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REGISTRERT  
STATENS OLJEDIREKTORAT

21 DES. 1979

STATOIL PRODUCTION LAB  
SPECIAL CORE ANALYSIS  
FILE NUMBER 050 DELTA 34/10-4  
050 P.5.12.10  
GECO SIEVE ANALYSIS REPORT  
PETROLEUM ENGINEERING DEPT. SEPT 1979

In dealing with sand control it is necessary, for correct gravel sizing, to determine the producing formations grain size and range.

In order to get information about the uniformity of the formation it was decided to have wet sieve analysis done on five friable sandstone from 34/10-4.

The samples were selected representative of the formation where DST's should be performed.

The sieve analysis was experimentally carried out by Geco Lab and reported by Statoil Production Lab.

To get a measure of the sands uniformity the individual and cumulative percentage retained are plotted as a function of grain size. From the cumulative curve it should be possible to determine the uniformity coefficient C for the formation:

$$C = \frac{D_{40}}{D_{90}}$$

Where  $D_{40}$  and  $D_{90}$  are the grain diameters at the 40 and 90 percentile plots respectively in the plot of cumulative percentage retained except in one case, the fraction passing through the 45 $\mu$  screen exceeds 10 %, therefore the C coeff. could not be determined. For future sieve analysis of this kind there should be carried out a complete sieve analysis, including the grain fractions below 45 . In order to be able to calculate the uniformity coefficient the complete analysis is necessary when the fraction passing through the 45 $\mu$  screen exceeds 10 %.

Looking at the figures for the individual percentage retained, it turns out that the fraction retained on the 75 $\mu$  screen varies from 37.5 % to 59.4 %. This indicates that the difference in screen opening between the previous screen, 150 $\mu$ , and the 75 $\mu$  screen is too big and the sieve analysis should have been carried out with at least two screens in between.

SAMPLE DEPTH (m)	EQUIV. LOG DEPTH (m)	DST DEPTH (ISF/SONIC) (m)	NEAREST $\phi$ MEASUREMENT (%)	NEAREST $K_L$ MEASUREMENT (md)	MEDIAN DIAMETER, $d_{50}$ (mm)	UNIFORMITY COEFF. $C = d_{40}/d_{90}$	UNIFORMITY
1828.4 -28.5	1824.4 -24.5	1824-1826	36	1200	0.135	3.3	MEDIUM
1829.2 -29.3	1825.2 -25.3	"	37	1600	0.15		—
1884.6 -84.68	1880.6 -80.68	1880-1885	38	640	0.10		—
1886.4 -86.45	1882.4 -82.45	"	36	440	0.098		—
1887.95-88.05	1883.95-84.05	"	35	230	0.098		—

