available stating permanent data, technical data and geological boundaries, the latter mainly within the evaporite sequence. The data on the status sheets originate mainly from the 'boorboek' (drillers book), which is kept for every individual well.

Depth reference in the status sheet is NAP. For all wells the elevation of CF and GL/MV above NAP is also given.

. 'Boorboek' / 'drillers book'

From most wells a scanned version of the drillers book / 'boorboek' is available. The 'boorboek' of wells B283 to B287 and B325 were not available. Especially the 'boorboek' of the earlier wells, represent the original data. The for the current study useful information in the 'boorboek' are e.g. reference depths, total depth, cored sections, mud gains/losses, mud weight, geological boundaries, and casing points. A few drillers books contain 'Prakla measurements' / Echo representations of the cavern from 1982 - 1995. For well B204 and later only little information is given in the 'boorboek'.

Different depth references are given in the drillers book, namely GL (maaiveld), 'bovenkant sok' , bodem flens (bottom flange) and, paal. It is not clear which depths they represent, nor if in a later stage changes have been made to 'sok' or 'flens'.

The first well drilled with a rotary rig is, B056 (spud date 1st July 1959). Consequently from B056 and on, reference depth in the 'boorboek' is RT generally. Geological boundaries given are recalculated to MV/ GL which is in most cases the same as CF. Most drillers books contain a geological summary with geological boundaries given in 2 decimal points relative to GL/MV. For earlier wells these boundaries are probably based on a combination of drilling data and core description. For later wells they are based on a GR log.

From Well B056 and on, the conductor depth is sometimes given, relative to GL/MV. For the first wells drilled with Rotary Table mud weight is monitored, some mud weights are given for wells B063 to B074.

Especially for the earlier drilled wells, the evaporite sequence is generally cored, and the depths of the salt units are given with an accuracy of 2 decimal points. Especially of the earliest wells the recovery of the cores can be very low. E.g. for B052 two cores have been taken the first one without recovery, the second one with only 2m recovery. In B063, 11 cores have been taken with an average recovery of 32%. Reference depth for the cored depth in the 'boorboek' is Rotary Table, depths are corrected with 2.50m to CF, unless otherwise indicated. Since core recovery is so low, probably part of the boundaries are defined by drilling breaks.. For wells from B070, recovery improves significantly to 70% and to over 90% from B073, from B204 no core recoveries are given. Of later wells, cored sections are not always noted in the 'boorboek'.

In the 'boorboek' of the earlier drilled wells, the base North Sea Supergroup is normally indicated as the first occurrence of more consolidated rock types or as the top of the Muschelkalk or Buntsandstein Fm. Nearly all of these earlier wells are cored from top salt down to TD in the Solling Formation.

. original well log / 'boorprofiel'

For most wells up to well B313, drilled in September 1982, an 'original well log' / 'boorprofiel' is available (1 : 500 scale). No original well log is available for B012 and wells B075 to B087. Of 23 wells an additional 1 : 50 core description of the evaporite sequence is available. As is known from the drillers book / 'boorboeken' many more cores were taken and probably described in detail. Reference depth for the logs is GL / MV,

generally with NAP – GL/MV distance given as well. Of wells B110 to B130 no NAP depth is given.

Core descriptions generally concern the evaporite sequence. Only for well B226 a core description of the Muschelkalk Fm. was available (153.5m – 192m GL/MV. Unfortunately no GR log of B226 is available.

Additionally the core descriptions give useful information on tectonically induced features, ranging from 'wrijfvlakken' and stylolite features to fault planes. Except for the cores of B277 and B278, small scale tectonic features are described for all cores. For several sections repeat sections within the salt units are recorded, namely for B116, B118, B120, B121, and B259.

. wireline logs

A total of around 2500 wireline GR logs were available. Of previously digitized logs, scans of the original paper version of the logs were available. A total of approximately 600 GR logs was used in this study. Logs were available over the entire trajectory of 286 wells (80% of the total number of wells). For 43 wells only a Gamma Ray log over the lower part of the well was available, where often only the evaporite sequence was logged. For less than 10% of the total of 336 wells no wireline logs were run at all. The latter 25 wells concern mainly the earlier drilled wells which are located in the northern part of the study area. For these only the 'boorboek' information is available.

The oldest wireline log dates back to 1963 (B081). Up to 1994 analogue logs were taken which have been digitized only recently. Normally a CCL and a GR log was ran, of which only the latter was digitized. Of these logs scans in tiff format were available for this study. In the current study all digitized logs were checked against the scans of the original logs. Digitization is of good quality generally, only in some instances a mirrored log (e.g. 049-20-10-1975), was encounterd or a scale shift had been missed (e.g. 297-19801023).

Normally no tool is specified on the scanned logs, sometimes logs were taken by Prakla – Seismos, they normally include a Neutron-Gamma log, which have limited significance for the overburden section and they were not used in the current study.

In the digitized files the reference depth is always given as Ground Level, this appeared to be erroneous for certain logs and series of logs. Especially for earlier logs Rotary Table is sometimes taken as a reference (e.g. B297), also other references were used, e.g. CCL on RT (e.g. 241-19860307) and, CCL on GL/MV (e.g. 247-19860924). Sometimes the reason for a correction made on the blueprints is not clear, e.g. for 248-19770131 the GR log had to be corrected -3.80m, for 303-19811201 a +1.2m 'tellerfout' (counter error) was indicated on the blueprint. For the Prakla logs a 'Rohrüberstand' is given probably of the tool to the GL/MV; it is not clear whether this is the correction for the CCL, Neutron-Gamma, or GR log. For the digitized analogue GR logs, later digital logs, were used for confirmation of the reference depth or correction thereof. The latter logs were often only taken over the evaporite sequence. Whenever reference depths and/or corrections indicated are not clear, GL/MV is assumed.

Within one Series logs can be taken relative to different levels. E.g. in Series 265, the logs of B266 and B267 were taken relative to RT and the log of B265 relative to GL/MV. All scans have been checked for reference level. For corrections a distance of 2.5m from RT to CF is assumed (unless otherwise stated).

Logs are assumed to have been taken through casing. This is often noted on the scans of the analogue logs. Whenever 'open hole' is noted on the blueprint this is indicated on the final well log (e.g. 295-19810211).

Up to 1994 logs were taken with an analogue tool, and especially of the earlier logs quality can be poor. From 1995 and on a digital tool was used. From 1995 to 2000, this concerned a Robertson Geologging Winlogger tool and from 2001 an Antares tool. From December 2008 a Socon tool is used. The Robertson and Antares tools give very good quality logs with an excellent resolution.

Other logs:
In wells B340 (340-19871211) and B399 (399-19940316)a set of wireline logs were taken by TNO. No reference depth is given, GL/MV is assumed. In B340 an SP log, Caliper, Resistivity, Neutron, and GR logs were ran, in B399 also a density and a sonic log were ran. Only the GR logs of both wells and the Neutron log of B340 had been digitized. Again, the neutron log is not very useful for the overburden section, but has been included in the final well log of B340. As in B515 (report no GL07.1001) the Resistivity logs of both wells do not show much resolution on the scan. Unfortunately the Sonic log of B399 is unreadable. Therefore only the density log of B399 has been digitized for this study, and it is included in the final well log of B399.

In 1963 a Sonic log was taken in B081. This log also has been digitized for this study and is included in the final well log of B081.

Of only a few wells ROP data were available, these were digitized and added to the final well logs.

. other
For this study no additional samples have been studied.

8.c List of available external studies

The study is based on the regional geology as described in the 'Geological Atlas of the Subsurface of the Netherlands. Sheet X: Almelo – Winterswijk, TNO-NITG, 1998.

The following results of other studies were available:
- ' NITG 05-074-C: Palynologische 'fingerprint' van AkzoNobel boring 480', TNO-NITG, 2005
- ' 545, Voorlopige Biostratigrafie van het Jura Traject van boring TWR-386 (AKZO)'; RGD, 1992
- ' Onderzoek naar de aanwezigheid van Jura of Onder-Krijt in de KNZ boringen 106, 133, 140 en 171'; reports 65, 66 & 67; RGD, year 1969
- ' Stratigrafische Interpretatie van een kerntrajekt uit boring KNZ 171'; report 68, RGD, 1969
- ' Boring 31 der Koninklijke Nederlandse Zoutindustrie.'; report 135; RGD, 1953
- ' Some remarks on selected palynomorphs near the Jurassic-Cretaceous boundary in the Netherlands', Herngreen et al, 1976
- ' Salt Resources in the Netherlands as Surveyed mainly by AKZO'; Harsveldt, 1978
- ' Acquisition and processing of well measurement in well B399 of AKZO Hengelo; report OS 94-22-B; TNO–NITG, 1994

‘ The development, Geology and Lithology of the Central-Northern Part of the Hengelo Rock Salt Solution Mining Area and its Geotechnical Characterisation’; Van Lange, 1994
‘ Subsidence over Solution Cavities in Salt in the Twenthe-Rijn Concession Area’; report MP-93-002; Bekendam, 1996
‘ Kartering Twenthe –Rijn, Uitbreiding Twenthe-Rijn en Buurse Concessie’, including database; report NITG 97-69C TNO-NITG, 1997. including database
‘ Boorgatmeting te Enschede (Overijssel); Standaard, spectraal en dichtheidsmeting (juli ’00); report 005.40306/01.02; TNO-NITG, 2000
‘ Actualisering van de bestaande geologische kaarten van de concessie Adolf van Nassau en van de concessies Twenthe-Rijn, Buurse en Uitbreiding Twenthe-Rijn’ report NITG 02-194-C; TNO-NITG, 2002., including database-4oct2002
‘ Stratigraphisch-sedimentologische und mineralogisch-geochemische Untersuchungen des Rotsalzes. Kavernenfeld Hengelo, Bohrung 480’; report 5145031243; BGR Hannover, 2004
‘ Boorlog interpretatie basis Tertiair; S05B0013; Syncera GeoData B.V., 2005

8.d Data sources and data quality

. permanent data

Spud and TD dates, coordinates and NAP depths originate from the status sheet.

Minor differences in NAP depths between log and status sheet are caused by rounding. NAP is given with two decimals on the status sheets and on the logs.

TD is given in ‘boorboek’ in the original well log and in the status sheet. Generally the depth from the status sheet has been used, ignoring small differences with other sources.

Differences in dates between the different sources are mainly due to differences in definition of TD date. In the status sheets sometimes the date of ‘well in production’ is taken, sometimes the first TD date before opening up of the borehole to a larger diameter. Dates are only corrected when e.g. a TD date precedes the Spuddate.

. depth reference

Depth reference is given in 'boorboek'/drillers book , original well log/'boorprofiel' and in the status sheets. Reference for the GR log is always conductor flange (CF) and is the reference used in this study for the GR logs and in the database.

In this study the data for CF given in the status sheets are used. Sometimes minor differences are observed with both 'boorprofiel' and 'boorboek' data; e.g. when the depth given as GL/ MV in the 'boorboek' is used as CF in the status sheet.

For wells B055 and earlier, the reference depth used in the ‘boorboek’ and on the original well log is GL/MV which generally equals CF. B056 is the first well drilled with a Rotary Table, from this well and on the depths in the ‘boorboek’ are relative to Rotary Table, which is generally taken as 2.50m MV. Depths with geological implications (e.g. Top Salt) were then recalculated to MV depths. Also for the original well logs, all depths are given relative to MV/CF.

For the GRlogs, the available blueprints often state the reference depths. For this study data are considered relative to MV unless stated otherwise. As with the other data, reference depth data are only corrected when evidently erroneous.

For wells up to B313 data could be compared with 'boorprofiel' en 'boorboek' data. Normally a zero-offset is given in the status sheet for GL /MV to CF depth. Only for 9 wells an offset is given, which is generally less than 0.20m. For B243 and B249 a GL/MV - CF distance of 1m is specified. The data have been compared with the 'boorboek' / 'boorprofiel' data and with the neighbouring wells. For B243 the CF value, and for B249 the GL/MV value is considered correct.

Also for wells B314 - B404 normally GL/MV and CF depth given in the status sheet are the same. No 'boorprofiel' is available, and the 'boorboek' data give only limited information. Where data could be compared the two sources give the same delta for GL to MV depth. Again distances between GL/MV and CF are generally less than 20cm. For B367 and B368 offsets are 82cm and 52cm respectively. For B378 and B380 a difference of 92cm and 74cm respectively was observed between the GL/MV data from the status sheet and that of the TNO datasheet (2004). The status sheet data have been used.

From well B405 and on, generally both GL/MV and CF depth are stated in the status sheet. Whenever they could be compared to 'boorboek' data they were found correct (e.g. B425 - B431).

. Total depth (TD)

Total depth is sometimes given in 'boorboek' and 'boorprofiel' and nearly always given in the status sheet. Total depth given is the total depth reached while drilling. Sometimes base Salt A in the status sheet is deeper than TD. In this case, the well was deepened while drilling out the 7" casing shoe (B112, B115, B117). The TD data from the status sheets are used. For the earlier wells they originate from the original well log / 'boorprofiel'. From the 'boorboek' it is not always clear if depths are relative to RT or to GL/MV (see also the discussion on reference depth).

Generally, drilling is stopped shortly after the negative drilling break of the Anhydrite unit A1. TD normally lies just into the Solling Formation. For a number of wells TD lies in the Anhydrite unit A1 (e.g. B128, B130, B208).

. Casing depth

Whenever available the depth of the casing shoe is indicated on the 1 : 500 final well logs. The data originate from the 'boorboek' for the surface casing. Up to well B131 the surface casing is generally removed. The depth of the 7" casing is taken from the status sheet, which is the current position of the casing shoe. Casing data are only shown when complete (diameter and depths). Casing depths are of some importance, because GR readings are lower when taken through the casing.

. Gains and losses

On both the well logs and the data sheets, water gains and mud losses are plotted against depth. Volumes are given whenever available. Rarely information on mud weight is available. Especially in the earlier wells water gains are stated at or just below Base N levels. In later years these gains probably stopped through better well control.

. Cored sections

Of the first hundred wells the entire evaporite sequence was generally cored. Cored sections given in the 'boorboek' are plotted on the logs and data sheets. From B056 and on, cored intervals are normally given relative to Rotary Table which were corrected to CF for the current study. From well B204 and on, 'boorboek' data tend to become more limited and references to coring become more scarce. Probably more and longer sections were cored than indicated in the 'boorboek'. In the current study cored sections are only included on the final well logs when a clear reference is made in the 'boorboek'.

. Wireline logs

Whenever more wireline logs of one well are available, the oldest complete log of good quality is used as a reference for geological boundaries. The reference Gamma Ray log is always plotted in the first column of the well log. Whenever considered useful an additional Gamma Ray is added in the second column. The year the wireline log is taken and the scale in counts per second (CPS) have been added in the header. For part 2, blueprints were available of the analogue logs. On the blueprints often is indicated which reference depths is used, and the wireline log has been corrected whenever necessary. Corrections are indicated on the 1:500 logs.

8.e Lithological boundaries

The basis for all boundaries is primarily the Gamma Ray log.
Geological boundaries are given to one decimal and relative to the reference Gamma Ray log, which is placed in the first column of the final well log.

For several wells the reference log is relatively new and is ran up from the upper part of the cavern. Whenever a log over the evaporite sequence is also present, it has been used to define the boundaries of the RNRO1 units. Whenever a log shift is made, the depths of the boundaries that originate from the shortest log are indicated with a dotted line on the log and are given in italic in the database. Whenever possible the log shift has been put in a unit like RNRO1-D1, which has a more or less uniform thickness anyway. This makes it possible to use the data of the salt units for the thickness maps.

To obtain a sound basis for the maps and correlation panels all inconclusive data have been omitted.

Especially in the northern part of the area information is scarce. To be able to construct depth maps at Base N, Top RNRO1 and Top Solling Fm. levels, boundaries have been evaluated using data from 'boorboek' and 'original well log'.

. Niedersachsen Gp. / Altena Gp.

In the original well logs sometimes (small) sections are ascribed to 'Jura/Malm'. Source for this interpretation is unclear, no reference to 'Jura/Malm' is made in the 'boorboeken', no sample descriptions or biostratigraphical age dating is available. The Gamma Ray log of these wells does not always show the presence of AT or SK sections. In this report sections are not ascribed to SK or AT unless indicated by the Gamma Ray log.

. **Base Muschelkalk Formation**

Base Muschelkalk Fm. as it is given in the original well logs is considered incorrect (see also report GL08.501) and these daa have not been used.

On the original well logs the Muschelkalk Fm. is not described lithologically. At the time of drilling of these wells, the base of the Muschelkalk Formation used to be laid at the first occurrence of red brown claystones, which is an arbitrary boundary. Later re-definition of the Muschelkalk – Röt boundary places it at the base of the Muschelkalk dolomites, which is approximately 30m deeper.

. **Main Röt Evaporite Mb.**

Boundaries within RNRO1 have only been added to the 1 : 500 final well logs when they are covered by a Gamma Ray log. When within the logged section, the position of the base of the Anhydrite-E unit has also been indicated on the 1 : 2500 Well Data. For the wells located in the Marssteden area the boundaries of the units within RNRO1 have also been indicated on the well data sheet (when originating from the GR log).

8.f Database

Attachment H, Excel document GL11901 gives all permanent data and geological boundaries relative to casing flange (CF). All data from previously studied wells have been included in the spreadsheet. Previously studied wells which are located within the current study area have been updated whenever necessary.

Please note the importance of using the database only in concurrence with the logs and well data.

Occurrences of faults within the well trajectory have been indicated in red in the database at unit level. If a fault is present within a unit, both Top and Bottom of the unit are indicated in red . If a fault is present between two units, the Top of the lower unit and the Bottom of the upper unit are given in red. Please consult the final well logs for more detail on cut-out and the maps for more information on strike and offset direction.

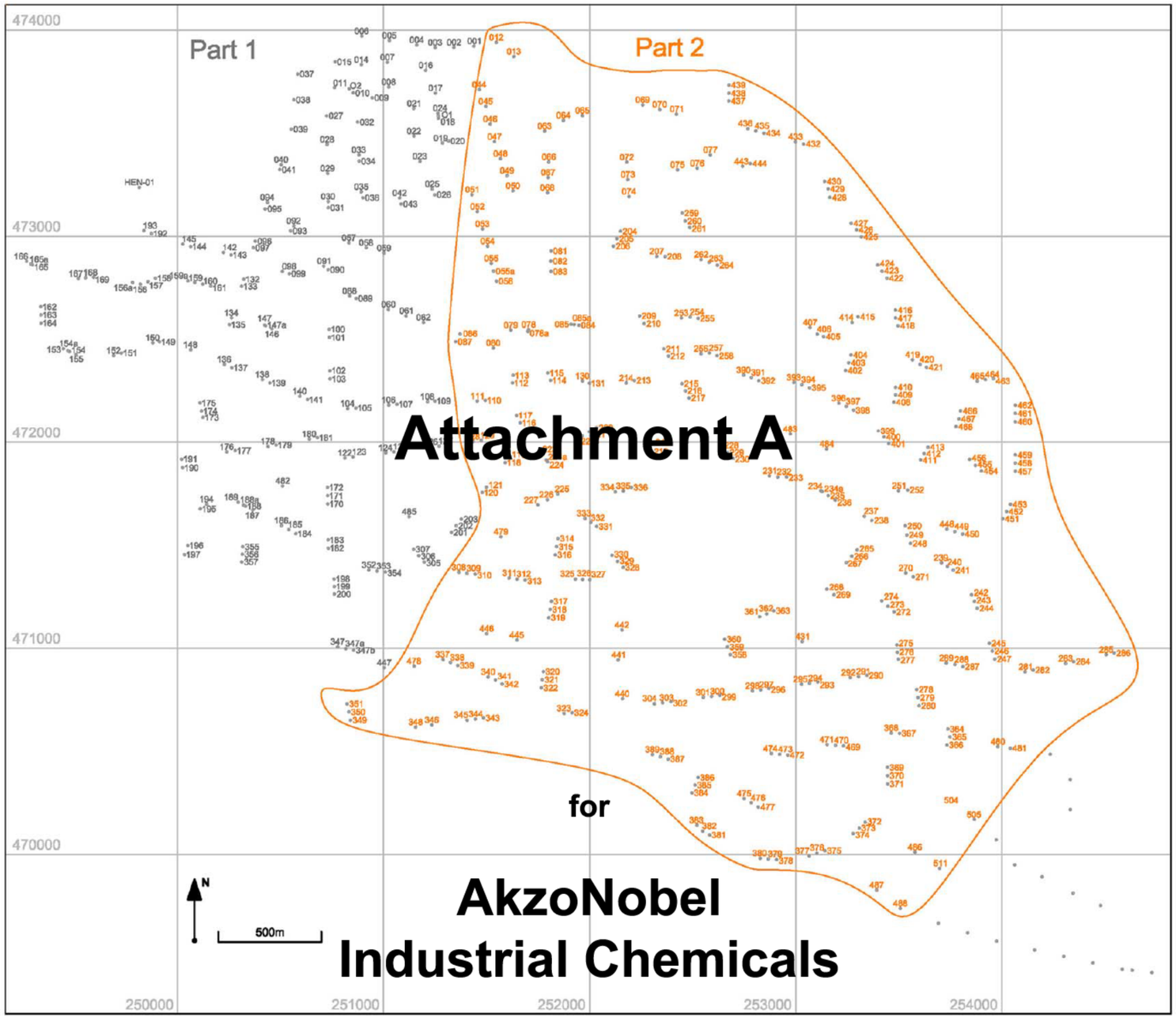
Top AT, top SK and Top RNMU are unconformable in all cases. This is not separately indicated at Fm/Mb level. The upper boundary of the uppermost unit within these formations forms the unconformity and is given in blue.

Numbers given in '*italic*' can not be used without consulting the final well log. E.g. whenever a GR curve is composed of different runs, boundaries originating from the shortest GR are given in *italic*. For Base North Sea Supergroup (base N / base Tertiary) the data are given in *italic & orange*, whenever they originate from the 'boorboek' This additional information is not added to other columns, e.g. to Top RNMU.

Also for Top Solling Fm. different sources are used; they are indicated in color and/or an *italic font* in the database. This additional information is not repeated in other columns (e.g. in the column giving Base RNRO1-A or Base RNRO1).

It is not always possible to recognise all units and subunits because of poor log quality. In these cases only the bottom of the lower recognised unit and the top of the upper unit is indicated.

Detailed Geology of the Hengelo Solution Mining Area
Part 2



Attachment A

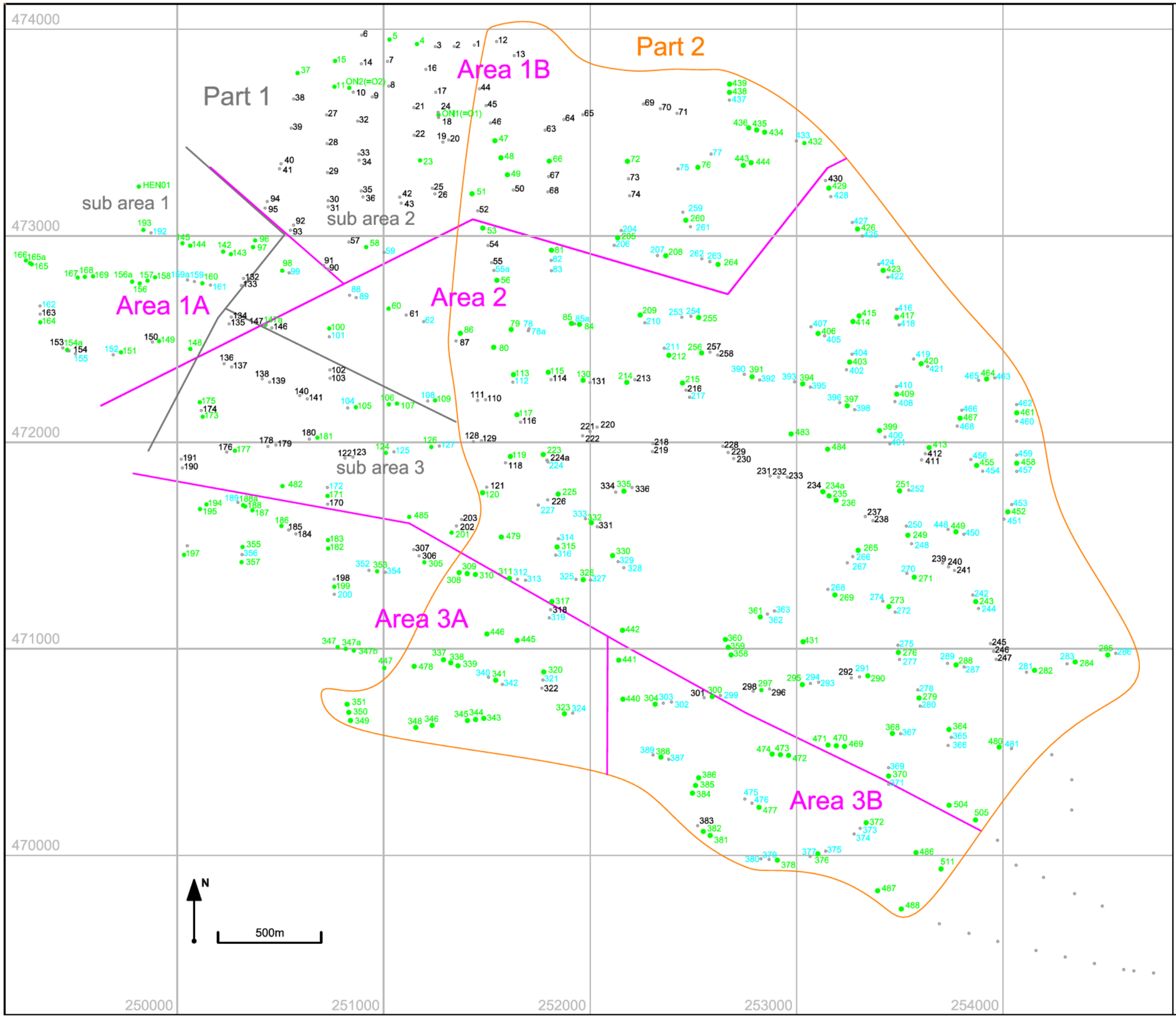
for

AkzoNobel
Industrial Chemicals

prepared by: GEOWULF*Laboratories*, the Netherlands
September 2011, report no: GL11.901

info@geowulf.nl

Map A-1: Well location and subdivision in tectonic areas



Map A-1:
Well location and subdivision in tectonic areas

Legend:

well location

GR log available

100 final well log, 1 : 500 scale

100 well data, 1 : 2500 scale

no GR log over entire trajectory

100 well data, 1 : 2500 scale

boundaries

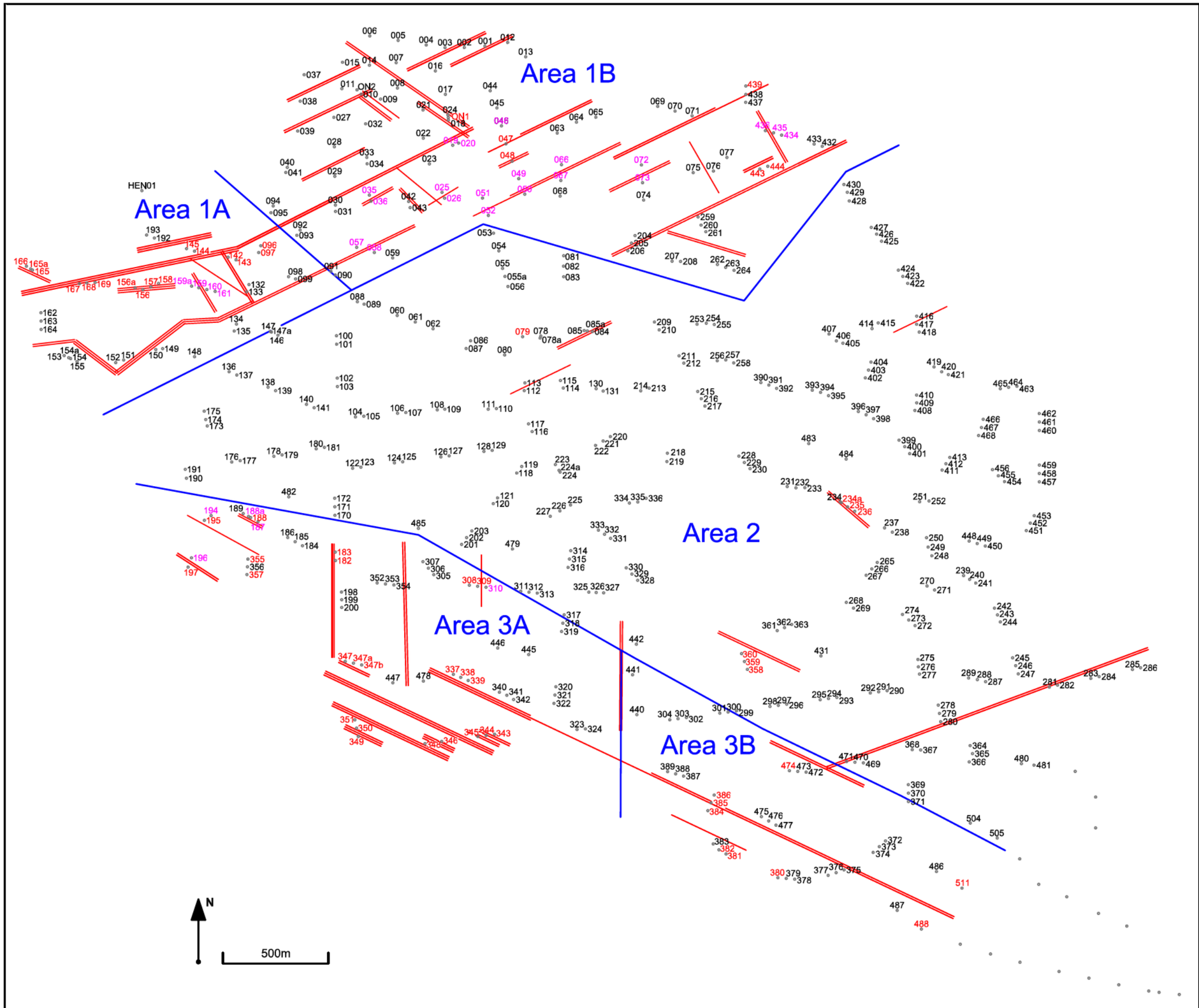
study area part 2

tectonic areas

subareas defined in part 1

prepared by:
GEOWULF *Laboratories*
attachment to report GL11.901

Map A-2: Tectonic areas and fault zones



Map A-2:
Tectonic areas and fault zones

for detail is referred to the depth maps (Attachment C).

Legend:

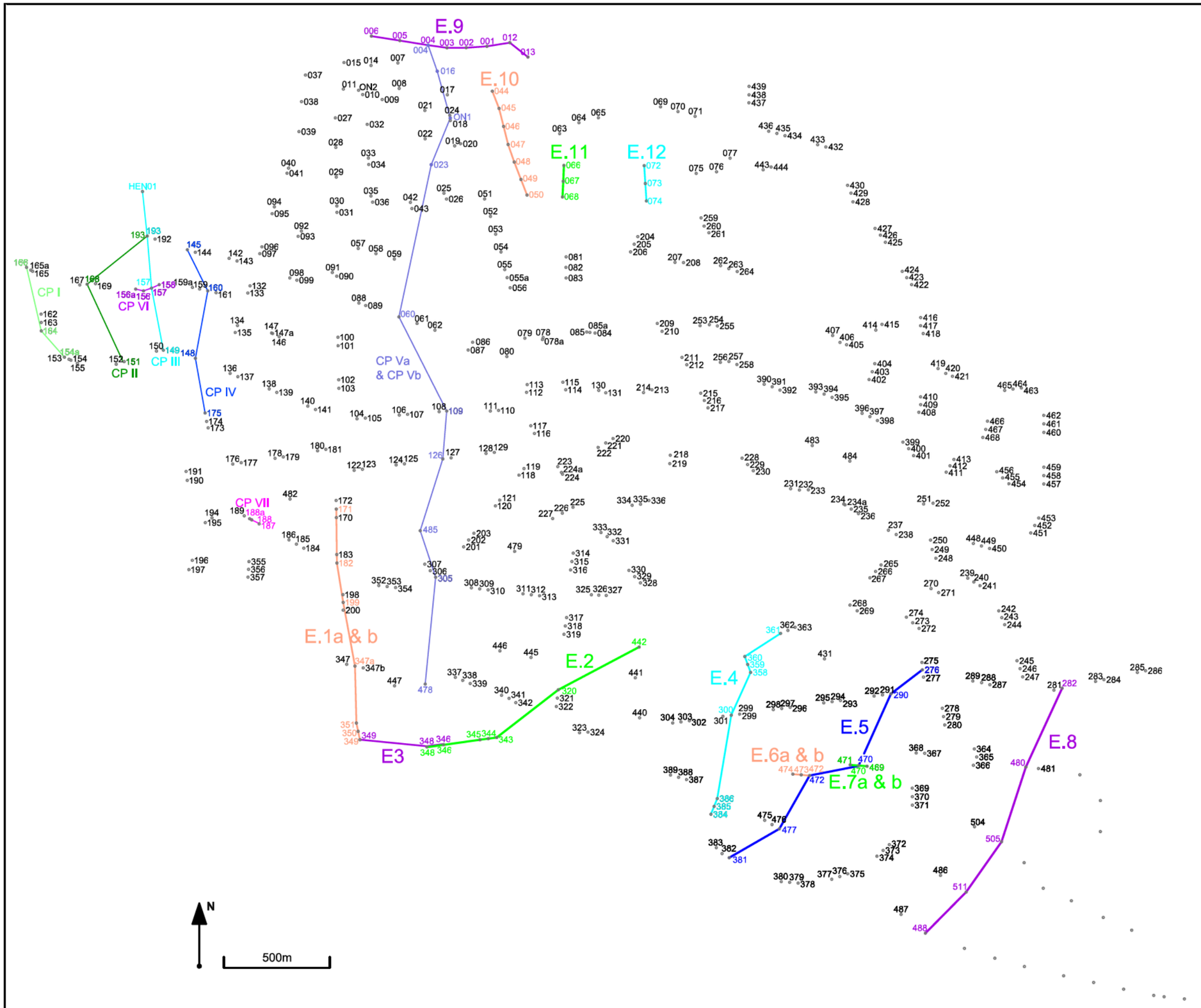
- . well location
- 100 well name
- 100 fault identified in well
- 100 fault identified in Series

fault lines with maximum present day offset

- offset <5m
- offset 5 - 20m
- offset >20m

prepared by:
GEOWULF*Laboratories*
attachment to report GL11.901

Map A-3: Correlation Panels



Map A-3: Correlation Panels

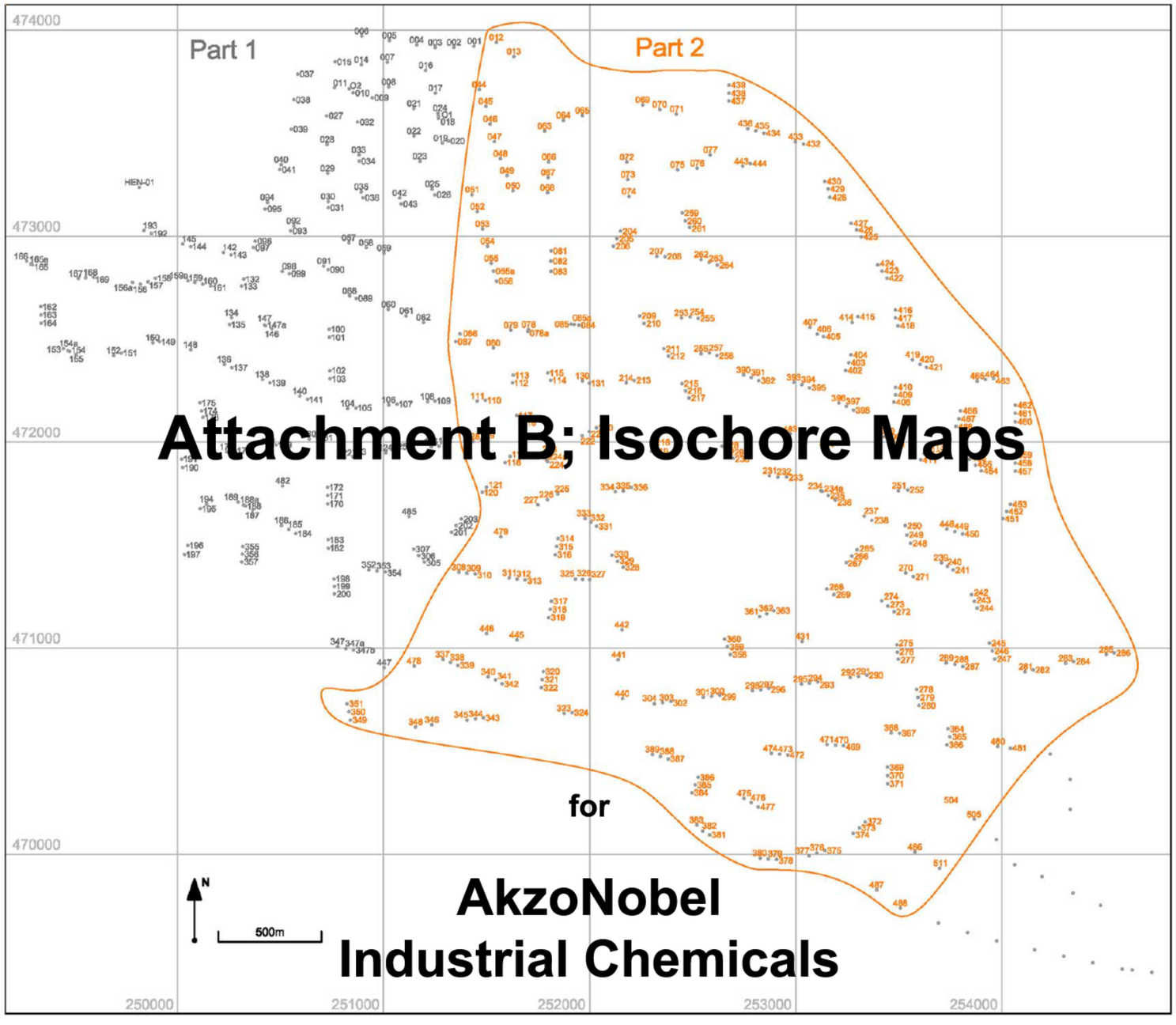
panels included in Part 1 & Part 2 of the study

Legend:

.	well location
100	well name
E.12	correlation panel Part 2 Attachment E, this report
CP VI	correlation panel Part 1 Report GL10.101

prepared by:
GEOWULF*Laboratories*
attachment to report GL11.901

Detailed Geology of the Hengelo Solution Mining Area
Part 2



Attachment B; Isochore Maps

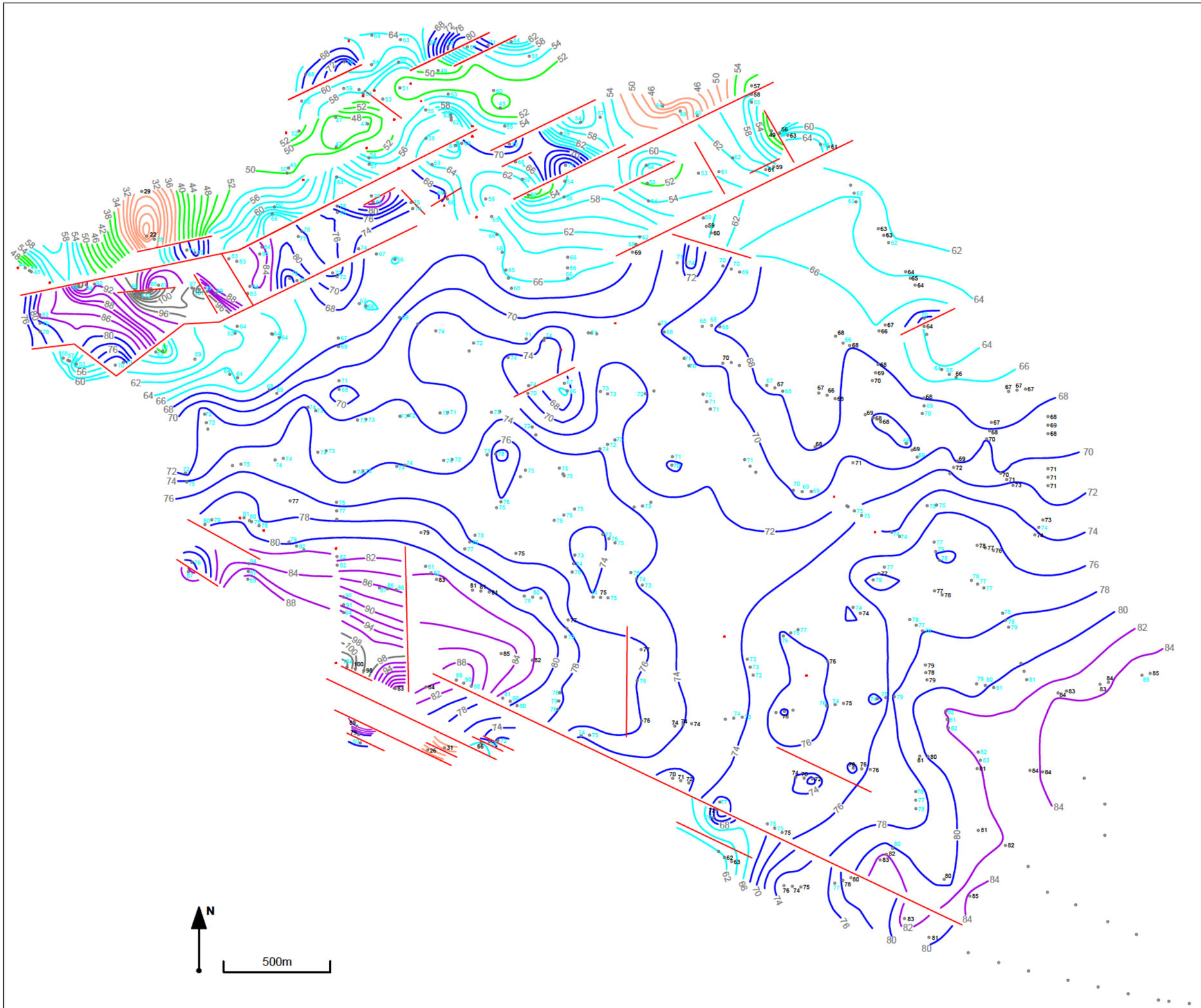
for

AkzoNobel
Industrial Chemicals

prepared by: GEOWULF*Laboratories*, the Netherlands
September 2011, report no: GL11.901

info@geowulf.nl

Map B-1: Thickness Main Röt Evaporite Mb.; RNRO1



Map B-1: Thickness RNRO1

thickness in meters
(faulted sections not included)

Legend:

well location

thickness (m)

20.4 source GR log

20.4 derived thickness

isochore lines (2m interval)

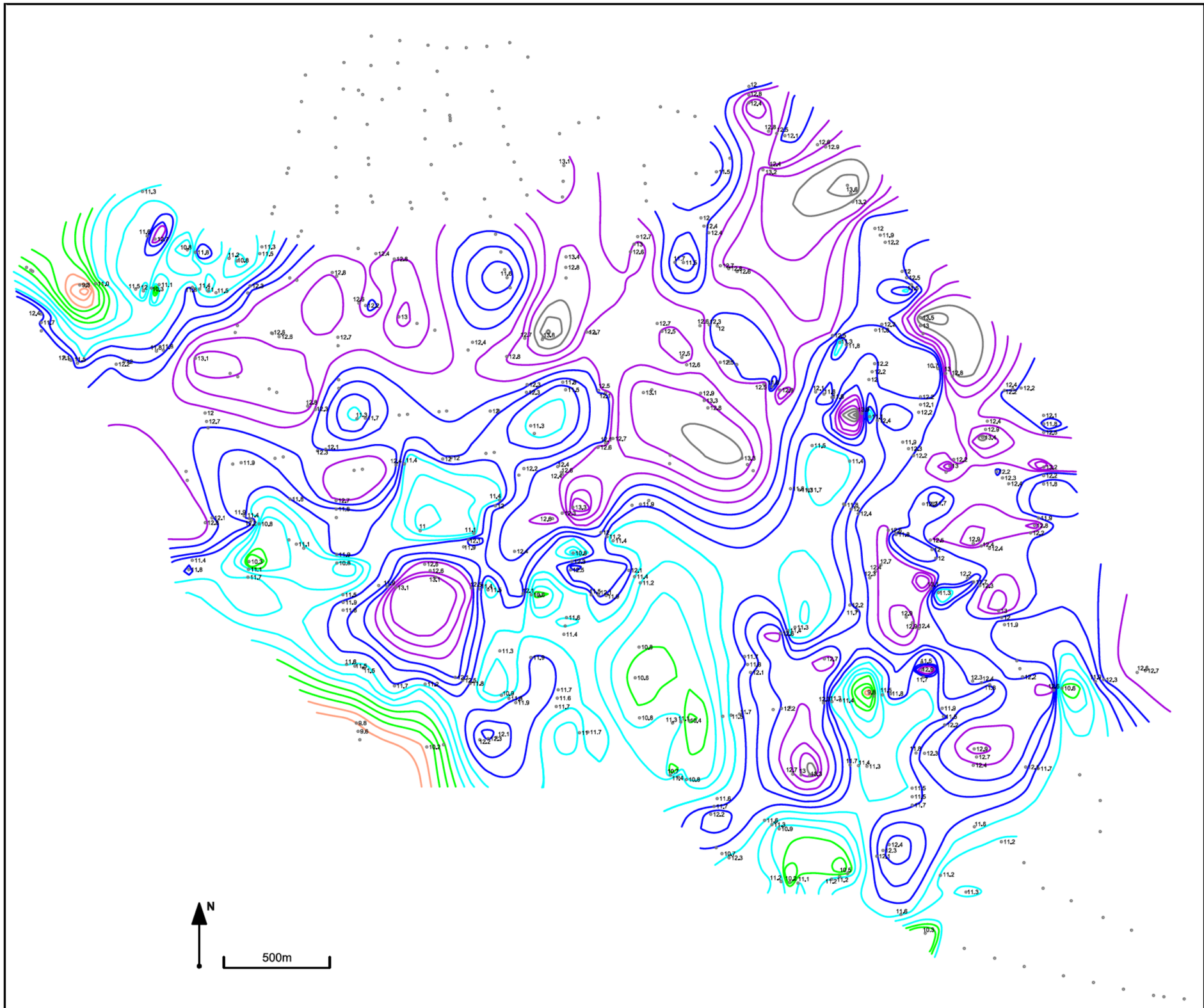
- ≤ 36m
- 38 -52m
- 54 - 66 m
- 68 - 80m
- 82 - 94m
- 96 - 108m

normal fault

- at top RNSO level
- at top RNRO1 level
- at both levels

prepared by:
GEOWULF*Laboratories*
attachment to report GL11.901

Map B-2: Thickness Main Röt Evaporite Mb.: RNRO1-E



Map B-2: Thickness RNRO1-E

thickness in meters
(faulted sections not included)

Legend:

. well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 9.5 - 10.0m
- 10.25 - 10.75m
- 11.0 - 11.5m
- 11.75 - 12.25m
- 12.5 - 13.0m
- 13.25 - 13.75m

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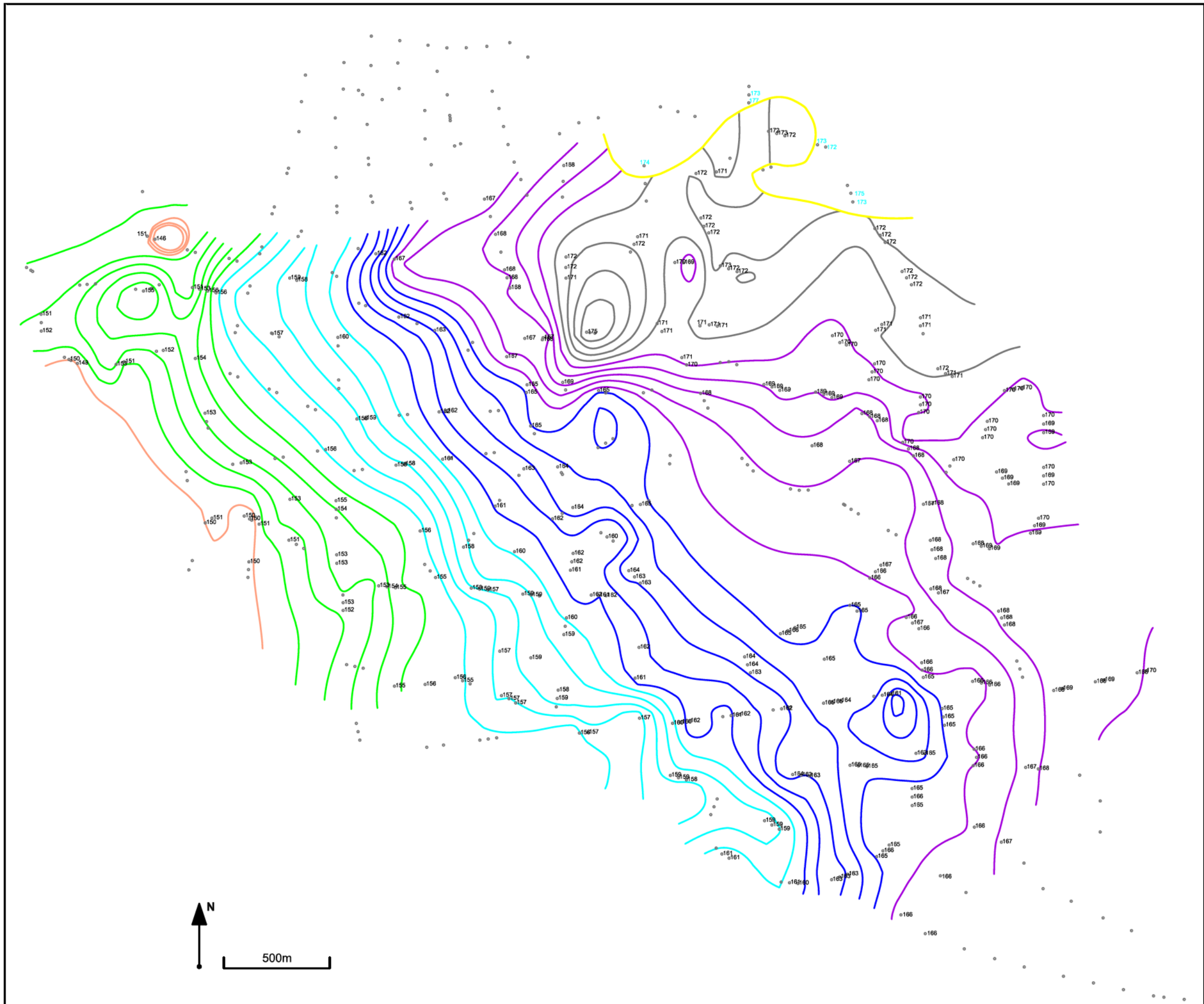
Map B-3: Thickness base Intermediate Röt Claystone Mb. to top Upper Röt Claystone Mb.



Map B-3: Thickness
RNROM + RNRO2 + RNROU

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit partly eroded
- partly eroded

isochore lines (1m interval)

- 146 - 150m
- 151 - 155m
- 156 - 160m
- 161 - 165m
- 166 - 170m
- 171 - 175m

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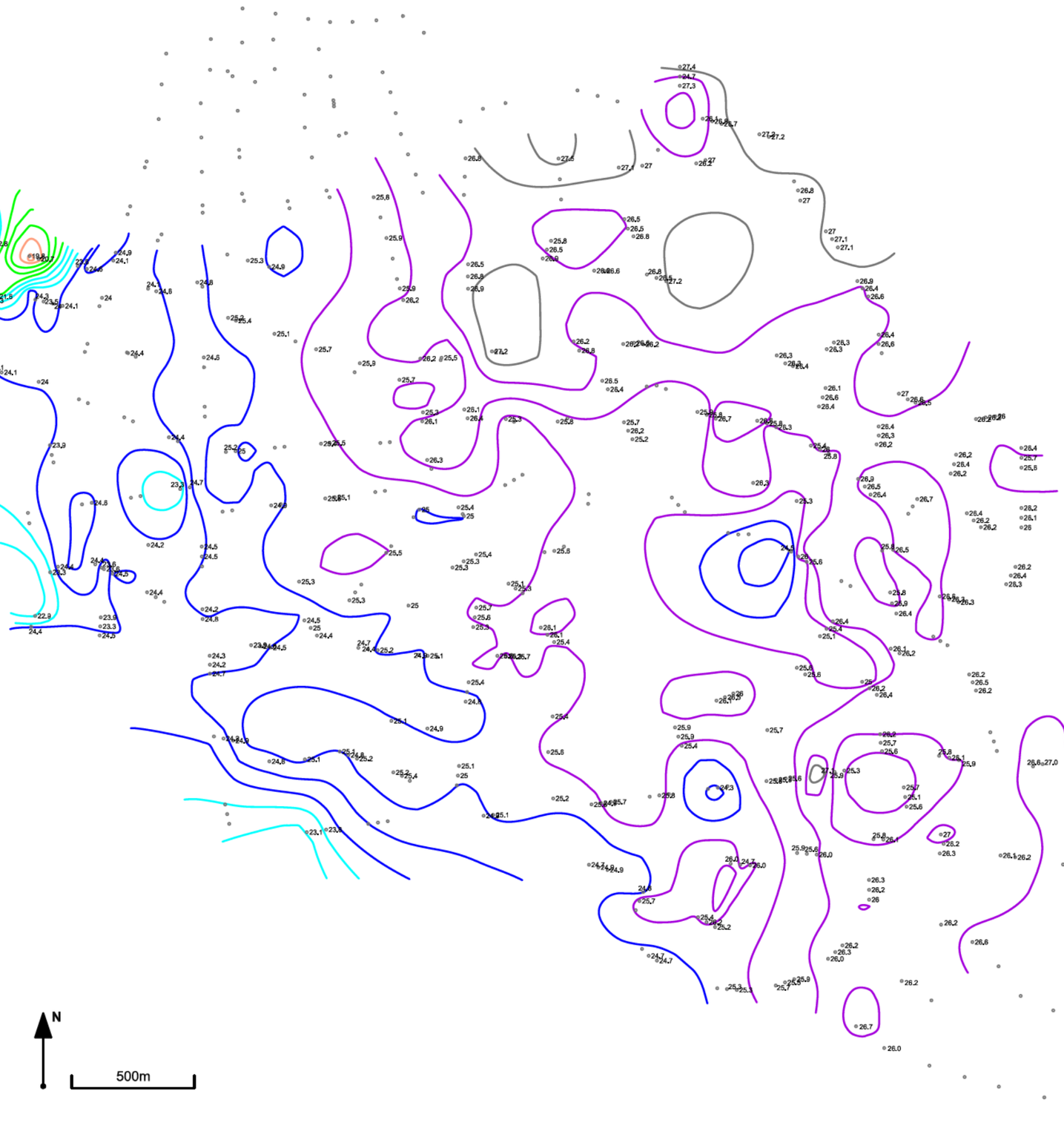
Map B-4: Thickness Intermeidate Röt Claystone Mb.: RNROM



Map B-4: Thickness RNROM

thickness in meters
(faulted sections not included)

Legend:

. well location

20.4 thickness (m)

isochore lines (0.5m interval)

- 19.5 - 20.5m
- 21.0 - 22.0m
- 22.5 - 23.5m
- 24.0 - 25.0m
- 25.5 - 26.5m
- 27.0 - 27.5m

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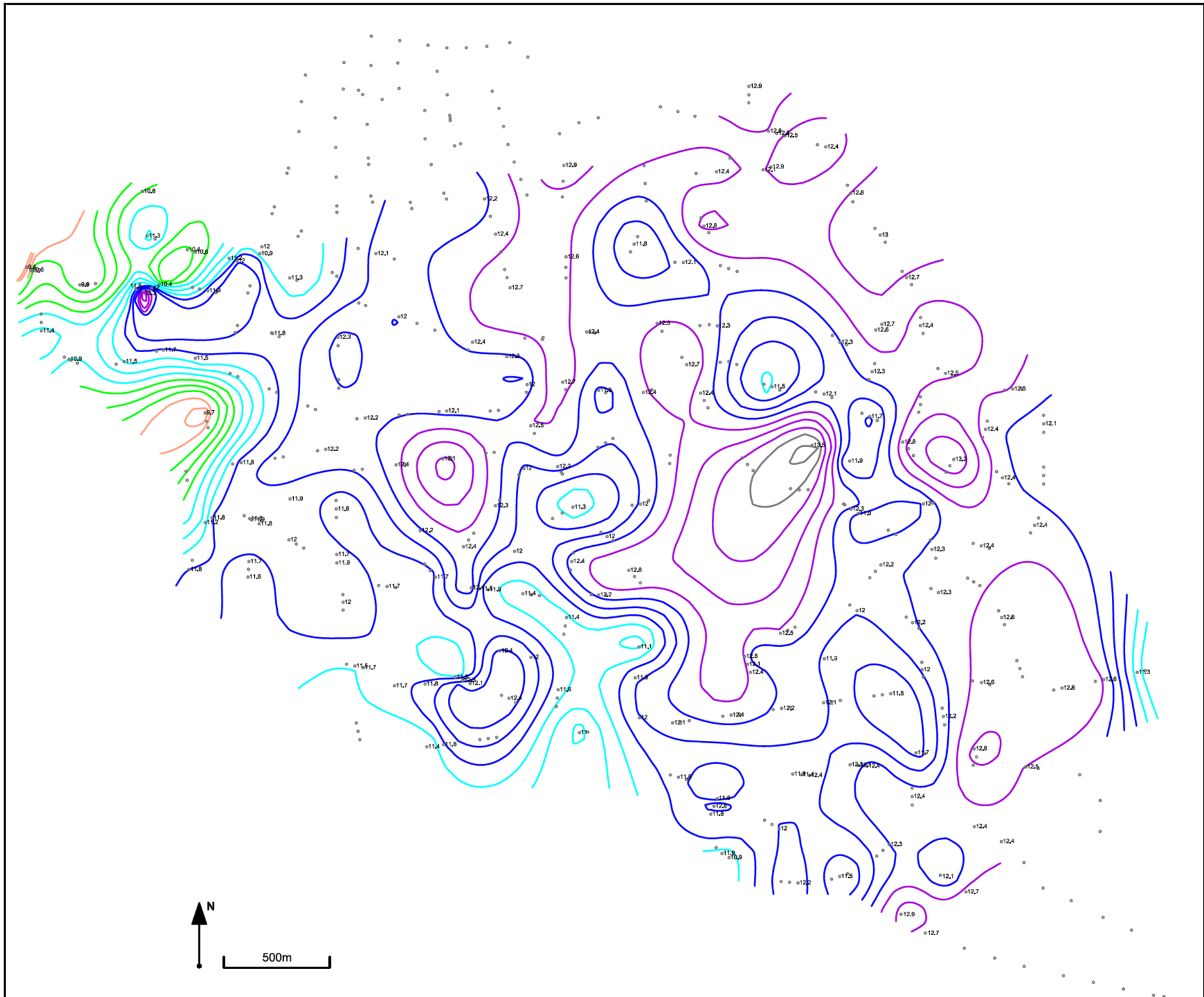
Map B-5: Thickness Inermediate Röt Claystone Mb.: RNROM-A



Map B-5: Thickness RNROM-A

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 9.5 - 10.0m
- 10.25 - 10.75m
- 11.0 - 11.5m
- 11.75 - 12.25m
- 12.5 - 13.0m
- 13.25 - 13.5m

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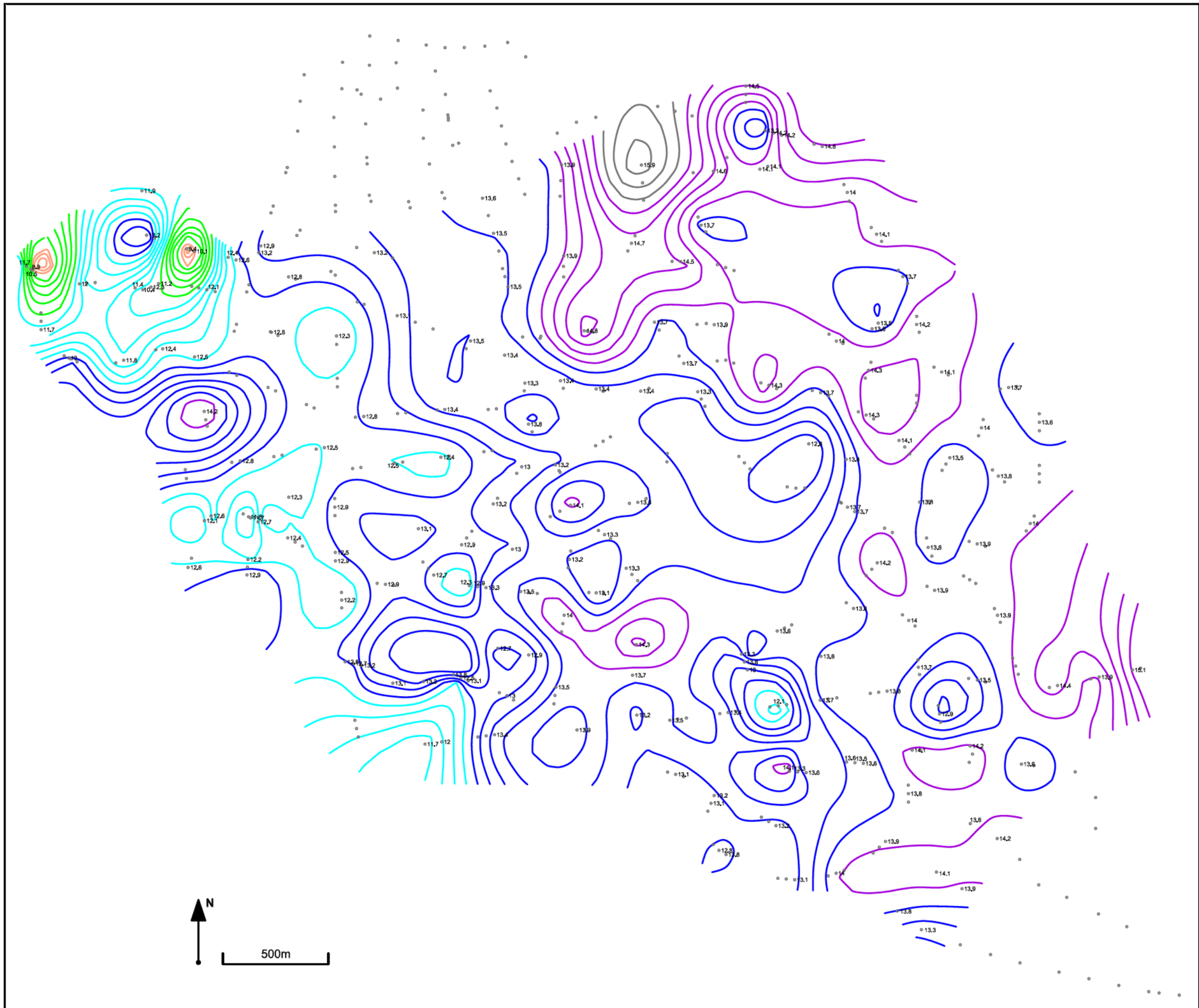
Map B-6: Thickness Intermediate Röt Claystone Mb.: RNROM-B



Map B-6: Thickness RNROM-B

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 9.0 - 10.0m
- 10.25 - 11.25m
- 11.5 - 12.5m
- 12.75 - 13.75m
- 14.0 - 15.0m
- 15.25 - 16.0m

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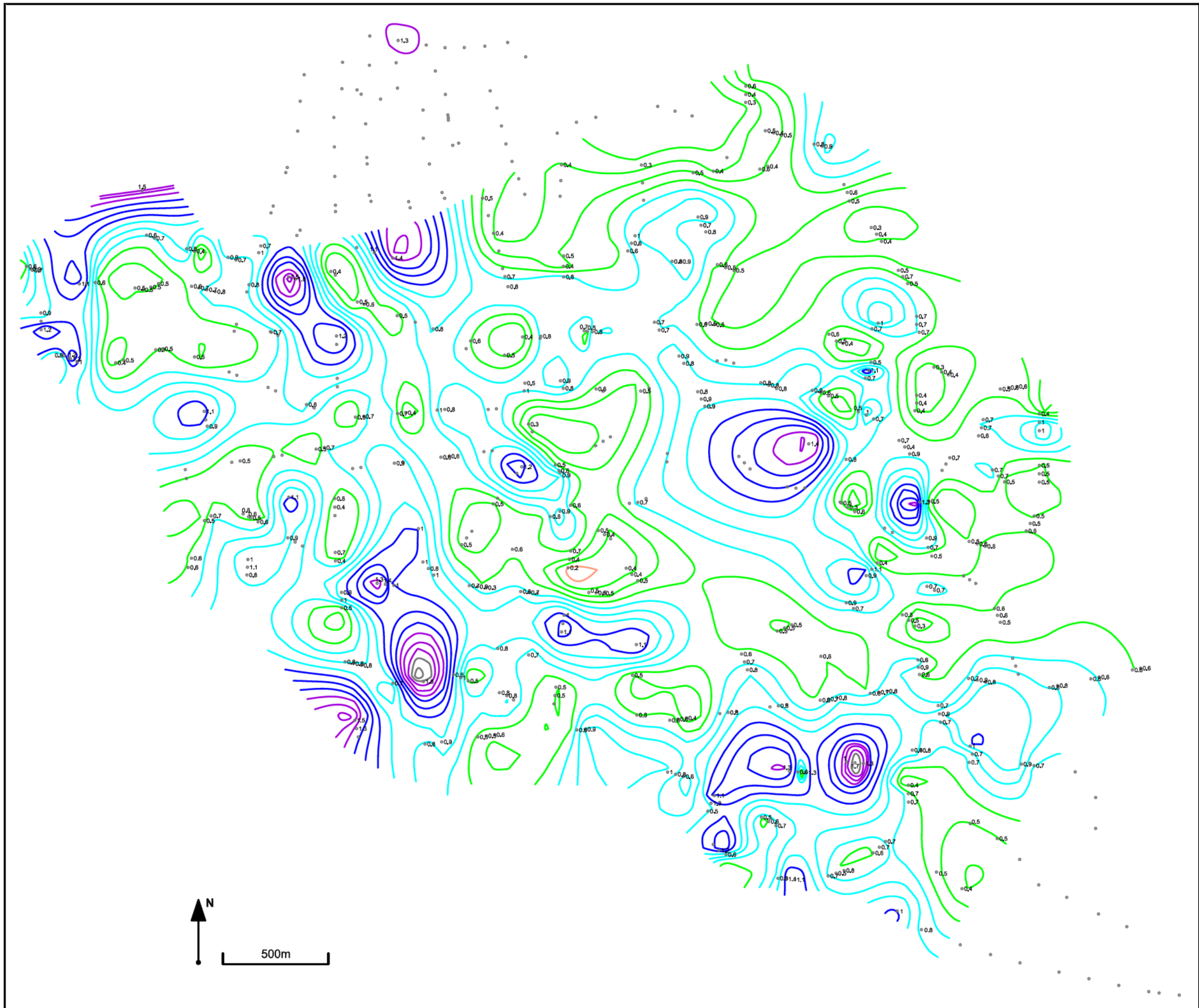
Map B-7: Thickness Upper Röt Evaporite Mb.: RNRO2



Map B-7: Thickness RNRO2

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.1m interval)

- 0.1 - 0.3m
- 0.4 - 0.6m
- 0.7 - 0.9m
- 1.0 - 1.2m
- 1.3 - 1.5m
- 1.6 - 1.8m

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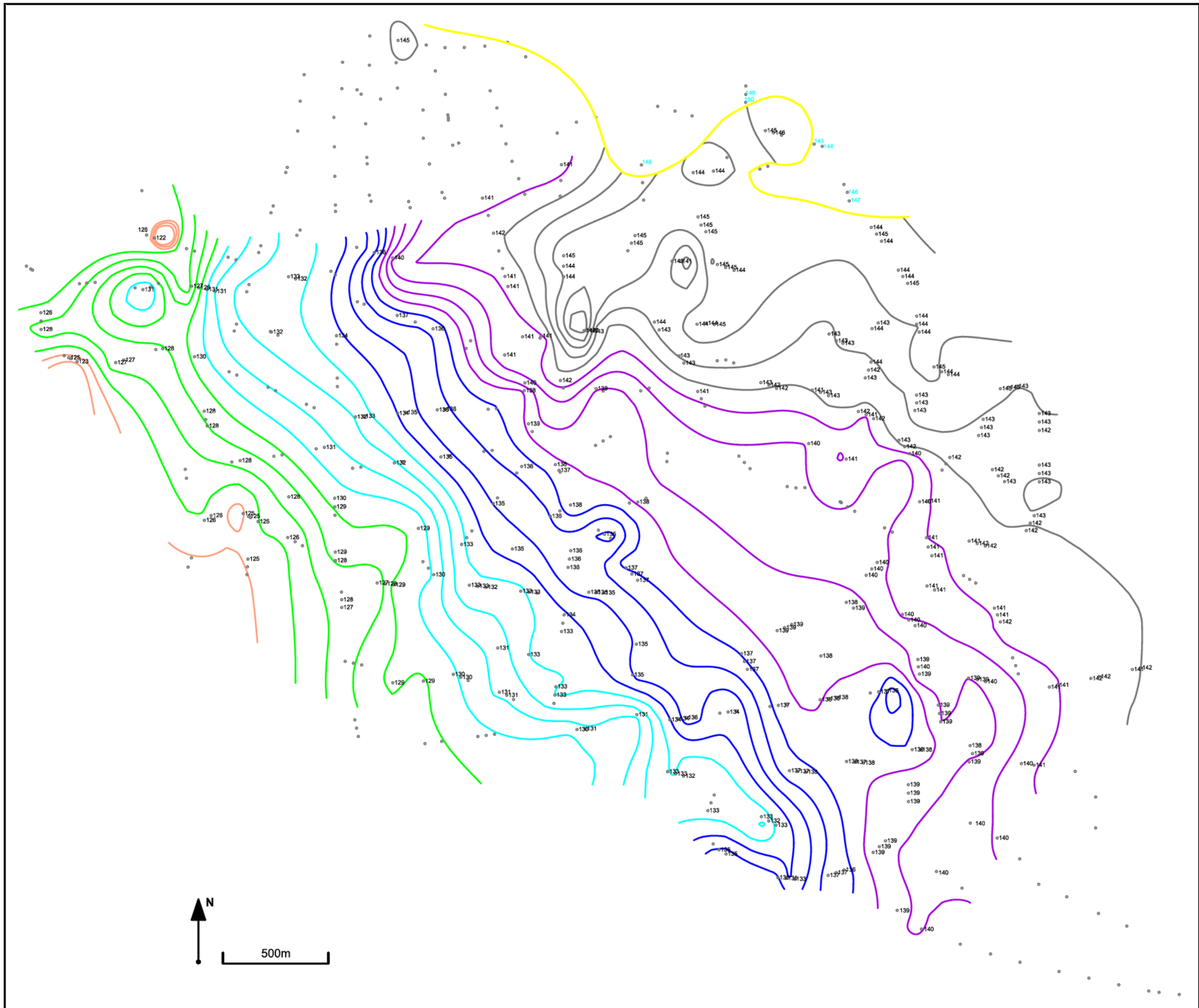
Map B-8: Thickness Upper Röt Claystone Mb.: RNROU



Map B-8: Thickness RNROU

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit partly eroded
- partly eroded

isochore lines (1m interval)

- 122 - 125m
- 126 - 129m
- 130 - 133m
- 134 - 137m
- 138 - 141m
- 142 - 146m

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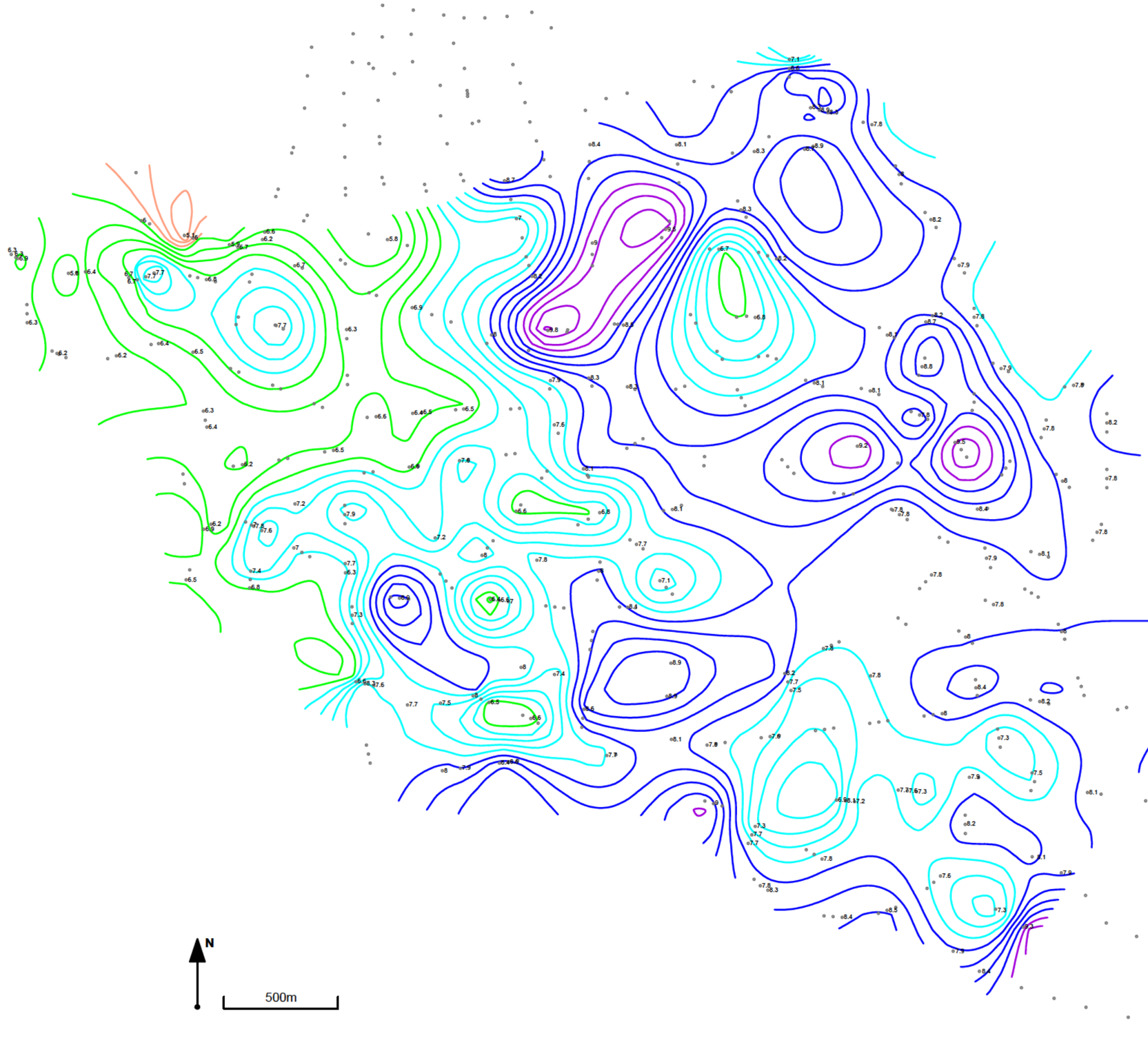
Map B-9: Thickness Upper Röt Claystone Mb.: RNROU-A



Map B-9: Thickness RNROU-A

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 5.0 - 5.75m
- 6.0 - 6.75m
- 7.0 - 7.75m
- 8.0 - 8.75m
- 9.0 - 9.75m

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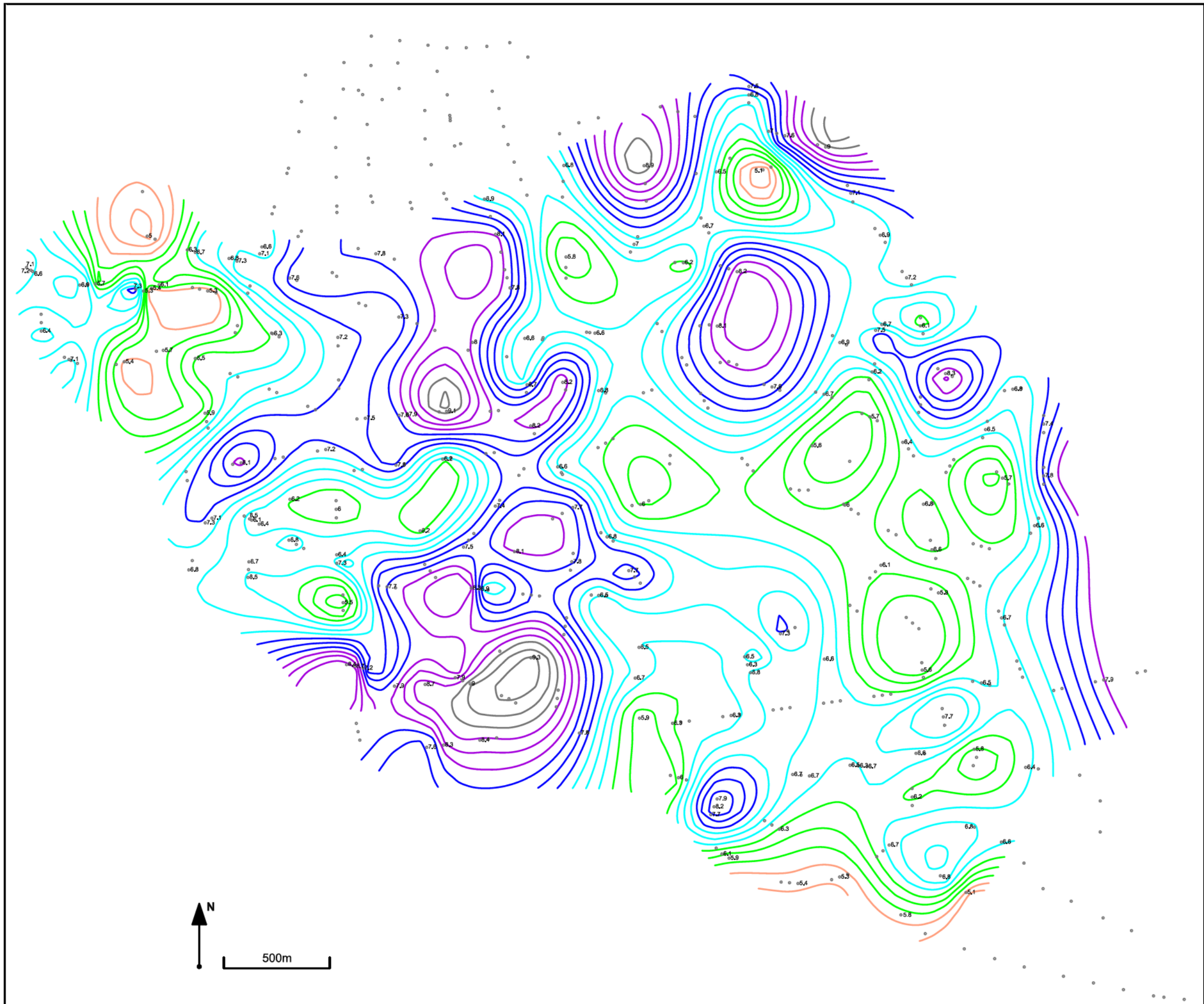
Map B-10: Thickness Upper Röt Claystone Mb.: RNROU-B



Map B-10: Thickness RNROU-B

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 5.0 - 5.5m
- 5.75 - 6.25m
- 6.5 - 7.0m
- 7.25 - 7.75m
- 8.0 - 8.5m
- 8.75 - 9.25m

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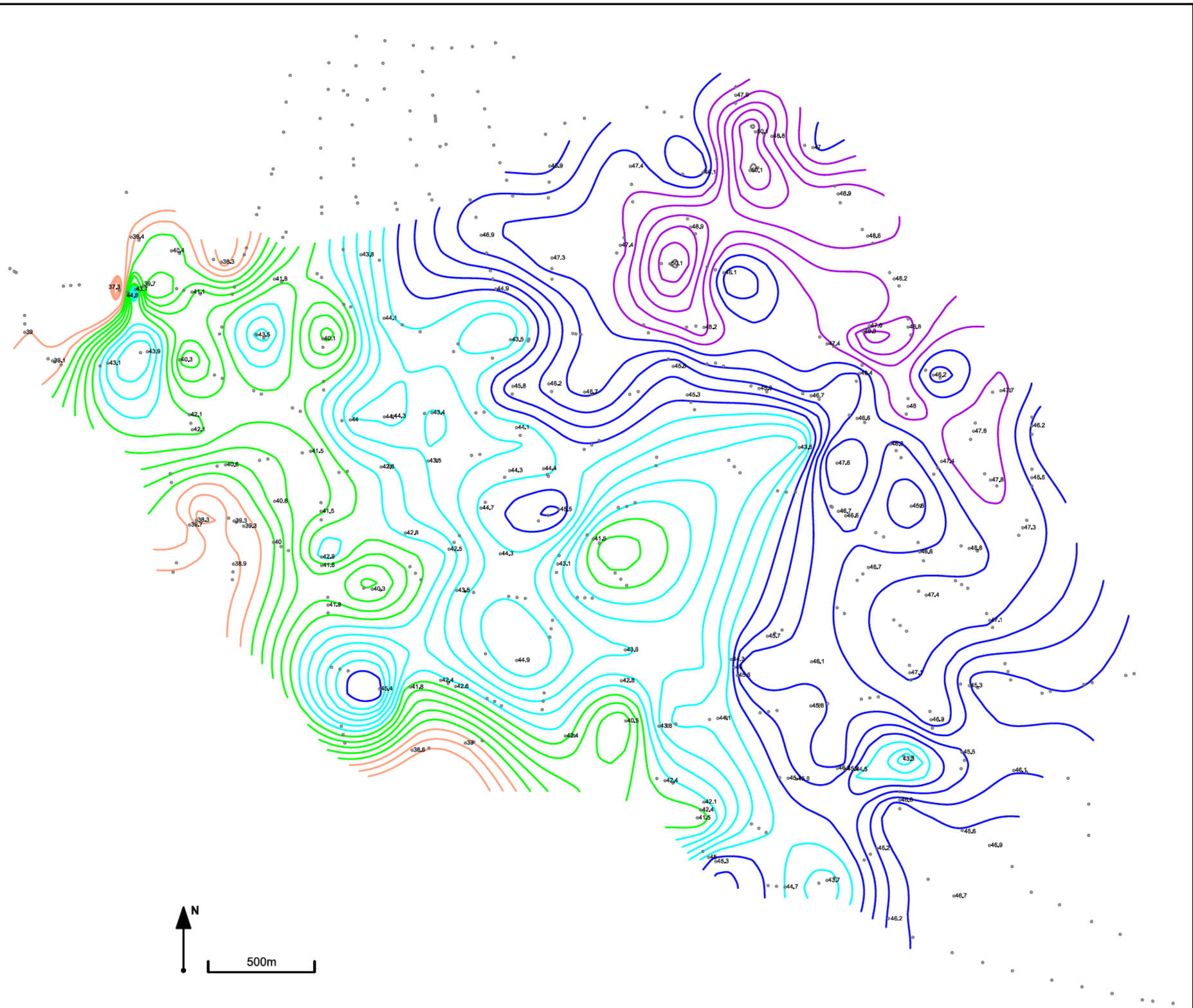
Map B-11: Thickness Upper Röt Claystone Mb.: RNROU-C



