KOTANEELEE Y.T.E-37

An International Company

NOWSCO Well Service Ltd.

RESEARCH AND DEVELOPMENT LABORATORY, 6820 - 36 STREET S.E., CALGARY, ALBERTA, CANADA T2C 2G4
TELEPHONE (403) 531-5454

Nowsco Chemical Technology Centre
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NRD - 95-125

CORE REPORT

for

Anderson Exploration Limited

Prepared by: Greg Henderson
Phone: 531-5436
Fax : 279-8433

Nowsco Representative

Don Green

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LABORATORY REPORT
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SAMPLE IDENTIFICATION KOTANEELEE YT E-37

Lab Sample No.	Sample Description
P-2821 a	Core chunk - 12806.1 ft.
P-2821 b	Core chunk - 12834.2 ft.
P-2821 c	Core chunk - 12864.6 ft.
P-2821 d	Core chunk - 12887.8 ft.
P-2821 e	Core chunk - 12922.8 ft.
P-2821 f	Core chunk - 12954.1 ft.
P-2821 g	Core chunk - 13174.4 ft.
P-2821 h	Core chunk - 13185.1 ft.

The above core plugs were analyzed to determine mineralogy and overall rock fabric as well as solubility in 15% hydrochloric acid.

LABORATORY PROCEDURES AND ANALYSIS

Acid Solubility Analysis

The solubility of a two gram sample, from each of the above core, was determined gravimetrically using 200 ml of 15% hydrochloric acid. The acid filtrate was then analyzed to determine the soluble species present. The results are summarized in the following table along with the molar carbonate ratio (Mg/Ca). The ratio gives a measure of the degree of dolomitization of the carbonate; pure limestone ($CaCO_3$) = 0.0, pure dolomite ($CaCO_3 \cdot MgCO_3$) = 1.0 and the presence of magnesite ($MgCO_3$) = > 1.0.

Sample Number	Analyzed Element (wt%)				Calculated Composition (wt%)				Molar Ratio (Mg/Ca)	Soluble (wt%)
	Ca	*Mg*	*Fe*	*SO_4*	*$CaCO_3$*	*$MgCO_3$*	*$FeCO_3$*	*$CaSO_4$*		
P-2821 a	21.2	12.7	0.1	<0.1	52.8	44.0	0.1	<0.1	1.0	96.9
P-2821 b	22.7	11.1	0.1	<0.1	56.8	38.6	0.1	<0.1	0.8	95.6
P-2821 c	23.2	10.8	0.1	<0.1	57.9	37.5	0.1	<0.1	0.8	95.6
P-2821 d	20.1	13.1	0.1	<0.1	52.1	45.5	0.2	<0.1	1.0	97.7
P-2821 e	23.3	11.4	0.1	<0.1	58.1	39.6	0.1	<0.1	0.8	97.8
P-2821 f	21.2	12.3	0.1	<0.1	52.8	42.8	0.1	<0.1	1.0	95.7
P-2821 g	21.3	12.1	0.1	<0.1	53.3	45.5	0.1	<0.1	1.0	98.9
P-2821 h	20.6	13.7	0.1	<0.1	51.3	47.7	0.1	<0.1	1.0	99.1

Scanning Electron Microscope Analysis

A freshly fractured surface from each core plug was examined using a scanning electron microscope (S.E.M.) equipped with an energy dispersive x-ray probe.

The samples is made up of a dark gray to black, massive dolomite containing frequent streaks of white dolomite which has filled in many of the natural fractures. The rock framework consists primarily of micritic, anhedral dolomite crystals. The white dolomite forms a breccia and the replacement of fossilized material in some areas. A carbonaceous substance is located throughout the rock matrix and contributes to the black color of the rock. Porosity is poor and is limited to natural fractures and the occasional vug. The carbonaceous substance is found filling pore spaces and, in some sections, constituting the majority of the core chunk. In many cases the carbonaceous substance was indistinguishable in appearance from the dolomite as the substance filled in vugs completely and assumed the crystal shape of the dolomite. A majority of the time the substance only contributed to the matrix phase. Matrix material was limited to the carbonaceous substance and, in sample P-2821c and P-2821g, small amounts of quartz.

See the attached S.E.M. photomicrographs.

SUMMARY

The acid solubility analysis shows the rock to be comprised of relatively pure dolomite. The rock ranges in solubility from 94 - 99% soluble in 15% hydrochloric acid at room temperature. The insoluble portion (1-6%) consists primarily of quartz and the carbonaceous substance.

The S.E.M. analysis indicates the samples are primarily dolomite which contains very little porosity or accessory minerals. The carbonaceous substance is spread evenly throughout the rock matrix and reduces the overall porosity.