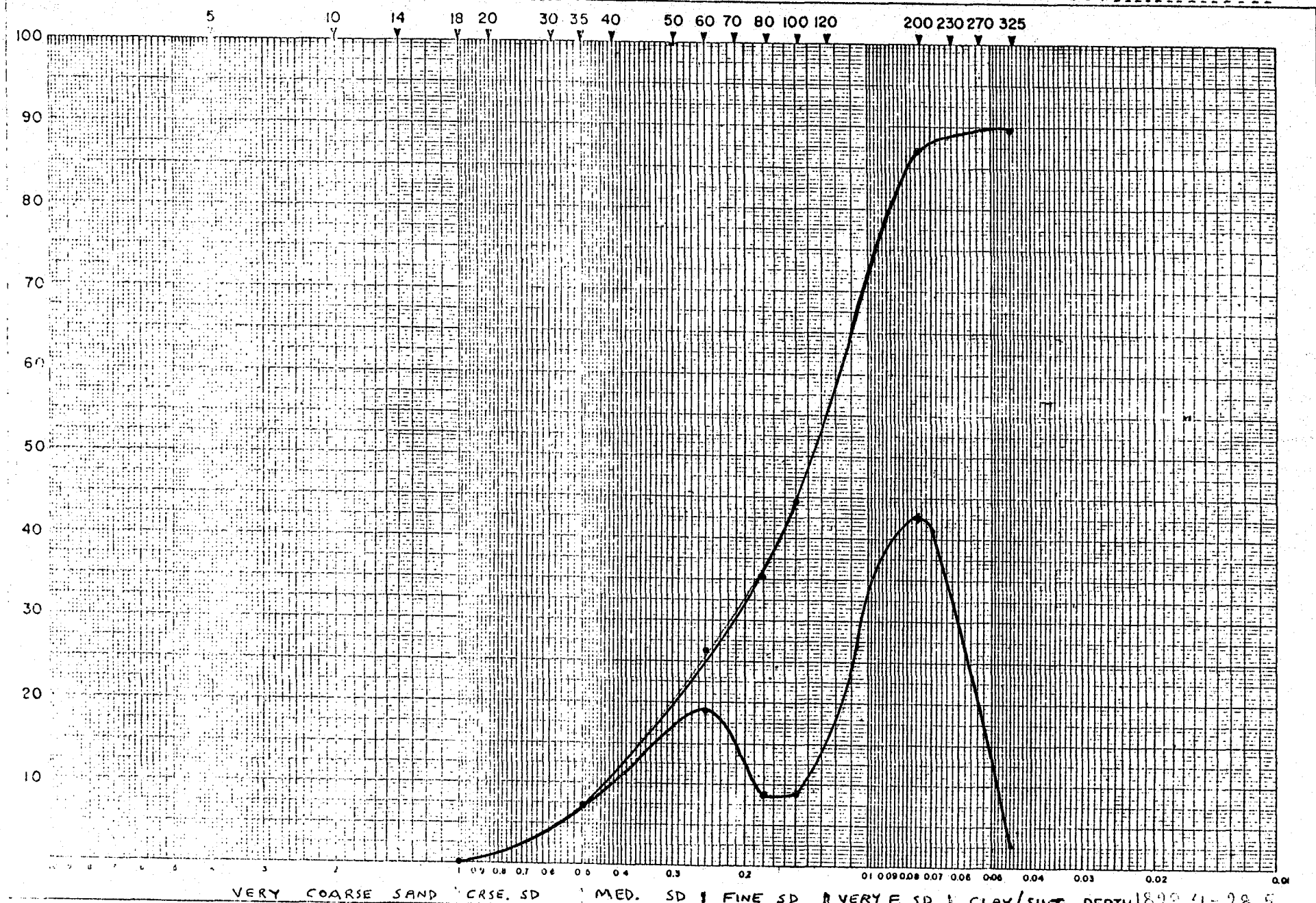
STATOIL PETROPHYSICS LAB.

LOCATION		SIEVE ANALYSIS					WELL DEPTH DATE																															
SAMPLE No.																																						
TYPE OF SAMPLE		Sand																																				
SIZE CLASS	SIEVE MESH OPENING		FRACTIONS RETAINED ON SIEVE					ORIGINAL TOTAL WEIGHT ('dried sample')																														
		mm	GROSS	BASIN	NET WT grams	INDIV%	CUM%	GROSS	BASIN	NET = 100% sample																												
VERY COARSE SAND										<u>INSOLUBLES</u> (sample after chemical treatment) GROSS : FILTER : NET : = 100% insoluble																												
						0.098	0.098																															
COARSE SAND						7.22	7.32			<u>SOLUBLES</u> Percentage of total sample dissolved after H <sub>2</sub> O <sub>2</sub> and HCl treatment <input type="text"/>																												
MEDIUM SAND						19.18	26.50			<u>SAND FRACTION</u> (+ coarse silt) (retained on 44µ sieve after wet sieving) GROSS FILTER NET <input type="text"/> % of insoluble																												
FINE SAND						8.8	35.30			<u>CALCULATING FACTOR</u> $f = \frac{100}{\text{net insoluble}} = \text{input}$																												
						9.0	44.32																															
VERY FINE SAND										<u>SAND PARAMETERS</u> $d_{10}$ <input type="text"/> $d_{40}$ 0.165 $d_{50}$ = median diam. 0.135 $d_{90}$ 0.050 $C = \frac{d_{40}}{d_{90}}$ <input type="text"/> 3.3																												
						42.53	86.86																															
CLAY + SILT						2.74	89.60			<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>5</td> <td>3</td> <td>2</td> </tr> <tr> <td>NON UNIFORM</td> <td>X</td> <td></td> <td></td> </tr> <tr> <td>MEDIUM</td> <td></td> <td></td> <td></td> </tr> <tr> <td>UNIFORM</td> <td></td> <td></td> <td></td> </tr> <tr> <td>WELL SORTED</td> <td></td> <td></td> <td></td> </tr> <tr> <td>WELL SORTED</td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRADED</td> <td></td> <td></td> <td></td> </tr> </table>		5	3	2	NON UNIFORM	X			MEDIUM				UNIFORM				WELL SORTED				WELL SORTED				GRADED			
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GRADED																																						
	RECEIVER																																					
		Fraction passed through 44µ sieve during wet sieving process (100-% sand fraction)																																				
CONTROL TOTAL						89.60	89.60																															
REMARKS		The material passed through 15 µ sieve is fine silt.																																				

