



97/12/18  
97- 868

Formation: Chance  
Area: Yukon  
Location: G-08/J-19/M-08

**CORE ANALYSIS**

**NORTHERN CROSS**

*NowSCO Representative: Randy Wilson*

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NOTICE: THE INTENT OF THIS REPORT IS TO PROVIDE INFORMATION ON THE SAMPLES TESTED, WHILE THE RECOMMENDATIONS ARE MADE IN GOOD FAITH AND REASONABLE EFFORTS HAVE BEEN MADE TO ENSURE THEIR RELIABILITY, NOWSCO WELL SERVICE LTD. ACCEPTS NO LIABILITY FOR DAMAGE ARISING FROM THE USE OF THIS REPORT.

**SUMMARY**

Core samples from the Chance formation were submitted to characterize the rock matrix, determine permeability and identify the soluble rock species present. Coreflow testing using various fluids was performed on the submitted samples to determine fluid compatibility with respect to the core.

**CONCLUSION**

- A Scanning Electron Microscope (S.E.M.) analysis was performed on the samples. See S.E.M. for rock matrix description and attached photomicrographs.
- The high concentrations of calcium feldspars reduce the chances of a successful hydrofluoric (HF) treatment. If HF acid is to be used it is recommended not to exceed an HF concentration of 1.5%.
- The solubility in 15% hydrochloric acid (HCl) of the submitted samples ranged from 4.8 to 12.3% after 30 minutes at 22 °C.
- The solubility in 12% hydrochloric and 3% hydrofluoric acid (12/3) of the submitted samples P-4975a through P-4975d ranged from 3.1 to 23.2% after 30 minutes at 22 °C.
- Permeability of the core plugs tested ranged from 0.14 to 149.95 millidarcies (mD).
- Coreflow testing performed on sample P-4975a indicates that a 91.3% decrease in permeability would occur. Testing performed on sample P-4975d however, indicates that permeability would increase. Coreflow testing using HF acid on these samples is inconclusive.
- Coreflow testing performed on sample P-4975e indicates that using 15% hydrochloric acid as a stimulation fluid should significantly increase the permeability.

**Sample Identification****Lab Sample No.****Sample Description**

P-4975a	Core plug, J-19, 4458.5 ft.
P-4975b	Core plug, G-08, 4400 ft.
P-4975c	Core plug, M-08, 4372 ft.
P-4975d	Core plug, M-08, 4365 ft.
P-4975e	Core plug, G-08, 4399.2 ft.
P-4975f	Core plug, G-08, 4401.0 ft.
P-4975g	Core plug, M-08, 4364.0 ft.
P-4975h	Core plug, M-08, 4363.0 ft.

### SCANNING ELECTRON MICROSCOPE ANALYSIS

A freshly fractured surface from core samples P-4975a and P-4975d were examined using a scanning electron microscope (S.E.M.) equipped with an x-ray dispersive probe.

Sample P-4975a was examined after being treated with acid, outlined in the coreflow testing procedure. The sample was friable but not unconsolidated. It consisted of a moderately well sorted sandstone with good visual porosity. The matrix grains were predominately quartz and feldspars, and exhibited a rough surface texture, most likely from exposure to acid. Cementation was difficult to determine, the sample appeared to have poor cementation and visually it looks as if this was accomplished through pressure contact and minor amounts of silica sutures. No accessory minerals were determined other than the presence of an abundant amount of Silica fines throughout the pore system. The sample was extremely abundant with pyrobitumens.

Sample P-4975h was also examined and was not exposed to acid. The sample consisted of a moderately well sorted sandstone with some areas exhibiting good porosity and other areas with poor to no porosity. The good porosity areas will be referred to as "open" and the poor areas as "infill". The matrix grains were composed of quartz, calcium-rich feldspar and minor amounts of chert. There was also an abundance of pyrobitumens present. Cementation in the "open" areas consisted primarily of pressure contact and silica sutures. In the "infill" areas the cementation consisted of calcite infill. Accessory minerals consisted of fine silica particles and very fine calcium-rich feldspars. No clays were visually determined. The calcium-rich feldspars had the appearance of becoming or were in the process becoming clays.

It is recommended due to the presence of calcite and calcium-rich feldspars that an XRD analysis be performed to determine the amount of these minerals present so a better decision on the type of stimulation fluid can be made.

See attached photomicrographs.

### HCl Acid Solubility Analysis

The solubility of two gram portions of core from each of the intervals were determined gravimetrically using 200 ml of 15% hydrochloric acid. Testing was conducted over a 30 minute time period at room temperature (22° C).

The acid filtrate from the 15% hydrochloric acid solubility was analyzed to determine the soluble species present. Results are summarized in Table #1 along with the molar carbonate ratio (Mg/Ca). The ratio gives a measure of the degree of dolomitization of the carbonate. Pure limestone ( $\text{CaCO}_3$ ) = 0.0, pure dolomite ( $\text{CaCO}_3 \cdot \text{MgCO}_3$ ) = 1.0, and the presence of magnesite ( $\text{MgCO}_3$ ) = > 1.0.

Table #1

Sample #	Analyzed Element (wt%)				Calculated Composition (wt%)				Molar Ratio (Mg/Ca)	Soluble (wt%)
	Ca	Mg	Fe	SO <sub>4</sub>	CaCO <sub>3</sub>	MgCO <sub>3</sub>	FeCO <sub>3</sub>	CaSO <sub>4</sub>		
P-4975a	0.10	<0.01	0.06	<0.01	0.25	<0.01	0.13	<0.01	<0.01	0.4
P-4975b	5.40	<0.01	0.06	0.25	13.22	<0.01	0.12	0.35	<0.01	13.7
P-4975c	11.38	0.01	0.07	<0.01	28.41	0.04	0.15	<0.01	<0.01	28.6
P-4975d	2.72	<0.01	0.07	<0.01	6.79	<0.01	0.14	<0.01	<0.01	6.9
P-4975e	4.27	<0.01	0.04	0.09	10.57	<0.01	0.09	0.12	<0.01	10.8
P-4975f	4.89	<0.01	0.04	0.10	12.11	<0.01	0.08	0.14	<0.01	12.3
P-4975g	1.00	<0.01	0.06	0.16	2.32	<0.01	0.13	0.22	<0.01	2.7
P-4975h	4.40	<0.01	0.04	0.11	10.87	<0.01	0.08	0.16	<0.01	11.1

### HCl/HF Acid Solubility Analysis

The solubility of two gram portions from samples P-4975a to P-4975d were determined gravimetrically using 200 ml of 12/3 HCl/HF acid. Testing was conducted over a 30 minute time period at room temperature (22° C).

