MAR 19690076: NORTHERN ALBERTA

Received date: Dec 31, 1969

Public release date: Jan 01, 1971

GEOLOGICAL REPORT

SULPHUR PROSPECTING PERMIT NO. 201

NORTHERN ALBERTA

Submitted to

Mr. J. F. Frey, President

Anco Exploration Ltd.

by

Harry L. Taylor, P. Geol.

Consulting Geologist

April 24th, 1969

I N D E X

	PAGE
INTRODUCTION	1
RECOMMENDATIONS	2
GENERAL GEOLOGY	3
EXPECTED MODE OF OCCURRENCE AND RELATIONSHIP TO GENERAL GEOLOGY	4 - 5
PROCEDURE	6
CONCLUSIONS	7
SAMPLE DESCRIPTIONS	8 -17
CHEMICAL AND GEOLOGICAL LABORATORIES LTD. SAMPLE REPORT	18

INTRODUCTION

This report has been prepared at the request of Mr. J. F. Frey of Anco Exploration Ltd. A sample study was made of all samples on wells adjacent to and on Sulphur Prospecting Permit No. 201. The information from the sample study was integrated with all other available geological information in an attempt to find the best possible location for one or more test holes which would be drilled to evaluate the potential of sulphur accumulation in the Devonian sediments.

Sulphur Prospecting Permit No. 201 totals approximatly 38,400 acres and is located 24 miles north of Fort McMurray on the east bank of the Athabasca River.

RECOMMENDATIONS

All of the samples taken from holes in the vicinity of Permit No. 201 were negative with respect to the presence of sulphur and therefore it is recommended that Sulphur Prospecting Permit No. 201 be surrendered.

GENERAL GEOLOGY

The Mesozoic rocks in the area of Permit 201 are about 400 to 600 feet thick being composed principally of Cretaceous sands and shales. In general the Cretaceous rocks thin to the east and thicken to the west. They are inclined gently westward into the Alberta Syncline so that progressively younger rocks are present in that direction.

The Cretaceous rocks rest with angular unconformity on rocks of Devonian age composed principally of carbonates and evaporites. Like the Cretaceous rocks, the Devonian rocks are inclined gently into the Alberta Syncline and become progressively younger in the westward direction. The Devonian rocks rest on the Precambrian basement rocks at a depth of approximately 1400 feet.

EXPECTED MODE OF OCCURRENCE

and

RELATIONSHIP TO GENERAL GEOLOGY

Sulphur Permit 201 was acquired in order to prospect for sulphur within strata of Devonian age. The Devonian rocks in the area of the permit are buried by approximately 500 feet of Cretaceous sands and shales so that the search for sulphur had to be carried out by examining all of the samples from nearby wells.

The expected mode of occurrence was based on the similarity between the Devonian sequence of rocks in the McMurray area and the sequence of rocks found in the Sicilian sedimentary sulphur deposits. The sulphur in the Sicilian deposits occurs directly below a bed of anhydrite and/or gypsum. One theory put forth for the deposition of sulphur in deposits of this type is the chemical reactions between calcium sulphate, hydrocarbons, water and oxygen. The following equations are given in Ries Economic Geology to account for the formation of sulphur:

$$CaSO_4 + 2C = CaS + 2CO_2$$

$$CaS + CO_2 + H_2O = CaCO_3 + H_2S$$

$$H_2S + O = H_2O + S$$

Expected Mode of Occurrence and
Relationship to General Geology (cont'd)

In the McMurray area the Prairie Evaporite of Devonian age could be the source of the calcium sulphate and the porous underlying Winnipegosis formation could have supplied the necessary hydrocarbons. Under the proper conditions the reactions as given in the above equations could have taken place with the resultant formation and deposition of sulphur. Although there are no known sulphur occurrences of this type in the McMurray area at the present time it is entirely possible that future work on the Prairie Evaporite could reveal an economic sulphur deposit.

PROCEDURE

In an attempt to evaluate Permit 201 with respect to a sulphur occurrence of this type a detailed sample examination was carried out on all of the wells in the area of Permit 201 which had penetrated the Devonian section. As the samples were examined, any rock chips which could possibly be sulphur either in its elemental or amorphous states were removed from the sample and sent to the Chemical and Geological Laboratories in Calgary for a qualitative sulphur determination. In all a total of 23 samples were taken from three wells located to the south and west of Permit 201.