GRAIN SIZE ANALYSIS

SAMPLE NUMBER

CUMULATIVE AND INDIVIDUAL PERCENT WEIGHT RETAINED.



VERY COARSE SAND CRSE. SD MED. SD FINE SD VERY F. SD CLAY/SILT DEPTH 1822.41-28.5

WELL 31/10-4

DATE 28/9-79

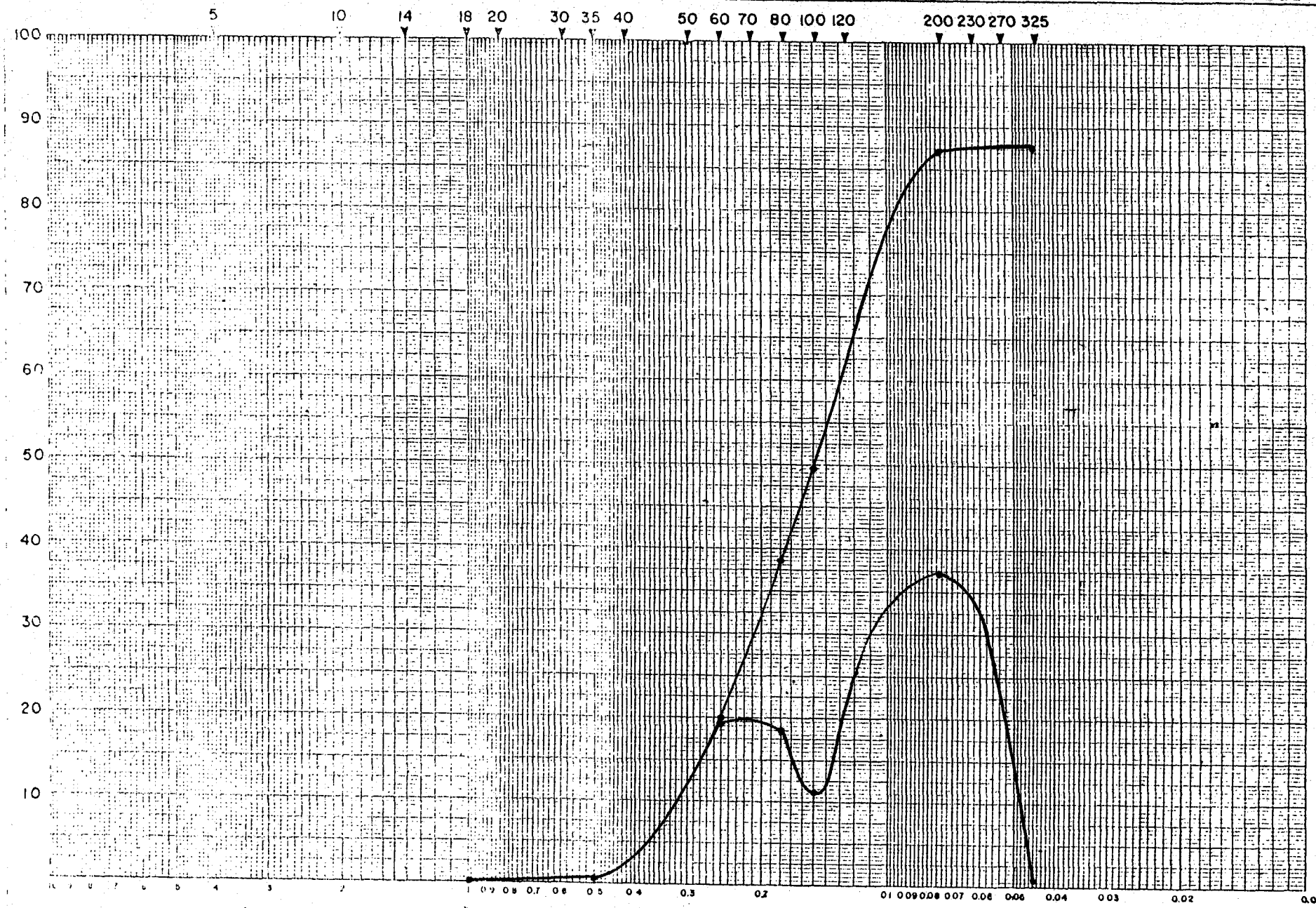
STATOIL PETROPHYSICS LAB.