Table #2

Sample #	Solubility (%)
P-4975a	3.1
P-4975b	6.2
P-4975c	23.2
P-4975d	9.9

In all cases a white precipitate formed when the rock came into contact with HF acid. The precipitate was likely fluorosilicates.

### Permeability to Nitrogen Determination

The permeability to nitrogen on submitted core plugs P-4975a to P-4975h was determined using a Nowsco CFA-4 Core Flow Apparatus equipped with a Hassler sleeve-type core holder. All testing was conducted at 22 °C. Results are presented on Table #3.

Table #3

Sample #	Permeability (mD)
P-4975a	2.33
P-4975b	1.53
P-4975c	0.14
P-4975d	55.17
P-4975e	18.19
P-4975f	2.23
P-4975g	1.50
P-4975h	149.95

### CORE FLOW ANALYSIS

Core flow testing on samples P-4975a, P-4975d and P-4975e was performed using a Nowasco CFA-4 Core Flow Apparatus. The regained permeability of the core was established after treating the core with various treatment fluids. Results are presented in Table #4, #5 and #6.

- All core flow testing was performed at a simulated bottom hole temperature of 69 °C and an overburden pressure of 4,500 psi.
- Comparing the permeability values for the reference fluid (soltrol) before and after each treatment fluid stage indicates the extent of improvement or damage that is created by the treatment.
- The 15% HCl acid blend used in all the coreflow tests contains the following additives; Nowferr 1W at 10 L/m<sup>3</sup> + Nowferr 14P at 0.8 kg/m<sup>3</sup> + AH-1 at 23 L/m<sup>3</sup> + AI-2 at 2 L/m<sup>3</sup> + AI-275 at 3 L/m<sup>3</sup>. The 12/3 acid blend also contained 50 kg/m<sup>3</sup> ammonium bifluoride.
- Soltrol is an iso-paraffinic C<sub>13</sub> solvent.

Table #4

Sample #: P-4975a				
Plug Diameter: 6.5 cm		Plug Length: 2.5 cm		
<i>Fluid</i>	<i>Direction</i>	<i>Pressure (psi)</i>	<i>Volume (mls)</i>	<i>Permeability (mD)</i>
Nitrogen	Forward	180	---	2.27
API Brine	Forward	1131	100	3.29
Soltrol	Forward	1947	100	1.50
15% HCl	Reverse	1871	100	0.74
12/3 HCl/HF	Reverse	1885	100	0.59
3% NH <sub>4</sub> Cl	Reverse	1851	100	0.98
Soltrol	Forward	2210	10	0.13

Table #5

Sample #:P-4975d				
Plug Diameter: 2.52 cm		Plug Length: 4.59 cm		
<i>Fluid</i>	<i>Direction</i>	<i>Pressure (psi)</i>	<i>Volume (mls)</i>	<i>Permeability (mD)</i>
Nitrogen	Forward	8.1	---	55.2
API Brine	Forward	80	50	31.0
Soltrol	Forward	150	150	27.1
15% HCl	Reverse	20	285	251.2
12/3 HCl/HF	Reverse	8	300	523.4
3% NH <sub>4</sub> Cl	Reverse	8	100	785.1
Soltrol	Forward	2.8	200	1115.0