Map B-11: Thickness RNROU-C

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.5m interval)

- 37.5 - 39.5m
- 40.0 - 42.0m
- 42.5 - 44.5m
- 45.0 - 47.0m
- 47.5 - 49.5m
- 50.0 - 50.5m

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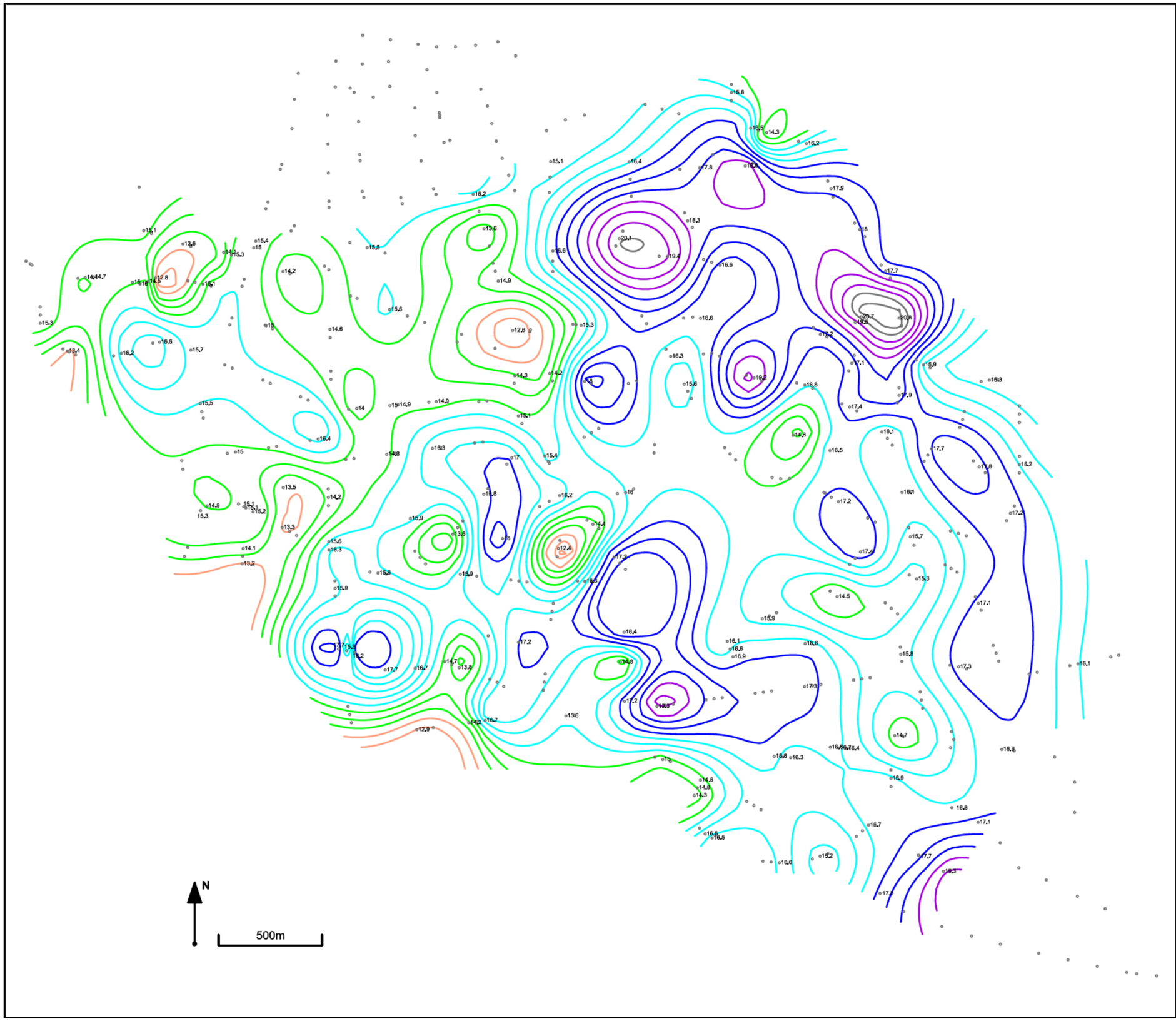
attachment to report GL11.901

Map B-12: Thickness Upper Röt Claystone Mb.:RNROU-C1



Map B-12: Thickness RNROU-C1

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.5m interval)

- 12.5 - 13.5m
- 14.0 - 15.0m
- 15.5 - 16.5m
- 17.0 - 18.0m
- 18.5 - 19.5m
- 20.0 - 21.0m

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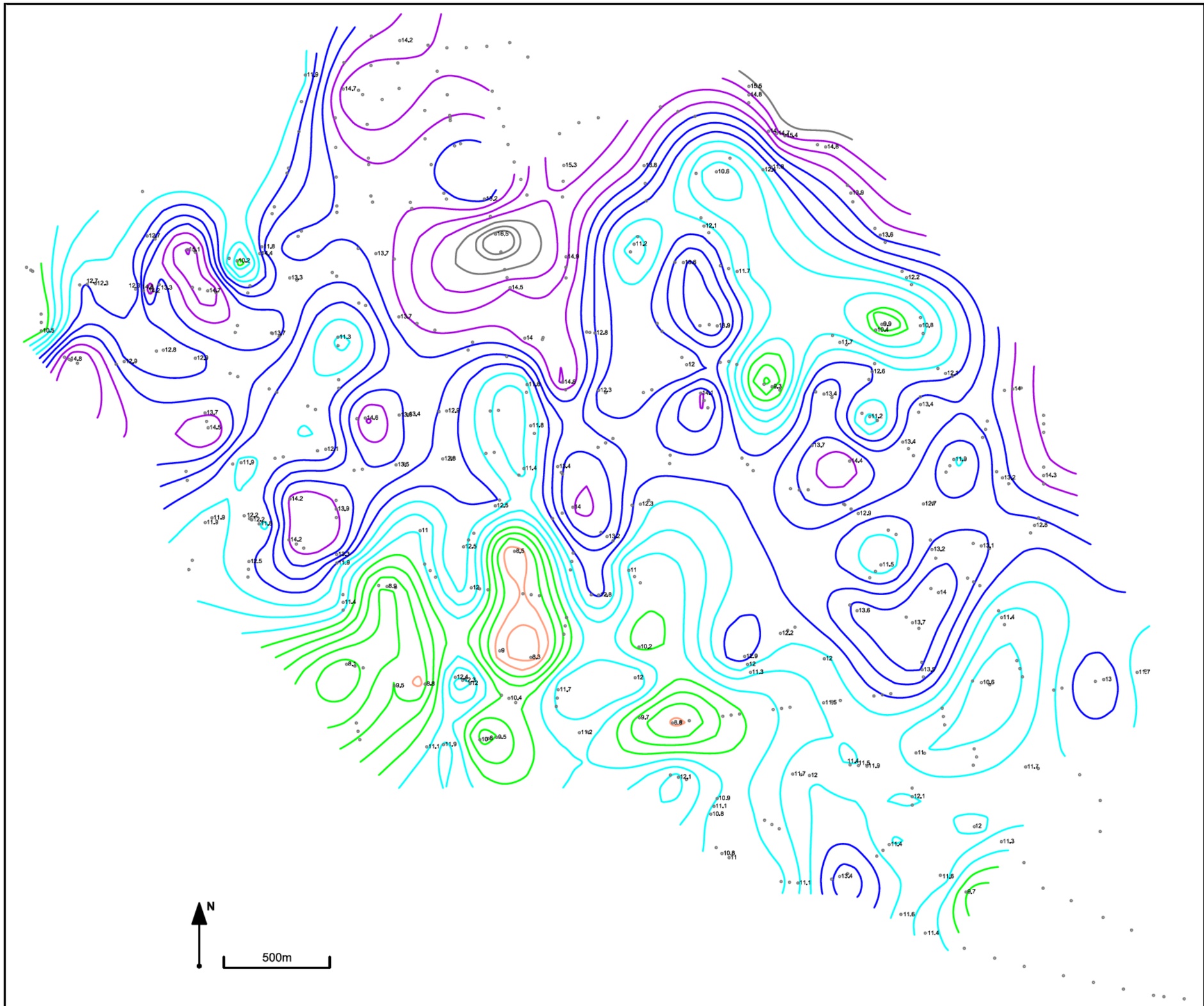
Map B-13: Thickness Upper Röt Claystone Mb.: RNROU-C2



Map B-13 Thickness RNROU-C2

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.5m interval)

- 8.0 - 9.0m
- 9.5 - 10.5m
- 11.0 - 12.0m
- 12.5 - 13.5m
- 14.0 - 15.0m
- 15.5 - 16.5m

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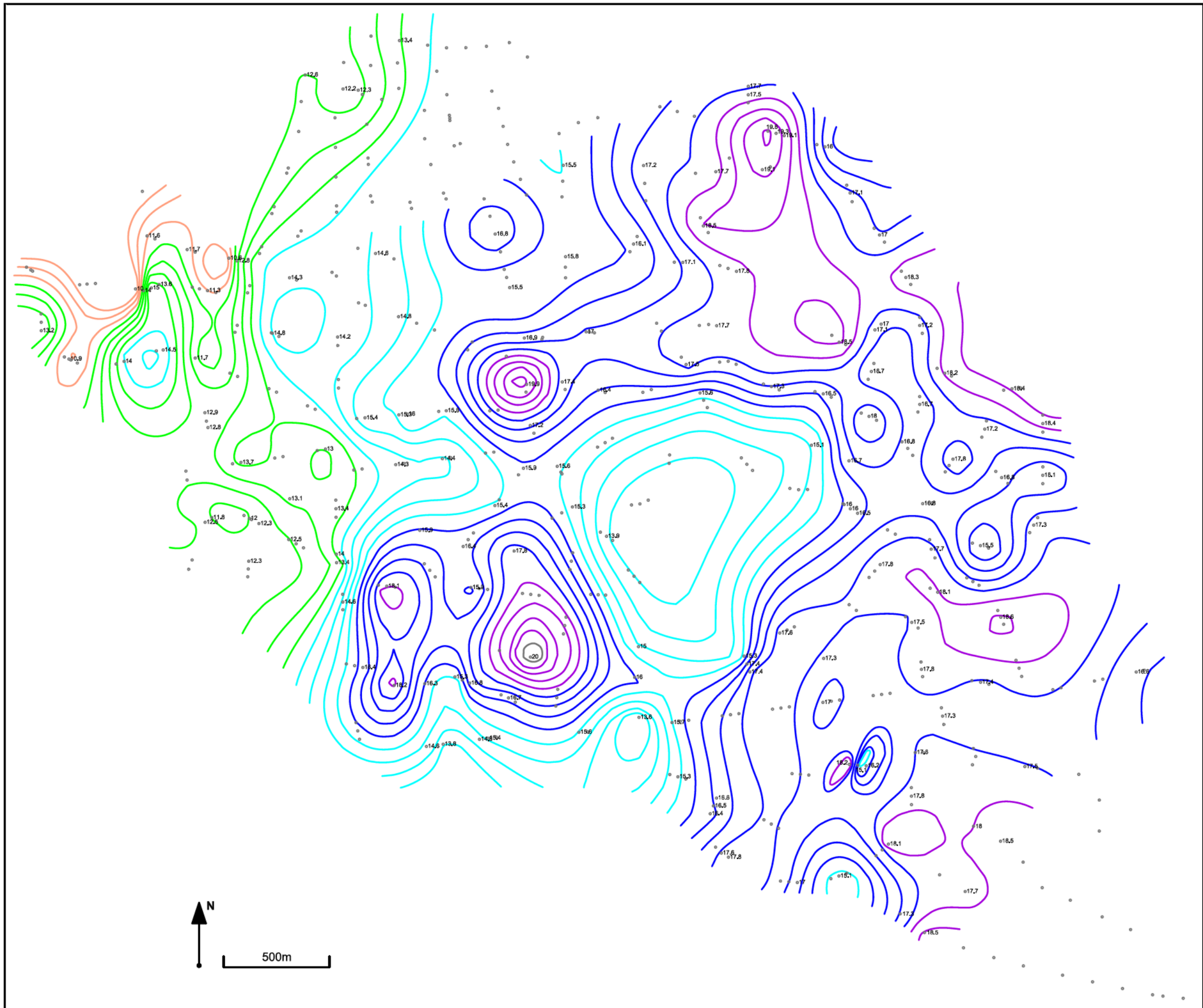
Map B-14: Thickness Upper Röt Claystone Mb.: RNROU-C3



Map B-14: Thickness RNROU-C3

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.5m interval)

- 10.0 - 11.5m
- 12.0 - 13.5m
- 14.0 - 15.5m
- 16.0 - 17.5m
- 18.0 - 19.5m
- 20.0m

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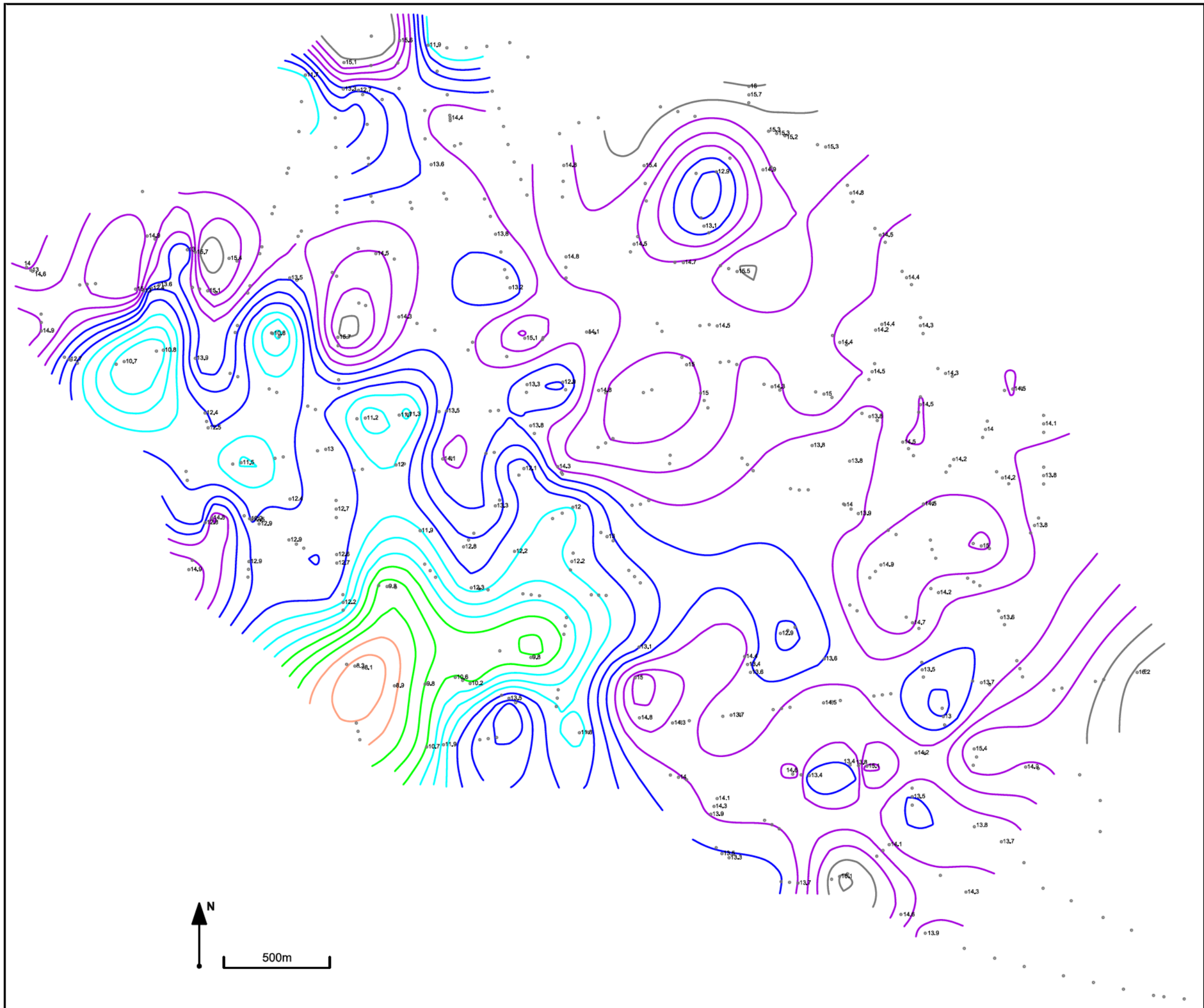
Map B-15: Thickness Upper Röt Claystone Mb.: RNROU-D



Map B-15: Thickness RNROU-D

thickness in meters
(faulted sections not included)

Legend:

. well location

20.4 thickness (m)

isochore lines (0.5m interval)

- 8.0 - 9.0m
- 9.5 - 10.5m
- 11.0 - 12.0m
- 12.5 - 13.5m
- 14.0 - 15.0m
- 15.5 - 16.5m

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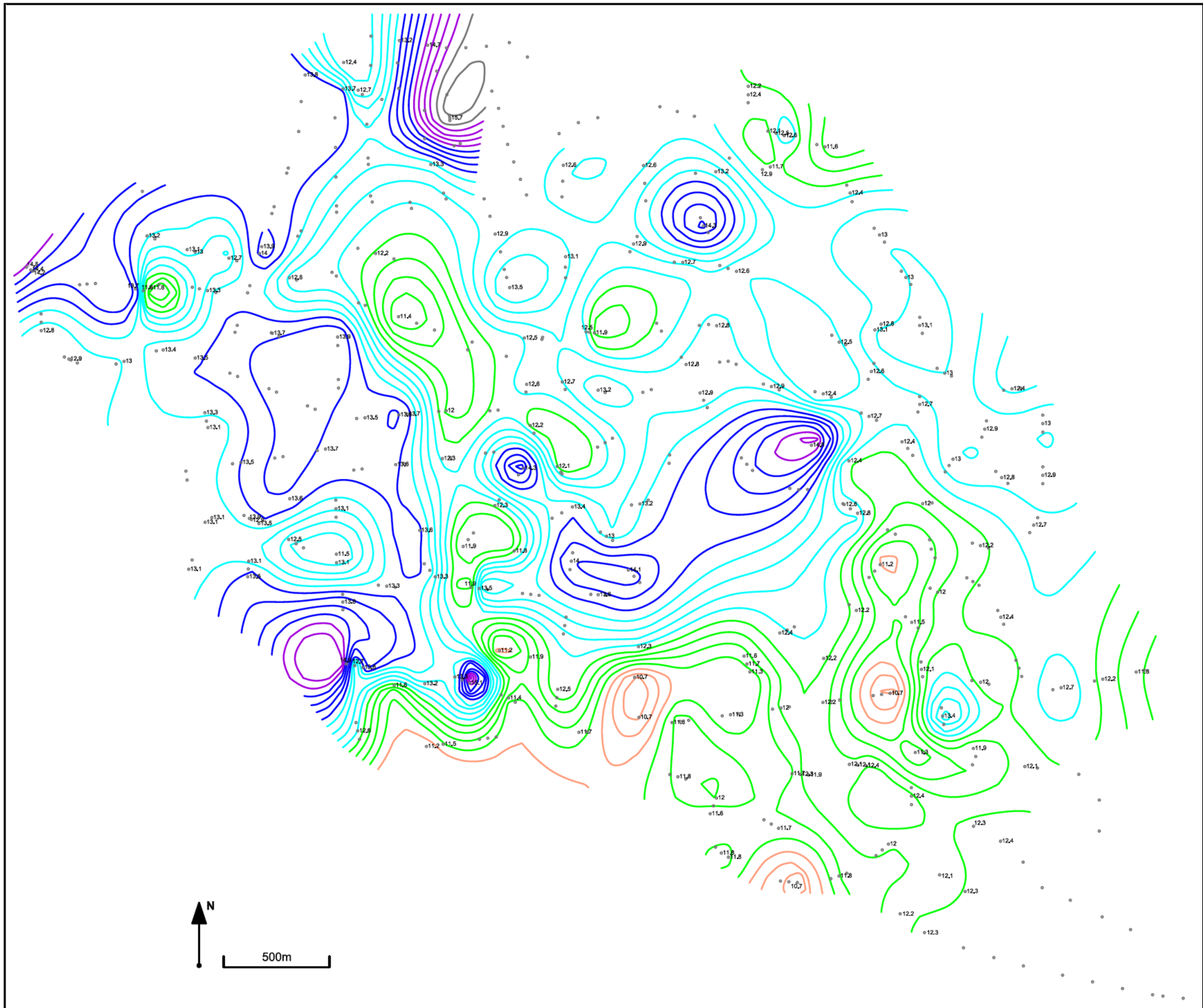
Map B-16: Thickness Upper Röt Claystone Mb.: RNROU-E



Map B-16: Thickness RNROU-E

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 10.5 - 11.25m
- 11.5 - 12.25m
- 12.5 - 13.25m
- 13.5 - 14.25m
- 14.5 - 15.25m
- 15.5 - 15.75m

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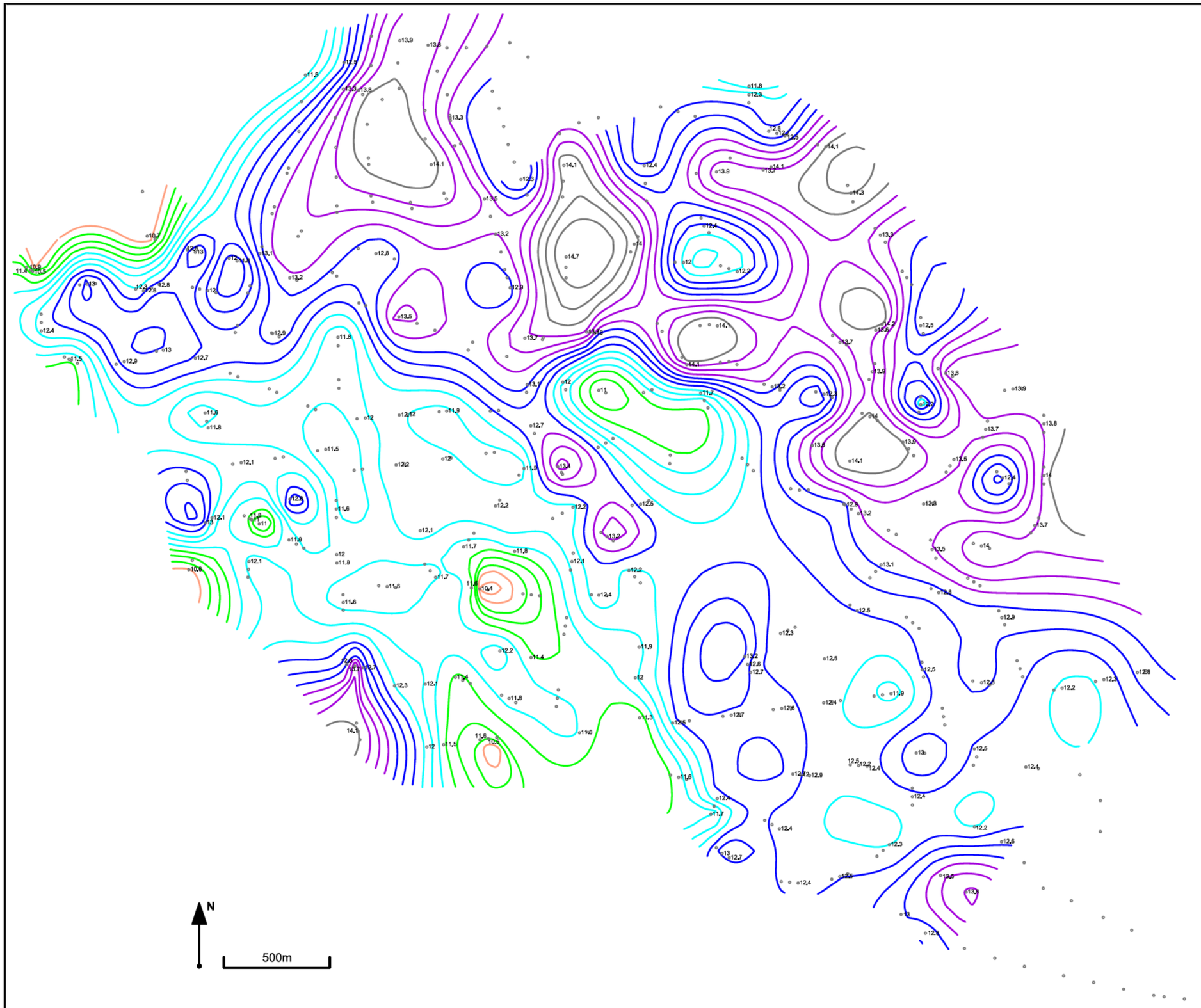
Map B-17: Thickness Upper Röt Claystone Mb.: RNROU-F



Map B-17: Thickness RNROU-F

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 10.25 - 10.75m
- 11.0 - 11.5m
- 11.75 - 12.25m
- 12.5 - 13.0m
- 13.25 - 13.75m
- 14.0 - 14.5m

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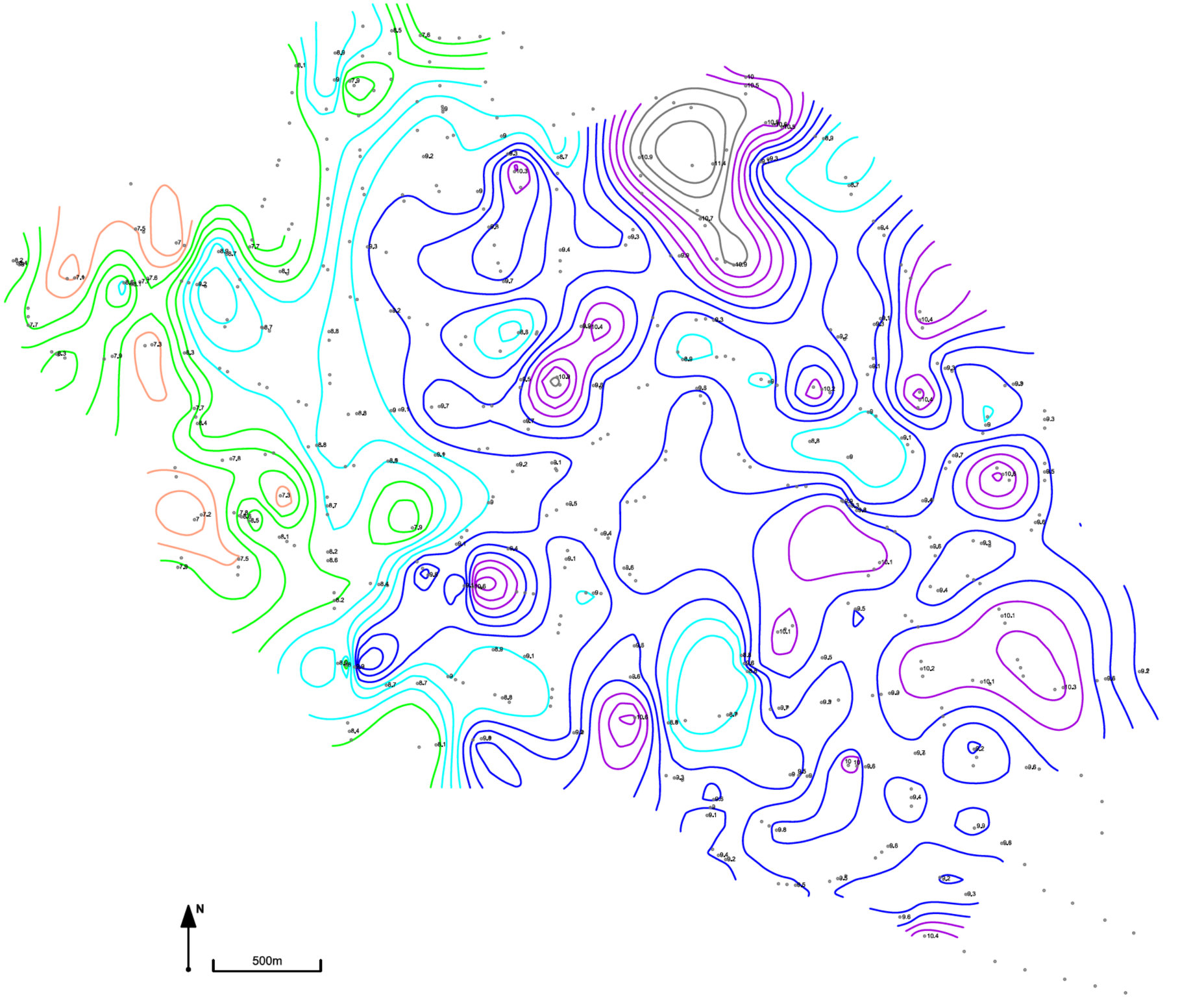
Map B-18: Thickness Upper Röt Claystone Mb.: RNROU-G



Map B-18: Thickness RNROU-G

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 7.0 - 7.5m
- 7.75 - 8.25m
- 8.5 - 9.0m
- 9.25 - 9.75m
- 10.0 - 10.5m
- 10.75 - 11.25m

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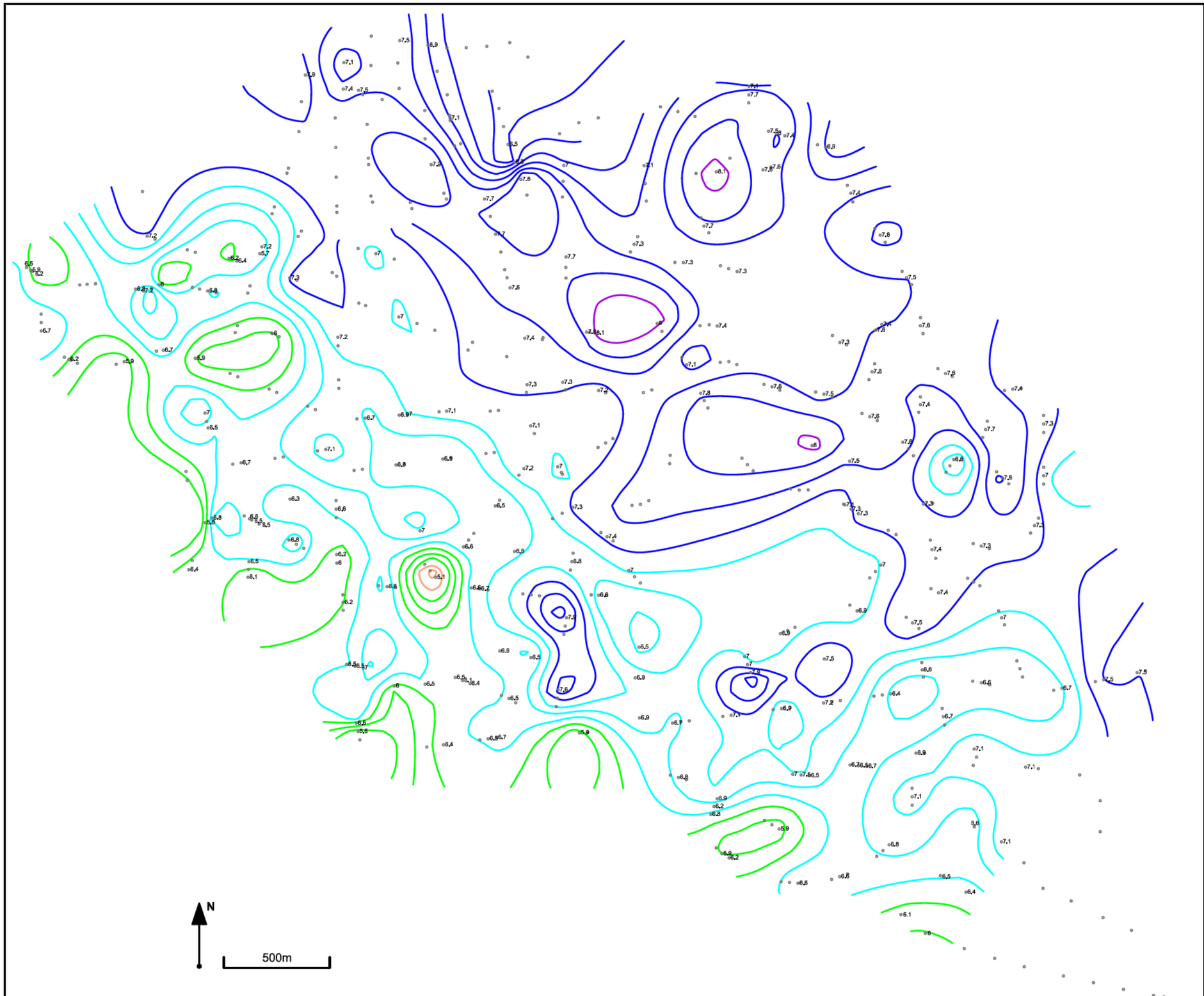
Map B-19: Thickness Upper Röt Claystone Mb.: RNROU-H



Map B-19: Thickness RNROU-H

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 5.0 - 5.5m
- 5.75 - 6.25m
- 6.5 - 7.0m
- 7.25 - 7.75m
- 8.0 - 8.25m

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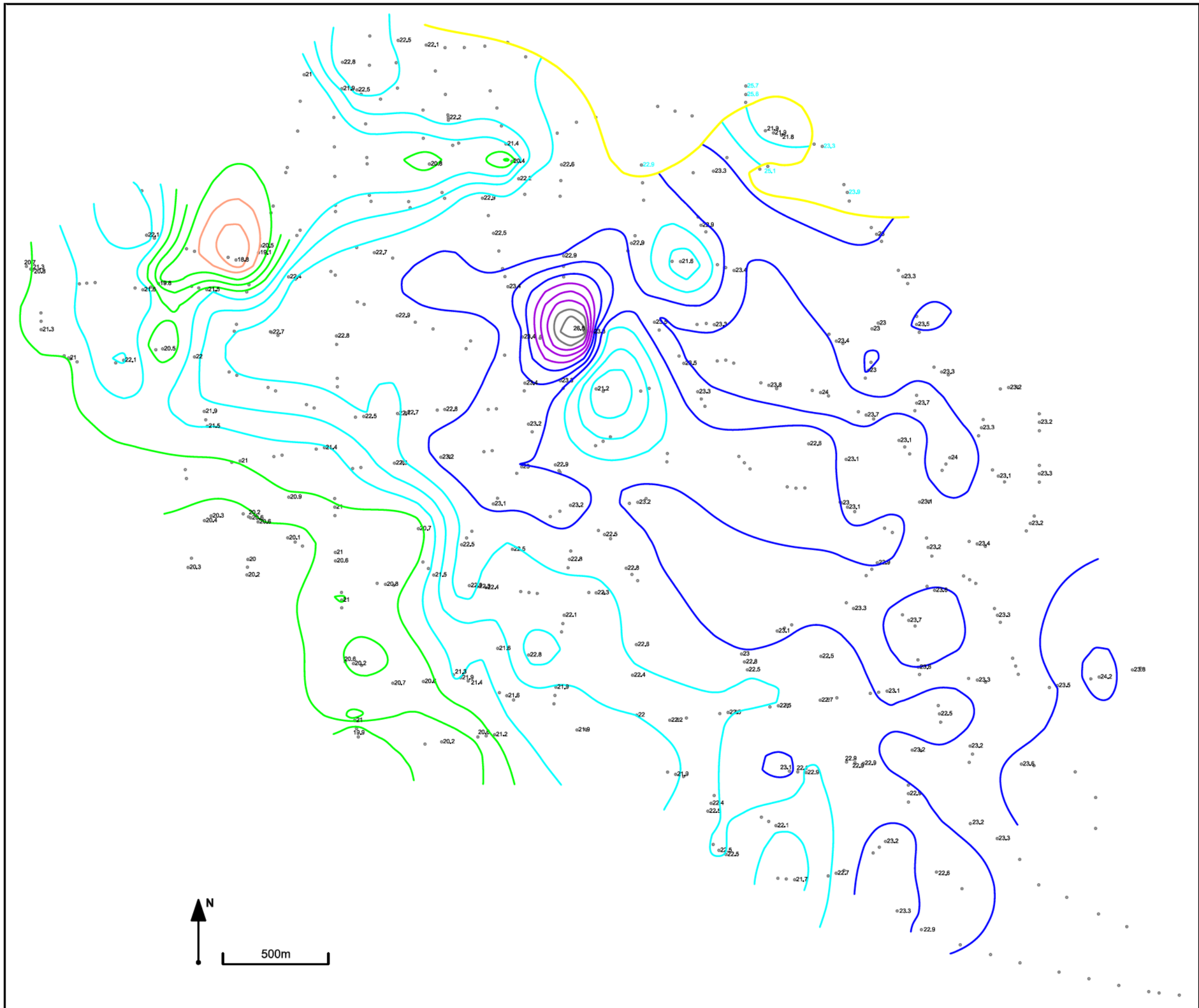
Map B-20: Thickness Upper Röt Claystone Mb.: RNROU-I



Map B-20: Thickness RNROU-I

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit partly eroded
- partly eroded

isochore lines (0.5m interval)

- 18.5 - 19.5m
- 20.0 - 21.0m
- 21.5 - 22.5m
- 23.0 - 24.0m
- 24.5 - 25.5m
- 26.0 - 27.0m

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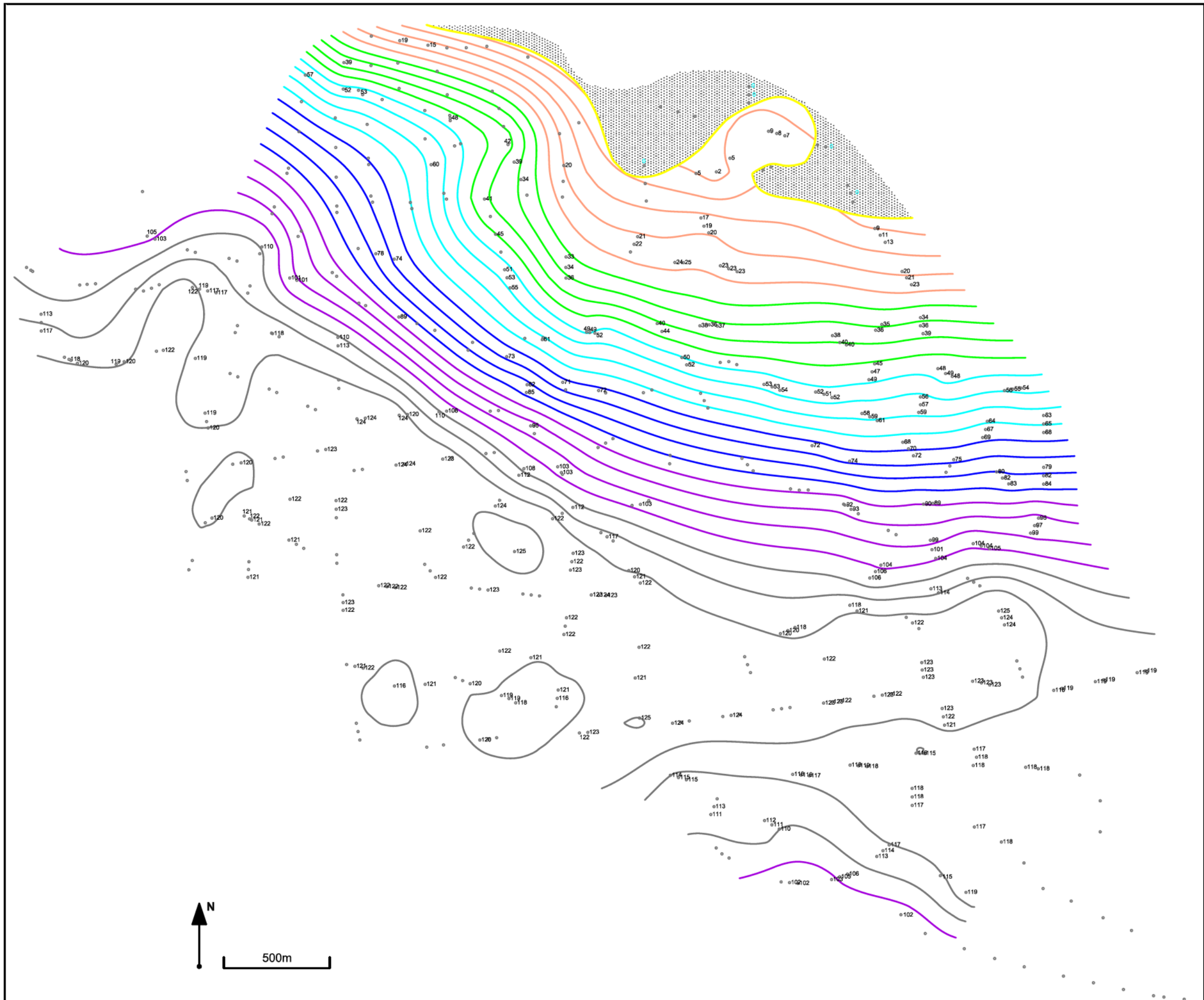
Map B-21: Thickness Muschelkalk Fm.



Map B-21: Thickness RNMU

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m); top eroded
- 0 unit eroded
- eroded

isochore lines (5m interval)

- RNMU = 0
- ≤ 25m
- 30 - 45m
- 50 - 65m
- 70 - 85m
- 90 - 105m
- 110 - 125m

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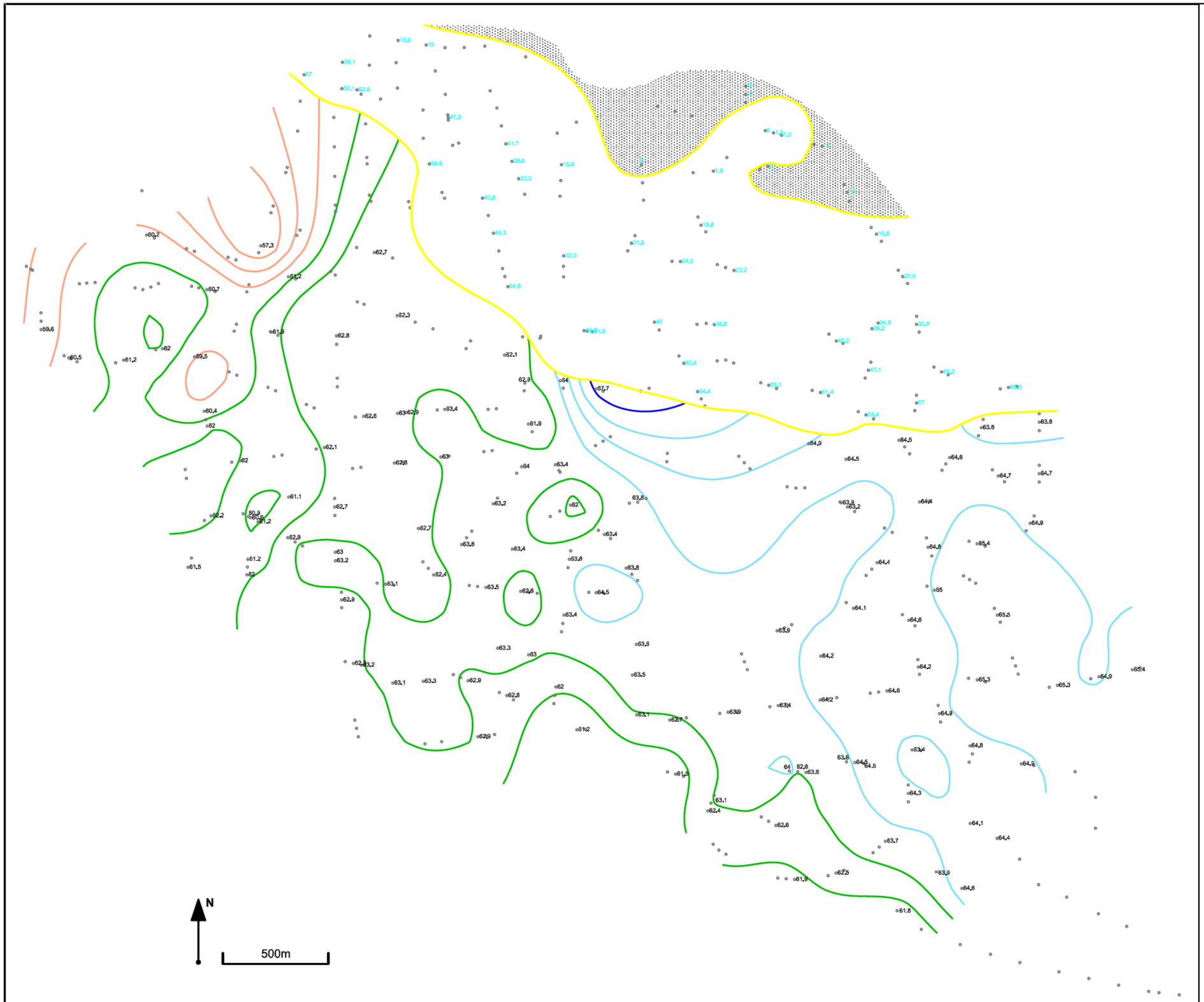
Map B-22: Thickness Muschelkalk Fm.: RNMU-A



Map B-22: Thickness RNMU-A

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (1m interval)

- 58 - 60m
- 61 - 63m
- 64 - 66m
- 67 - 68m

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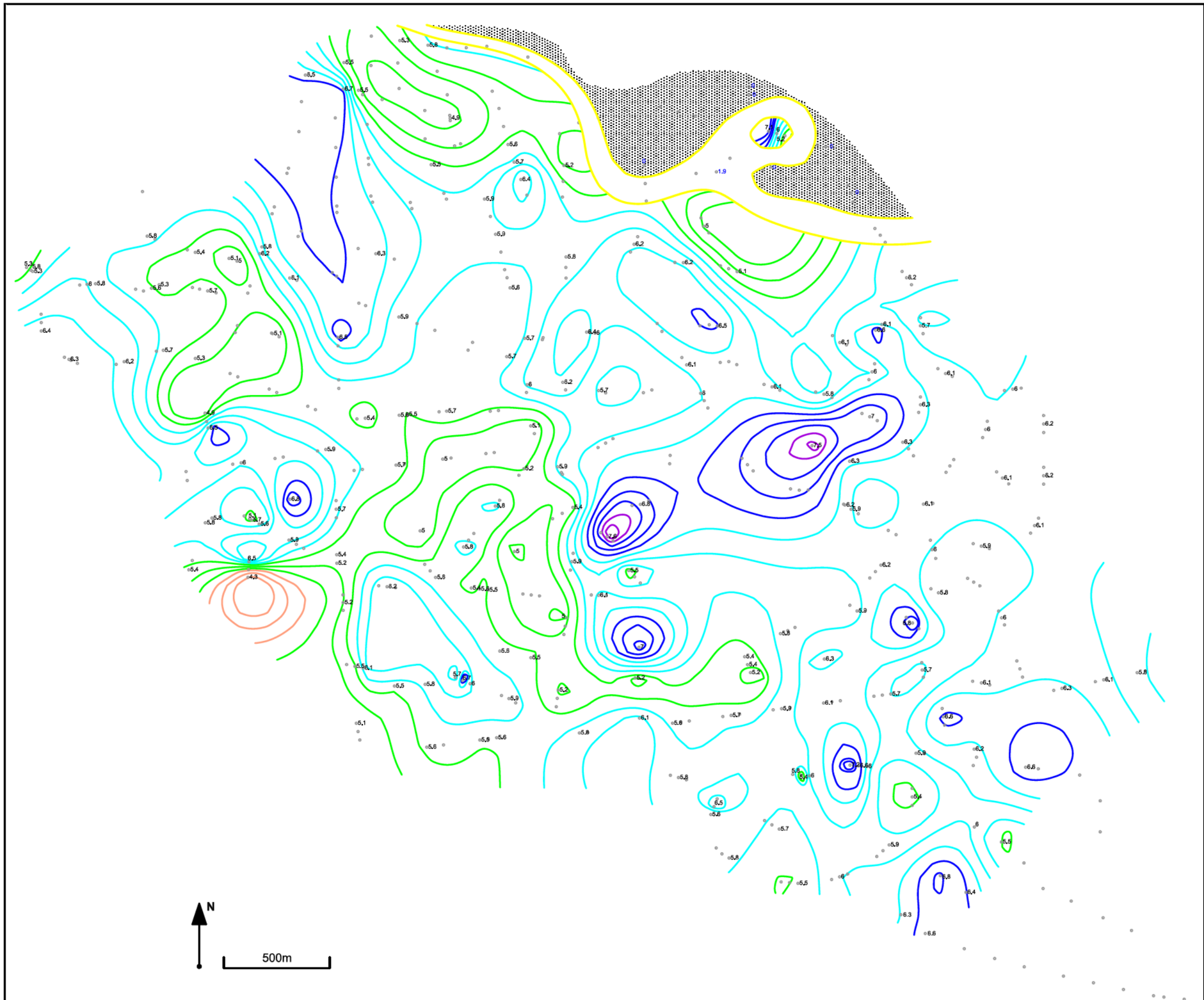
Map B-23: Thickness Muschelkalk Fm.: RNMU-A1



Map B-23: Thickness RNMU-A1

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 4.25 - 4.75m
- 5.0 - 5.5m
- 5.75 - 6.25m
- 6.5 - 7.0m
- 7.25 - 7.75m

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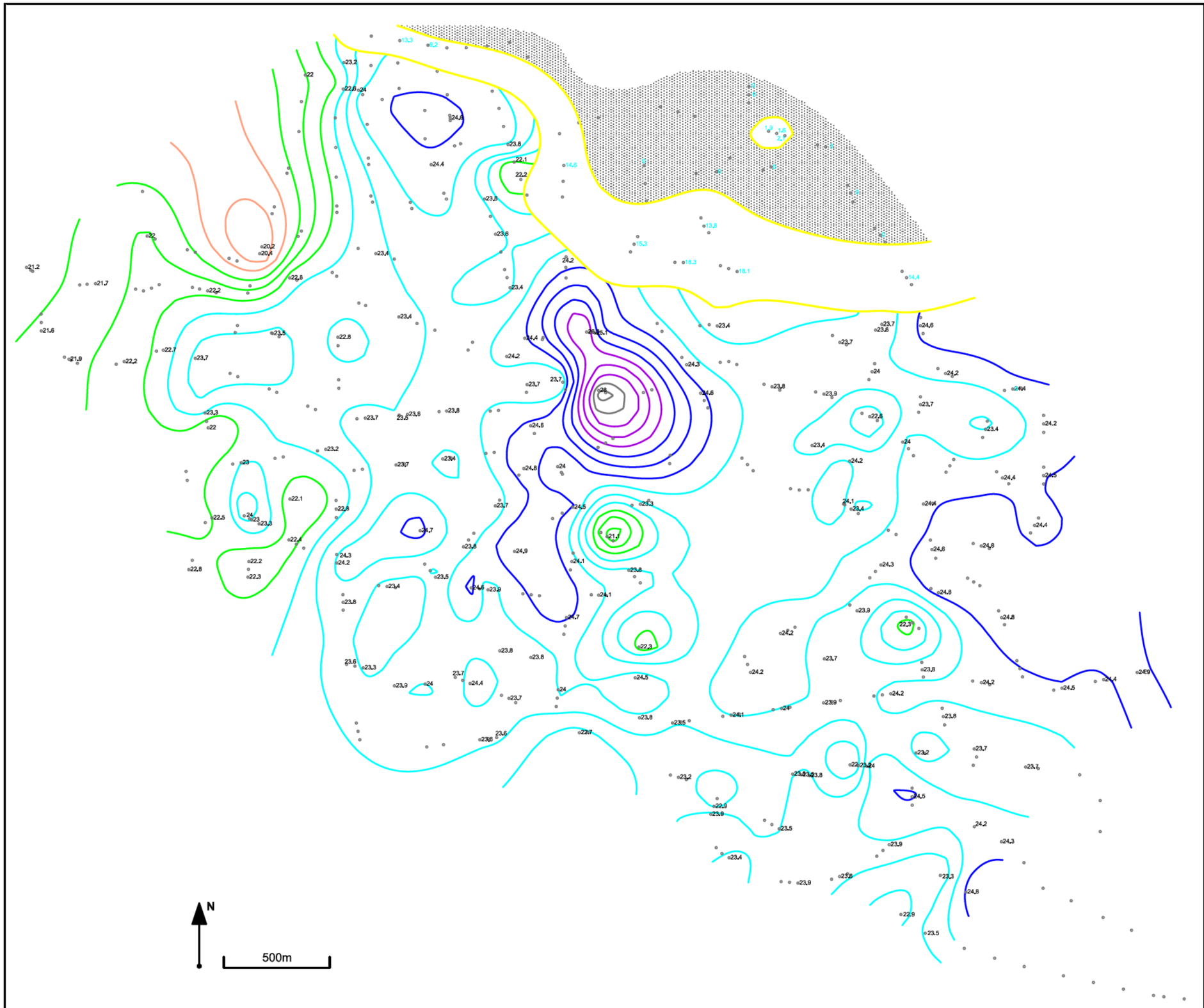
Map B-24: Thickness Muschelkalk Fm.: RNMU-A2



Map B-24: Thickness RNMU-A2

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.5m interval)

- 20.0 - 21.0m
- 21.5 - 22.5m
- 23.0 - 24.0m
- 24.5 - 25.5m
- 26.0 - 27.0m
- 27.5 - 28.0m

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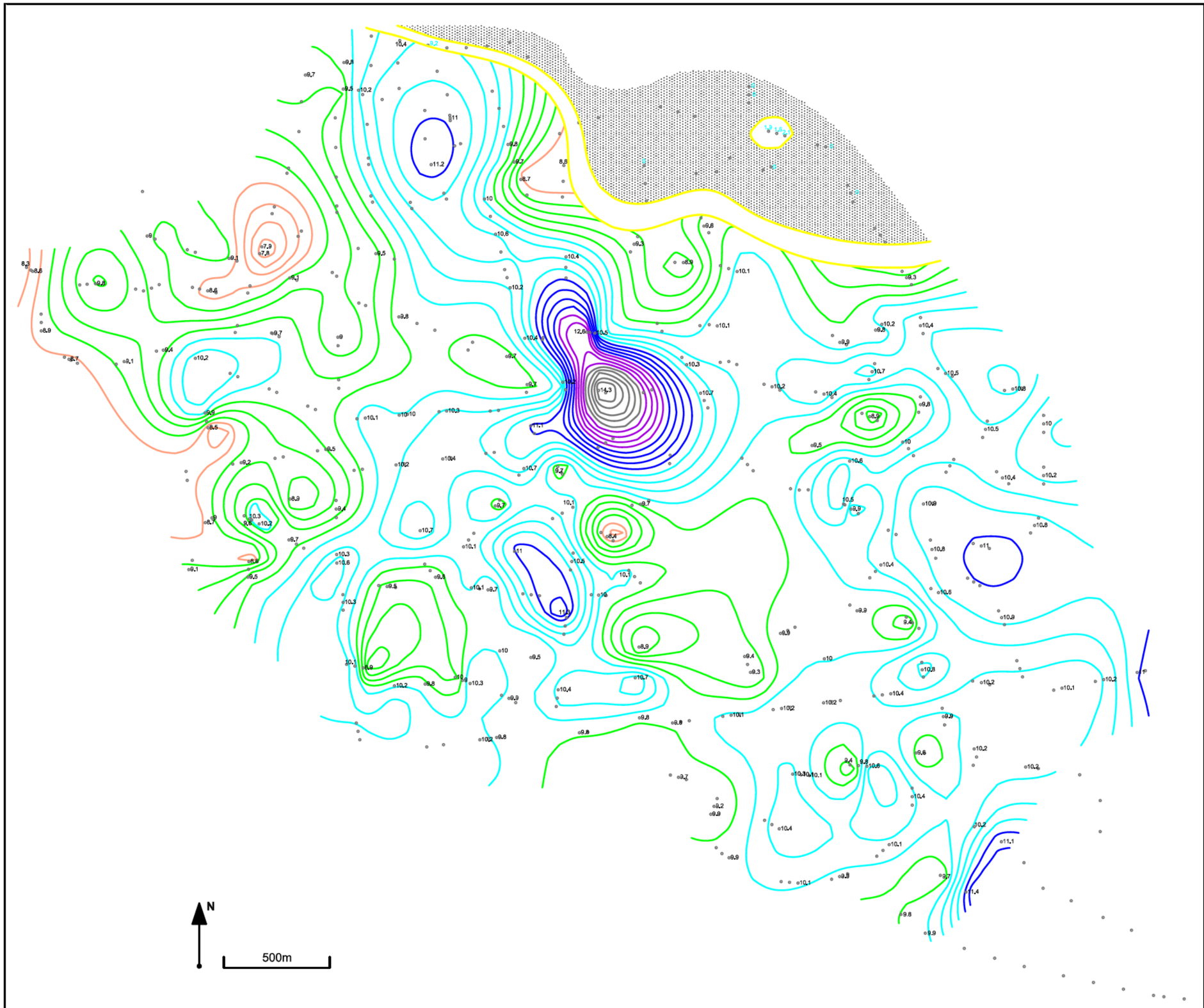
Map B-25: Thickness Muschelkalk Fm.: RNMU-A2a



Map B-25: Thickness RNMU-A2a

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 8.0 - 8.75m
- 9.0 - 9.75m
- 10.0 - 10.75m
- 11.0 - 11.75m
- 12.0 - 12.75m
- 13.0 - 14.0m

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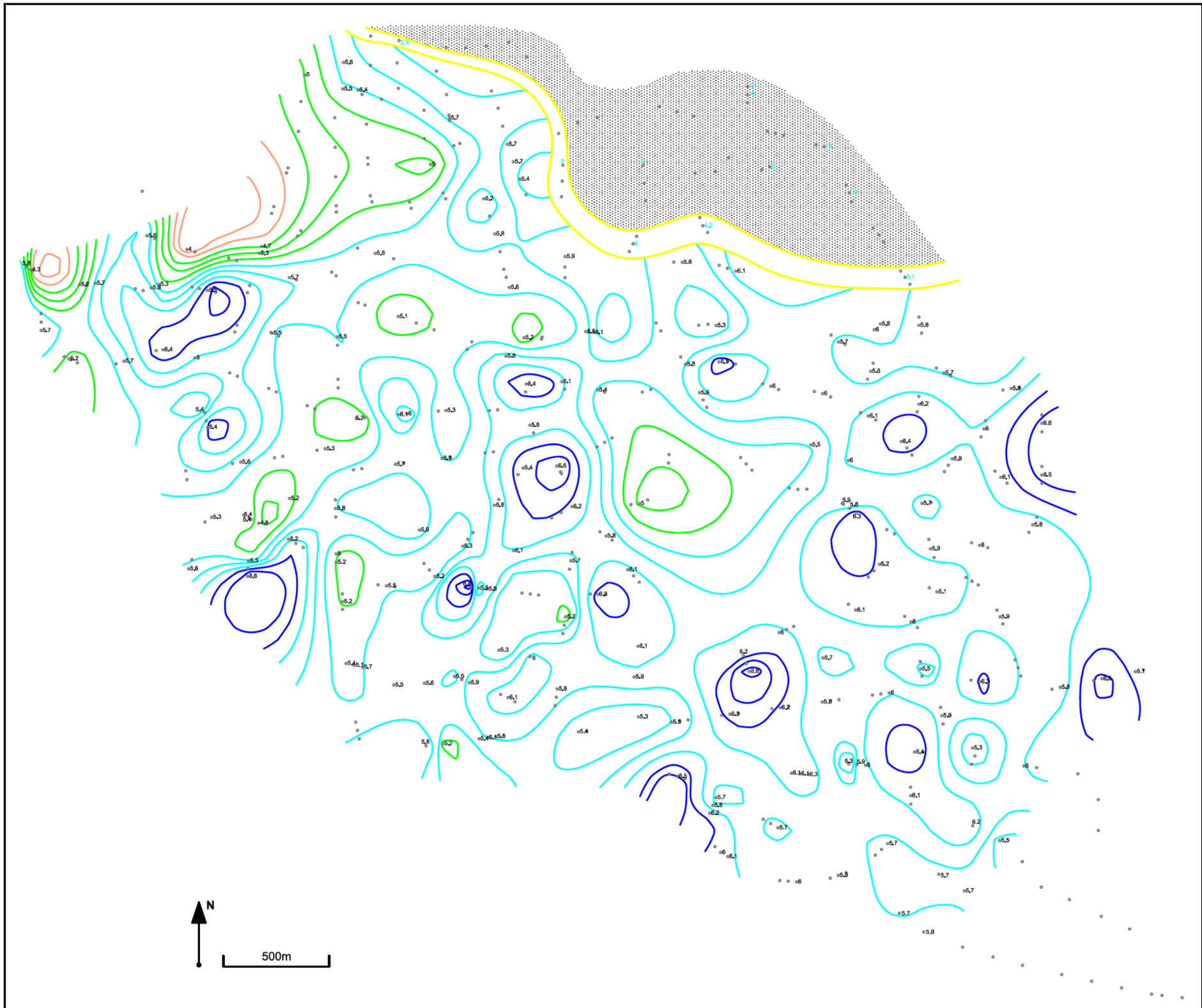
Map B-26: Thickness Muschelkalk Fm.: RNMU-A2b



Map B-26: Thickness RNMU-A2b

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 4.0 - 4.5m
- 4.75 - 5.25m
- 5.5 - 6.0m
- 6.25 - 6.75m

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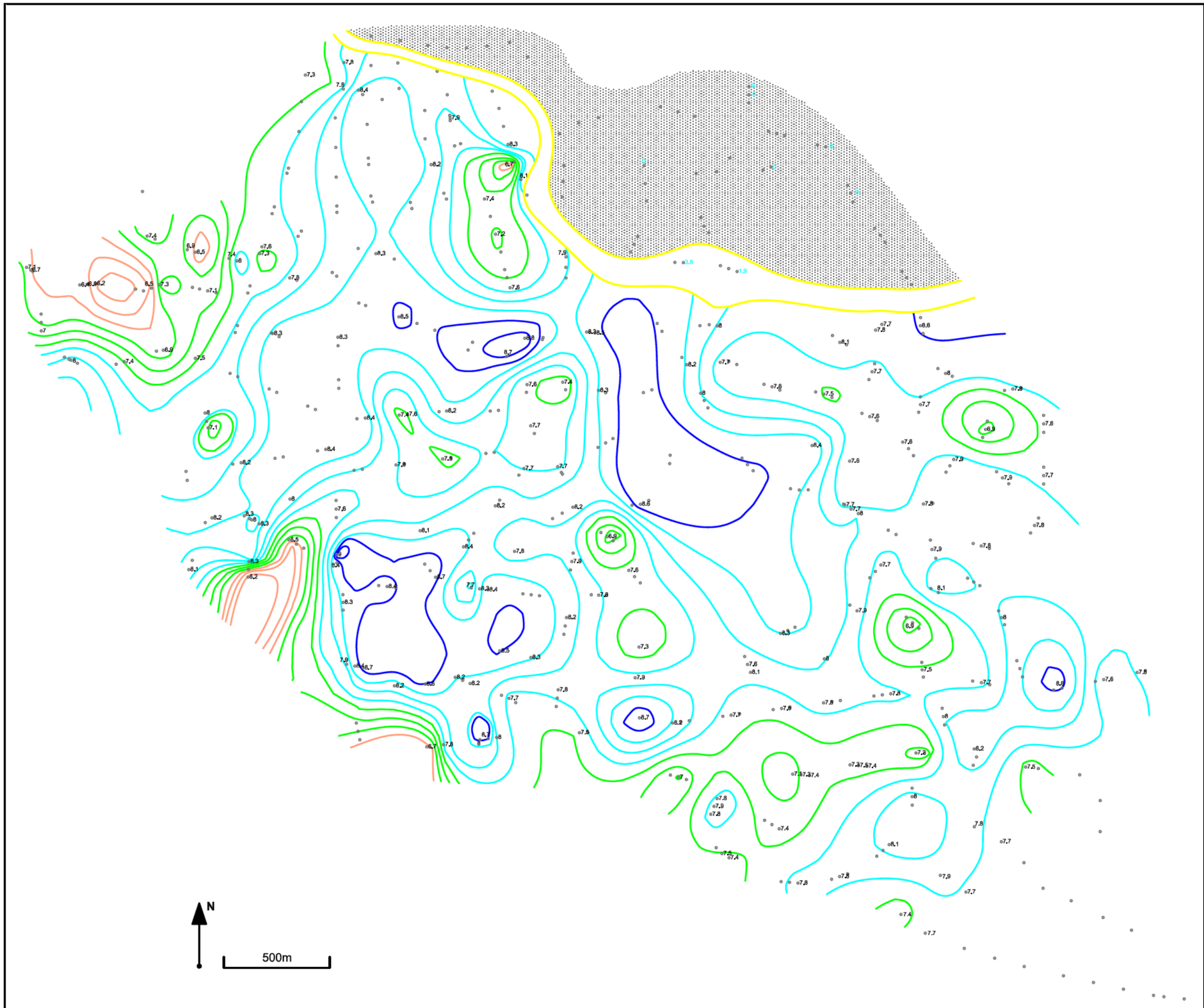
Map B-27: Thickness Muschelkalk Fm.: RNMU-A2c



Map B-27: Thickness RNMU-A2c

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 6.25 - 6.75m
- 7.0 - 7.5m
- 7.75 - 8.25m
- 8.5 - 9.0m

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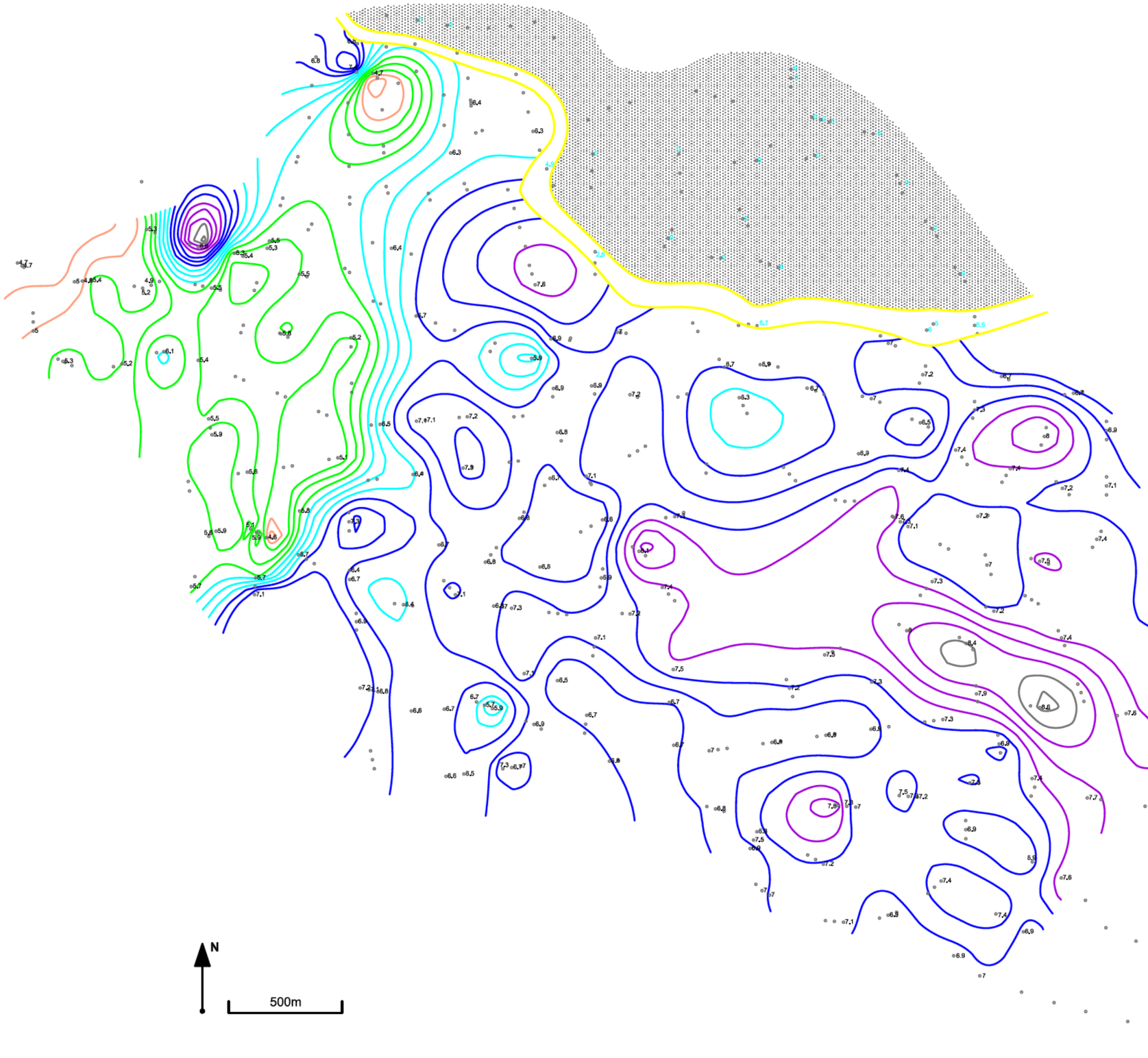
attachment to report GL11.901

Map B-28: Thickness Muschelkalk Fm.: RNMU-A3



Map B-28: Thickness RNMU-A3

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 4.5 - 5.0m
- 5.25 - 5.75m
- 6.0 - 6.5m
- 6.75 - 7.25m
- 7.5 - 8.0m
- 8.25 - 8.75m

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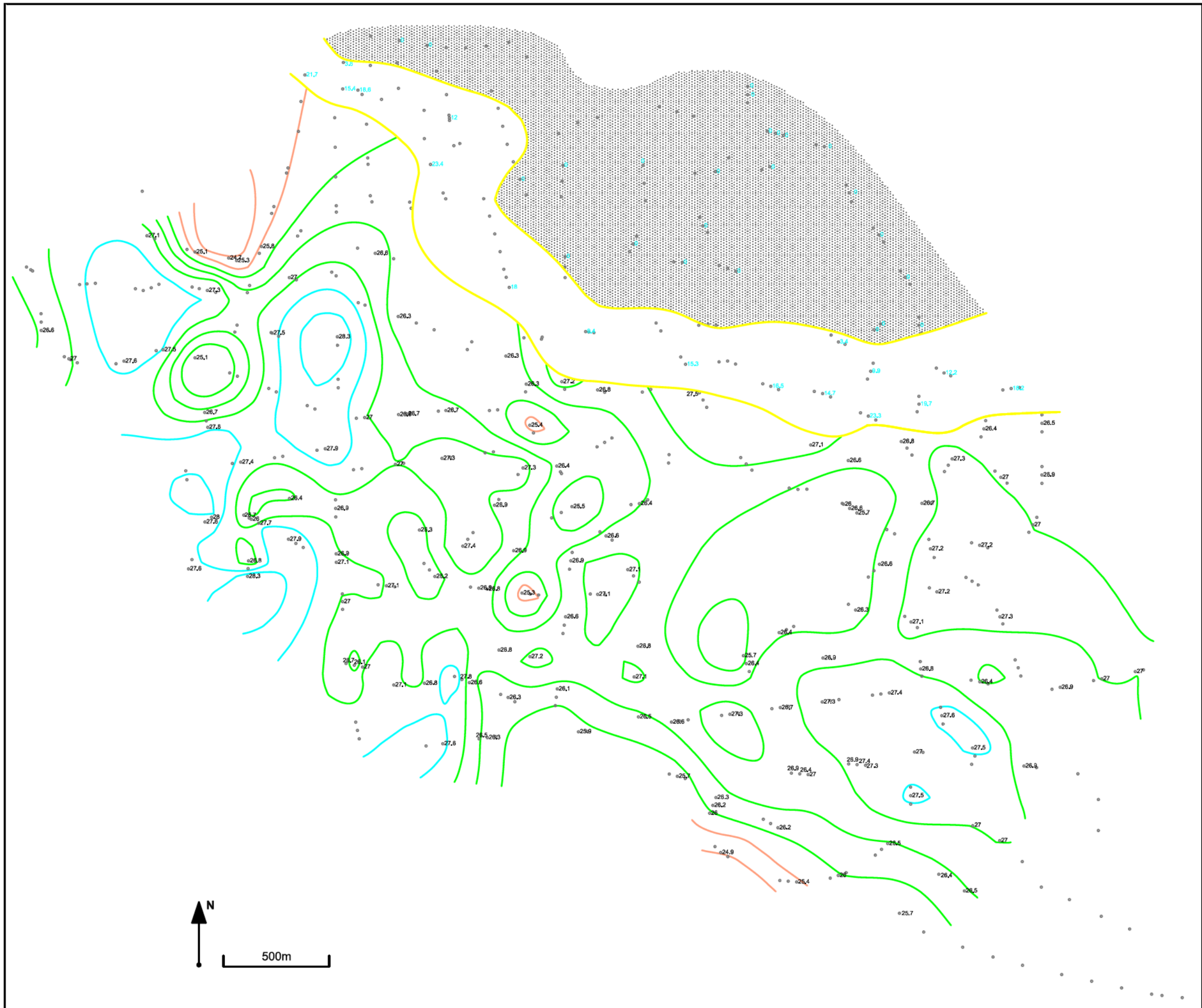
Map B-29: Thickness Muschelkalk Fm.: RNMU-A4



Map B-29: Thickness RNMU-A4

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.5m interval)

- 24.5 - 25.5m
- 26.0 - 27.0m
- 27.5 - 28.5m

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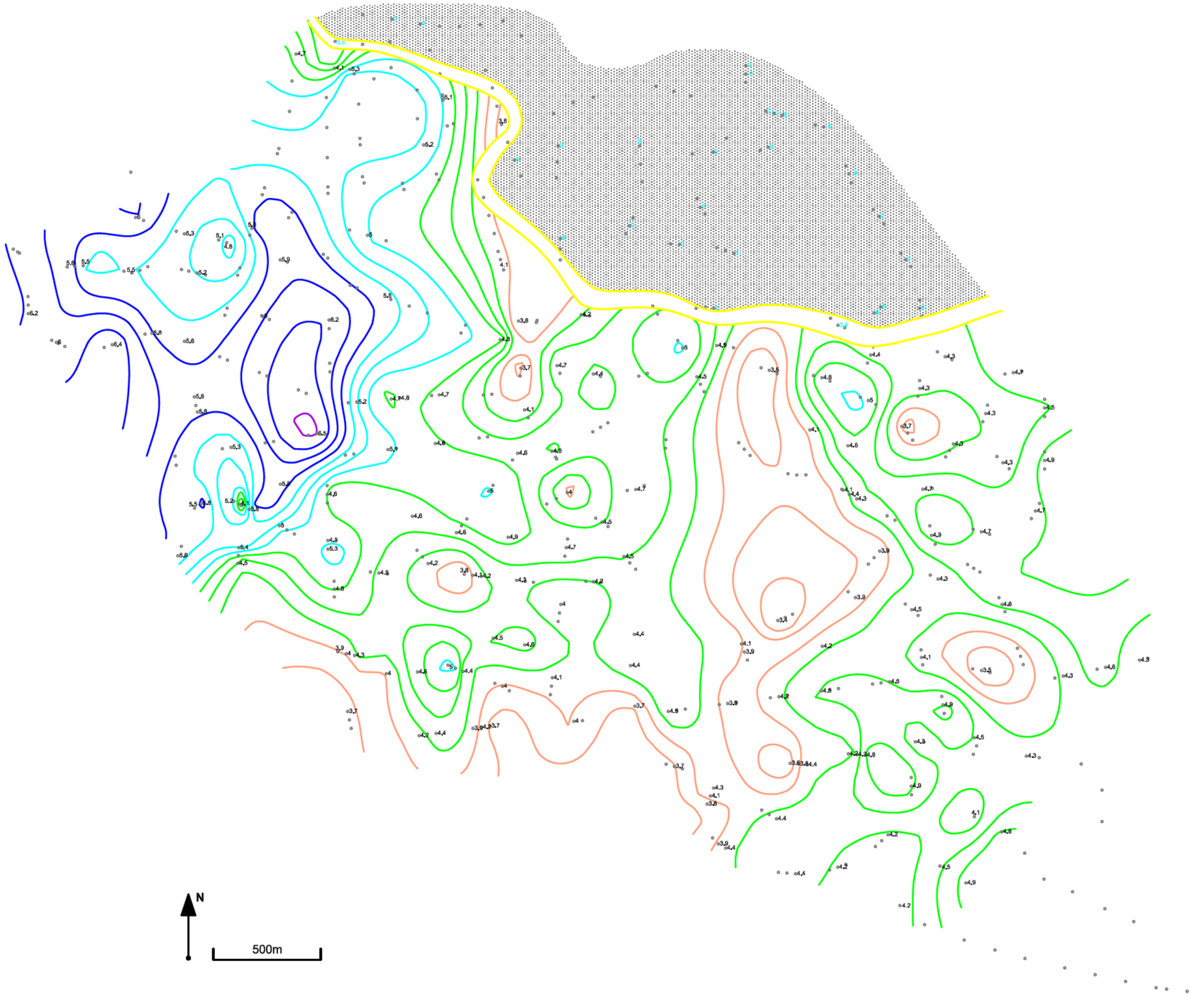
Map B-30: Thickness Muschelkalk Fm.: RNMU-A4ab



Map B-30: Thickness RNMU-A4ab

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 3.5 - 4.0m
- 4.25 - 4.75m
- 5.0 - 5.5m
- 5.75 - 6.25m
- 6.5m

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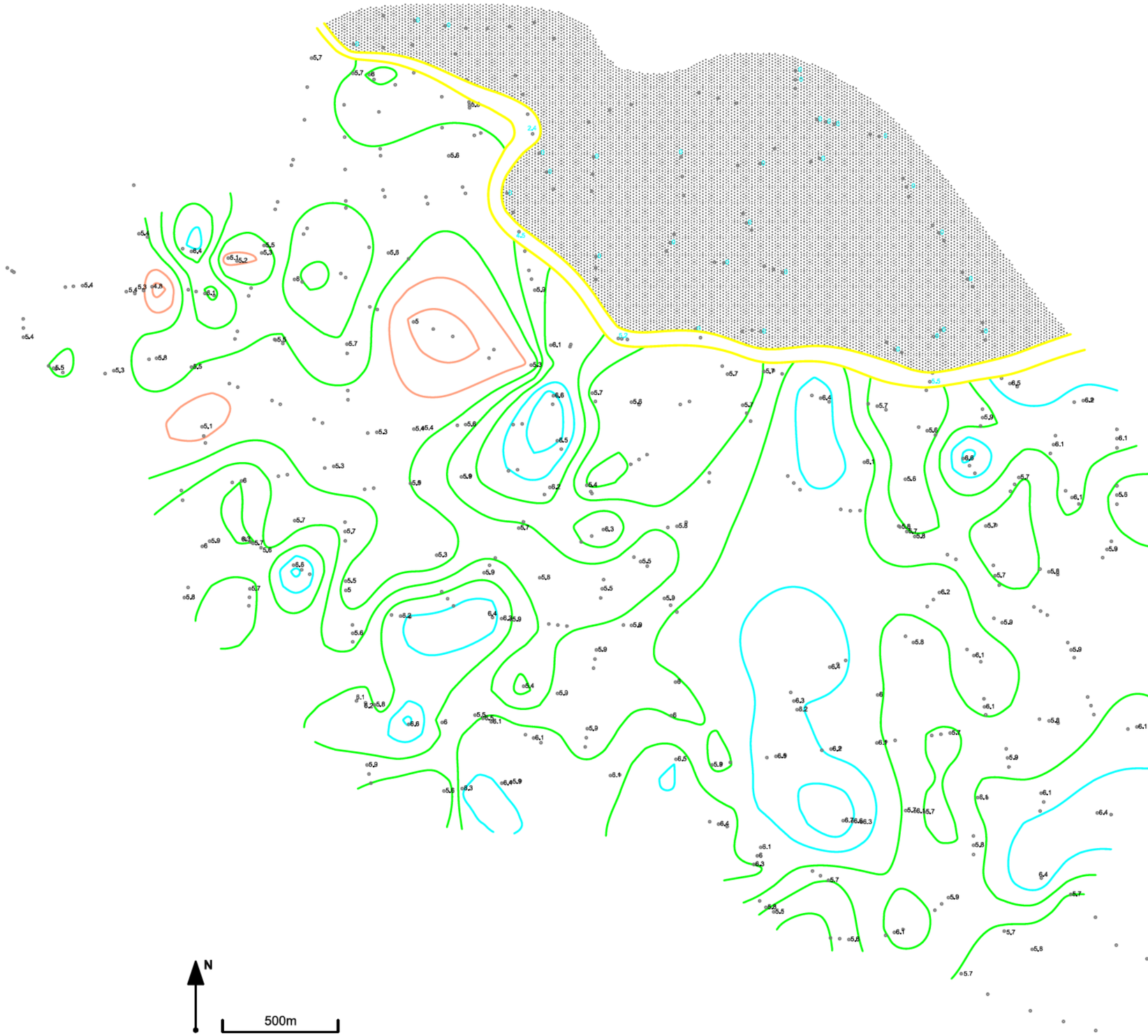
Map B-31: Thickness Muschelkalk Fm.: RNMU-A4c