LOCATION		SIEVE ANALYSIS					WELL							
SAMPLE No.							DEPTH							
TYPE OF SAMPLE		Sand					DATE							
SIZE CLASS	SIEVE MESH OPENING	FRACTIONS RETAINED ON SIEVE					ORIGINAL TOTAL WEIGHT (dried sample)							
		GROSS	BASIN	NET WT grams	INDIV%	CUM%								
VERY COARSE SAND	mm							GROSS BASIN NET = 100% sample						
COARSE SAND					0.03	0.03		INSOLUBLES (sample after chemical treatment) GROSS : FILTER : NET : = 100% insoluble						
MEDIUM SAND					0.72	0.75		SOLUBLES Percentage of total sample dissolved after H <sub>2</sub> O <sub>2</sub> and HCl treatment <input type="text"/>						
FINE SAND					19.20	19.95		SAND FRACTION (+ coarse silt) (retained on 44µ sieve after wet sieving) GROSS FILTER : NET : <input type="text"/> % of insoluble						
VERY FINE SAND					18.57	38.52		CALCULATING FACTOR $f = \frac{100}{\text{net insoluble}} = \text{input}$						
					11.15	49.67								
CLAY + SILT					37.15	86.82		SAND PARAMETERS d <sub>10</sub> <input type="text"/> d <sub>40</sub> <input type="text"/> 0.175 d <sub>50</sub> = median diam. <input type="text"/> 0.15 d <sub>90</sub> <input type="text"/> - C = d <sub>40</sub> /d <sub>90</sub> <input type="text"/> - 5 3 2 <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>NON UNIFORM</td><td>MEDIUM</td><td>UNIFORM</td></tr><tr><td>WELL SORTED</td><td>WELL SORTED</td><td>GRADED</td></tr></table>	NON UNIFORM	MEDIUM	UNIFORM	WELL SORTED	WELL SORTED	GRADED
	NON UNIFORM	MEDIUM	UNIFORM											
	WELL SORTED	WELL SORTED	GRADED											
RECEIVER														
Fraction passed through 44µ sieve during wet sieving process (100-% sand fraction)														
CONTROL TOTAL				87.52	87.52									
REMARKS														

# GRAIN SIZE ANALYSIS

SAMPLE NUMBER \_\_\_\_\_

CUMULATIVE AND INDIVIDUAL PERCENT WEIGHT RETAINED



VERY COARSE SAND | CRSE. SD | MED. SD | FINE SD. | VERY F. SD | CLAY/SILT DEPTH 18.29.20-29.30  
WELL 321.10.4  
DATE 28/9.79

STATOIL PETROPHYSICS LAB.

LOCATION		SIEVE ANALYSIS					WELL	
SAMPLE No.							DEPTH	
TYPE OF SAMPLE		Sand					DATE	
SIZE CLASS	SIEVE MESH OPENING	FRACTIONS RETAINED ON SIEVE					ORIGINAL TOTAL WEIGHT	
	mm	GROSS	BASIN	NET WT	INDIV%	CUM%	('dried sample')	
VERY COARSE SAND				grams			GROSS	
							BASIN	
							NET	= 100% sample
COARSE SAND							<b>INSOLUBLES</b>	
							(sample after chemical treatment)	
							GROSS:	
MEDIUM SAND							FILTER:	
							NET:	= 100% insoluble
							<b>SOLUBLES</b>	
FINE SAND					0.05	0.05	Percentage of total sample dissolved after H <sub>2</sub> O <sub>2</sub> and HCl treatment <input type="checkbox"/>	
							<b>SAND FRACTION (+ coarse silt)</b>	
							(retained on 44µ sieve after wet sieving)	
VERY FINE SAND							GROSS	
					2.51	2.56	FILTER:	
							NET	<input type="checkbox"/> % of insoluble
CLAY + SILT							<b>CALCULATING FACTOR</b>	
							f = $\frac{100}{\text{net insoluble}}$ = <input type="text"/>	
							<b>SAND PARAMETERS</b>	
							d <sub>10</sub>	<input type="text"/>
							d <sub>40</sub>	0.108
							d <sub>50</sub> = median diam.	0.10
							d <sub>90</sub>	-
							C = d <sub>40</sub> /d <sub>90</sub>	-
							5 3 2	
							NON UNIFORM MEDIUM UNIFORM WELL SORTED WELL SORTED GRADED	
RECEIVER								
FRACTION PASSED THROUGH 44µ SIEVE DURING WET SIEVING PROCESS (100-% SAND FRACTION)								
CONTROL TOTAL					83.40	83.40		