The Chemical and Geological Laboratories followed the procedure, outlined below, to establish the presence or absence of sulphur.

1. The samples were converted to sulphide, polysulphide and thiosulphate by boiling a few milligrams with alkali hydroxide.

2. The solutions were evaporated and the residues treated with potassium cyanide to produce possible thiocyanates.

3. The residues, on evaporation, were tested for thiocyanates by taking them into a dilute sulphuric acid solution and testing the solutions reaction to ferric chloride. If a red soluble complex ($Fe^{+3} + {}_{3}CNS^{-}$) formed, it was taken as a positive test for original free sulphur.

The test as outlined above would reveal from 3 to 5 ppm free sulphur and so the tests can be taken as being very conclusive.

CONCLUSIONS

The tests as carried out by Chemical and Geological Laboratories were negative. These test results indicate that the Devonian in the area of Permit 201 does not contain sulphur in quantities sufficient to support any further investigations.

SAMPLE DESCRIPTION

SUN UNION RUTH LAKE 6-3-93-10-W4M

Sample Quality: Excellent

K.B. Elevation ---868 feet
Ground Elevation--862 feet

100 - 110	SANDSTONE:	white, coarse grained, unconsolidated, saturated with bitumen with minor Limestone: greyish-white, microcrystalline, micro-microsic, very argillaceous; no visible porosity.
110 - 230	LIMESTONE:	light grey, microcrystalline, micro-sucrosic, moderately to very silty, moderately argillaceous; spotty bitumen stain.
230 - 240	LIMESTONE:	buff, microcrystalline to cryptocrystalline, clear, pyritic, a few fossils; no visible porosity.
240 - 270	LIMESTONE:	buff, microcrystalline to cryptocrystalline, clear, pyritic, many crinoid stems; traces of large vugs with crystal linings.
270 - 310	LIMESTONE:	light grey, microcrystalline, moderately silty, dense; no visible porosity.
310 - 373	LIMESTONE:	buff, microcrystalline to crystalline, slightly argillaceous, dense, calcarentic in part, traces of pyrite; no visible porosity.

FIREBAG 373 + 495

373 - 430	LIMESTONE:	light grey, microcrystalline, moderately silty, dense, traces of pyrite; no visible porosity.
		Sample No. 1 370' - 380'
430 - 490	LIMESTONE:	light grey, microcrystalline, very slightly argillaceous, dense; no visible porosity.
		Sample No. 2 450' - 460'
490 - 500	LIMESTONE:	light grey, microcrystalline, very slightly argillaceous, dense; no visible porosity with minor LIMESTONE: light brown, micro-cyrstalline to crystalline, clear, slightly anhydritic; traces of pinpoint inter-crystalline porosity.
500 - 510	LIMESTONE:	light brown, microcrystalline to crystalline, clear, slightly anhydritic, traces of pin-point intercrystalline porosity.

SUN UNION RUTH LAKE 6-3-93-10-W4M (cont'd)