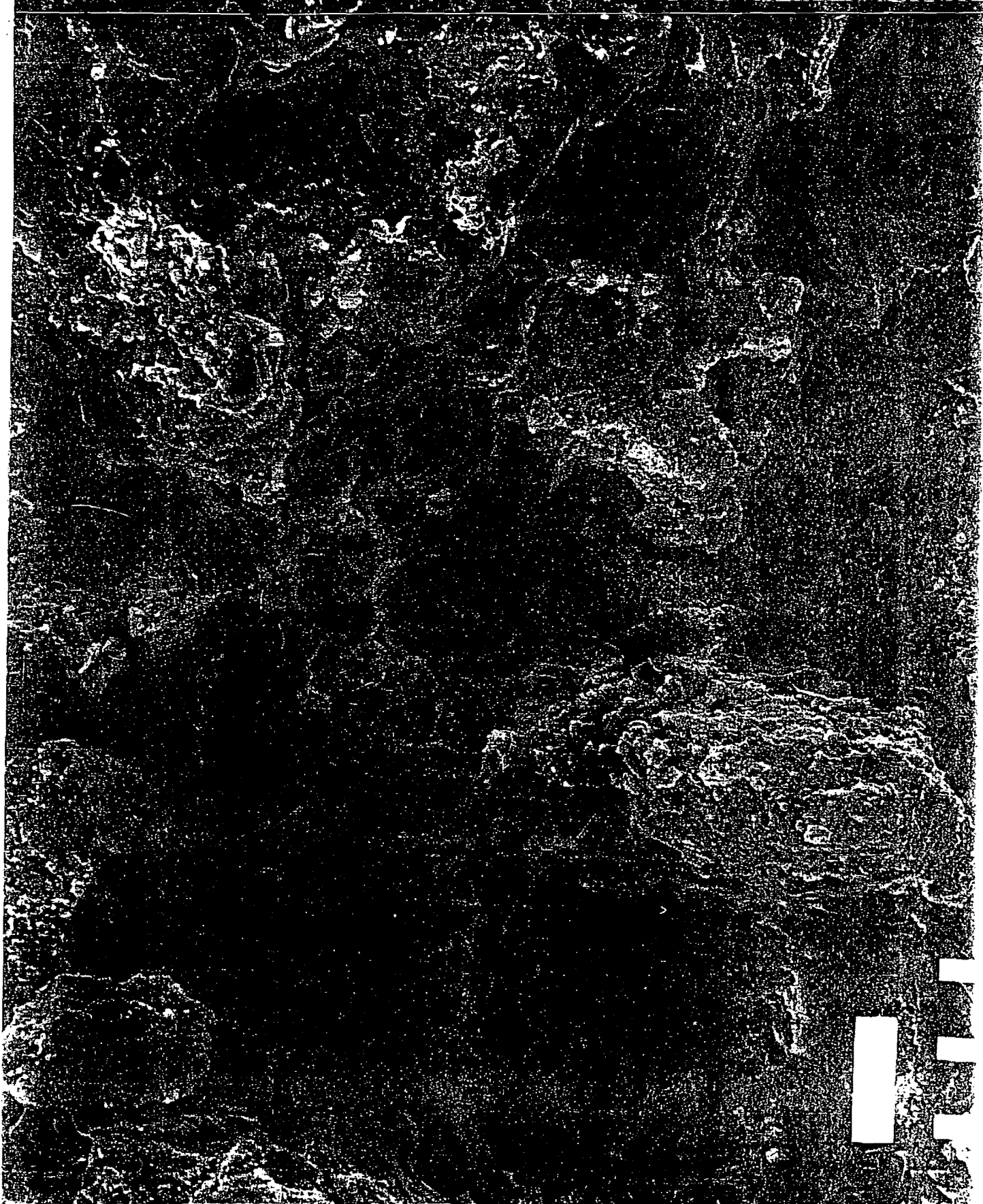
Table #6

Sample #:P-4975e				
Plug Diameter: 2.51 cm		Plug Length: 3.17 cm		
<i>Fluid</i>	<i>Direction</i>	<i>Pressure (psi)</i>	<i>Volume (mls)</i>	<i>Permeability (mD)</i>
Nitrogen	Forward	13	---	18.2
API Brine	Forward	225	50	4.4
Soltrol	Forward	379	200	2.5
15% HCl	Reverse	16	150	67.1
Soltrol	Forward	1.7	200	1734.2