REMARKS

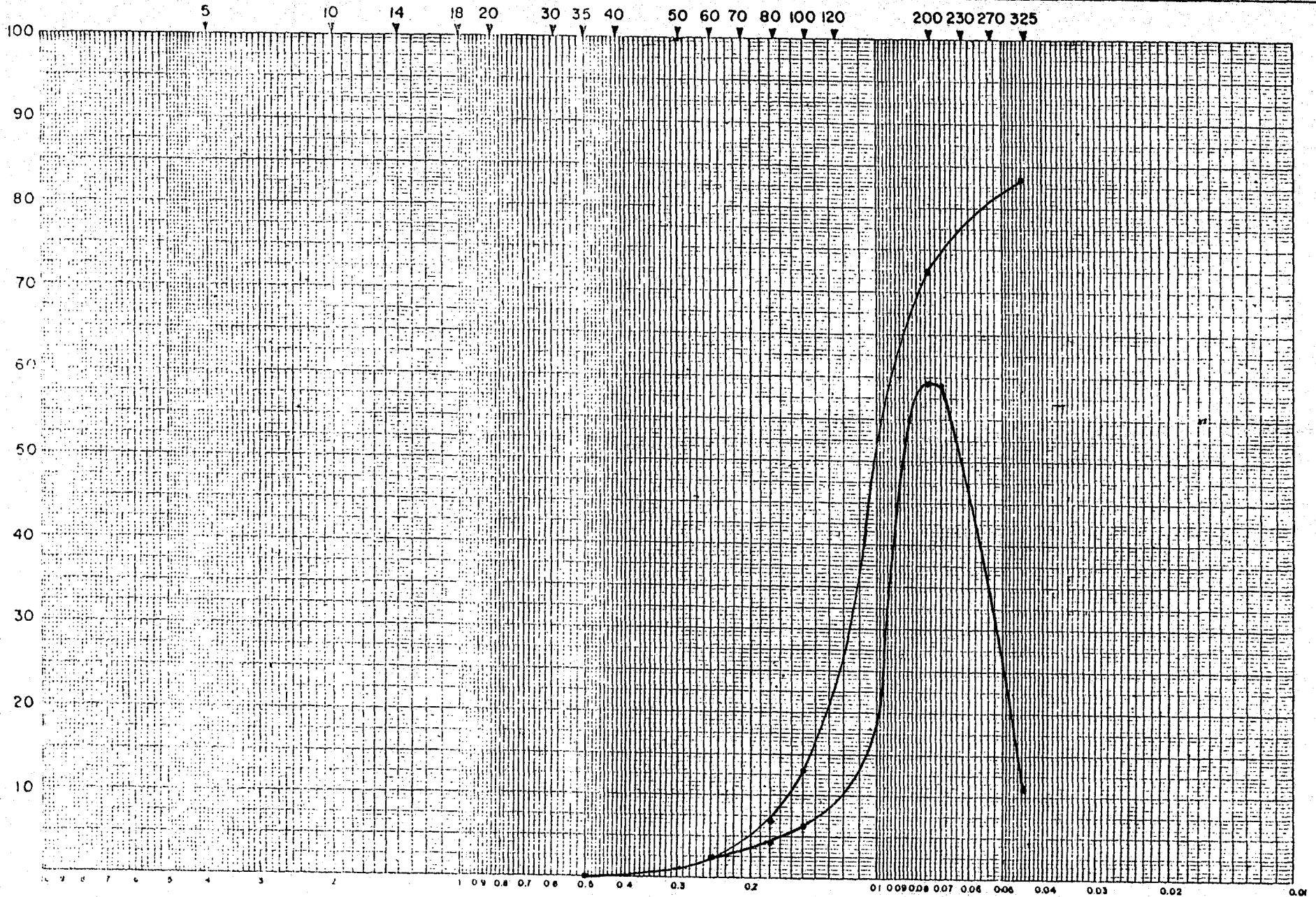
The material passed through 44µ sieve is fine sand.