The carbonaceous substance consisted of primarily of elements sulfur, carbon and oxygen, as observed by the energy dispersive x-ray probe. This substance was not effected by solvents or hydrochloric acid.

OBSERVATIONS

- The pore lining minerals that were present would not be removed using solvents.
- The bitumen and quartz fines released by acid treatments would become mobile and migrate towards the wellbore area.
- The type of porosity contained in the rock indicates that the permeability is poor and it is evident most of the production is emanating from natural fractures.
- The amount of fines generated by an acid treatment would be insignificant in relation to the overall total solubility of the rock.

Please contact me at the laboratory should you have any questions.

Sincerely,

NOWSCO WELL SERVICE LTD.

Greg Henderson Ch.T.,
Laboratory Technologist,
Stimulation Technical Services

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S.E.M. Photomicrograph Micron Marker System

The bars and dots located on the lower right hand corner of the photographs provide a means of relating the size of the magnified images to their actual sizes.

The actual marker bar length corresponding to the various dot coding is as follows.

Marker Display	Marker Bar Length mm	Marker Bar Length (μ m)
	0.0001	0.1 (1000 Å)
	0.001	1.0
	0.01	10.0
	0.1	100.0
	1.0	1000.0

Determining Magnification

Measure the marker bar length (from picture in millimetres), and divide the actual marker bar length (from the table above in microns) and multiply the result by 1000.

Marker bar measurement from photomicrograph = 10.5 mm, with 2 dot coding
Actual marker bar length from table above in microns = 10 microns

$$\therefore \quad \frac{10.5 \text{ mm}}{10 \text{ microns}} \times 1000 = 1050 \text{ magnification}$$

Determining Particle Size

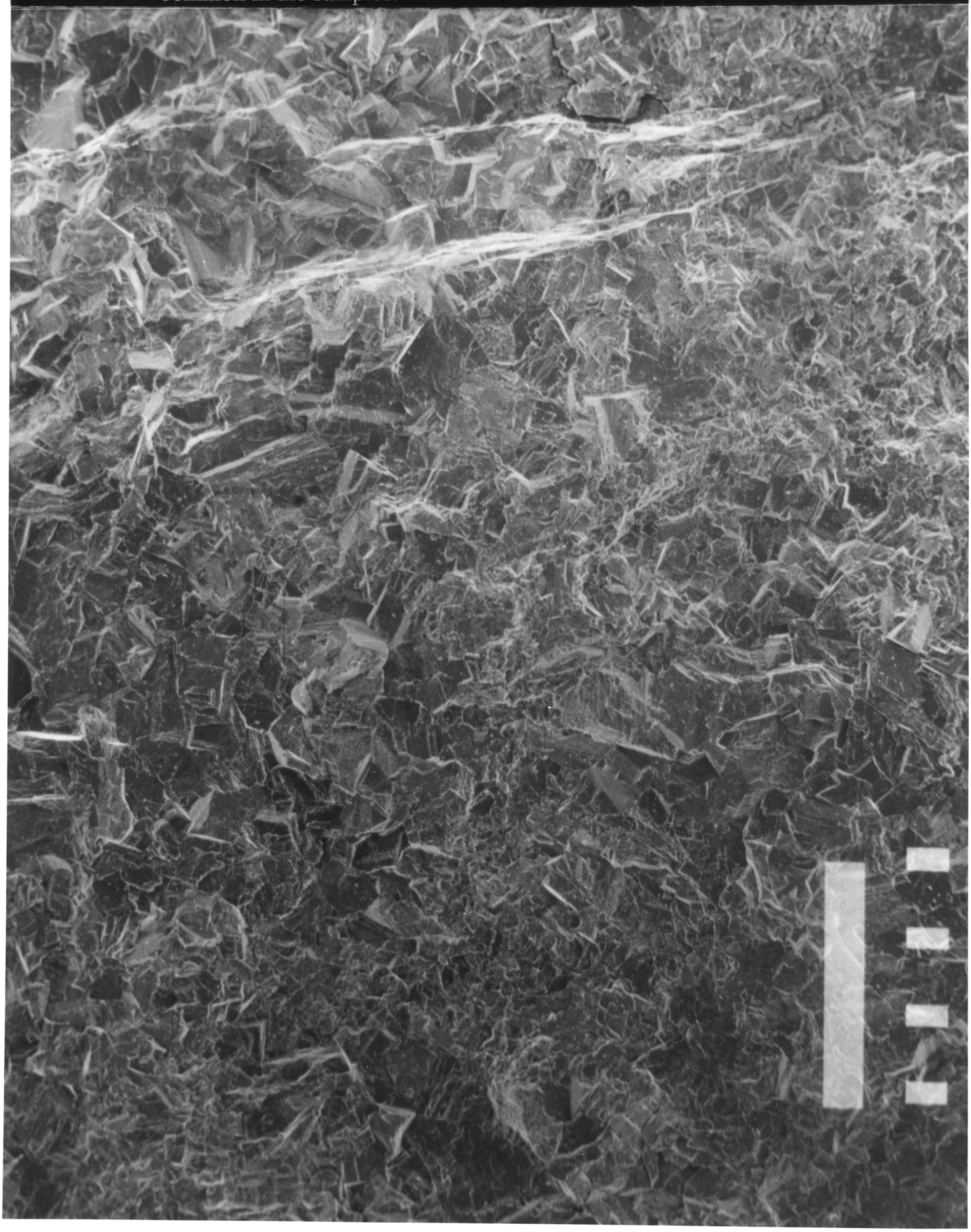
Measure the item of interest from the photomicrograph in millimetres. Next, measure the marker bar length from the photomicrograph in millimetres. Divide the item length by the marker bar length and multiply the result by the corresponding marker bar length in millimetres from the table above.