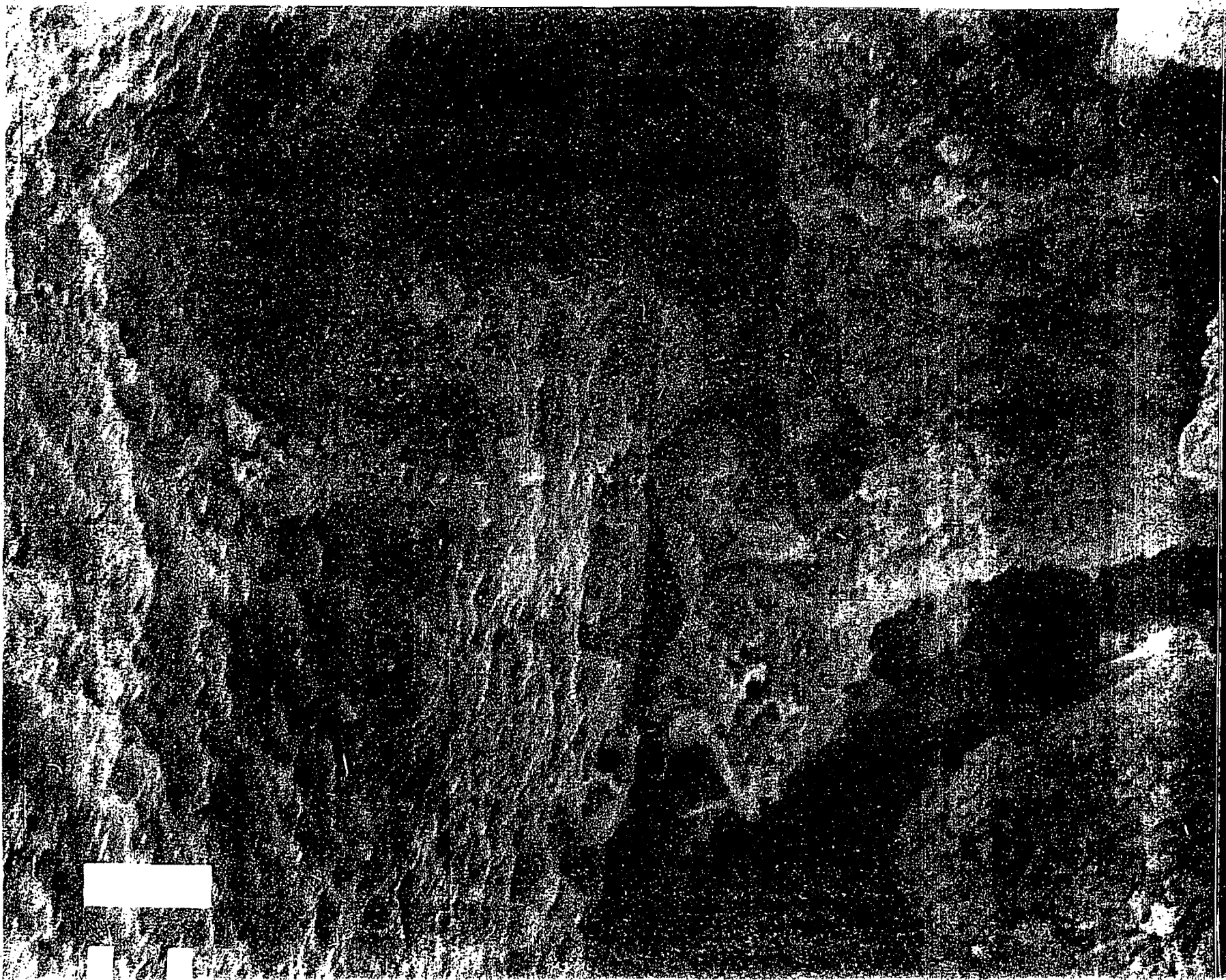
S.E.M. PHOTOMICROGRAPHS

*p-4975a Northern Cross*

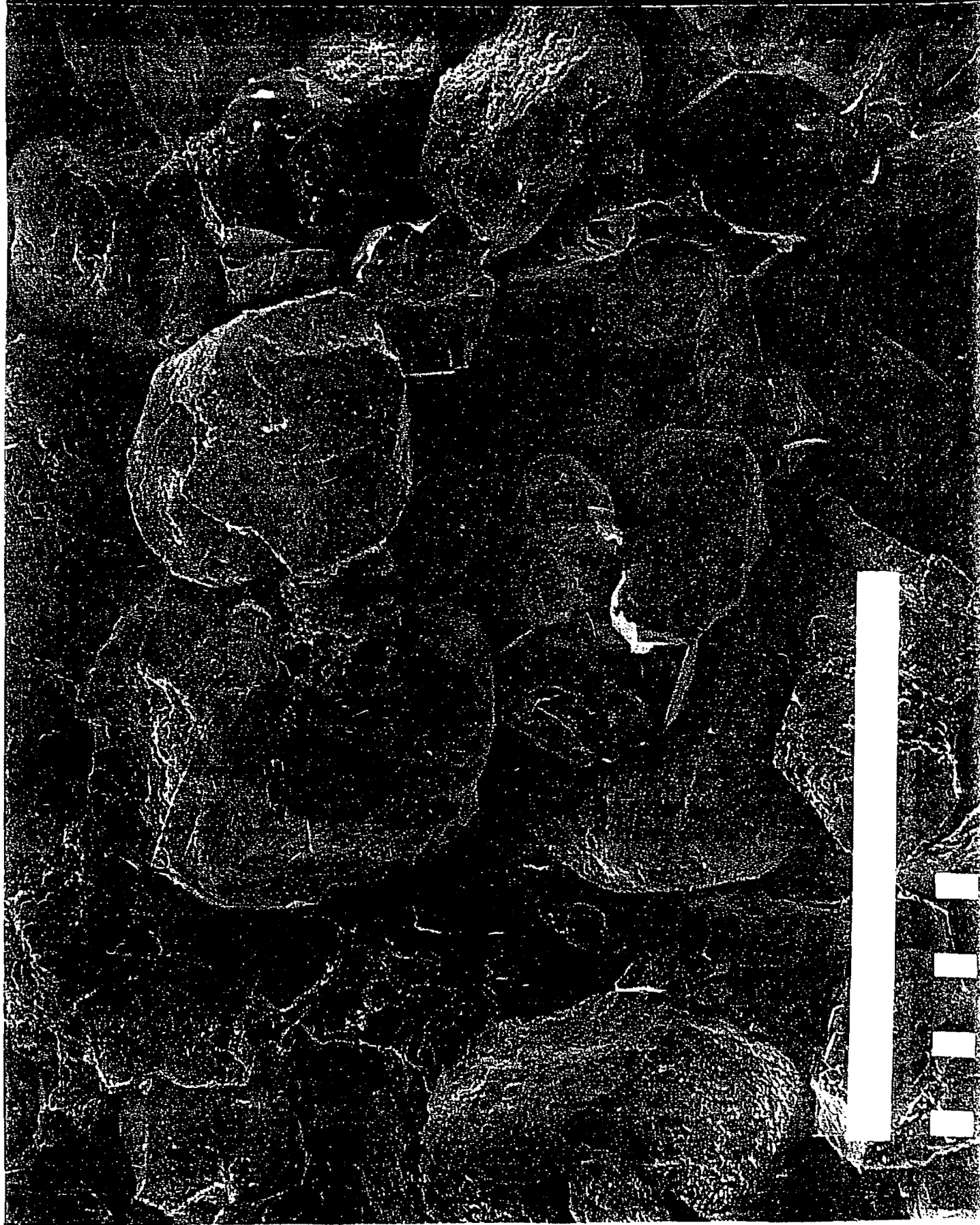
100X Overall, illustrating rock fabric after acid dissolution.