# GRAIN SIZE ANALYSIS

SAMPLE NUMBER \_\_\_\_\_

CUMULATIVE AND DISCRETE PERCENT WEIGHT RETAINED



VERY COARSE SAND | COARSE SAND | MED. SAND | FINE SAND | VERY FINE SAND | CLAY/SILT  
DEPTH 1884.6 - 841.68  
WELL 34/10-4  
DATE 28/6 79

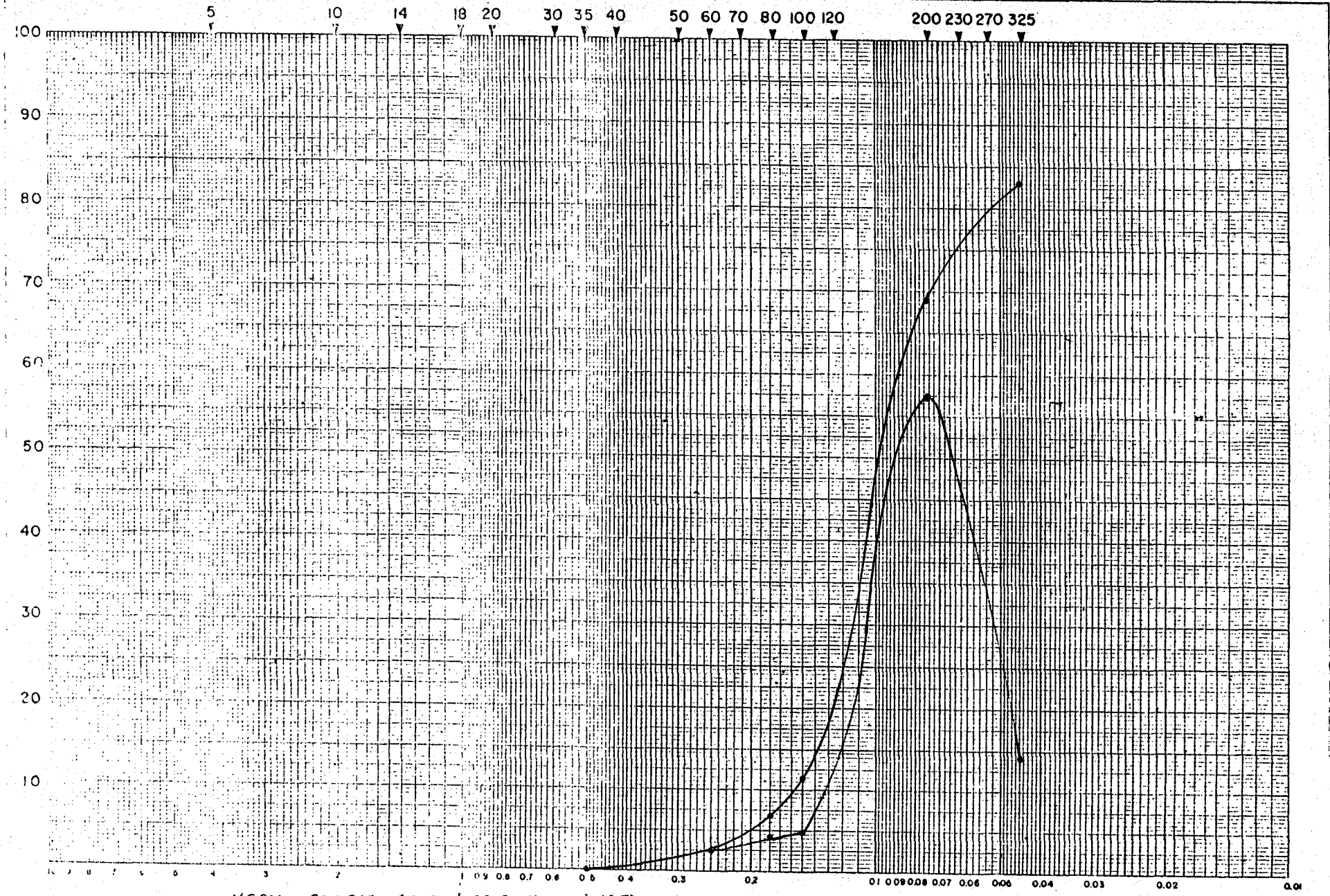
STATOIL PETROPHYSICS LAB.