Item length from photomicrograph = 8 mm
Marker bar length from photomicrograph = 11 mm, 2 dot coding
Marker bar length from above table with corresponding 2 dot coding = 0.01 mm

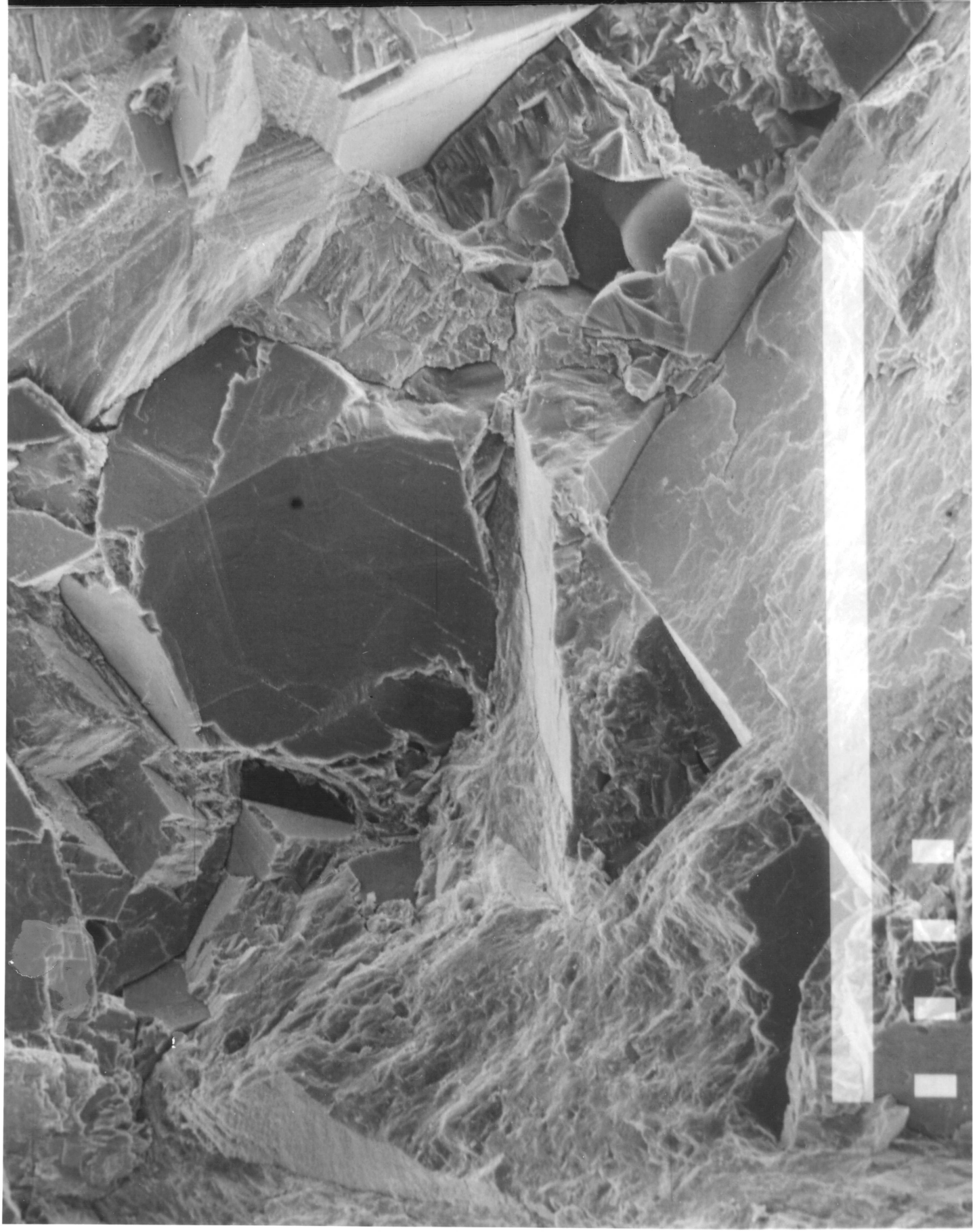
$$\therefore \quad \frac{8 \text{ mm}}{11 \text{ mm}} \times 0.01 \text{ mm} = 0.0072 \text{ mm or } 7.2 \text{ microns}$$

