

MICROFILMED

TO

June/1979.

GEOLOGICAL RECONNAISSANCE

SEVERN RIVER, ONTARIO

A Cance Traverse

June, 1963

for
SOCEPET LIMITED

by

R. D. Johnson

October, 1963



R.D. Johnson
R.D. Johnson, P.Geol.
Consulting Geologist,
Calgary

CONTENTS

	Page
INTRODUCTION	1
PURPOSE	1
GENERAL DESCRIPTION	2
STRATIGRAPHY	2
ORDOVICIAN	4
Portage Chute Formation	4
SILURIAN	4
Severn River Limestone	5
Lower Beds	
Middle Reefy Beds	
Upper Beds	
Ekwan River Limestone	6
Lower Beds	
Middle Beds	
Upper Beds	
Attawapiskat Coral Reef	7
Reef	
Overlying Beds	
STRUCTURE	7
RESERVOIR POTENTIAL	8
SEEPS, ETC.	9
ROCK and FAUNA SAMPLES	9
COASTAL TRAVERSE	9
DISCUSSION	10
CONCLUSION	11

* * *

APPENDIX I
Photographs

APPENDIX II
Field Notes

MAP INFOLDED

INTRODUCTION

The party comprised Dr. S. J. Nelson and myself, together with two Ojibway Indians from the settlement at Big Trout Lake. Dr. Nelson had prior experience on the Churchill and Nelson rivers and was primarily charged with the paleontological and stratigraphic problems of the area. My major function was to gain some insight into the economic potentials of the exposed sections and to confirm or discount certain economic possibilities including broad structural and stratigraphic considerations. Dr. Nelson's work is presented as a separate report.

The reason the Severn River was chosen over others, particularly the Winisk, was simply that it offered, on preliminary knowledge, a more complete section and was closer to the area of interest at Cape Tatnam. The projected work on the Severn River would then bracket Cape Tatnam between the Severn and Nelson rivers. The Kaskattama River was not used since it appeared too small and short a river for our purposes. With data available from the Churchill, Nelson and Severn rivers, a boulder survey in the permit areas and a traverse of the Kaskattama would then be practical.

The traverse was made using a twenty-foot skiff-stern canoe with a ten horsepower outboard. This equipment proved ideal for our purpose. Two trips with a Beaver aircraft were required to place the canoe equipment and party on the Severn River from Big Trout Lake, a distance of fifty miles. A Norseman aircraft was able to bring back the canoe, rock samples, equipment and men from Fort Severn to Big Trout Lake in one trip, a distance of 175 miles. One combined safety check, supply drop and sample pickup was made by a Cessna 180 when the party was camped at the base of the Limestone Rapids.

PURPOSE

The main purpose of this traverse was to examine the sedimentary section overlying the Precambrian as it outcrops along the Severn River, with particular emphasis on the economic aspects of the section. The existence of the Paleozoic outcrop along this river was well noted by early workers. Of these, Savage and Van Tuyl (1919)* presented the most authoritative work available on the Paleozoics of the Hudson Bay Lowlands.

*Savage, T.E. and Van Tuyl, F.M., 1919, Geology and Stratigraphy of the Area of Paleozoic Rocks in the Vicinity of Hudson and James Bays: Geol. Soc. Am. Bull., v.30, pp. 339-378.

These two workers had reported Silurian rocks along the Severn River and had divided the sequence into three stratigraphic units: the Severn River limestone (lowermost); the Ekwan River limestone and the Attawapiskat coral reef.

It should be noted that early workers had made no mention of sediments other than Silurian in the Severn River area.

Some of the questions outstanding at the start of the traverse were:

- (1) What is the age of the sedimentary section? Are there strata present younger and/or older than Silurian?
- (2) What are the gross lithologies of the stratigraphic succession?
- (3) What are the reservoir possibilities of the outcropping strata?
- (4) Is there any suggestion of sandstones or shales in the section?
- (5) What structural information is available from the outcrops?

The traverse also offered firsthand experience and knowledge of surface conditions; factors essential to exploration planning.

GENERAL DESCRIPTION

The traverse of the Severn River covered approximately 160 miles. Of this distance, outcrop occupied about 30 miles, or less than twenty per cent. The outcrops occur in three distinct zones with the lengthy inter-outcrop zones being covered by glacial clays and tills.