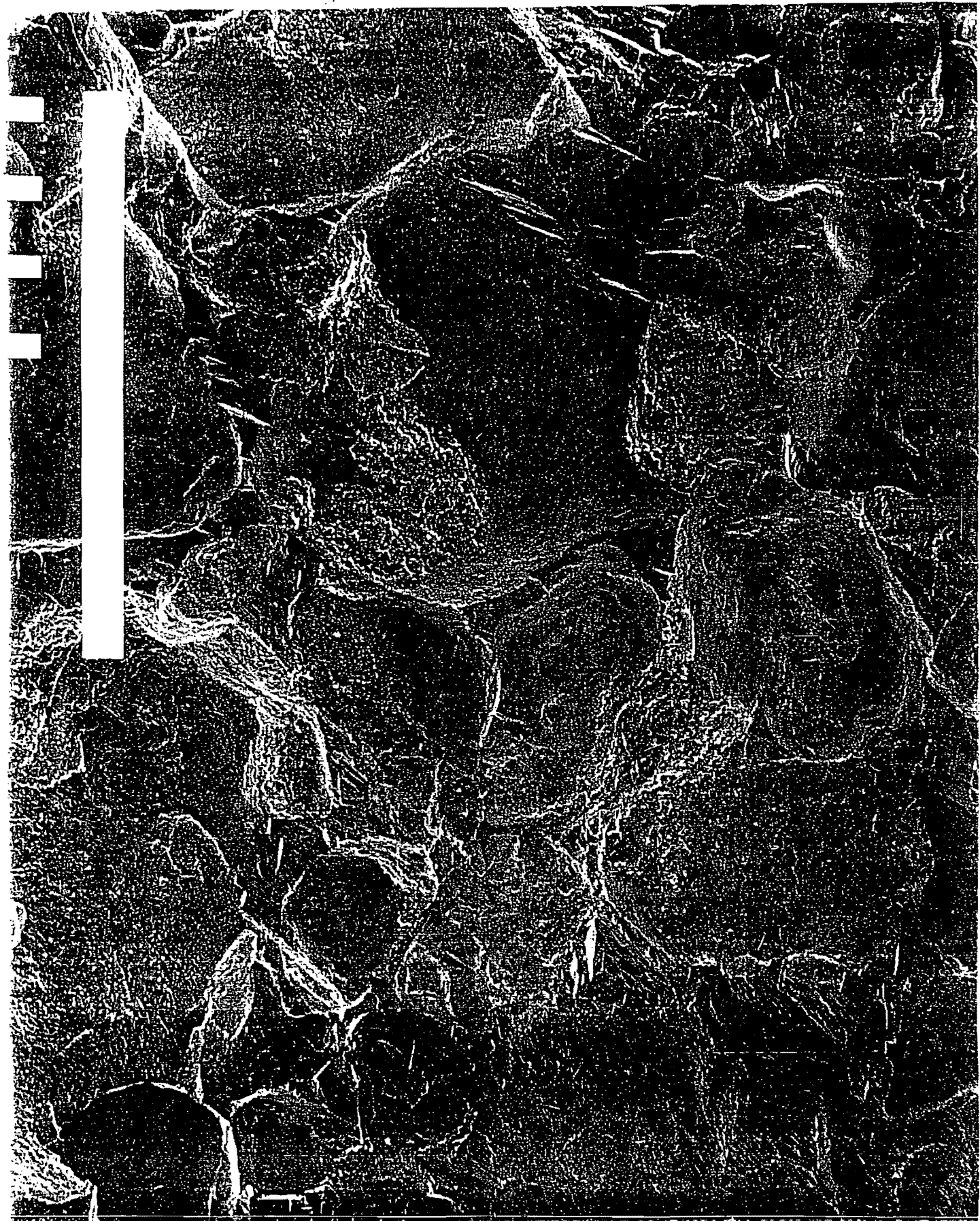


*p-4975a Northern Cross*  
1000X Pore Area illustrating acid dissolution.



*p-4975h Northern Cross*  
45X. Overall, illustrating 'open' area.





p-4975h Northern Cross  
45X Overall, illustrating 'infill' area.

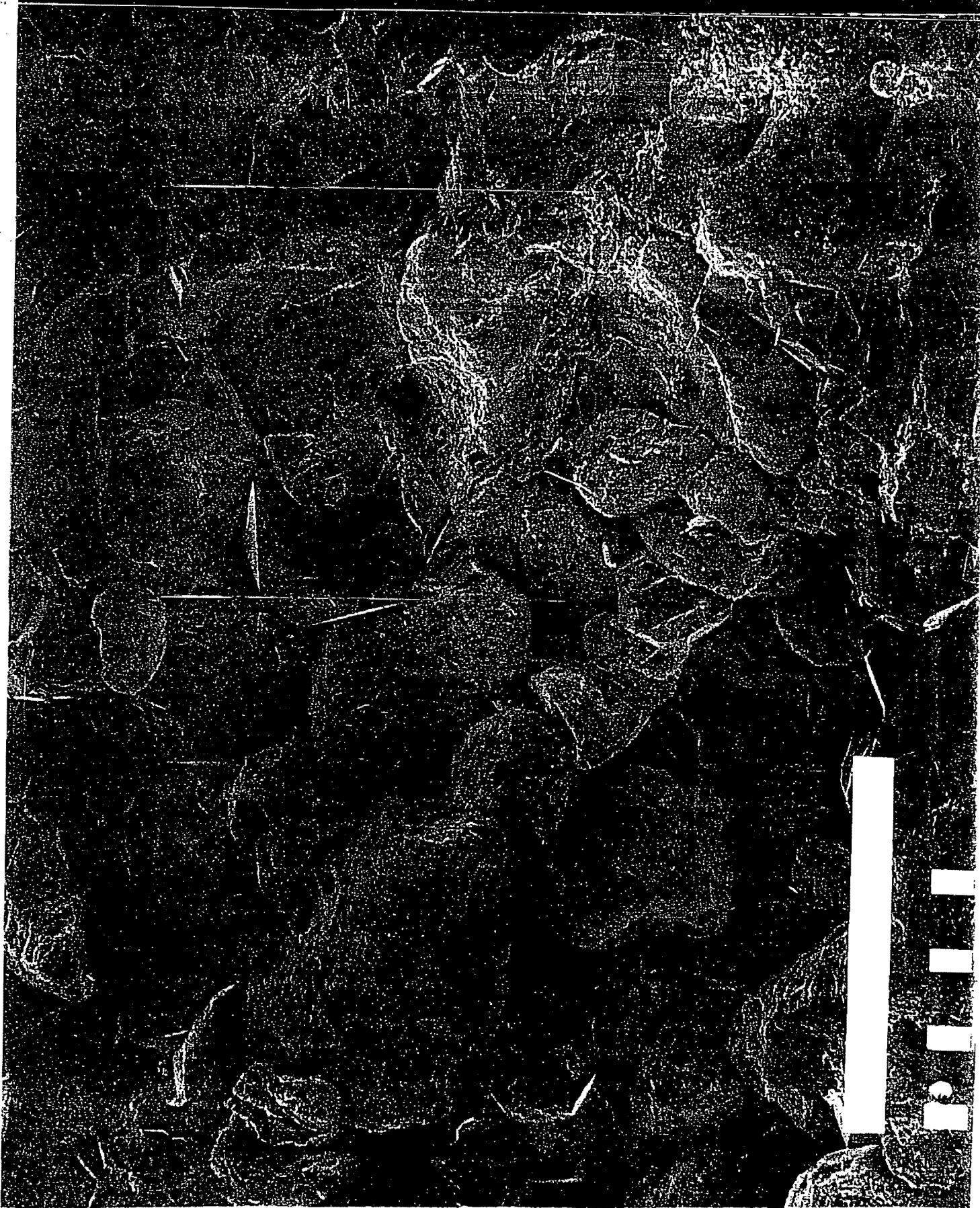
*p-4975h. Northern Cross*  
700X Ca-rich Feldspars in pore area.