S.E.M. PHOTOMICROGRAPHS

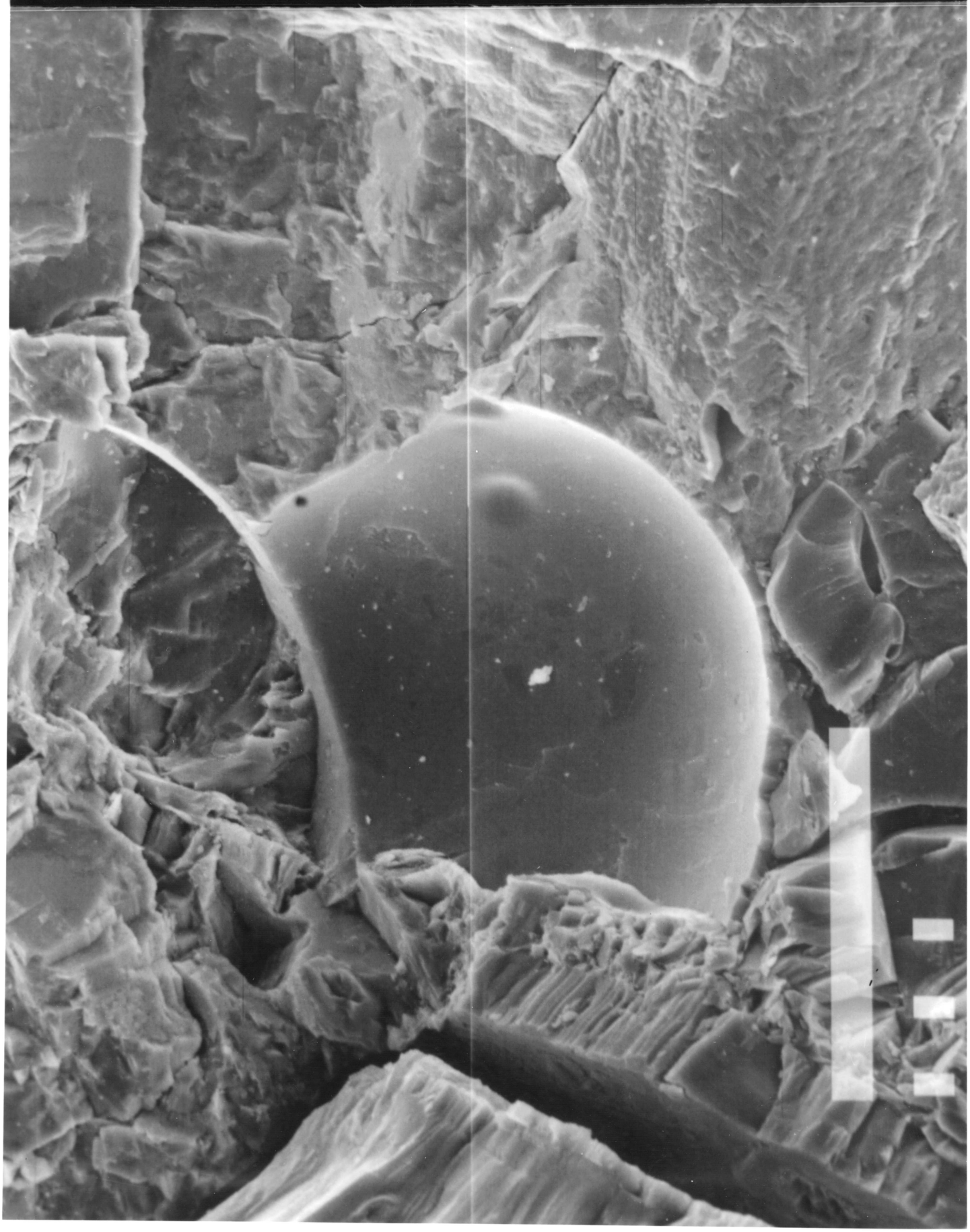
P-2821 e Low magnification image illustrating the overall rock fabric common in the samples.