510 - 520	ANHYDRITE:	white, crystalline to cryptocrystalline, dense.
520 - 530	LIMESTONE:	tan, microcrystalline, dense, anhydritic; no visible porosity with minor ANHYDRITE: white, crystalline to cryptocrystalline, dense.
530 - 540	SANDSTONE:	light grey, very fine, dense, calcareous, no visible porosity with minor ANHYDRITE: white, crystalline to cryptocrystalline, dense.
		Sample No. 3 530' - 540'
540 - 550	SANDSTONE:	light brown, very fine, dense, calcareous, no visible porosity.
550 - 560	SANDSTONE:	light brown, very fine, dense, calcareous, no visible porosity with minor ANHYDRITE: white, crystalline to cryptocrystalline, dense.
560 - 590	LIMESTONE:	whitish grey, microcrystalline, silty, dense; no visible porosity with minor ANHYDRITE: white, crystalline to cryptocrystalline, dense.
		Sample No. 4 560' - 570'
590 - 604	LIMESTONE:	light brown, cryptocrystalline to microcrystalline, very argillaceous; no visible porosity with minor ANHYDRITE: white, cryptocrystalline to crystalline, dense.
		Watt Mountain 604 +264
604 - 610	SHALE:	light grey, calcareous, with minor SANDSTONE: light grey, very fine, calcareous cement; no visible porosity.
610 - 650	SHALE:	light grey, calcareous, with minor ANHYDRITE: white, dense, amorphous with minor SANDSTONE: light grey, very fine calcareous cement; no visible porosity.
		Sample No.5 610' - 620'
650 - 660	LIMESTONE:	light brown, cryptocrystalline to microcrystalline, slightly argillaceous; no visible porosity with minor ANHYDRITE: white, dense, amorphous (one chip in the interval 650' - 660' looked like amorphous anhydrite but it had a yellow sulphur colored coating on it).
		Sample No. 6 650' - 660'
660 - 664	LIMESTONE:	tan, microcrystalline, micro-sucrosic, very argillaceous; traces of vugs with anhydrite linings with minor ANHYDRITE: white, amorphous, dense.
		Prairie Evaporite 664 +204

SUN UNION RUTH LAKE 3-93-10-W4M (cont'd)

664 - 700	ANHYDRITE:	white, microcrystalline, dense (690-700' considerable yellow stain on anhydrite; this could be sulphur). Sample No. 7 690' - 700'
	Winnipegosis	700 +168
700 - 720	DOLOMITE:	light brown, crystalline, sucrosic, very good small intercrystalline porosity with minor ANHYDRITE: white, crystalline to amorphous, dense.
720 - 750	DOLOMITE:	dark brown, crystalline, sucrosic with minor ANHYDRITE: white, crystalline to amorphous, dense. Sample No. 8 740' - 750'
750 - 780	DOLOMITE:	light brown, crystalline, sucrosic, excellent small intercrystalline porosity.
780 - 790	DOLOMITE:	dark brown, crystalline, sucrosic, excellent small intercrystalline porosity.
790 - 820	LIMESTONE:	dark brown, cryptocrystalline to microcrystalline, clear; no visible porosity.
820 - 830	LIMESTONE:	dark brown, cryptocrystalline to microcrystalline, dense with minor DOLOMITE: light brown, crystalline, clear, fair intergranular small porosity with minor ANHYDRITE: white, cryptocrystalline to crystalline, dense.
830 - 970	LIMESTONE:	dark brown, microcrystalline, clear, anhydritic; no visible porosity.
970 - 980	LIMESTONE:	light brown, cryptocrystalline to microcrystalline, moderately argillaceous; no visible porosity with minor ANHYDRITE: white, amorphous, dense. Sample No. 9 970' - 980'
	Red Beds	980 -112
980 - 990	SHALE:	red, silty, slightly calcareous.
990 -1000	LIMESTONE:	buff, cryptocrystalline, silty; no visible porosity.
1000 -1010	SHALE:	red, silty, slightly calcareous with minor LIMESTONE: buff, cryptocrystalline, silty; no visible porosity.

SUN UNION RUTH LAKE 3-93-10-W4M (cont'd)