LOCATION		SIEVE ANALYSIS					WELL																												
SAMPLE No.							DEPTH																												
TYPE OF SAMPLE		Sand					DATE																												
SIZE CLASS	SIEVE		FRACTIONS RETAINED ON SIEVE				ORIGINAL TOTAL WEIGHT (dried sample)																												
	MESH	OPENING mm	GROSS	BASIN	NET WT grams	INDIV%		CUM%																											
VERY COARSE SAND							GROSS BASIN NET = 100% sample																												
COARSE SAND					0.13	0.13	INSOLUBLES (sample after chemical treatment) GROSS : FILTER : NET : = 100% insoluble																												
MEDIUM SAND					2.41	2.55	SOLUBLES Percentage of total sample dissolved after H <sub>2</sub> O <sub>2</sub> and HCl treatment <input type="text"/>																												
FINE SAND					4.24	6.78	SAND FRACTION (+ coarse silt) (retained on 44µ sieve after wet sieving) GROSS FILTER : <input type="text"/> % of insoluble NET :																												
					4.79	11.57																													
VERY FINE SAND					57.3	57.38	CALCULATING FACTOR $f = \frac{100}{\text{net insoluble}} = \text{input}$ SAND PARAMETERS d <sub>10</sub> <input type="text"/> d <sub>40</sub> 0.105 d <sub>50</sub> = median diam. 0.098 d <sub>90</sub> <input type="text"/> C = d <sub>40</sub> /d <sub>90</sub> <input type="text"/>																												
CLAY + SILT					14.15	83.11	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>5</td> <td>3</td> <td>2</td> </tr> <tr> <td>NON UNIFORM</td> <td></td> <td></td> <td></td> </tr> <tr> <td>MEDIUM</td> <td></td> <td></td> <td></td> </tr> <tr> <td>UNIFORM</td> <td></td> <td></td> <td></td> </tr> <tr> <td>WELL SORTED</td> <td></td> <td></td> <td></td> </tr> <tr> <td>WELL SORTED</td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRADED</td> <td></td> <td></td> <td></td> </tr> </table>		5	3	2	NON UNIFORM				MEDIUM				UNIFORM				WELL SORTED				WELL SORTED				GRADED			
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GRADED																																			
	RECEIVER																																		
		Fraction passed through 44µ sieve during wet sieving process (100-% sand fraction)																																	
CONTROL TOTAL				83.11	83.11																														
REMARKS																																			

# GRAIN SIZE ANALYSIS

SAMPLE NUMBER .....

CONTINUOUS AND INDIVIDUAL PERCENT WEIGHT RETAINED.



VERY COARSE SAND CRSE. SD MED. SD FINE SD VERY F. SD CLAY/SILT DEPTH 886.4-86.45  
 WELL 2110-4  
 DATE 25/9/79

STATOIL PETROPHYSICS LAB.

<b>LOCATION</b>	<b>WELL</b>
<b>SAMPLE No.</b>	<b>DEPTH</b>
<b>TYPE OF SAMPLE</b> Sand	<b>DATE</b>

SIZE CLASS	SIEVE MESH OPENING mm	FRACTIONS RETAINED ON SIEVE				
		GROSS	BASIN	NET WT grams	INDIV%	CUM%
VERY COARSE SAND						
COARSE SAND	0.425			1.50	0.13	0.13
MEDIUM SAND					4.57	4.70
FINE SAND	0.250				8.96	13.65
	0.150				6.20	19.86
VERY FINE SAND						
	0.075			59.41	79.27	
CLAY + SILT	0.045			9.45	88.72	
	<b>RECEIVER</b>					
		Fraction passed through 44µ sieve during wet sieving process (100-% sand fraction)				
<b>CONTROL TOTAL</b>				88.72	88.72	

**ORIGINAL TOTAL WEIGHT**  
(dried sample)

GROSS  
BASIN  
NET = 100% sample

**INSOLUBLES**  
(sample after chemical treatment)

GROSS:  
FILTER:  
NET: = 100% insoluble

**SOLUBLES**

Percentage of total sample dissolved after H<sub>2</sub>O<sub>2</sub> and HCl treatment