*p-4975h Northern Cross*  
1000X Ca-rich Feldspars.



*p-49751 Northern Cross*  
30X. Overall, illustrating rock fabric.





DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT  
RESOURCE MANAGEMENT DIVISION

## Application to Amend a Drilling Authority

This application, in triplicate, must be submitted and approved before commencing operations. If the well location is changed, this application must be accompanied where required, with a plan of survey approved by the Surveyor General.

In compliance with the "Canada Oil and Gas Land Regulations", application is hereby made to amend Drilling Authority No. ...., concerning Western Minerals Chance Y.T. No. 1 (M-08)  
L-8-66-10-137-30  
.....  
(Name and Number of Well)

The following amendments are required: .....

Unit be changed from "L" to "M"  
.....

Latitude becomes 66° 07' 45.985" N  
.....

Longitude becomes 137° 31' 27.302" W  
.....

Universal Well Location Reference becomes 66. 12944° N 137. 52425° W  
.....

Unique Well Identifier becomes 300M086610137300  
.....  
.....  
.....

Reasons for the amendments: This is needed as the result of a Legal Survey of the  
location of the well site by Paul S. White, D. L. S., Whitehorse, Y. T.  
in April 1968 and approved by the Surveyor General on 22nd August 1968.  
.....  
.....

Dated at Calgary ....., this 15th day of October ....., 19 68.

Signed by [Signature] .....

Title Director .....

Company Western Minerals Ltd. .....

(For Resource Management Division use only)

APPROVED

This application has been examined and approved subject to the following conditions: .....

REPORT OF CRUDE PETROLEUM ANALYSIS

Mines Branch, Division of Fuels, Ottawa

Laboratory Number 297-63

IDENTIFICATION

FIELD: YUKON CENTRAL - SOUTH EAGLE PLAIN

POOL:

ZONE: CARBONIFEROUS

Well Name: Western Minerals

Province: Yukon

Chance YT No. 1

Location: Lat. 66° 7' 42"

Long. 137° 31' 42"

Sample from: D.N.A. & N.R.

Interval tested, depth, feet: 4371'-4372'

Producing Zone: Carboniferous

Date sampled: 31 July 1960 - 3 Aug. 1960

Geological Age:

Sampled at: Flowline Trap

GENERAL CHARACTERISTICS

Specific gravity at 60°F.	0.874	A.P.I. gravity at 60°F.	30.4
Sulphur, percent by weight	1.03	Pour point, °F.	5
Saybolt Universal Viscosity		Colour	brownish-black
at 77 °F., sec.	63	Carbon residue, percent by weight	2.7
at 100 °F., sec.	51	(Conradson)	

DISTILLATION, U.S. Bureau of Mines Routine Method

Stage 1 - Distillation at atmospheric pressure, 750 mm. Hg.

First drop, 54°C. (129°F.)

Fraction No.	Cut at °C.	Cut at °F.	Per cent	Sum per cent	Specific gravity 60°F.	Degrees A.P.I. 60°F.	Correlation index	Aniline point, °C.	Visco. S.U. 100°F.	Cloud test, °F.	Refractive index 20°C.
1.	50	122	-	-							
2.	75	167	2.4	2.4	0.704	67.5	-	-			1.4073
3.	100	212	2.5	4.9	0.733	61.5	27	52.6			1.4074
4.	125	257	5.1	10.0	0.752	56.7	27	50.0			1.4175
5.	150	302	6.2	16.2	0.772	51.8	29	46.7			1.4294
6.	175	347	5.3	21.5	0.792	47.2	32	46.0			1.4402

FORM "E"

C A N A D A

DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES

NORTHERN ADMINISTRATION BRANCH

RESOURCES DIVISION

PRODUCTION TEST REPORT

Date . . September 13th. 1960 . .

Name of well . . Western Minerals Chance No. 1 . . . . .

Classification of well<sup>#</sup> Suspended Oil Well. Permit or Lease No. . N.A. . . . .

Owners name . . Peel Plateau Exploration Ltd. . . . .

Operators name . Western Minerals Ltd. . . . .

Location Eagle Plains. - Yukon. . . . . N. Lat. 66° 7' 42" . . W. Long. 137° 31' 42"

Survey description, if available . . . . Not as yet surveyed. . . . .

Field Name . . . . N.A. . . . . District name Eagle Block - Yukon .

Spudded . . May 30th, 1959 . . . . . ~~Completed~~ . . . . . Elevation, -

Ground . . . . 1752' . . . . .

K.B. . . . . 1769' . . . . .

CASING AND TUBING RECORD

Size	Weight	Grade	Amount Set at	Sacks Cement	Calculated top of cement	Measured top of cement
1 .18"	48	H-40	157'	200	Surface	Surface
2 .13-3/8"	54.5	J-55	2001'	1260	Surface	Surface
3 .9-5/8"	40.8.36	J-55	5104'	450	3600'	3550'
4 . . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
5 . . . .	. . . .	. . . .	. . . .	. . . .	. . . .	. . . .
Name of productive zone . . . .				Carboniferous . . . . .		
Formation . . . . .				Sandstone . . . . .		
Depths: Top of formation . . . .				4034' . . . . Gas/oil Interface . 4325' - 4330' (by log)		
Bottom of formation . 5210'						

Method of producing . . . **Swab tests through tubing and drill pipe** . . . . .  
 Gravity of Oil  
 at 60/60°F. . . . . **29.30° - 29.38°** . . . . . Gravity of Gas **0.568 - 0.758** .

PRODUCTION DATA

Date	No. of hrs. on Prod.	Oil Prod'd Barrels	Water Prod'n % cut Barrels	Gas Prod'n MCF	GOR cfpb	Choke size
.....	.....	.....	.....	.....	.....	.....
(See Attached Sheet on 'Production Data!')						
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....