1010 - 1034	SHALE: red, silty, slightly calcareous.	
	Precambrian	1034 -166

SAMPLE DESCRIPTION

BAYSEL STEEPBANK 13-16-91-8-W4M

Sample Quality: Excellent

K.B. Elevation - 1439 feet
Ground Elevation - 1437 feet

560 - 580	LIMESTONE:	light grey, cryptocrystalline to microcrystalline, moderately silty and sandy, fossiliferous in part; no visible porosity, traces of dead oil stain.
580 - 610	LIMESTONE:	light grey, cryptocrystalline, to microcrystalline, moderately silty and sandy, fossiliferous in part; no visible porosity, traces of dead oil stain with minor SANDSTONE: white, coarse, unconsolidated.
610 - 680	LIMESTONE:	light grey, cryptocrystalline, slightly silty; no visible porosity. Sample No. 10 660' - 670'
680 - 818	LIMESTONE:	buff, cryptocrystalline, slightly fossiliferous, moderately silty, scattered crystals of pyrite; no visible porosity.
	FIREBAG	818 +621
818 - 940	LIMESTONE:	buff, cryptocrystalline, clear, traces of pyrite; no visible porosity.
940 - 960	LIMESTONE:	brown, cryptocrystalline, slightly anhydritic, clear; no visible porosity.
960 - 970	LIMESTONE:	brown, cryptocrystalline, slightly anhydritic, clear; no visible porosity, with minor ANHYDRITE: white, microcrystalline to amorphous, dense. Sample No. 11 960' - 970'
970 - 980	ANHYDRITE:	white, crystalline to amorphous, dense, Sample No. 12 970' - 980'
980 - 990	ANHYDRITE:	white, crystalline to amorphous, dense with minor LIMESTONE: buff, cryptocrystalline, anhydritic; no visible porosity.
990 -1010	SANDSTONE:	light grey, very fine, well cemented with a calcareous cement; no visible porosity.
1010 -1020	SANDSTONE:	light grey, very fine, well cemented with a calcareous cement, no visible porosity with minor ANHYDRITE: white, microcrystalline to amorphous. Sample No. 13 1010' - 1020'

BAYSEL STEEPBANK 13-16-91-8-W4M (cont'd)

1020 - 1047	ANHYDRITE:	white, crystalline to amorphous, dense.
	Watt Mountain	1047 +392
1047 - 1100	ANHYDRITE:	white, crystalline to amorphous, dense.
	Prairie Evaporite	1100 +339
1100 - 1130	ANHYDRITE:	white, crystalline to amorphous, dense.
	Winnipegosis	1130 +309
1130 - 1160	DOLOMITE:	light brown, crystalline, sucrosic, traces of pinpoint intercrystalline porosity with minor ANHYDRITE: white, crystalline to amorphous, dense.
1160 - 1200	DOLOMITE:	light brown, crystalline, slightly sucrosic; no visible porosity.
1200 - 1210	DOLOMITE:	buff, crystalline, moderately sucrosic, traces of pinpoint intercrystalline porosity.
1210 - 1230	DOLOMITE:	buff, crystalline, moderately sucrosic; traces of pinpoint intercrystalline porosity increasing to fair pinpoint porosity.
1230 - 1240	DOLOMITE:	buff, microcrystalline to crystalline, moderately silty; no visible porosity.
	Sample No. 14	1220' - 1230'
1240 - 1370	DOLOMITE:	buff, crystalline, slightly sucrosic, slightly silty, fossiliferous; poor intercrystalline porosity.
	Sample No. 15	1320' - 1330'
	Sample No. 16	1360' - 1370'
1370 - 1400	DOLOMITE:	buff, crystalline, slightly sucrosic, slightly silty, fossiliferous; poor intercrystalline porosity with minor SHALE: black.
1400 - 1410	DOLOMITE:	buff, crystalline, clear; poor to trace pinpoint intercrystalline porosity.
1410 - 1440	DOLOMITE:	buff, cryptocrystalline, clear; no visible porosity with minor SHALE: black and minor SANDSTONE: white, coarse, unconsolidated.
	Red Beds	1440 -1

BAYSEL STEEPBANK 13-16-91-8-W4M

1440 - 1470	SHALE:	orange with minor SANDSTONE: clear, coarse, unconsolidated.
		Sample No. 17 1440' - 1450'
1470 - 1480	SHALE:	black with minor SANDSTONE: clear, coarse, unconsolidated.
1480 - 1500	SHALE:	orange with minor SHALE: black with minor SANDSTONE; clear, coarse, unconsolidated.
1500 - 1516	SANDSTONE:	clear, coarse, unconsolidated with minor GRANITE: pink, weathered.
		Precambrian 1516 -77
1516 - 1568	GRANITE:	weathered.

SAMPLE DESCRIPTION

BAYSEL STEEPBANK 15-29-91-8-W4M

Sample Quality: Excellent

K.B. Elevation - 1319 ft.
Ground Elevation - 1316 ft.