Map B-31: Thickness RNMU-A4c

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 4.75 - 5.25m
- 5.5 - 6.0m
- 6.25 - 6.75m

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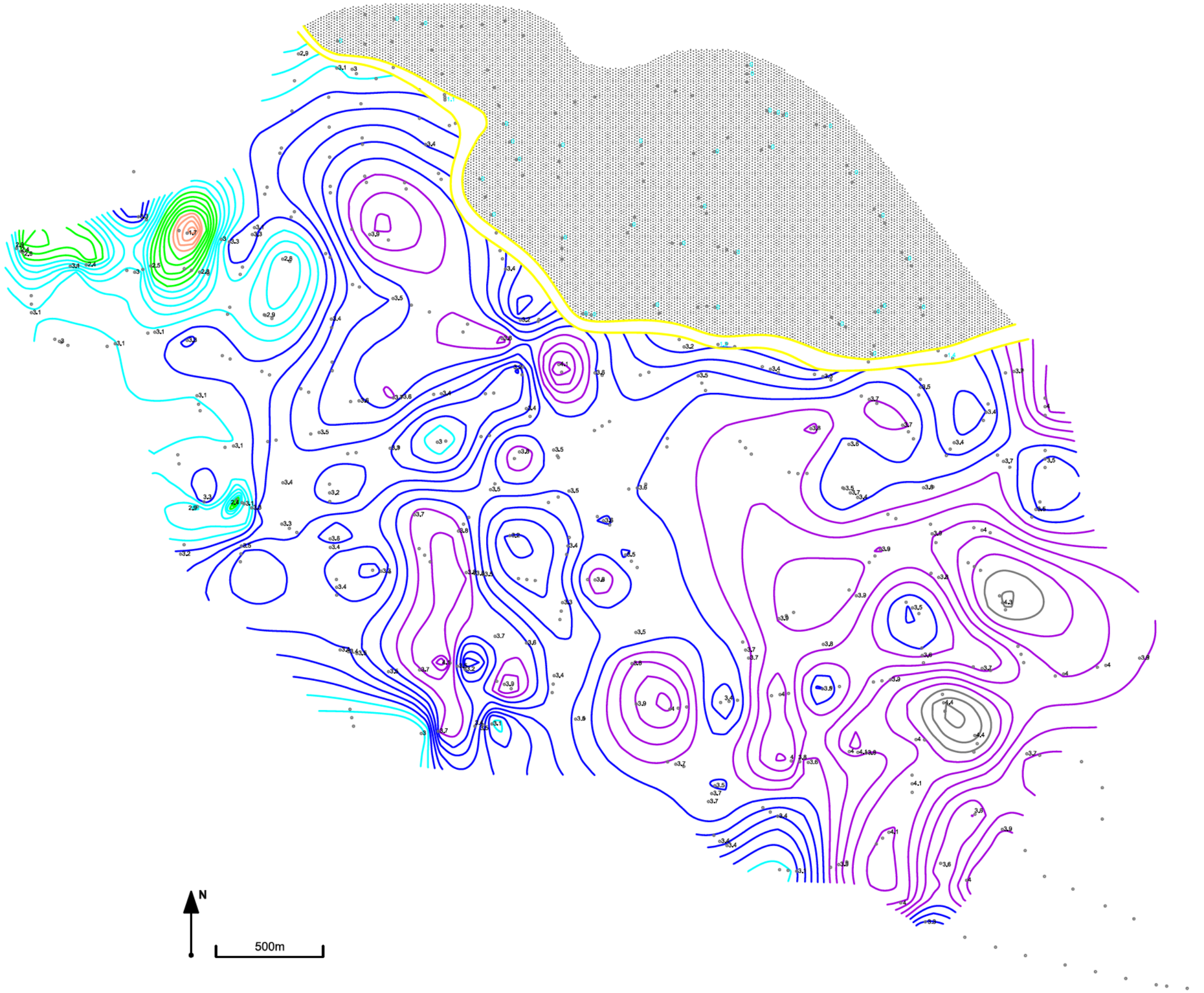
Map B-32: Thickness Muschelkalk Fm.: RNMU-A4d



Map B-32: Thickness RNMU-A4d

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.1m interval)

- 1.7 - 2.1m
- 2.2 - 2.6m
- 2.7 - 3.1m
- 3.2 - 3.6m
- 3.7 - 4.1m
- 4.2 - 4.4m

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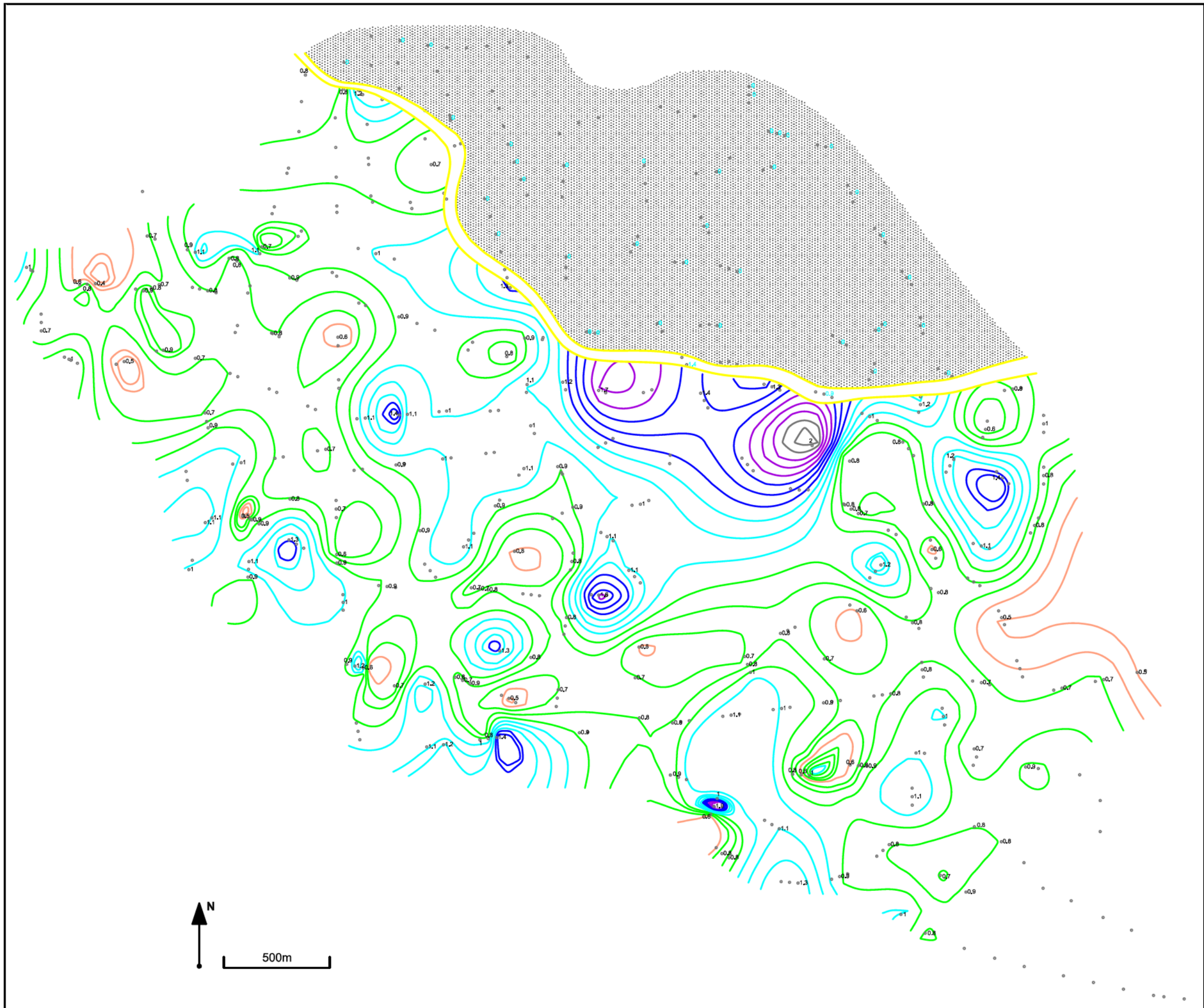
Map B-33: Thickness Muschelkalk Fm.: RNMU-A4e



Map B-33: Thickness RNMU-A4e

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.1m interval)

- 0.4 - 0.6m
- 0.7 - 0.9m
- 1.0 - 1.2m
- 1.3 - 1.5m
- 1.6 - 1.8m
- 1.9 - 2.0m

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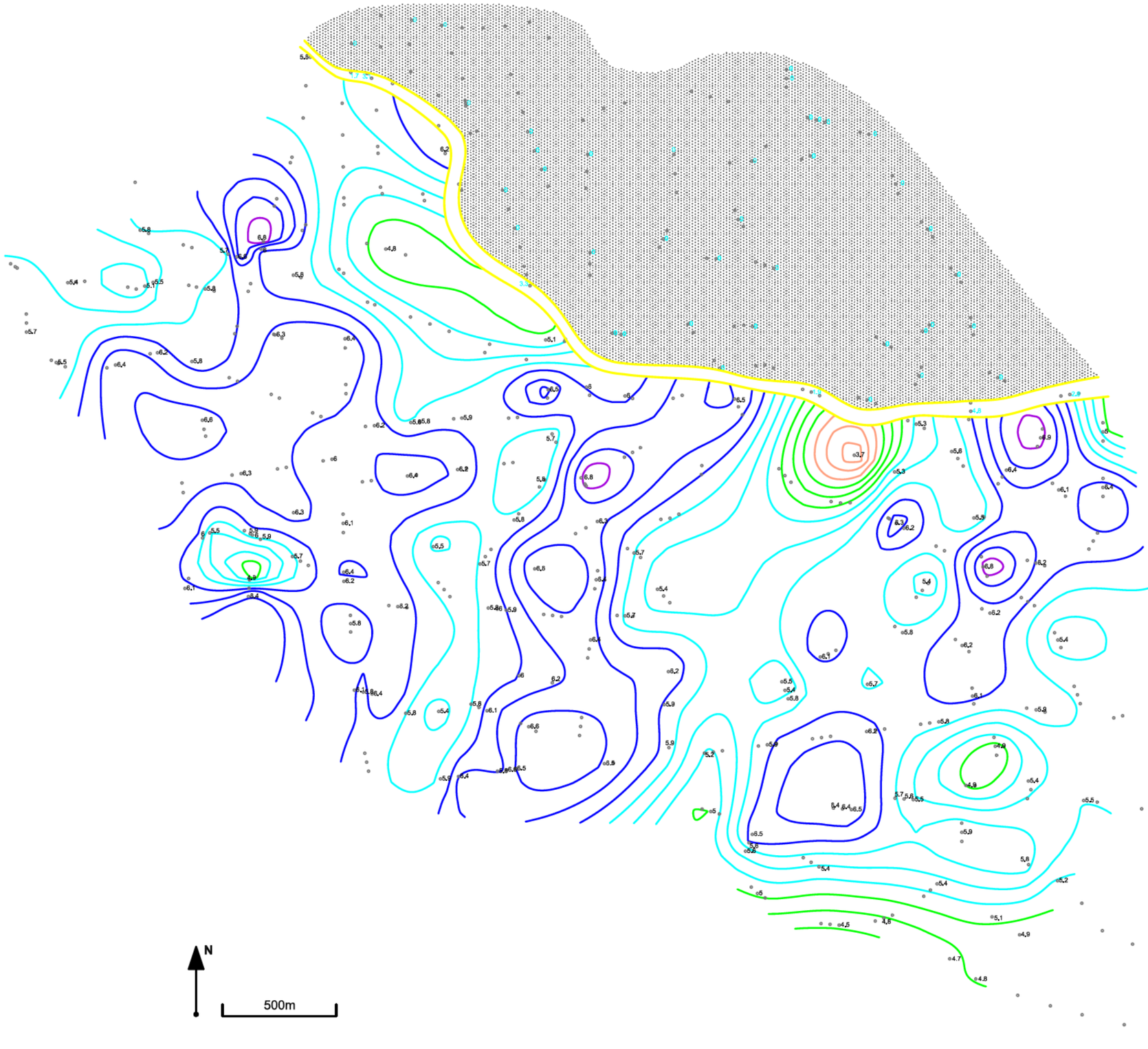
Map B-34: Thickness Muschelkalk Fm.: RNMU-A4f



Map B-34: Thickness RNMU-A4f

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 3.75 - 4.25m
- 4.5 - 5.0m
- 5.25 - 5.75m
- 6.0 - 6.5m
- 6.75m

prepared by:
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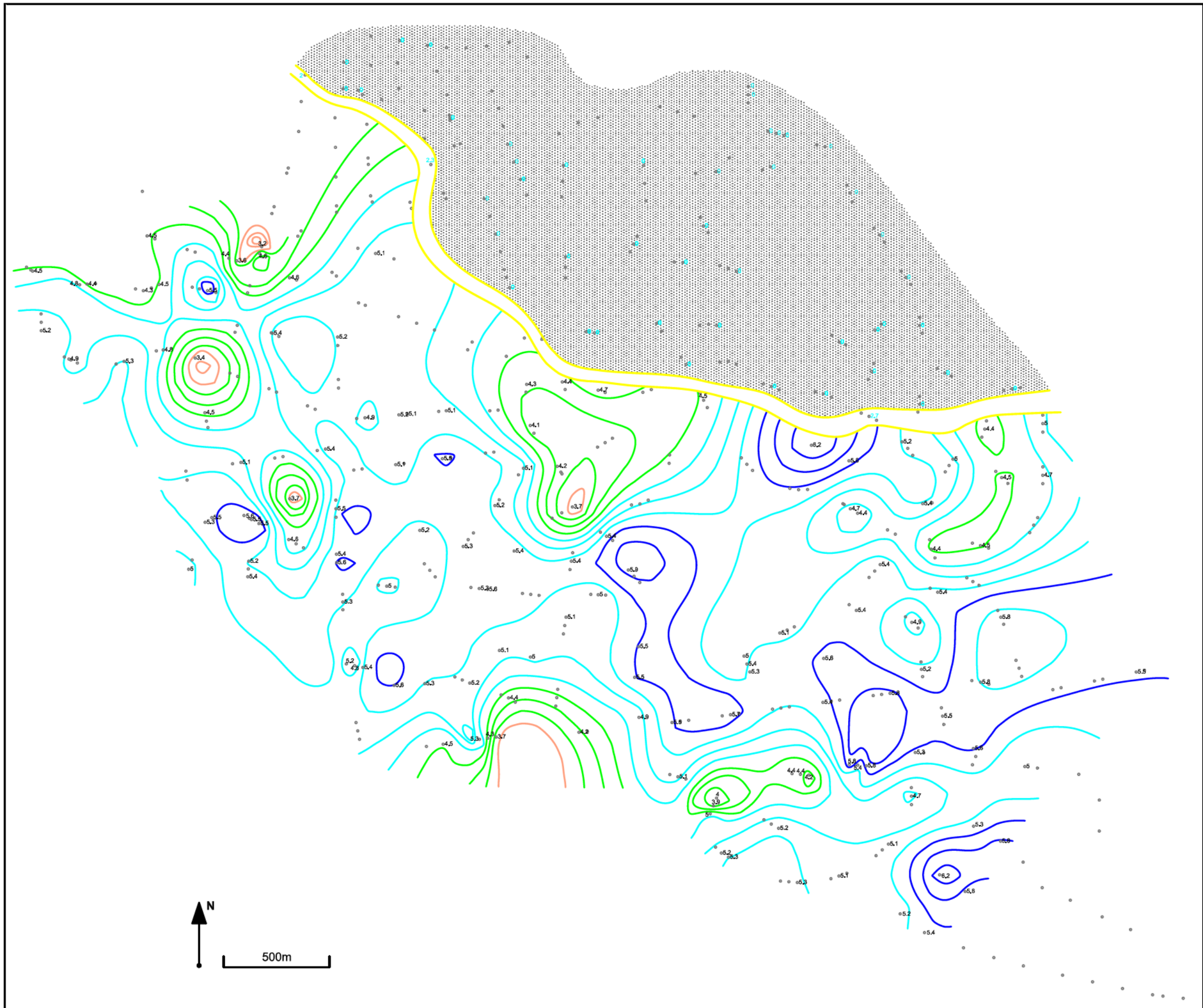
attachment to report GL11.901

Map B-35: Thickness Muschelkalk Fm.: RNMU-A4g



Map B-35: Thickness RNMU-A4g

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 3.25 - 3.75m
- 4.0 - 4.5m
- 4.75 - 5.25m
- 5.5 - 6.0m

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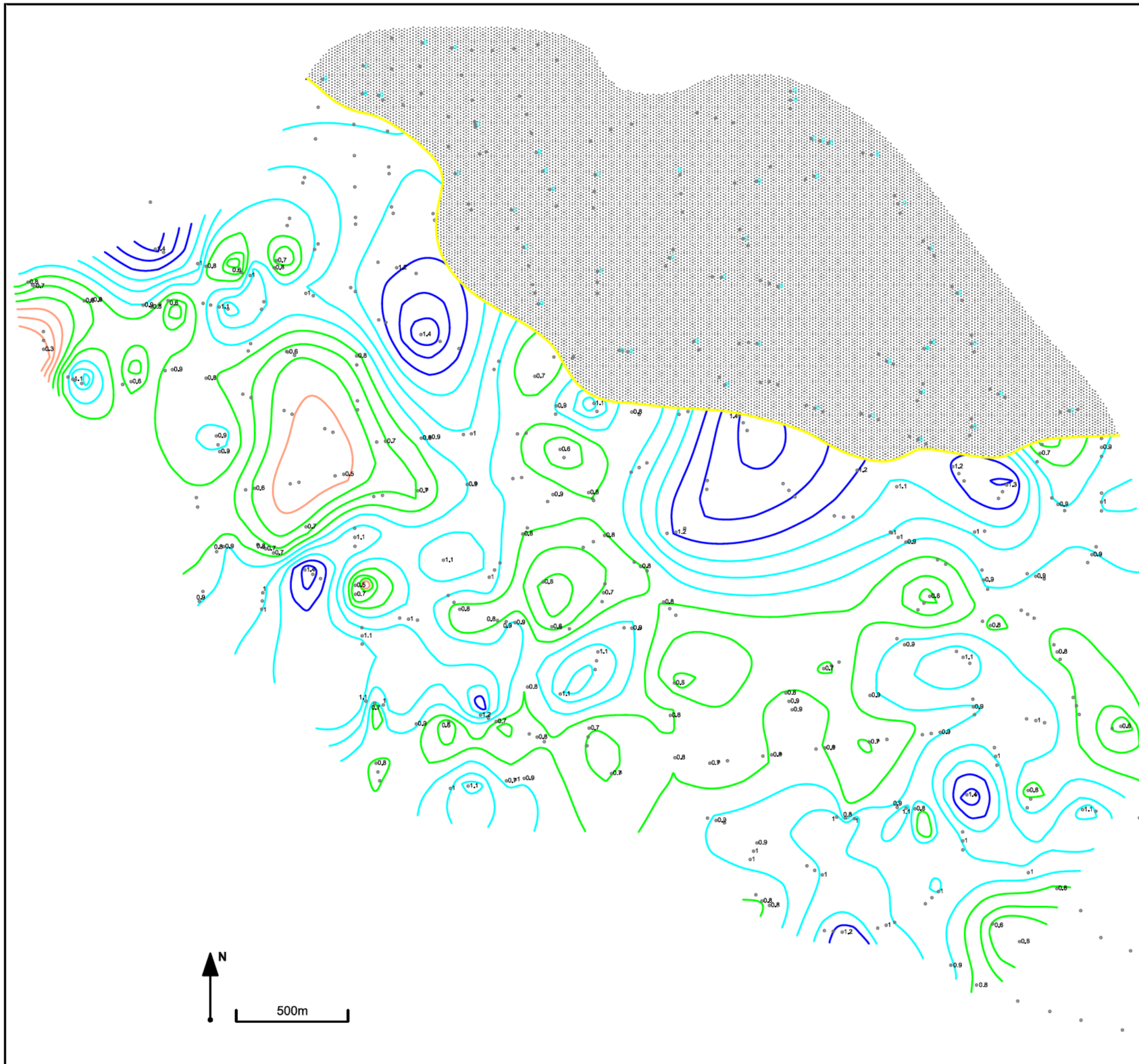
Map B-36: Thickness Muschelkalk Fm.: RNMU-A4h



Map B-36: Thickness RNMU-A4h

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- fully eroded

isochore lines (0.1m interval)

- 0.3 - 0.5m
- 0.6 - 0.8m
- 0.9 - 1.1m
- 1.2 - 1.4m

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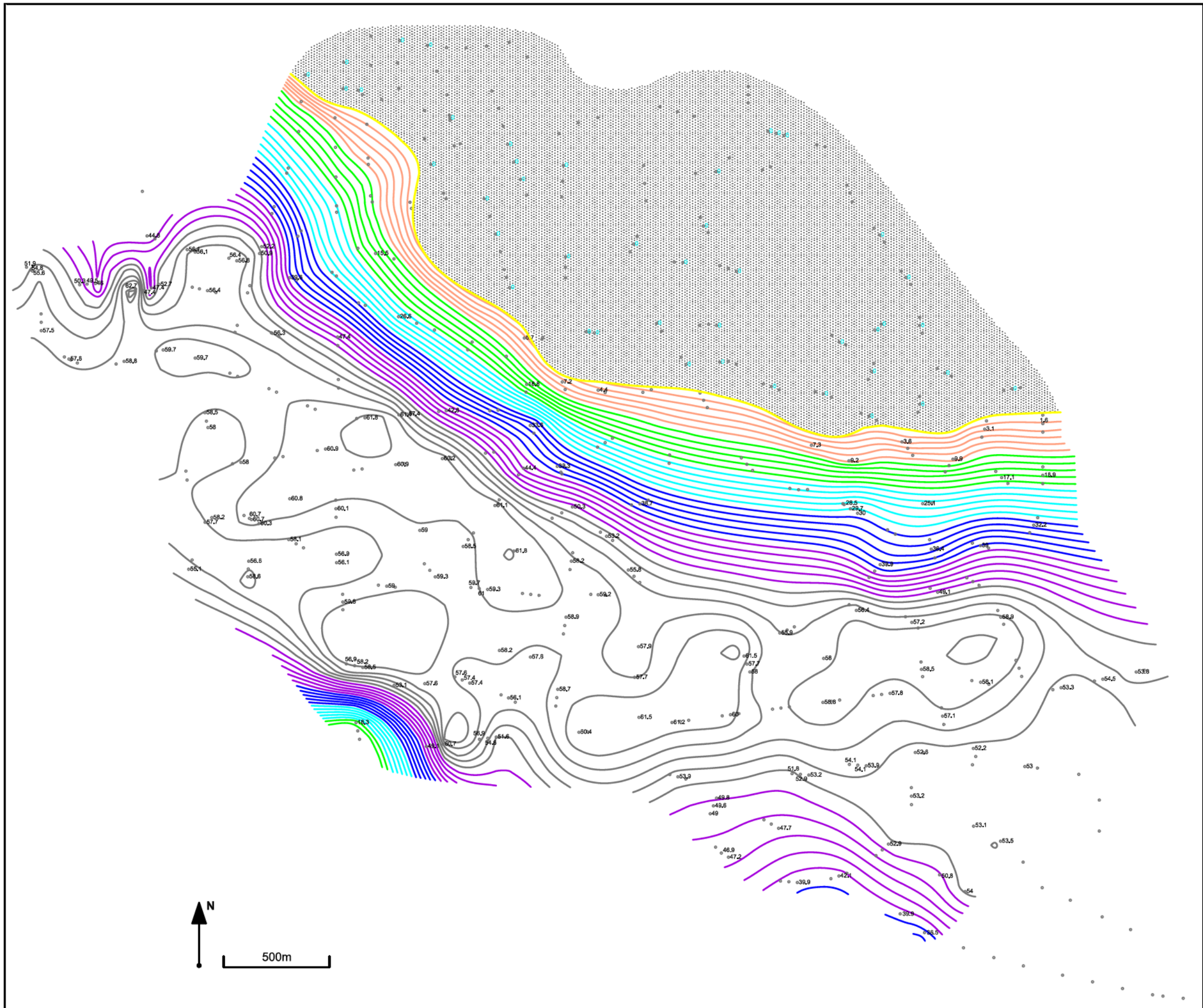
Map B-37: Thickness Muschelkalk Fm.: RNMU-B



Map B-37: Thickness RNMU-B

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m); top eroded
- 0 unit eroded
- eroded

isochore lines (2m interval)

- RNMU-B = 0
- 2 - 10m
- 12 - 20m
- 22 - 30m
- 32 - 40m
- 42 - 50m
- 52 - 62m

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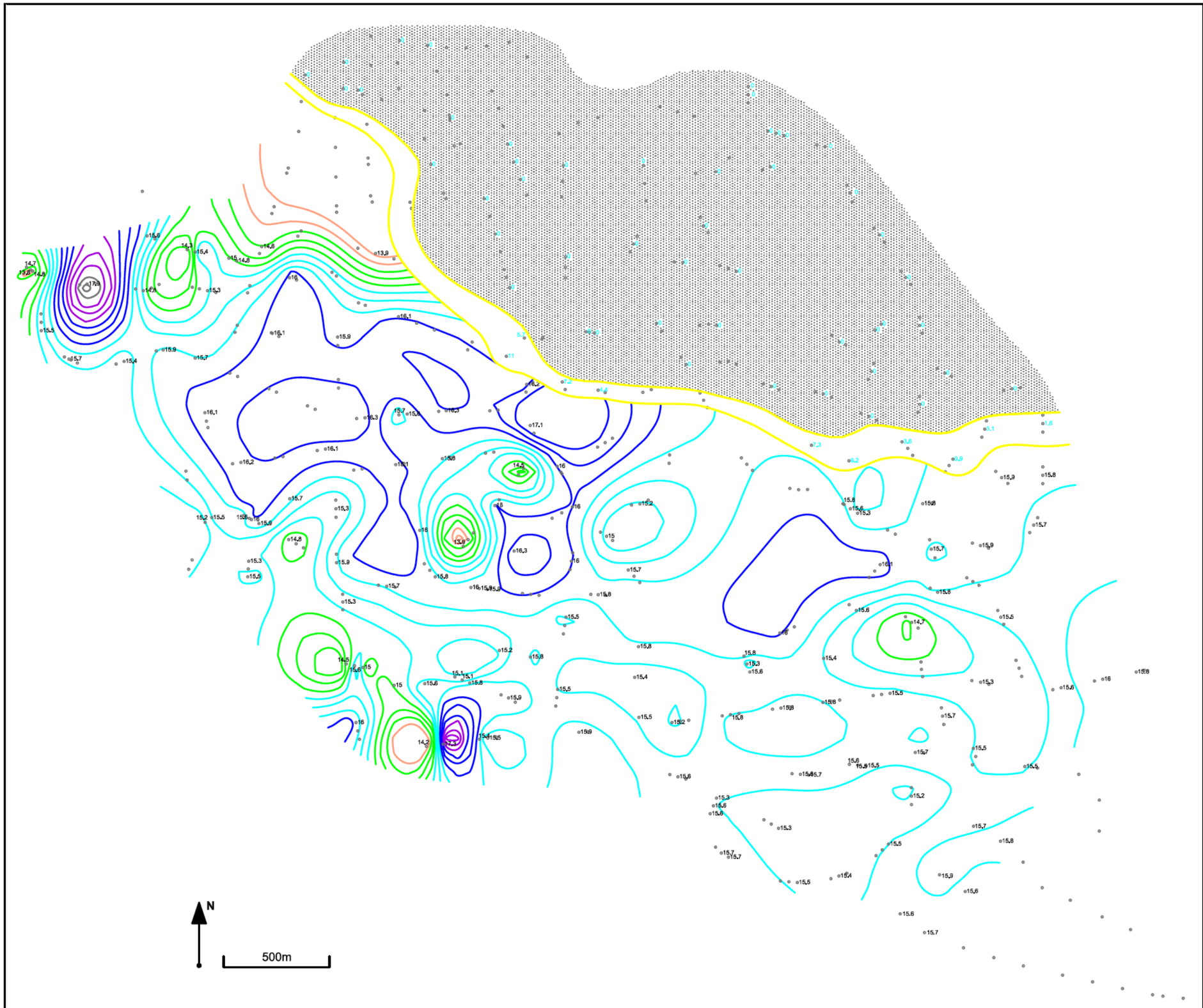
Map B-38: Thickness Muschelkalk Fm.: RNMU-B1



Map B-38: Thickness RNMU-B1

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 13.75 - 14.25m
- 14.5 - 15.0m
- 15.25 - 15.75m
- 16.0 - 16.5m
- 16.75 - 17.25m
- 17.5 - 18.0m

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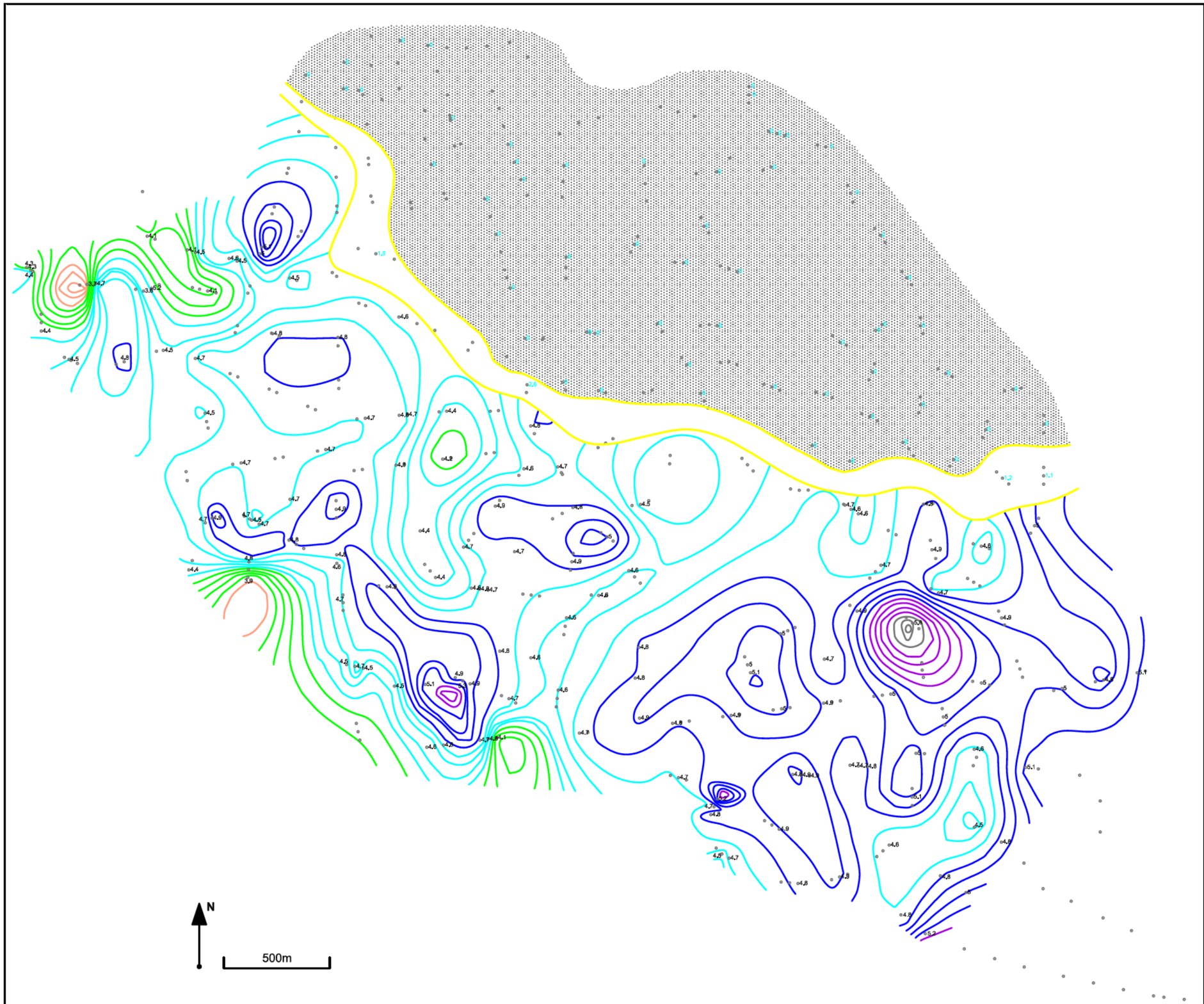
attachment to report GL11.901

Map B-39: Thickness Muschelkalk Fm.: RNMU-B2



Map B-39: Thickness RNMU-B2

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.1m interval)

- 3.6 - 3.9m
- 4.0 - 4.3m
- 4.4 - 4.7m
- 4.8 - 5.1m
- 5.2 - 5.5m
- 5.6 - 5.8m

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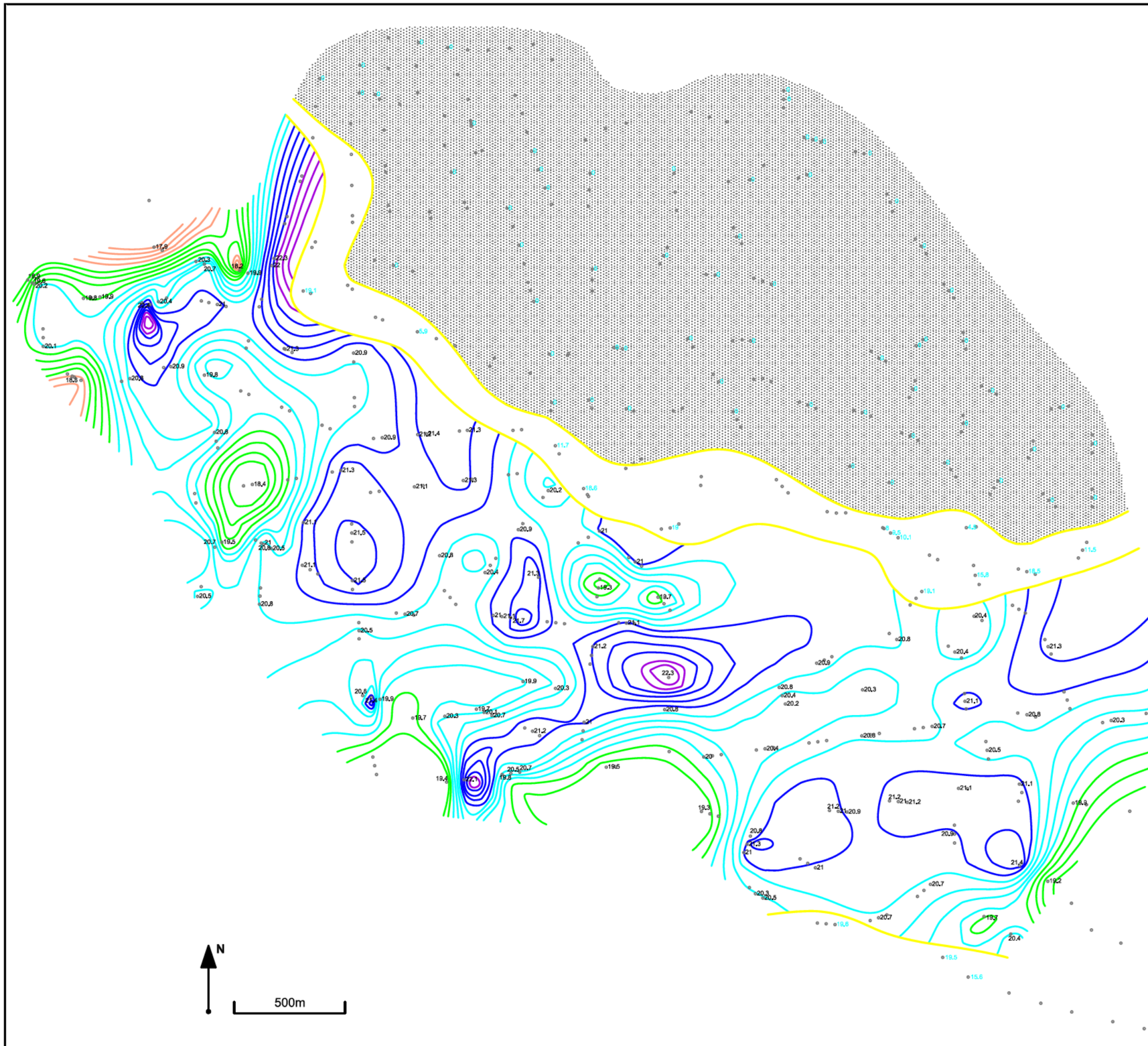
Map B-40: Thickness Muschelkalk Fm.: RNMU-B3



Map B-40: Thickness RNMU-B3

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 18.0 - 18.75m
- 19.0 - 19.75m
- 20.0 - 20.75m
- 21.0 - 21.75m
- 22.0 - 22.75m

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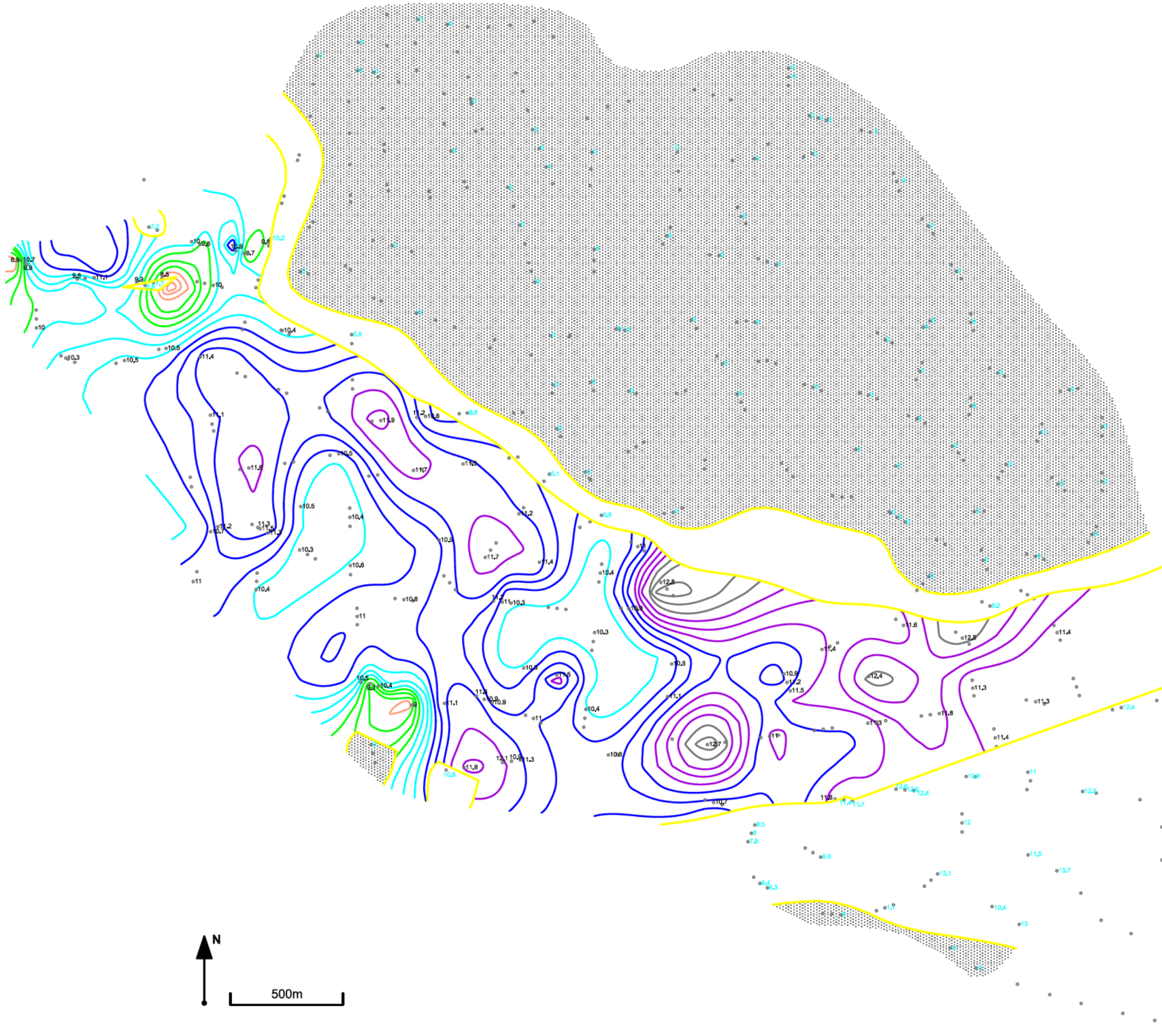
Map B-41: Thickness Muschelkalk Fm.: RNMU-B4



Map B-41: Thickness RNMU-B4

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 8.5 - 9.0m
- 9.25 - 9.75m
- 10.0 - 10.5m
- 10.75 - 11.25m
- 11.5 - 12.0m
- 12.25 - 12.75m

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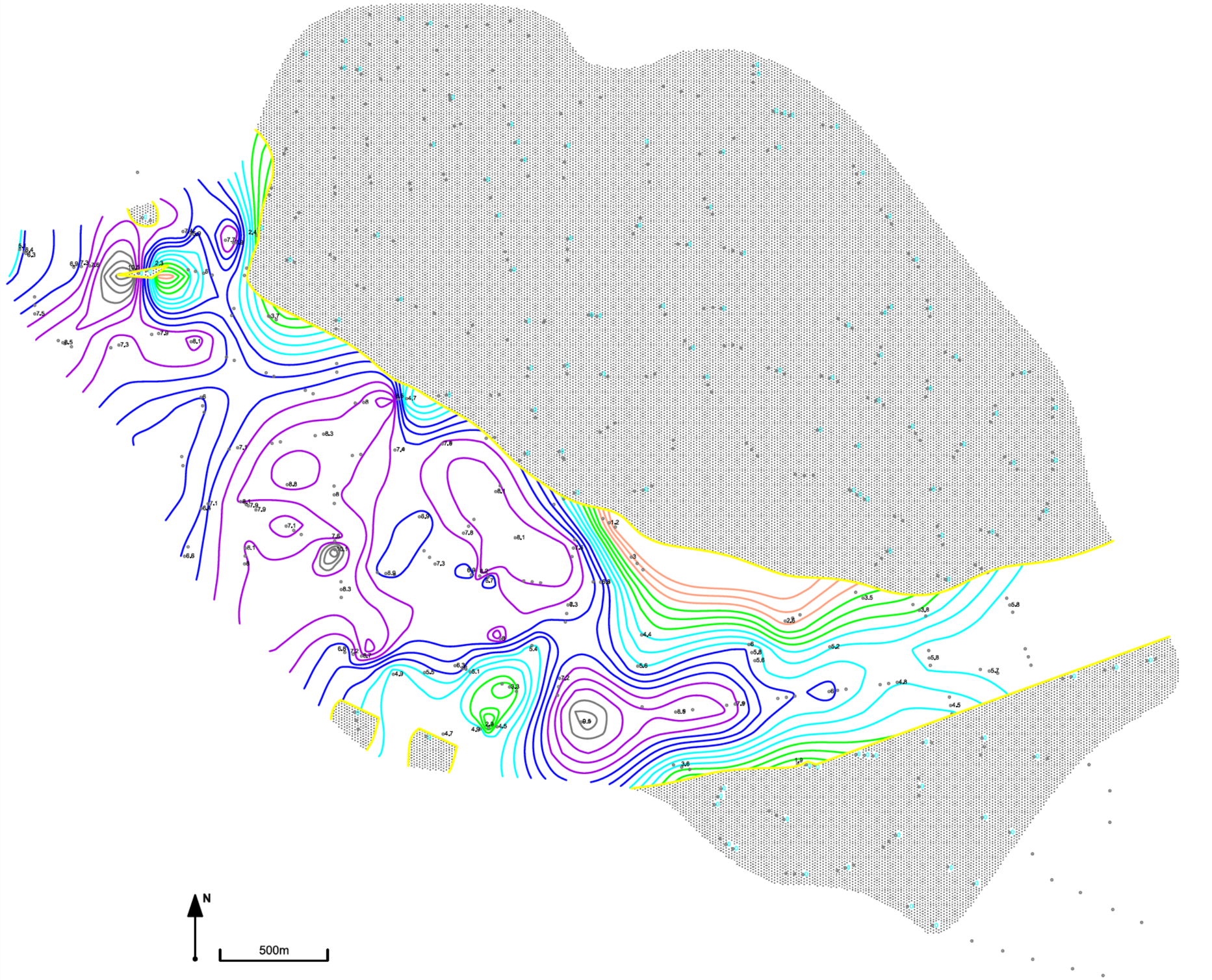
Map B-42: Thickness Muschelkalk Fm.: RNMU-B5



Map B-42: Thickness RNMU-B5

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m); top eroded
- 0 unit eroded
- eroded

isochore lines (0.5m interval)

- RNMU-B5 = 0
- 1.5 - 2.5m
- 3.0 - 4.0m
- 4.5 - 5.5m
- 6.0 - 7.0m
- 7.5 - 8.5m
- 9.0 - 10.0m

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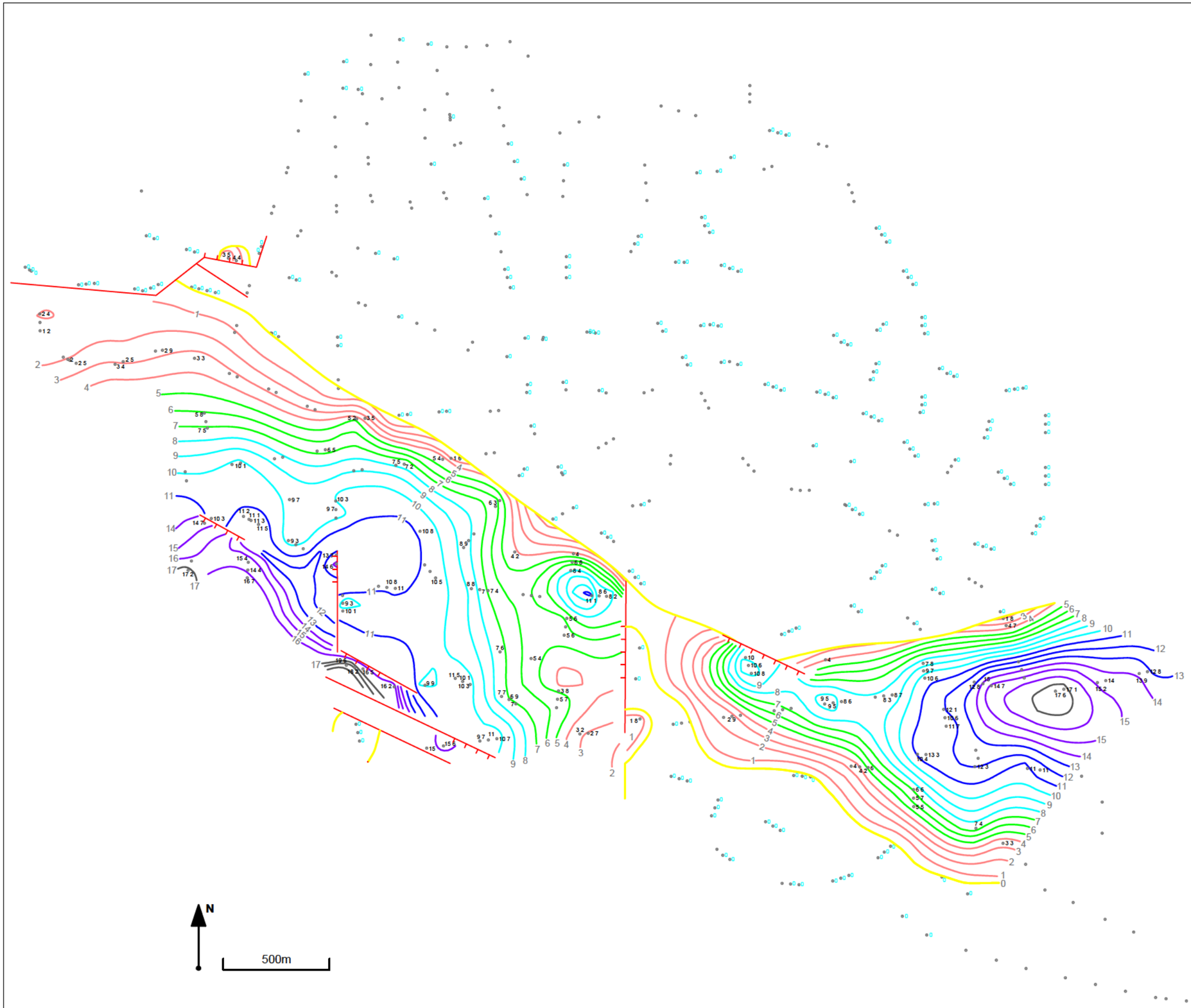
Map B-43: Thickness Altena Gp.: AT



Map B-43: Thickness AT

thickness in meters
(faulted sections not included)

Legend:

well location

20.4 thickness (m)

0 datapoint with AT eroded

eroded

isochore lines (1m interval)

- AT = 0
- ≤ 4m
- 5 - 7m
- 8 - 10m
- 11 - 13m
- 14 - 16m
- 17 - 19m

normal fault

- offset
- no offset at this level

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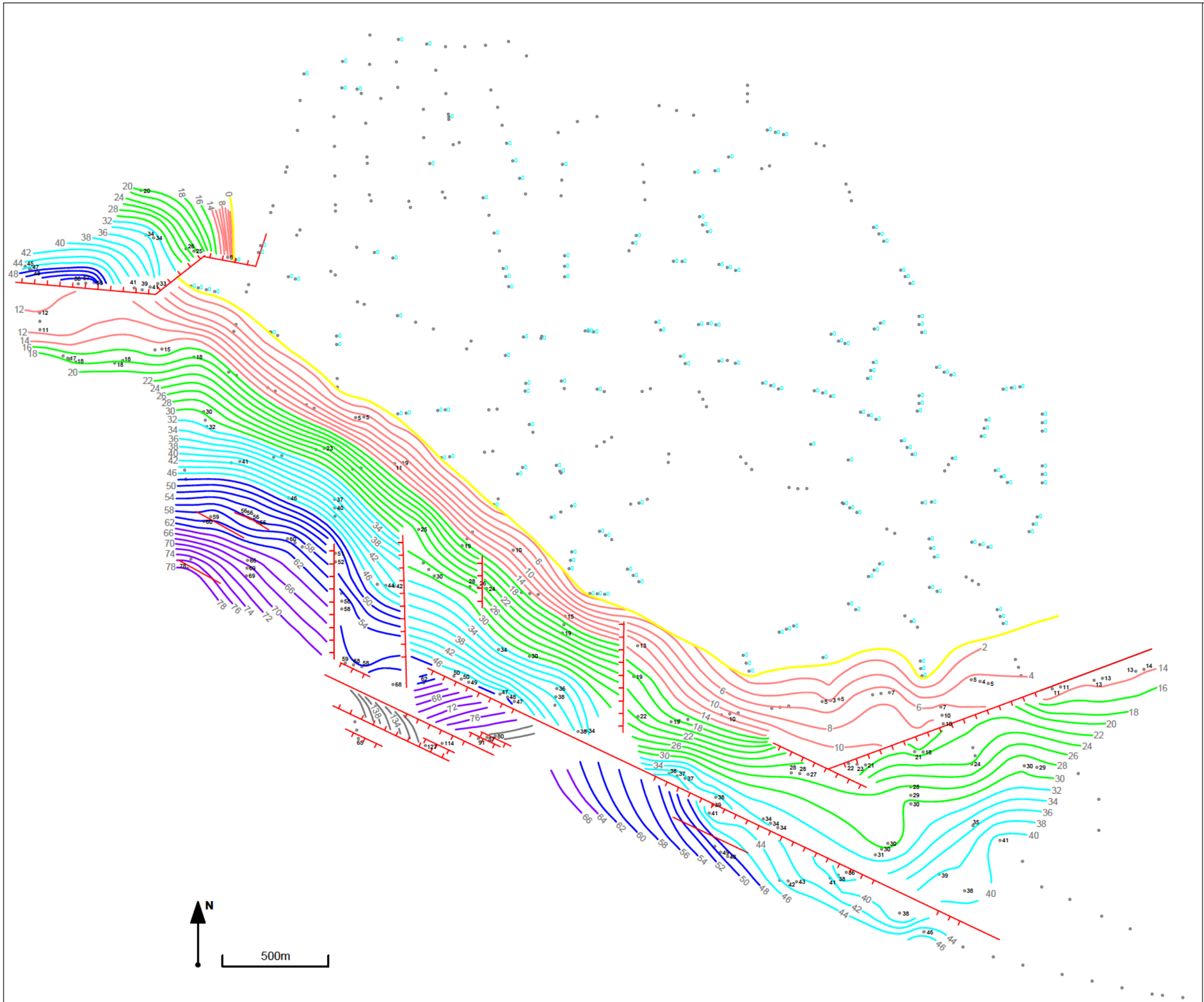
Map B-44: Thickness Niedersachsen Gp.: SK



Map B-44: Thickness SK

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 0 datapoint with SK eroded
- eroded

isochore lines (2m interval)

- SK = 0
- ≤ 14m
- 16 - 30m
- 32 - 46m
- 48 - 62m
- 64 - 78m
- ≥80m

normal fault

- offset
- no offset at this level

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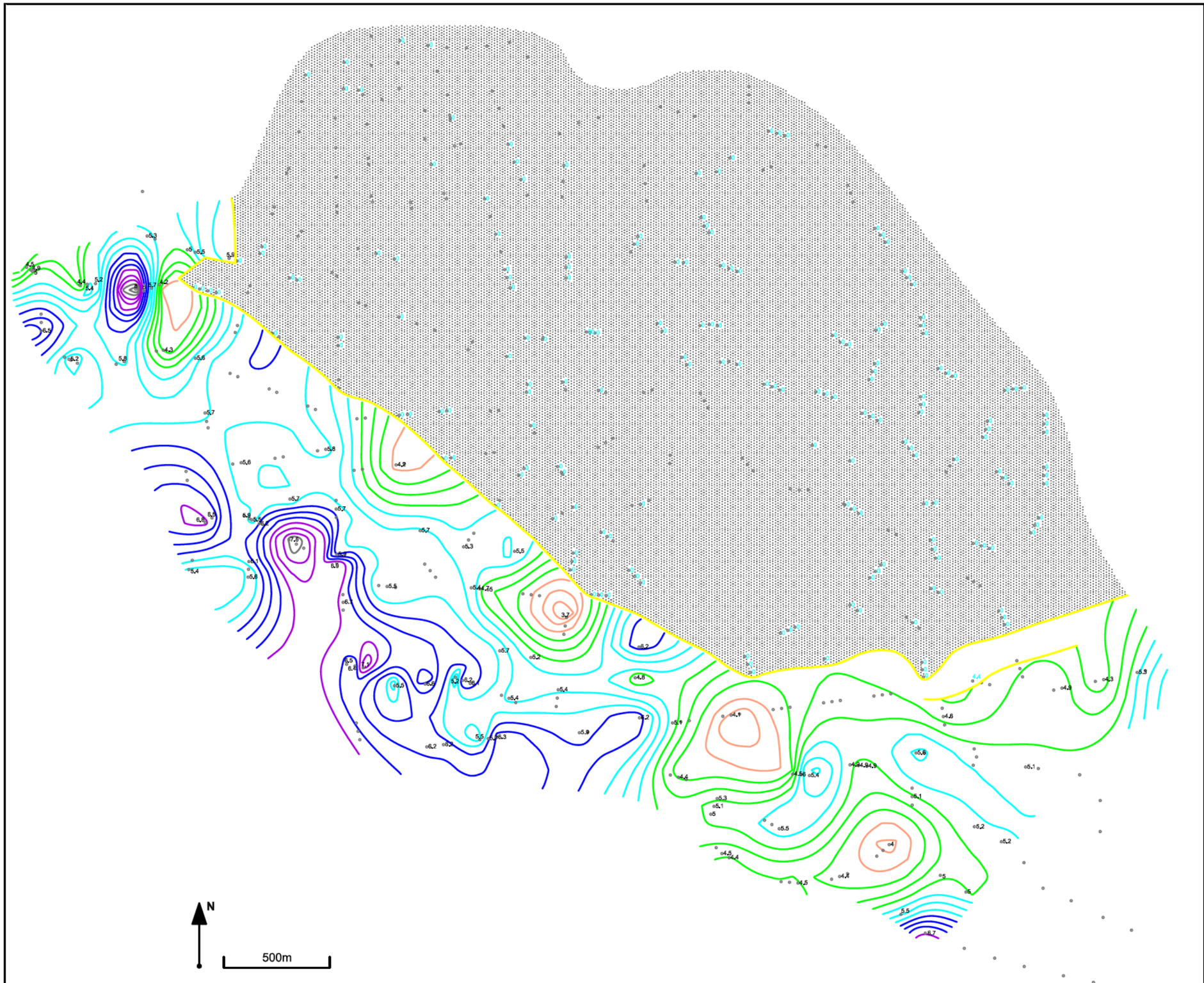
Map B-45: Thickness Niedersachsen Gp.: SK-A



Map B-45: Thickness SK-A

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.25m interval)

- 3.75 - 4.25m
- 4.5 - 5.0m
- 5.25 - 5.75m
- 6.0 - 6.5m
- 6.75 - 7.25m
- 7.5 - 8.0m

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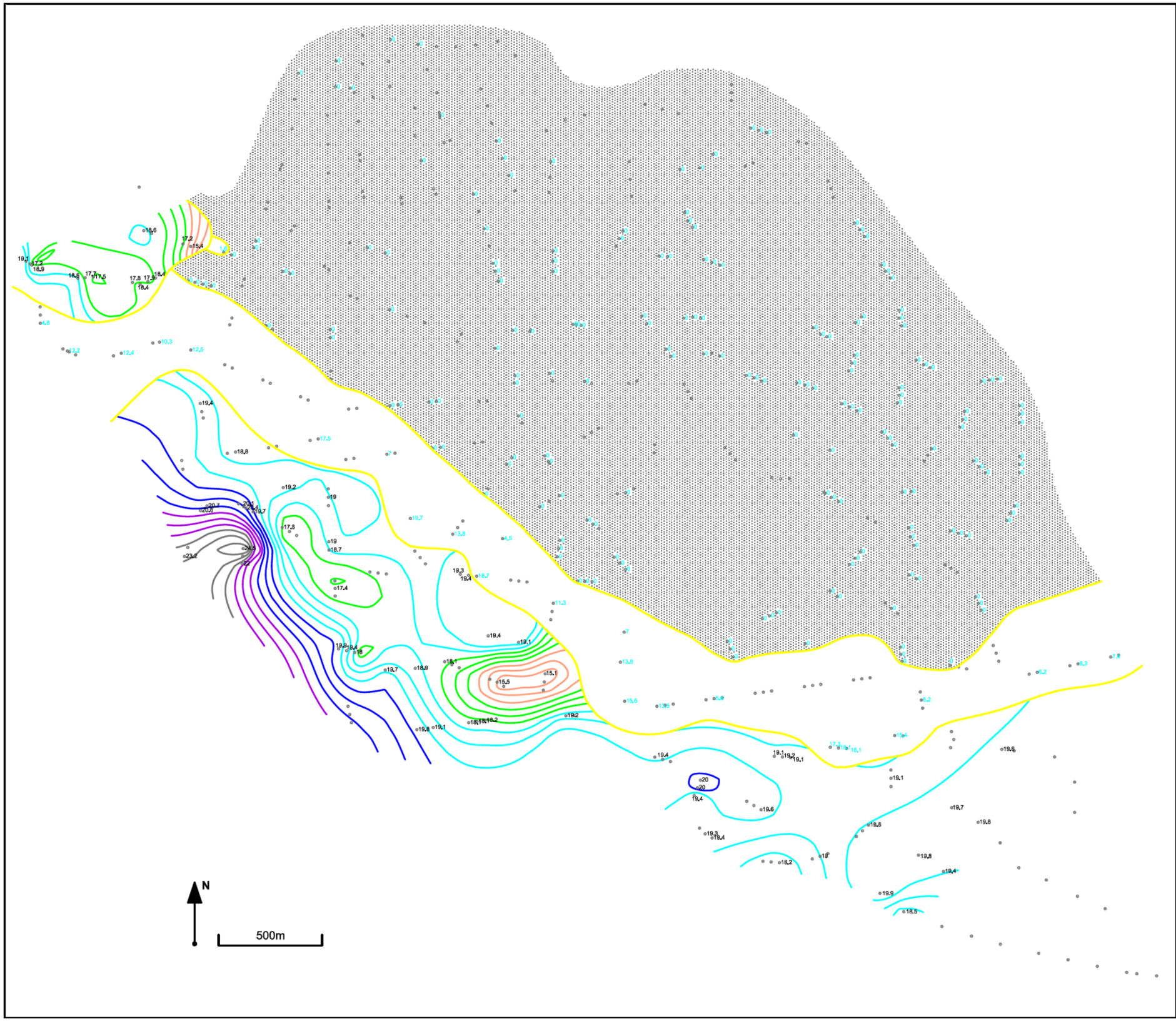
Map B-46: Thickness Niedersachsen Gp.: SK-B



Map B-46: Thickness SK-B

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (0.5m interval)

- 15.5 - 16.5m
- 17.0 - 18.0m
- 18.5 - 19.5m
- 20.0 - 21.0m
- 21.5 - 22.5m
- 23.0 - 24.0m

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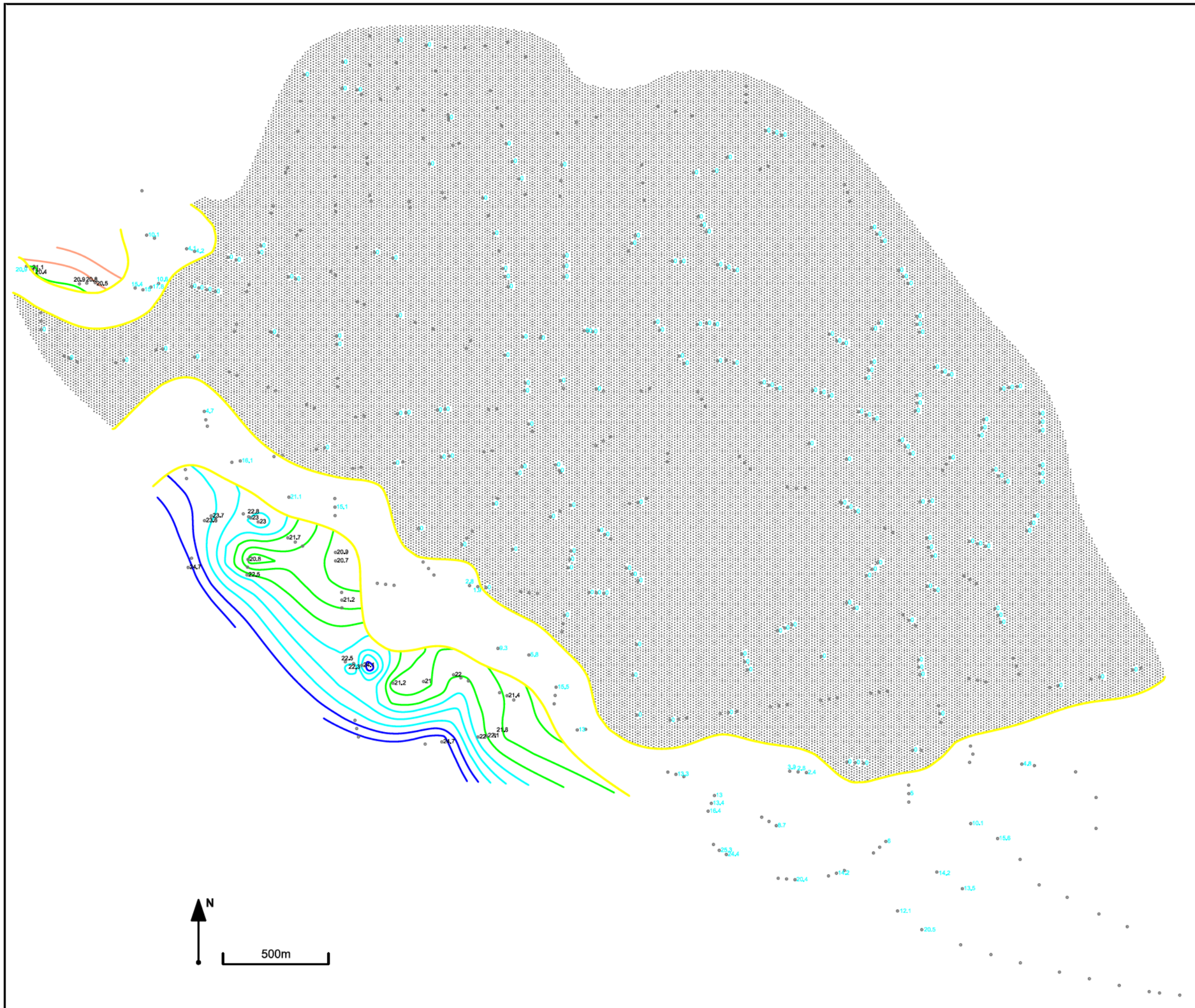
Map B-47: Thickness Niedersachsen Gp.: SK-C



Map B-47: Thickness SK-C

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- fully eroded

isochore lines (0.5m interval)

- 19.5 - 20.5m
- 21.0 - 22.0m
- 22.5 - 23.5m
- 24.0 - 25.0m

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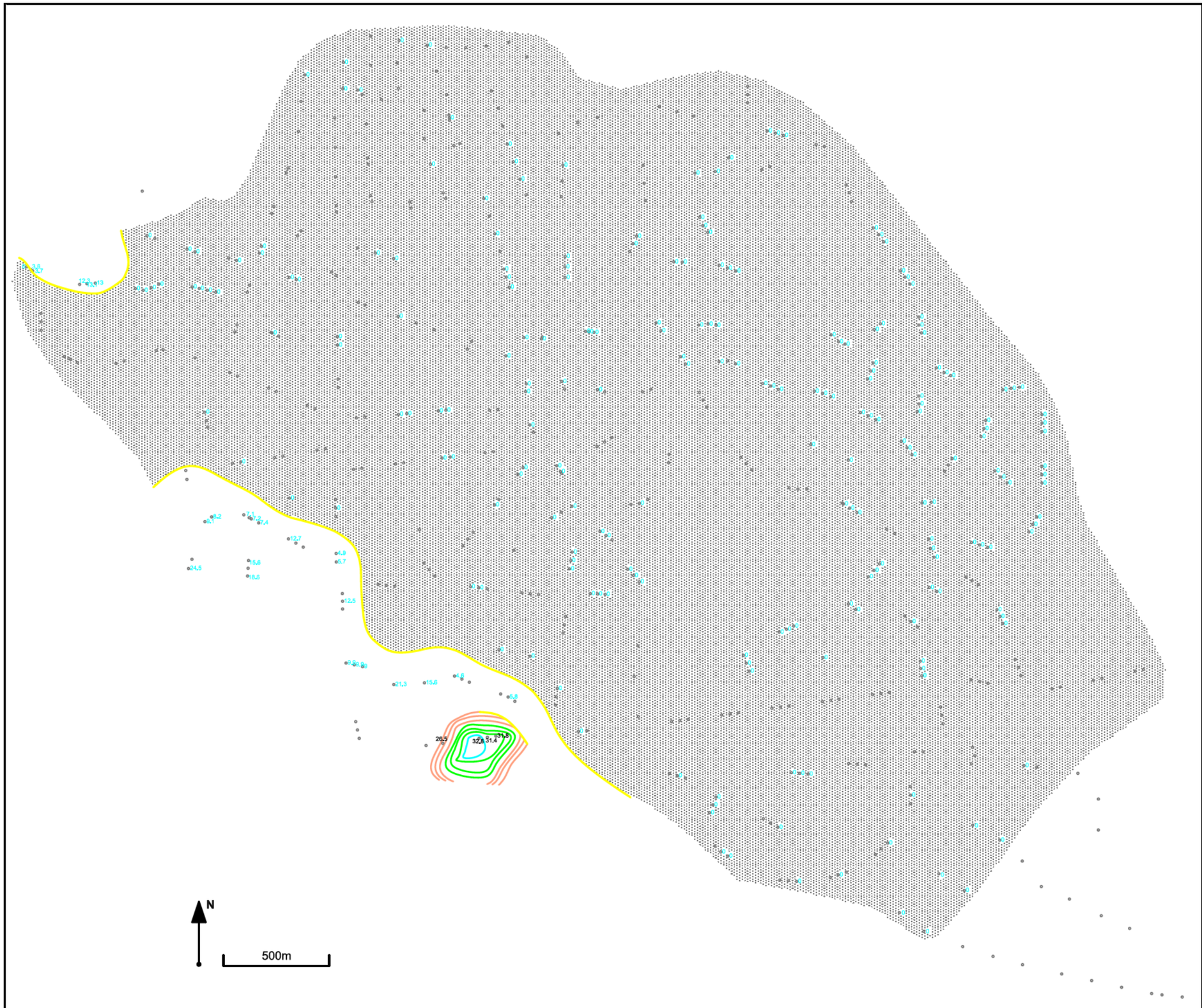
Map B-48: Thickness Niedersachsen Gp.: SK-D



Map B-48: Thickness SK-D

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m)
- 20.4 unit (partly) eroded
- partly eroded
- eroded

isochore lines (1m interval)

- 26.0 - 28.0m
- 29.0 - 31.0m
- 32.0m

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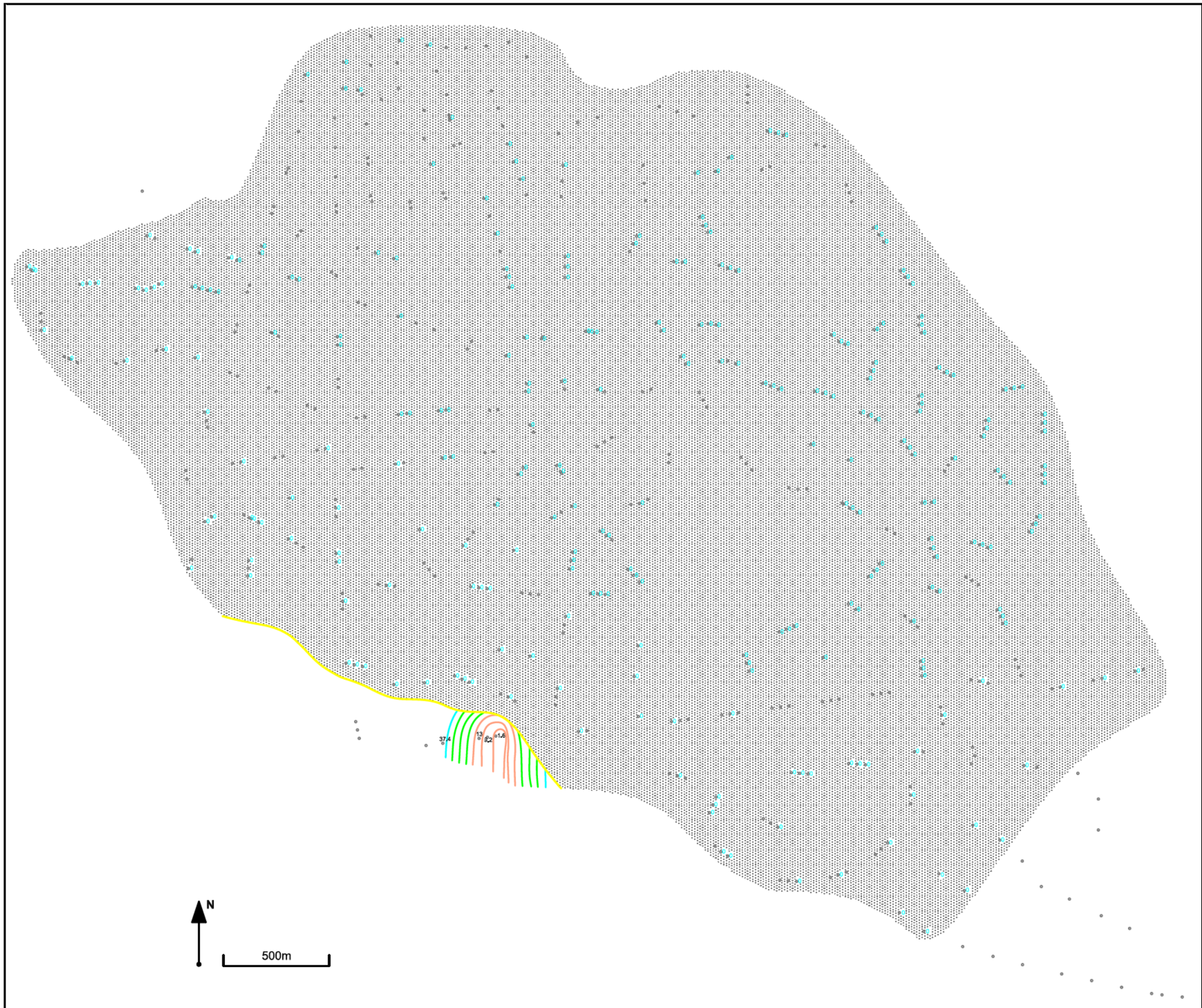
Map B-49: Thickness Niedersachsen Gp.: SK-E



Map B-49: Thickness SK-E

thickness in meters
(faulted sections not included)

Legend:

- well location
- 20.4 thickness (m); top eroded
- 0 unit eroded
- partly eroded
- eroded

isochore lines (5m interval)

- 5 - 15m
- 20 - 30m
- 35m

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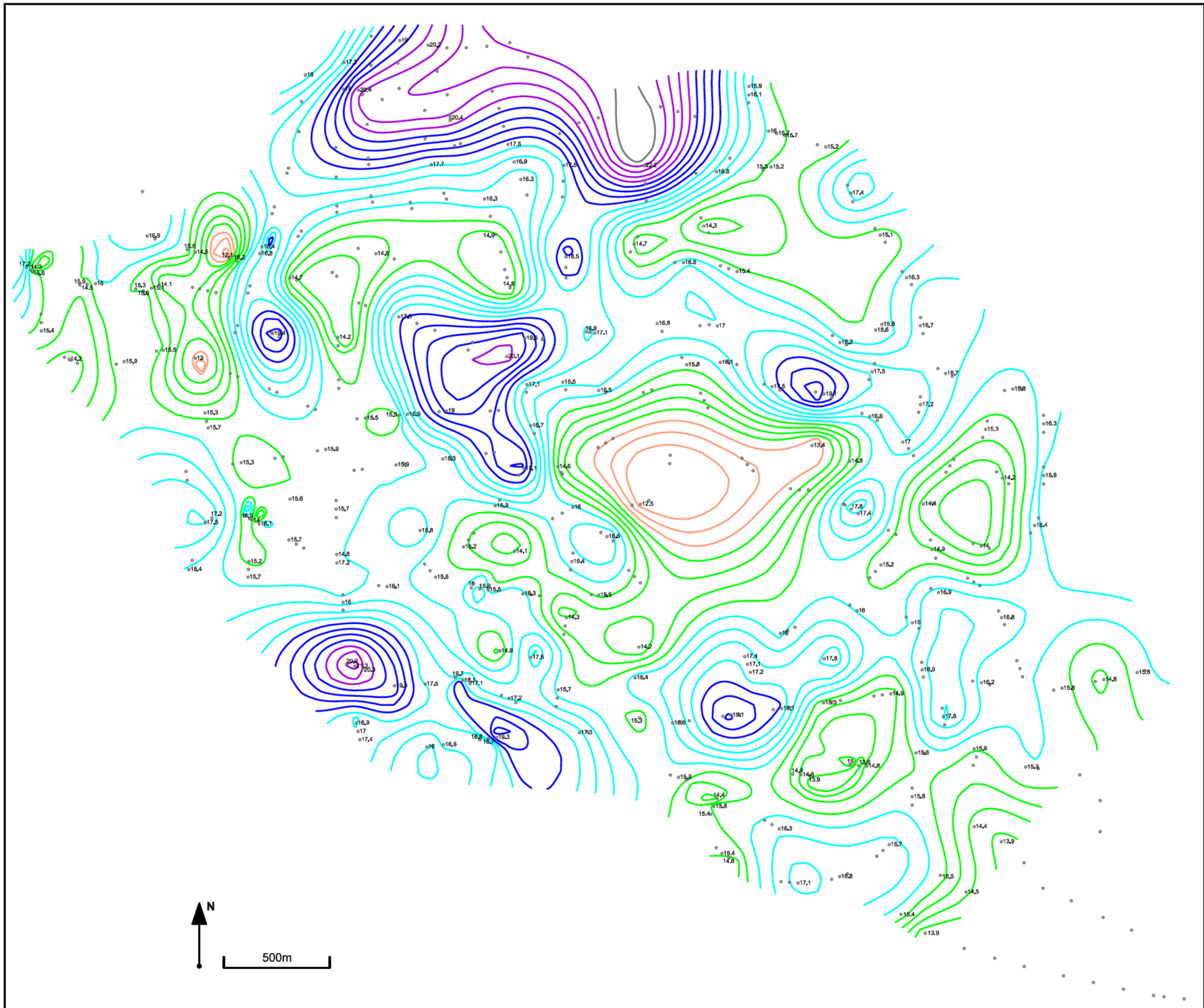
Map B-50: Thickness North Sea Supergp.: N-1



Map B-50: Thickness N-1

thickness in meters

Legend:

well location

20.4 thickness (m)

isochore lines (0.5m interval)

- 12.0 - 13.5m
- 14.0 - 15.5m
- 16.0 - 17.5m
- 18.0 - 19.5m
- 20.0 - 21.5m
- 22.0 - 23.5m

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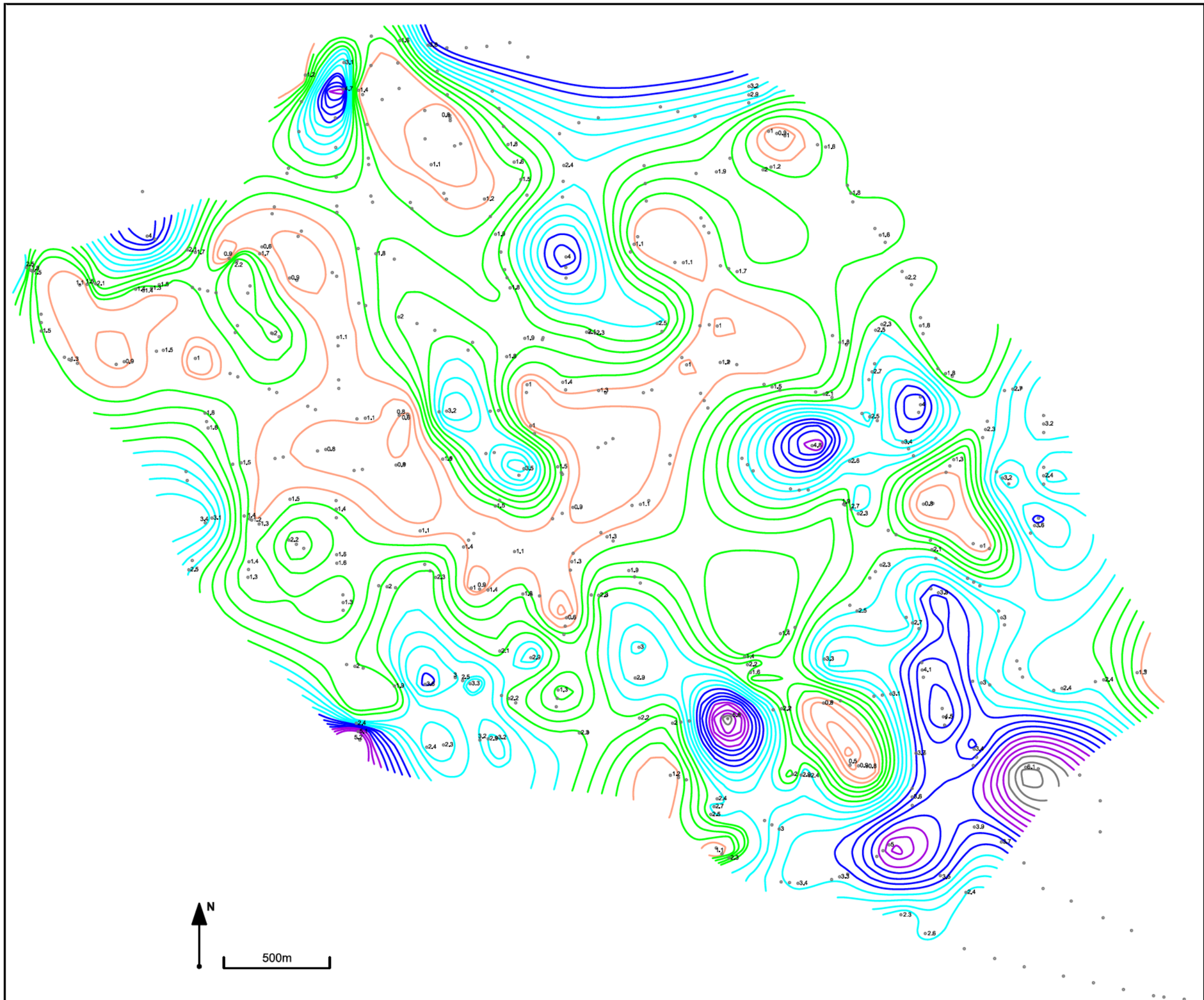
Map B-51: Thickness North Sea Supergp.: N-1a



Map B-51: Thickness N-1a

thickness in meters

Legend:

well location

20.4 thickness (m)

isochore lines (0.25m interval)

- 0.5 - 1.25m
- 1.5 - 2.25m
- 2.5 - 3.25m
- 3.5 - 4.25m
- 4.5 - 5.25m
- 5.5 - 6.25m