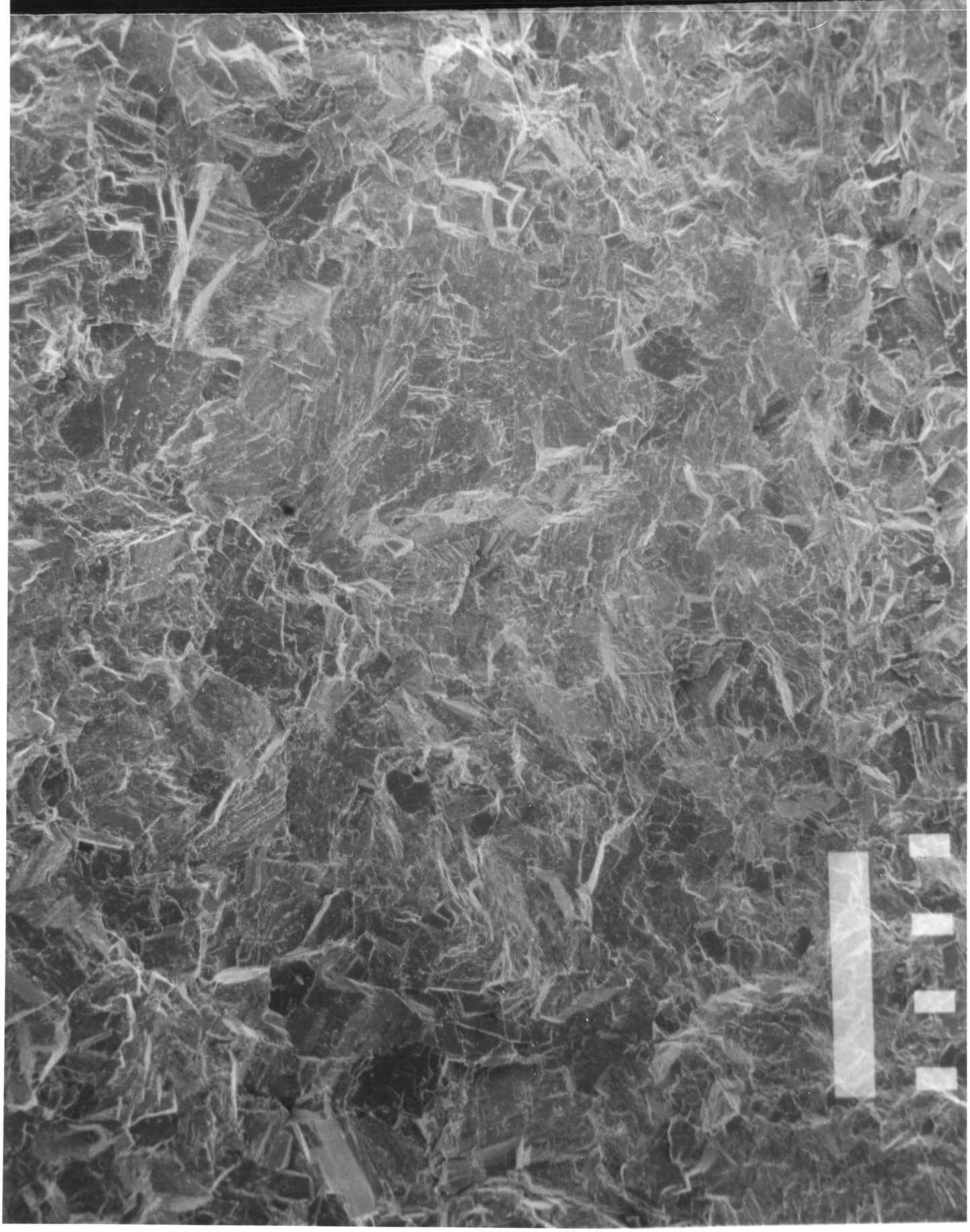
P-2821 e Normal magnification image illustrating the well formed dolomite crystals. Note the absence of exposed crystal faces.



P-2821 e High magnification image showing a deposit of the carbonaceous material frequently encountered in the rock. Note the rock like structure of the substance (arrows).



P-2821 h Low magnification image showing the tight rock fabric.



P-2821 h Normal magnification image illustrating the anhedral rock structure.