540 - 630	LIMESTONE:	light grey, cryptocrystalline, moderately silty, micro-sucrosic; no visible porosity.
630 - 640	SANDSTONE:	clear, very coarse, sub-rounded to sub-angular grains, unconsolidated.
640 - 752	LIMESTONE:	light grey, cryptocrystalline, slightly chalky, moderately silty and sandy, dense; no visible porosity.
		FIREBAG 752 +567
752 - 850	LIMESTONE:	light grey, cryptocrystalline, slightly chalky, moderately silty and sandy, dense; no visible porosity.
850 - 870	LIMESTONE:	light grey, cryptocrystalline, slightly chalky, moderately silty and sandy, dense; no visible porosity with minor SANDSTONE: clear to pink, medium to coarse grained, sub-rounded to sub-angular grains, unsolidated.
870 - 880	LIMESTONE:	brown, (mottled), cryptocrystalline, moderately argillaceous; no visible porosity.
880 - 890	LIMESTONE:	brownish-grey, cryptocrystalline, chalky, very soft; poor pinpoint porosity.
890 - 930	LIMESTONE:	light grey, cryptocrystalline, slightly argillaceous; no visible porosity.
930 - 944	LIMESTONE:	light grey, cryptocrystalline, slightly argillaceous; no visible porosity with minor ANHYDRITE: white, amorphous.
		Sample No. 18 930' - 940'
		Watt Mountain 944 +375
944 - 960	SHALE:	black with minor SHALE: grey with minor ANHYDRITE: white, amorphous.
		Sample No. 19 950' - 960'
960 - 976	LIMESTONE:	brown, cryptocrysalline to microcrystalline, moderately argillaceous, slightly anhydritic; no visible porosity.
		Prairie Evaporite 976 +343

BAYSEL STEEPBANK 15-29-91-8-W4M

976 - 980	ANHYDRITE:	clear and white; microcrystalline and amorphous with minor LIMESTONE: brown, cryptocrystalline to microcrystalline, moderately argillaceous, slightly anhydritic; no visible porosity.
		Sample No. 20 970' - 980'
980 - 990	ANHYDRITE:	clear and white, microcrystalline and amorphous.
990 - 1000	ANHYDRITE:	clear and white, microcrystalline and amorphous with minor SHALE: black.
1000 - 1072	ANHYDRITE:	clear and white, microcrystalline and amorphous.
		Winnipegosis 1072 +247
1072 - 1080	DOLOMITE:	buff, microcrystalline to cryptocrystalline, slightly anhydritic; no visible porosity.
1080 - 1090	DOLOMITE:	buff, microcrystalline to cryptocrystalline, slightly anhydritic; no visible porosity with minor ANHYDRITE: white, microcrystalline, dense.
1090 - 1100	ANHYDRITE:	white, microcrystalline, dense.
1100 - 1110	DOLOMITE:	brown, microcrystalline to cryptocrystalline, anhydritic, dense with minor ANHYDRITE: white, microcrystalline, dense.
1110 - 1130	DOLOMITE:	buff, microcrystalline to cryptocrystalline, slightly micro-sucrosic; no visible porosity.
1130 - 1140	DOLOMITE:	buff, microcrystalline to cryptocrystalline, slightly micro-sucrosic; no visible porosity with minor ANHYDRITE: white, amorphous.
		Sample No. 21 1130' - 1140'
1140 - 1150	DOLOMITE:	brown, microcrystalline to cryptocrystalline. anhydritic; no visible porosity.
1150 - 1190	DOLOMITE:	brown, microcrystalline to crystalline, slightly sucrosic; very poor pinpoint intercrystalline porosity.
1190 - 1220	DOLOMITE:	dark brown, microcrystalline, silty, dense.
1220 - 1240	DOLOMITE:	buff, microcrystalline, clear; very poor pinpoint intercrystalline porosity.
1240 - 1250	DOLOMITE:	buff, microcrystalline, clear; very poor pinpoint intercrystalline porosity with minor ANHYDRITE: white, microcrystalline, dense.