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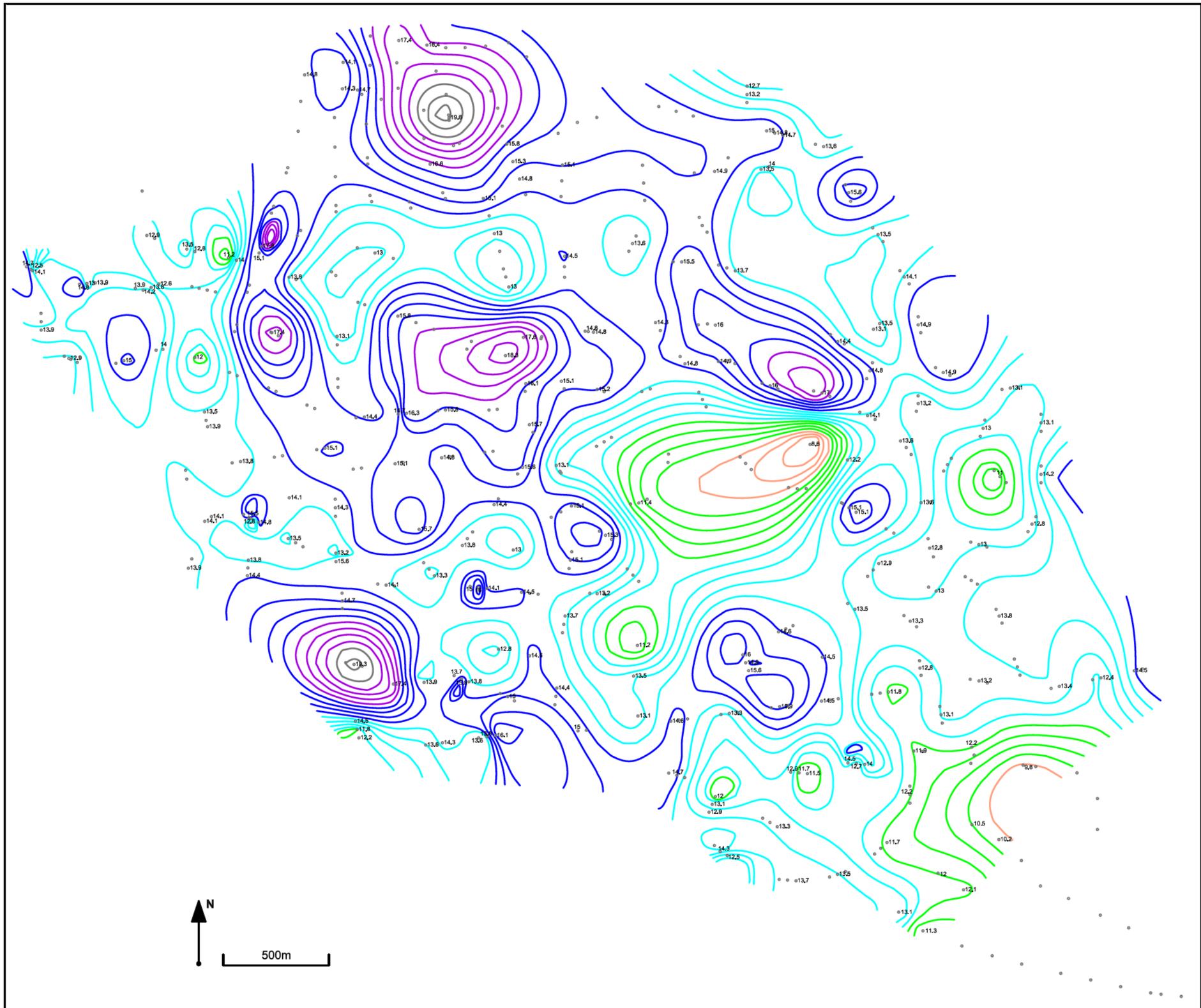
Map B-52: Thickness North Sea Supergp.: N-1b



Map B-52: Thickness N-1b

thickness in meters

Legend:

well location

20.4 thickness (m)

isochore lines (0.5m interval)

- 8.5 - 10.0m
- 10.5 - 12.0m
- 12.5 - 14.0m
- 14.5 - 16.0m
- 16.5 - 18.0m
- 18.5 - 20.0m

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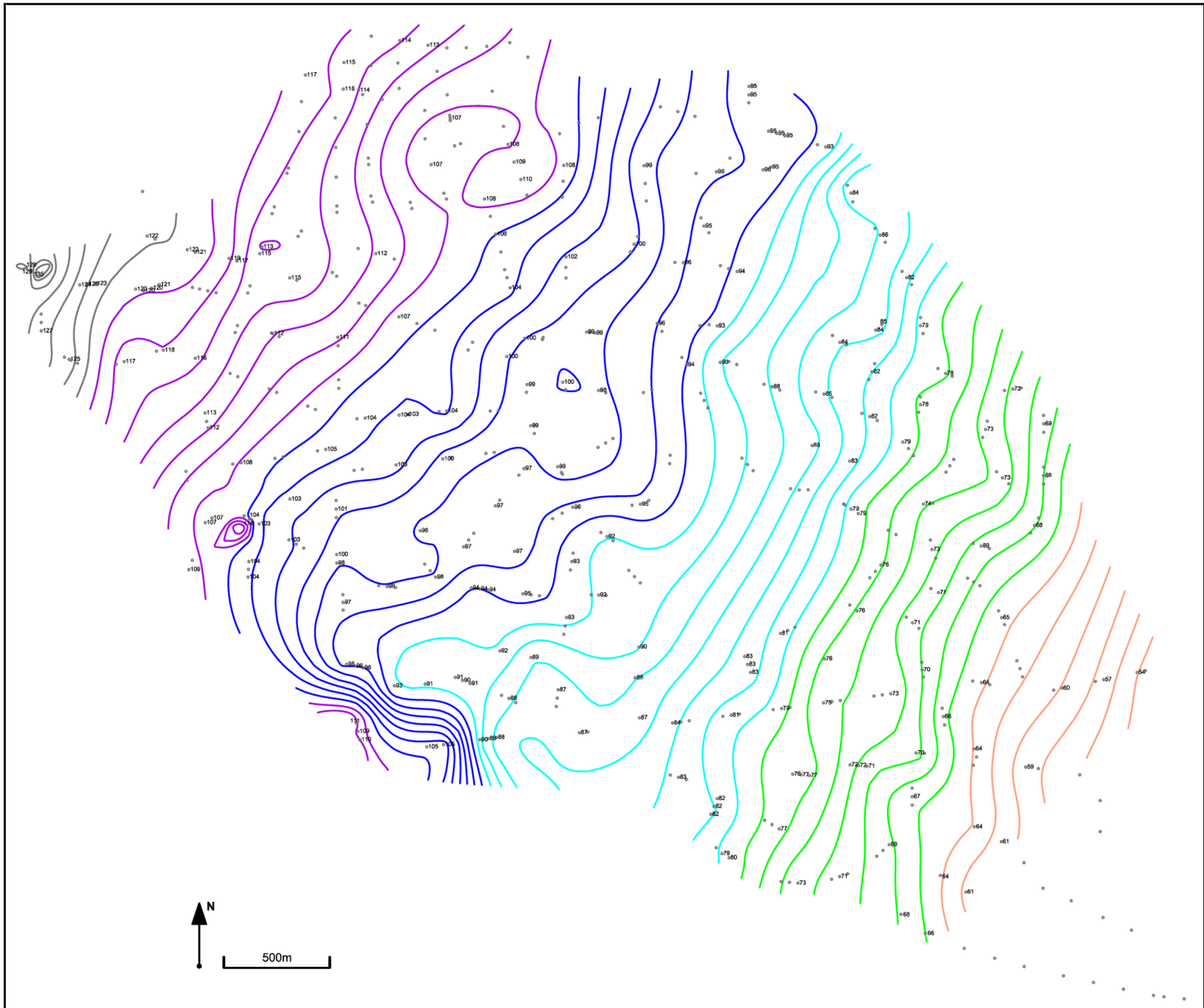
attachment to report GL11.901

Map B-53: Thickness North Sea Supergp.: N-2



Map B-53: Thickness N-2

thickness in meters to CF / GL

Legend:

well location

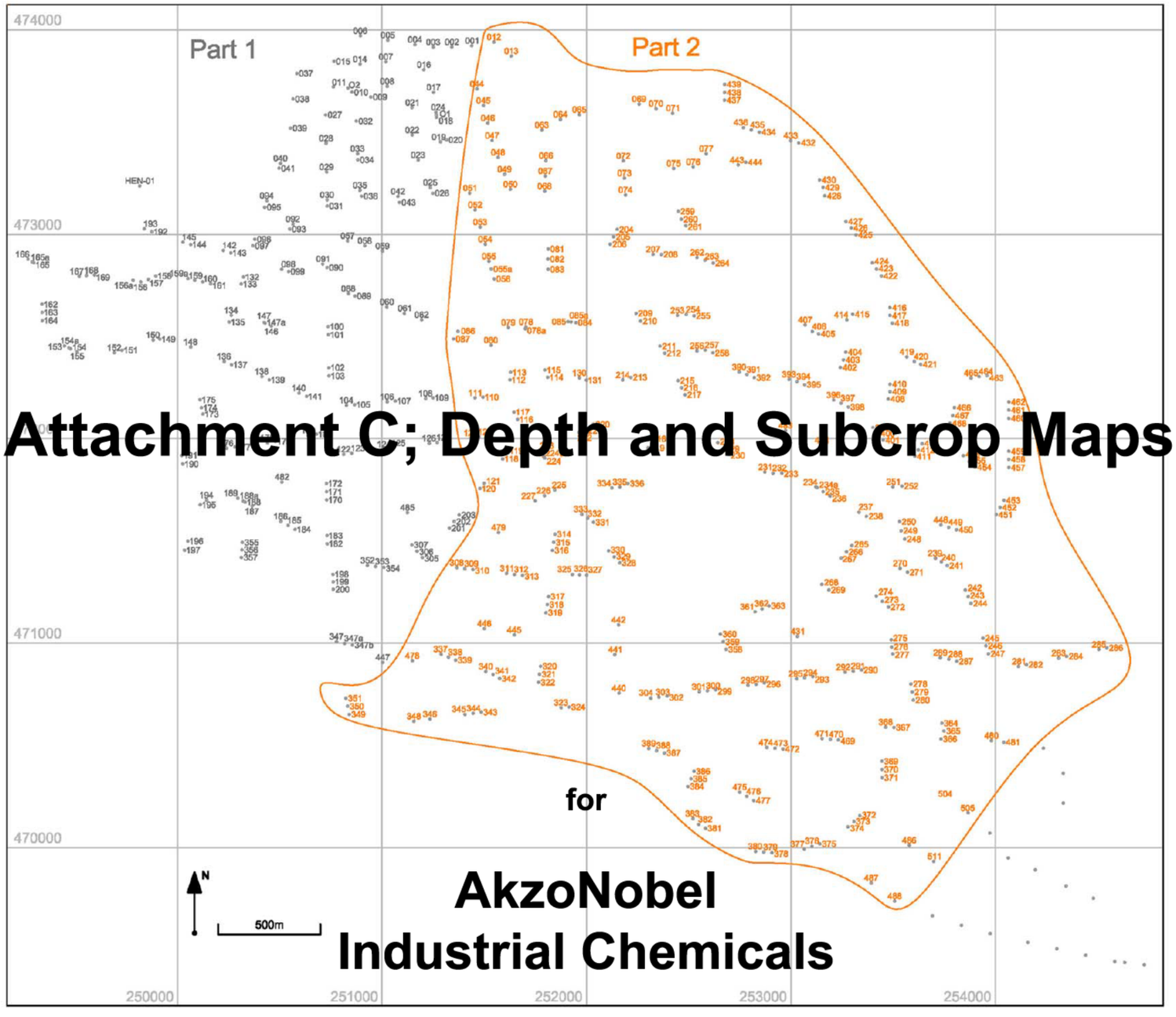
20.4 thickness (m)

isochore lines (2m interval)

- 52-64m
- 66-78m
- 80-92m
- 94-106m
- 108-120m
- 122-134m

prepared by:
GEOWULF *Laboratories*
attachment to report GL11.901

Detailed Geology of the Hengelo Solution Mining Area
Part 2



Attachment C; Depth and Subcrop Maps

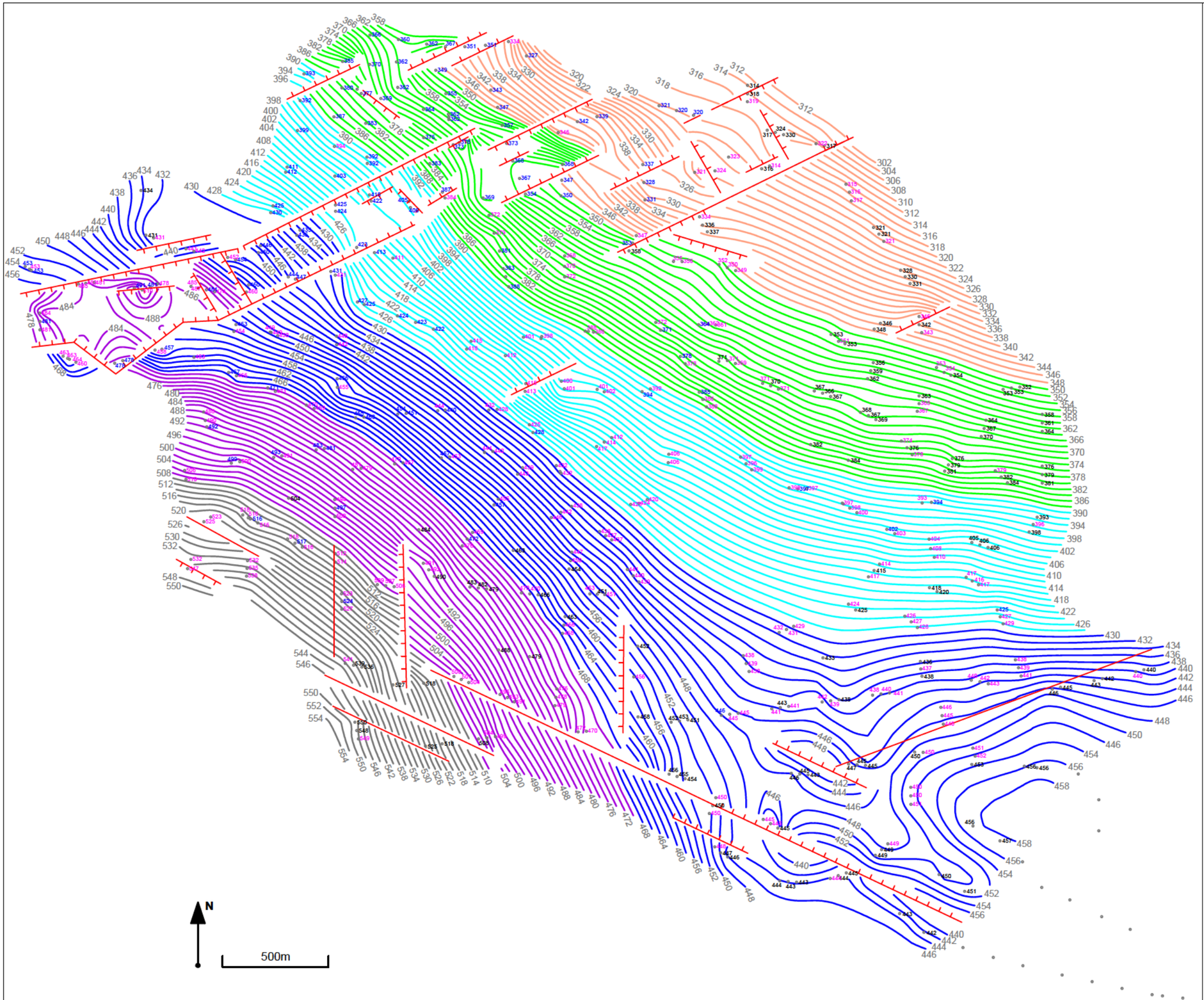
for

AkzoNobel
Industrial Chemicals

prepared by: GEOWULF*Laboratories*, the Netherlands
September 2011, report no: GL11.901

info@geowulf.nl

Map C-1: Depth Top Solling Fm.: RNSO



Map C-1: Depth Top RNSO

Legend:

- well location

depth in meters below NAP

- 20.4 source GR log
- 20.4 source 'orig. log' & cored
- 20.4 source base A2 or 'original log' and not cored

isolines (2m interval)

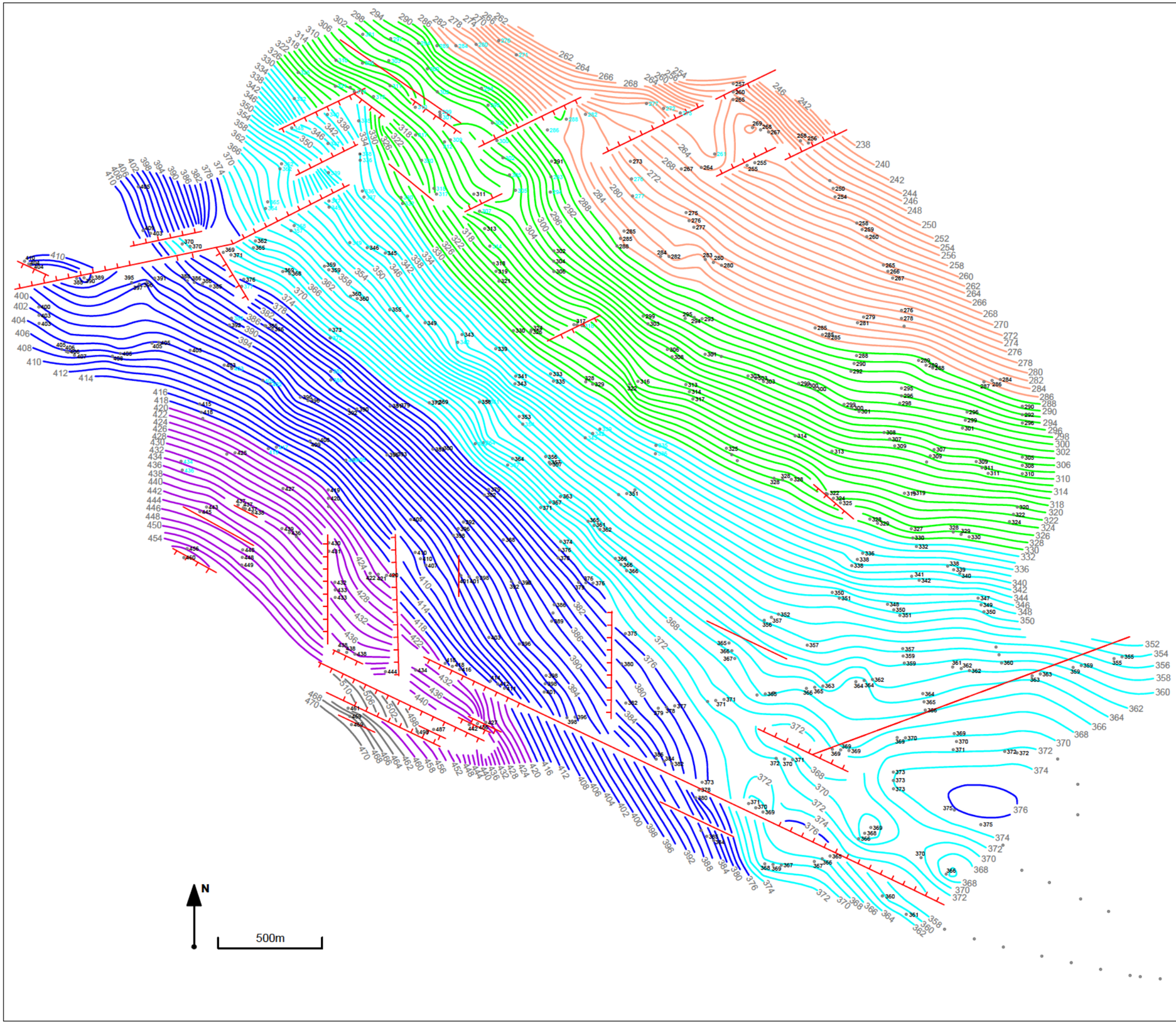
- ≤ 348m
- 350 - 388m
- 390 - 428m
- 430 - 468m
- 470 - 508m
- ≥ 510m

normal fault

- offset
- no offset at this level

prepared by:
GEOWULF*Laboratories*
attachment to report GL11.901

Map C-2: Depth Top Main Röt Evaporite Mb.: RNRO1



Map C-2: Depth Top RNRO1

Legend:

- well location

depth in meters below NAP

- 20.4 source GR log
- 20.4 derived depth

isolines (2m interval)

- ≤ 286m
- 288 - 330m
- 332 - 374m
- 376 - 418m
- 420 - 460m
- ≥ 462m

normal fault

- offset
- no offset at this level

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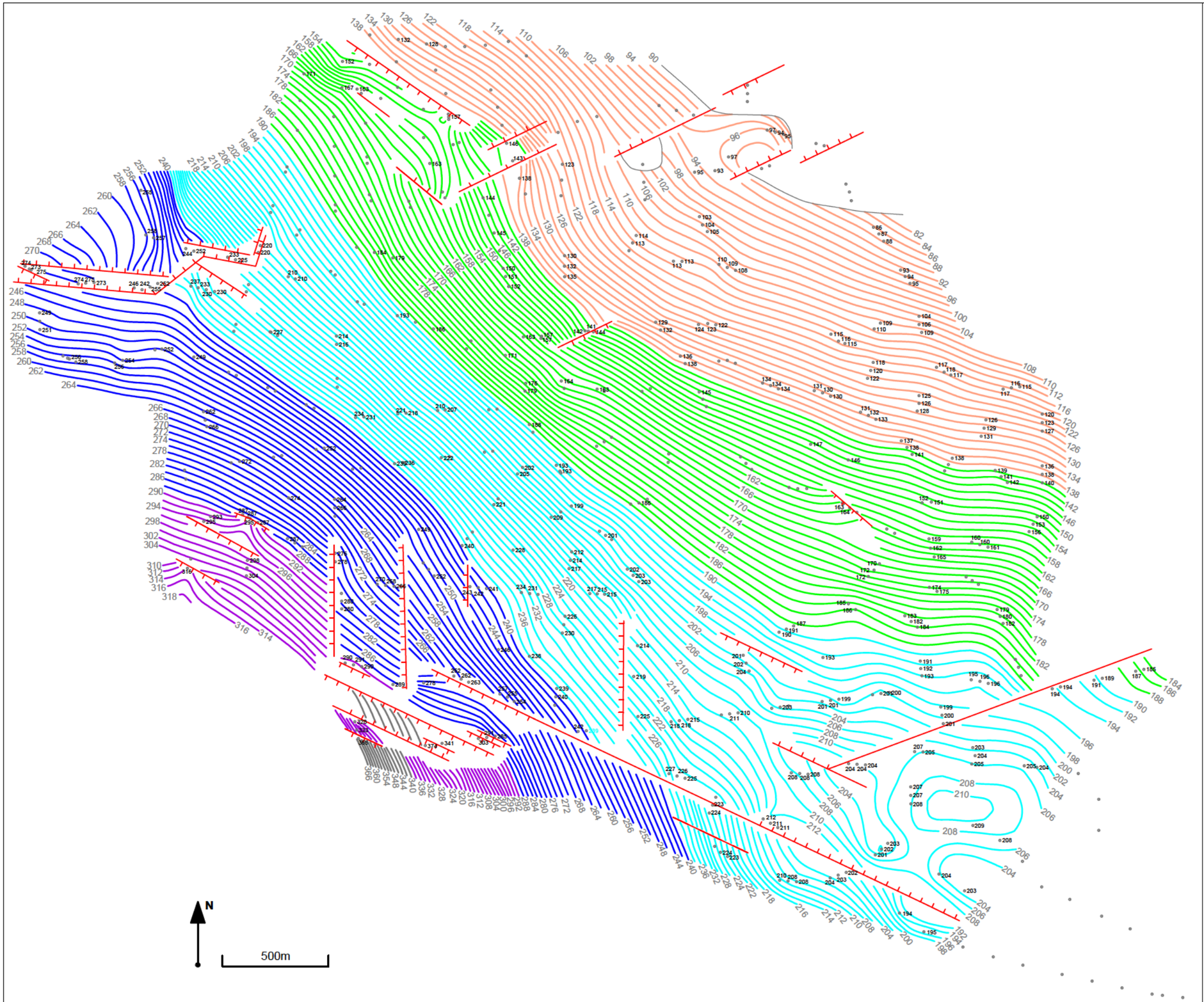
Map C-3: Depth Base Muschelkalk Fm.: RNMU



Map C-3: Depth Base RNMU

Legend:

- well location

depth in meters below NAP

- 20.4 source GR log
- eroded

isolines (2m interval)

- ≤ 138m
- 140 - 188m
- 190 - 238m
- 240 - 288m
- 290 - 338m
- ≥ 340m

normal fault

- offset
- no offset at this level

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GEOWULF*Laboratories*
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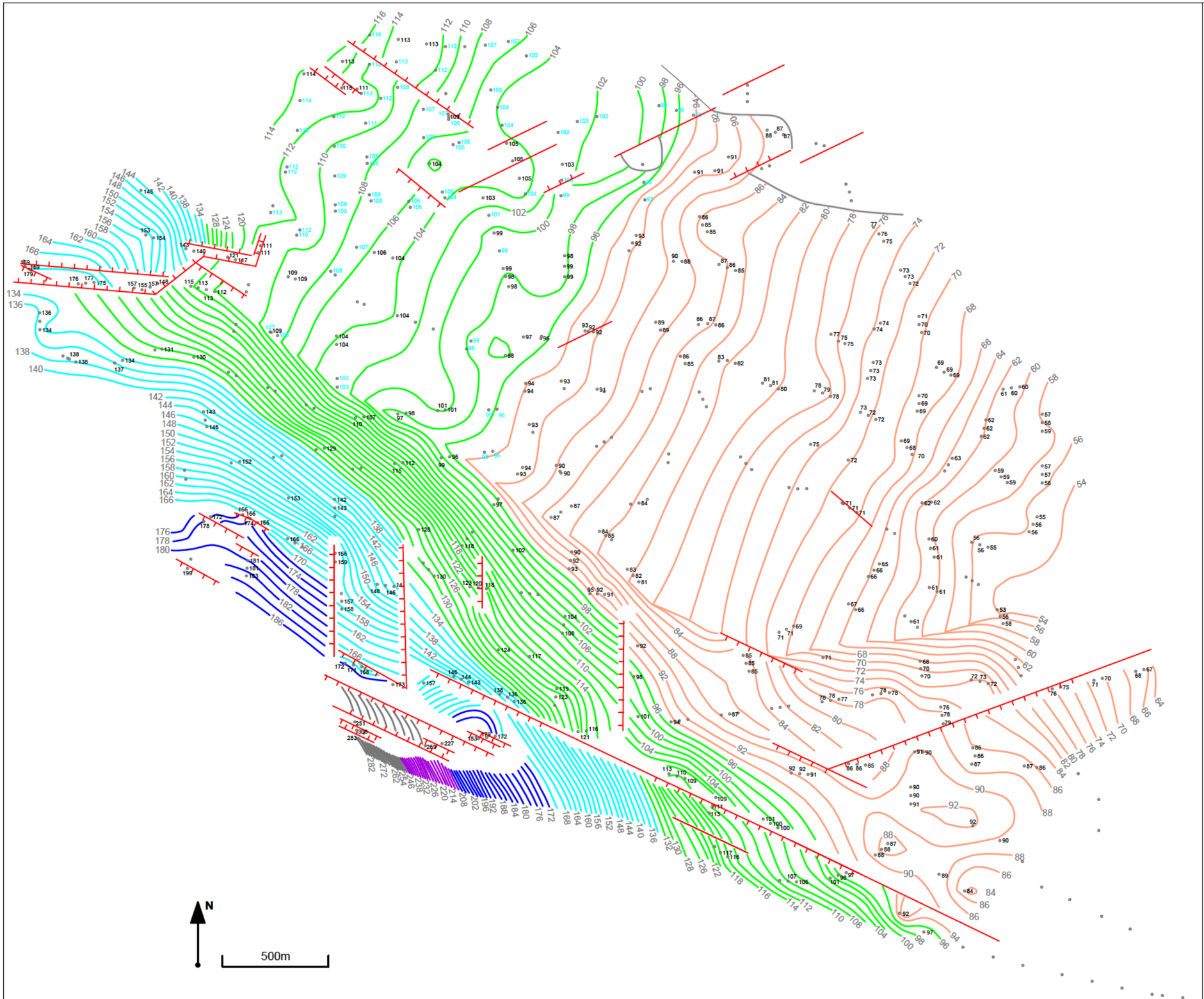
Map C-4: Depth Top MMuschelkalk Fm: RNMU



Map C-4: Depth Top RNMU

Legend:

- well location

depth in meters below NAP

- 20.4 source GR log

20.4

isolines (2m interval)

- ≤ 94m
- 96 - 132m
- 134 - 170m
- 172 - 208m
- 210 - 246m
- ≥ 248m

normal fault

- offset
- no offset at this level

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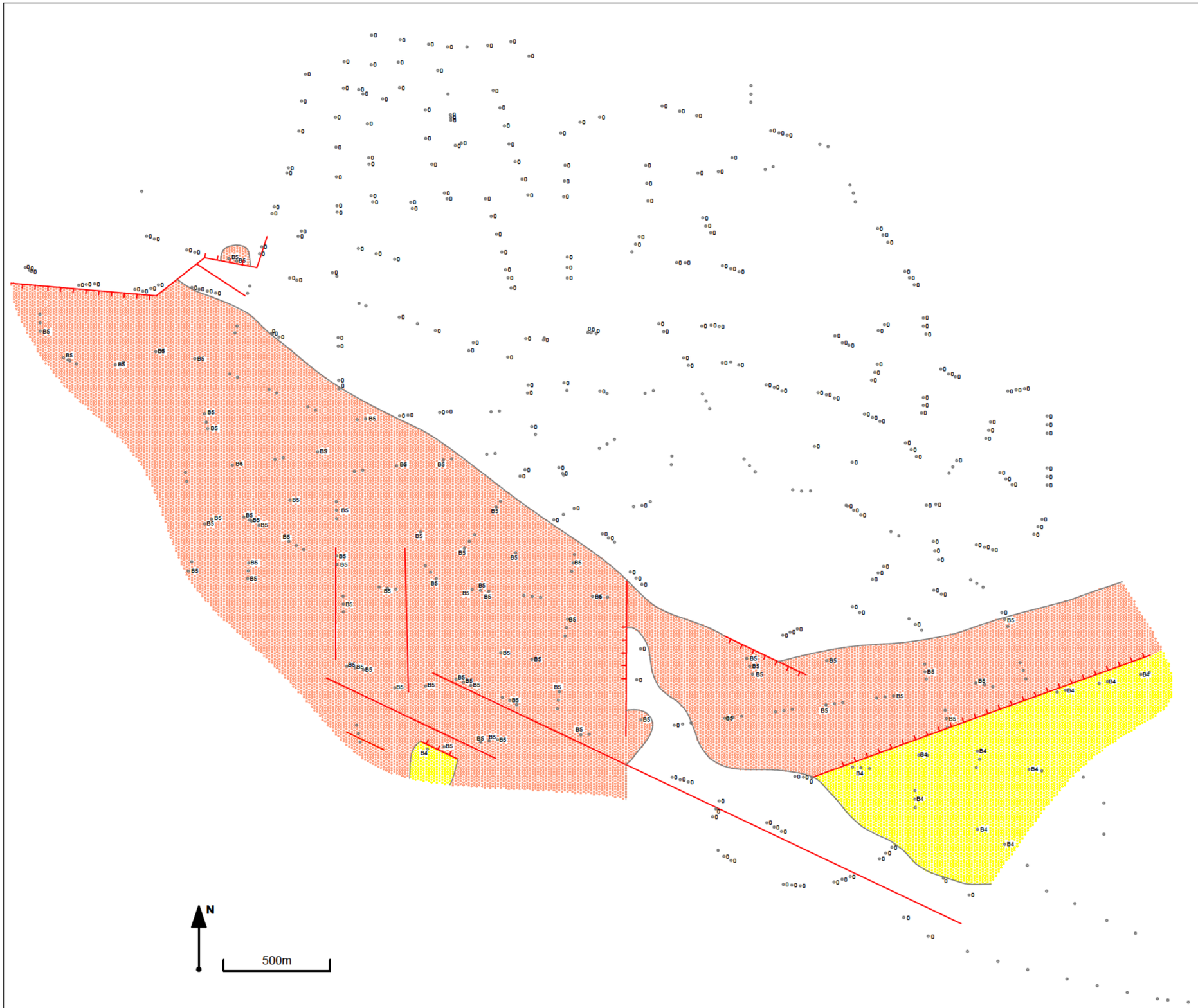
AkzoNobel Industrial Chemicals

Detailed Geology of the Hengelo Solution Mining Area, part 2

Map C-5: Subcrop Altena Gp: AT



Map C-5:
Subcrop Base AT Unconformity

Legend:

- well location
- 0 datapoint with AT eroded
- AT eroded

Unit underlying Base AT

- B unit name
- RNMU-B4
- RNMU-B5

normal fault

- offset
- no offset at this level

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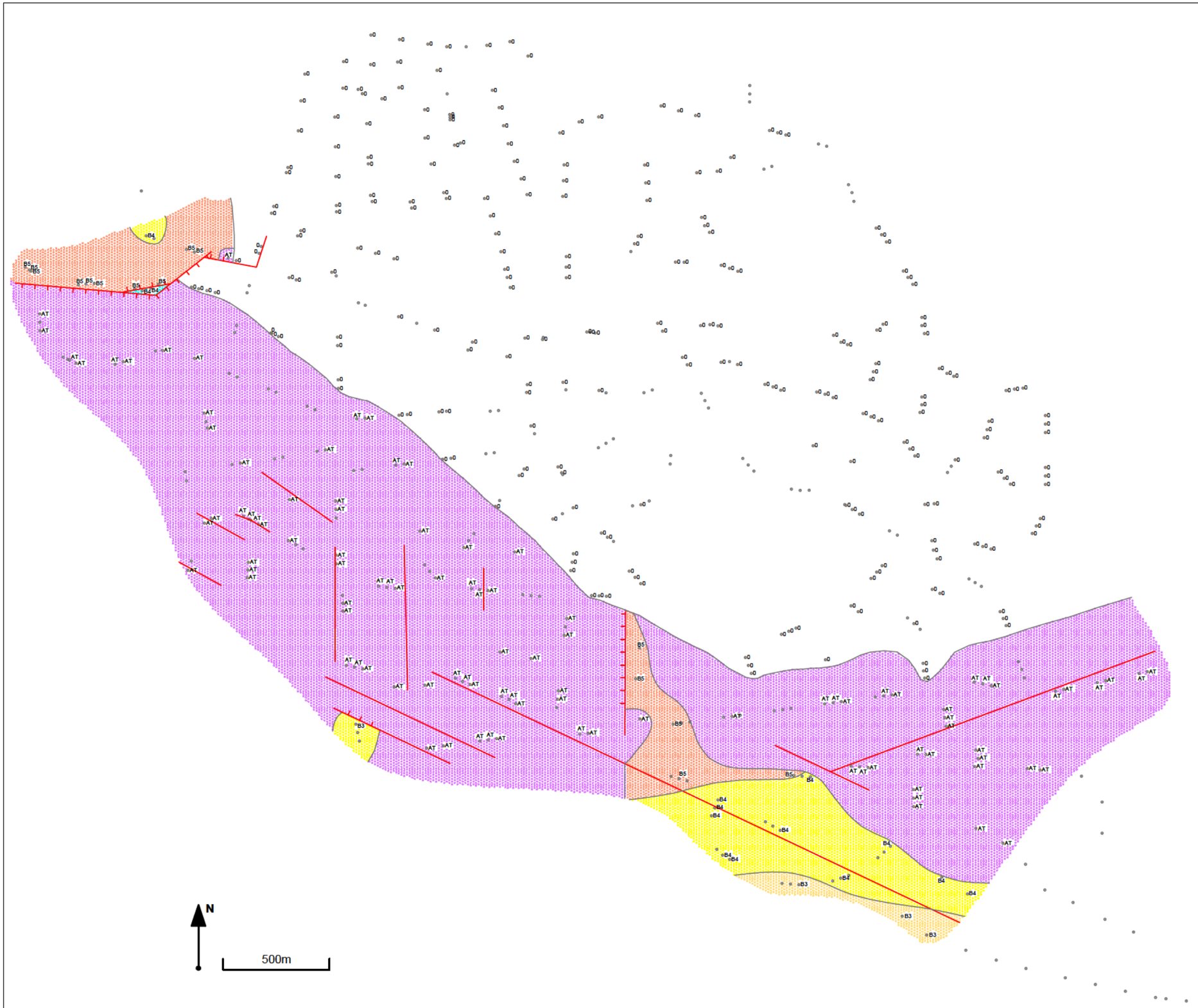
Map C-6: Subcrop Niedersachsen Gp.: SK



Map C-6:
Subcrop Base SK Unconformity

Legend:

- well location
- 0 datapoint with SK eroded
- SK eroded

Unit underlying base SK

- B unit name
- RNMU-B3
- RNMU-B4
- RNMU-B5
- AT

normal fault

- offset
- no offset at this level

prepared by:
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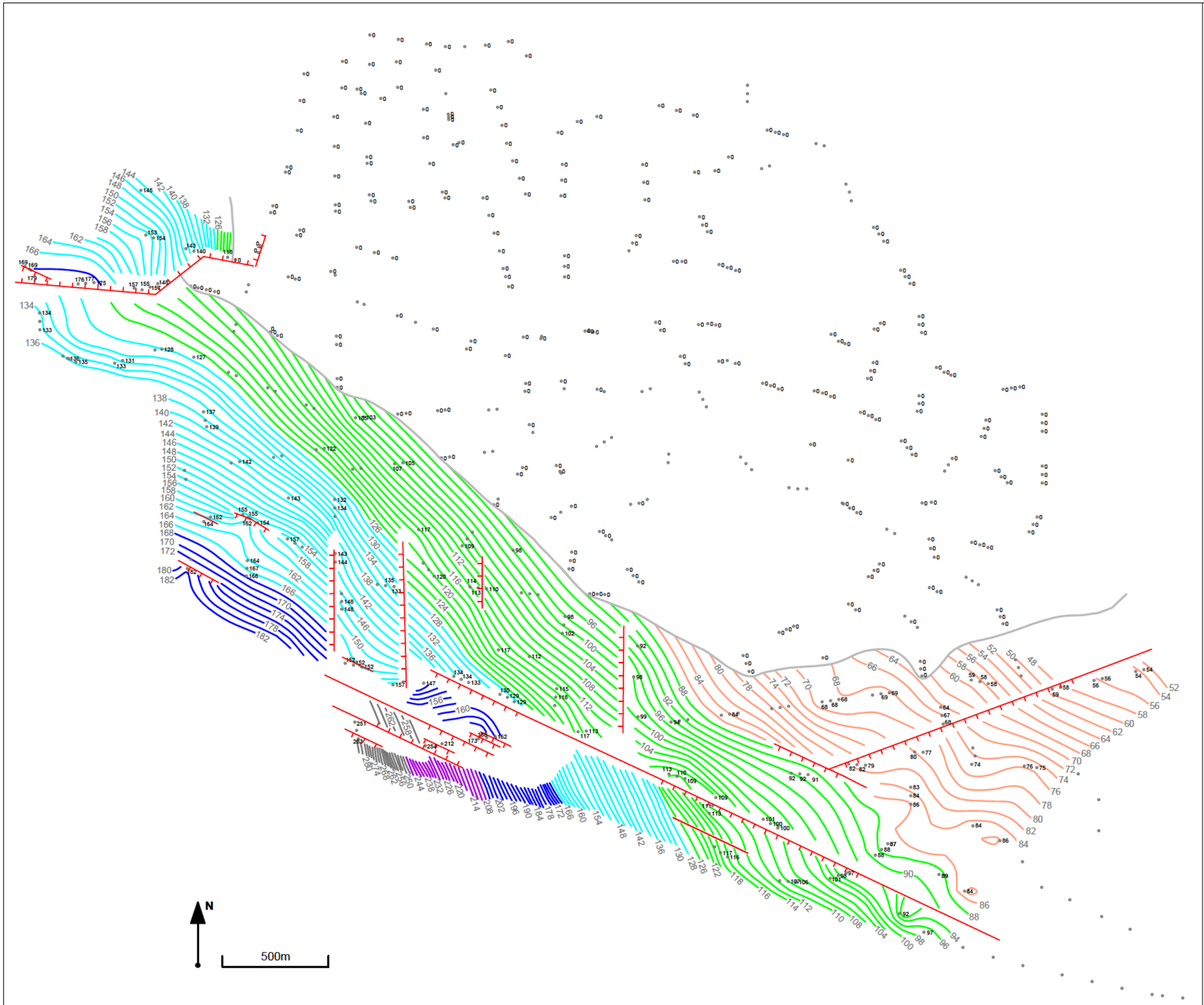
attachment to report GL11.901

Map C-7: Depth Base Niedersachsen Gp.: SK



Map C-7: Depth Base SK

Legend:

- well location

depth in meters below NAP

- 20.4 source GR log
- 0 datapoint with no SK
- eroded

isolines (2m interval)

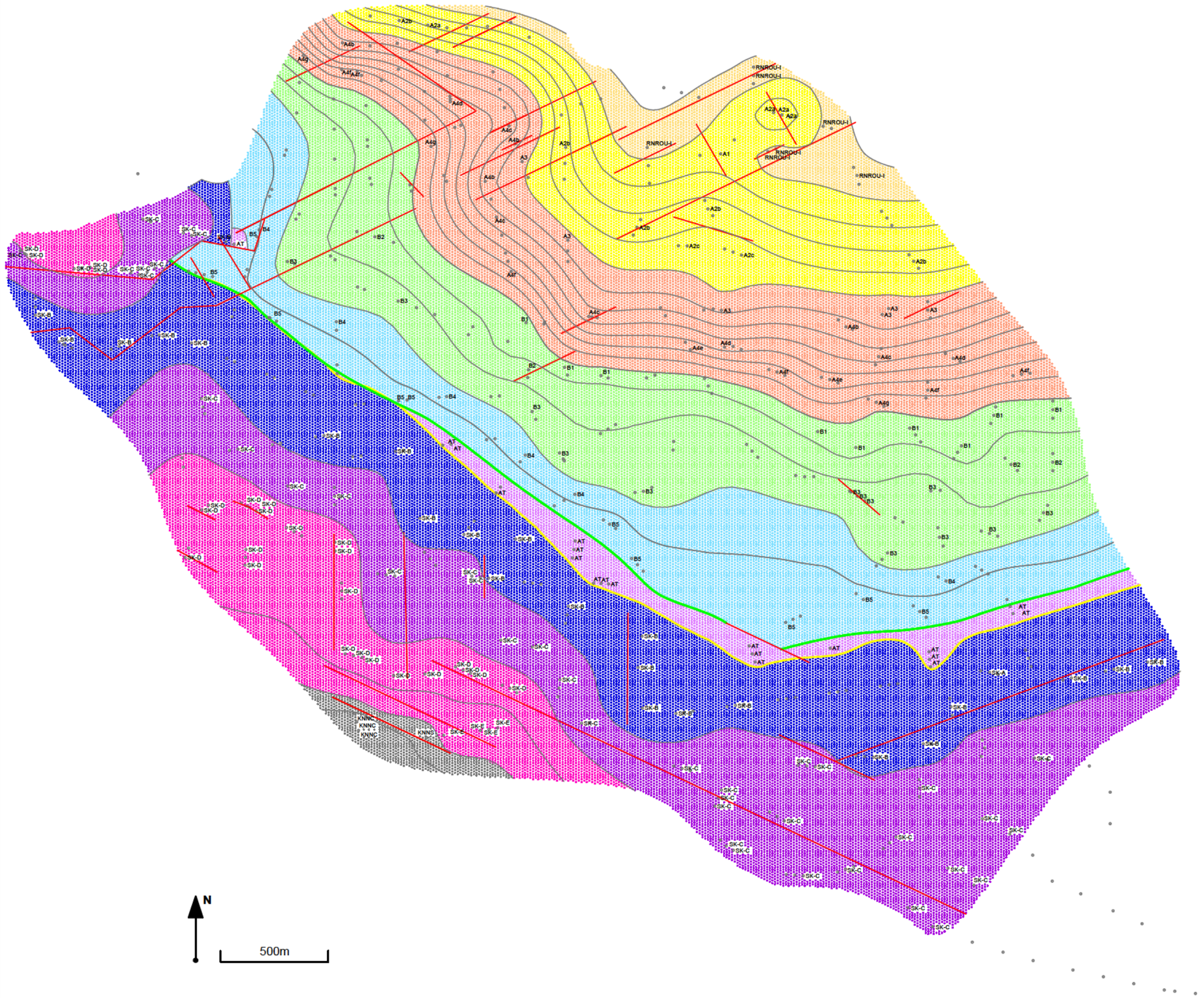
- ≤ 86m
- 88 - 126
- 128 - 166m
- 168 - 206m
- 208 - 246m
- ≥ 248m

normal fault

- offset
- no offset at this level

prepared by:
GEOWULF*Laboratories*
attachment to report GL11.901

Map C-8: Subcrop North Sea Supergp.: N



Map C-8:
Subcrop Base N Unconformity
(contour lines not edited to fault lines)

Legend:

- well location
- AT = 0 (see map C-5)
- SK = 0 (see map C-6)

Unit underlying base N

B unit name

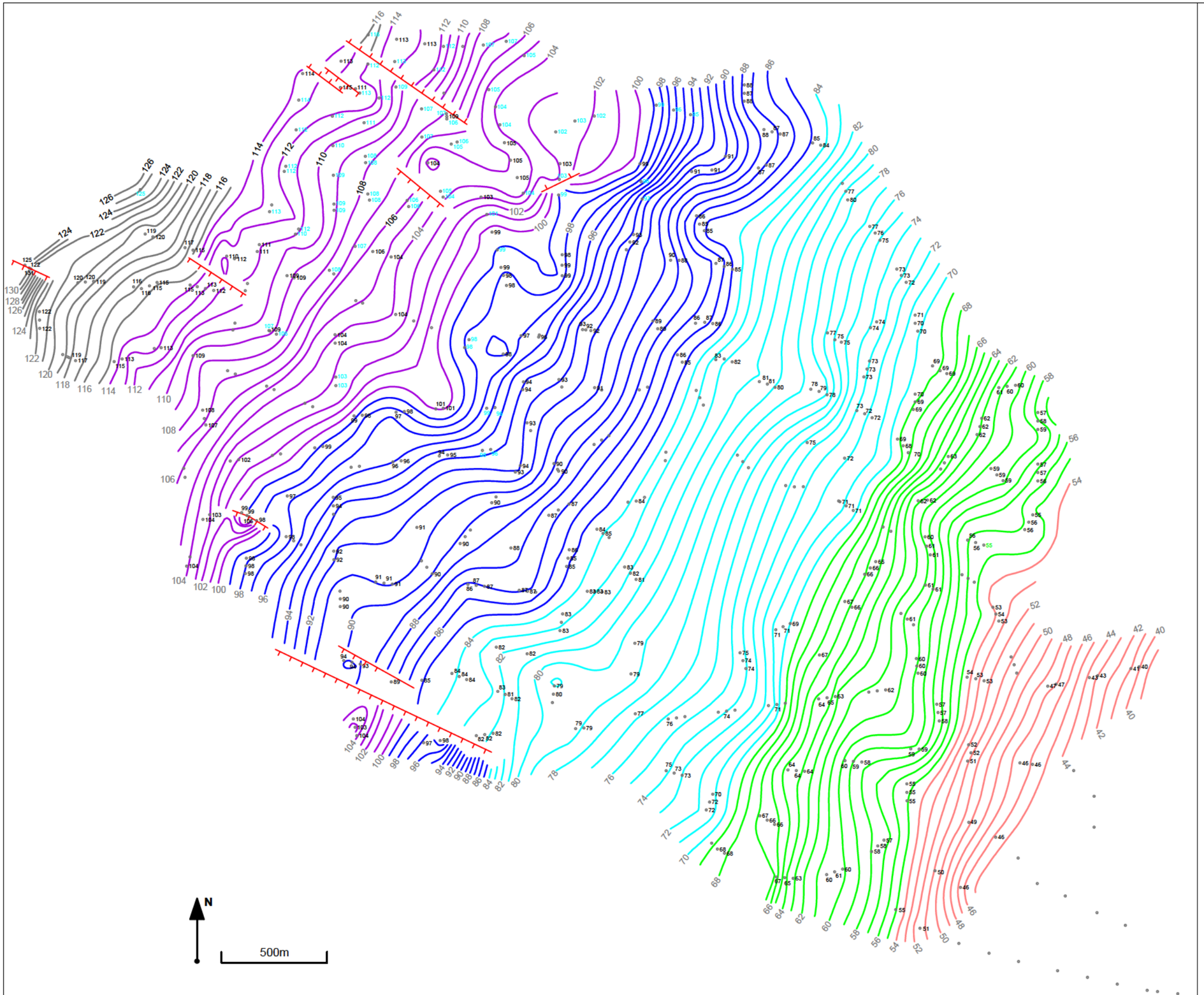
in order of decreasing erosion:

- RNROU
- RNMU-A1 & A2
- RNMU-A3 & A4
- RNMU-B1, B2 & B3
- RNMU-B4 & B5
- AT
- SK-A & B
- SK-C
- SK-D & E
- KN

main normal fault at deeper level(s)

prepared by:
GEOWULF*Laboratories*
attachment to report GL11.901

Map C-9: Depth Base North Sea Supergp.: N



Map C-9: Depth Base N

Legend:

- well location

depth in meters below NAP

- 20.4 source GR log
- 20.4 source 'boorboek'

isolines (1m interval)

- ≤ 54m
- 55 - 69m
- 70 - 84m
- 85 - 99m
- 100 - 114m
- ≥ 115m

normal fault

- offset
- no offset at this level

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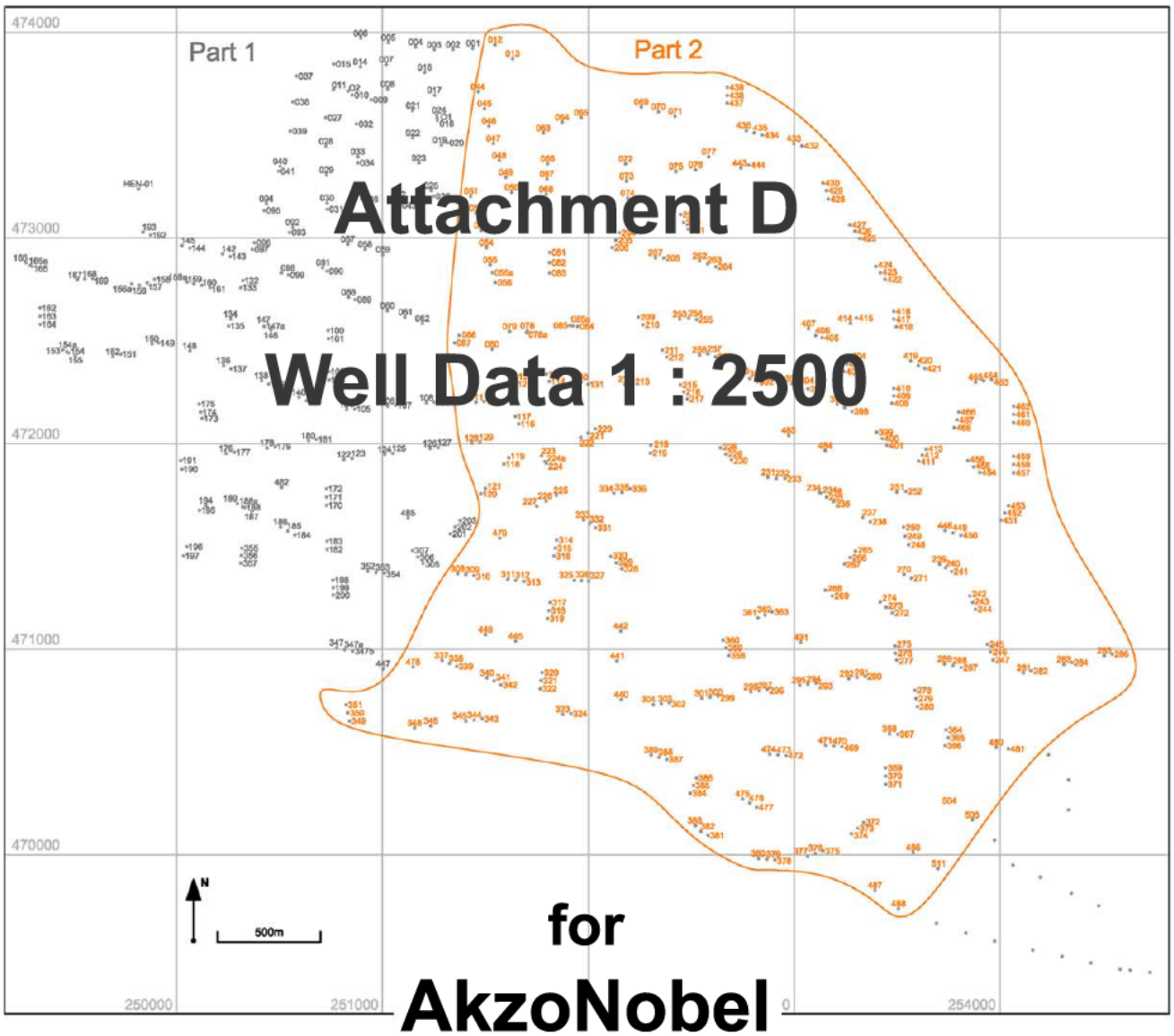
Detailed Geology of the Hengelo Solution Mining Area Part 2



Attachment D

Well Data 1 : 2500

for

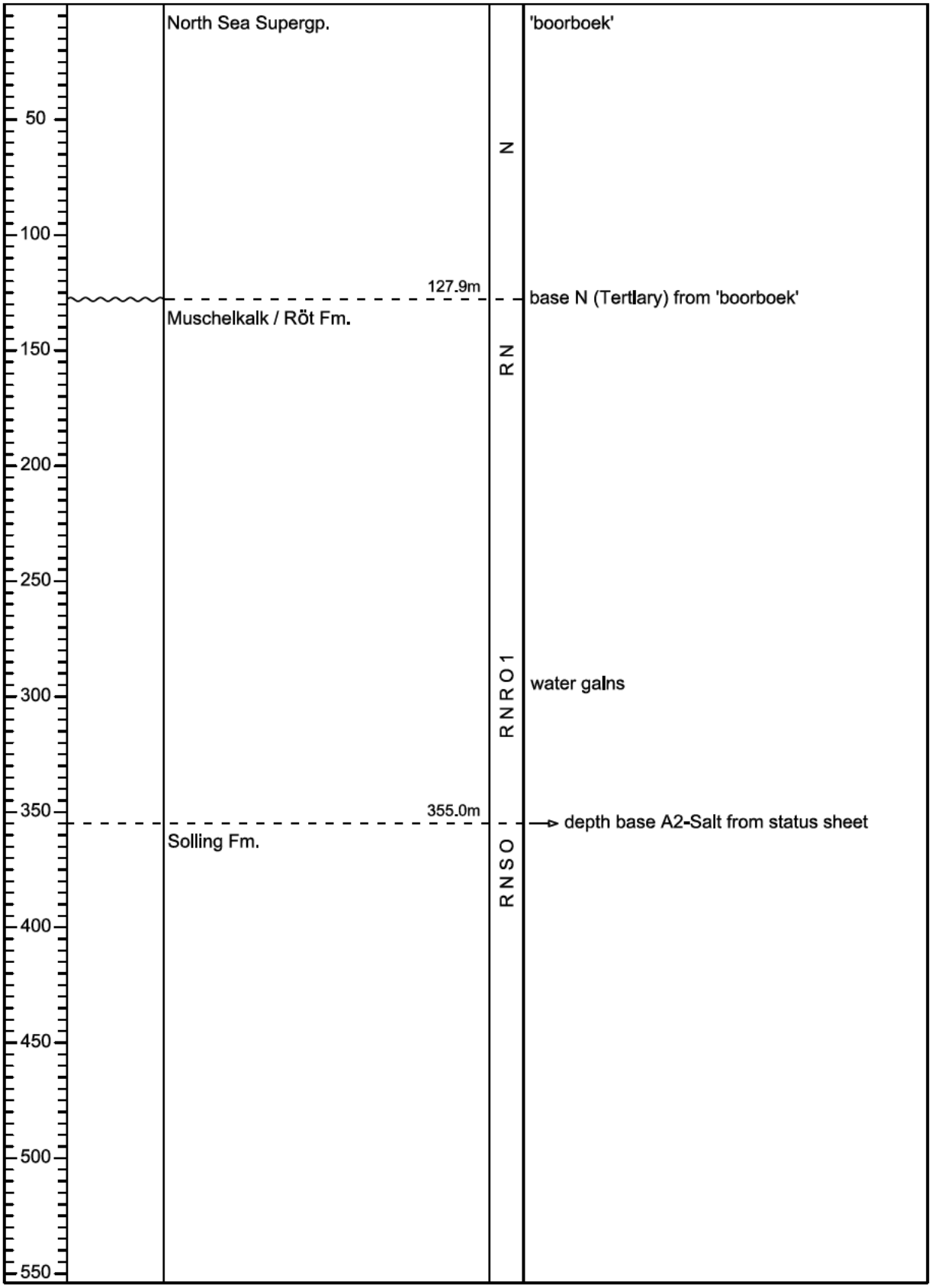
AkzoNobel Industrial Chemicals

prepared by:
GEOWULF*Laboratories*, the Netherlands
December 2010, report no: GL11.901
info@geowulf.nl

Well Data B012

RD Coordinates:	X: 251547.1 Y: 473940.9	TD:	359.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	10th June 1947	CF:	+21.11m NAP
TD date:	13th November 1947	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data B013

RD Coordinates:	X: 251632.3 Y: 473873.0	TD:	353.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	10th December 1947	CF:	+21.12m NAP
TD date:	23rd February 1948	CF - GL(MV):	0m

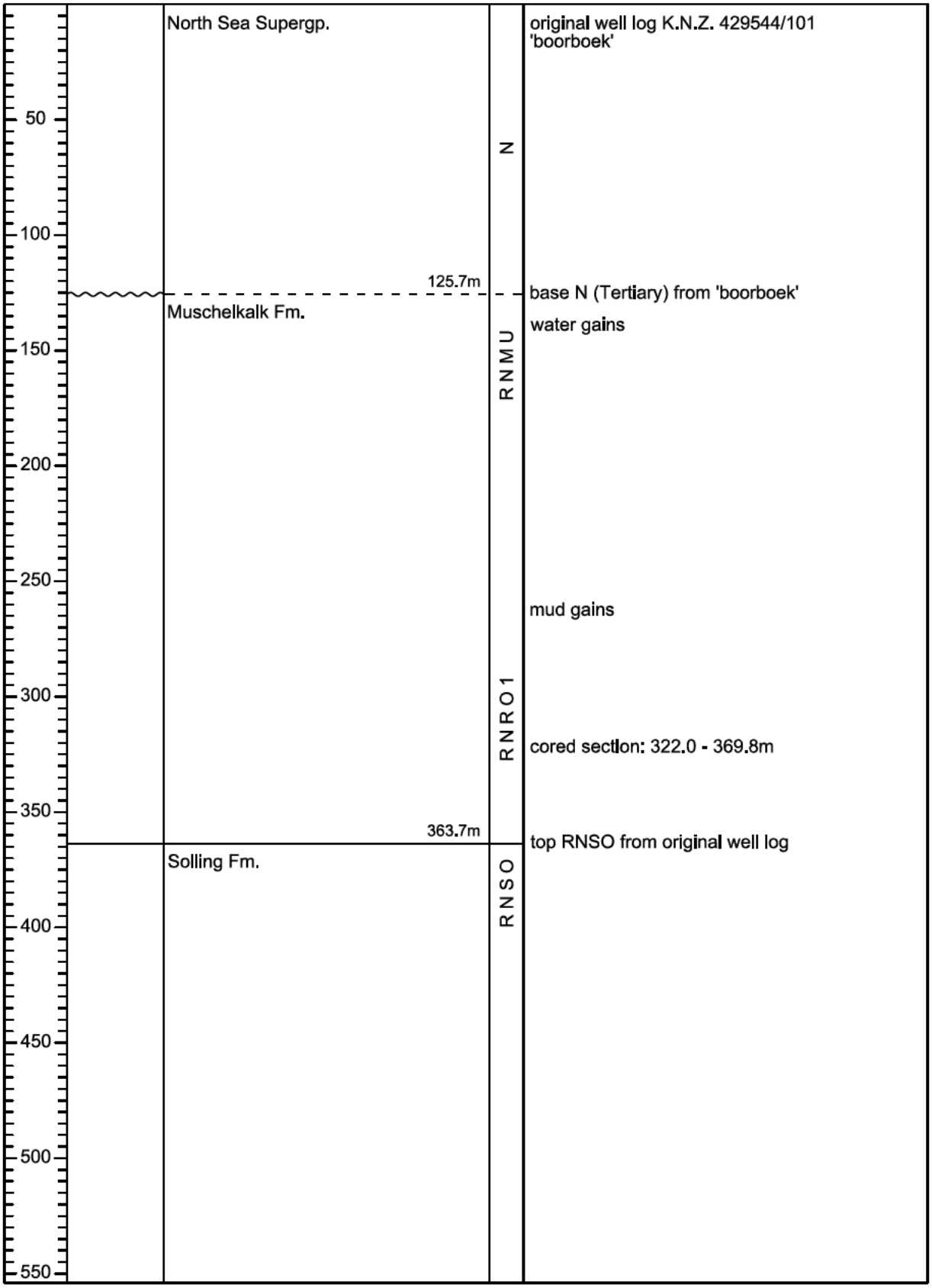
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
		North Sea Supergp.	N	original well log Z.A. 93 'boorboek'
126.0m				base N (Tertiary) from 'boorboek'
		Muschelkalk / Röt Fm.	RN	
			RNRO1	cored section: 303.0 - 353.6
347.8m				top RNSO from original well log
		Solling Fm.	RNSO	

Well Data B044

RD Coordinates:	X: 251464.2 Y: 473712.0	TD:	369.8
		Depth reference:	Conductor Flange (CF)
Spud date:	4th April 1957	CF:	+20.90m
TD date:	31st May 1957	CF - GL(MV):	0m

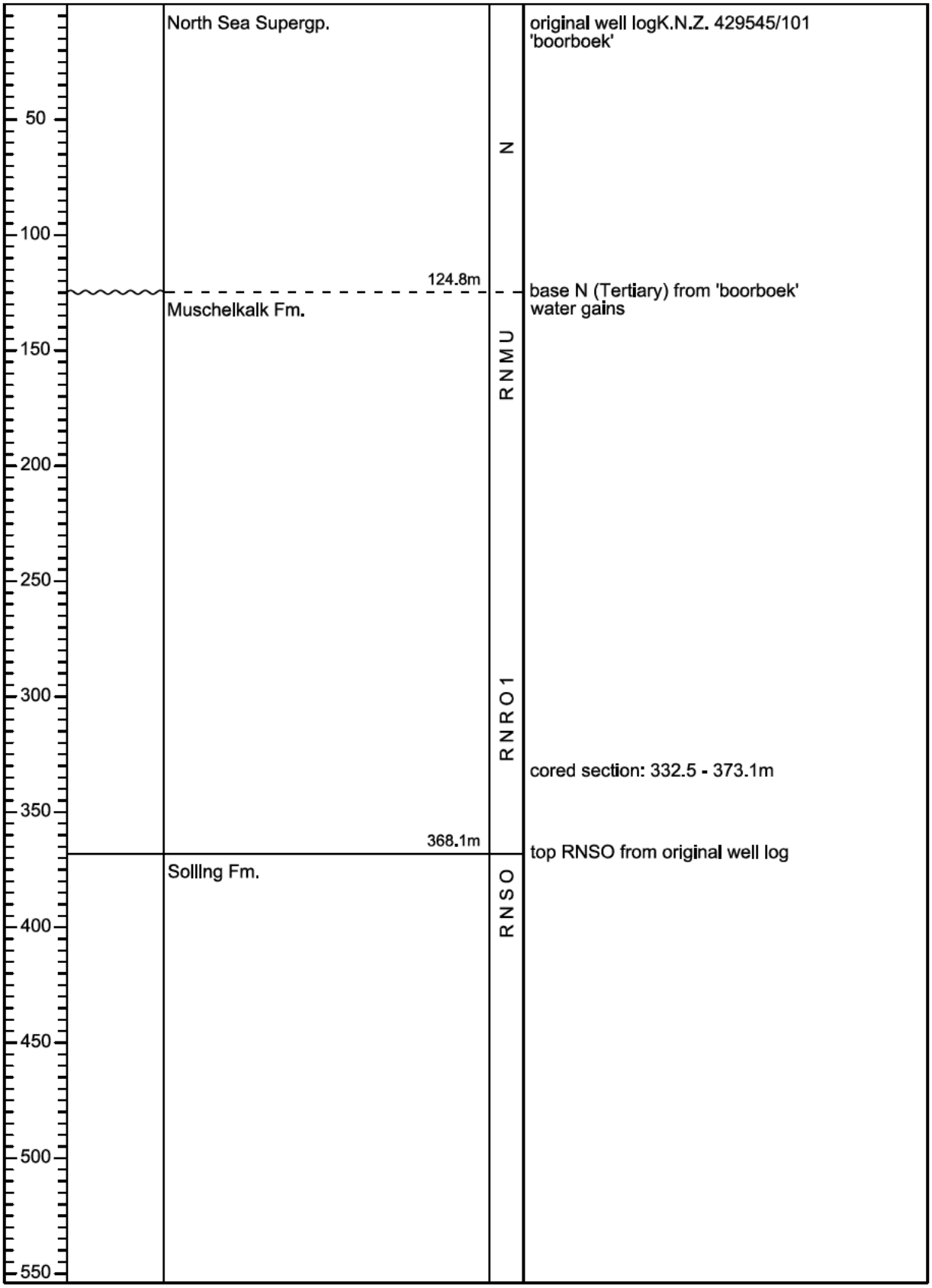
Scale: 1 : 2500



Well Data B045

RD Coordinates:	X: 251496.1 Y: 473630.5	TD:	373.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	27th June 1957	CF:	+20.97m NAP
TD date:	14th August 1957	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data B046

RD Coordinates:	X: 251517.5 Y: 473545.8	TD:	380.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	12th September 1957	CF:	+21.03m NAP
TD date:	31st October 1957	CF - GL(MV):	0m

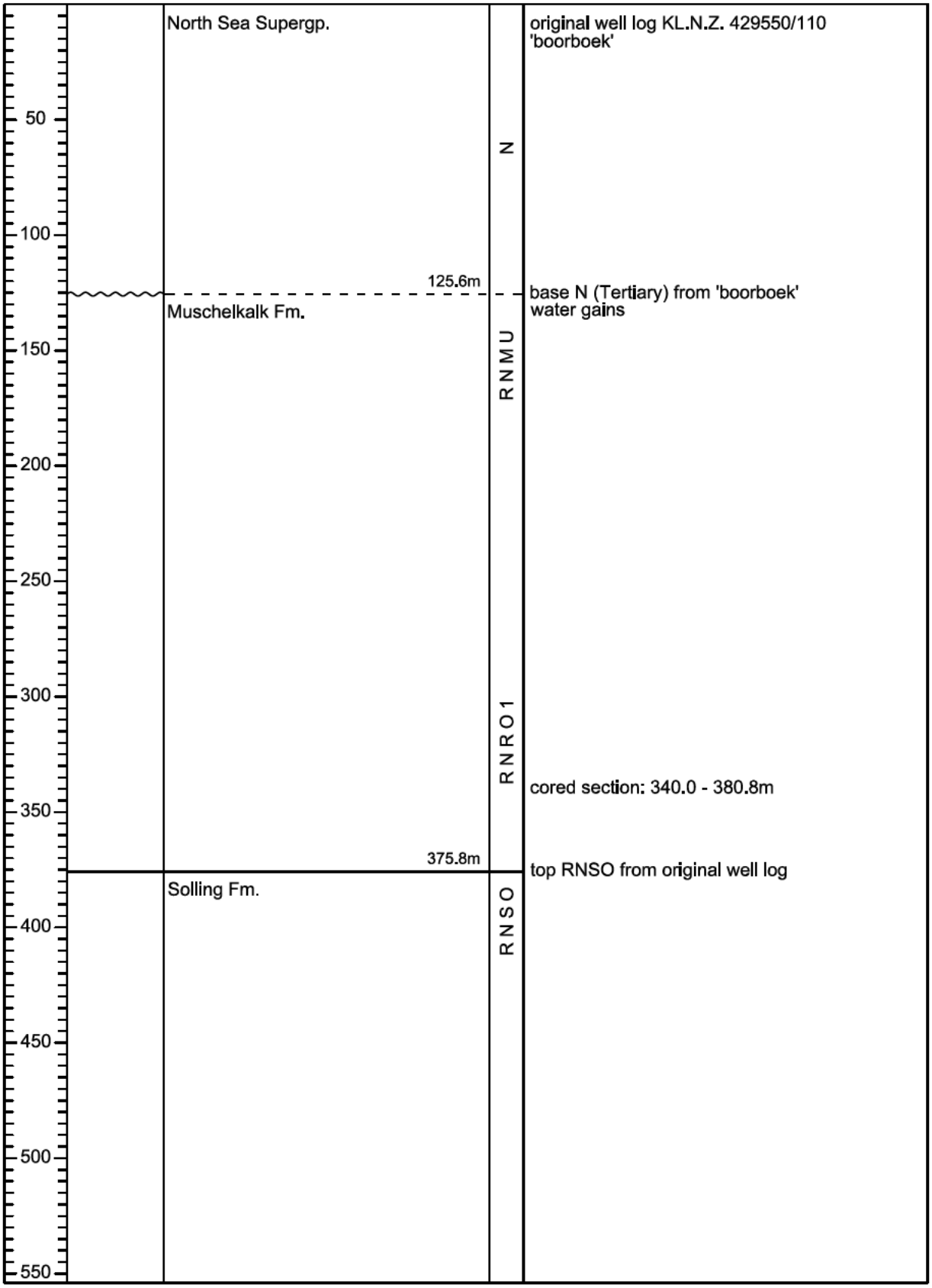
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429546/101 'boorboek'
100		125.2m		base N (Tertiary) from 'boorboek'
150		Muschelkalk Fm.	RNMU	water gains water gains, 6m3/hr
200				
250				
300			RNRO1	
350				cored section: 336.0 - 380.2m
		377.9m		top RNSO from orlginal well log
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data B050

RD Coordinates:	X: 251628.0 Y: 473221.9	TD:	380.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	11th August 1958	CF:	+21.39m NAP
TD date:	29th September 1958	CF - GL(MV):	0m

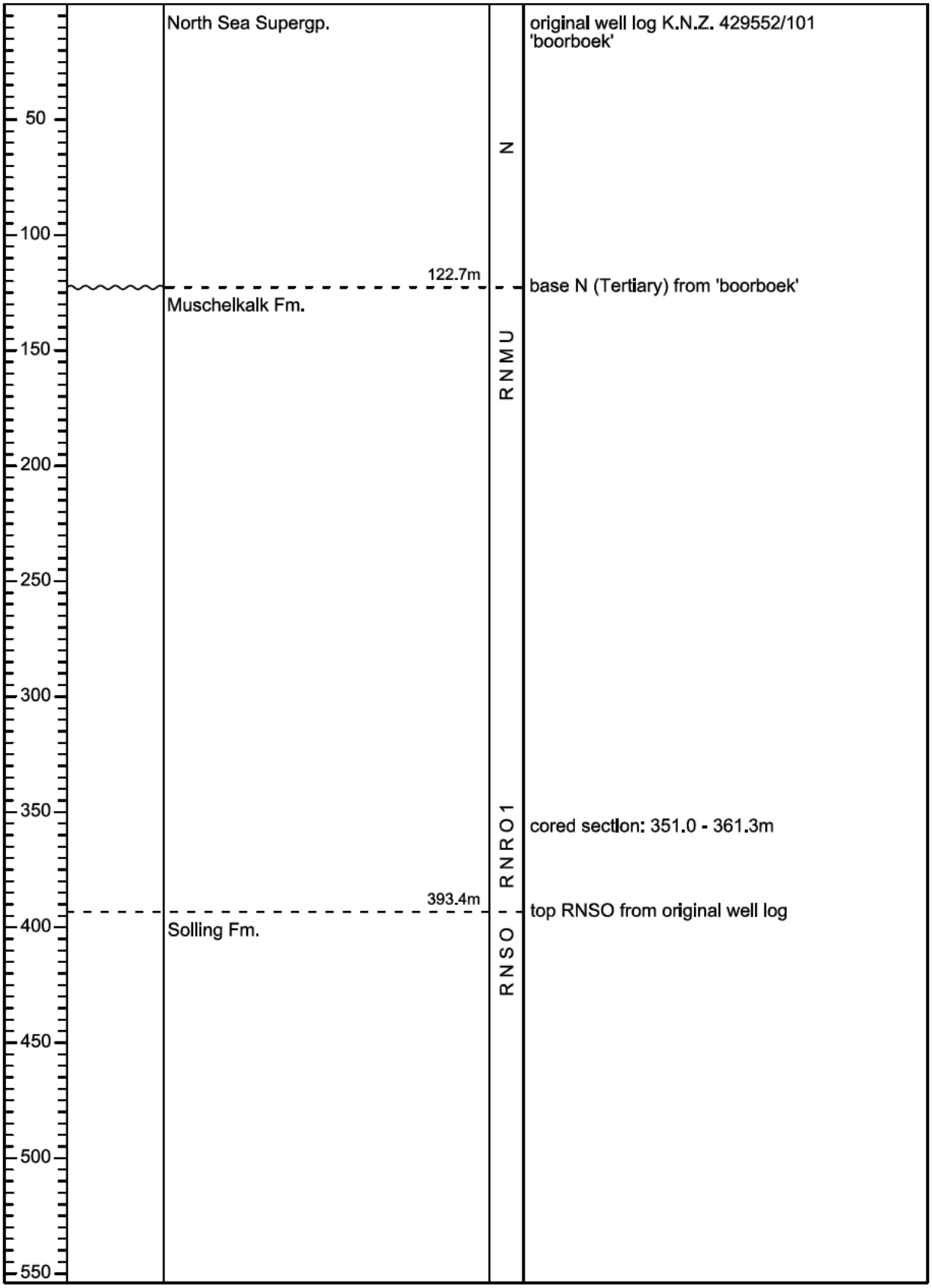
Scale: 1 : 2500



Well Data B052

RD Coordinates:	X: 251455.5 Y: 473121.2	TD:	393.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th December 1958	CF:	+21.23m NAP
TD date:	21st January 1959	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data B054

RD Coordinates:	X: 251505.2 Y: 472953.4	TD:	407.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	1st April 1959	CF:	+21.12m NAP
TD date:	2nd May 1959	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429554/101 'boorboek'
100				
		120.5m		base N (Tertiary) from 'boorboek'
		Muschelkalk Fm.	RNMU	water gains
150				
200				
250				
300				
350			RNRO1	cored section: 345.5.0 - 407.1m
		402.5m		top RNSO from original well log
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 055: Well B055

RD Coordinates:	X: 251522.8 Y: 472870.3	TD:	413.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	30th May 1959	CF:	+20.94m NAP
TD date:	16th July 1959	CF - GL(MV):	0m

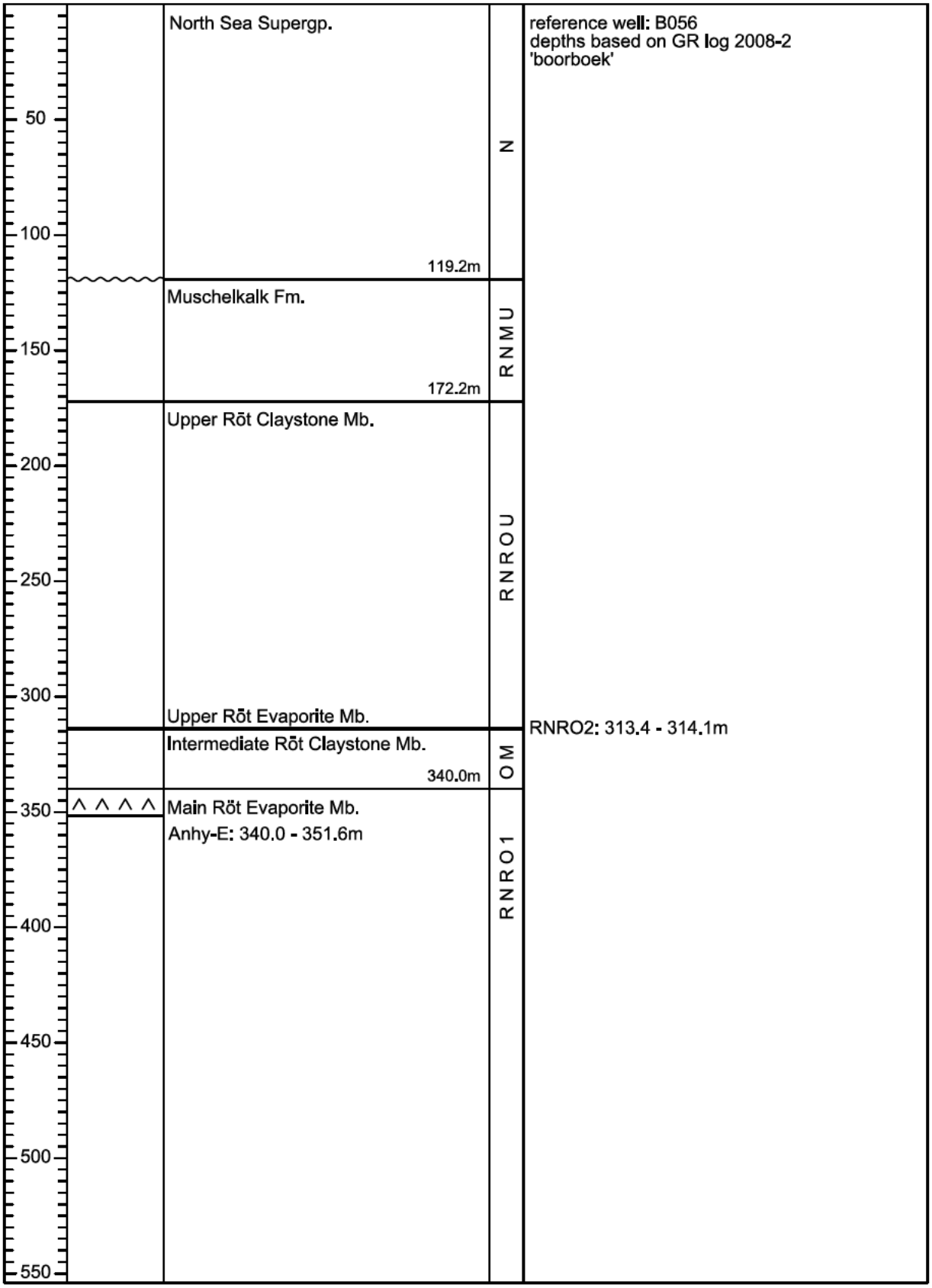
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B056 depths based on GR log 1983-1 original well log K.N.Z. 429555/101 'boorboek'
100		119.7m		water gains
150		Muschelkalk Fm.	RNMU	
		170.5m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300			RNROM	
		338.9m		cored section: 341.5 - 405.4m
350		Main Röt Evaporite Mb.	RNRO1	
400		403.7m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 055: Well B055a

RD Coordinates:	X: 251534.2 Y: 472832.2	TD:	349.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	2nd June 2008	CF:	+21.31m NAP
TD date:	5th June 2008	CF - GL(MV):	0.31m

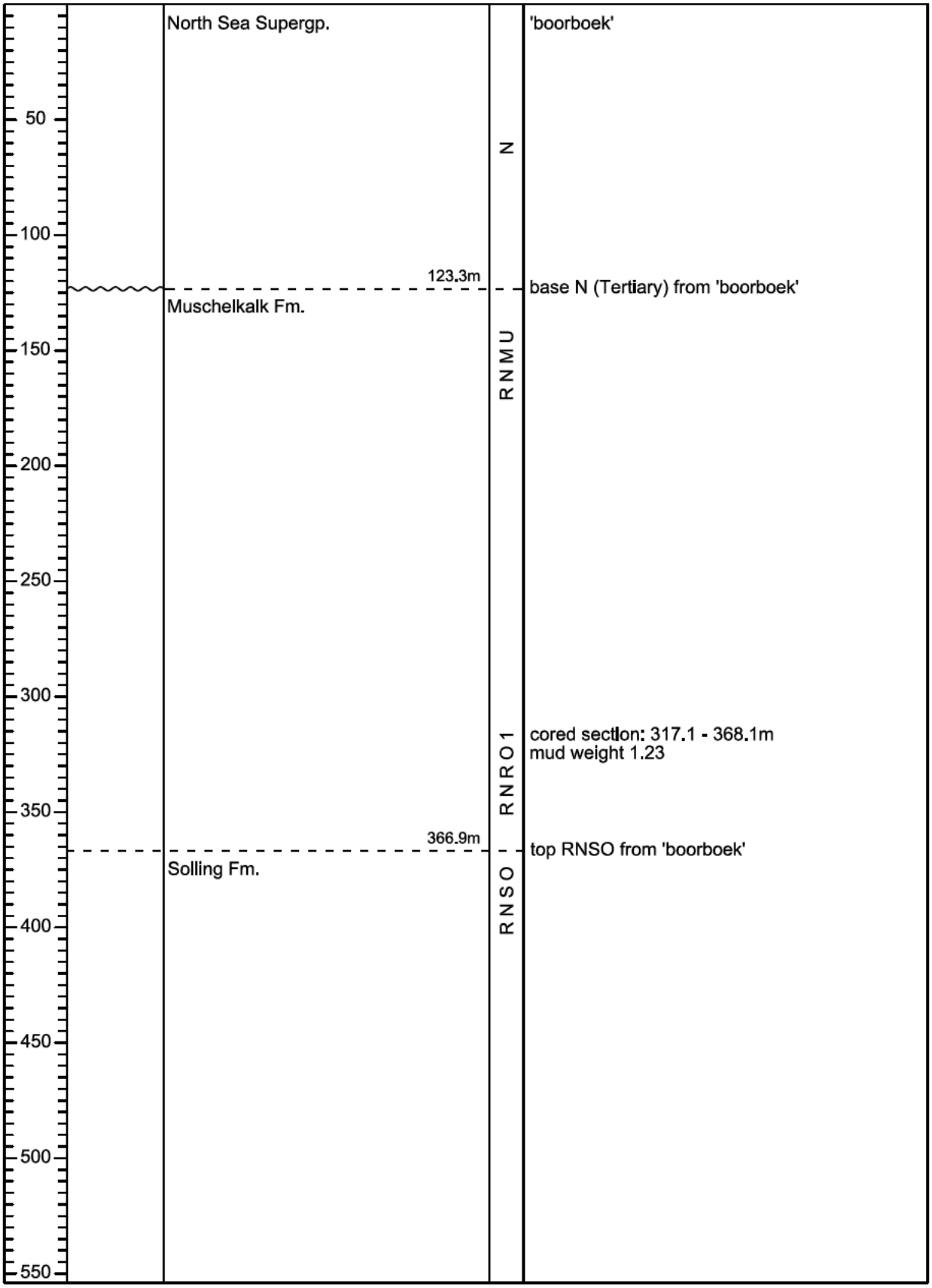
Scale: 1 : 2500



Well Data Series 063: Well B063

RD Coordinates:	X: 251781.9 Y: 473511.7	TD:	372.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	22nd September 1960	CF:	+21.12m NAP
TD date:	2nd November 1960	CF - GL(MV):	-0.09m