**SAND FRACTION (+ coarse silt)**  
(retained on 44µ sieve after wet sieving)

GROSS  
FILTER:  
NET:  % of insoluble

**CALCULATING FACTOR**

$f = \frac{100}{\text{net insoluble}} =$

**SAND PARAMETERS**

d<sub>10</sub>

d<sub>40</sub> 0.108

d<sub>50</sub> = median diam. 0.098

d<sub>90</sub> -

$C = d_{40}/d_{90}$

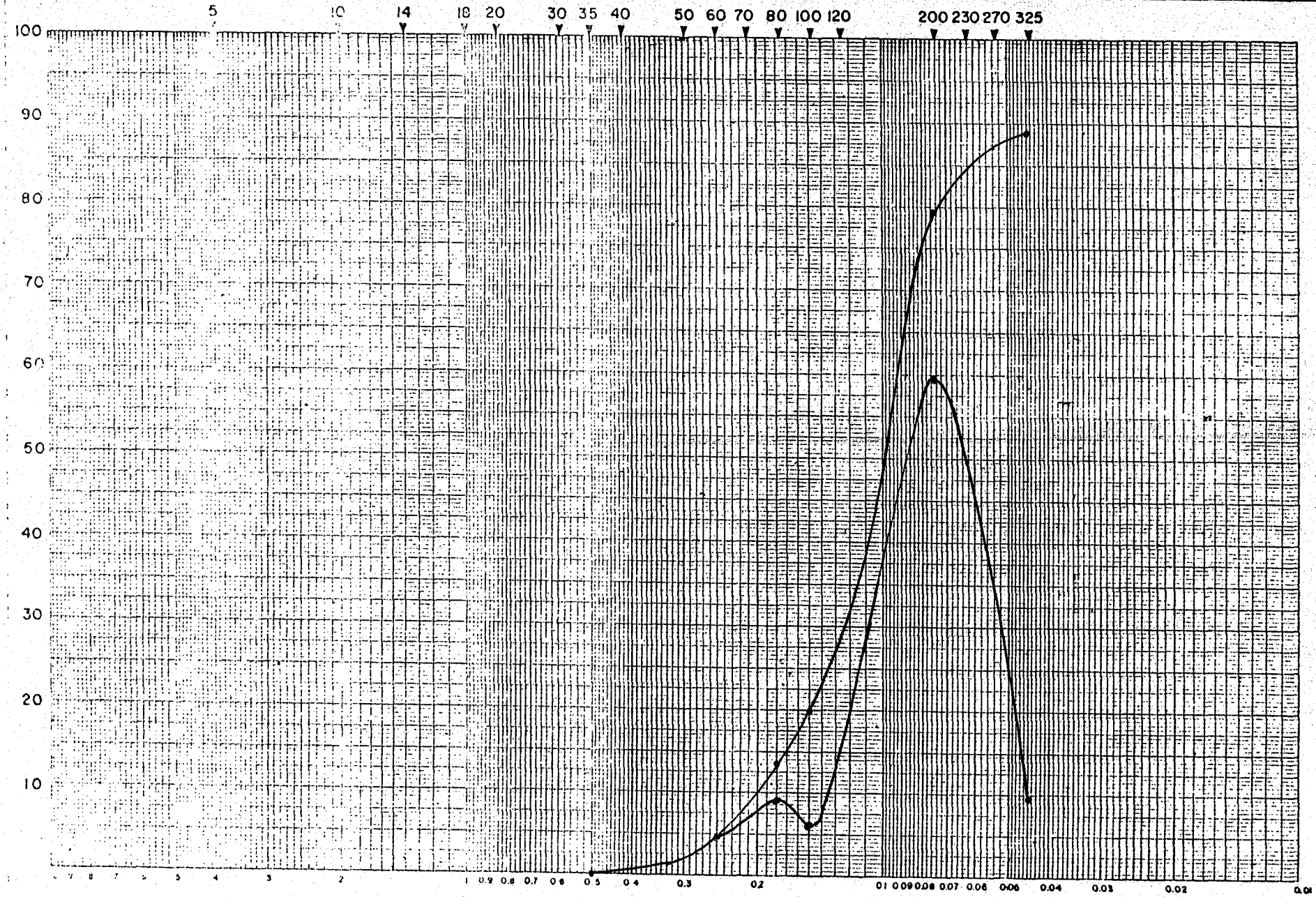
	5	3	2
NON UNIFORM			
MEDIUM			
UNIFORM			
WELL SORTED			
WELL SORTED			
SORTED			
GRADED			

**REMARKS** The material passed through 44µ sieve during wet sieving process (100-% sand fraction)

# GRAIN SIZE ANALYSIS

SAMPLE NUMBER \_\_\_\_\_

CUMULATIVE AND INDIVIDUAL PERCENT WEIGHT



VERY COARSE SAND | CRSE. SD | MED. SD | FINE SD. | VERY F. SD | CLAY/SILT DEPTH 887.95-88.05  
WELL 34.110-4  
DATE 28/9-79