The first outcrop of concern to this project occurs at the rapids, herein named Jubilation Rapids, which occur about fifteen miles up the Severn River from the mouth of the Witego River (Photos 1 and 2). These rapids are the last downstream appearance of the Precambrian, and mark the Precambrian-Paleozoic contact. The south bank of the rapids shows extensive outcrops of orthoclase granite (SR 4). Here, the surface of the Precambrian is washed clean of Paleozoic "scabs". However, minor Paleozoic carbonate and sandy carbonate drift occurs which is suggestive of the Ordovician Portage Chute formation. On the north side of the rapids (SR 2), the Ordovician rocks of the Portage Chute formation are exposed along the bank for about half a mile. The Precambrian outcrops in the water almost to the north shore but the actual contact is obscured by the river. The contact is unconformable with the surface of the Precambrian rocks dipping northeastward under the Paleozoic rocks. The Paleozoics in turn appear essentially flat-lying, but presumably also dip very gently to the northeast.

Downstream from the Ordovician outcrop at Jubilation Rapids, no outcrop occurs for the next eighty miles. The river is sharply incised with steep banks, generally thirty to fifty feet of clay and boulder tills (Photos 3 and 4). Between Jubilation Rapids and the Witegoo River some fifteen miles downstream, occasional sampling of Paleozoic gravel and boulders (SR 1, 3 and 5) suggests that this material had strong affinities to rocks of Ordovician age, particularly the Portage Chute formation. From the Witegoo River downstream some sixty-five miles to the first outcrop, the boulders strongly suggest Silurian-type lithologies (SR 6, 7, 8 and 9).

The second series of outcrop consists of good intermittent showings along twenty-one miles of river, from below the mouth of the Rooksand River to the lower gate of the Limestone Rapids (Photos 5 to 15). This interval contains the Silurian outcrops which Savage and Van Tuyl divided into the "Severn River Limestones" and the "Ekwan River Limestones". In the present traverse, geological stations SR 10 to SR 20 inclusive were made at pertinent outcrops. Largely following Savage and Van Tuyl, SR 10, 11, 13, 14, 15 and 16 are placed in the Severn River formation while SR 12 and 17 to 20 are placed in the Ekwan River formation.

The outcrop interval assigned to the Severn River and Ekwan River limestones is followed by an obscured area of some nineteen miles. This interval, as the obscured interval upstream, has high banks of Pleistocene clays and is totally devoid of outcrop.

The third series of outcrop occur along a nine-mile stretch of river as good intermittent exposures ending in the excellent continuous exposure along the north bank of Long Portage Rapids (Photos 16 to 24). The outcrops at geological stations SR 21, 22 and 23 are typical of those above Long Portage, while SR 24, 25 and 26 are along the rapids. Savage and Van Tuyl call the strata outcropping along this section of the river the Attawapiskat coral reef, and the designation is used in this report.

That part of the river from the base of Long Portage Rapids to the Hudson Bay coast is the third obscured area (Photos 25 to 28). Not a single indication of outcrop was found along the river. High banks of Pleistocene clays and tills, often to fifty feet and exhibiting two and three-fold divisions, confine the river across this wide coastal belt. The lack of outcrop in this area is particularly disappointing since presumably the youngest sediments of the on-shore area would occupy this position.

STRATIGRAPHY

Ordovician and Silurian carbonates outcrop along the Severn River. No evidence was found suggesting the presence of Proterozoic or Cambrian sediments. No evidence indicated the presence of strata younger than Silurian.

The present work suggests an absolute minimum thickness of exposed Paleozoic strata of 130 feet. (This estimate may be too conservative and the actual outcropping thickness may approach but should not exceed 200 feet.) The traverse is so long and the obscured intervals so extensive that additions of large amounts of sediments both at the surface and within the section is entirely possible. The amount of the measured section probably has little relationship with the total section present in the Fort Severn area.

ORDOVICIAN

The presence of Ordovician strata in the Severn River area is previously unreported. The outcrop while at least half a mile long, is very low exposing only ten feet of section and occurs only on the north side of Jubilation Rapids. A party working along the south bank of the river could conceivably miss the outcrop. If the outcrop were missed, and since there is no outcrop for some eighty miles downstream, the placing of the Precambrian-Paleozoic contact might become somewhat arbitrary. This seems to be the case with the existing maps.

Portage Chute Formation

10' +

The strata at SR 2 are tentatively assigned to this formation, while the rubble at SR 1, 3, 4 and 5 are suggestive of this formation (with minor affinities to the Surprise Creek formation).

Limestone, light brown-grey, fine to crypto mainly microcrystalline, pelmatosian fragments, brown fucoidal mottling, minor spotty vuggy porosity. Minor drift suggest that the basal beds become a brown to brown-grey sandy limestone to limy sandstone. The sand is quartz, poorly sorted from fine to coarse grained, mainly poorly rounded. The sandy drift is at all times tight.