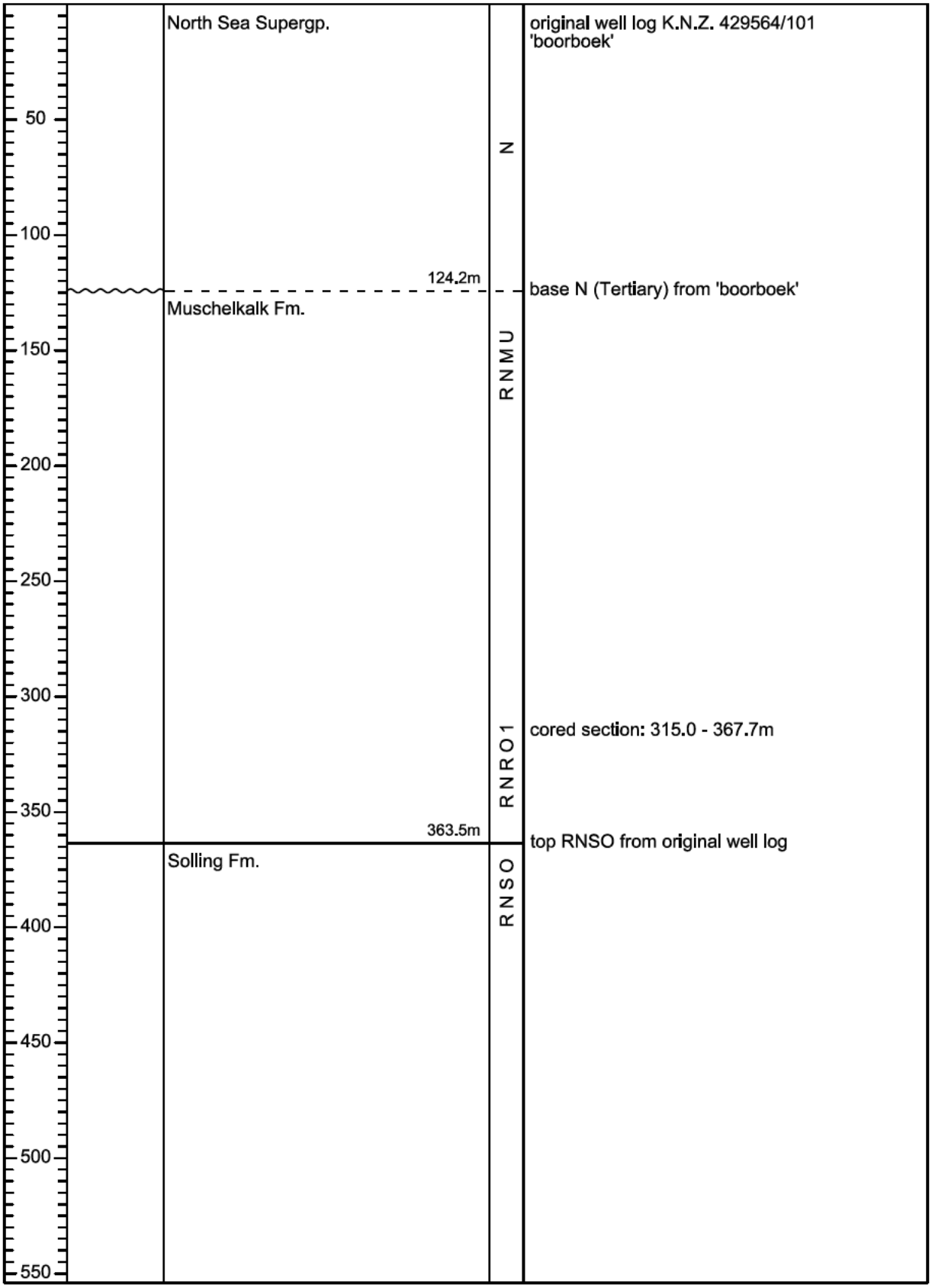
Scale: 1 : 2500



Well Data Series 063: Well B064

RD Coordinates:	X: 251872.9 Y: 473563.3	TD:	367.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	15th March 1961	CF:	+21.66m NAP
TD date:	31st March 1961	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 063: Well B065

RD Coordinates:	X: 251965.0 Y: 473586.6	TD:	363.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th April 1961	CF:	+21.05m NAP
TD date:	9th May 1961	CF - GL(MV):	0m

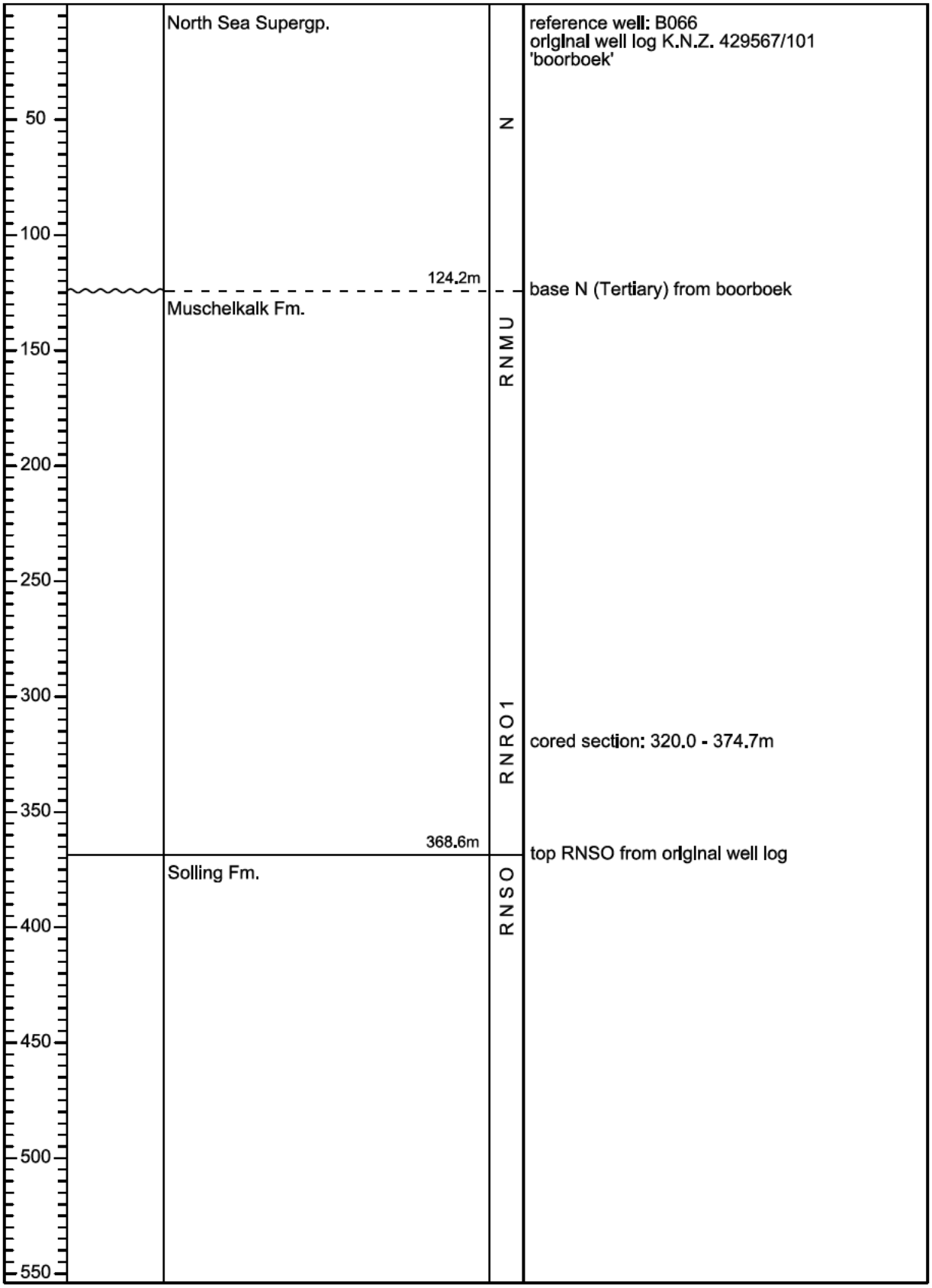
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429565/101 'boorboek'
100		123.0m		base N (Tertiary) from 'boorboek'
150		Muschelkalk Fm.	RNMU	
200				
250				
300			RNRO1	cored section: 315.0 - 363.3m mud weight 1.28
350		360.5m		top RNSO from original well log
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 066: Well B067

RD Coordinates:	X: 251798.8 Y: 473286.8	TD:	374.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st November 1960	CF:	+21.36m NAP
TD date:	19th December 1960	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 066: Well B068

RD Coordinates:	X: 251795.6 Y: 473212.8	TD:	375.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	4th January 1961	CF:	+21.34m NAP
TD date:	31st January 1961	CF - GL(MV):	0m

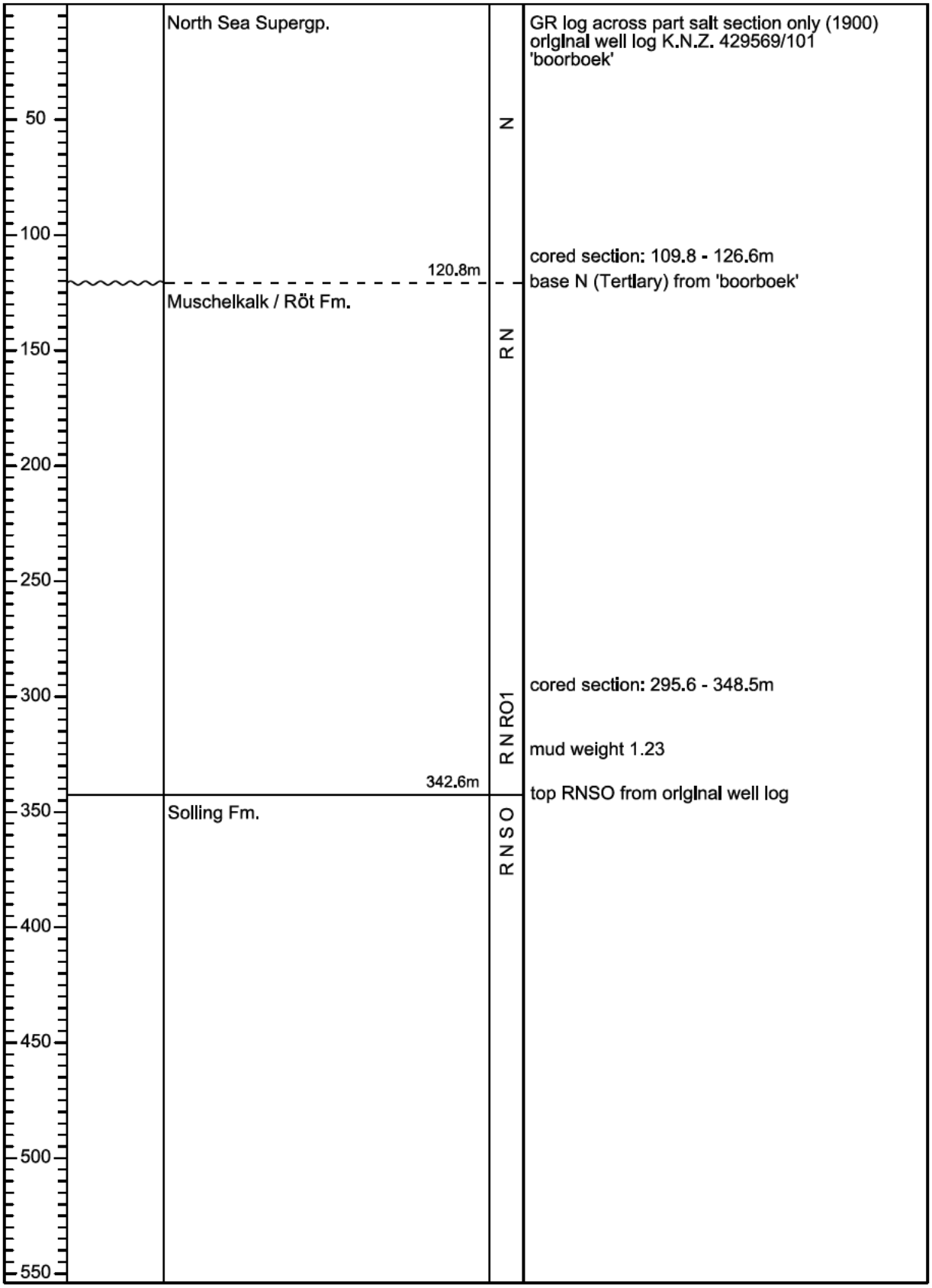
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B066 original well log K.N.Z. 429568/101 'boorboek'
100				
		120.3m		base N (Tertiary) from 'boorboek'
150		Muschelkalk Fm.	RNMU	
200				
250				
300				cored section: 305.9 - 308.0m
350			RNRO1	cored section: 343.6 - 372.9m
		371.2m		top RNSO from original well log
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 069: Well B069

RD Coordinates:	X: 252258.0 Y: 473638.2	TD:	348.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	27th October 1961	CF:	+22.0m NAP
TD date:	16th November 1961	CF - GL(MV):	0m

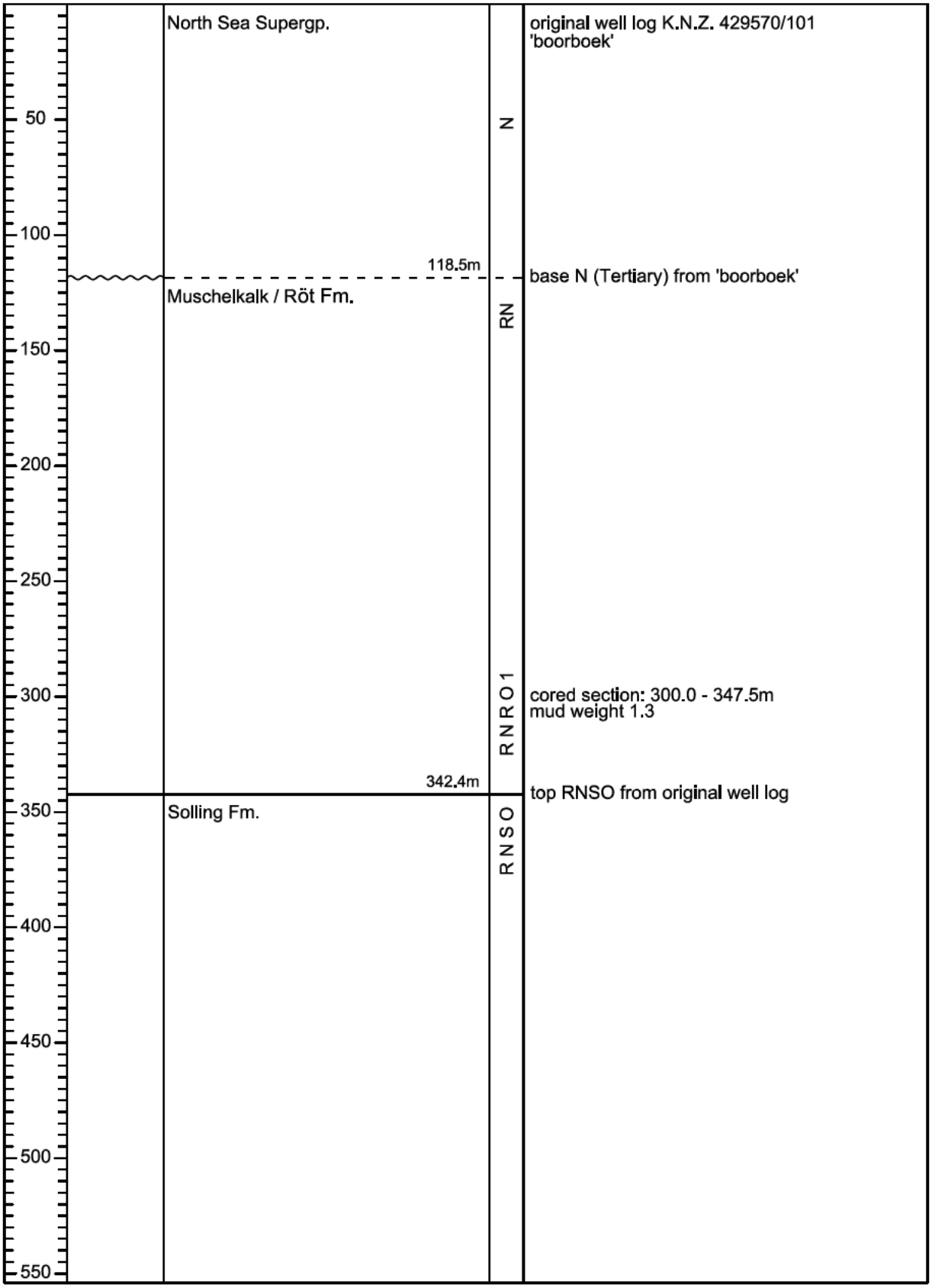
Scale: 1 : 2500



Well Data Series 069: Well B070

RD Coordinates:	X: 252340.1 Y: 473615.6	TD:	347.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	12th November 1961	CF:	+22.24m NAP
TD date:	15th December 1961	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 069: Well B071

RD Coordinates:	X: 252420.9 Y: 473593.2	TD:	345.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	15th January 1962	CF:	+22.23m NAP
TD date:	31st January 1962	CF - GL(MV):	0m

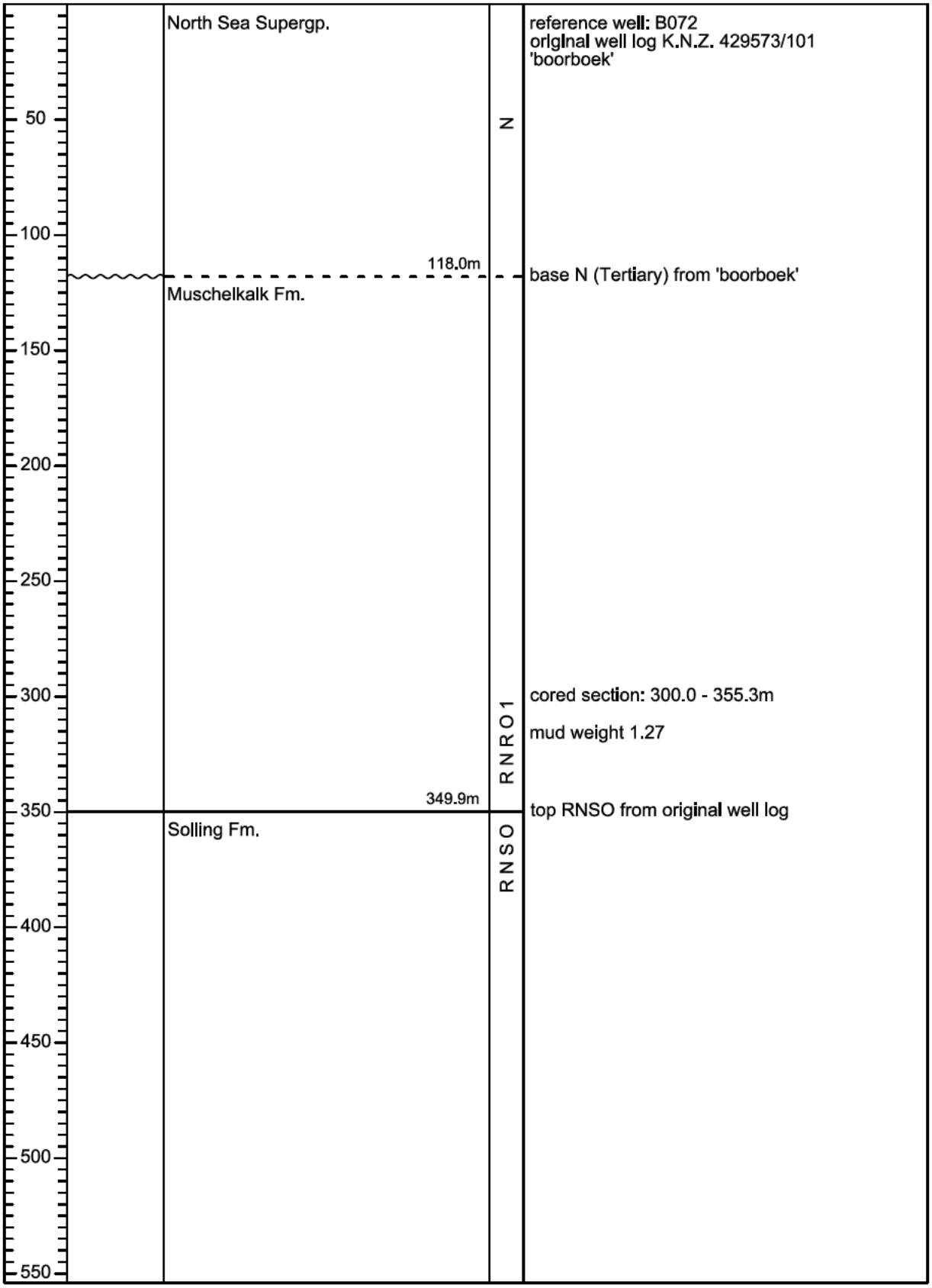
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429571/101 'boorboek'
100		117.0m		base N (Tertiary) from 'boorboek'
150		Muschelkalk / Röt Fm.	RN	
200				
250				
300			RNRO1	cored section: 300.0 - 345.8m mud weight 1.2
350		341.9m Solling Fm.	RNSO	top RNSO from original well log
400				
450				
500				
550				

Well Data Series 072: Well B073

RD Coordinates:	X: 252186.2 Y: 473276.6	TD:	355.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th August 1961	CF:	+21.97m NAP
TD date:	28th August 1961	CF - GL(MV):	0m

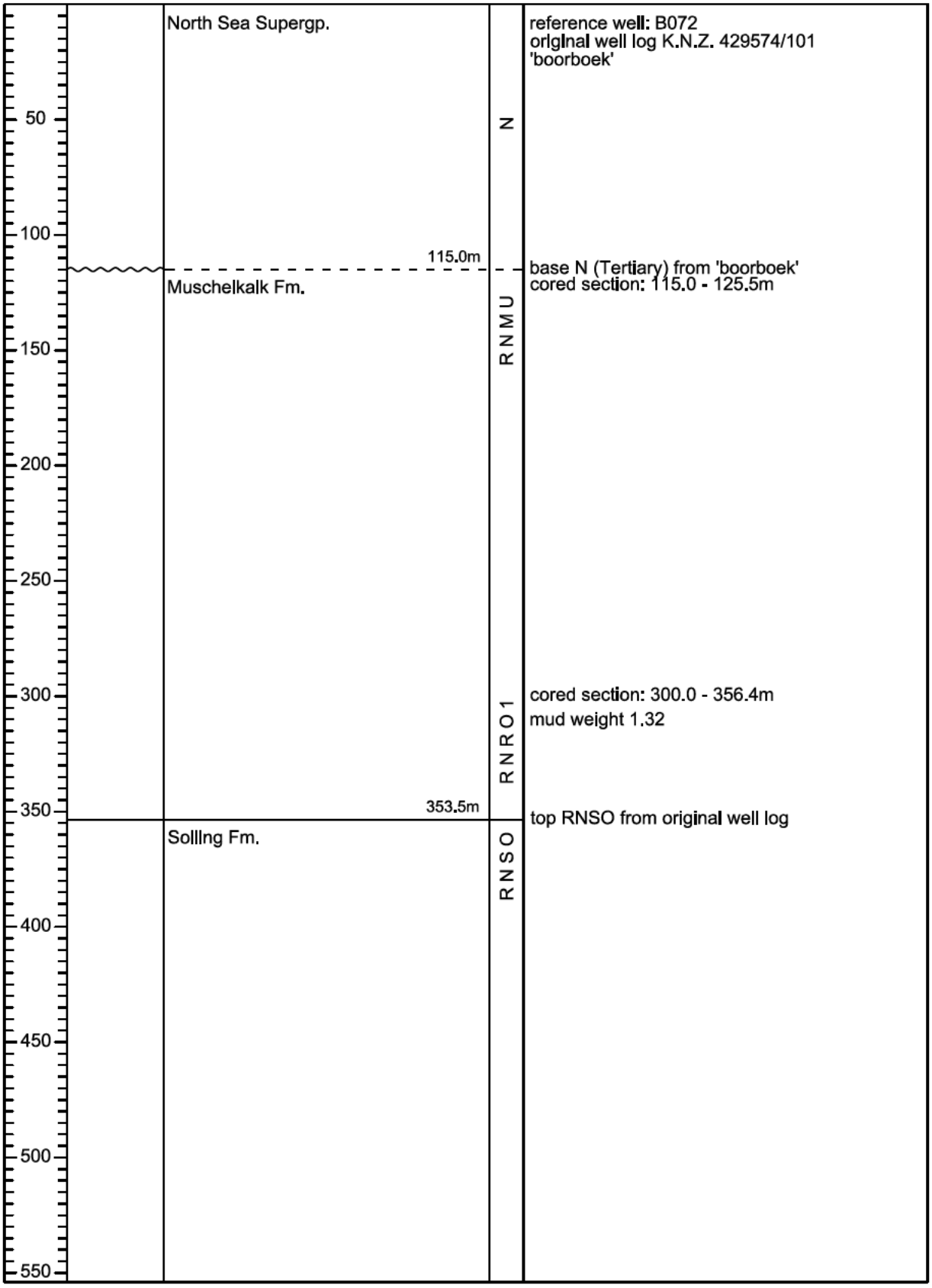
Scale: 1 : 2500



Well Data Series 072: Well B074

RD Coordinates:	X: 252191.2 Y: 473194.2	TD:	355.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	10th September 1961	CF:	+22.36m NAP
TD date:	4th October 1961	CF - GL(MV):	0m

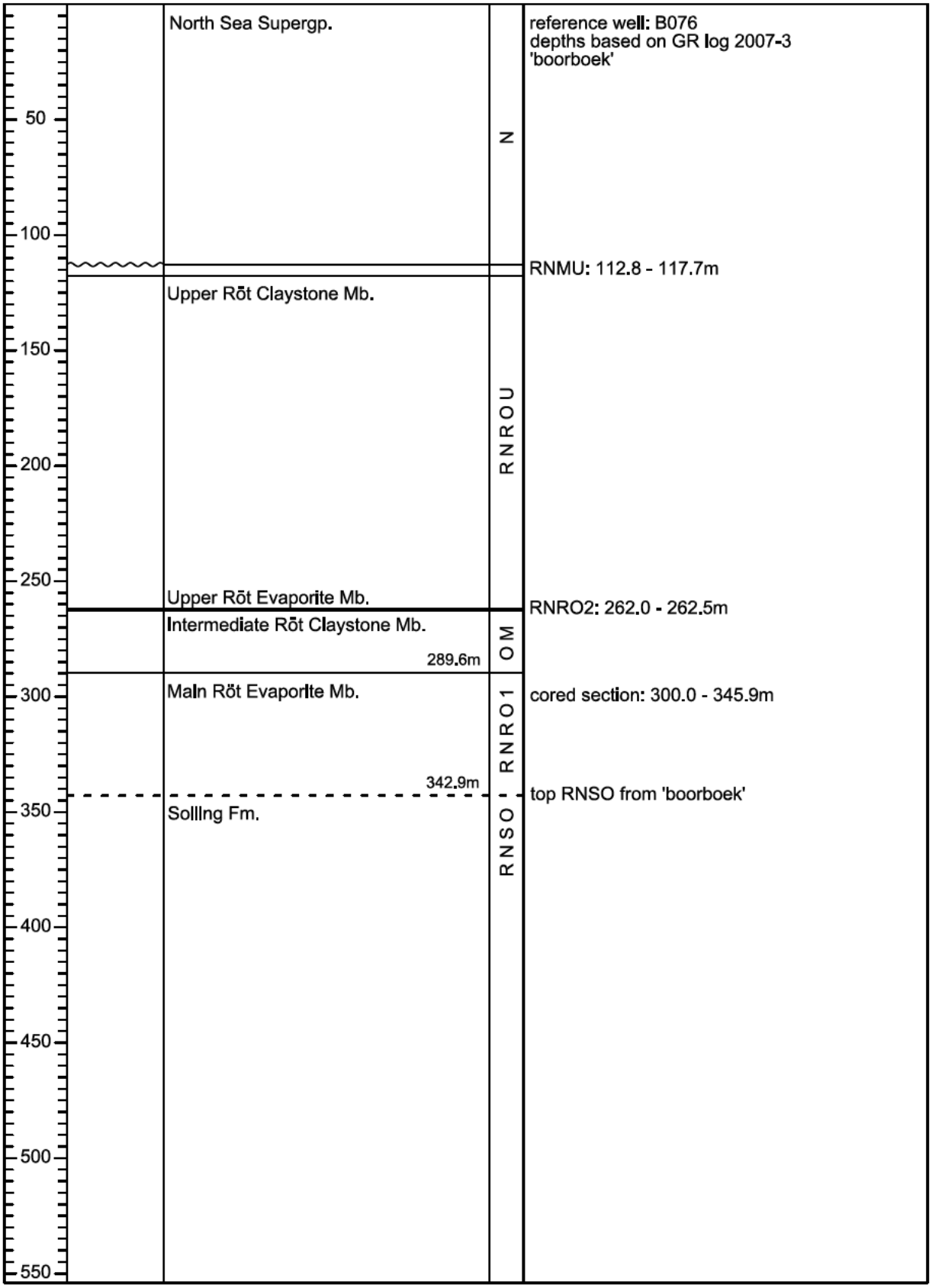
Scale: 1 : 2500



Well Data Series 075: Well B075

RD Coordinates:	X: 252426.2 Y: 473324.0	TD:	350.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	10th April 1962	CF:	+22.21m NAP
TD date:	2nd May 1962	CF - GL(MV):	0.04m

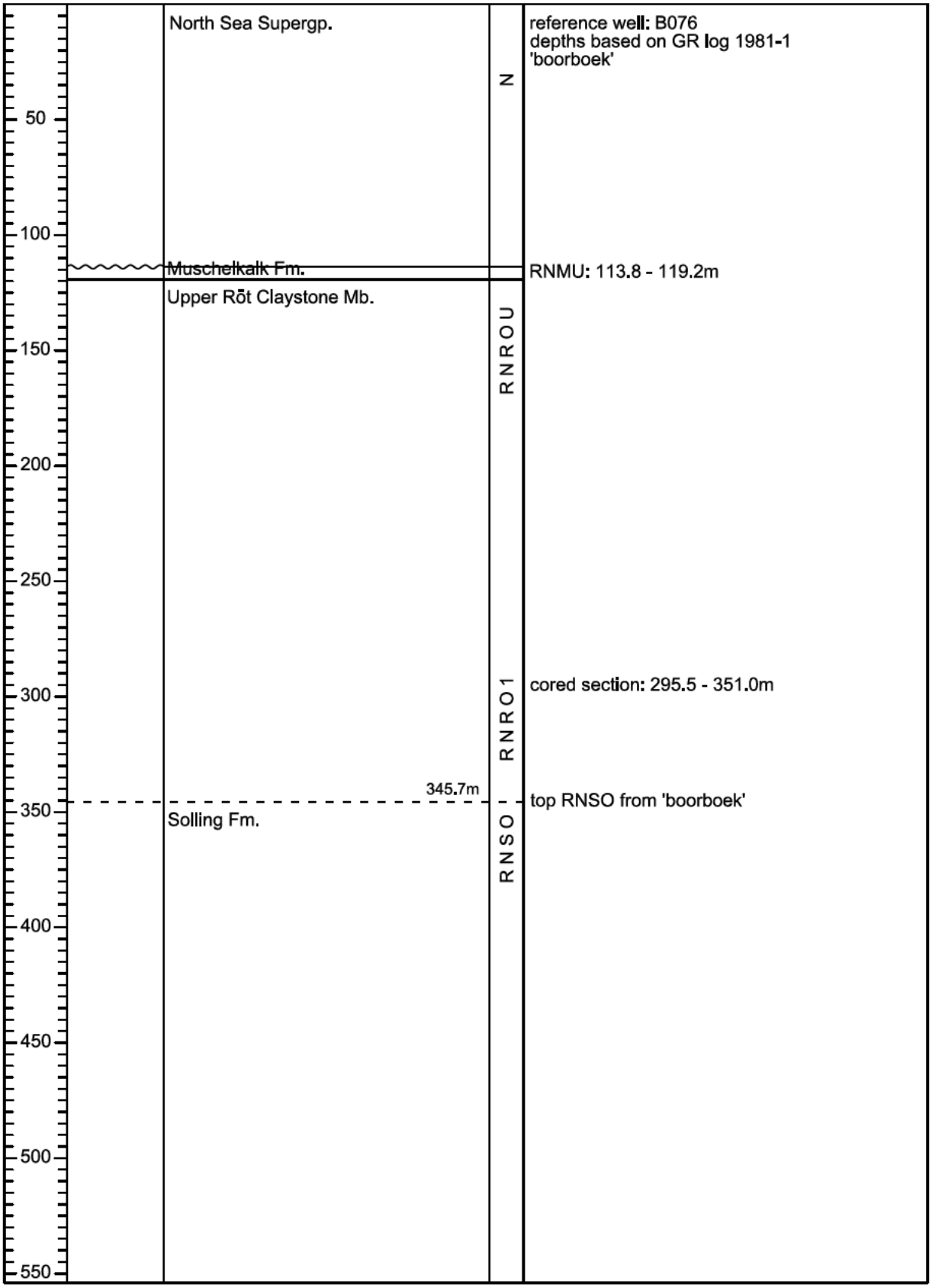
Scale: 1 : 2500



Well Data Series 075: Well B077

RD Coordinates:	X: 252586.1 Y: 473395.8	TD:	350.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	23rd June 1962	CF:	+22.69m NAP
TD date:	5th July 1962	CF - GL(MV):	-0.31m

Scale: 1 : 2500



Well Data Series 078: Well B078

RD Coordinates:	X: 251704.2 Y: 472549.8	TD:	421.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th August 1962	CF:	+22.69m NAP
TD date:	24th August 1962	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B079 depths based on GR log 1990-2 'boorboek'
100				
150		Muschelkalk Fm. 179.4m	RNMU	
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 320.2 - 321.0m
		Intermediate Röt Claystone Mb. 346.5m	OM	cored section: 345.5 - 421.1m
350	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 346.5 - 360.3m	RNRO1	
400		420.7m		top RNSO from 'boorboek'
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 078: Well B078a

RD Coordinates:	X: 251700.8 Y: 472540.4	TD:	364.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th September 2009	CF:	+22.83m NAP
TD date:	23rd September 2009	CF - GL(MV):	0.10m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B079 depths based on GR log 2009-1 'boorboek'
100		119.3m		
150		Muschelkalk Fm.	RNMU	mud losses
		180.3m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300			RNROM	
		Intermediate Röt Claystone Mb.		
350		348.6m		
		Main Röt Evaporite Mb.	RNRO1	
400				
450				
500				
550				

Well Data Series 081: Well B082

RD Coordinates:	X: 251811.7 Y: 472881.0	TD:	394.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	28th August 1963	CF:	+22.52m NAP
TD date:	13th September 1963	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B081 depths based on GR log 2006-2 'boorboek'
100		121.5m		
150		Muschelkalk Fm.	RNMU	
		155.0m		
200		Upper Röt Claystone Mb.	RNROU	
250		Upper Röt Evaporite Mb.		
300		Intermediate Röt Claystone Mb.	OM	RNRO2: 299.3 - 299.7m
		326.5m		
350	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section:341.6 - 347.8m
		Anhy-E: 326.5 - 339.3m		
		392.3m		cored section: 387.5 - 393.7m
400		Solling Fm.	RNSO	top RNSO from 'boorboek'
450				
500				
550				

Well Data Series 081: Well B083

RD Coordinates:	X: 251812.4 Y: 472830.9	TD:	399.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	28th August 1963	CF:	+22.93m NAP
TD date:	21st October 1963	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B081 depths based on GR log 1987-1 original well log K.N.Z. 429583/101 'boorboek'
100		121.6m		
		Muschelkalk Fm.	RNMU	
150		157.9m		
		Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 301.6 - 302.4m
		Intermediate Röt Claystone Mb.	OM	
		329.3m		
		Main Röt Evaporite Mb.	RNRO1	cored section: 342.5 - 348.7m
350		395.0m		cored section: 389.5 - 399.0m top RNSO from 'boorboek'
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 084: Well B085a

RD Coordinates:	X: 251924.6 Y: 472574.0	TD:	358.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	25th August 2008	CF:	+23.17m NAP
TD date:	4th September 2008	CF - GL(MV):	0m

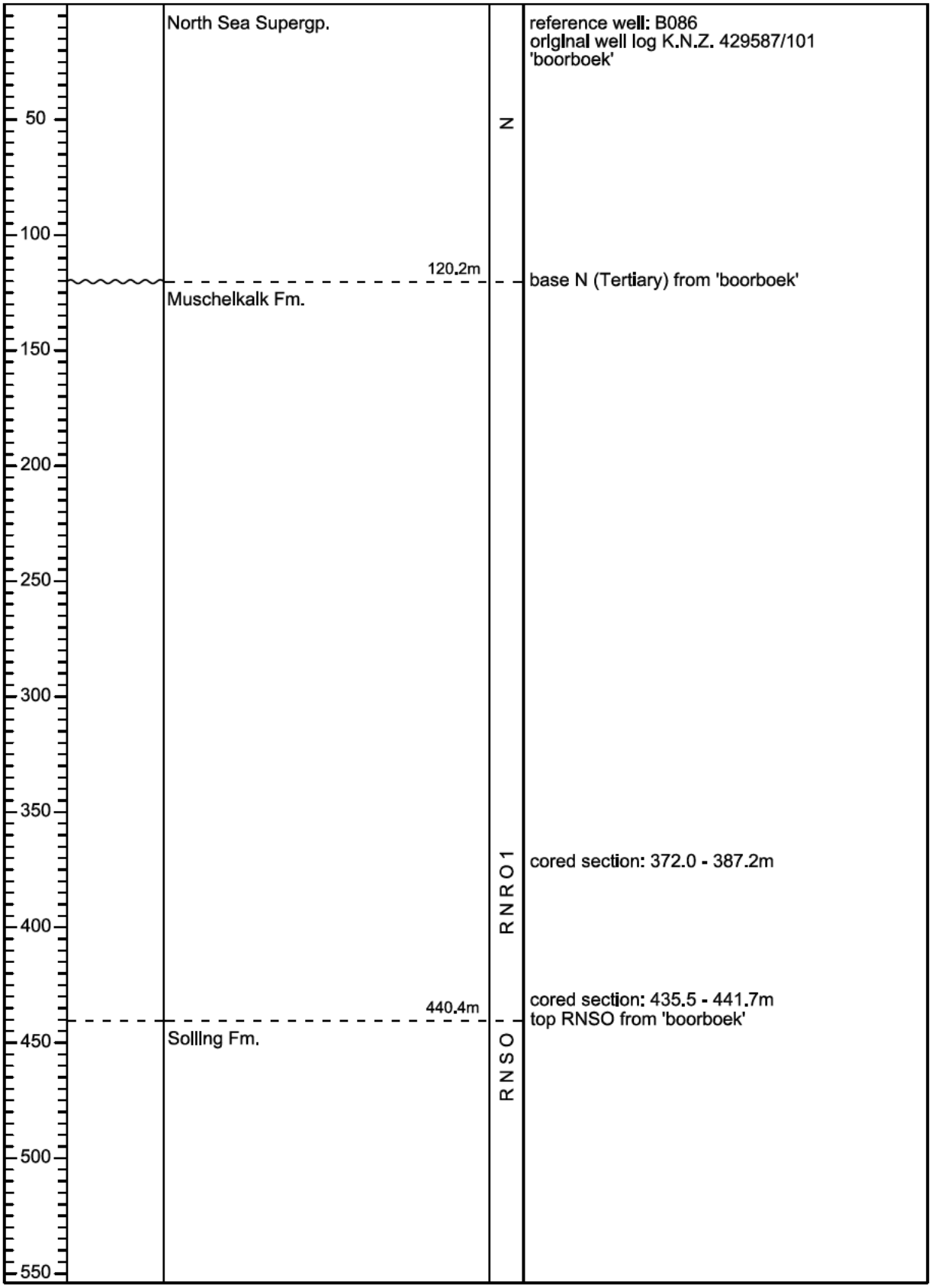
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B085 depths based on GR log 2008-2 'boorboek'
100		115.0m		
150		Muschelkalk Fm.	RNMU	
		164.3m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 311.5 - 312.0m
350		Intermediate Röt Claystone Mb.	RNROM	
400				
450				
500				
550				

Well Data Series B086: Well B087

RD Coordinates:	X: 251350.3 Y: 472490.8	TD:	441.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	9th March 1964	CF:	+21.95m NAP
TD date:	24th March 1964	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 110: Well B110

RD Coordinates:	X: 251493.8 Y: 472206.2	TD:	451.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	23rd August 1965	CF:	+22.50m NAP
TD date:	7th September 1965	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429610/101 'boorboek'
100				
150				mud losses
200				
250				
300				
350				
400			RNRO1	
450		450.4m Solling Fm.	RNSO	top RNSO from original well log
500				
550				

Well Data Series 110: Well B111

RD Coordinates:	X: 251454.8 Y: 472203.1	TD:	459.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	28th September 1965	CF:	+22.40m NAP
TD date:	19th October 1965	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429611/101 'boorboek'
100				
150				
200				
250				
300				
350				
400	^ ^ ^ ^	Maln Röt Evaporlte Mb. base Anhy-E: 392.7m	RNRO1	base Anhy-E based on GR log 1978-1
450		453.9m Solling Fm.	RNSO	top RNSO from 'boorboek'
500				
550				

Well Data Series 112: Well B112

RD Coordinates:	X: 251625.6 Y: 472291.3	TD:	434.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	2nd May 1966	CF:	+22.45m NAP
TD date:	17th May 1966	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B113 depths based on GR log 1995-5 original well log K.N.Z. 429612/101 'boorboek'
100		116.4m		
150		Muschelkalk Fm.	RNMU	mud losses
200		201.0m		
250		Upper Röt Claystone Mb.	RNROU	
300		Upper Röt Evaporite Mb.		RNRO2: 338.7 - 339.7m
350		Intermediate Röt Claystone Mb.	OM	
		365.8m		
400	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 365.8 - 378.1m	RNRO1	
		434.9m		top RNSO at base A2 from status sheet
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 114 : Well B114

RD Coordinates:	X: 251810.6 Y: 472303.5	TD:	426.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	4th July 1966	CF:	+24.10m NAP
TD date:	14th July 1966	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B115 depths based on GR log 1986-2 original well log K.N.Z. 429614/101 'boorboek'
100				
150				mud losses
200				
250				
300			RNROU	
		Upper Röt Evaporite Mb.		RNRO2: 332.1 - 332.9m
350		Intermediate Röt Claystone Mb. 359.3m	OM	
	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 359.3 - 370.8m	RNRO1	
400		424.8m		top RNSO from 'boorboek'
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 116: Well B116

RD Coordinates:	X: 251663.0 Y: 472097.2	TD:	454.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	26th August 1966	CF:	+23.00m NAP
TD date:	14th September 1966	CF - GL(MV):	0m

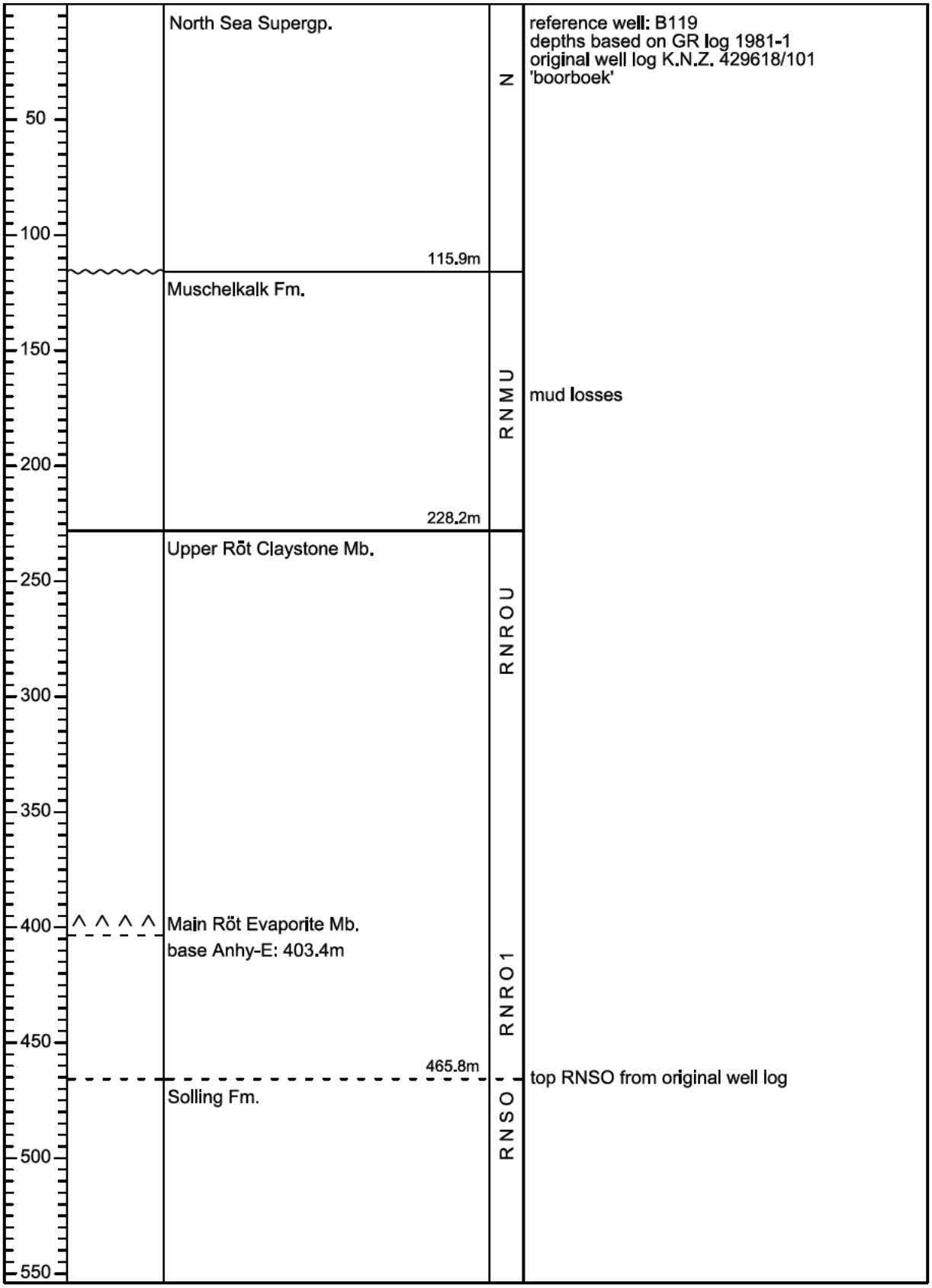
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429616/101 'boorboek'
100				
150				mud losses
200				
250				
300				
350				
400			RNRO1	cored section: 395.4 - 454.2m
450		451.0m		top RNSO from orlginal well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 118: Well B118

RD Coordinates:	X: 251590.3 Y: 471900.8	TD:	468.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	24th October 1966	CF:	+23.15m NAP
TD date:	9th November 1966	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 120: Well B121

RD Coordinates:	X: 251499.3 Y: 471782.9	TD:	480.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	25th March 1967	CF:	+22.50m NAP
TD date:	7th April 1967	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B120 original well log K.N.Z. 429621/101 'boorboek'
100				
150				
200				
250				
300				
350			RNROM	
400		401.5m		boundaries based on GR log 1981-3
	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 401.5 - 412.9m	RNRO1	
450		477.1m		top RNSO from original well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 128: Well B128

RD Coordinates:	X: 251434.5 Y: 472003.2	TD:	467.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	29th September 1967	CF:	+22.35m NAP
TD date:	12th October 1967	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429628/101 'boorboek'
100				
150				
200				
250				
300				
350				
400				
450			RNRO1	
		465.9m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
500				
550				

Well Data Series 128: Well B129

RD Coordinates:	X: 251473.7 Y: 472008.1	TD:	465.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	25th October 1967	CF:	+22.31m NAP
TD date:	2nd November 1967	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 429629/101 'boorboek'
100				
150				
200				
250				
300				
350				
400				
450			RNRO1	
		463.9m		top RNSO from orlginal well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 130: Well B131

RD Coordinates:	X: 251999.5 Y: 472289.2	TD:	426.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	8th December 1967	CF:	+23.70m NAP
TD date:	19th December 1967	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B130 original well log K.N.Z. 429631/101 'boorboek'
100				cored section: 114.5 - 152.5m
150				
200				
250				
300				
350		352.4m	RNROM	boundaries based on GR log 1993-1
	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 352.4 - 364.5m	RNRO1	
400		425.3m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 204: Well B204

RD Coordinates:	X: 25150.6 Y: 473025.8	TD:	372.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	14th April 1971	CF:	+22.78m NAP
TD date:	20th April 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B205 depths based on GR log 1981-1 original well log K.N.Z. 4296204/101 'boorboek'
100		115.7m		
		Muschelkalk Fm.	MU	mud losses mud losses
		136.4m		
150		Upper Röt Claystone Mb.	RNROU	mud losses
200				
250		Upper Röt Evaporite Mb.		RNRO2: 281.0 - 282.0m
		Intermediate Röt Claystone Mb.	OM	
300		307.8m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 307.8 - 320.5m		
350		370.1m		top RNSO from original well log
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 204: Well B206

RD Coordinates:	X: 252116.4 Y: 472953.8	TD:	383.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	12th January 1971	CF:	+22.90m NAP
TD date:	19th January 1971	CF - GL(MV):	0m

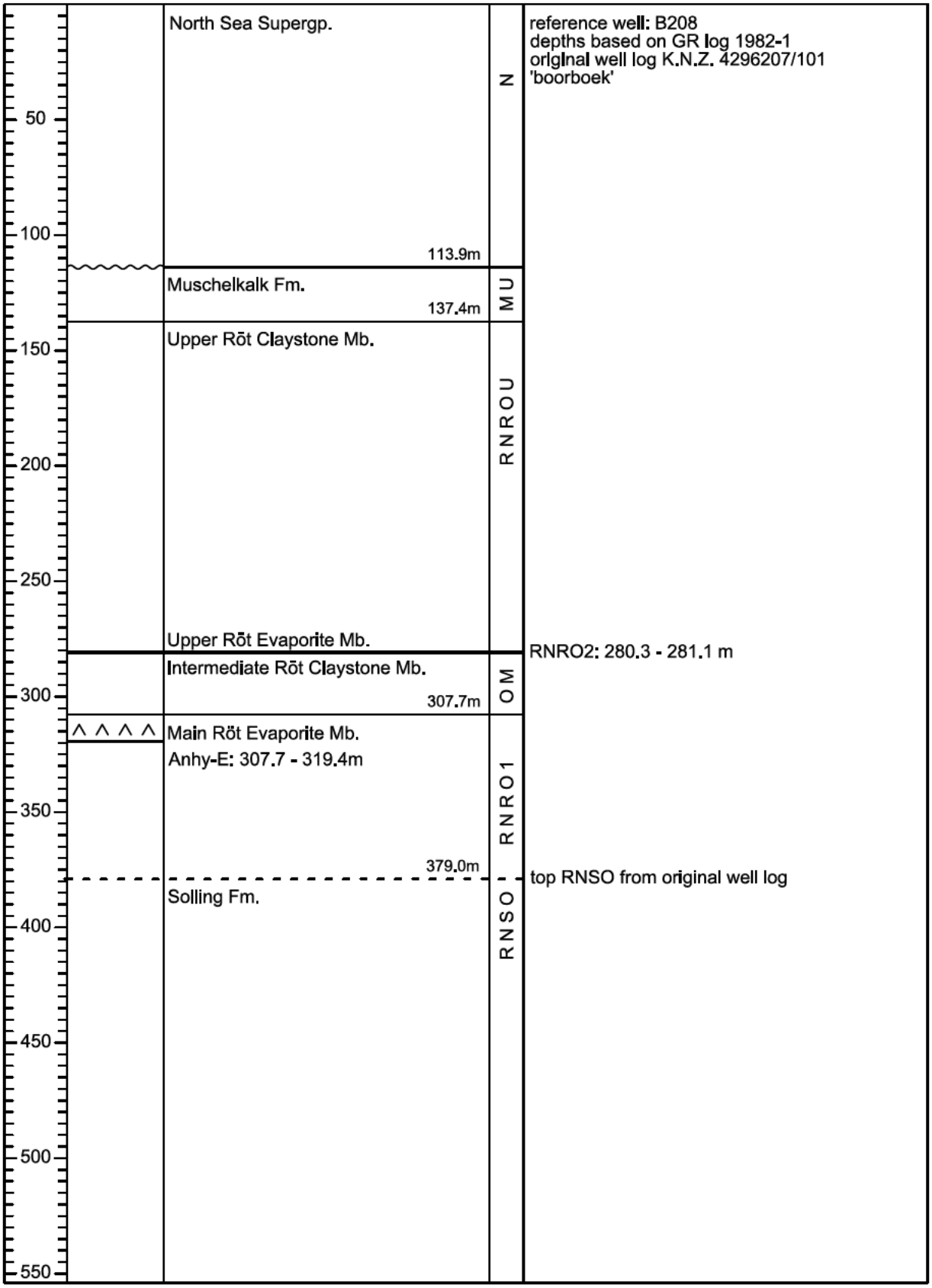
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B205 depths based on GR log 1971-1 original well log K.N.Z. 4296205/101 'boorboek'
100				
150				
200			RNROU	
250		Upper Röt Evaporite Mb.		RNRO2: 283.7 - 284.3m
300		Intermediate Röt Claystone Mb. 311.2m	OM	
	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 311.2 - 323.8m	RNRO1	
350		380.4m		
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 207: Well B207

RD Coordinates:	X: 252326.0 Y: 472904.3	TD:	379.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	25th May 1971	CF:	+24.06m NAP
TD date:	3rd June 1971	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 209: Well B210

RD Coordinates:	X: 252265.2 Y: 472579.2	TD:	397.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st April 1971	CF:	+24.50m NAP
TD date:	28th April 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B209 depths based on GR log 1983-1 original well log K.N.Z. 4296210/101 'boorboek'
100		113.2m		
		Muschelkalk Fm.	RNMU	
150		156.7m		
		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 299.7 - 300.4m
300		Intermediate Röt Claystone Mb.	OM	
		327.2m		cored section: 326.5 - 394.5m
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 327.2 - 339.7m		
		395.6m		
400		Solling Fm.	RNSO	top RNSO from original well log
450				
500				
550				

Well Data Series 211: Well B211

RD Coordinates:	X: 252359.0 Y: 472455.9	TD:	407.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	3rd May 1971	CF:	+25.05m NAP
TD date:	12th May 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B212 depths based on GR log 2009-9 original well log K.N.Z. 4296211/101 'boorboek'
100		110.8m		
		Muschelkalk Fm.	RNMU	
150		161.0m		
		Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 304.1 - 305.0m
		Intermediate Röt Claystone Mb.	OM	
		331.5m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section: 334.6 - 405.3m
350		Anhy-E: 331.5 - 344.0m		
400		402.7m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 213: Well B213

RD Coordinates:	X: 252217.3 Y: 472303.2	TD:	417.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th July 1971	CF:	+24.16m NAP
TD date:	26th July 1971	CF - GL(MV):	0m

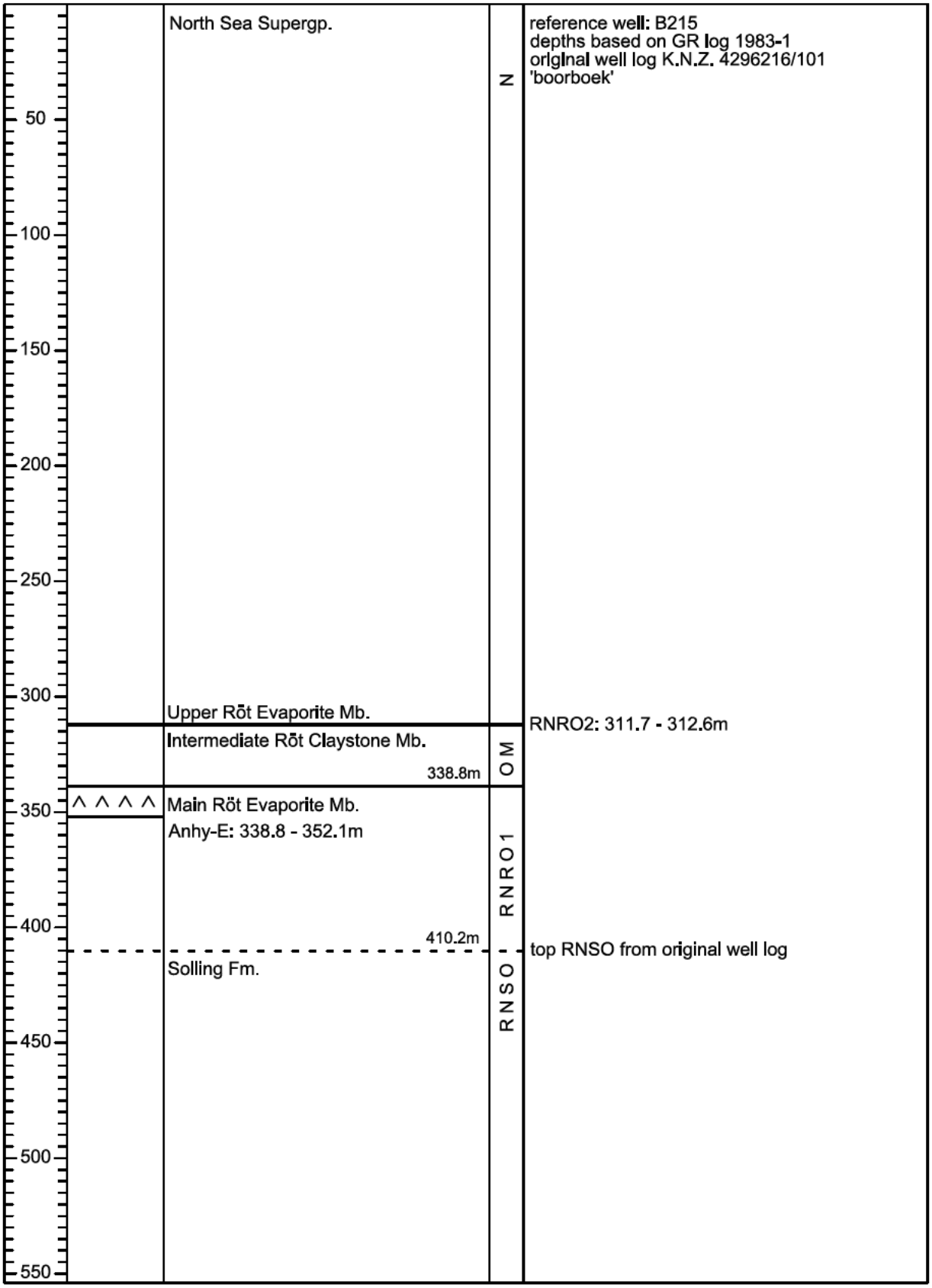
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B214 orlginal well log K.N.Z. 4296213/101 'boorboek'
100				
150				
200				
250				
300				
350	^ ^ ^ ^	Main Röt Evaporite Mb. base Anhy-E: 355.6m	RNRO1	base Anhy-E based on GR log 1983-1
400				
		416.0m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 215: Well B216

RD Coordinates:	X: 252464.7 Y: 472252.8	TD:	410.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	8th June 1971	CF:	+24.39m NAP
TD date:	14th June 1971	CF - GL(MV):	0m

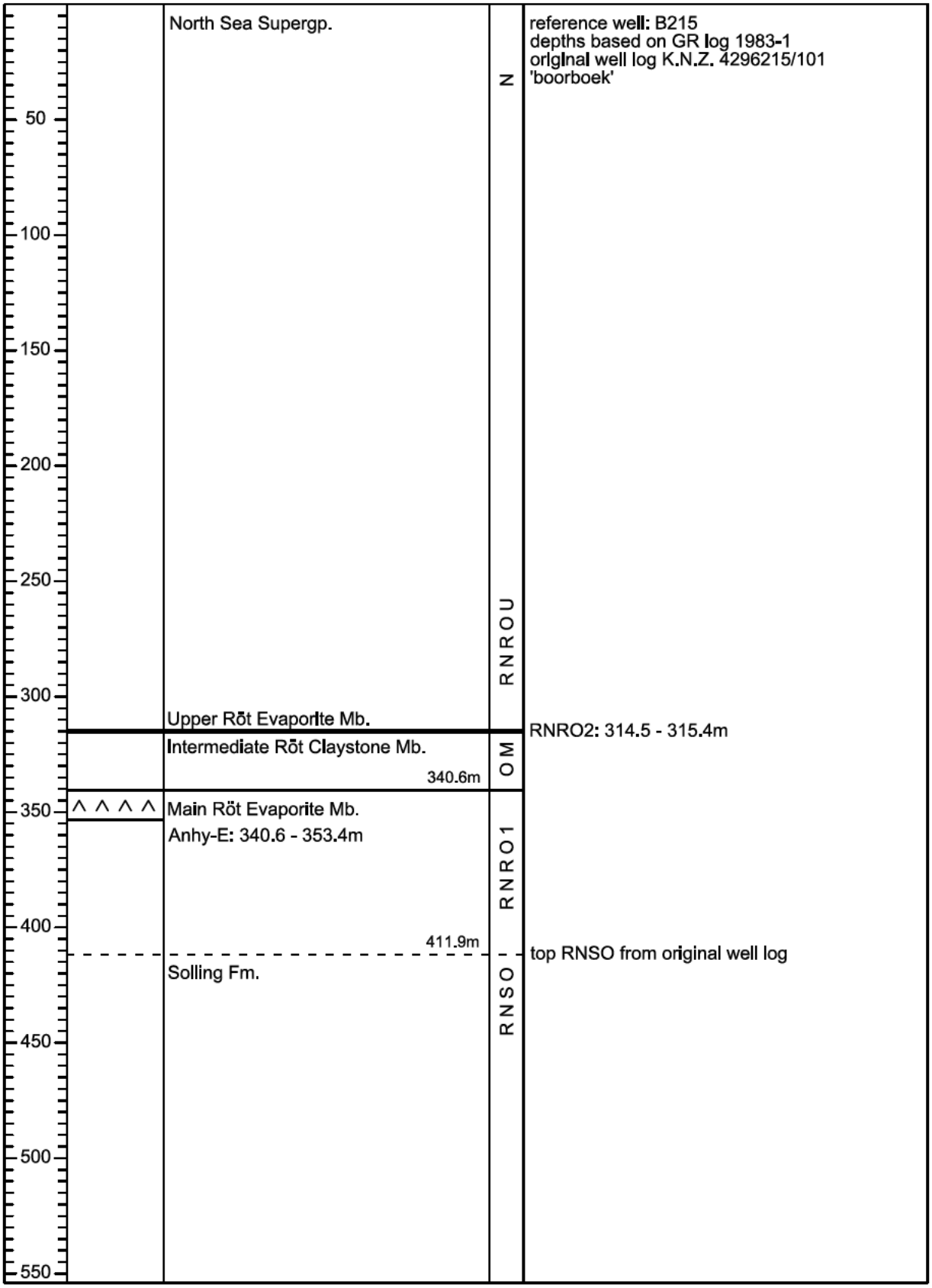
Scale: 1 : 2500



Well Data Series 215: Well B217

RD Coordinates:	X: 252481.8 Y: 472218.2	TD:	412.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	17th June 1971	CF:	+23.77m NAP
TD date:	23rd June 1971	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 218: Well B218

RD Coordinates:	X: 252303.8 Y: 471994.7	TD:	432.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	30th August 1971	CF:	+24.13m NAP
TD date:	4th September 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
		North Sea Supergp.	N	original well log K.N.Z. 4296218/101 'boorboek'
50				
100				
150				
200				
250				
300				
350				
	^ ^ ^ ^	Main Röt Evaporite Mb.		base Anhy-E based on GR log 1994-1
		base Anhy-E: 370.5m	RNRO1	
400				
		430.4m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 218: Well B219

RD Coordinates:	X: 252301.5 Y: 471955.2	TD:	431.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	2nd August 1971	CF:	+24.19m NAP
TD date:	12 August 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296219/101 'boorboek'
100				
150				
200				
250				
300				
350	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section: 363.7 - 428.6m
		base Anhy-E: 372.5m		base Anhy-E based on GR log 1994-1
400				
		430.0m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 220: Well B220

RD Coordinates:	X: 252034.0 Y: 472073.3	TD:	437.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	17th September 1971	CF:	+24.61m NAP
TD date:	27th September 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
		North Sea Supergp.	N	original well log K.N.Z. 4296220/101 'boorboek'
150				mud losses
350	^ ^ ^ ^	Main Röt Evaporite Mb. base Anhy-E: 379.1m	RNRO1	base Anhy-E based on GR log 1985-1
		436.4m		top RNSO from original well log
450		Solling Fm.	RNSO	

Well Data Series 220: Well B221

RD Coordinates:	X: 251999.4 Y: 472052.6	TD:	440.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	4th October 1971	CF:	+24.27m NAP
TD date:	14th October 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
		North Sea Supergp.	N	original well log K.N.Z. 4296221/101 'boorboek'
50				
100				
150				mud losses
200				
250				
300				
350				
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	base Anhy-E based on GR log 1985-1
		base Anhy-E: 376.6m		
400				
		438.7m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 220: Well B222

RD Coordinates:	X: 251963.8 Y: 472031.6	TD:	442.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	26th October 1971	CF:	+24.42m NAP
TD date:	2nd November 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
		North Sea Supergp.	N	original well log K.N.Z. 4296222/101 'boorboek'
50				
100				
150				
200				
250				
300				
350				
	^ ^ ^ ^	Main Röt Evaporite Mb.		base Anhy-E based on GR log 1985-1
		base Anhy-E: 379.1m	RNRO1	
400				
		441.9m		top RNSO from original well log
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 223: Well B224

RD Coordinates:	X: 251795.6 Y: 471905.3	TD:	456.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	9th May 1972	CF:	+24.06m NAP
TD date:	25th May 1972	CF - GL(MV):	0m

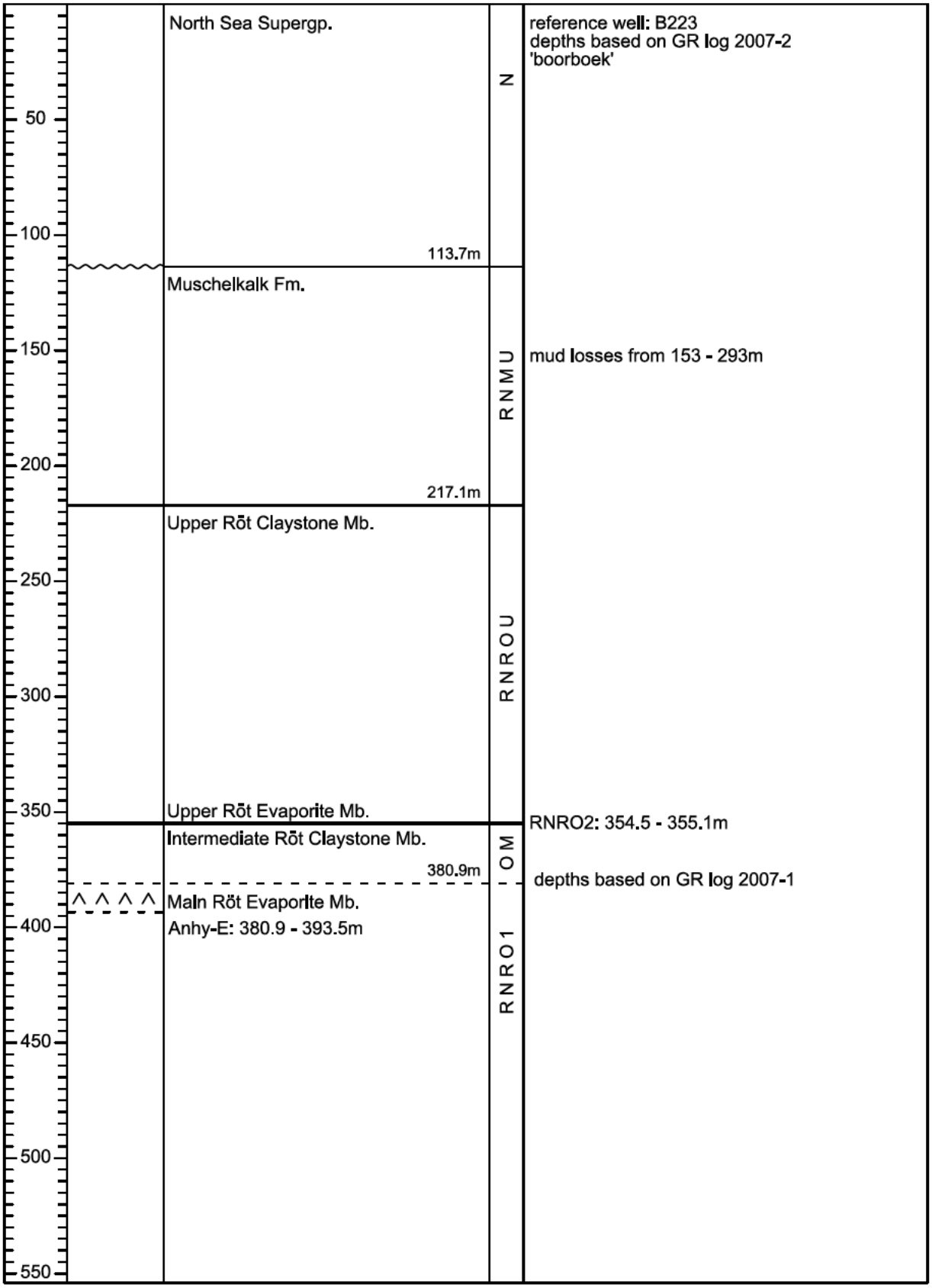
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
		North Sea Supergp.	N	reference well: B223 depths based on GR log 1986-1 original well log K.N.Z. 4296224/101 'boorboek'
350		Upper Röt Evaporite Mb.		
		Intermediate Röt Claystone Mb.	OM	RNRO2: 355.0 - 355.9m
		380.9m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
400		Anhy-E: 380.9 - 393.3m		
		455.3m		
450		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
500				
550				

Well Data Series 223: Well B224a

RD Coordinates:	X: 251790.3 Y: 471913.6	TD:	456.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st February 2007	CF:	+24.02m NAP
TD date:	1st March 2007	CF - GL(MV):	0.02m

Scale: 1 : 2500



Well Data Series 225: Well B226

RD Coordinates:	X: 251794.6 Y: 471721.3	TD:	466.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	27th January 1972	CF:	+24.19m NAP
TD date:	14th February 1972	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B225 depths based on GR log 1997-6 original well log K.N.Z. 4296226/101 'boorboek'
100				
150				cored section: 153.5 - 174.6m
200				
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 364.7 - 365.6m
		Intermediate Röt Claystone Mb.	OM	
		390.9m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 390.9 - 403.2m		
450		465.7m		top RNSO from original well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 225: Well B227

RD Coordinates:	X: 251749.0 Y: 471696.0	TD:	470.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	23rd November 1971	CF:	+23.92m NAP
TD date:	8th December 1971	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B225 depths based on GR log 1999-7 original well log K.N.Z. 4296225/101 'boorboek'
100		111.4m		
		Muschelkalk Fm.	RNMU	
150				
200		233.2m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 369.1 - 369.7m
		Intermediate Röt Claystone Mb.	OM	
		395.0m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section: 400.0 - 435.3m
		Anhy-E: 395.0 - 407.6m		
450		469.5m		top RNSO from original well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 228: Well B228

RD Coordinates:	X: 252642.6 Y: 471980.8	TD:	421.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	28th June 1971	CF:	+23.83m NAP
TD date:	5th July 1971	CF - GL(MV):	0m

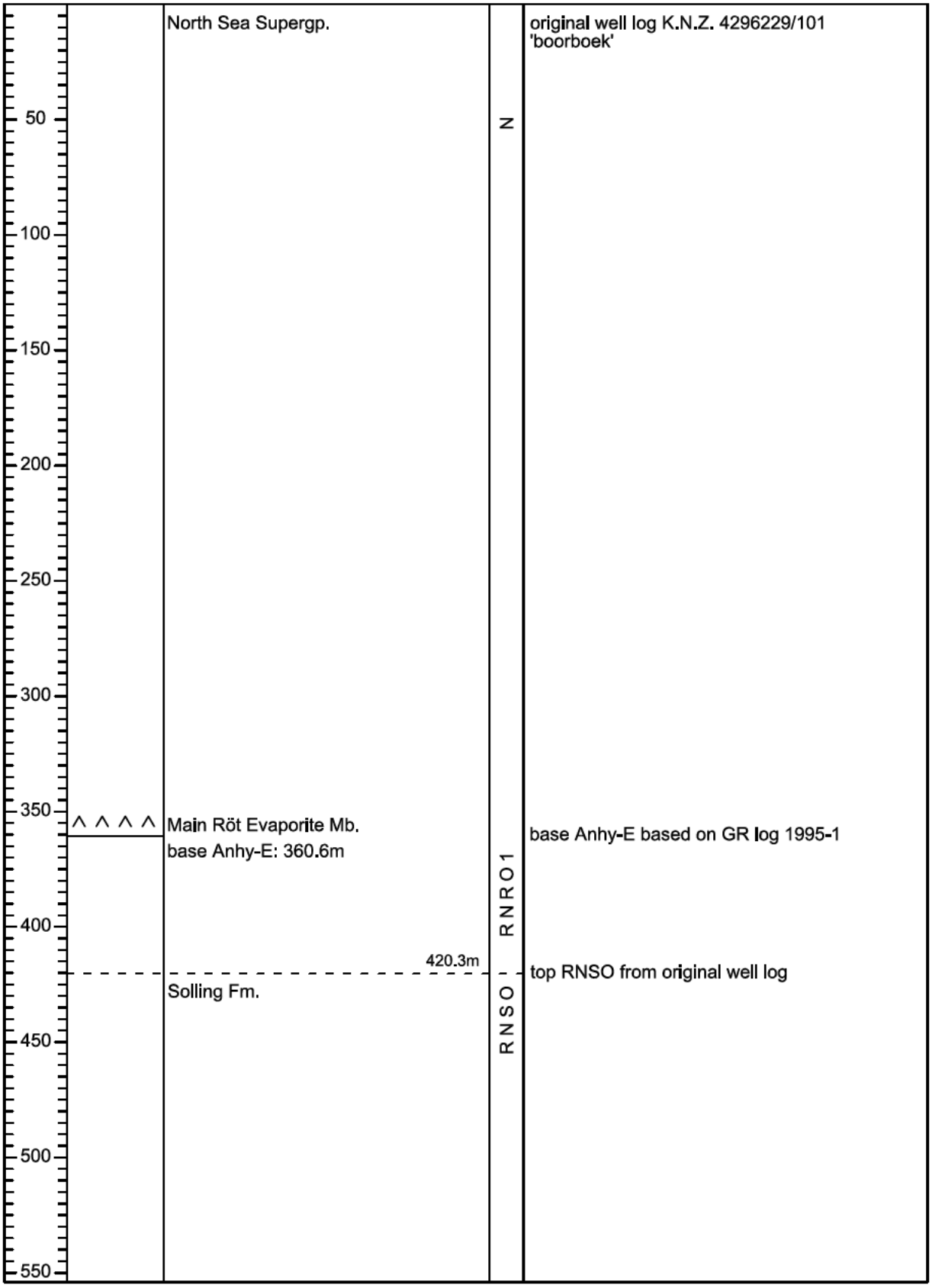
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296228/101 'boorboek'
100				
150				
200				
250				
300			RNROM	
350		349.0m		boundaries based on GR log 1995-1
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section: 355.7 - 421.1m
		Anhy-E: 349.0 - 362.3m		
400		420.4m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 228: Well B229

RD Coordinates:	X: 252668.7 Y: 471950.6	TD:	422.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	14th June 1971	CF:	+23.99m NAP
TD date:	22nd June 1971	CF - GL(MV):	0m

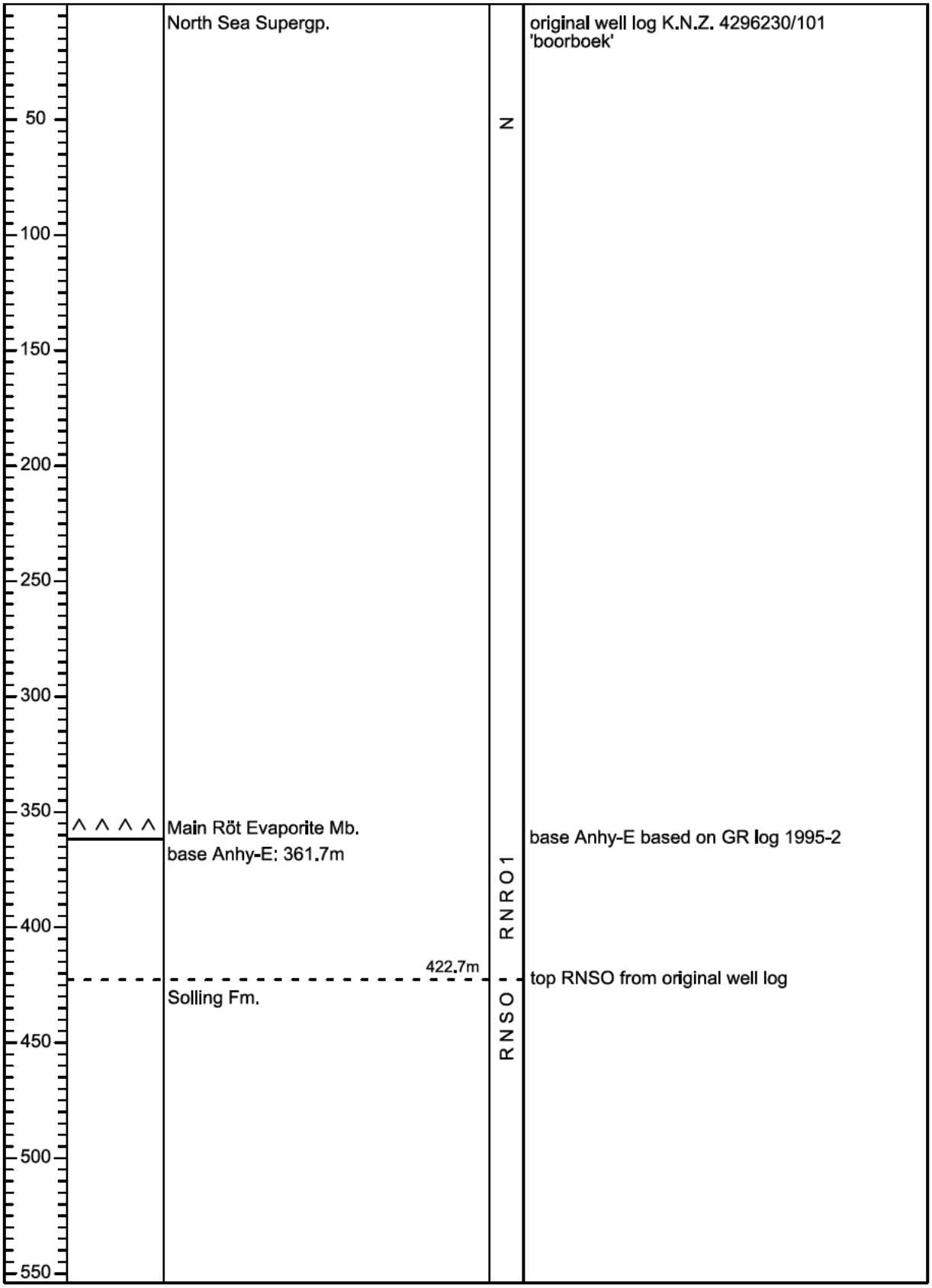
Scale: 1 : 2500



Well Data Series 228: Well B230

RD Coordinates:	X: 252695.5 Y: 471921.6	TD:	423.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	1st July 1971	CF:	+24.20m NAP
TD date:	9th July 1971	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 231: Well B231