BAYSEL STEEPBANK 15-29-91-8-W4M

1250 - 1260	DOLOMITE:	grey, cryptocrystalline, chalky with minor SANDSTONE: clear to pink, sub-rounded grains, unconsolidated.
		Sample No. 22 1250' - 1260'
1260 - 1290	DOLOMITE:	light brown, cryptocrystalline to microcrystalline, slightly chalky; no visible porosity.
1290 - 1300	MUDSTONE:	red, chalky with minor SANDSTONE: clear, medium-grained, sub-rounded grains, unconsolidated.
1300 - 1330	DOLOMITE:	buff, cryptocrystalline, dense; no visible porosity.
		Sample No. 23 1310' - 1320'
1330 - 1340	DOLOMITE:	buff, cryptocrystalline, dense; no visible porosity with minor ANHYDRITE: white, amorphous to microcrystalline, dense.
1340 - 1350	DOLOMITE:	buff, cryptocrystalline, dense, no visible porosity with minor SANDSTONE: red, medium-grained, weakly cemented with red mud to unconsolidated, sub-angular grains.
		Red Beds 1350 -31
1350 - 1430	SANDSTONE:	pink to red, medium to coarse grained, weakly cemented with red mud to unconsolidated, sub-rounded grains.
		Precambrian 1430 -111
1430 - 1438	GRANITE:	pink.

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

4605 - 12th Street N.E. Calgary 67, Alberta

April 21, 1969

Mr. H. Taylor
47 - 301-8th Avenue S.W.
CALGARY 2, Alberta

Laboratory Report Number: C69-4488
Stone Chips From Drilling Well

Dear Sir:

The chips submitted have been qualitatively tested for the presence of free sulfur, and the findings are recorded below. The method used was as follows:

Samples converted to sulfide, solysulfide and thiosulphate by boiling a few milligrams with alkali hydroxide. The solutions were evaporated and the residues treated with potassium cyanide to produce possible throcyanates. The residues on evaporation were tested for thiocyanates by taking them into a dilute sulfuric acid and testing the solutious reaction to ferric chloride. If a red soluble complex ($Fe^{+3} + 3CNS^{-}$) formed, it was taken as a positive test for original free sulfur. As the test outlined above would reveal from 3<5 ppm free sulfur the results may be taken as very conclusive.

SAMPLE #	WELL NAME	LOCATION	DEPTH	SULFUR
1	Sun Union Ruth Lake	6-3-93-10W4	370-380	Nil
2	" " " "	"	450-460	"
3	" " " "	"	530-540	"
4	" " " "	"	560-570	"
5	" " " "	"	610-620	"
6	" " " "	"	650-660	"
7	" " " "	"	690-700	"
8	" " " "	"	740-750	"
9	" " " "	"	970-980	"
10	Baysel Steepbank	13-16-91-8W4M	660-670	"
11	" "	"	960-970	"
12	" "	13-16-91-8	970-980	"
13	" "	13-16-91-8W4M	1010-20	"
14	" "	"	1220-30	"
15	" "	13-16-91-8	1320-30	"
16	" "	13-16-91-8W4M	1360-70	"
17	" "	"	1440-50	"
18	" "	15-29-91-8W4M	930-940	"
19	" "	"	950-960	"
20	" "	"	970-980	"
21	" "	15-29-91-8	1130-40	"
22	" "	"	1250-60	"
23	" "	"	1310-20	"

Yours truly

[redacted]

CERTIFICATION

I, Harry L. Taylor, of Calgary, Alberta do hereby certify that:

1. I am a graduate of the University of Minnesota where I obtained a M.S. degree in Economic Geology. I am also a graduate of the Michigan College of Mining and Technology where I obtained a B.S. degree in Geological Engineering. Prior to attending the Michigan College of Mining and Technology I graduated from a two year course in technical mining at the Lakehead Technical Institute.
2. I am a Consulting Geologist and an active member in good standing of the Alberta Association of Professional Engineers. I am also a member in good standing of the Alberta Society of Petroleum Geologists.
3. From May 1949 to April 1957, except for the time that I was attending University, I was actively engaged in the mining industry; both in mine operations and field exploration.

4. From April 1957 to the present time I have been actively engaged in the petroleum business, both as a Production Geologist and an Exploration Geologist.

5. I have not received, nor do I expect to receive or acquire, directly or indirectly, any interest in any of the properties or securities of Anco Exploration Ltd., or its subsidiaries.

Respectfully submitted,

H. L. Taylor

SULPHUR PROSPECTING PERMIT No. 201