PRESSURE DATA

Date	Reservoir		Wellhead Pressures			Separator	
	Press psig	Depth feet	Tubing psig	Casing psig	Choke Size	Pressure psig	Temp °F.
June 14/60	1900.	4369-70	.120/220	. . 0 . .	1/4"	. . N.A. . .	. N.A. . .
June 15/60	1900.	4369-70	. . 0/20	. . 0 . .	1/2"	. . N.A. . .	. N.A. . .
June 20/60	1900.	4364-65	.250/275	. . 0 . .	1/4"	. . N.A. . .	. N.A. . .
June 20/60	1900.	4364-65	.420/435	. . 0 . .	11/64"	. . N.A. . .	. N.A. . .
June 23/60	1900	4358-59	.780/820	. . 0 . .	11/64"	. . N.A. . .	. N.A. . .
June 23/60	1900	4358-59	400/700	. . 0 . .	14/64"	. . N.A. . .	. N.A. . .
July 31/60	1900.	4371-72	. 25/125	. . 0 . .	1/2"	. . N.A. . .	. N.A. . .
Aug. 1/60	1900.	4371-72	. 50/75	. . 0 . .	1/4"	. . N.A. . .	. N.A. . .

GAS MEASUREMENT DATA (Flange or Tap)

Date	Orifice Plate size	Meter-Run Pressures (Psig) Static Differential	Meter-Run Temp. °F. (Ave.)	Remarks
.....	.....	.....	.....	.....

(See Attached Sheet on 'Production Data')

Sampled by . . . . . N. G. Needham . . . . .

Samples obtained from . . . . . Flow line trap . . . . .

Core, oil, gas and water analyses required by Section 70 (2) of the Regulations.

have been forwarded

~~XXXXXXXXXX~~

~~XXXXXXXXXXXX~~

Remarks . . . . .  
. . . . .  
. . . . .  
. . . . .

~~duplicate~~  
triplicate

This form is submitted in ~~duplicate~~ triplicate to the Oil Conservation Engineer "in accordance with Sections 71 and 72 of the Regulations.

Signed by . . . *W. G. Campbell* . . .  
W. G. Campbell

Title . . . . . Project Manager . . . . .

Company . . . . . Western Minerals Ltd. . . . .

Date . . . . . September 13th, 1960 . . . . .

PRODUCTION DATA

<u>Date</u>	<u>Perforated Zone Tested</u>	<u>Hours on Production</u>	<u>Oil Produced Ebls.</u>	<u>Water Production % Cut Ebls.</u>	<u>Gas Mcf/Day</u>	<u>Gor Cfpb</u>	<u>Choke Size</u>
<u>STAGE I</u>							
June 8th/60	4364-65 & 4369-70	Perforated simultaneously with 5 shots in each zone.					
June 9th/60	4369-70	Testing. Packer set too low and covering perforations.					
June 10-11/60	4369-70	12-1/2	53	7 4	20-30 Est.*	200-300	1/4" & 1/2"
June 11-13/60	4364-65	46	235	- -	20-30 Est.*	150-225	1", 1/2", 1/4"
June 14th/60	4369-70	15	52	19 12	20-30 Est.*	200-300	1/4"
June 15-17/60	4369-70	34-3/4	143	7 10-1/2	20-30 Est.*	200-300	1/2" & 1/4"
June 17th/60	4369-70	5	6	25 2	20-30 Est.*	650-1000	1/4"
June 18th/60	4369-70	Testing to flare pit. Oil and Water.					
June 19th/60	4364-65	Testing to flare pit. Oil and Water.					
June 20th/60	4364-65	4-1/4	21.12	28 8.25	20-30 Est.*	170-250	1/4"
June 20th/60	4364-65	6-1/4	20.5	23 6.2	20-30 Est.*	200-300	11/64"
June 20th/60	4364-65	3-1/4	20.1	24 6.2	20-30 Est.*	130-200	1/4"
June 21st/60	4364-65	3-1/4	21.8	18 4.8	20-30 Est.*	120-200	1/4"
June 21st/60	4364-65	2	11.7	18 2.56	20-30 Est.*	150-225	1/4"
June 22-23/60	4358-59	5-3/4	21.24	20 5.31	2000-5000	24,000-60,000	11/64"

<u>Date</u>	<u>Perforated Zone Tested</u>	<u>Hours on Production</u>	<u>Oil Produced Ebls.</u>	<u>Water Production</u>		<u>Gas Mcf/Day</u>	<u>Gor Cfpb</u>	<u>Choke Size</u>
				<u>% Cut</u>	<u>Ebls.</u>			
June 23rd/60	4358-59	5-3/4	20.77	19	5.19	2000-5000	24,000-60,000	1 1/64"
June 23-24/60	4358-59	5	20.9	23	6.2	2000-5000	24,000-60,000	1 1/64"
June 24th/60	4358-59	6	21.1	12	2.85	2000-5000	24,000-60,000	1 1/64"
June 25th/60	4364-65 & 4369-70	Testing to flare pit. Gas and Water (Salt)						
June 26-27/60	4358-59 & 4364-65	12	11.4	53	12.8	Gas produced from Gas Cap channeling behind casing.		1/8" & 10/64"
June 27th/60	4380-81	Perforated with 4 shots.						
June 28th/60	Set packer at 4376' and found there was communication behind casing between perforations at 4380-81', and perforations at 4369-70', 4364-65', 4358-59'.							
June 29th/60	Cement squeezed all perforations.							
<u>STAGE II</u>								
June 29th - July 2nd/60	Waiting on cement.							
July 2nd/60	4364-65	Perforated with 4 shots. Recovered 1500-1700' clean oil and 300' oil cut mud in tubing after waiting 12 hours.						
July 3rd/60	4364-65	Testing to flare pit. Packer not seating properly. No fluid.						
July 4th/60	4360-1/2 & 4362-1/2	Perforated with 9 shots. Testing, but packer not seating properly. No fluid.						