RD Coordinates:	X: 252871.8 Y: 471836.7	TD:	423.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	14th September 1972	CF:	+25.50m NAP
TD date:	27th September 1972	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296231/101 'boorboek'
100				
150				
200				
250				
300			RNROM	
350		353.5m		
	^ ^ ^ ^	Main Röt Evaporite Mb.		boundaries based on GR log 1979-1
		Anhy-E: 353.5 - 365.3m	RNRO1	
400		423.0m		
		Solling Fm.	RNSO	top RNSO from original well log
450				
500				
550				

Well Data Series 231: Well B232

RD Coordinates:	X: 252912.9 Y: 471830.6	TD:	423.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th November 1972	CF:	+25.72m NAP
TD date:	22nd November 1972	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296232/101 'boorboek'
100				
150				
200				
250				
300			RNROM	
350		353.7m		
	^ ^ ^ ^	Main Röt Evaporite Mb.		boundaries based on GR log 1979-1
		Anhy-E: 353.7 - 365.0m	RNRO1	
400		422.7m		
		Solling Fm.	RNSO	top RNSO from original well log
450				
500				
550				

Well Data Series 231: Well B233

RD Coordinates:	X: 252955.3 Y: 471831.5	TD:	425.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	2nd January 1973	CF:	+25.75m NAP
TD date:	9th January 1973	CF - GL(MV):	0m

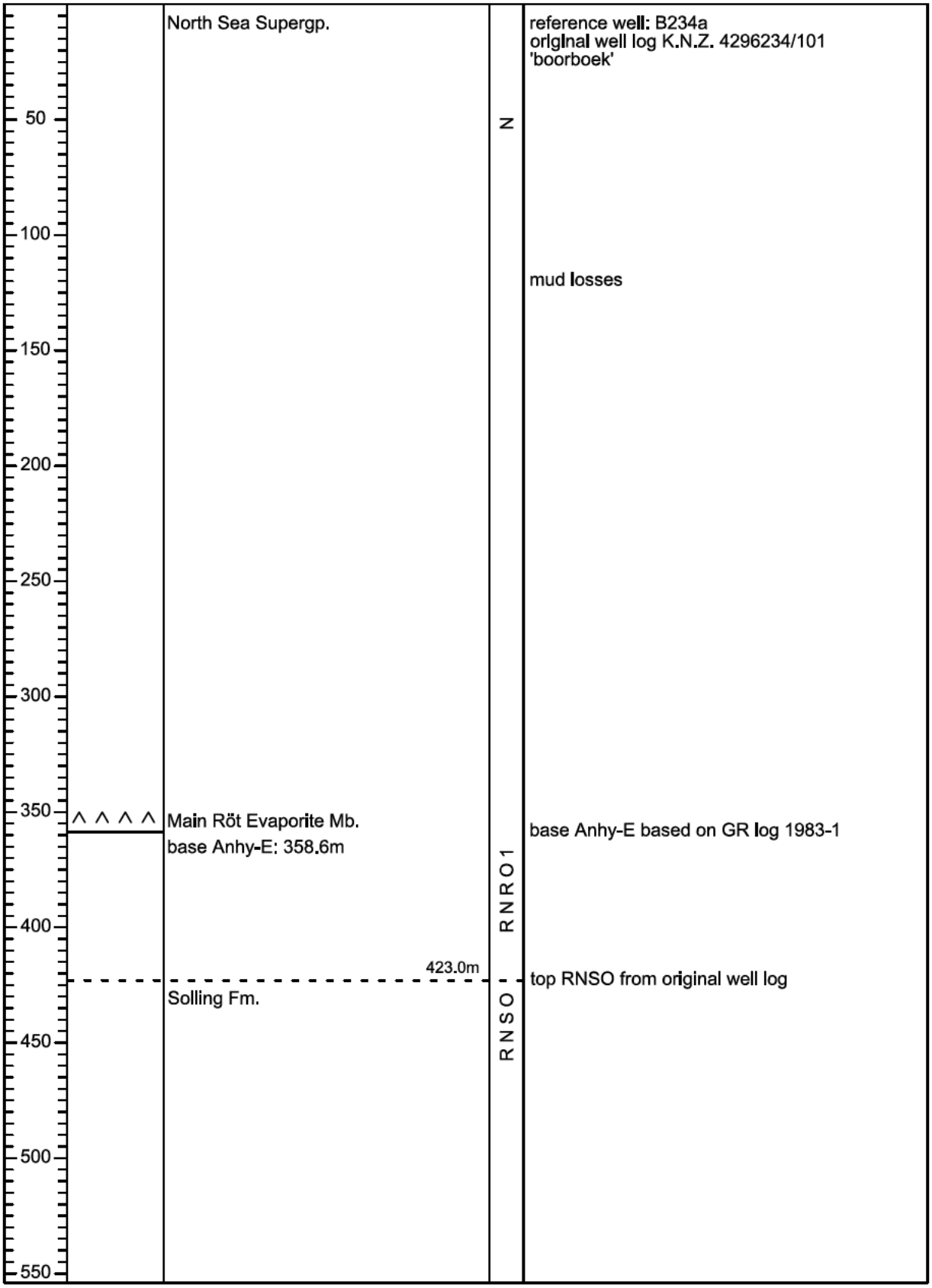
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296233/101 'boorboek'
100				
150				mud losses
200				
250				
300			RNROM	
350		353.7m		boundaries based on GR log 1979-1
	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 353.7 - 365.4m	RNRO1	
400		422.8m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 234: Well B234

RD Coordinates:	X: 253122.2 Y: 471764.4	TD:	423.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	15th August 1973	CF:	+25.54m NAP
TD date:	28th August 1973	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 237: Well B237

RD Coordinates:	X: 253333.0 Y: 471640.8	TD:	433.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	13th November 1973	CF:	+26.22m NAP
TD date:	26th November 1973	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296237/101 'boorboek'
100				
150				
200				mud losses
250				
300			RNROM	
350		354.4m		boundaries based on GR log 1995-2
	^ ^ ^ ^	Main Röt Evaporite Mb.		cored section: 365.0 - 433.9m
400		Anhy-E: 354.4 - 367.0m	RNRO1	
		428.2m		top RNSO from original well log
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 237: Well B238

RD Coordinates:	X: 253369.8 Y: 471620.8	TD:	431.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	13th December 1973	CF:	+26.08m NAP
TD date:	3rd January 1974	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296238/101 'boorboek'
100				
150				mud losses
200				mud losses
250				
300			RNROM	
350		355.1m		boundaries based on GR log 1986-1
	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 355.1 - 366.9m	RNRO1	
400		429.4m		top RNSO from original well log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 239: Well B239

RD Coordinates:	X: 253707.3	TD:	444.7m
	Y: 471414.8	Depth reference:	Conductor Flange (CF)
Spud date:	1st March 1974	CF:	+27.00m NAP
TD date:	12th March 1974	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296239/101 'boorboek'
100				
150				mud losses
200				
250				
300				
350			RNROM	
		365.4m		boundaries based on GR log 1986-1
	^ ^ ^ ^	Main Röt Evaporite Mb.		
		Anhy-E: 365.4 - 377.6m	RNRO1	
400				
		443.5m		top RNSO from original well log
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 239: Well B240

RD Coordinates:	X: 253736.0	TD:	443.7m
	Y: 471396.9	Depth reference:	Conductor Flange (CF)
Spud date:	5th April 1974	CF:	+27.26m NAP
TD date:	18th Aprll 1974	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296240/101 'boorboek'
100				
150				
200				
250				
300			RNROM	
350		366.6m		
	^ ^ ^ ^	Main Röt Evaporite Mb.		boundaries based on GR log 1986-1
400		Anhy-E: 366.6 - 378.3m	RNRO1	
		442.8m		top RNSO at base A2 from status sheet
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 239: Well B241

RD Coordinates:	X: 253765.2 Y: 471379.3	TD:	445.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	16th May 1974	CF:	+27.37m NAP
TD date:	30th May 1974	CF - GL(MV):	0m

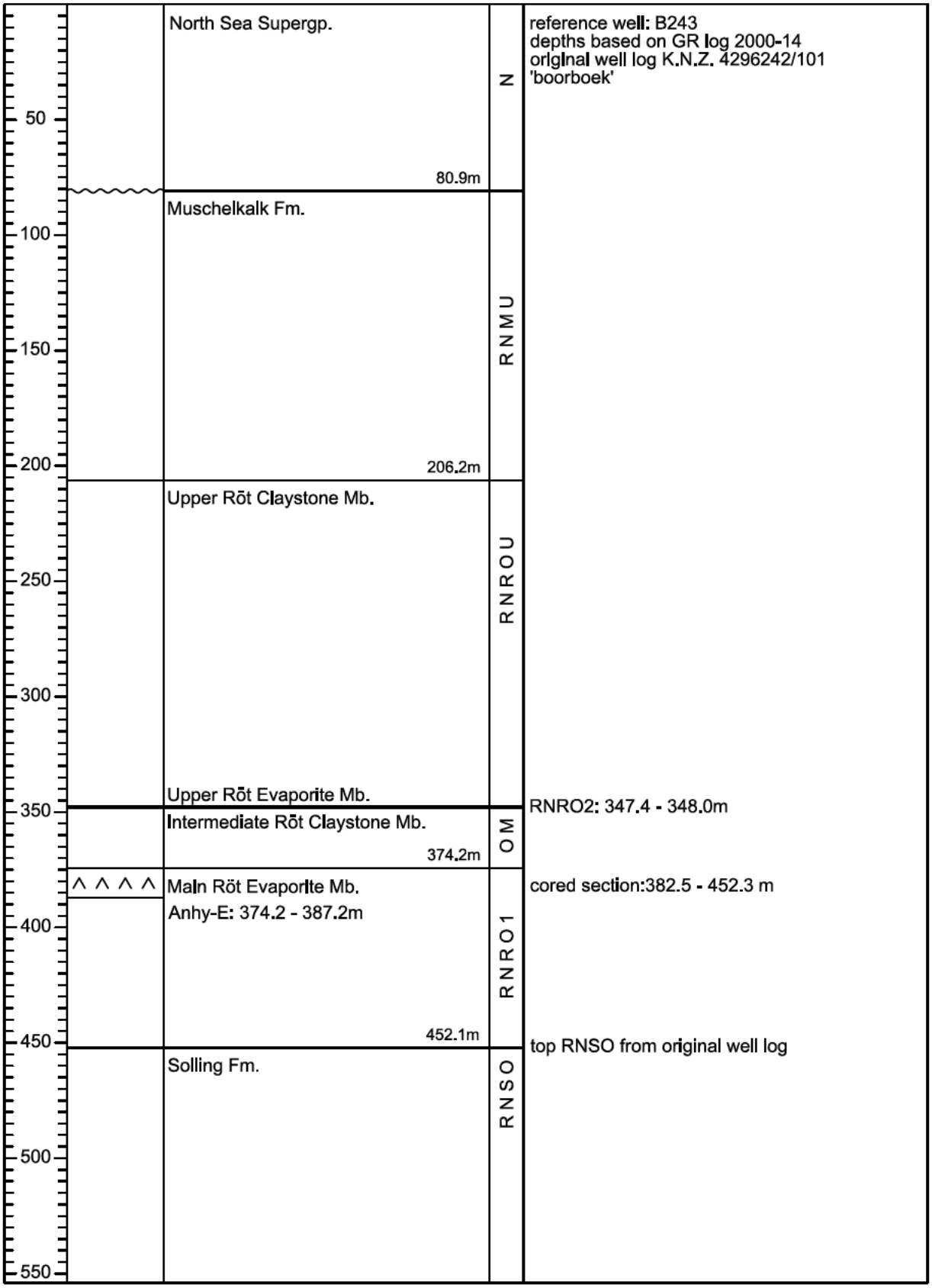
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296241/101 'boorboek'
100				
150				
200				
250				
300				
350			RNROM	
		367.4m		boundaries based on GR log 1986-1
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
400		Anhy-E: 367.4 - 379.7m		
		444.0m		top RNSO from original well log
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 242: Well B242

RD Coordinates:	X: 253853.7 Y: 471260.5	TD:	452.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	16th September 1974	CF:	+27.52m NAP
TD date:	3rd October 1974	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 242: Well B244

RD Coordinates:	X: 253881.5 Y: 471195.3	TD:	456.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st June 1974	CF:	+27.29m NAP
TD date:	9th July 1974	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B243 depths based on GR log 2000-14 original well log K.N.Z. 4296244/101 'boorboek'
				ATRT: 80.6 - 85.3m
100		Muschelkalk Fm.	RNMU	
150				mud losses
200		209.0m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 350.5 - 351.0m
		Intermediate Röt Claystone Mb.	OM	
		377.2m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
400		Anhy-E: 377.2 - 389.1m		
450		455.8m		top RNSO from original well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 245: Well B245

RD Coordinates:	X: 253939.7	TD:	468.9m
	Y: 471025.2	Depth reference:	Conductor Flange (CF)
Spud date:	16th May 1973	CF:	+27.42m NAP
TD date:	29th May 1973	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296245/101 'boorboek'
100				
150				
200				
250				
300				
350				
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	base Anhy-E based on GR log 1991-1
		base Anhy-E: 397.4m		
450				
		465.2m	RNSO	top RNSO from original well log
		Solling Fm.		
500				
550				

Well Data Series 245: Well B246

RD Coordinates:	X: 253954.1	TD:	467.0m
	Y: 470988.1	Depth reference:	Conductor Flange (CF)
Spud date:	6th April 1973	CF:	+27.50m NAP
TD date:	25th April 1973	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
		North Sea Supergp.	N	original well log K.N.Z. 4296246/101 'boorboek'
50				
				cored section: 77.5 - 109.4m
100				
150				
200				
250				
300				
350				
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	base Anhy-E based on GR log 1991-1
		base Anhy-E: 399.6m		
450				
		466.3m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
500				
550				

Well Data Series 245: Well B247

RD Coordinates:	X: 253966.5 Y: 470949.1	TD:	469.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	26th February 1973	CF:	+27.50m NAP
TD date:	20th March 1973	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	original well log K.N.Z. 4296247/101 'boorboek'
100				
150				
200				
250				
300				
350			RNROM	cored section: 372.4 - 393.6m
		387.8m		boundaries based on GR log 1986-1
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 387.8 - 400.0m		
450		468.7m		top RNSO from original well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 248: Well B248

RD Coordinates:	X: 253557.1 Y: 471508.7	TD:	436.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	10th January 1977	CF:	+26.57m NAP
TD date:	25th January 1977	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B249 depths based on GR log 1977-1 original well log K.N.Z. 2296248/101 'boorboek'
		87.4m		
100		Muschelkalk Fm.	RNMU	mud losses
150		191.5m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 332.1 - 332.6m
		Intermediate Röt Claystone Mb.	OM	
350		359.0m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 359.0 - 371.0m		cored section: 389.5 - 406.1m
400		436.1m		top RNSO at base A2 from GR log
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 248: Well B250

RD Coordinates:	X: 253531.7 Y: 471594.4	TD:	431.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	2nd November 1976	CF:	+26.79m NAP
TD date:	12th November 1976	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B249 depths based on GR log 1976-1 original well log K.N.Z. 2296250/101 'boorboek'
		87.0m		
100		Muschelkalk Fm.	RNMU	
150				mud losses
		185.8m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 326.8 - 327.7m
		Intermediate Röt Claystone Mb.	OM	
		353.5m		
350	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 353.5 - 366.0m	RNRO1	
400				
		430.4m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 251: Well B252

RD Coordinates:	X: 253543.4 Y: 471768.3	TD:	420.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	13th September 1976	CF:	+25.96m NAP
TD date:	29th September 1976	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B251 depths based on GR log 1976-1 original well log K.N.Z. 2296252/101 'boorboek'
		87.8m		
100		Muschelkalk Fm.	RNMU	mud losses
150		176.7m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 317.6 - 318.1m
		Intermediate Röt Claystone Mb.	OM	
		344.6m		
350	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section: 353.5 - 420.8m
		Anhy-E: 344.6 - 356.3m		
400		420.0m		
		Solling Fm.	RNSO	top RNSO from original well log
450				
500				
550				

Well Data Series 253: Well B253

RD Coordinates:	X: 252444.4 Y: 472605.9	TD:	389.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	24th October 1974	CF:	+24.83m NAP
TD date:	13th November 1974	CF - GL(MV):	0m

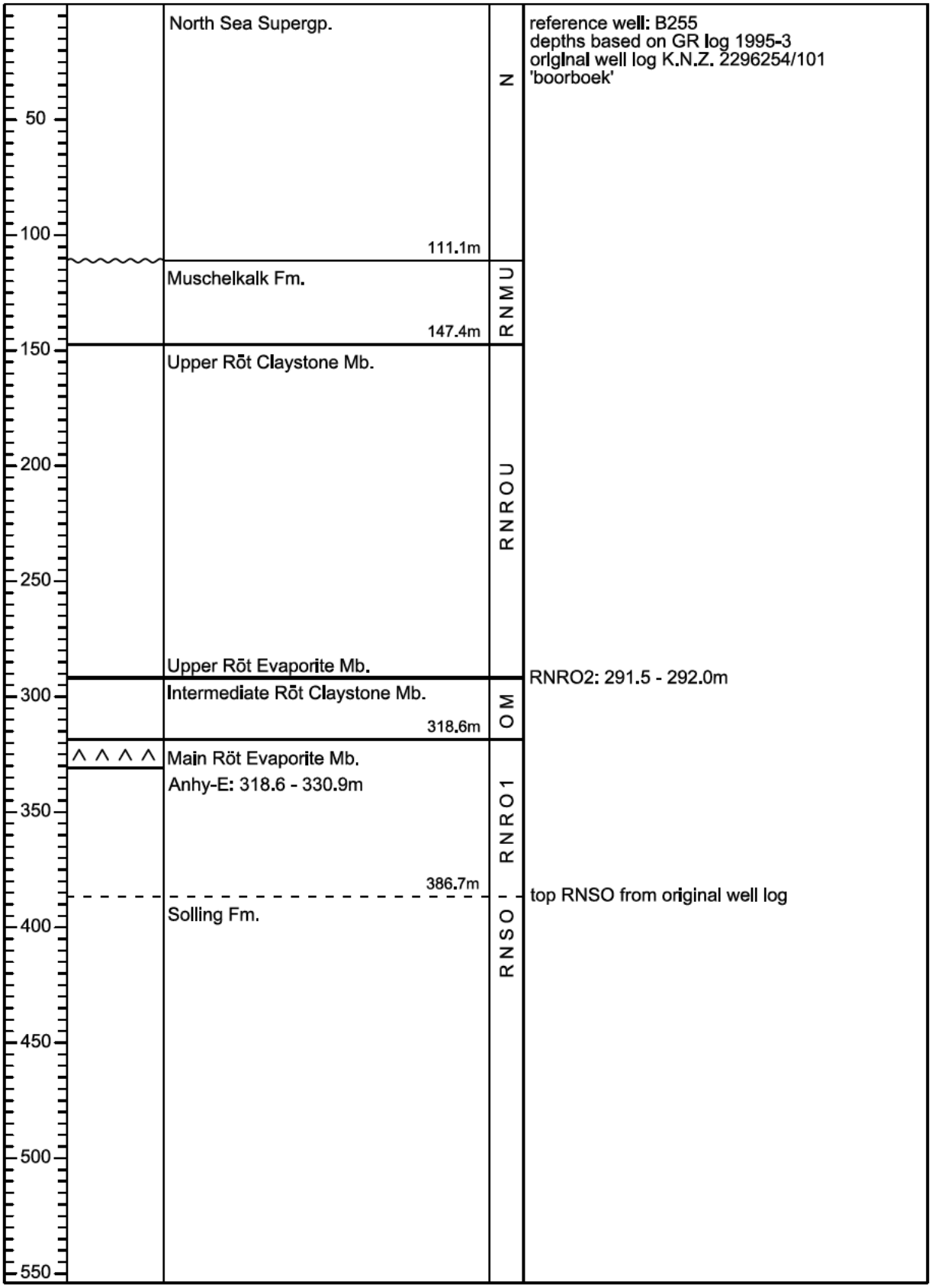
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B255 depths based on GR log 1995-3 original well log K.N.Z. 2296253/101 'boorboek'
100		111.3m		
		Muschelkalk Fm.	RNMU	mud losses
150		149.1m		
		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 293.5 - 294.1m
300		Intermediate Röt Claystone Mb.	OM	
		320.3m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section: 337.5 - 389.9m
350		Anhy-E: 320.3 - 332.9m		
		388.5m		
400		Solling Fm.	RNSO	top RNSO from original well log
450				
500				
550				

Well Data Series 253: Well B254

RD Coordinates:	X: 252488.2 Y: 472610.4	TD:	392.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	27th November 1974	CF:	+24.47m NAP
TD date:	7th January 1975	CF - GL(MV):	0m

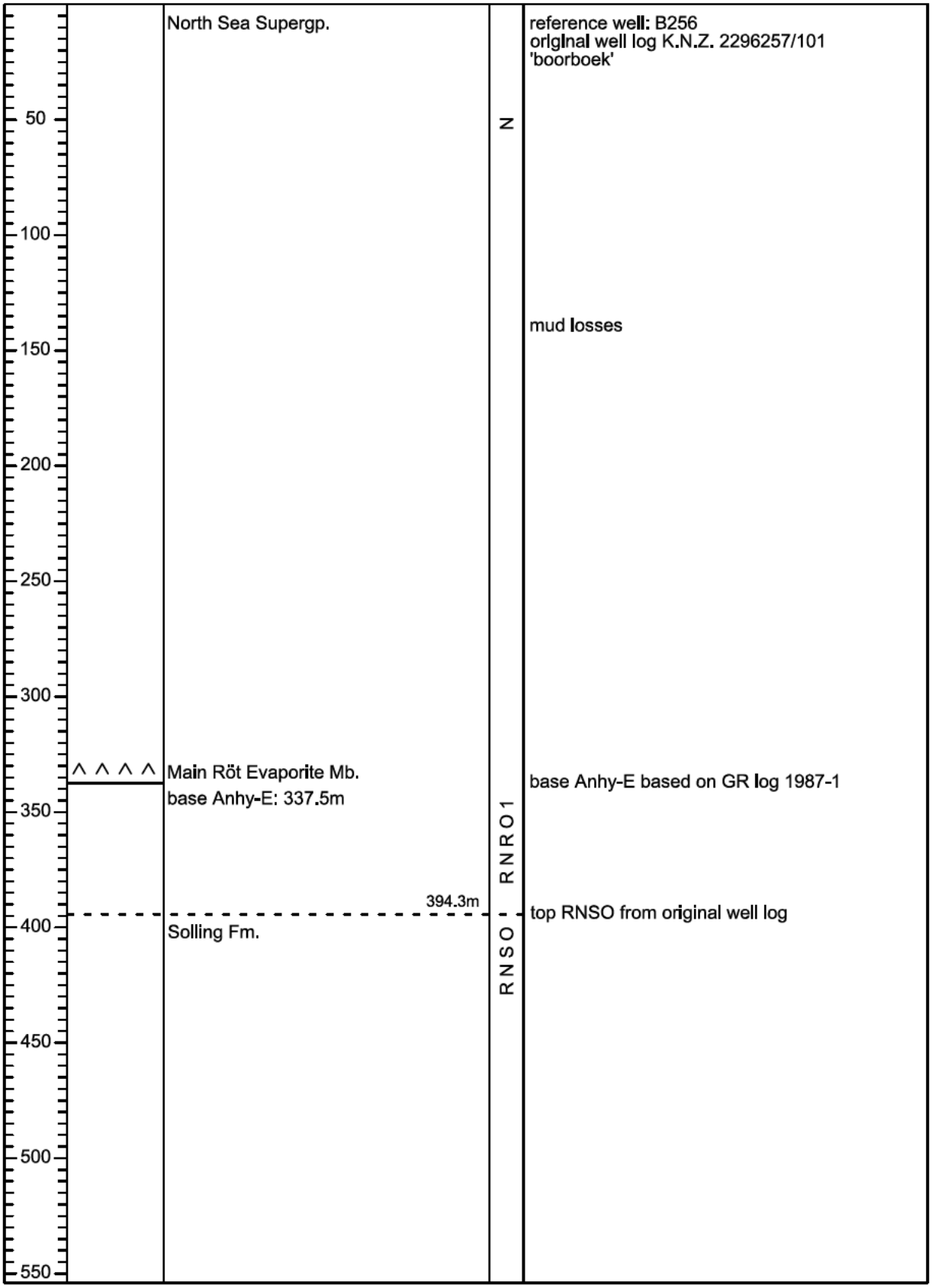
Scale: 1 : 2500



Well Data Series 256: Well B257

RD Coordinates:	X: 252580.5 Y: 472436.7	TD:	395.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	24th March 1975	CF:	+23.66m NAP
TD date:	10th Aprll 1975	CF - GL(MV):	0m

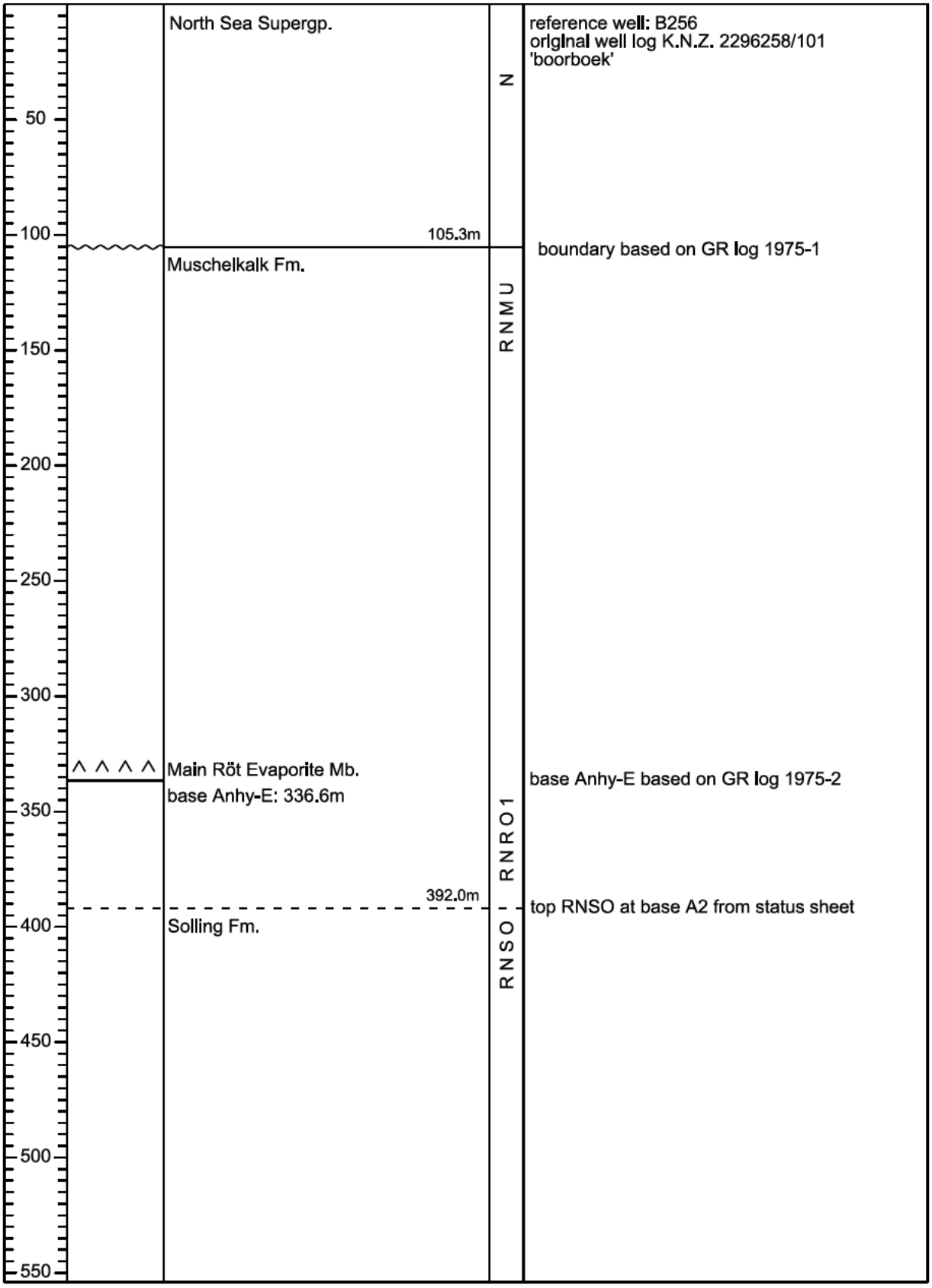
Scale: 1 : 2500



Well Data Series 256: Well B258

RD Coordinates:	X: 252618.1 Y: 472422.7	TD:	392.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	4th March 1975	CF:	+23.76m NAP
TD date:	12th March 1975	CF - GL(MV):	0m

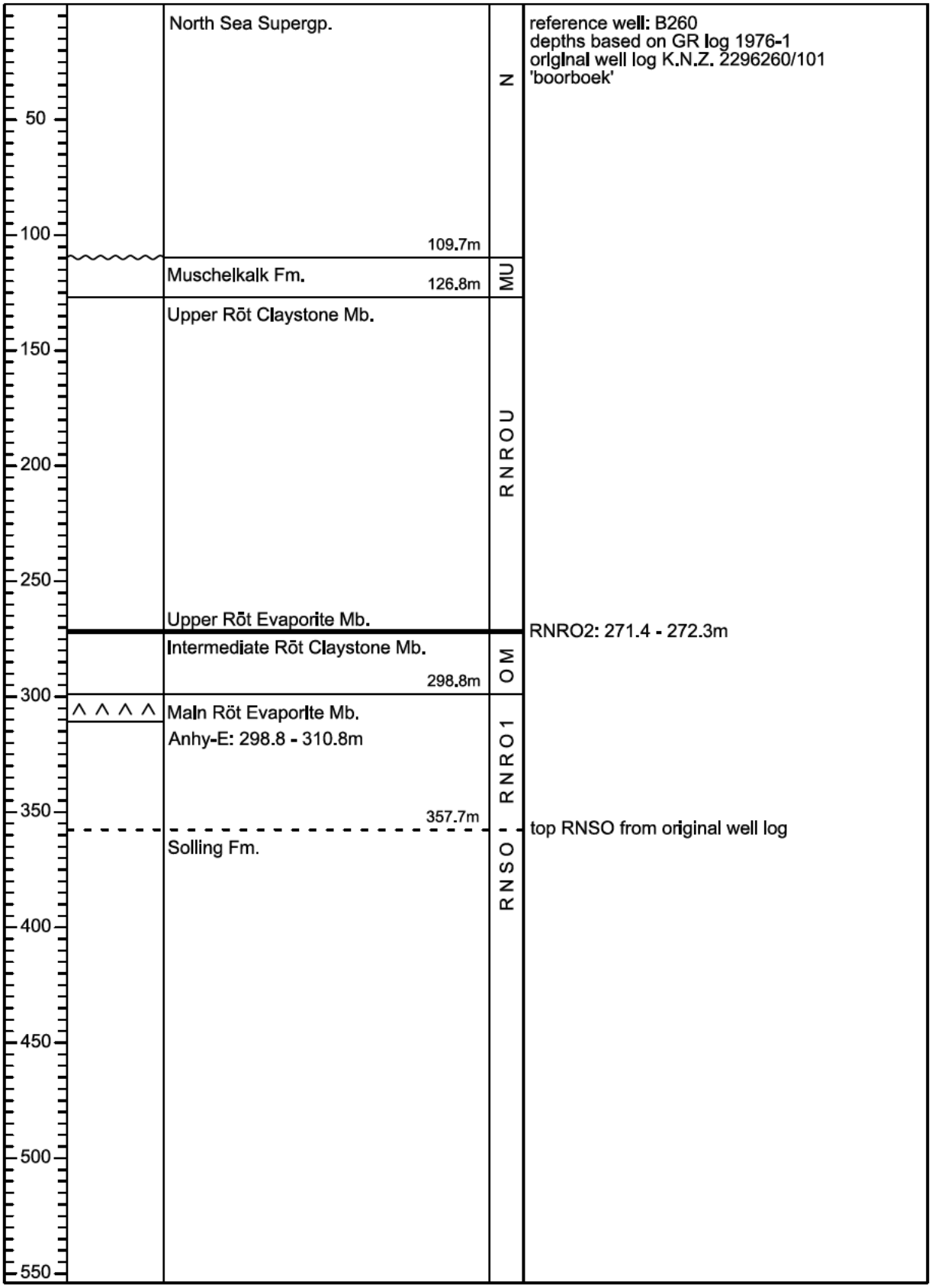
Scale: 1 : 2500



Well Data Series 259: Well B259

RD Coordinates:	X: 252449.1 Y: 473114.3	TD:	358.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	16th December 1975	CF:	+23.88m NAP
TD date:	24th December 1975	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 259: Well B261

RD Coordinates:	X: 252486.2 Y: 473044.2	TD:	365.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th October 1975	CF:	+24.10m NAP
TD date:	30th October 1975	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B260 depths based on GR log 1975-1 original well log K.N.Z. 2296261/101 'boorboek'
100		109.1m		
		Muschelkalk Fm. 129.0m	MU	
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 273.7 - 274.5m
		Intermediate Röt Claystone Mb. 301.3m	OM	
300	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 301.3 - 313.7m	RNRO1	
350		361.4m		
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 262: Well B262

RD Coordinates:	X: 252540.9	TD:	378.1m
	Y: 472888.8	Depth reference:	Conductor Flange (CF)
Spud date:	1st April 1976	CF:	+24.95m NAP
TD date:	13th April 1976	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B264 depths based on GR log 1976-1 original well log K.N.Z. 2296262/101 'boorboek'
100		111.6m		
		Muschelkalk Fm.	MU	
150		135.0m		
		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 280.2 - 280.8m
		Intermediate Röt Claystone Mb.	OM	
300		307.6m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 307.6 - 320.3m		
350		377.1m		top RNSO from original well log
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 262: Well B263

RD Coordinates:	X: 252579.9	TD:	375.0m
	Y: 472875.1	Depth reference:	Conductor Flange (CF)
Spud date:	3rd May 1976	CF:	+24.87m NAP
TD date:	18th May 1976	CF - GL(MV):	0m

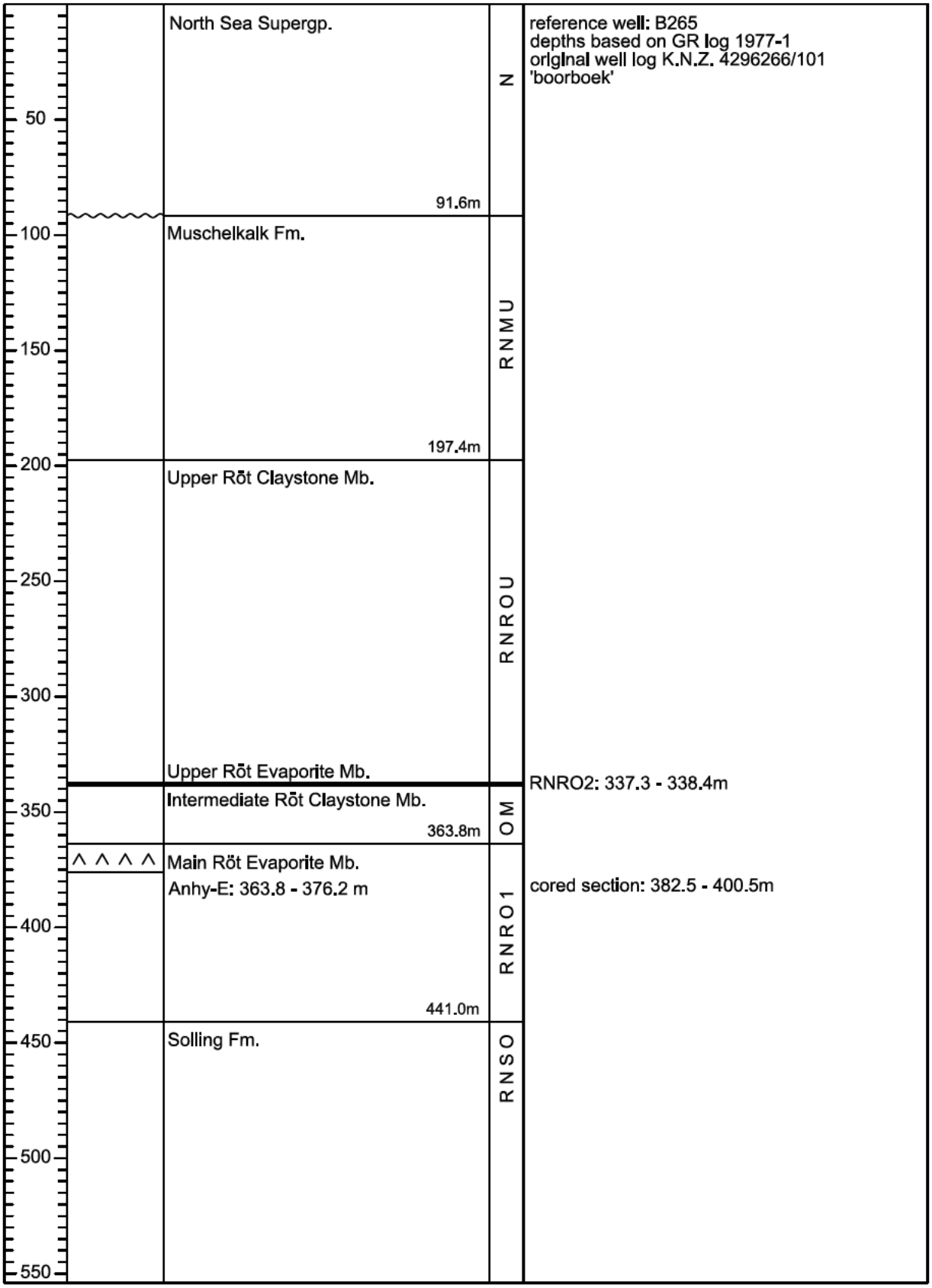
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B264 depths based on GR log 1983-2 original well log K.N.Z. 2296263/101 'boorboek'
100		110.8m		
		Muschelkalk Fm.	MU	
		133.5m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 278.0 - 278.6m
		Intermediate Röt Claystone Mb.	OM	
300		305.1m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 305.1 - 317.9m		
350		375.0m		top RNSO from original well log
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 265: Well B266

RD Coordinates:	X: 253272.4 Y: 471446.5	TD:	444.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	29th March 1977	CF:	+25.87m NAP
TD date:	18th Aprll 1977	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 265: Well B267

RD Coordinates:	X: 253245.9 Y: 471416.5	TD:	444.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	5th May 1977	CF:	+25.90m NAP
TD date:	17th May 1977	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B265 depths based on GR log 1977-1 original well log K.N.Z. 4296267/101 'boorboek'
		92.0m		
100		Muschelkalk Fm.	RNMU	
150				
		197.9m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 337.8 - 338.7m
350		Intermediate Röt Claystone Mb.	OM	
		363.8m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
400		Anhy-E: 363.8 - 376.1m		
		442.3m		top RNSO at base A2 from status sheet
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 268: Well B268

RD Coordinates:	X: 253151.6 Y: 471287.8	TD:	449.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	9th June 1977	CF:	+26.02m NAP
TD date:	23rd June 1977	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B269 depths based on GR log 1977-1 original well log K.N.Z. 4296269/101 'boorboek'
		92.7m		
100		Muschelkalk Fm.	RNMU	
150				
200		211.0m		
		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 349.2 - 350.1m
350		Intermediate Röt Claystone Mb.	OM	
		375.7m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
400		Anhy-E: 375.7 - 387.9m		
		449.4m		
450		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
500				
550				

Well Data Series 270: Well B270

RD Coordinates:	X: 253534.2 Y: 471365.4	TD:	446.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	26th September 1977	CF:	+26.91m NAP
TD date:	6th October 1977	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B271 depths based on GR log 1977-1 original well log K.N.Z. 4296270/101 'boorboek'
		87.7m		
100		Muschelkalk Fm.	RNMU	
150				
		200.8m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 341.6 - 342.3m
350		Intermediate Röt Claystone Mb.	OM	
		368.4m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
400		Anhy-E: 368.4 - 381.5m		
		444.9m		
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 272: Well B272

RD Coordinates:	X: 253477.4 Y: 471177.8	TD:	455.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	12th December 1978	CF:	+26.40m NAP
TD date:	16th January 1979	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B273 depths based on GR log 1979-1 original well log K.N.Z. 4296272/101 'boorboek'
100				
150			RNMU	
200		Muschelkalk Fm. 210.5m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 350.2 - 350.5m
		Intermediate Röt Claystone Mb. 376.9m	OM	
400	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 376.9 - 389.3m	RNRO1	
450		454.3m		top RNSO at base A2 from GR log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 272 : Well B274

RD Coordinates:	X: 253417.8 Y: 471230.8	TD:	455.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st September 1978	CF:	+26.19m NAP
TD date:	4th October 1978	CF - GL(MV):	0m

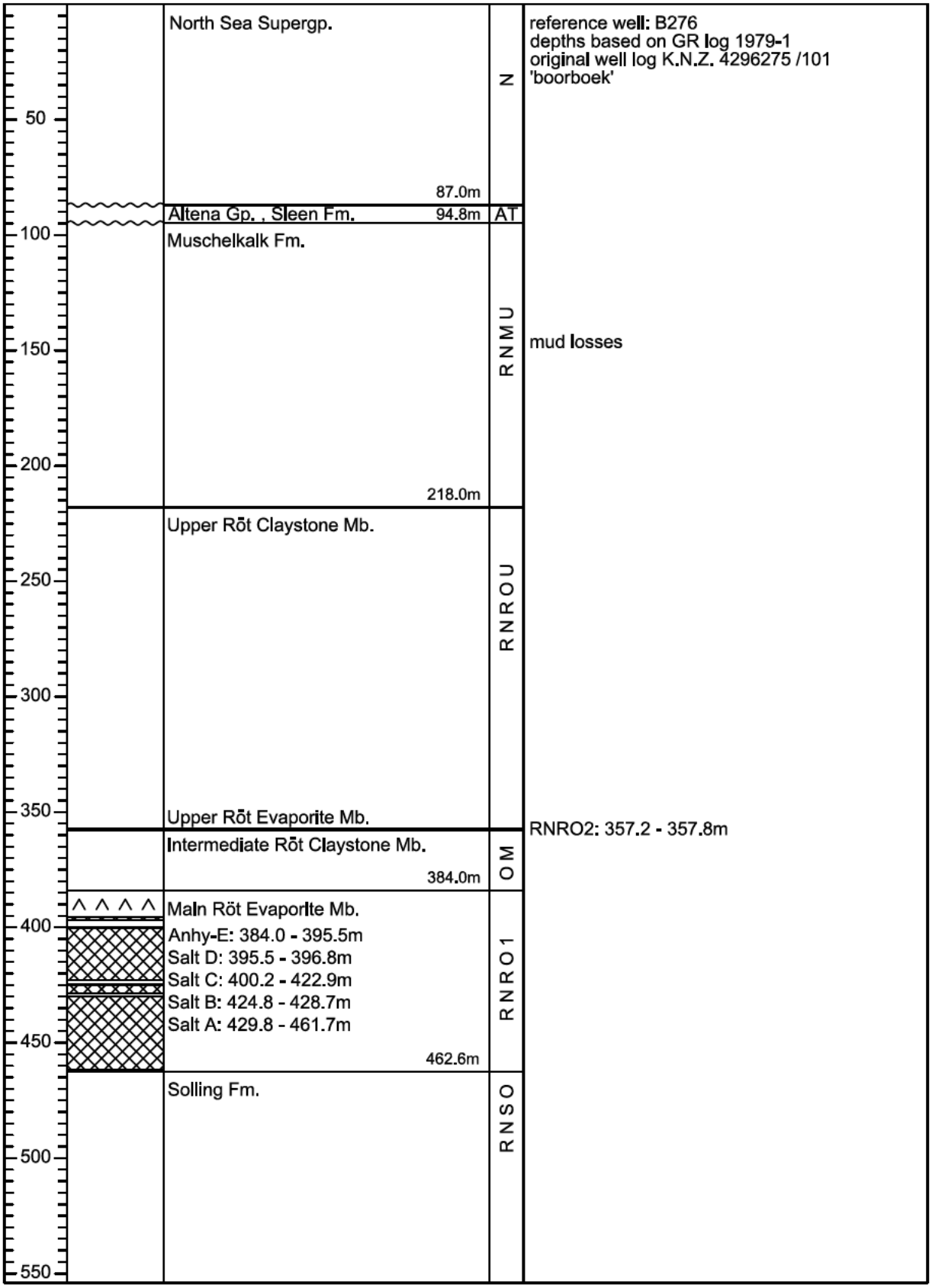
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B273 depths based on GR log 1978-1 original well log K.N.Z. 4296274/101 'boorboek'
100				
150				mud losses
200		209.0m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 348.9 - 349.5m
		Intermediate Röt Claystone Mb.	OM	
		374.5m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 374.5 - 387.4m		
450		452.1m		top RNSO from original well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 275: Well B275

RD Coordinates:	X: 253491.1 Y: 471017.3	TD:	462.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	13th June 1979	CF:	+26.78m NAP
TD date:	28th June 1979	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 275: Well B277

RD Coordinates:	X: 253498.7 Y: 470948.3	TD:	466.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th February 1979	CF:	+26.83m NAP
TD date:	8th March 1979	CF - GL(MV):	0m

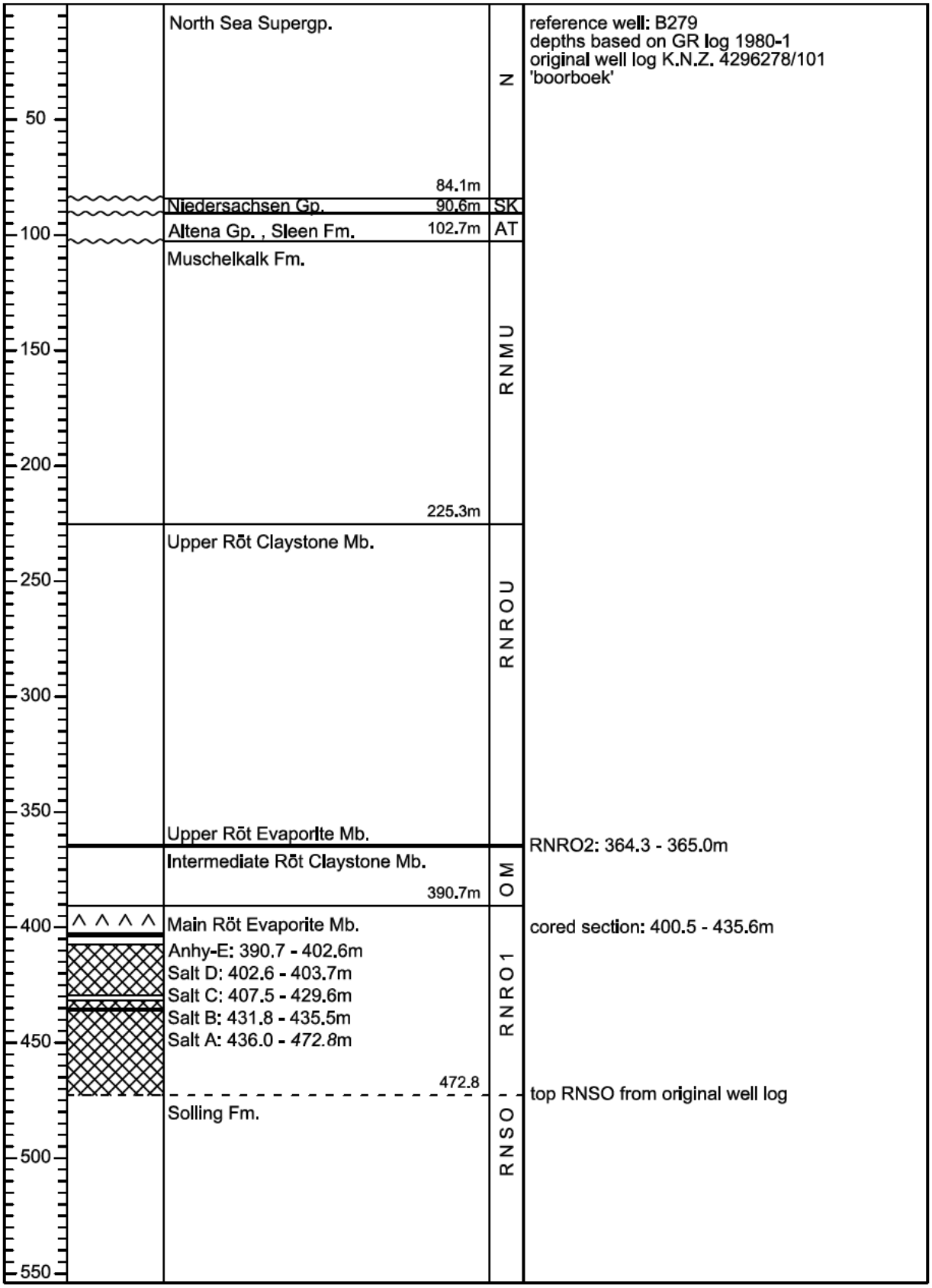
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B276 depths based on GR log 1979-1 original well log K.N.Z. 4296277/101 'boorboek'
		86.7m		
		Altena Gp. , Sleen Fm. 97.2m	AT	
100		Muschelkalk Fm.	RNMU	
150				mud losses
				mud losses
200		220.3m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 359.5 - 360.1m
		Intermediate Röt Claystone Mb.	OM	
		385.7m		
400		Main Röt Evaporite Mb.	RNRO1	cored section: 400.0 - 466.0m
		Anhy-E: 385.7 - 397.4m		
		Salt D: 397.4 - 400.1m		
		Salt C: 404.2 - 424.7m		
		Salt B: 426.8 - 431.2m		
450		Salt A: 432.0 - 464.1m		
		465.0		
		Solling Fm.	RNSO	
500				
550				

Well Data Series 278: Well B278

RD Coordinates:	X: 253587.3 Y: 470801.1	TD:	473.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	26th March 1979	CF:	+26.72m NAP
TD date:	16th Aprll 1980	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 278: Well B280

RD Coordinates:	X: 253599.0 Y: 470722.5	TD:	477.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	24th January 1980	CF:	+26.58m NAP
TD date:	7th February 1980	CF - GL(MV):	0m

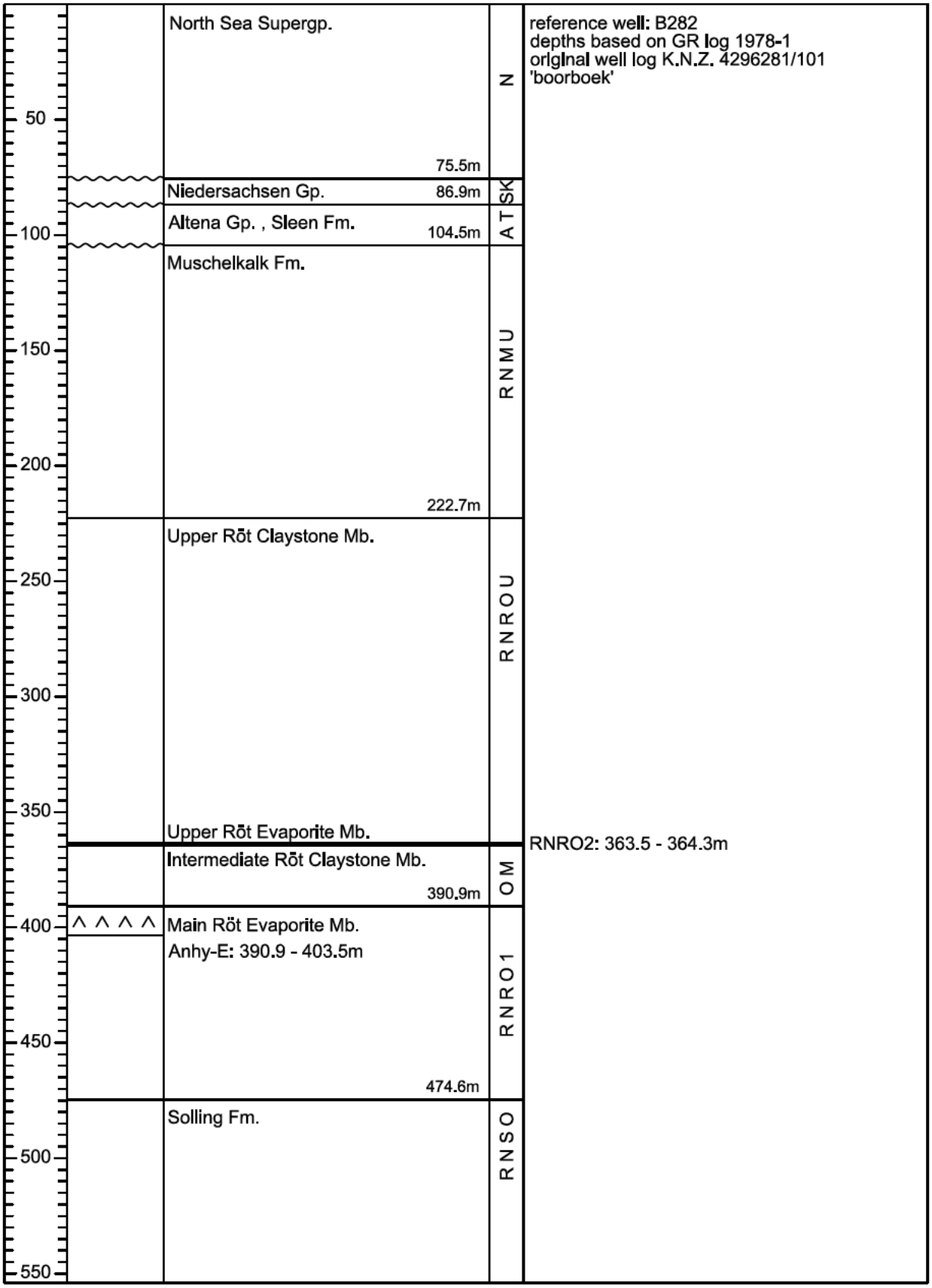
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B279 depths based on GR log 1980-1 original well log K.N.Z. 4296280/101 'boorboek'
		84.5m		
		Niedersachsen Gp. 94.1m	SK	
100		Altena Gp. , Sleen Fm. 105.8m	AT	
		Muschelkalk Fm.	RNMU	
150				mud losses, 4m3
200		227.2m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 366.2 - 366.9m
		Intermediate Röt Claystone Mb.	OM	
		392.5m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 392.5 - 404.7m		
		Salt D: 404.7 - 407.1m		
		Salt C: 411.4 - 432.0m		
450		Salt B: 434.2 - 438.4m		
		Salt A: 439.0 - 473.7m		
		473.7m		top RNSO at base A2 from GR log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 281: Well B281

RD Coordinates:	X: 254113.7 Y: 470886.7	TD:	474.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	16th May 1978	CF:	+28.35m NAP
TD date:	26th May 1978	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 283: Well B283

RD Coordinates:	X: 254310.5 Y: 470927.6	TD:	471.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	13th March 1978	CF:	+28.62m NAP
TD date:	29th March 1978	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp. 71.6m	N	reference well: B284 depths based on GR log 1978-1 original well log K.N.Z. 4296283/101
		Niedersachsen Gp. 84.9m	SK	
		Altena Gp. , Sleen Fm. 100.1m	AT	
100		Muschelkalk Fm. 219.4m	RNMU	
150				
200				
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2 361.0 - 361.8m
		Intermediate Röt Claystone Mb. 387.8m	OM	
400	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 387.8 - 399.7m	RNRO1	
450		471.2m		
		Solling Fm.	RNSO	
500				
550				

Well Data Series 285: Well B286

RD Coordinates:	X: 254546.1 Y: 470978.2	TD:	474.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	2nd November 1977	CF:	+29.03m NAP
TD date:	24th November 1977	CF - GL(MV):	0m

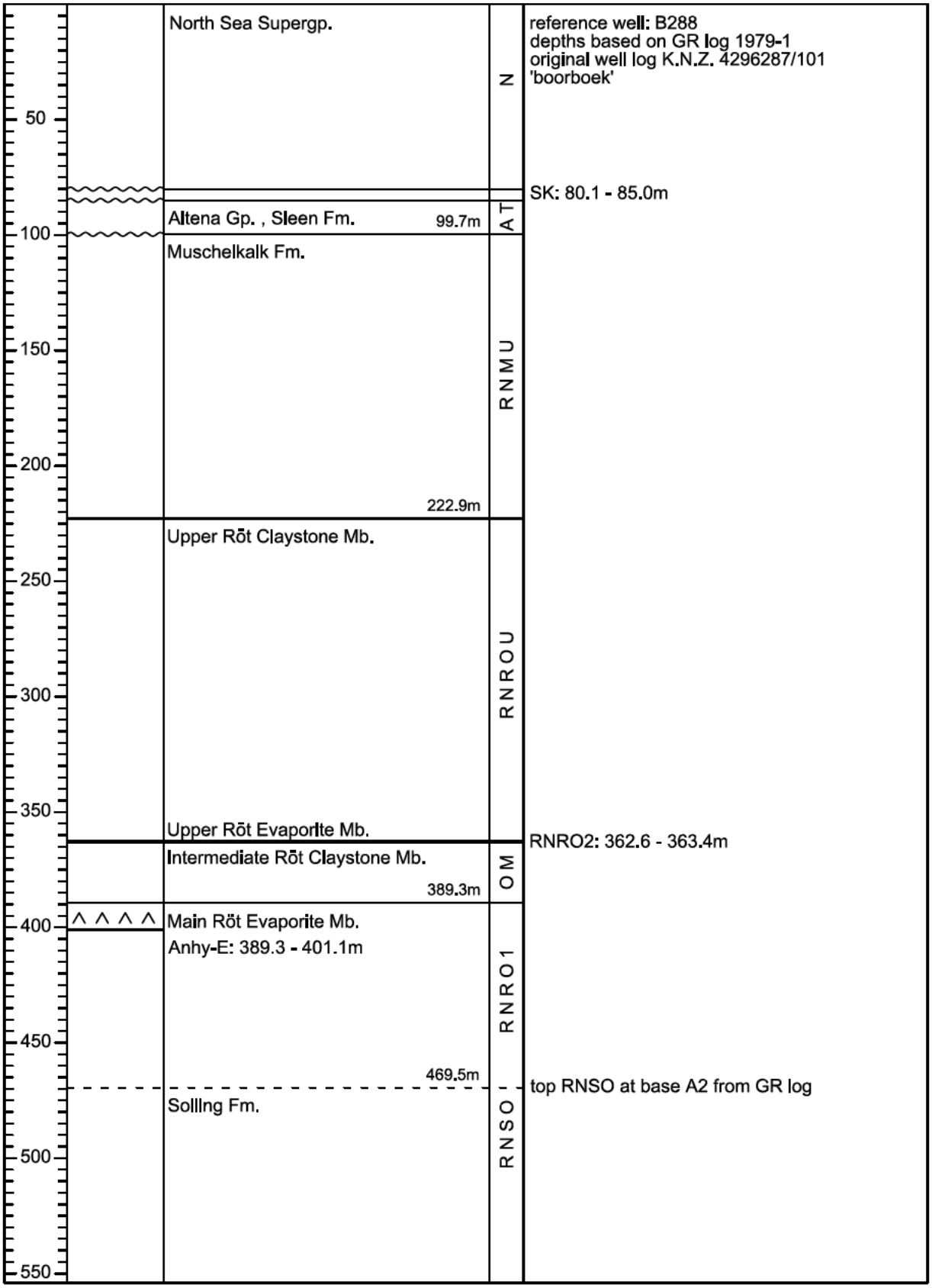
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B285 depths based on GR log 2009-15 original well log K.N.Z. 4296286/101
		68.7m		
		Niedersachsen Gp. 82.8m	SK	
		Altena Gp. , Sleen Fm. 95.6m	AT	
100		Muschelkalk Fm.	RNMU	
150				
200		214.5m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 356.8 - 357.4m
		Intermediate Röt Claystone Mb.	OM	
		384.1m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
400		Anhy-E: 384.1 - 396.8m		
450		468.7m		
		Solling Fm.	RNSO	
500				
550				

Well Data Series 287: Well B287

RD Coordinates:	X: 253811.5 Y: 470912.2	TD:	472.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	29th August 1979	CF:	+27.40m NAP
TD date:	11th September 1979	CF - GL(MV):	0m

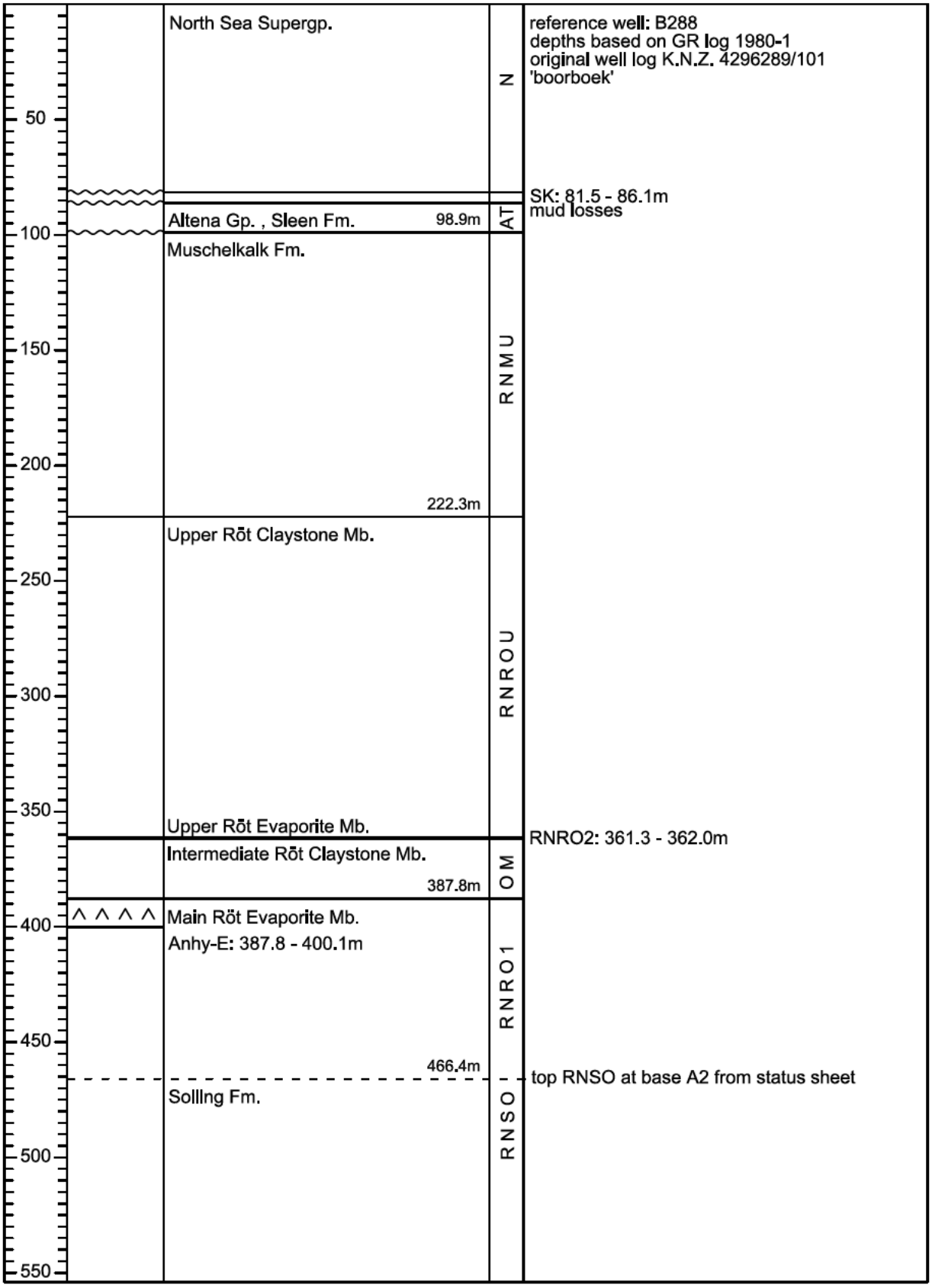
Scale: 1 : 2500



Well Data Series 287: Well B289

RD Coordinates:	X: 253731.1 Y: 470929.5	TD:	469.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st November 1979	CF:	+27.03m NAP
TD date:	6th December 1979	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 290: Well B291

RD Coordinates:	X: 253305.0 Y: 470864.3	TD:	468.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	2nd March 1981	CF:	+26.41m NAP
TD date:	1st July 1981	CF - GL(MV):	0m

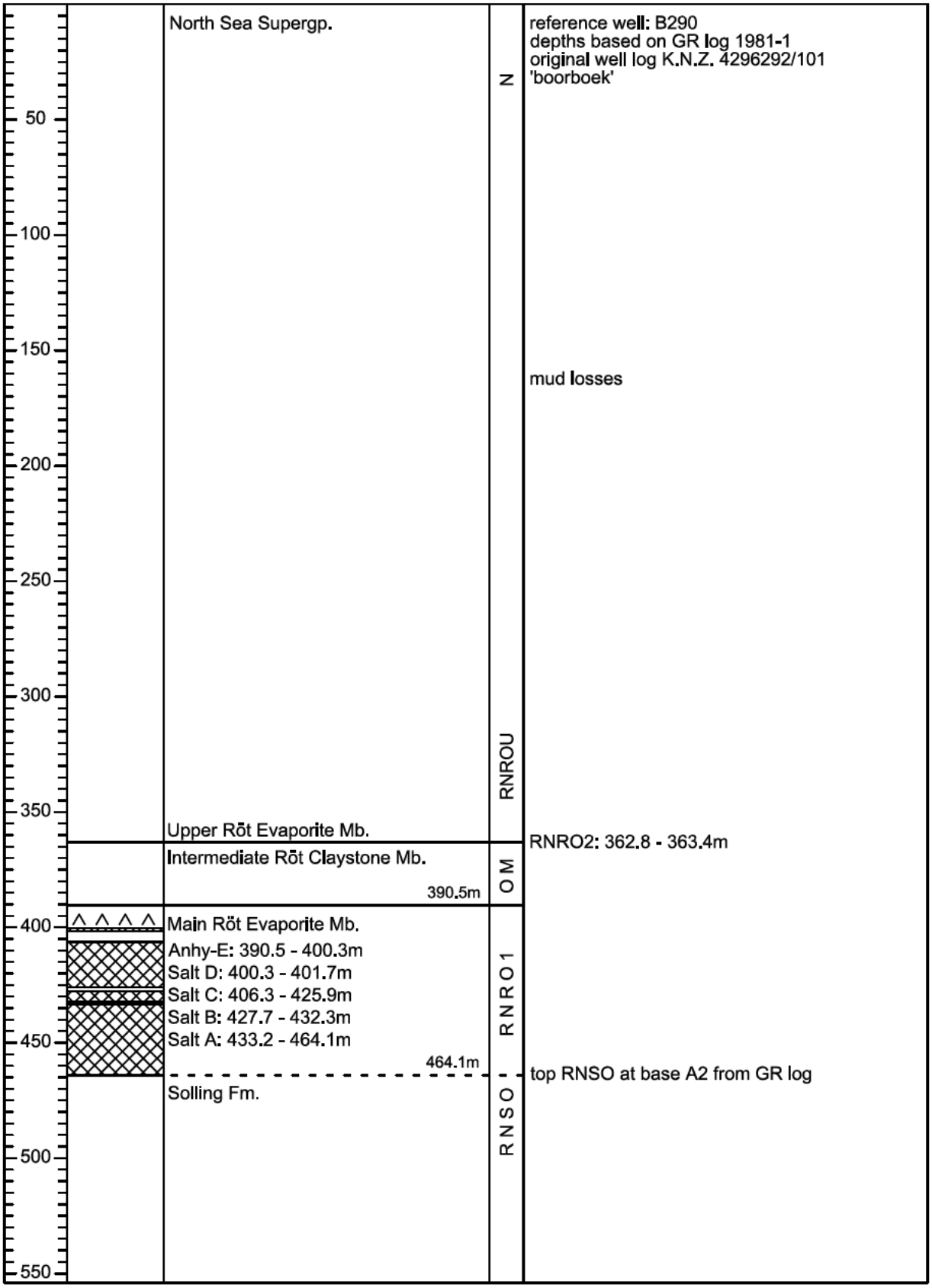
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	NSK	reference well: B290 depths based on GR log 1981-1 original well log K.N.Z. 4296291/101 'boorboek'
		Niedersachsen Gp. 95.9m		
100		Altena Gp. , Sleen Fm. 104.2m	AT	
		Muschelkalk Fm.	RNMU	
150				
200		227.1m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 364.3 - 365.0m
		Intermediate Röt Claystone Mb. 390.9m	OM	
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 390.9 - 402.4m Salt D: 402.4 - 403.6m Salt C: 407.7 - 428.5m Salt B: 430.0 - 435.3m Salt A: 436.0 - *466.1*m		
450		466.1m		top RNSO from orlginal well log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 290: Well B292

RD Coordinates:	X: 253265.4 Y: 470858.8	TD:	465.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	3rd august 1981	CF:	+26.35m NAP
TD date:	1st September 1981	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 293: Well B293

RD Coordinates:	X: 253106.8 Y: 470837.7	TD:	467.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th March 1981	CF:	+26.24m NAP
TD date:	2nd Aprll 1981	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B295 depths based on GR log 1981-1 original well log K.N.Z. 4296293/101 'boorboek'
100		Altena Gp. , Sleen Fm. 103.2m	AT	SK: 89.2 - 94.6m
150		Muschelkalk Fm.	RNMU	
200		225.4m		mud losses
250		Upper Rōt Claystone Mb.	RNROU	
300				
350		Upper Rōt Evaporite Mb.		RNRO2: 363.0 - 363.8m
		Intermediate Rōt Claystone Mb. 389.4m	OM	
400		Main Rōt Evaporite Mb. Anhy-E: 389.4 - 400.8m Salt D: 400.8 - 403.1m Salt C: 406.8 - 427.6m Salt B: 429.5 - 433.4m Salt A: 434.3 - 463.6m	RNRO1	
450		464.5m		
500		Solling Fm.	RNSO	
550				

Well Data Series 293: Well B294

RD Coordinates:	X: 253067.2 Y: 470832.1	TD:	465.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	24th February 1981	CF:	+26.25m NAP
TD date:	6th March 1981	CF - GL(MV):	0m

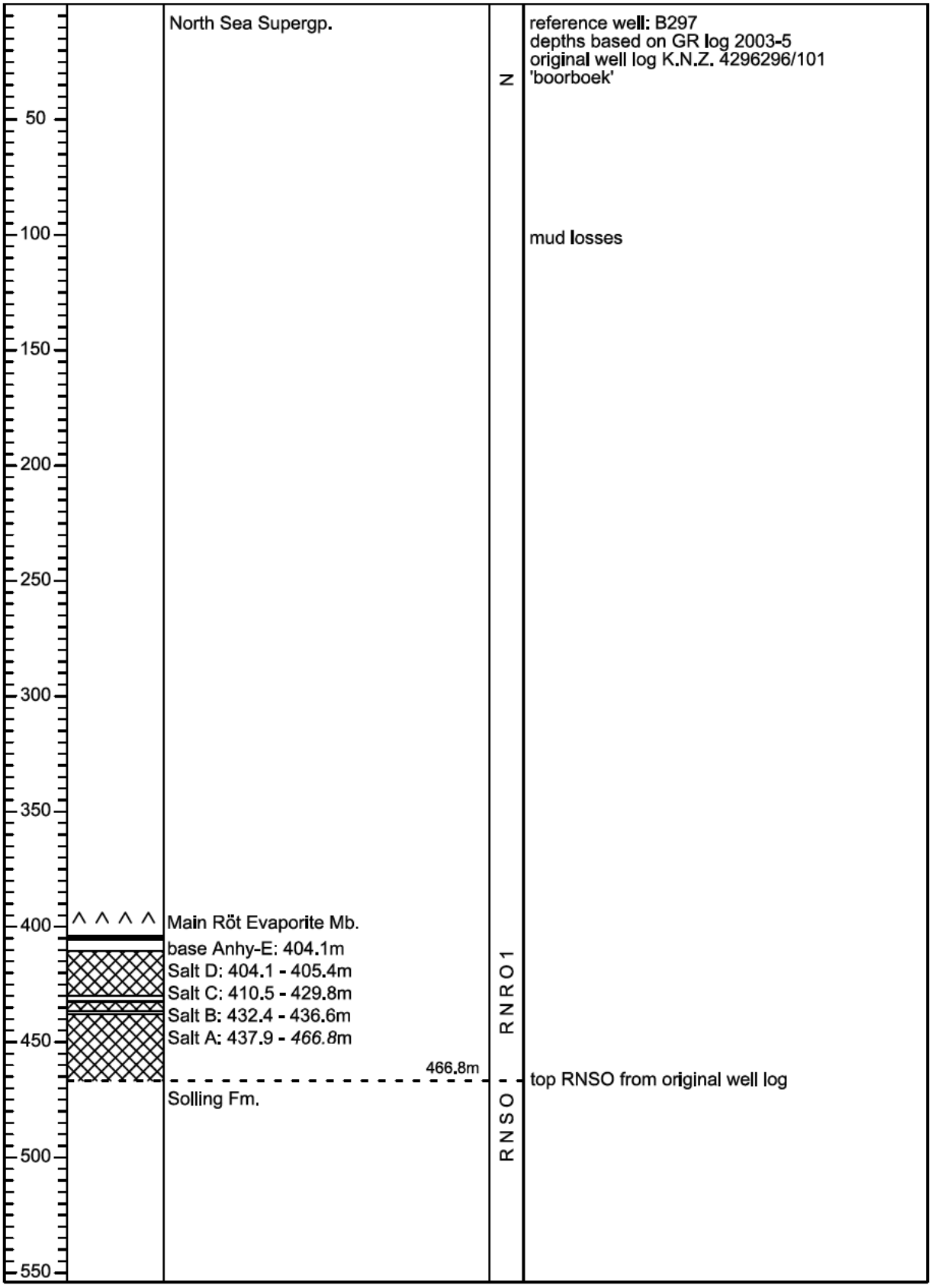
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B295 depths based on GR log 1992-2 original well log K.N.Z. 4296294/101 'boorboek'
100		Altena Gp. , Sleen Fm. 104.1m	AT	SK: 91.7 - 94.6m
150		Muschelkalk Fm.	RNMU	
200		226.8m		mud losses
250		Upper Röt Claystone Mb.	RNROU	
300		Upper Röt Evaporite Mb.		RNRO2: 364.7 - 365.4m
350		Intermediate Röt Claystone Mb. 391.3m	OM	
400		Main Röt Evaporite Mb. Anhy-E: 391.3 - 402.6m Salt D: 402.6 - 404.2m Salt C: 409.2 - 429.1m Salt B: 431.0 - 435.6m Salt A: 436.4 - *465.1*m	RNRO1	
450		465.1m		top RNSO at base A2 from status sheet
500		Solling Fm.	RNSO	
550				

Well Data Series 296: Well B296

RD Coordinates:	X: 252869.3 Y: 470805.6	TD:	466.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	11th December 1980	CF:	+25.95m NAP
TD date:	29th December 1980	CF - GL(MV):	0m

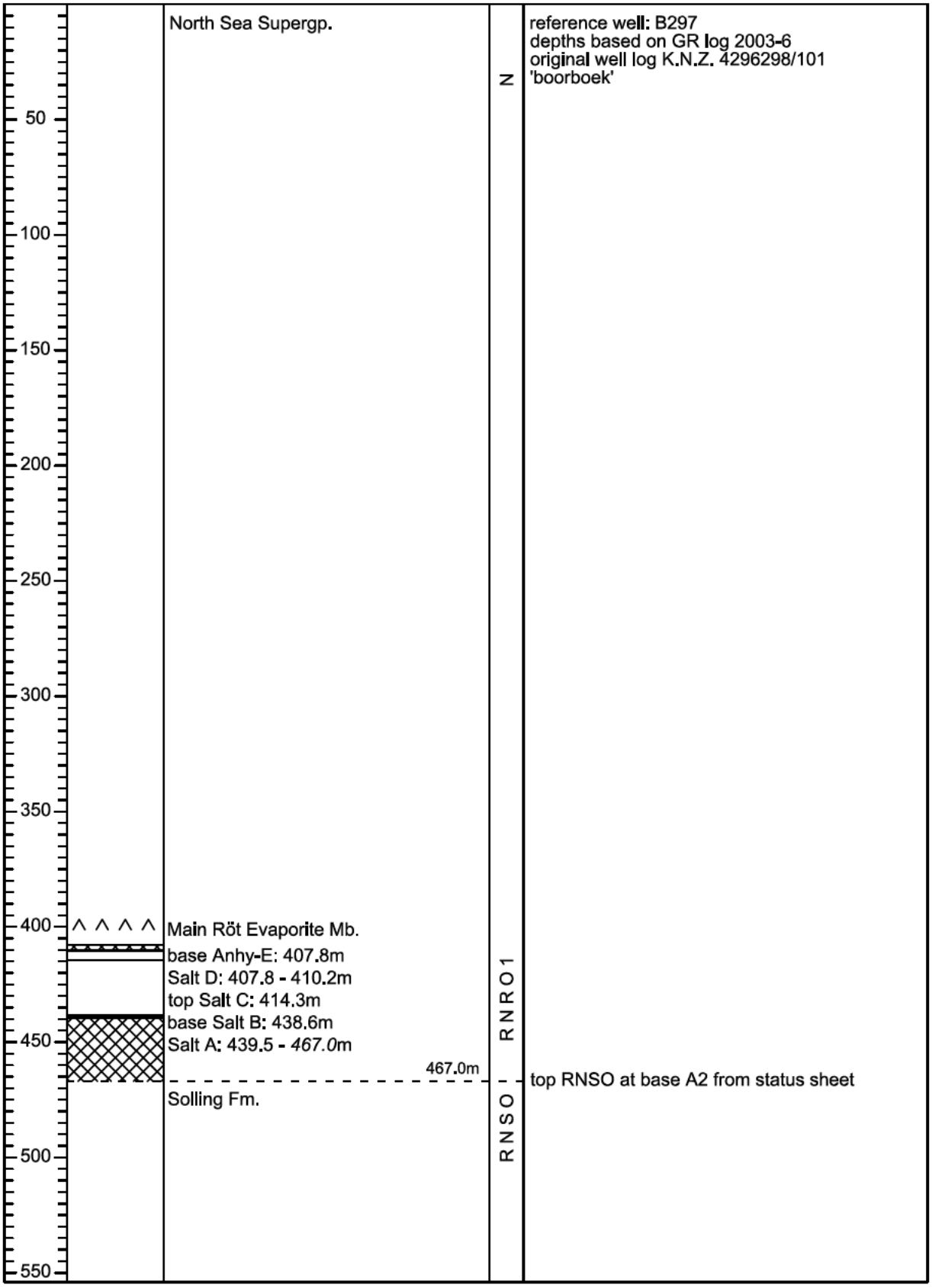
Scale: 1 : 2500



Well Data Series 296: Well B298

RD Coordinates:	X: 252789.8 Y: 470794.7	TD:	468.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	10th September 1980	CF:	+26.22m NAP
TD date:	23rd September 1980	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 299: Well B299

RD Coordinates:	X: 252631.3 Y: 470773.4	TD:	470.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	27th May 1982	CF:	+25.89m NAP
TD date:	9th June 1982	CF - GL(MV):	0m

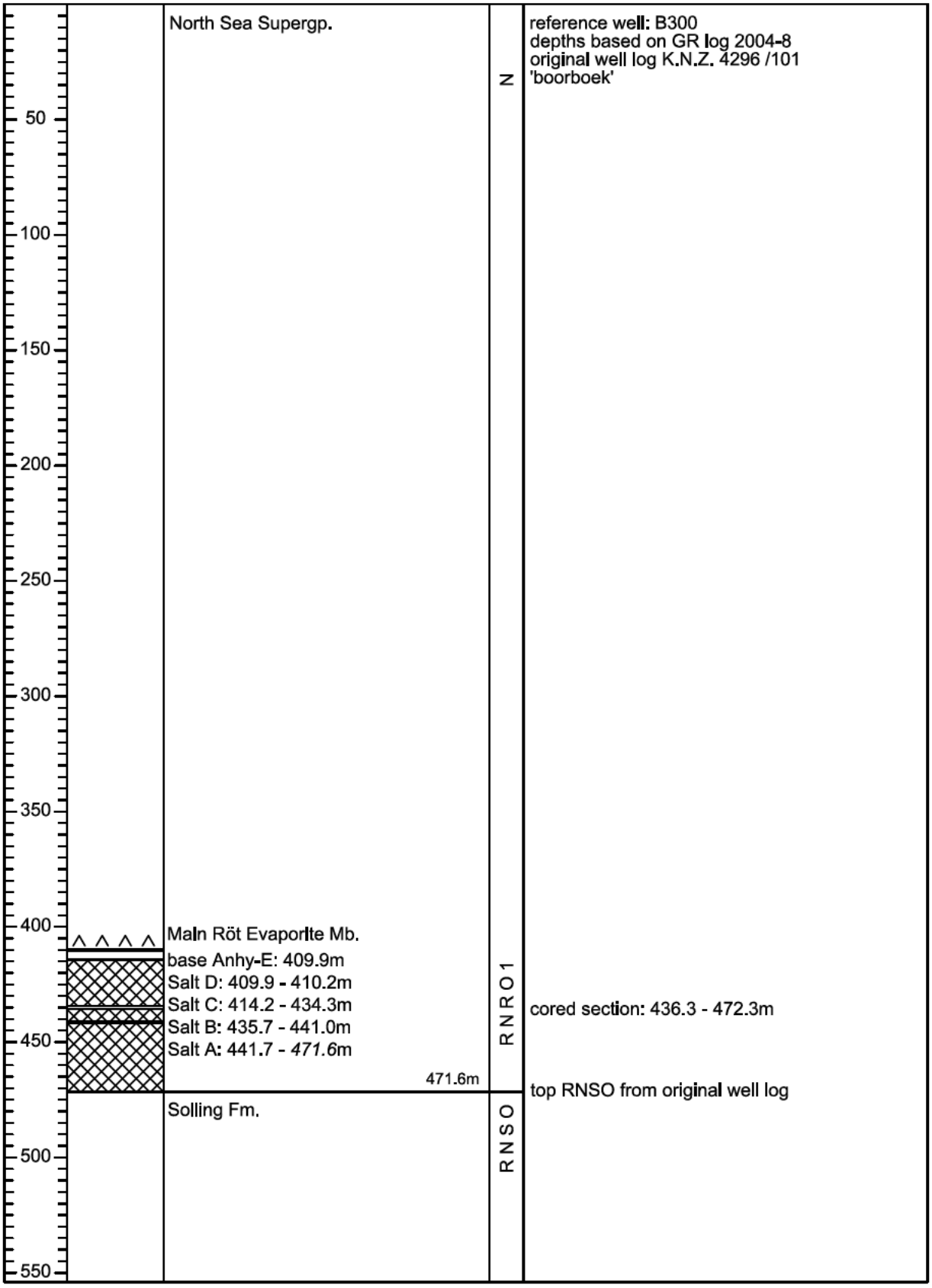
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B300 depths based on GR log 1982-1 original well log K.N.Z. 4296299/101 'boorboek'
100				
150				
200			RNMU	
		235.6m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350			OM	
		397.1m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 397.1 - 408.8m		
		Salt C: 413.7 - 433.2m		
		Salt B: 435.3 - 440.3m		
450		Salt A: 441.0 - *469.9*m		
		469.9m		
		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
500				
550				

Well Data Series 299: Well B301

RD Coordinates:	X: 252552.2	TD:	472.3m
	Y: 470763.0	Depth reference:	Conductor Flange (CF)
Spud date:	7th April 1982	CF:	+25.83m NAP
TD date:	23rd April 1982	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 302: Well B302

RD Coordinates:	X: 252393.9 Y: 470742.1	TD:	476.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	11th March 1982	CF:	+25.42m NAP
TD date:	26 March 1982	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B304 depths based on GR log 1982-1 original well log K.N.Z. 4296302/101 'boorboek'
100				
150				
200				
250		240.6m Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 376.1 - 376.5m
400		Intermedlate Röt Claystone Mb. 402.2m	OM	
450		Main Röt Evaporite Mb. Anhy-E: 402.2 - 412.6m Salt D: 412.6 - 416.7m Salt C: 421.0 - 440.3m Salt B: 442.0 - 446.9m Salt A: 447.8 - 475.9m 476.2m	RNRO1	cored section: 444.5 - 476.7m
500		Solling Fm.	RNSO	
550				

Well Data Series 302: Well B303

RD Coordinates:	X: 252354.2 Y: 470736.8	TD:	479.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	3rd November 1981	CF:	+25.18m NAP
TD date:	24th November 1981	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B304 depths based on GR log 1981-1 original well log K.N.Z. 4296303/101 'boorboek'
100				
150				
200				
250		243.6m	RNMU	cored section: 217.5 - 224.2m
300		Upper Röt Claystone Mb.	RNROU	cored section: 277.5 - 283.8m
350				cored section: 333.7 - 337.7
400		Upper Röt Evaporite Mb.		RNRO2: 378.0 - 378.6m
		Intermediate Röt Claystone Mb. 403.5m	OM	
450		Main Röt Evaporite Mb. Anhy-E: 403.5 - 414.6m Salt D: 414.6 - 416.6m Salt C: 420.6 - 441.0m Salt B: 442.9 - 447.1m Salt A: 447.8 - 476.9m 477.7m	RNRO1	cored section: 455.0 - 472.9m
500		Solling Fm.	RNSO	
550				

Well Data Series 311: Well B312

RD Coordinates:	X: 251648.1 Y: 471336.4	TD:	493.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	15th November 1982	CF:	+23.76m NAP
TD date:	2nd December 1982	CF - GL(MV):	0.02m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B311 depths based on GR log 1982-1 original well log K.N.Z. 4296312/101 'boorboek'
100		110.9m		
		Niedersachsen Gp.	SK	
150				mud losses, 6m3
200			RNMU	
250		Muschelkalk Fm. 254.9m		
		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 388.2 - 388.9m
400		Intermediate Röt Claystone Mb. 414.0m	OM	
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
450		Anhy-E: 414.0 - 424.6m		
		493.1m		
500		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
550				

Well Data Series 311: Well B313

RD Coordinates:	X: 251687.5 Y: 471331.9	TD:	490.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th September 1982	CF:	+23.89m NAP
TD date:	27th September 1982	CF - GL(MV):	0m

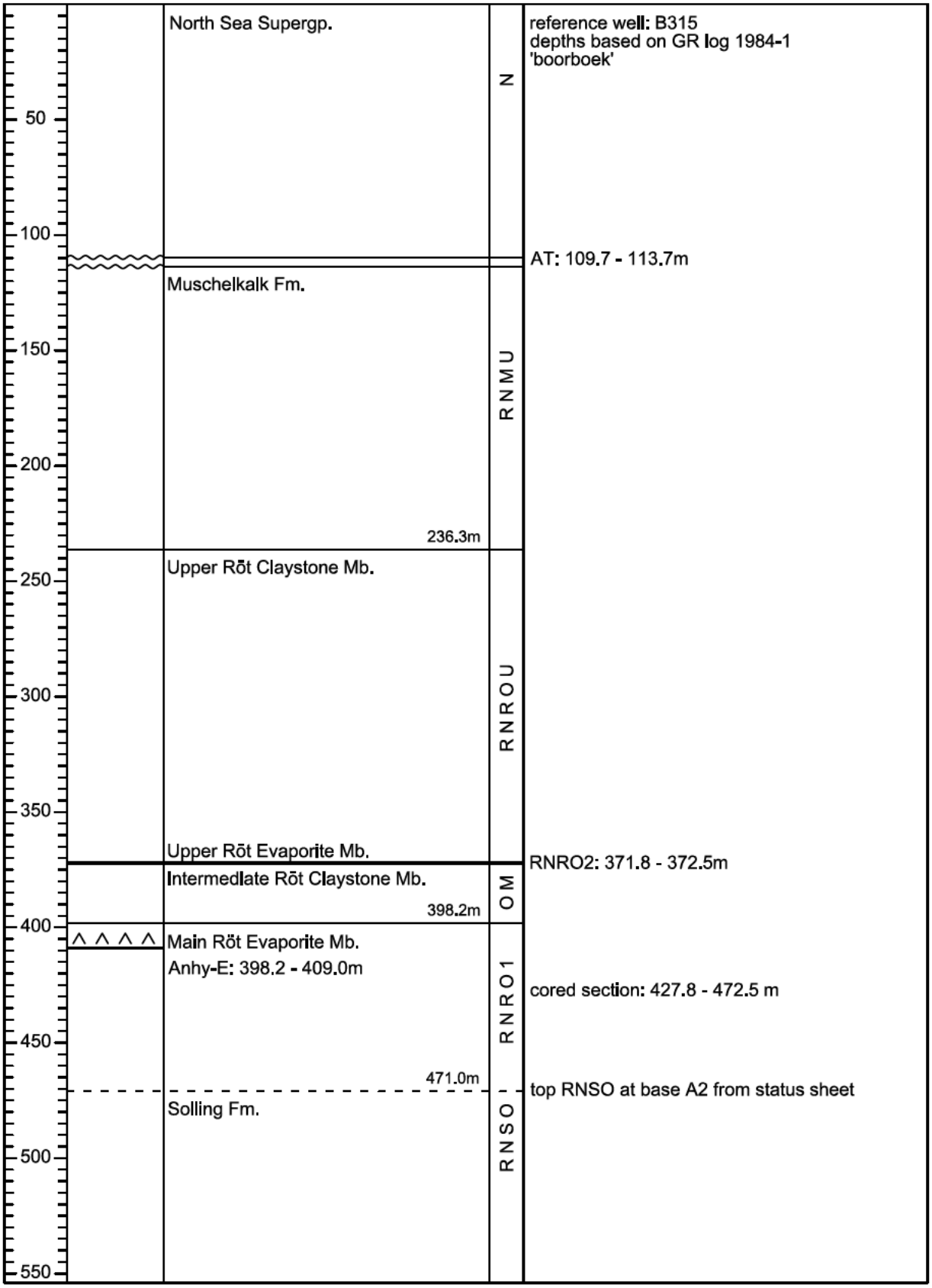
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B311 depths based on GR log 1982-1 original well log K.N.Z. 4296313/101 'boorboek'
100				
150				
200				
250				
300				
350				
400				
	^ ^ ^ ^	Main Röt Evaporite Mb.		cored section: 425.7 - 490.9m
450		base Anhy-E: 423.4m	RNRO1	
		490.0m		
500		Solling Fm.	RNSO	
550				

Well Data Series 314: Well B314

RD Coordinates:	X: 251846.1 Y: 471532.8	TD:	472.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	6th February 1984	CF:	+24.08m NAP
TD date:	23rd February 1984	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 314: Well B316

RD Coordinates:	X: 251833.7 Y: 471453.6	TD:	477.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	4th November 1983	CF:	+24.23m NAP
TD date:	24th November 1983	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B315 depths based on GR log 1983-1R 'boorboek'
100		109.2m		
		Altena Gp. , Sleen Fm. 117.6m	AT	
		Muschelkalk Fm.	RNMU	
150				mud losses, 1.5m3
200		240.9m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 376.6 - 376.8m
		Intermediate Röt Claystone Mb.	OM	
400		402.1m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 402.1 - 414.6m		
450		477.9m		
		Solling Fm.	RNSO	
500				
550				

Well Data Series 317: Well B318

RD Coordinates:	X: 251808.5 Y: 471189.3	TD:	489.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	4th June 1984	CF:	24.05m NAP
TD date:	27th June 1984	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B317 'boorboek'
100				
150				
200				
250				
300				
350				
400				
	^ ^ ^ ^	Main Röt Evaporite Mb. base Anhy-E: 421.8m	RNRO1	cored section: 414.1 - 489.8m base Anhy-E based on GR log 1984-1
450				
		489.6m		top RNSO at base A2 from status sheet
500		Solling Fm.	RNSO	
550				

Well Data Series 317: Well B319

RD Coordinates:	X: 251802.4 Y: 471149.9	TD:	492.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	28th August 1984	CF:	+24.28m NAP
TD date:	24th September 1984	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B317 depths based on GR log 1984-1 'boorboek'
100		107.1m		
		Niedersachsen Gp.	SK	
		Altena Gp. . Sleen Fm.		AT: 126.4 - 132.0m
150		Muschelkalk Fm.	RNMU	
200				
250		253.8m		
		Upper Rōt Claystone Mb.	RNROU	
300				
350		Upper Rōt Evaporite Mb.		RNRO2: 387.2 - 388.3m cored section: 390.0 - 456.6m
400		Intermediate Rōt Claystone Mb.	OM	
		413.1m		
	^ ^ ^ ^	Main Rōt Evaporite Mb.	RNRO1	
		Anhy-E: 413.1 - 424.5m		
450		491.8m		
		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
500				
550				

Well Data Series 320: Well B321

RD Coordinates:	X: 251771.0 Y: 470849.0	TD:	502.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	3rd December 1984	CF:	+24.26m NAP
TD date:	18th December 1984	CF - GL(MV):	0m

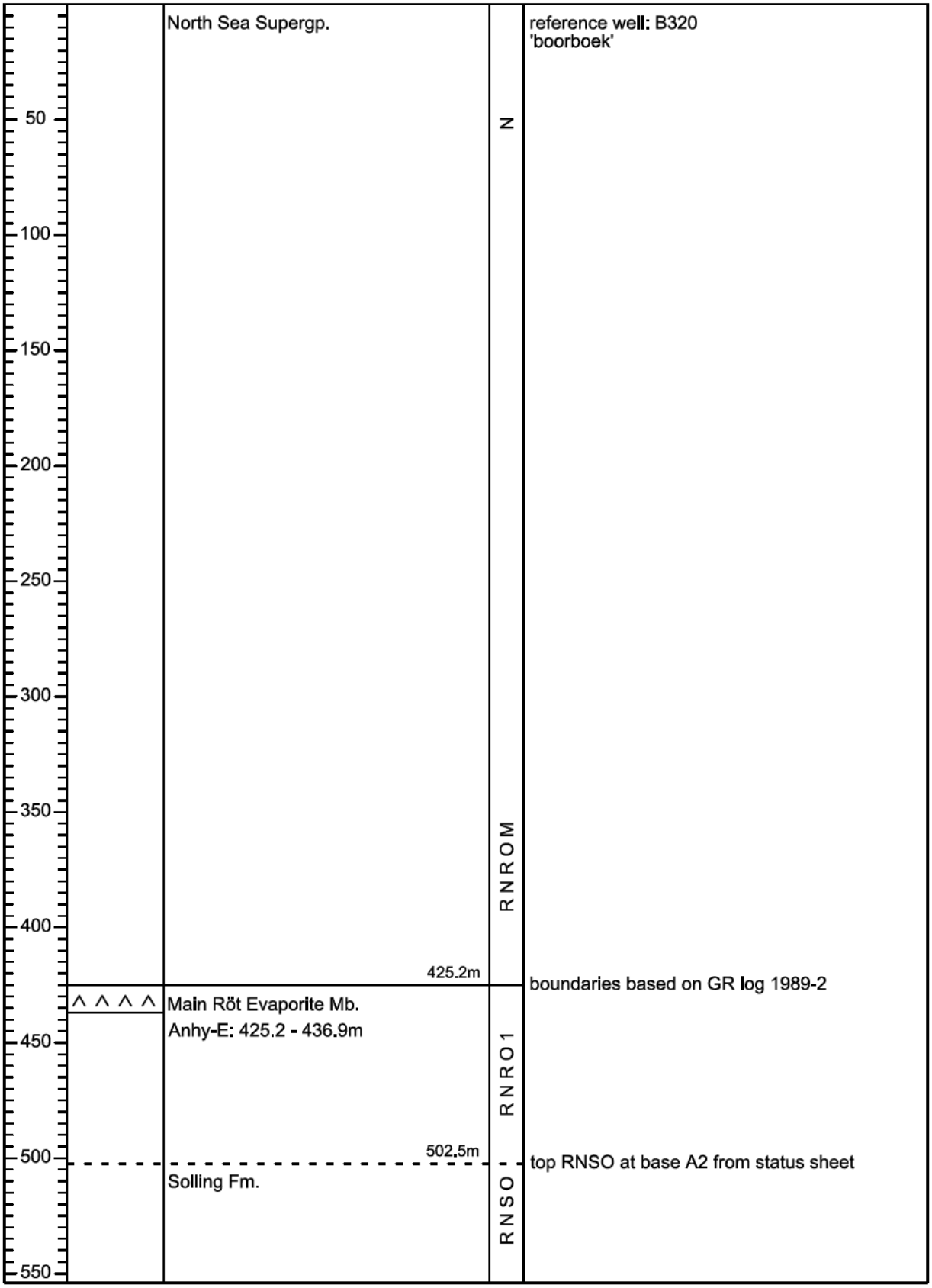
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B320 depths based on GR log 1985-1 'boorboek'
100		103.9m		
		Niedersachsen Gp.	SK	
150		Altena Gp. , Sleen Fm.		AT: 141.9 - 147.6m
		Muschelkalk Fm.	RNMU	
200				
250		264.0m		
		Upper Röt Claystone Mb.	RNROU	
300				
350				
		Upper Röt Evaporite Mb.		RNRO2: 397.1 - 397.6m
400		Intermediate Röt Claystone Mb.	OM	
		422.6m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section: 434.0 - 503.2m
450		Anhy-E: 422.6 - 434.2m		
		501.5m		
500		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
550				

Well Data Series 320: Well B322

RD Coordinates:	X: 251766.3 Y: 470809.3	TD:	503.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	15th January 1985	CF:	+24.37m NAP
TD date:	13th February1985	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 323: Well B324

RD Coordinates:	X: 251915.4 Y: 470688.6	TD:	497.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	27th March 1985	CF:	+25.53m NAP
TD date:	12th April 1985	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B323 depths based on GR log 1985-1 'boorboek'
100		104.4m		
		Niedersachsen Gp.	SK	
				AT: 138.8 - 141.5m
150		Muschelkalk Fm.	RNMU	
200				
250		264.4m		
		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		
400				RNRO2: 395.2 - 396.1m
		Intermediate Röt Claystone Mb.	OM	
		421.2m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 421.1 - 432.9m		
450				
		495.4m		
500		Solling Fm.	RNSO	top RNSO at base A2 from GR log
550				

Well Data Series 325: Well B325

RD Coordinates:	X: 251931.6 Y: 471336.4	TD:	477.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	8th August 1985	CF:	+24.16m NAP
TD date:	28th August 1985	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B326 depths based on GR log 1985-1
100		107.6m		
		Altena Gp. , Sleen Fm. 118.7m	AT	
150		Muschelkalk Fm.	RNMU	
200		241.5m		
250		Upper Röt Claystone Mb.	RNROU	
300		Upper Röt Evaporite Mb.		RNRO2: 376.9 - 377.4m
350		Intermediate Röt Claystone Mb.	OM	
400		403.0m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
450		Anhy-E: 403.0 - 414.5m		
		476.7m		top RNSO at base A2 from status sheet
500		Solling Fm.	RNSO	
550				

Well Data Series 325: Well B327

RD Coordinates:	X: 252001.7 Y: 471333.2	TD:	474.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	6th November 1985	CF:	+24.53m NAP
TD date:	26th November 1985	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B326 depths based on GR log 1988-1 'boorboek'
100		Altena Gp. , Sleen Fm.		AT: 107.5 - 115.7m
		Muschelkalk Fm.	RNMU	mud losses
150				
200		239.1m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 374.4 - 374.9m
		Intermediate Röt Claystone Mb.	OM	
400		400.6m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 400.6 - 412.5m		
450		474.6m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
500				
550				

Well Data Series 328: Well B328

RD Coordinates:	X: 252163.0 Y: 471392.6	TD:	466.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	8th August 1986	CF:	+25.05m NAP
TD date:	21st August 1986	CF - GL(MV):	0.01m

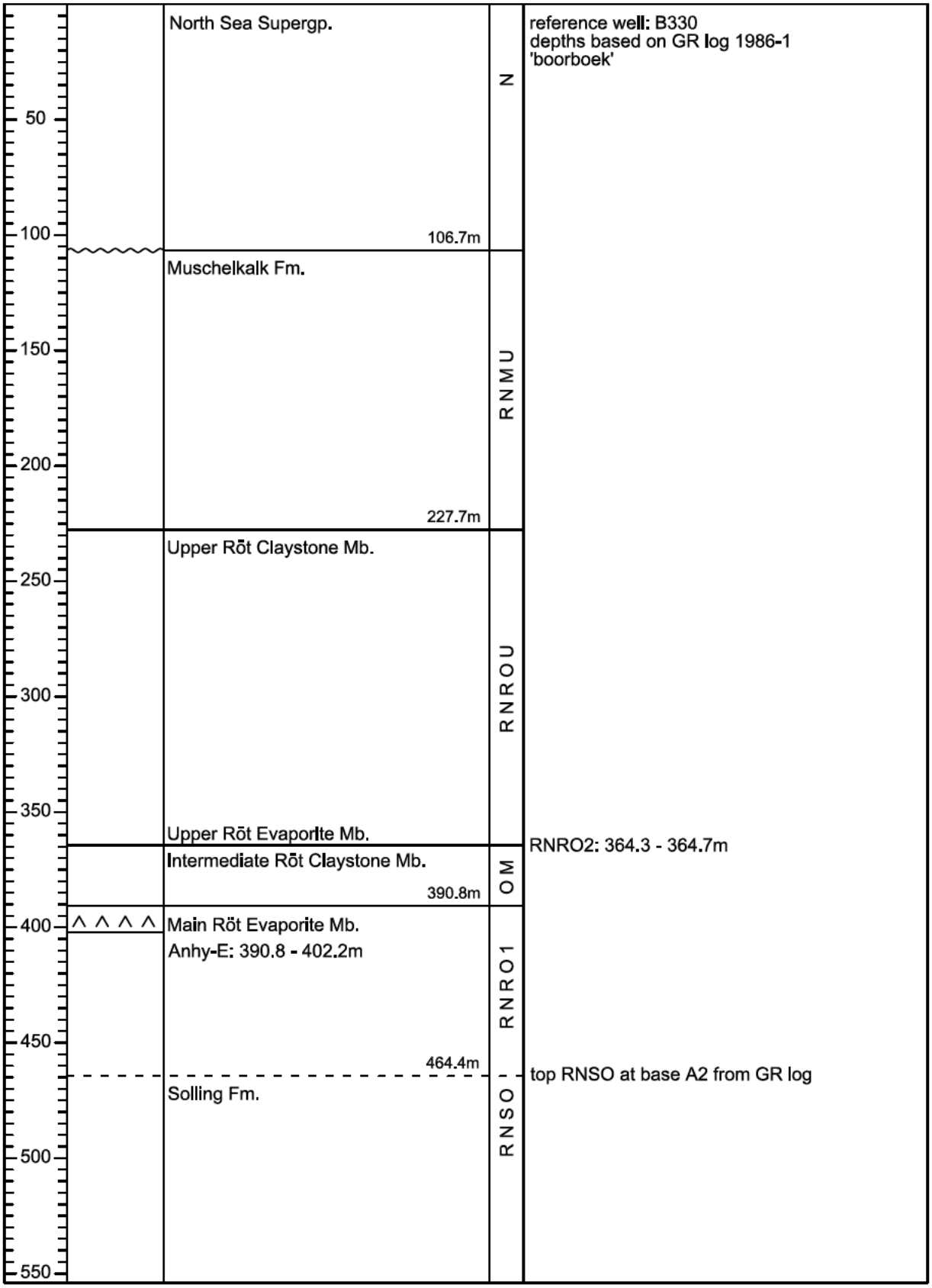
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B330 depths based on GR log 1986-1 'boorboek'
100		106.4m		
		Muschelkalk Fm.	RNMU	
150				
200		228.1m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 365.2 - 365.7m
		Intermediate Röt Claystone Mb.	OM	
		391.1m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 391.1 - 402.3m		
450		463.7m		top RNSO at base A2 from GR log
		Solling Fm.	RNSO	
500				
550				

Well Data Series 328: Well B329

RD Coordinates:	X: 252135.8 Y: 471422.0	TD:	465.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	18th September 1986	CF:	+24.80m NAP
TD date:	10th October 1986	CF - GL(MV):	-0.10m

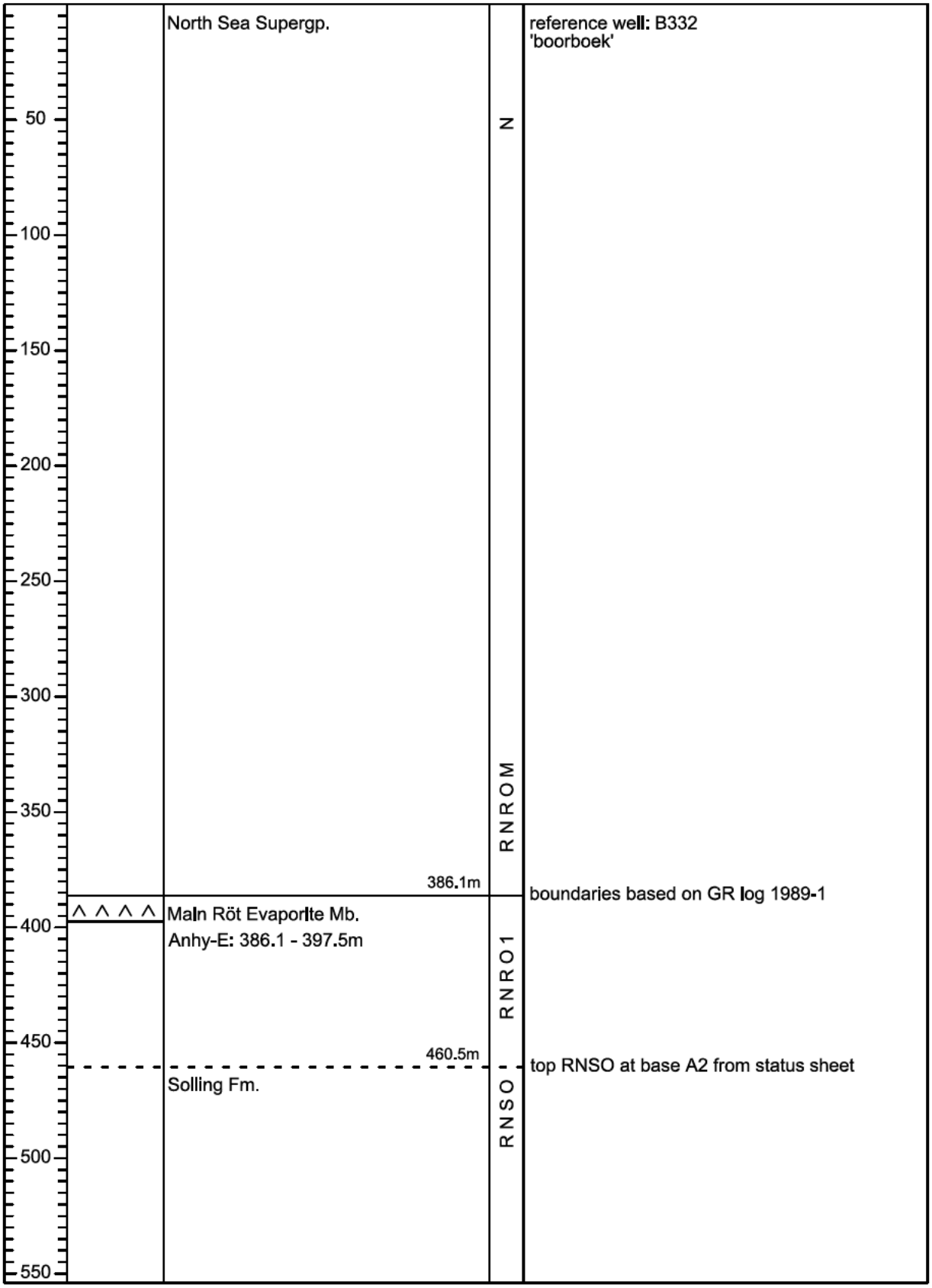
Scale: 1 : 2500



Well Data Series 331: Well B331

RD Coordinates:	X: 252034.7 Y: 471591.3	TD:	461.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	9th March 1987	CF:	+24.16m NAP
TD date:	24th March 1987	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 331: Well B333

RD Coordinates:	X: 251977.1 Y: 471630.2	TD:	461.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	1st December 1986	CF:	+24.13m NAP
TD date:	16th December 1986	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B332 depths based on GR log 1986-1 'boorboek'
100		108.4m		
150		Muschelkalk Fm.	RNMU	
200		227.0m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 363.3 - 363.8m
		Intermediate Röt Claystone Mb.	OM	
		388.9m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 388.9 - 400.9m		
450		461.2m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
500				
550				

Well Data Series 334: Well B334

RD Coordinates:	X: 252124.0	TD:	451.4m
	Y: 471758.6	Depth reference:	Conductor Flange (CF)
Spud date:	1st July 1987	CF:	+24.33m NAP
TD date:	13th July 1987	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
		North Sea Supergp.	N	reference well: B335 'boorboek'
50				
100				
150				
200				
250				
300				
350				
	^ ^ ^ ^	Main Röt Evaporite Mb.		base Anhy-E based on GR log 1987-1
400		base Anhy-E: 387.1m	RNRO1	
		448.6m		top RNSO at base A2 from GR log
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 334: Well B336

RD Coordinates:	X: 252202.9 Y: 471781.2	TD:	444.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	21th April 1987	CF:	+24.33m NAP
TD date:	11th May 1987	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B335 'boorboek'
100				
150				
200				
250				
300				
350				
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	base Anhy-E based on GR log 2006-12
400		base Anhy-E: 384.0m		
		444.3m		top RNSO at base A2 from status sheet
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 340: Well B340

RD Coordinates:	X: 251507.8 Y: 470862.1	TD:	519.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	24th November 1987	CF:	+24.21m NAP
TD date:	11th December 1987	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B341 depths based on GR log 1987-1 'boorboek'
100		107.0m		
		Niedersachsen Gp.	SK	
150		154.3m		
		Altena Gp. , Sleen Fm. 162.0m	AT	
		Muschelkalk Fm.	RNMU	
200				
250		281.2m		
		Upper Röt Claystone Mb.	RNROU	
300				
350				
400		Upper Röt Evaporite Mb.		RNRO2: 412.4 - 413.2m
		Intermediate Röt Claystone Mb.	OM	
		438.4m		
450	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 438.4 - 449.3m		
500		519.2m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
550				

Well Data Series 340: Well B342

RD Coordinates:	X: 251575.0 Y: 470827.6	TD:	515.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th September 1987	CF:	+24.38m NAP
TD date:	24th September 1987	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B341 depths based on GR log 1987-2 'boorboek'
100		106.4m		
		Niedersachsen Gp.	SK	
150		Altena Gp. , Sleen Fm.		AT: 153.4 - 160.4m
		Muschelkalk Fm.	RNMU	
200				
250		278.6m		
		Upper Röt Claystone Mb.	RNROU	
300				
350				
400			RNROM	
		435.3m		
	^ ^ ^ ^	Main Röt Evaporite Mb.		
450		Anhy-E: 435.3 - 447.2m		
			RNRO1	
500		515.0m		
		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
550				

Well Data Series 361: Well B362

RD Coordinates:	X: 252858.9 Y: 471168.2	TD:	457.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	9th May 1989	CF:	+26.31m NAP
TD date:	25th May 1989	CF - GL(MV):	0m

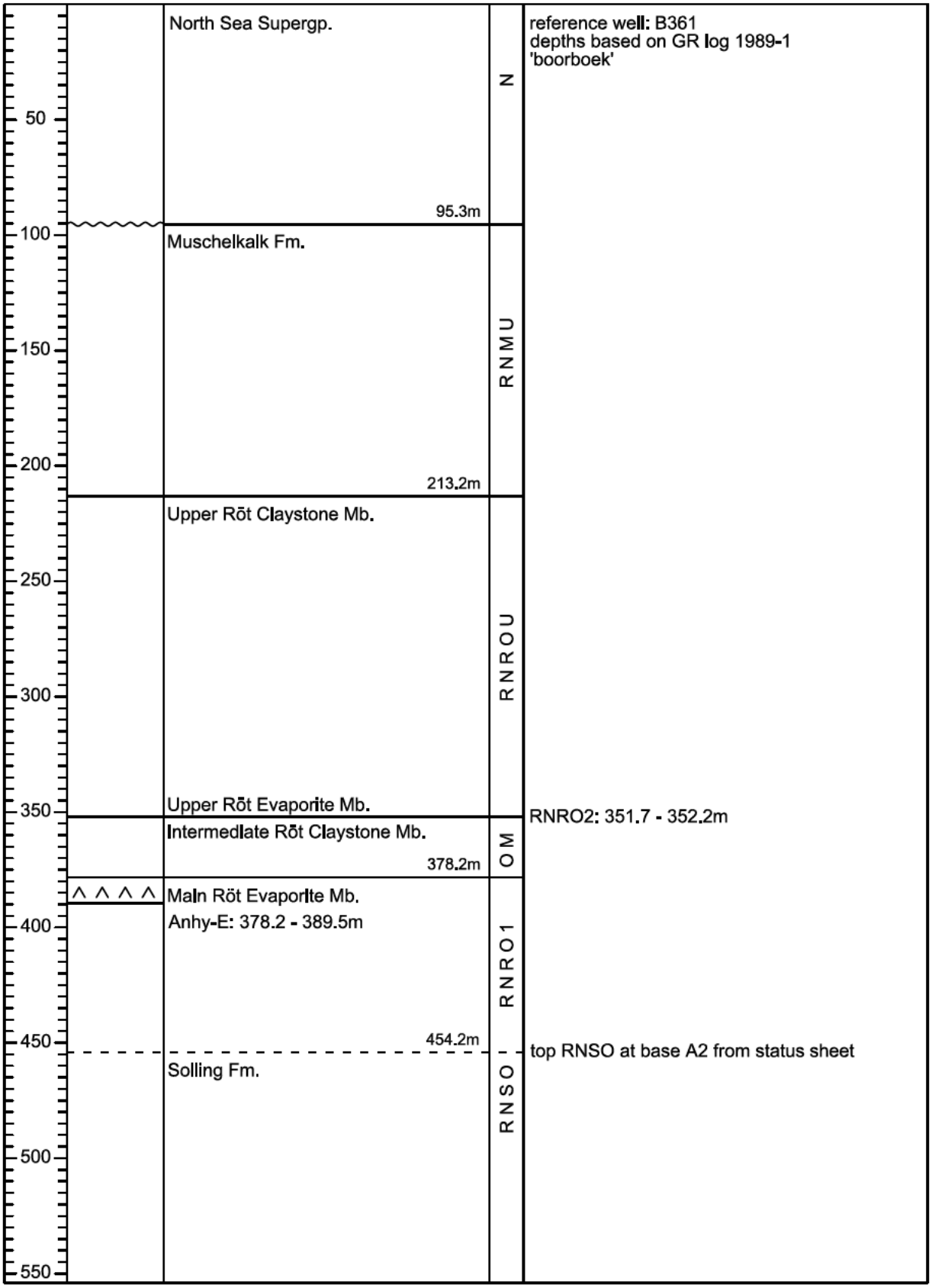
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B361 depths based on GR log 1989-1 'boorboek'
		97.5m		
100		Muschelkalk Fm.	RNMU	
150				
200		217.5m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 356.0 - 356.5m
		Intermediate Röt Claystone Mb.	OM	
		383.0m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	cored section: 391.5 - 457.8m
400		Anhy-E: 383.0 - 394.4m		
450		457.0m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
500				
550				

Well Data Series 361: Well B363

RD Coordinates:	X: 252892.9 Y: 471183.2	TD:	454.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th April 1989	CF:	+26.01m NAP
TD date:	18th April 1989	CF - GL(MV):	0m

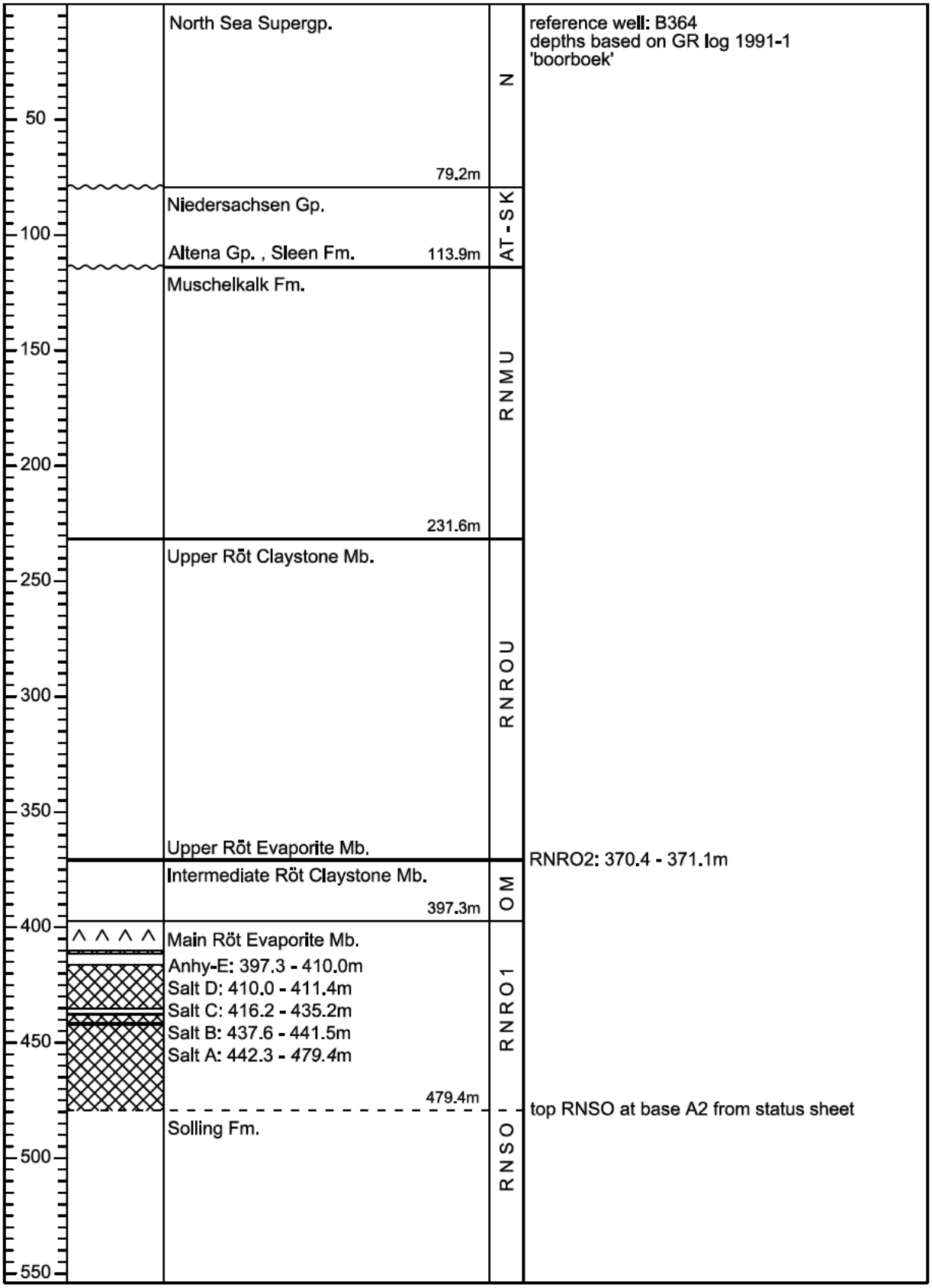
Scale: 1 : 2500



Well Data Series 364: Well B365

RD Coordinates:	X: 253749.5 Y: 470571.2	TD:	482.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	18th February 1991	CF:	+27.58m NAP
TD date:	25th Februay 1991	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 364: Well B366

RD Coordinates:	X: 253734.0 Y: 470532.2	TD:	480.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	18th March 1991	CF:	+27.84m NAP
TD date:	21st March 1991	CF - GL(MV):	0m

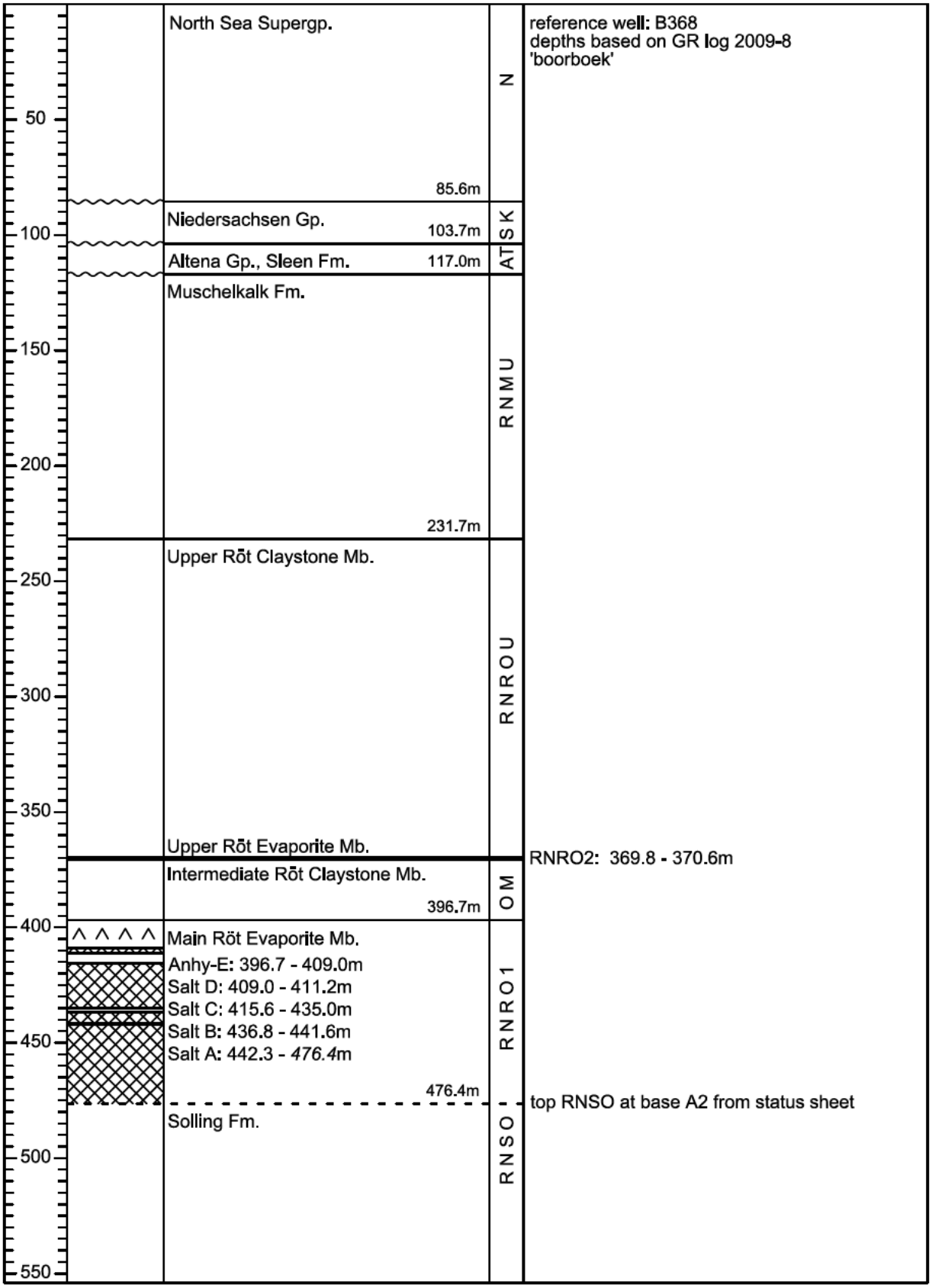
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp. 78.7m	N	reference well: B364 depths based on GR log 1991-1 'boorboek'
100		Niedersachsen Gp. 102.3m	SK	
		Altena Gp. , Sleen Fm. 114.6m	AT	
150		Muschelkalk Fm. 233.0m	RNMU	
200				
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 372.3 - 373.0m
		Intermediate Röt Claystone Mb. 399.3m	OM	
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 399.3 - 411.7m		
		Salt D: 411.7 - 413.5m		
450		Salt C: 418.4 - 438.2m		
		Salt B: 440.8 - 444.2m		
		Salt A: 444.8 - 480.1m 480.6m		
500		Solling Fm.	RNSO	
550				

Well Data Series 367: Well B367

RD Coordinates:	X: 253504.0 Y: 470588.7	TD:	476.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	6th December 1991	CF:	+26.92m NAP
TD date:	16th December 1991	CF - GL(MV):	-0.59m

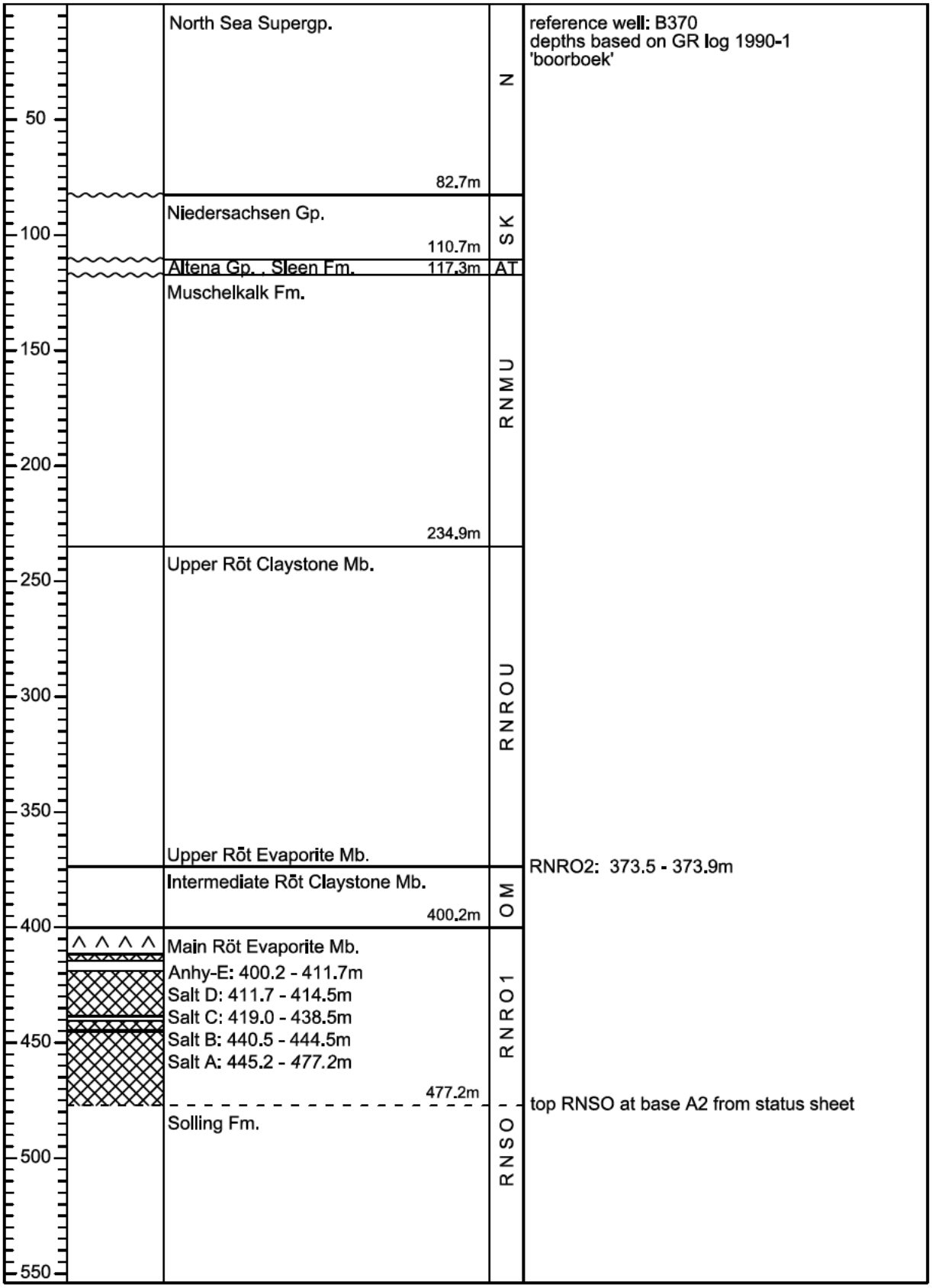
Scale: 1 : 2500



Well Data Series 369: Well B369

RD Coordinates:	X: 253445.5 Y: 470424.2	TD:	478.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	22nd October 1990	CF:	+27.50m NAP
TD date:	1st November 1990	CF - GL(MV):	0m

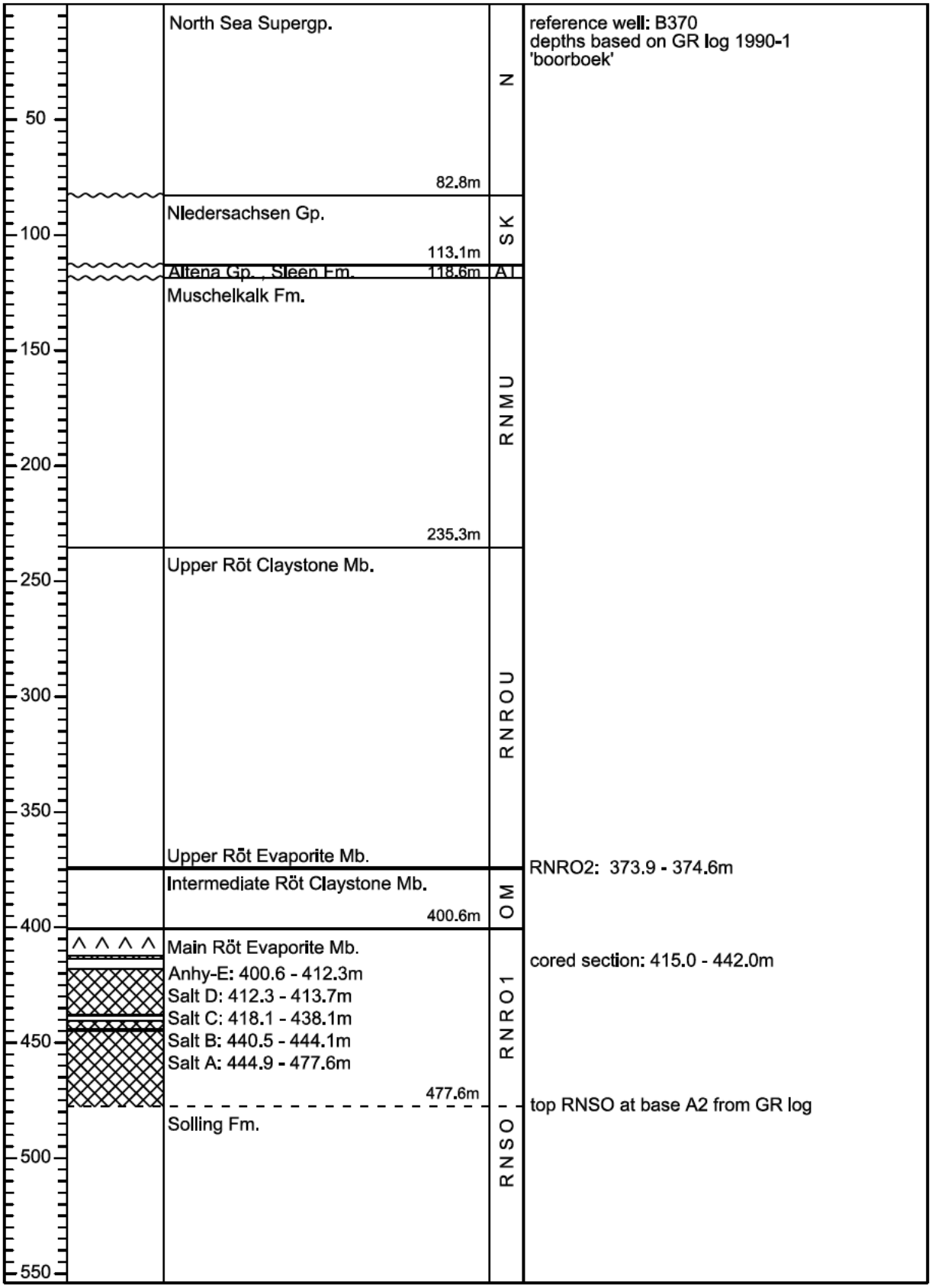
Scale: 1 : 2500



Well Data Series 369: Well B371

RD Coordinates:	X: 253446.2 Y: 470344.1	TD:	478.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	10th December 1990	CF:	+27.52m NAP
TD date:	17th December 1990	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 372: Well B373

RD Coordinates:	X: 253308.1 Y: 470130.5	TD:	477.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th January 1993	CF:	+27.89m NAP
TD date:	18th January 1993	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B372 depths based on GR log 1993-1 'boorboek'
		85.4m		
100		Niedersachsen Gp.	SK	
		115.7m		
150		Muschelkalk Fm.	RNMU	
200		229.8m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 368.7 - 369.4m
		Intermediate Röt Claystone Mb.	OM	
		395.7m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 395.7 - 408.0m		
		Salt D: 408.0 - 410.5m		
		Salt C: 416.1 - 434.7m		
450		Salt B: 437.4 - 441.4m		
		Salt A: 442.3 - 476.3m		
		477.2m		
500		Solling Fm.	RNSO	
550				

Well Data Series 372: Well B374

RD Coordinates:	X: 253278.8 Y: 470103.3	TD:	476.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	4th February 1993	CF:	+27.79m NAP
TD date:	12th February 1993	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B372 depths based on GR log 1993-1 'boorboek'
		85.6m		
100		Niedersachsen Gp.	SK	
		116.2m		
150		Muschelkalk Fm.	RNMU	
200		228.9m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 367.4 - 368.0m
		Intermediate Röt Claystone Mb.	OM	
		394.0m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 394.0 - 406.1m		
		Salt D: 406.1 - 408.1m		
		Salt C: 412.7 - 433.4m		
450		Salt B: 435.6 - 439.8m		
		Salt A: 440.6 - 475.9m		
		476.7m		
		Solling Fm.	RNSO	
500				
550				

Well Data Series 375: Well B375

RD Coordinates:	X: 253141.2 Y: 470020.3	TD:	472.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	24th February 1993	CF:	+27.22m NAP
TD date:	4th March 1993	CF - GL(MV):	0m

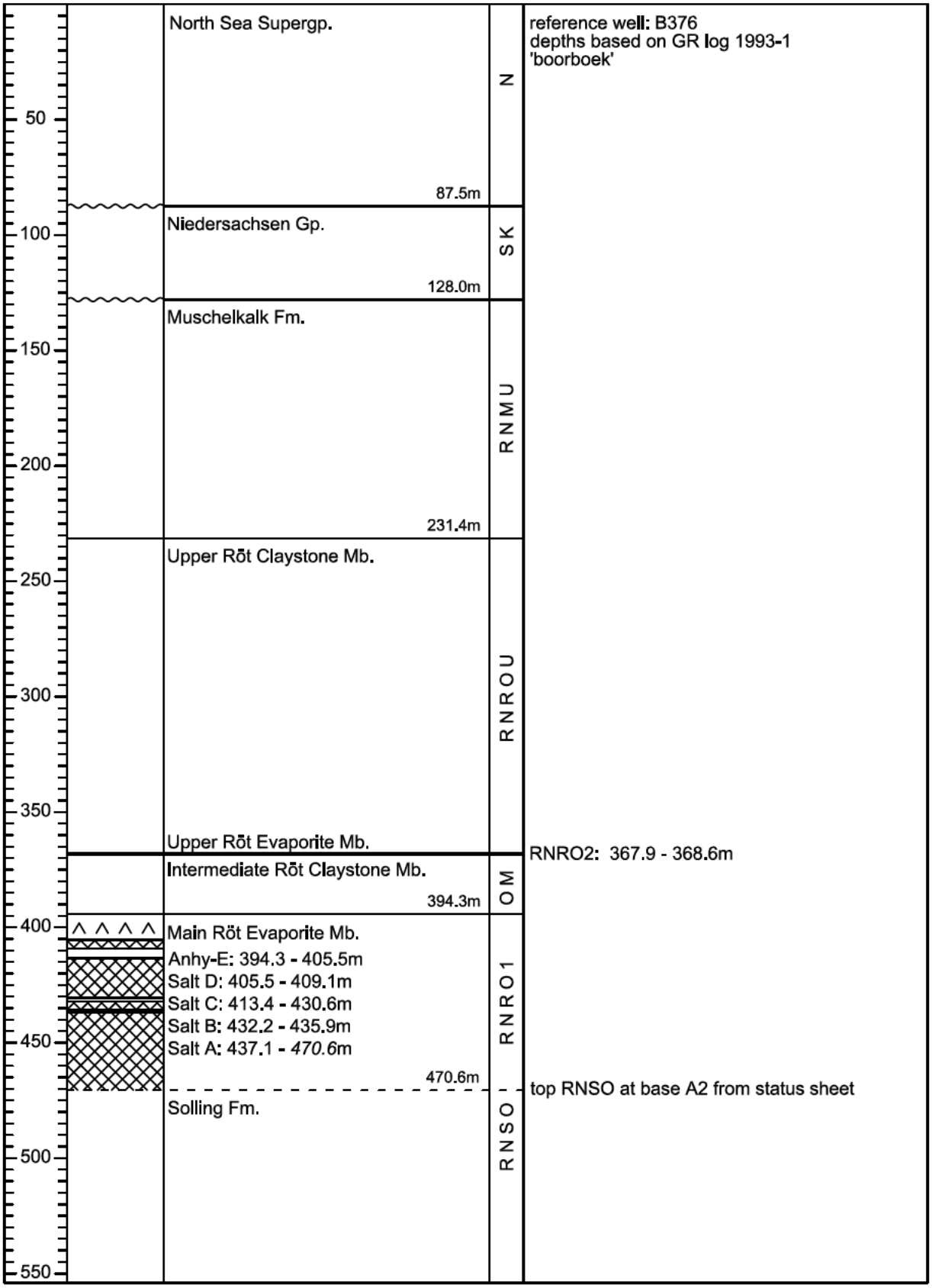
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B376 depths based on GR log 1993-1 'boorboek'
		87.6m		
100		Niedersachsen Gp.	SK	
		124.0m		
150		Muschelkalk Fm.	RNMU	
200		229.6m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 365.8 - 366.6m
		Intermediate Röt Claystone Mb.	OM	
		392.5m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 392.5 - 403.0m		
		Salt C: 407.2 - 424.7m		
		Salt B: 426.5 - 429.9m		
450		Salt A: 430.9 - 472.2m		
		472.6m		
		Solling Fm.	RNSO	
500				
550				

Well Data Series 375: Well B377

RD Coordinates:	X: 253065.6 Y: 469994.4	TD:	470.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	14th April 1993	CF:	+27.09m NAP
TD date:	21st April 1993	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 378: Well B379

RD Coordinates:	X: 252867.1 Y: 469980.0	TD:	470.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st June 1993	CF:	+27.24m NAP
TD date:	28th June 1993	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B378 depths based on GR log 1993-1 'boorboek'
		91.8m		
100		Niedersachsen Gp.	SK	
		133.8m		
150		Muschelkalk Fm.	RNMU	
		235.5m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 370.2 - 371.3m
		Intermediate Röt Claystone Mb.	OM	
		396.6m		
400		Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 396.6 - 406.8m Salt D: 406.8 - 410.4m Salt C: 415.8 - 432.4m Salt B: 434.7 - 438.4m Salt A: 439.4 - 470.2m		
450		470.7m		
		Solling Fm.	RNSO	
500				
550				

Well Data Series 378: Well B380

RD Coordinates:	X: 252827.3 Y: 469983.3	TD:	469.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	12th July 1993	CF:	+26.74m NAP
TD date:	23rd July 1993	CF - GL(MV):	0m

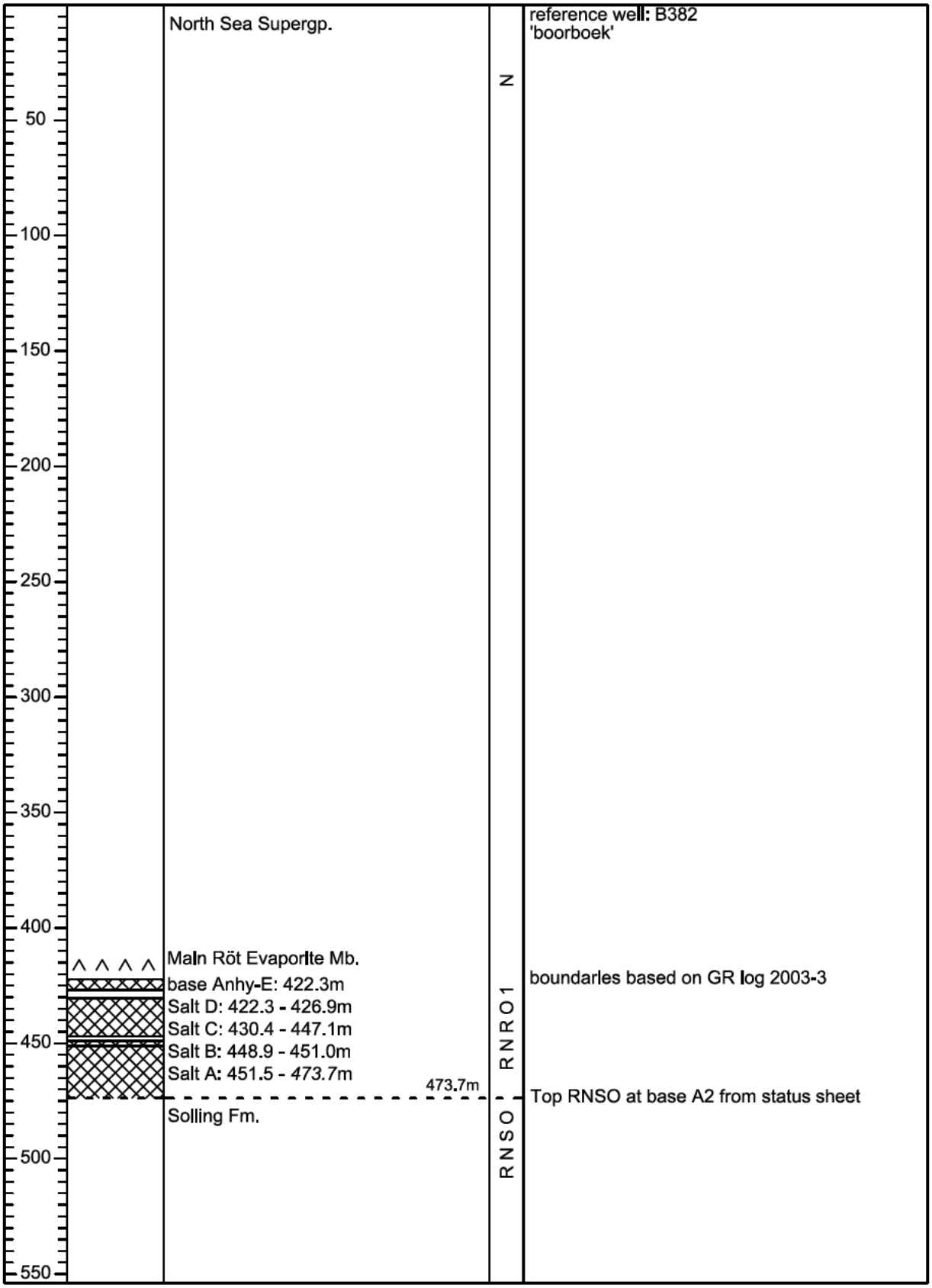
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp. 93.6m	N	reference well: B378 depths based on GR log 1993 'boorboek'
100		Niedersachsen Gp. 236.3m	SK RNMU	
150				
200				
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 371.5 - 372.3m fault in RNROM
		Intermediate Röt Claystone Mb. 394.8m	OM	
400	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 394.8 - 406.0m Salt D: 406.0 - 410.6m Salt C: 415.3 - 433.1m Salt B: 435.2 - 439.3m Salt A: 440.1 - 470.2m 470.8m	RNRO1	cored section: 403.5 - 468.8m
450				
		Solling Fm.	RNSO	
500				
550				

Well Data Series 381: Well B383

RD Coordinates:	X: 252521.0 Y: 470143.4	TD:	474.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	23rd June 1998	CF:	+26.24m NAP
TD date:	7th July 1998	CF - GL(MV):	0.14m

Scale: 1 : 2500



Well Data Series 387: Well B387

RD Coordinates:	X: 252380.80	TD:	480.4m
	Y: 470464.80	Depth reference:	Conductor Flange (CF)
Spud date:	13th July 1992	CF:	+25.82m NAP
TD date:	23rd July 1992	CF - GL(MV):	0m

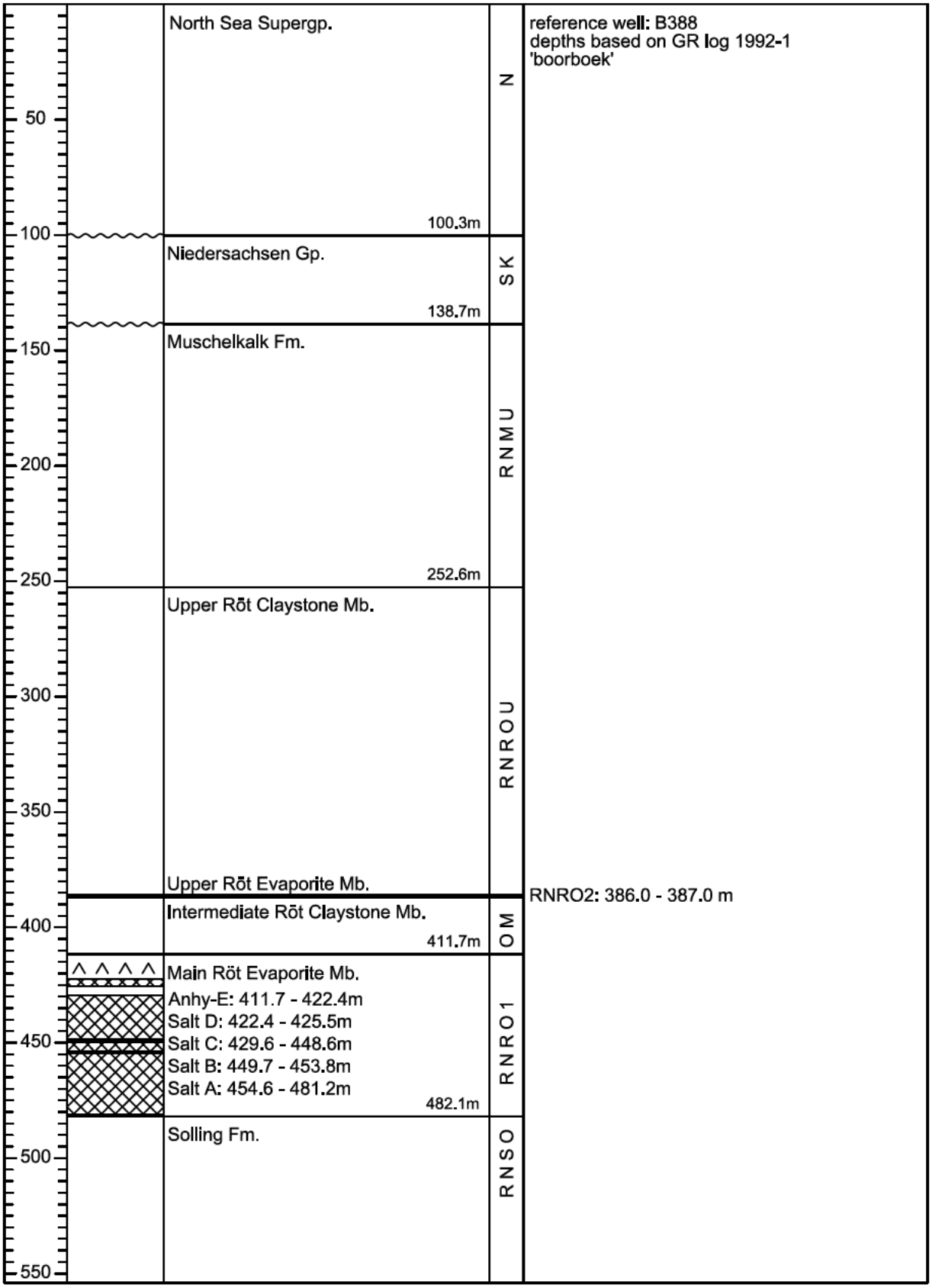
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B388 depths based on GR log 1992-1 'boorboek'
		98.7m		
100		Niedersachsen Gp.	SK	
		135.2m		
150		Muschelkalk Fm.	RNMU	
200				
		250.4m		
250		Upper Röt Claystone Mb.	RNROU	
300				
350		Upper Röt Evaporite Mb.		RNRO2: 382.5 - 383.1m
		Intermediate Röt Claystone Mb.	OM	
400		408.0m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 408.0 - 418.8m		
		Salt D: 418.8 - 420.3m		
450		Salt C: 424.9 - 444.1m		
		Salt B: 446.3 - 449.9m		
		Salt A: 450.5 - 479.4m		
		479.9m		
500		Solling Fm.	RNSO	
550				

Well Data Series 387: Well B389

RD Coordinates:	X: 252304.9 Y: 470486.1	TD:	481.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	26th May 1992	CF:	+25.69m NAP
TD date:	11th June 1992	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 390: Well B390

RD Coordinates:	X: 252746.7 Y: 472329.2	TD:	394.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	14th October 1991	CF:	+24.69m NAP
TD date:	21st October 1991	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B391 depths based on GR log 1991-1 'boorboek'
100		105.7m		
		Muschelkalk Fm.	RNMU	mud losses
150		158.9m		
		Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 301.4 - 302.2m
		Intermediate Röt Claystone Mb.	OM	
		328.1m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 328.1 - 340.6m		
		395.0m		top RNSO at base A2 from status sheet
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 390: Well B392

RD Coordinates:	X: 252821.3 Y: 472301.9	TD:	395.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th June 1991	CF:	+24.90m NAP
TD date:	27th June 1991	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B391 depths based on GR log 1991-1 'boorboek'
100		104.8m		
		Muschelkalk Fm.	RNMU	mud losses
150		158.8m		mud losses
		Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 300.6 - 301.4m
		Intermediate Röt Claystone Mb.	OM	
		328.1m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 328.1 - 340.9m		
		395.2m		
400		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
450				
500				
550				

Well Data Series 393: Well B393

RD Coordinates:	X: 252990.4 Y: 472293.4	TD:	390.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	16th April 1991	CF:	+24.41m NAP
TD date:	23rd April 1991	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B394 depths based on GR log 1991-1 'boorboek'
100		102.7m Muschelkalk Fm.	RNMU	
150		155.0m Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 296.2 - 297.1m
300		Intermediate Röt Claystone Mb. 323.7m	OM	
350	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 323.7 - 335.8m 391.1m	RNRO1	
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 393: Well B395

RD Coordinates:	X: 253067.2 Y: 472267.3	TD:	391.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	5th June 1991	CF:	+24.60m NAP
TD date:	11th June 1991	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B394 depths based on GR log 1991-1 'boorboek'
100		102.8m Muschelkalk Fm.	RNMU	
150		155.0m Upper Röt Claystone Mb.	RNROU	mud losses, 3m3
200				
250				
300		Upper Röt Evaporite Mb. Intermediate Röt Claystone Mb.	OM	RNRO2: 297.6 - 298.1m
350	^ ^ ^ ^	324.4m Main Röt Evaporite Mb. Anhy-E: 324.4 - 336.0m	RNRO1	
400		392.0m Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 396: Well B396

RD Coordinates:	X: 253208.7 Y: 472192.2	TD:	394.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	22nd October 1992	CF:	+25.96m NAP
TD date:	29th October 1992	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B397 depths based on GR log 1992-1 'boorboek'
100		99.1m Muschelkalk Fm.	RNMU	
150		157.0m Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 299.1 - 299.6m
		Intermediate Röt Claystone Mb.	OM	
350	^ ^ ^ ^	325.0m Main Röt Evaporite Mb. Anhy-E: 325.0 - 338.9m	RNRO1	
400		394.1m Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 396: Well B398

RD Coordinates:	X: 253281.0 Y: 472158.3	TD:	394.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	10th September 1992	CF:	+25.70m NAP
TD date:	16th September 1992	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B397 depths based on GR log 1992-1 'boorboek'
100		97.6m Muschelkalk Fm.	RNMU	
150		158.4m Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 300.1 - 300.8m
		Intermediate Röt Claystone Mb. 326.6m	OM	
350	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 326.6 - 339.0m	RNRO1	
400		395.0m Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 399: Well B400

RD Coordinates:	X: 253428.3 Y: 472025.7	TD:	403.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	31st March 1994	CF:	+26.84m NAP
TD date:	14th April 1994	CF - GL(MV):	0m

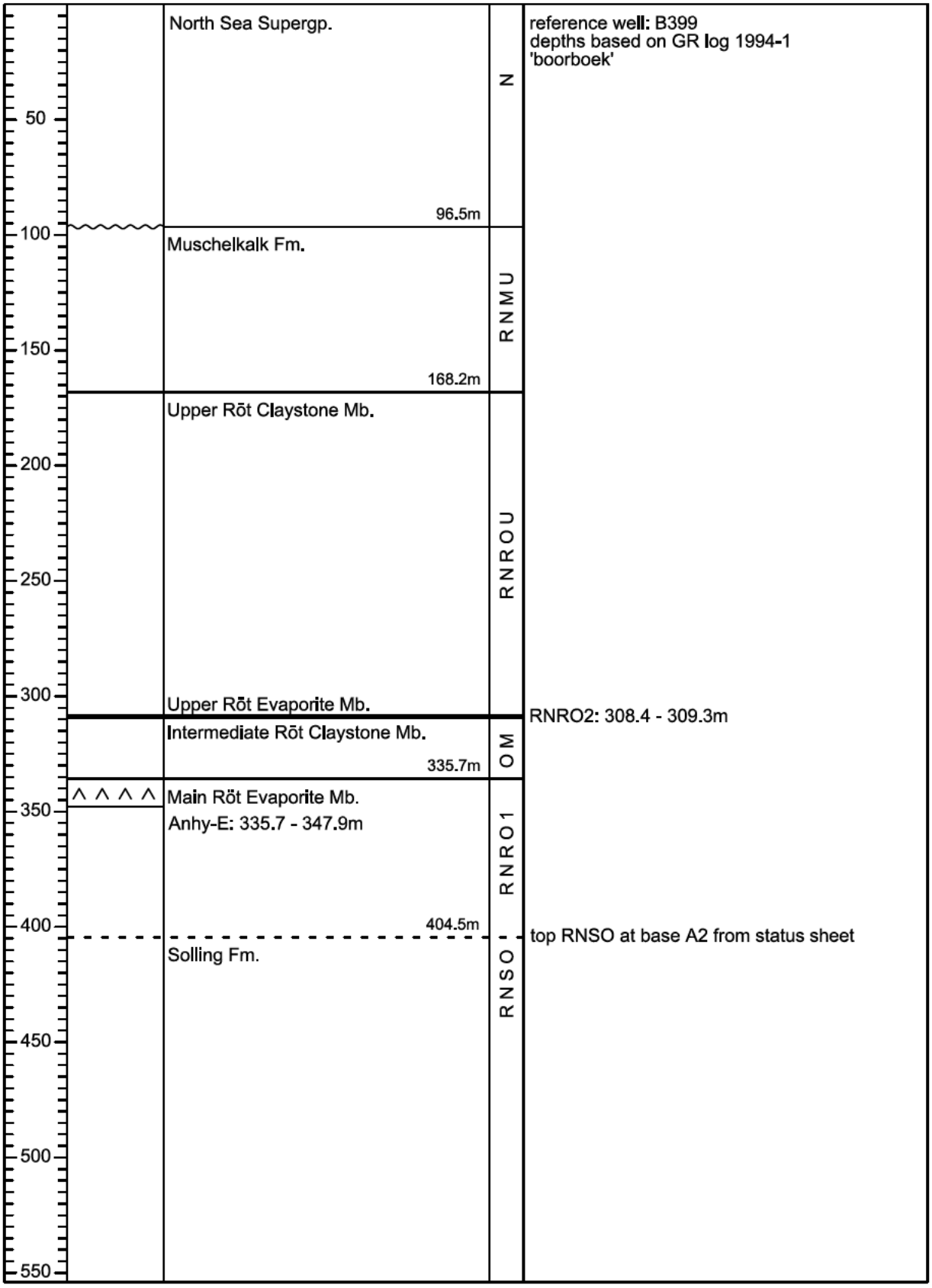
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B399 depths based on GR log 1994-1 'boorboek'
100		95.3m Muschelkalk Fm.	RNMU	
150		165.3m Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 306.8 - 307.2m
		Intermediate Röt Claystone Mb. 333.7m	OM	
350	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 333.7 - 346.0m	RNRO1	
400		402.9m Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 399: Well B401

RD Coordinates:	X: 253452.0 Y: 471992.8	TD:	405.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	16th May 1994	CF:	+26.79m NAP
TD date:	25th May 1994	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 402: Well B402

RD Coordinates:	X: 253241.7 Y: 472351.5	TD:	388.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	28th December 1994	CF:	+25.64m NAP
TD date:	17th January 1995	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B403 depths based on GR log 1995-2 'boorboek'
100		98.9m Muschelkalk Fm.	RNMU	
150		148.1m Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 290.8 - 291.5m
300		Intermediate Röt Claystone Mb.	OM	
350	^ ^ ^ ^	317.9m Main Röt Evaporite Mb. Anhy-E: 317.9 - 329.9m	RNRO1	
400		387.6m Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 402: Well B404

RD Coordinates:	X: 253268.5 Y: 472426.6	TD:	382.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th February 1995	CF:	+26.17m NAP
TD date:	27th February 1995	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B403 depths based on GR log 19 'boorboek'
100		99.1m Muschelkalk Fm.	RNMU	
150		144.5m Upper Rōt Claystone Mb.	RNROU	
200				
250		Upper Rōt Evaporite Mb.		RNRO2: 288.0 - 288.5m
300		Intermediate Rōt Claystone Mb. 314.6m	OM	
350	^ ^ ^ ^	Main Rōt Evaporite Mb. Anhy-E: 314.6 - 326.8m	RNRO1	
400		382.3m Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 405: Well B405

RD Coordinates:	X: 253135.6 Y: 472515.8	TD:	378.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	30th March 1995	CF:	+25.13m NAP
TD date:	6th April 1995	CF - GL(MV):	-0.01m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B406 depths based on GR log 1995-2 'boorboek'
100		100.5m Muschelkalk Fm.	RNMU	
		140.5m Upper Röt Claystone Mb.	RNROU	
150				
200				
250		Upper Röt Evaporite Mb.		RNRO2: 283.7 - 284.1m
		Intermediate Röt Claystone Mb.	OM	
300		310.5m		
	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 310.5 - 322.3m	RNRO1	
350		378.5m		
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 405: Well B407

RD Coordinates:	X: 253069.7 Y: 472559.6	TD:	377.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	12th June 1995	CF:	+24.74m NAP
TD date:	15th June 1995	CF - GL(MV):	-0.01m

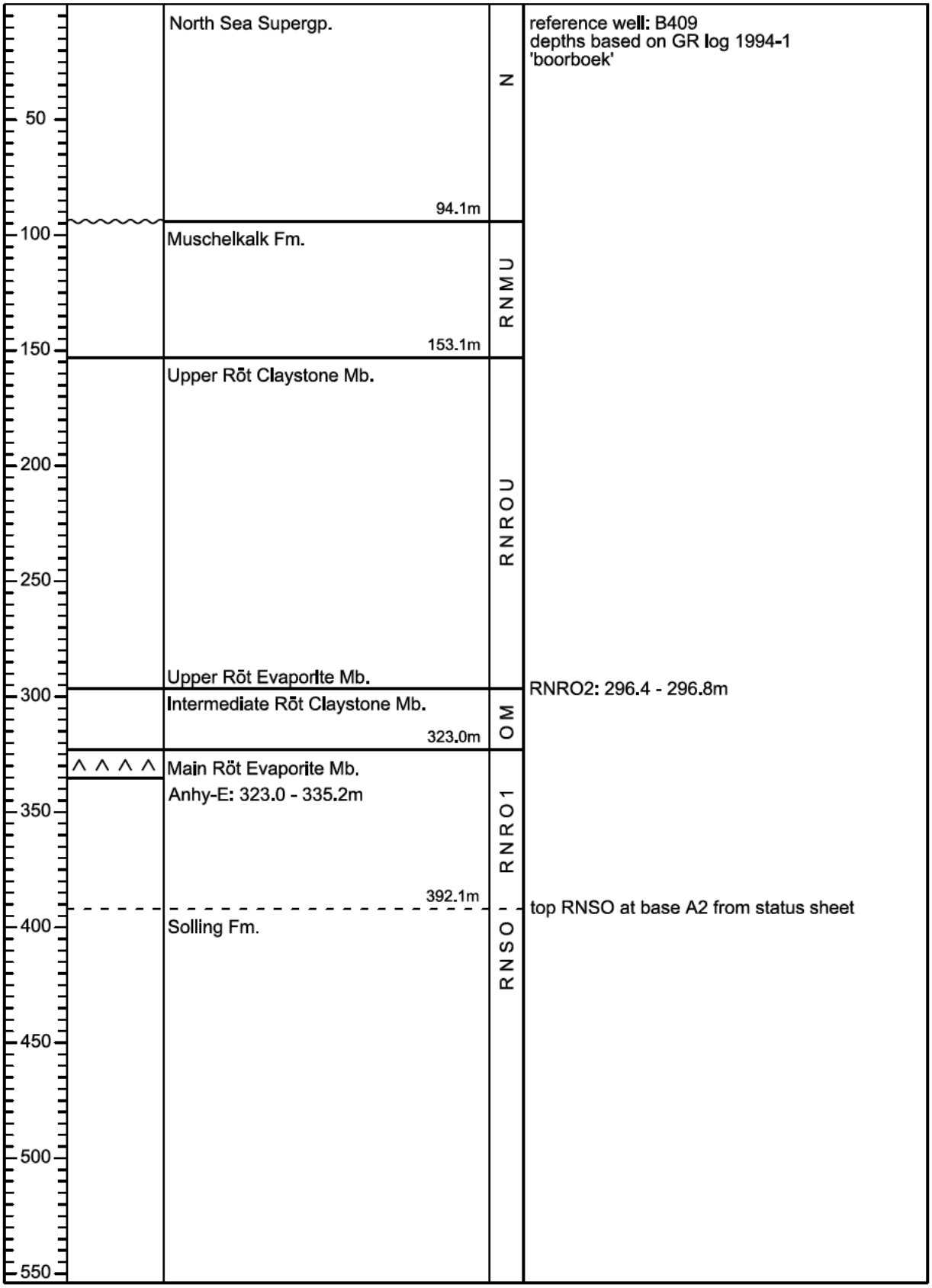
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B406 depths based on GR log 1995-2 'boorboek'
100		101.6m Muschelkalk Fm.	RNMU	
150		139.6m Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 282.4 - 283.0m
300		Intermediate Röt Claystone Mb. 309.3m	OM	
350	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 309.3 - 321.8m	RNRO1	
400		377.4m Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 408: Well B408

RD Coordinates:	X: 253476.5 Y: 472197.3	TD:	392.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	27th June 1994	CF:	+25.44m NAP
TD date:	30th June 1994	CF - GL(MV):	0m