<u>Date</u>	<u>Perforated Zone Tested</u>	<u>Hours on Production</u>	<u>Oil Produced Bbls.</u>	<u>Water Production % Cut Bbls.</u>	<u>Gas Mcf/Day</u>	<u>Gor Cfpb</u>	<u>Choke Size</u>
July 5th/60	4360-1/2 - 4362-1/2 & 4364-65	Testing to flare pit.			Recovered gas and oil cut mud.	Gas T.S.T.M.	
July 5th/60	4360-1/2 - 4362-1/2 & 4364-65	Acidized.					
July 5-8/60	4360-1/2 - 4362-1/2 & 4364-65	Testing to flare pit.			Recovered gas with small amounts of fresh water (Spent acid).		
July 8-10/60	4364-65 & 4360-1/2 - 4362-1/2	47-1/2	3 (Distillate)	- -	Gas produced from gas cap channeling behind casing. Estimates 3-5 mmcf/day.		11/64", 13/64" & 1/4"
July 11th/60		Circulating.					
July 12th/60	4360-1/2 - 4362-1/2 & 4364-65	Cement squeezed.	W.O.C.				
<u>STAGE III</u>							
July 13-15/60		W.O.C. & W.O.O.					
July 16th/60	4332-33	Perforated.					
July 16-17/60	4332-33	Swabbing to flare pit.			Traces of gas and distillate.		
July 17th/60	4332-33	Testing to flare pit.			Gas and distillate. Swabbing to test tank. Collected 1.6 barrels distillate in 9 hours. Acidized. Gas 10-20 Mmcf/Day.		

<u>Date</u>	<u>Perforated Zone Tested</u>	<u>Hours on Production</u>	<u>Oil Produced Ebls.</u>	<u>Water Production % Cut Ebls.</u>	<u>Gas Mcf/Day</u>	<u>Gor Cf/b</u>	<u>Choke Size</u>
July 18th/60	4332-33	Cement squeezed.					
July 19-20/60		W.O.C.					
July 20th/60	4340-41	Perforated with 4 shots.					
July 20-21/60	4340-41	Testing to flare pit. Gas and distillate. Gas T.S.T.M.					
July 22nd/60	4340-41	Swabbing to test tank. Collected 1.75 barrels distillate in 3 hours. Gas T.S.T.M.					
July 23rd/60	4346-47	Perforated with 4 shots. Recovering 1/2 barrel fluid (fresh muddy water) per hour on swab. Gas T.S.T.M.					
July 24th/60	4346-47	Acidized. Testing to flare pit. Recovering 1-1/2 to 3 barrels fluid per pull on swab. Fresh water and gas. Estimated 25-50 mcf/day.					
July 25th/60	4346-47	Testing to flare pit. Recovering 1 to 2 barrels fluid per pull. Water (spent acid).					
July 26-27/60		Circulating.					
July 27th/60	4340-41 & 4346-47	Acidized. Communication between 4332-33' and 4346-47' established.					
July 28th/60	4332-33 & 4340-41 & 4346-47	Cement squeezed.					
<u>STAGE IV</u>							
July 29th/60		W.O.C.					

<u>Date</u>	<u>Perforated Zone Tested</u>	<u>Hours on Production</u>	<u>Oil Produced Bbls.</u>	<u>Water Production</u>		<u>Gas Mcf/Day</u>	<u>Gor Cfpb</u>	<u>Choke Size</u>
				<u>% Cut</u>	<u>Bbls.</u>			
July 30th/60	4371-72	Perforated with 4 shots. Testing to flare pit. Tubing unloaded 2 to 3 barrels fluid (oil) every 2 to 2-1/2 hours. Trace of sediment and oil cut mud.						
July 31st/60	4371-72	8	22.9	0.4	0.1	20-30 Est.*	250-350	1/2", 26/64" & 1/4"
July 31st - Aug. 3rd/60	4371-72	60	166.6	-	-	20-30 Est.*	250-350	1/2"

\* Solution Gas

**CHEMICAL & GEOLOGICAL LABORATORIES LTD.**

10568 - 114th Street, Edmonton, Alberta  
 Phones 25624 - 42562

2706 Centre Street N., Calgary, Alberta  
 Phone 70149

**ANALYTICAL REPORT**

From Western Minerals Limited Product Crude  
 Address..... Date Received: August 20, 1959.  
 Other Pertinent Data Sample #1.  
 Analyzed by Chemical & Geological Labs. Ltd. Date August 26, 1959. Lab. No. C2350

Color: Dark Brown  
 Specific Gravity @60/60°F.. 0.8794  
 °A.P.I. Gravity @60/60°F.. 29.38°  
 B.S. & W. (total): 10.2 % (vol.)  
     Water: 1.2 % (vol.)  
     Sediment: 9.0 % (vol.)  
 Total Sulphur: 1.13 % (by wt.)  
 Salt Content: 90. lbs. NaCl/1000 bbl..  
 Carbon Residue (Conradson): 2.95 % (wt.)  
 Pour Point: Unheated: +25°F.  
               Heated: +25°F.

HEMPEL DISTILLATION

Rooms: 72°F. Bar: 664 mm. Mercury.  

	<u>°F.</u>
I. B. P.	130
5.0 %	180
7.0 %	212
10.0 %	272
15.0 %	308
20.0 %	352
25.0 %	400
30.0 %	452
35.0 %	486
40.0 %	520
41.0 %	525
45.0 %	562
50.0 %	591
55.0 %	614
Cracked at	615

Reid Vapor Pressure: 1.1 psig.  
 VISCOSITY: Kinematic Saybolt Universal  
             °F. Centistokes Seconds  
             50 41.9 194.2  
             70 20.2 98.5  
             100 9.6 54.8

Distillation Summary

Water		1.0 %
400 F.	Naphtha	24.0 %
525 F.	Kerosine	16.0 %

Remarks:

Two samples submitted, only one sample analyzed.