Scale: 1 : 2500



Well Data Series 408: Well B410

RD Coordinates:	X: 253484.7 Y: 472270.1	TD:	388.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	31st October 1994	CF:	+25.80m NAP
TD date:	10th November 1994	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B409 depths based on GR log 1994-2 'boorboek'
95.3m				
100		Muschelkalk Fm.	RNMU	
151.1m				
150		Upper Röt Claystone Mb.	RNROU	
200				
250				
Upper Röt Evaporite Mb.				RNRO2: 294.2 - 294.6m
300		Intermediate Röt Claystone Mb.	OM	
321.0m				
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 321.0 - 333.2m		cored section: 339.5 - 355.3m
388.5m				
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 411: Well B411

RD Coordinates:	X: 253605.5 Y: 471914.8	TD:	408.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	31st January 1994	CF:	+27.09m NAP
TD date:	9th February 1994	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B413 'boorboek'
100				
150				
200				
250				
300				
350	^ ^ ^ ^	Main Röt Evaporite Mb. base Anhy-E: 350.2m	RNRO1	cored section: 335.8 - 342.8m boundaries based on GR log 1995-1
400		407.9m		
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 411: Well B412

RD Coordinates:	X: 253623.5 Y: 471944.7	TD:	407.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	8th December 1993	CF:	+26.86m NAP
TD date:	16th December 1993	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B413 'boorboek'
100				
150				
200				
250				
300		336.1m	RNROM	boundaries based on GR log 1995-1
350	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 336.1 - 349.1m	RNRO1	cored section: 369.8 - 406.9m
400		406.1m		
450		Solling Fm.	RNSO	
500				
550				

Well Data Series 416: Well B416

RD Coordinates:	X: 253485.0 Y: 472644.1	TD:	371.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	6th March 1996	CF:	+25.63m NAP
TD date:	14th March 1996	CF - GL(MV):	-0.01m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B417 depths based on GR log 1996-2 'boorboek'
		96.2m		
100		Muschelkalk Fm.	RNMU	
		130.1m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 274.2 - 274.9m
		Intermediate Röt Claystone Mb.	OM	
		301.3m		
300	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 301.3 - 314.8m		
350		371.0m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 416: Well B418

RD Coordinates:	X: 253497.3 Y: 472568.6	TD:	369.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th May 1996	CF:	+25.55m NAP
TD date:	23rd May 1996	CF - GL(MV):	-0.01m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B417 depths based on GR log 1996-2 'boorboek'
		95.7m		
100		Muschelkalk Fm.	RNMU	
		134.4m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 278.3 - 279.0m
		Intermediate Röt Claystone Mb.	OM	
300	^ ^ ^ ^	Main Röt Evaporite Mb. base Anhy-E: 317.4m		boundaries based on GR log 2007-5
350		368.3m	RNRO1	top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 419: Well B419

RD Coordinates:	X: 253567.1 Y: 472403.5	TD:	379.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	28th June 1996	CF:	+26.69m NAP
TD date:	4th July 1996	CF - GL(MV):	0.11m

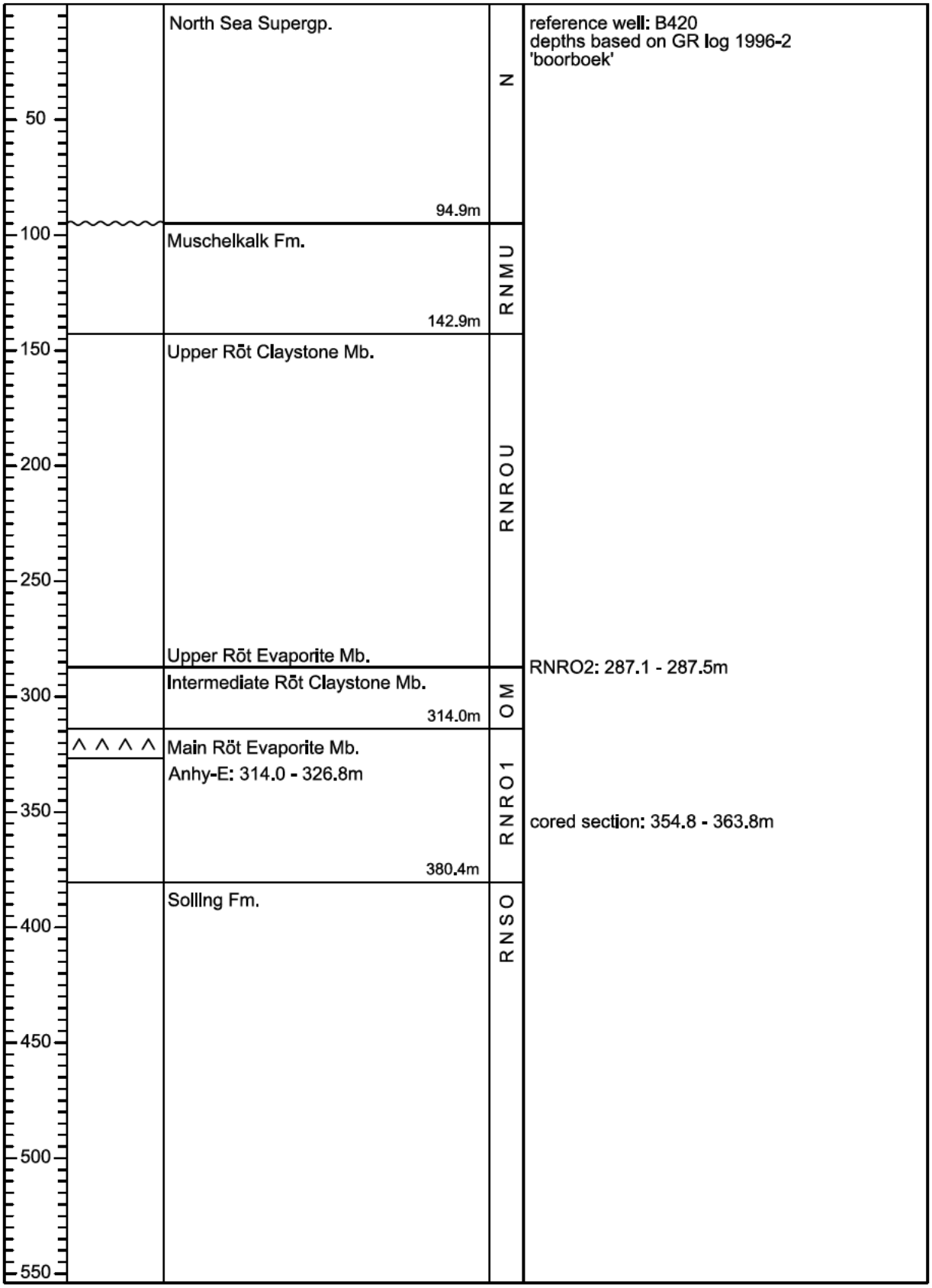
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B420 depths based on GR log 2008-11 'boorboek'
		95.2m		
100		Muschelkalk Fm.	RNMU	
		143.5m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 288.1 - 288.4m
300		Intermediate Röt Claystone Mb.	OM	
		315.4m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 315.4 - 326.1m		
350		379.0m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 419: Well B421

RD Coordinates:	X: 253635.1 Y: 472367.1	TD:	380.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	3rd October 1996	CF:	+26.19m NAP
TD date:	14th October 1996	CF - GL(MV):	-0.01m

Scale: 1 : 2500



Well Data Series 422: Well B422

RD Coordinates:	X: 253442.5 Y: 472799.4	TD:	356.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	8th October 1997	CF:	+25.54m NAP
TD date:	15th October 1997	CF - GL(MV):	0.11m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B423 depths based on GR log 2009-6 'boorboek'
100		97.9m Muschelkalk Fm.	MU	
		120.7m Upper Röt Claystone Mb.	RNROU	
150				
200				
250		Upper Röt Evaporite Mb.		RNRO2: 265.3 - 265.8m
		Intermediate Röt Claystone Mb.	OM	
300	^ ^ ^ ^	292.4m Main Röt Evaporite Mb. Anhy-E: 292.4 - 303.9m	RNRO1	
350		356.6m		
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 422: Well B424

RD Coordinates:	X: 253398.3 Y: 472862.0	TD:	354.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st May 1997	CF:	+25.30m NAP
TD date:	29th May 1997	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B423 depths based on GR log 1997-2 'boorboek'
		98.6m		
100		Muschelkalk Fm.	MU	mud losses
		118.3m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 262.6 - 263.1m
		Intermediate Röt Claystone Mb.	OM	
		290.0m		
300	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 290.0 - 302.0m		
350		353.7m		
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 425: Well B425

RD Coordinates:	X: 253318.7 Y: 472999.1	TD:	346.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	1st April 1997	CF:	+25.45m NAP
TD date:	8th April 1997	CF - GL(MV):	0.15m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B426 depths based on GR log 1997-1 'boorboek'
100		100.0m Muschelkalk Fm. 113.3m	MU	
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 257.5 - 257.9m
		Intermediate Röt Claystone Mb. 285.0m	OM	
300	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 285.0 - 297.2m	RNRO1	
350		346.4m Solling Fm.	RNSO	top RNSO at base A2 from status sheet
400				
450				
500				
550				

Well Data Series 425: Well B427

RD Coordinates:	X: 253269.8 Y: 473064.5	TD:	346.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	29th January 1997	CF:	+25.43m NAP
TD date:	5th February 1997	CF - GL(MV):	0.13m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B426 depths based on GR log 1997-1 'boorboek'
100		102.1m Muschelkalk Fm. 111.5m	MU	
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 255.8 - 256.1m
		Intermediate Röt Claystone Mb. 283.1m	OM	
300	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy-E: 283.1 - 295.1m	RNRO1	
350		346.1m Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 428: Well B428

RD Coordinates:	X: 253165.7 Y: 473189.9	TD:	341.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	5th December 1996	CF:	+24.52m NAP
TD date:	14th October 1996	CF - GL(MV):	0.02m

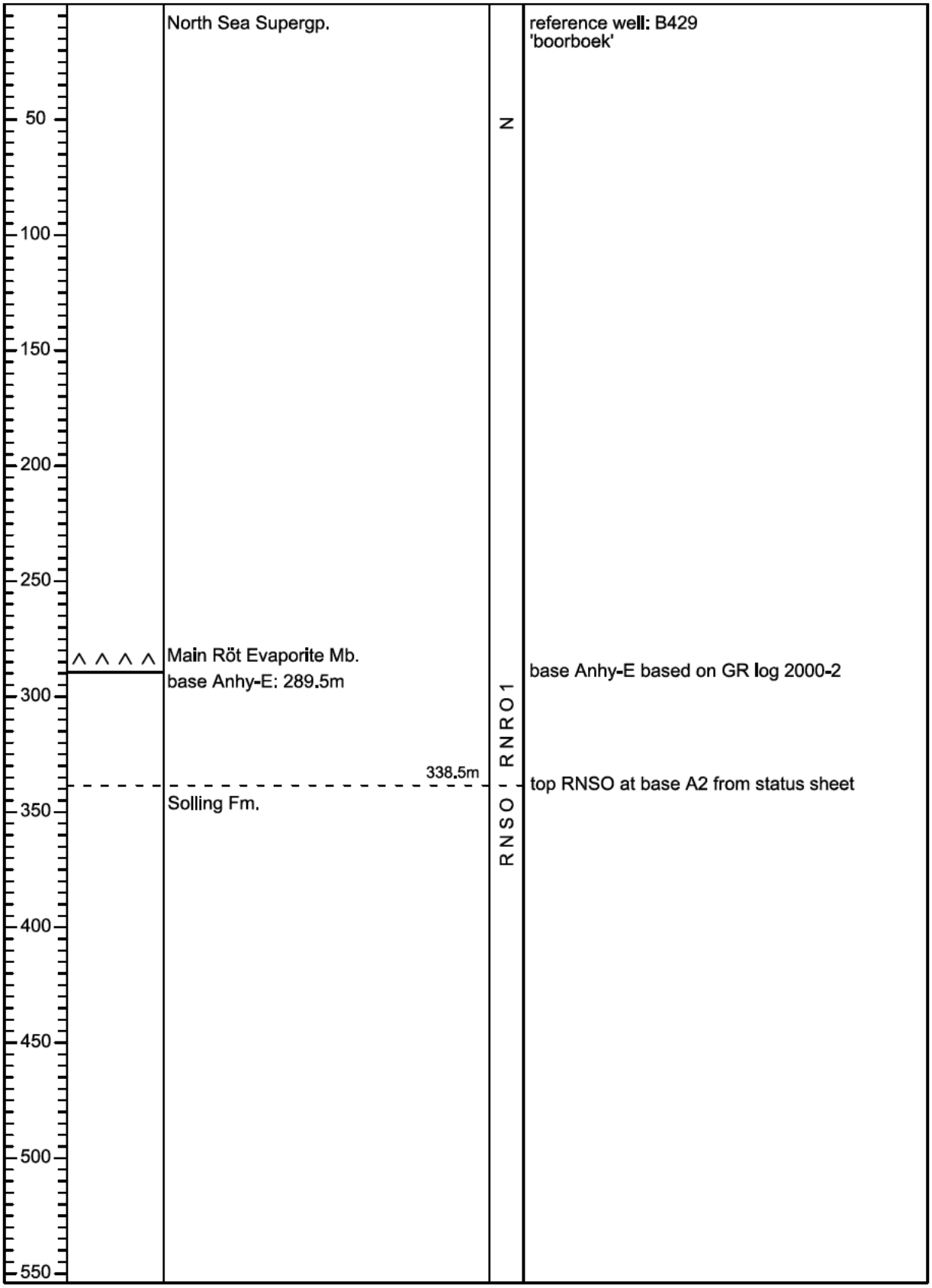
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B429 depths based on GR log 1996-1 'boorboek'
100		104.1m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 251.4 - 251.9m
		Intermediate Röt Claystone Mb.	OM	
		278.9m		
300	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 278.9 - 292.1m		
		341.1m		top RNSO at base A2 from status sheet
350		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 428: Well B430

RD Coordinates:	X: 253140.2	TD:	339.3m
	Y: 473267.9	Depth reference:	Conductor Flange (CF)
Spud date:	31st October 1996	CF:	+24.49m NAP
TD date:	6th November 1996	CF - GL(MV):	0.07m

Scale: 1 : 2500



Well Data Series 431: Well B433

RD Coordinates:	X: 252999.2 Y: 473459.6	TD:	346.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	19th January 1999	CF:	+23.78m NAP
TD date:	28th January 1999	CF - GL(MV):	0.10m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B432 depths based on GR log 1999-1 'boorboek'
100		108.7m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 253.6 - 254.4m
		Intermediate Röt Claystone Mb.	OM	
		281.6m		
300	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 281.6 - 294.2m		
		344.8m		top RNSO at base A2 from status sheet
350		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 437: Well B437

RD Coordinates:	X: 252674.8 Y: 473657.2	TD:	343.3m
		Depth reference:	Conductor Flange (CF)
Spud date:	11th November 1999	CF:	+23.37m NAP
TD date:	19th November 1999	CF - GL(MV):	0.09m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B depths based on GR log 19 original well log K.N.Z. 4296431/101 'boorboek'
100		110.9m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 260.4 - 260.7m
		Intermediate Röt Claystone Mb.	OM	
		288.0m		
300	^ ^ ^ ^	Main Röt Evaporite Mb. Anhy E: 288.0 - 300.4 m	RNRO1	
350				
400				
450				
		342.0m		
500		Solling Fm.	RNSO	top RNSO at base A2 from status sheet
550				

Well Data Series 448: Well B448

RD Coordinates:	X: 253733.7 Y: 471578.4	TD:	432.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	22nd February 2000	CF:	+27.05m NAP
TD date:	6th March 2000	CF - GL(MV):	0.12m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B449 depths based on GR log 2000-2 'boorboek'
		82.9m		
100		Muschelkalk Fm.	RNMU	
150		186.6m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 327.7 - 328.2m
		Intermediate Röt Claystone Mb.	OM	
350	^ ^ ^ ^	354.8m Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 354.8 - 367.7m		
400		432.3m		
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 448: Well B450

RD Coordinates:	X: 253810.0 Y: 471555.0	TD:	434.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	25th April 2000	CF:	+27.73m NAP
TD date:	16th May 2000	CF - GL(MV):	0.10m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B449 depths based on GR log 2000-1 'boorboek'
		83.0m		
100		Muschelkalk Fm.	RNMU	mud losses
150		188.3m		mud losses
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 330.5 - 331.1m
		Intermediate Röt Claystone Mb.	OM	
350		357.4m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 357.4 - 369.8m		
400		433.5m		
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 451: Well B451

RD Coordinates:	X: 254004.5 Y: 471628.1	TD:	427.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	5th June 2001	CF:	+28.40m NAP
TD date:	22nd June 2001	CF - GL(MV):	0.10m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B452 depths based on GR log 2000-1 'boorboek'
		84.8m		
100		Muschelkalk Fm.	RNMU	
150				mud losses mud losses
		184.2m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 325.8 - 326.4m
		Intermediate Röt Claystone Mb.	OM	
350		352.7m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 352.7 - 364.9m		
400		426.7m		
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 451: Well B453

RD Coordinates:	X: 254042.1 Y: 471698.5	TD:	422.5m
		Depth reference:	Conductor Flange (CF)
Spud date:	4th April 2001	CF:	+28.97m NAP
TD date:	1st May 2001	CF - GL(MV):	0.16m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B452 depths based on GR log 2001-1 'boorboek'
		83.7m		
100		Muschelkalk Fm.	RNMU	
150		179.3m		
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 322.3 - 322.8m
		Intermediate Röt Claystone Mb.	OM	
350	^ ^ ^ ^	349.0m		
		Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 349.0 - 360.9 m		
400		421.8m		
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 454: Well B454

RD Coordinates:	X: 253901.6 Y: 471860.2	TD:	413.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	7th September 2001	CF:	+28.10m NAP
TD date:	19th September 2001	CF - GL(MV):	0.20m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B455 depths based on GR log 2001-2 'boorboek'
		87.3m		
100		Muschelkalk Fm.	RNMU	mud losses
150		170.1m		mud losses
200		Upper Röt Claystone Mb.	RNROU	
250				
300		Upper Röt Evaporite Mb.		RNRO2: 312.7 - 313.2m
		Intermediate Röt Claystone Mb.	OM	
		339.4m		
350	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 339.4 - 351.8m		
400		412.2m		
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 454: Well B456

RD Coordinates:	X: 253844.2 Y: 471916.8	TD:	408.4m
		Depth reference:	Conductor Flange (CF)
Spud date:	26th October 2001	CF:	+27.98m NAP
TD date:	7th November 2001	CF - GL(MV):	0.21m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B455 depths based on GR log 2001-1 'boorboek'
		87.4m		
100		Muschelkalk Fm.	RNMU	
150		167.4m		mud losses
		Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 309.6 - 310.3m
		Intermediate Röt Claystone Mb.	OM	
		336.7m		
350	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 336.7 - 348.9m		
400		406.0m		top RNSO at base A2 from status sheet
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 457: Well B457

RD Coordinates:	X: 254066.2 Y: 471859.0	TD:	409.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	28th February 2002	CF:	+27.55m NAP
TD date:	12th March 2002	CF - GL(MV):	0.20m

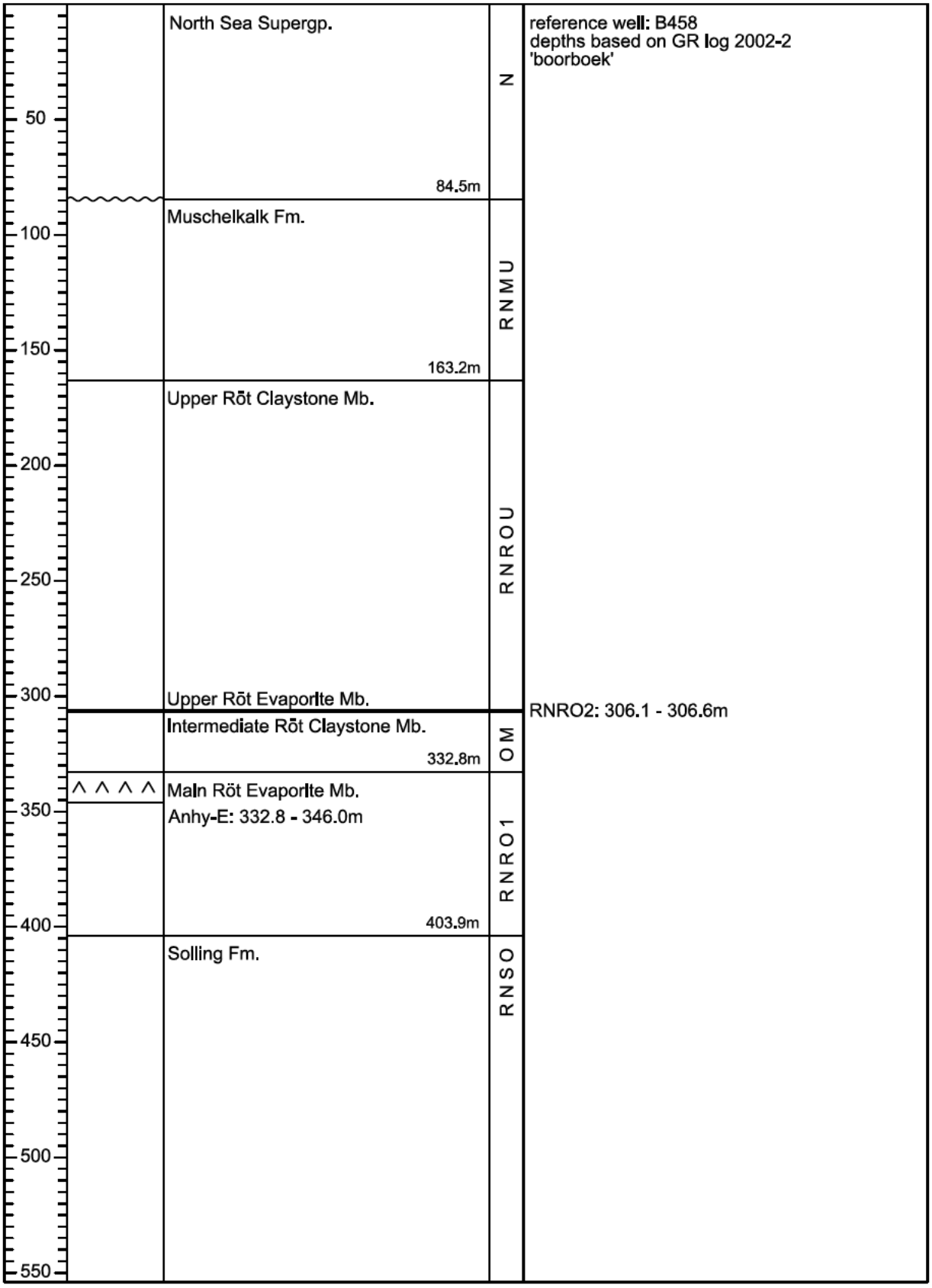
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B458 depths based on GR log 2002-1 'boorboek'
		84.0m		
100		Muschelkalk Fm.	RNMU	
150		167.8m		
		Upper Röt Claystone Mb.	RNROU	mud losses
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 310.9 - 311.4m
		Intermediate Röt Claystone Mb.	OM	
		337.4m		
350	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 337.4 - 349.2m		
400		408.6m		
		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 457: Well B459

RD Coordinates:	X: 254066.4 Y: 471938.4	TD:	404.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	11th January 2002	CF:	+27.66m NAP
TD date:	24th January 2002	CF - GL(MV):	0.20m

Scale: 1 : 2500



Well Data Series 460: Well B460

RD Coordinates:	X: 254066.4 Y: 472102.5	TD:	392.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	25th April 2002	CF:	+27.81m NAP
TD date:	17th May 2002	CF - GL(MV):	0.09m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B461 depths based on GR log 2002-1 'boorboek'
		87.3m		
100		Muschelkalk Fm.	RNMU	mud losses
150		155.1m		
		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 297.0 - 298.0m
300		Intermediate Röt Claystone Mb.	OM	
		323.6m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 323.6 - 336.1m		
		392.0m		
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 460: Well B462

RD Coordinates:	X: 254066.3 Y: 472182.7	TD:	386.9m
		Depth reference:	Conductor Flange (CF)
Spud date:	21st June 2002	CF:	+27.38m NAP
TD date:	3rd July 2002	CF - GL(MV):	0.12m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B461 depths based on GR log 2002-1 'boorboek'
		84.8m		
100		Muschelkalk Fm.	RNMU	
		147.5m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 290.7 - 291.1m
300		Intermediate Röt Claystone Mb.	OM	
		317.5m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 317.5 - 329.6m		
		385.7m		
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 463: Well B463

RD Coordinates:	X: 253960.3 Y: 472311.9	TD:	379.1m
		Depth reference:	Conductor Flange (CF)
Spud date:	8th January 2003	CF:	+27.07m NAP
TD date:	16th Januarry 2003	CF - GL(MV):	0.03m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B464 depths based on GR log 2003-1 'boorboek'
		87.5m		
100		Muschelkalk Fm.	RNMU	
		141.9m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 284.8 - 285.4m
		Intermediate Röt Claystone Mb.	OM	
300		311.4m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 311.4 - 323.6m		
		378.7m		
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 463: Well B465

RD Coordinates:	X: 253881.5 Y: 472300.3	TD:	380.7m
		Depth reference:	Conductor Flange (CF)
Spud date:	6th November 2002	CF:	+26.88m NAP
TD date:	19th November 2002	CF - GL(MV):	0m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B464 depths based on GR log 2002-1 'boorboek'
		88.1m		
100		Muschelkalk Fm.	RNMU	mud losses
		143.6m		
150		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 286.9 - 287.4m
300		Intermediate Röt Claystone Mb.	OM	
		313.6m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 313.6 - 325.8m		
		380.2m		
		Solling Fm.	RNSO	
400				
450				
500				
550				

Well Data Series 466: Well B466

RD Coordinates:	X: 253800.4 Y: 472155.3	TD:	390.6m
		Depth reference:	Conductor Flange (CF)
Spud date:	2nd April 2003	CF:	+26.56m NAP
TD date:	14th April 2003	CF - GL(MV):	0.07m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B467 depths based on GR log 2003-5 'boorboek'
		88.6m		
100		Muschelkalk Fm.	RNMU	mud losses
150		153.0m		
		Upper Röt Claystone Mb.	RNROU	
200				
250		Upper Röt Evaporite Mb.		RNRO2: 296.0 - 296.7m
300		Intermediate Röt Claystone Mb.	OM	
		322.9m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 322.9 - 335.3m		
		390.3m		
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 466: Well B468

RD Coordinates:	X: 253778.4 Y: 472078.7	TD:	396.2m
		Depth reference:	Conductor Flange (CF)
Spud date:	25th February 2003	CF:	+26.44m NAP
TD date:	6th March 2003	CF - GL(MV):	0.09m

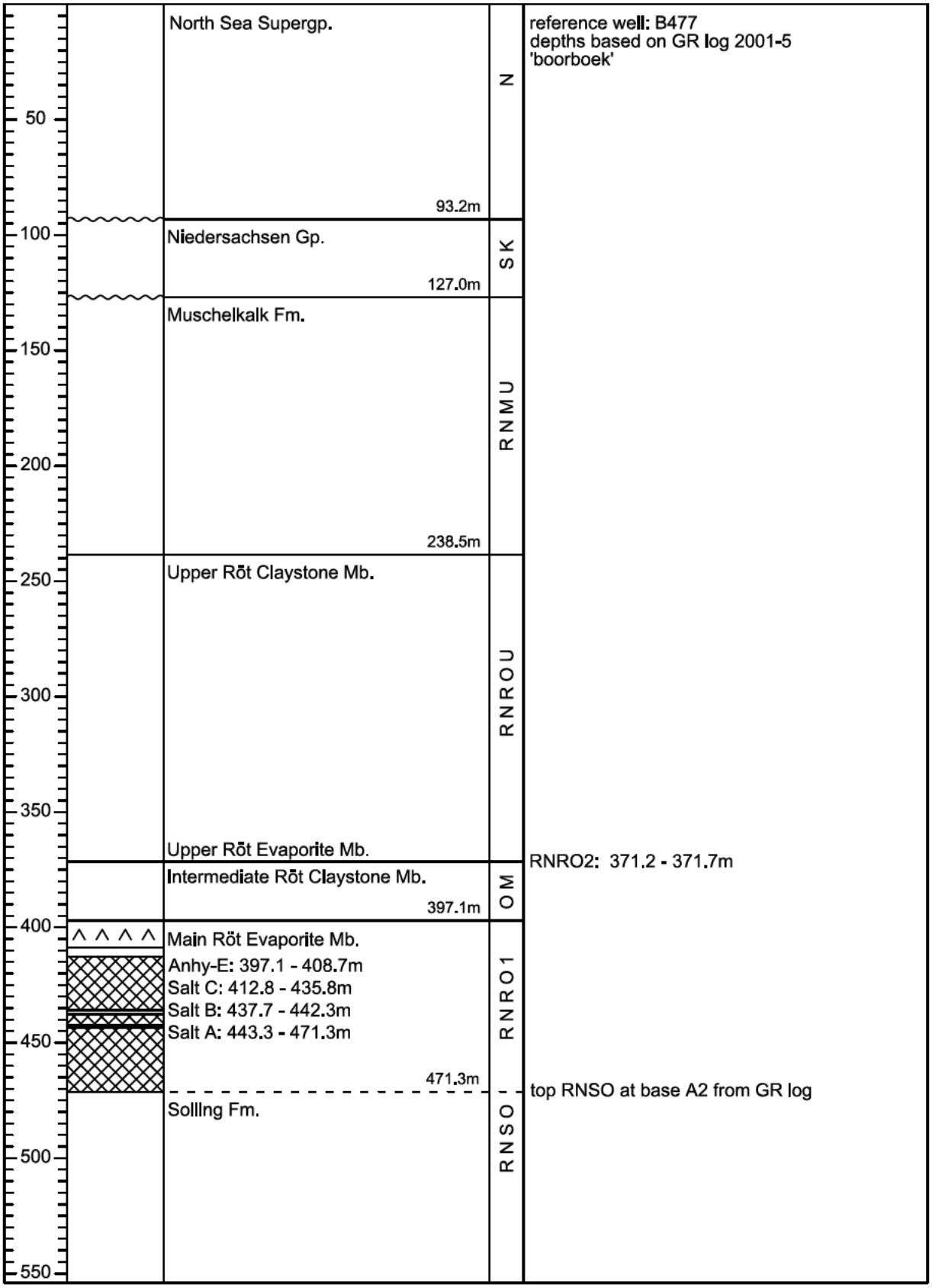
Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B467 depths based on GR log 2003-2 'boorboek'
		88.8m		
100		Muschelkalk Fm.	RNMU	
150		157.6m		
		Upper Röt Claystone Mb.	RNROU	
200				
250				
300		Upper Röt Evaporite Mb.		RNRO2: 300.3 - 300.9m
		Intermediate Röt Claystone Mb.	OM	
		327.1m		
	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
350		Anhy-E: 327.1 - 340.5m		
		396.6m		
400		Solling Fm.	RNSO	
450				
500				
550				

Well Data Series 475: Well B475

RD Coordinates:	X: 252749.30	TD:	472.3m
	Y: 470272.60	Depth reference:	Conductor Flange (CF)
Spud date:	5th December 2000	CF:	+26.39m NAP
TD date:	10th January 2001	CF - GL(MV):	0.17m

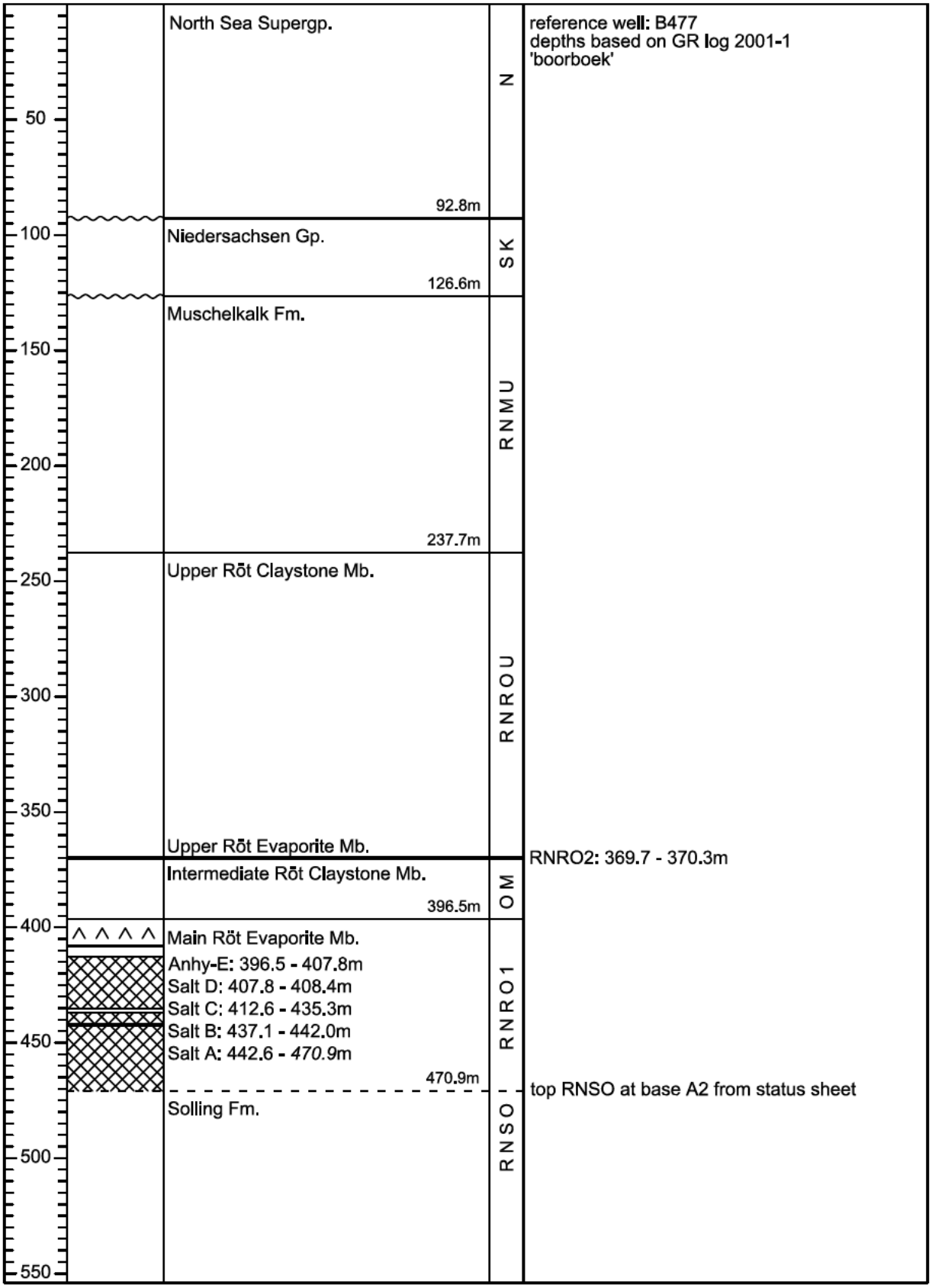
Scale: 1 : 2500



Well Data Series 475: Well B476

RD Coordinates:	X: 252783.9 Y: 470252.4	TD:	471.8m
		Depth reference:	Conductor Flange (CF)
Spud date:	6th March 2001	CF:	+26.50m NAP
TD date:	27th March 2001	CF - GL(MV):	0.14m

Scale: 1 : 2500



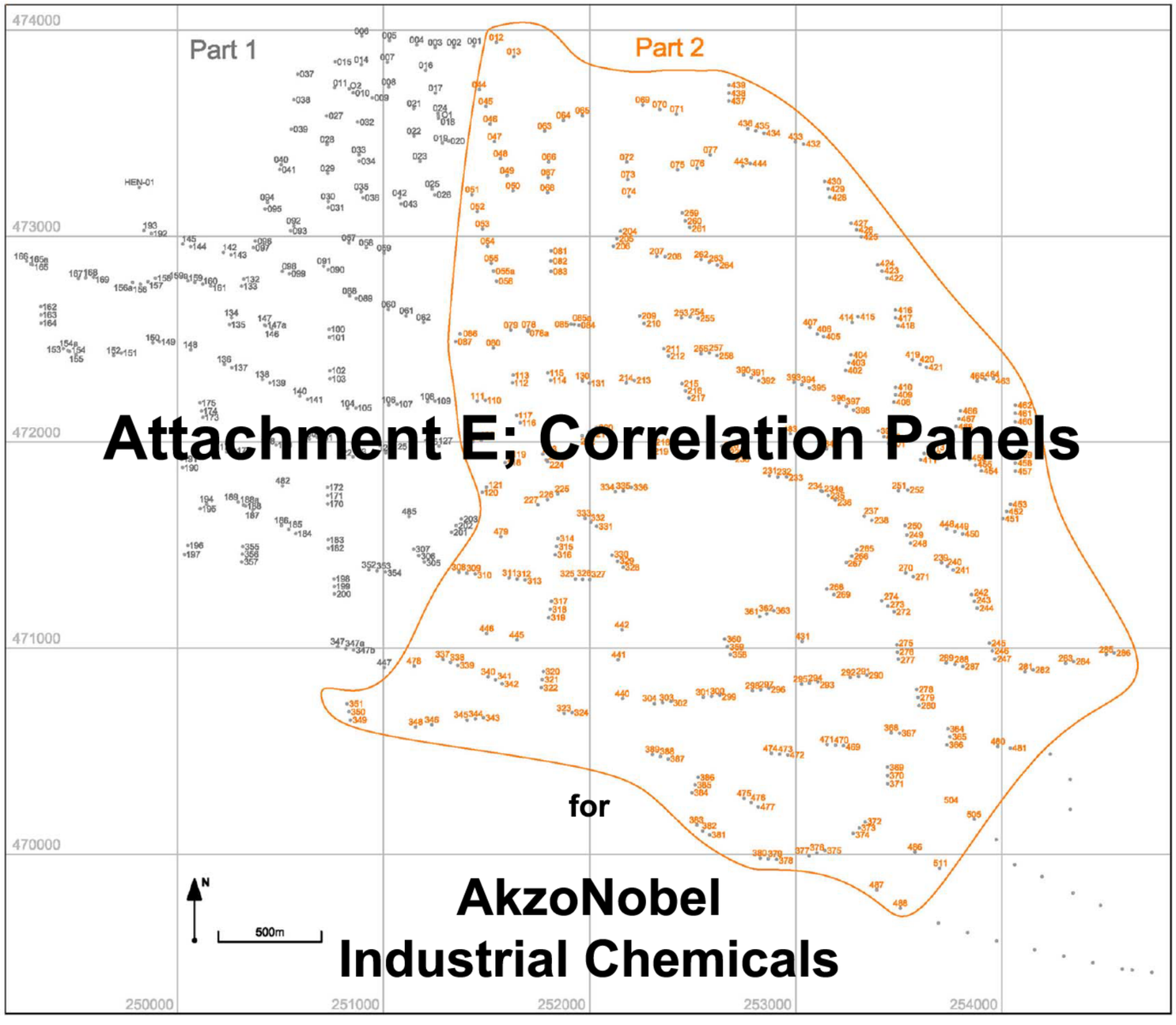
Well Data Series 480: Well B481

RD Coordinates:	X: 254041.18 Y: 470516.62	TD:	485.0m
		Depth reference:	Conductor Flange (CF)
Spud date:	20th October 2003	CF:	+28.94m NAP
TD date:	31st October 2003	CF - GL(MV):	0.05m

Scale: 1 : 2500

Depth (m)	Lithology	Stratigraphy	reg. code	Remarks
50		North Sea Supergp.	N	reference well: B480 depths based on GR log 2003-2 'boorboek'
		75.0m		
		Niedersachsen Gp.	SK	
100		103.9m		
		Altena Gp. , Sleen Fm. 114.9m	AT	
		Muschelkalk Fm.	RNMU	
150				
200		233.0m		
		Upper Röt Claystone Mb.	RNROU	
250				
300				
350		Upper Röt Evaporite Mb.		RNRO2: 374.1 - 374.8m
		Intermediate Röt Claystone Mb.	OM	
		401.0m		
400	^ ^ ^ ^	Main Röt Evaporite Mb.	RNRO1	
		Anhy-E: 401.0 - 412.7m		
		Salt D: 412.7 - 416.4m		
		Salt C: 420.7 - 441.8m		
450		Salt B: 443.8 - 447.7m		
		Salt A: 448.6 - 484.5m		
		484.8m		
		Solling Fm.	RNSO	
500				
550				

Detailed Geology of the Hengelo Solution Mining Area
Part 2



Attachment E; Correlation Panels

for

AkzoNobel
Industrial Chemicals

prepared by: GEOWULF*Laboratories*, the Netherlands
September 2011, report no: GL11.901

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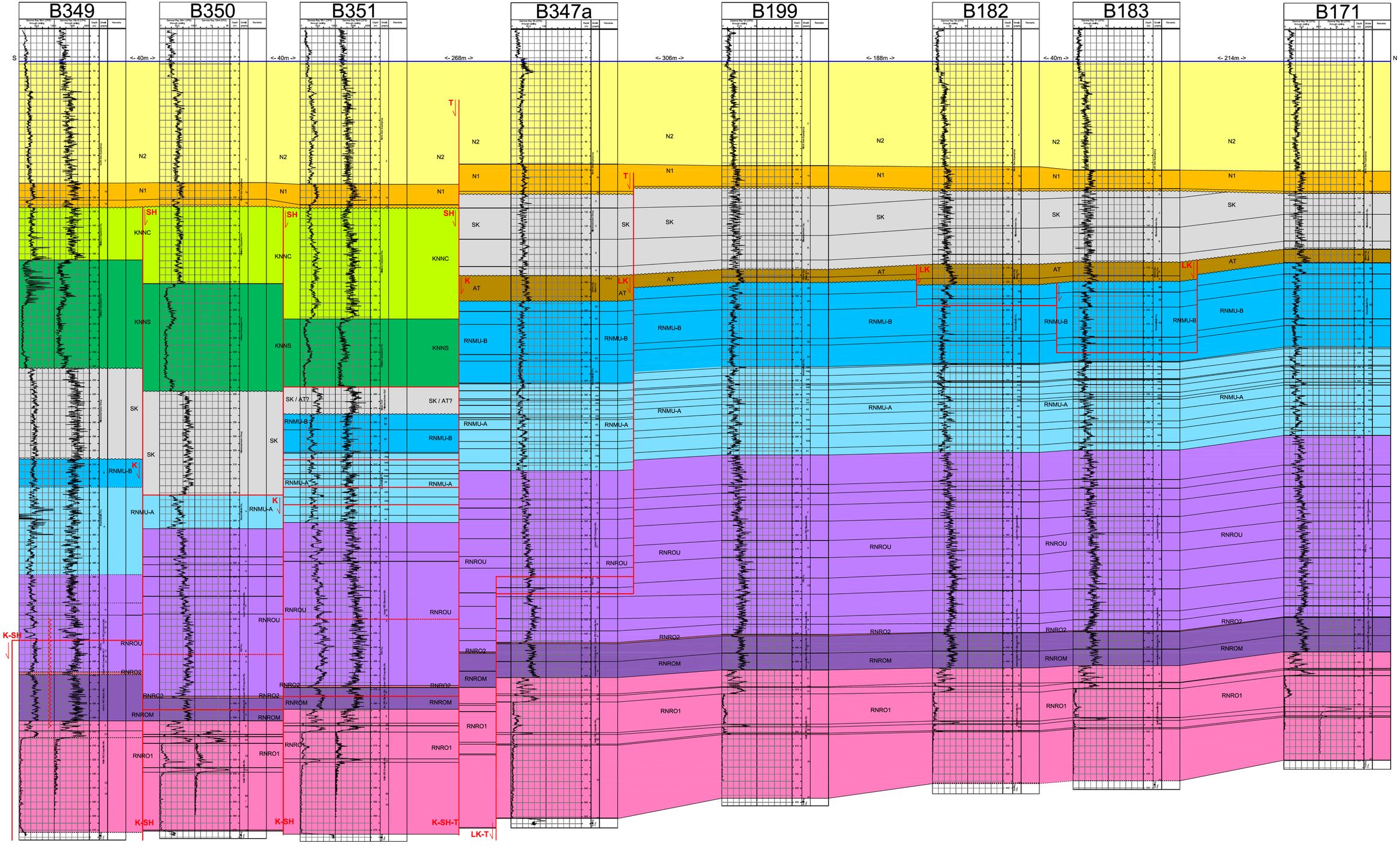
B349
B350
B351
B347a
B199
B182
B183
B171
S
N
<- 40m ->
<- 40m ->
<- 268m ->
<- 306m ->
<- 188m ->
<- 40m ->
<- 214m ->
N2
N1
SK
AT
RNMU-B
RNMU-A
RNROU
RNRO2
RNROM
RNRO1
KNNC
KNNS
SK / AT?
SH
T
K
LK
K-SH
K-SH-T
LK-T
E-1a: B349 - B171; line-up NAP
AkzoNobel
LEGEND
vertical scale 1 : 1000
LITHOLOGY
clay / claystone
silt / siltstone
sand / sandstone
marl
limestone
calcareous sandstone
dolomite
anhydrite
salt
LITHOLOGICAL DETAIL
argillaceous bit: claystone bed
silty bit: siltstone bed
sandy bit: sandstone bed
slightly sandy very sandy
bit: sandstone bed sandstone bed
silt stringers bit: siltstone bed
silt laminae bit: siltstone bed
silty bit: siltstone bed
bit: anhydrite bed
anhydrite nodule
bit: halite bed
FOSSILS AND OTHER GEOLOGICAL DETAIL
glauconite
shell fragments
carbonate
plant fragments
coal/brown coal bed/s
OTHER
unconformity
stratigraphic boundary
T / Tertiary fault
SH / Subhercynian fault
K / Kimmerian fault
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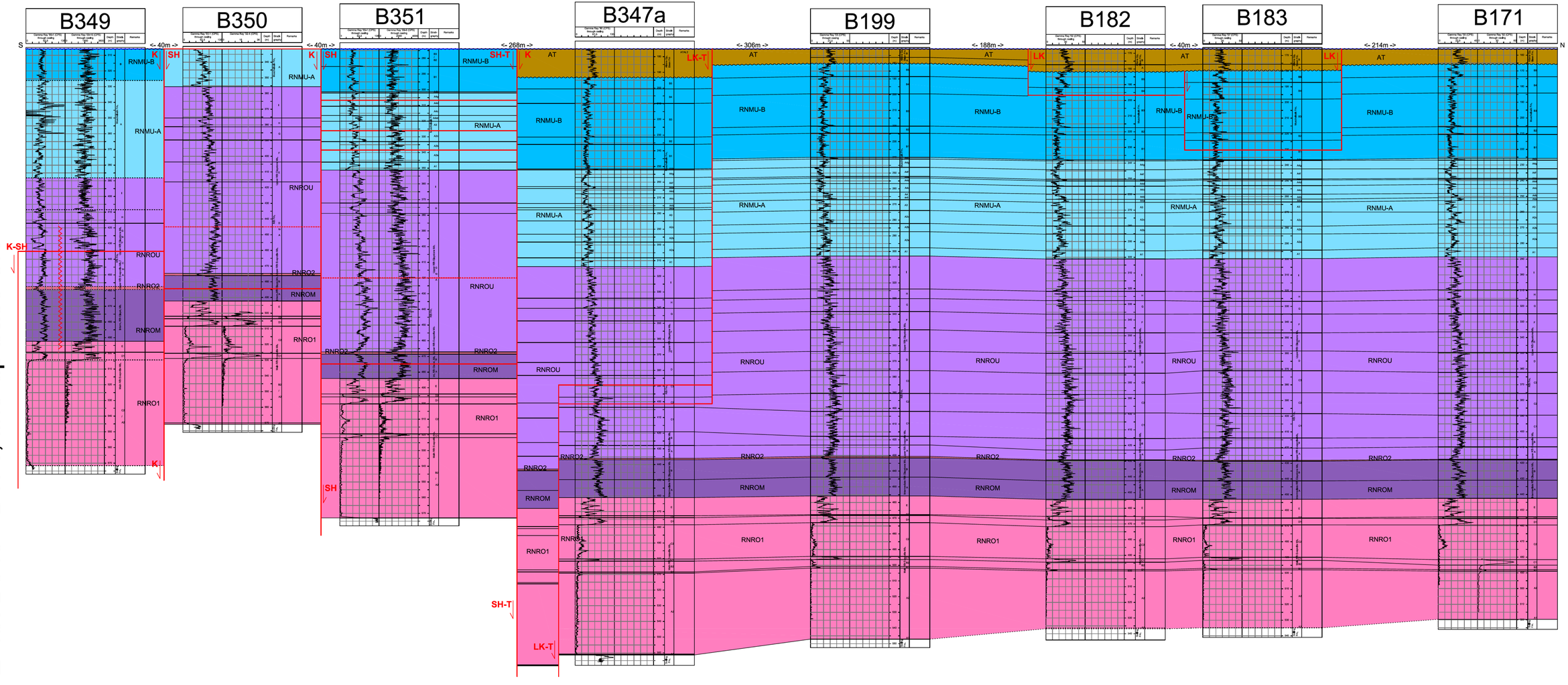
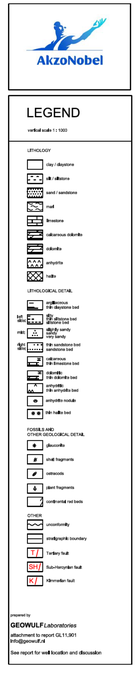
See report for well location and discussion

E-1b: B349 - B171; line-up base SK





E-2: B348 - B442; line-up NAP

B348 | B346 | B345 | B344 | B343 | B320 | B442

SW <- 80m -> <- 178m -> <- 35m -> <- 40m -> <- 367m -> <- 432m -> NE

T
SH
LK
LK2
EK
KNNS
N2
N1
SK
AT
RNMU-B
RNMU-A
RNROU
RNRO2
RNROM
RNRO1

LK-SH
EK-LK-SH
LK-SH-T
SH
SH
LK-SH

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LEGEND

vertical scale 1 : 1000

LITHOLOGY
- clay / claystone
- silt / siltstone
- sand / sandstone
- marl
- limestone
- calcareous dolomite
- dolomite
- anhydrite
- halite

LITHOLOGICAL DETAIL
- argillaceous
- thin claystone bed
- silty
- thin siltstone bed
- silt/clay
- silty sandy
- clay
- very sandy
- thin sandstone bed
- sandstone bed
- calcareous
- thin limestone bed
- dolomitic
- thin dolomite bed
- anhydritic
- thin anhydrite bed
- anhydrite nodule
- thin halite bed

FOSSILS AND OTHER GEOLOGICAL DETAIL
- glauconite
- shell fragments
- ostracods
- plant fragments
- continental red beds

OTHER
- unconformity
- stratigraphic boundary
- Tertiary fault
- SH Suburcrynian fault
- Klimmeten fault

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E-3: B349 - B346; line-up Top SK / Base KN

W

B349

<- 323m ->

B348

<- 75m ->

B346

E

AkzoNobel

N2

N1

SH

KNNC

KNNS

LK2

LK1

SK

RNMU-B

RNMU-A

AT

EK

RNROU

RNRO2

RNROM

RNRO1

T

LEGEND

vertical scale 1 : 1000

LITHOLOGY

- clay / claystone
- silt / siltstone
- sand / sandstone
- marl
- limestone
- calcareous dolomite
- dolomite
- anhydrite
- halite

LITHOLOGICAL DETAIL

- argillaceous thin claystone bed
- left side: silty thin siltstone bed siltstone bed
- mid.: slightly sandy sandy very sandy
- right side: thin sandstone bed sandstone bed
- calcareous thin limestone bed
- dolomitic thin dolomite bed
- anhydritic thin anhydrite bed
- anhydrite nodule
- thin halite bed

FOSSILS AND OTHER GEOLOGICAL DETAIL

- glauconite
- shell fragments
- ostracods
- plant fragments
- continental red beds

OTHER

- unconformity
- stratigraphic boundary
- T/ Tertiary fault
- SH/ Sub-Hercynian fault
- K/ Kimmerian fault

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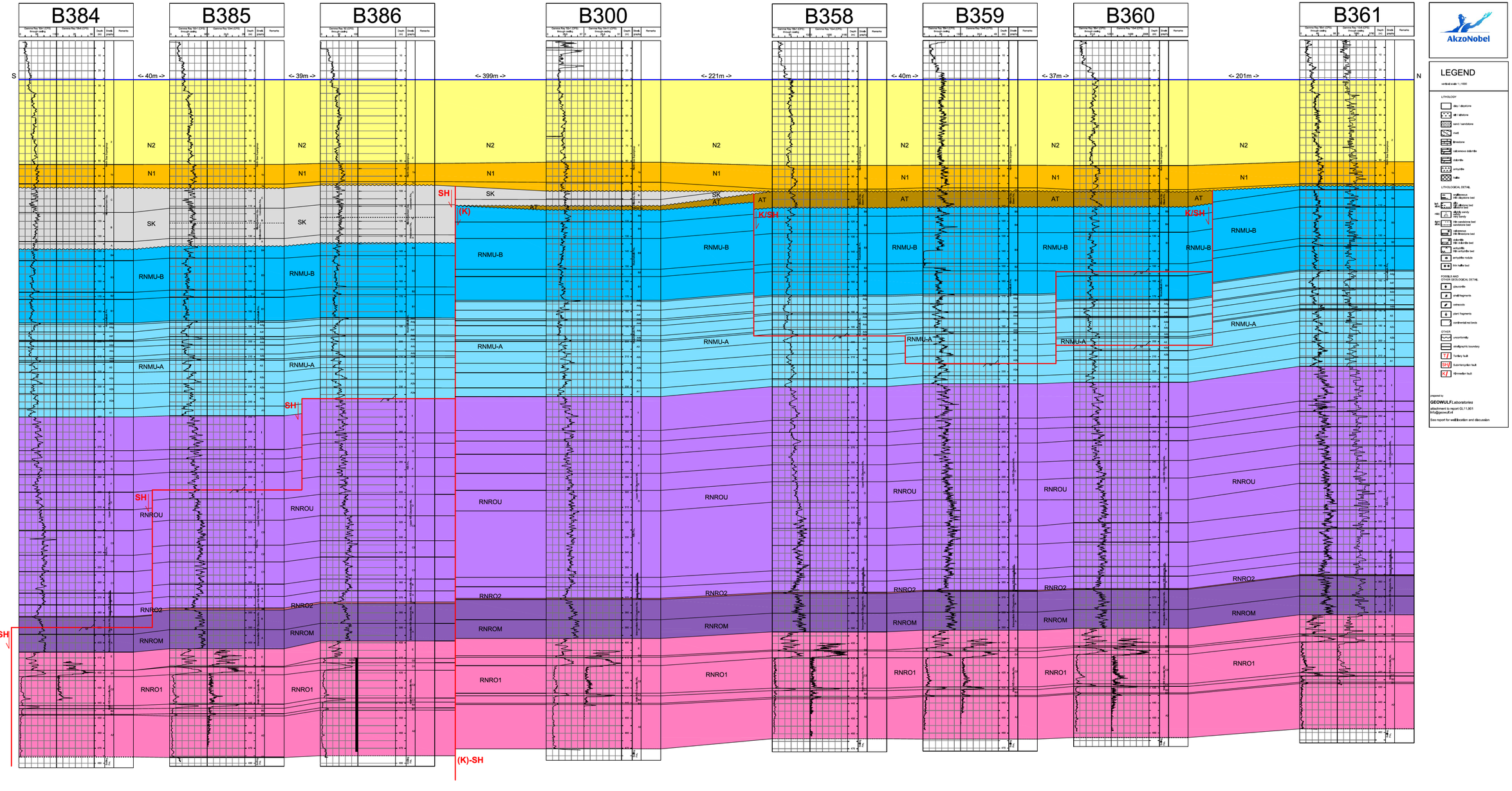
E-4: B384 - B361; line-up NAP



E-5v2: B381 - B276; line-up NAP

B381 | B477 | B472 | B470 | B290 | B276

SW <- 273m -> <- 289m -> <- 236m -> <- 372m -> <- 186m -> NE

N2
N1
SK
AT
RNMU-B
RNMU-A
RNROU
RNRO2
RNROM
RNRO1

SH
(SH)
EK
(K)

(K)-SH
(K)-(SH)
EK-SH

AkzoNobel

LEGEND

vertical scale 1 : 1000

LITHOLOGY
- clay / claystone
- silt / siltstone
- sand / sandstone
- marl
- limestone
- calcareous dolomite
- dolomite
- anhydrite
- halite

LITHOLOGICAL DETAIL
- argillaceous intbd claystone bed
- silty intbd siltstone bed
- slightly sandy intbd very sandy
- intbd sandstone bed sandstone bed
- calcareous intbd limestone bed
- dolomitic intbd dolomite bed
- anhydritic intbd anhydrite bed
- anhydritic nodule
- intbd halite bed

FOSSILS AND OTHER GEOLOGICAL DETAIL
- glauconite
- shell fragments
- ostracods
- plant fragments
- continental red beds

OTHERS
- unconformity
- stratigraphic boundary
- Tertiary fault
- Sub-Hercynian fault
- Kimmerian fault

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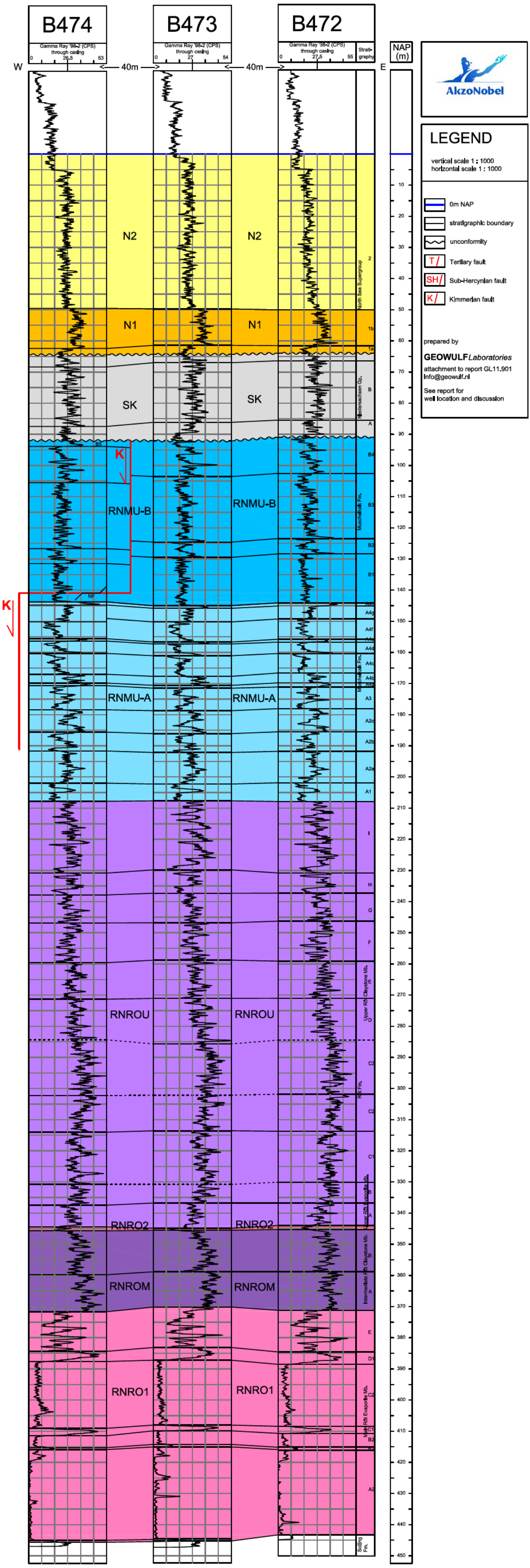
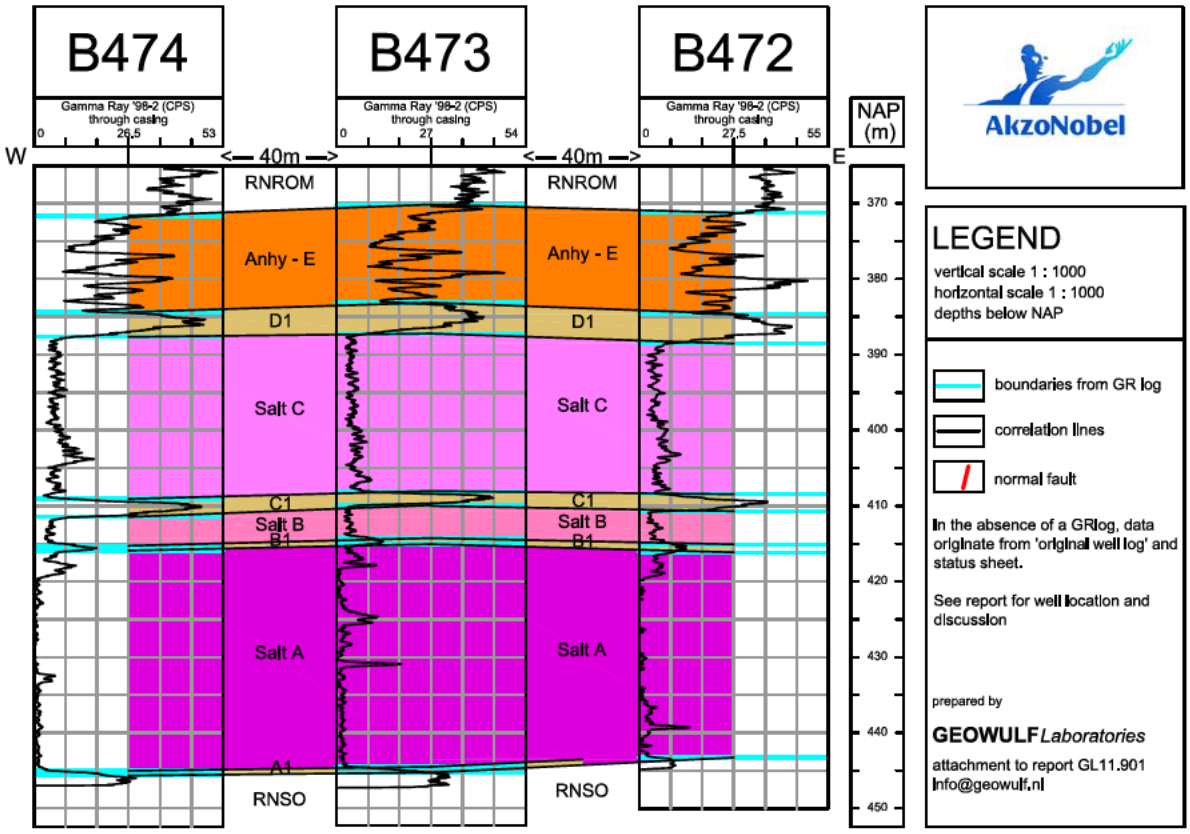
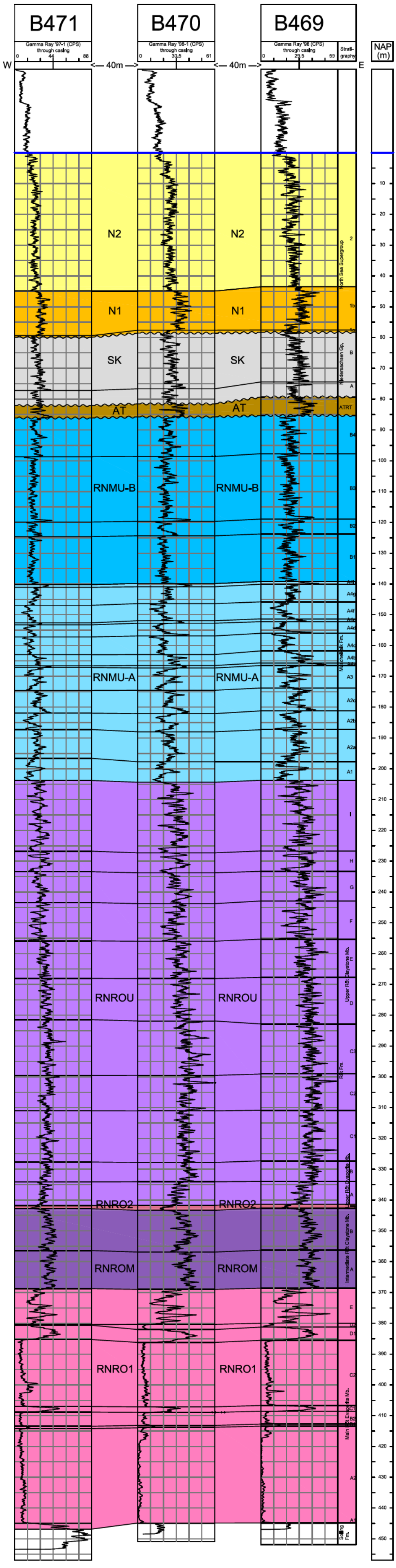
E-6a: Series 472; line-up NAP



E-6b: Series 472; Evaporite Sequence (RNRO1)



E-7a: Series 469; line-up NAP



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LEGEND

vertical scale 1 : 1000
horizontal scale 1 : 1000

- 0m NAP
- stratigraphic boundary
- unconformity
- T/ Tertiary fault
- SH/ Sub-Hercynian fault
- K/ Kimmerian fault

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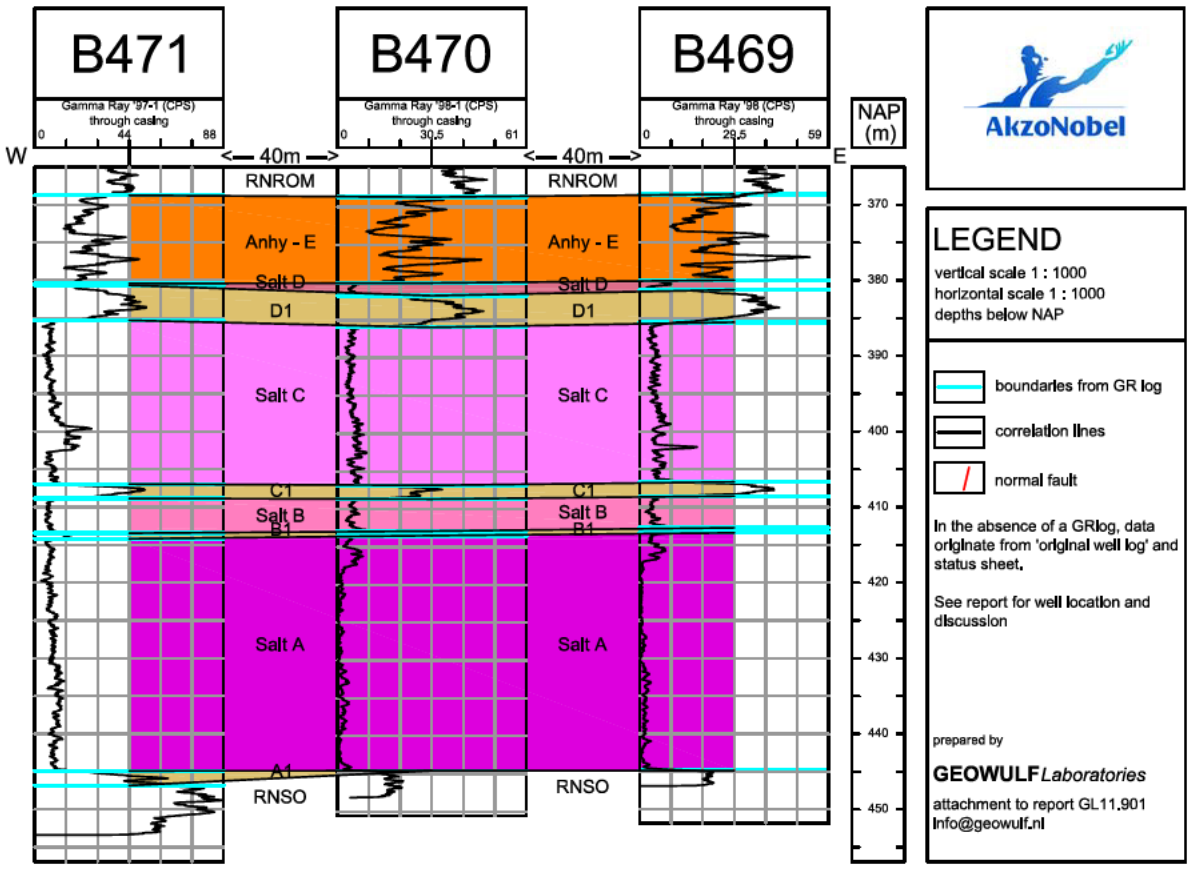
well location and discussion

E-7b: Series 469; Evaporite Sequence (RNRO1)



AkzoNobel

LEGEND

vertical scale 1 : 1000
horizontal scale 1 : 1000
depths below NAP

boundaries from GR log

correlation lines

normal fault

In the absence of a GRlog, data originate from 'original well log' and status sheet.

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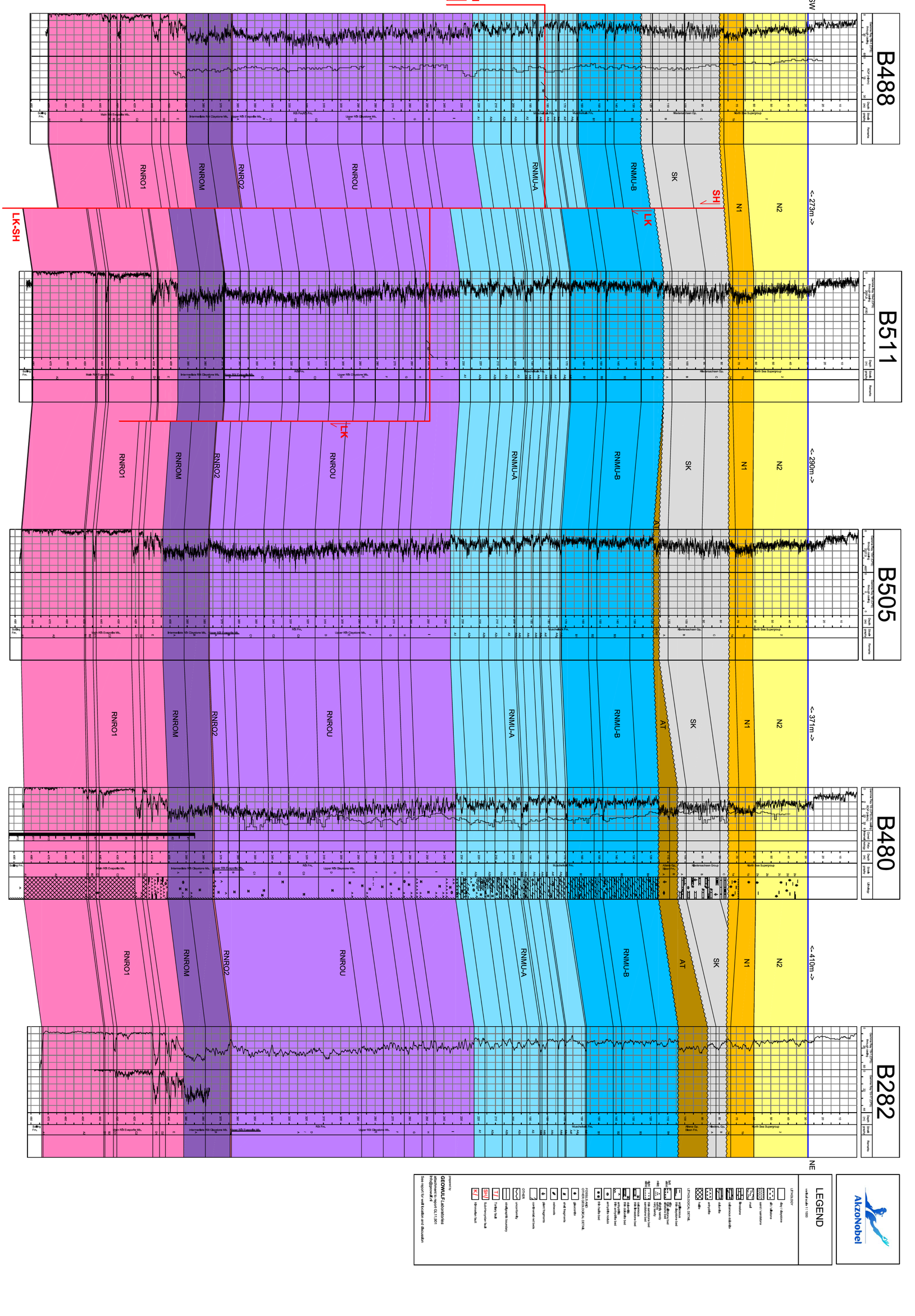
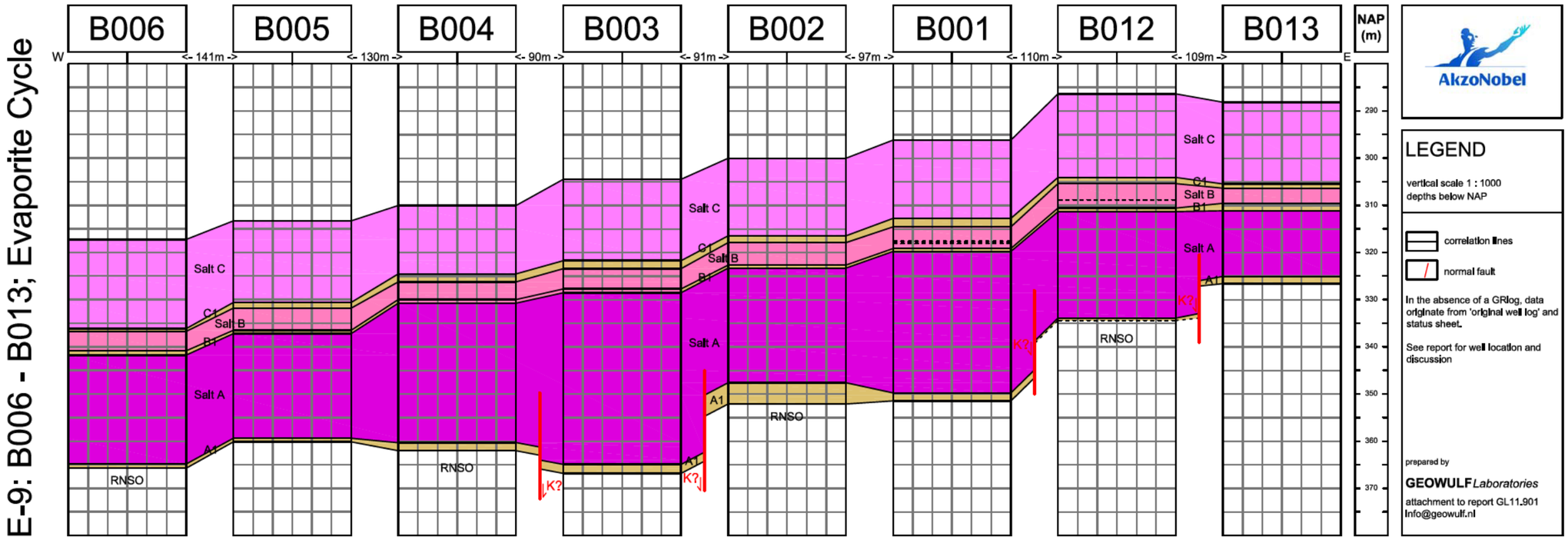
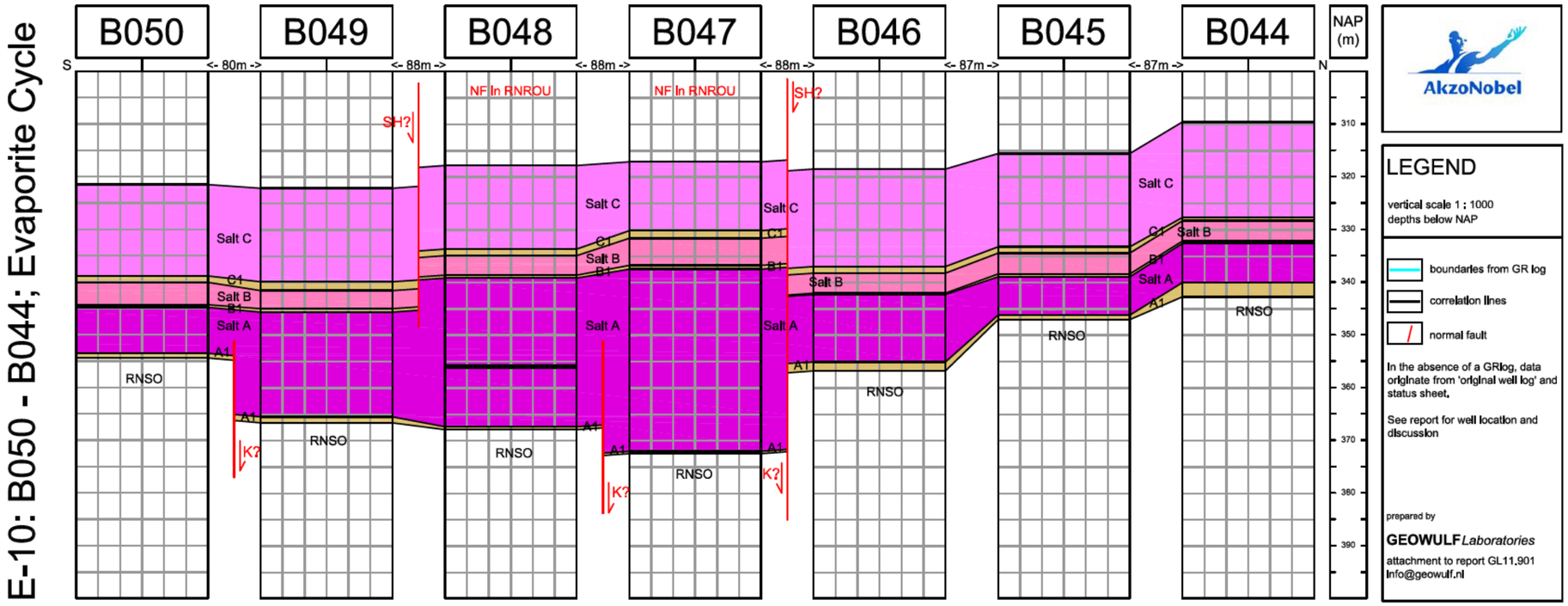
E-8: B488 - B282; line-up NAP



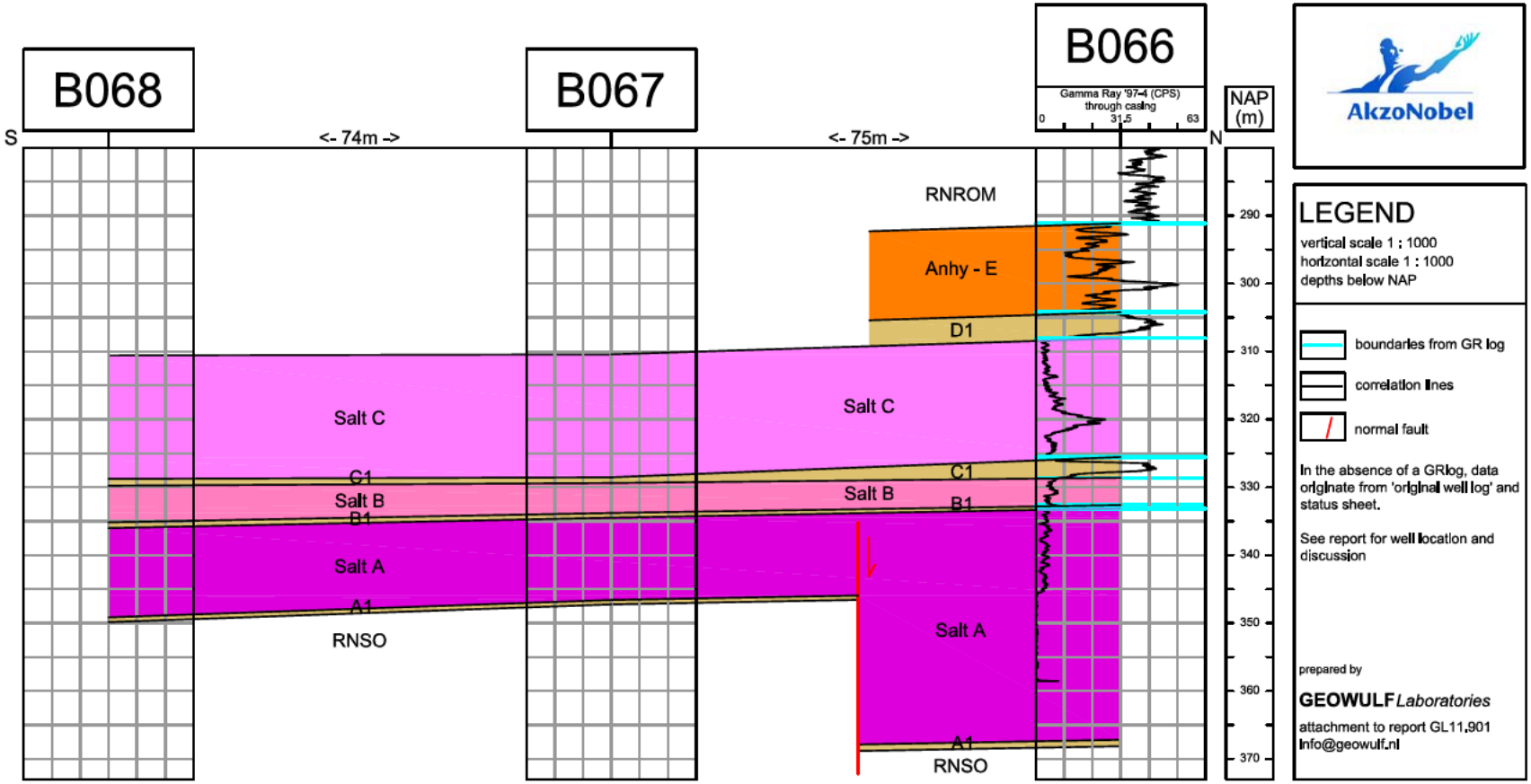
E-9: B006 - B013; Evaporite Cycle



E-10: B050 - B044; Evaporite Cycle



E-11: Series 066; Evaporite Sequence (RNRO1)



E-12: Series 072; Evaporite Sequence (RNRO1)