SILURIAN

This report follows the formational division of the Silurian as introduced by Savage and Van Tuyl. It recognizes outcrops of three formations along the rivers: namely, Severn River limestone, Ekwan River limestone and Attawapiskat coral reef. There is disagreement between this report

and Savage and Van Tuyl as to the stratigraphic sequence within each formation, although the formational limits are not in dispute. The present work would indicate that in some cases outcrop of stratigraphic equivalents had been added together instead of made equal. However, the purpose of the present work is reconnaissance in nature and primarily designed for economic purposes. The resolution of stratigraphic arguments is left to the future.

Severn River Limestone

The series of outcrops from which the Severn River limestones are defined are intermittent and their inter-relationship not clearly understood. SR 11 and SR 13 are identical. The lower few feet of SR 14 appears the same as the upper bed of SR 11 and 13. SR 16 appears to be the same sequence as SR 14 but reaching slightly higher in the section. SR 10 and 15 are reefy biohermal outcrops whose position in the section is undetermined. Savage and Van Tuyl place SR 10 as the lower unit of the Severn River limestones. The present work would tend to place both SR 10 and 15 as lateral variations of the upper porous unit of SR 11 and 13.

The synthesis of the field work indicates the following is the probable nature of the Severn River limestones:

Lower Beds

13' +

This includes Units 1, 2 and 3 of SR 11 and SR 13. (See Photo 5 and 7)

Limestone, very light grey, weathers light grey, micro to crypto-crystalline, blocky fracture, tight with occasional vugs near top. At this locality, a middle 3' zone shows the undulating micro-banding of algal structure.

Middle Reefy Bed

4' +

This bed is Unit 4 of SR 11 and 13 and perhaps includes the biohermal developments of SR 10 and possibly SR 15 as lateral equivalents. (See Photo 5, 6 and 9)

Limestone, light yellowish-grey to orange-buff, micro to finely crystalline, algal structures, excellent vuggy porosity. Lateral biohermal developments of algal and stromatoporoidal material anticipated.

Upper Beds

25' +

These beds include mainly SR 14 and 16 (See Photo 8). Possibly SR 10 and 15 belong as lateral variations of this horizon rather than the underlying beds.

Limestone, cream to buff and grey-brown, micro to finely crystalline in part chalky (lime-muds), in part fine to coarsely fossil fragmental with nil to good intercrystalline porosity, in part sub to well developed colitic texture with nil to excellent porosity (main colite bed may be as much as 4 feet), no odor or stain.

Ekwan River Limestone:

Outcrops at the geological stations SR 12, 17, 18, 19 and 20 are placed in this stratigraphic unit. It is possible that the strata of SR 12 belong within the Severn River beds. However, in this report and on the basis of lithological similarity they are placed as rough equivalents of the beds at SR 17, the lowermost unit of the Ekwan River limestones. The strata of SR 12, 17 and 18 are believed to belong to the same unit as Unit "a" of SR 19 and SR 20.

While the correlation of outcrops assigned to the Ekwan River beds is far from established, the following is the probable relationship:

Lower Beds (resistive unit) 20' +

These beds include the strata outcropping at SR 12, 17, 18 and the lower unit (Unit "a") at SR 19 and 20. (See Photos 10, 11, 12 and 14)

Limestone, light medium brown, microcrystalline; variably fossil fragmental from fine to coarse, trace subcolitic in lower part, trace blue-grey stringy chert nodules in upper part; nubbly weathering, generally tight with spotty poor intercrystalline porosity and minor vuggy porosity near top. Fossils include Favosites, Halysites, Alveolites, stromatoporoids, strophomenids and cephalopods.

Middle Beds (platy regressive unit) 11'

These beds form the middle regressive unit (Unit "b") at SR 19 and 20. (See Photos 11, 12 and 13)

Limestone, yellowish-brown, yellowish weathering, slightly to moderately dolomitic, microcrystalline, hard chalky texture, thin-bedded and platy, minor very thin fragmental beds, tight. Fossils rare and include mainly strophomenids.

Upper Beds (resistive unit) 6' +

These beds are the upper resistive rough-water unit of SR 19 and 20. (See Photos 12, 13 and 15)

Limestone, light grey-brown in part cream, microcrystalline, very highly and coarsely fragmental, a very rough-water rock which

includes large fragments of corals, beds irregular from 1" - 4" and nubbly weathering, porosity irregular poor to good. Fossils similar to Lower Beds plus *Endophyllum* and *Pachyphyllum* types.

Attawapiskat Coral Reef

Outcrops from SR 21 to SR 26 are placed in this unit as described by Savage and Van Tuyl. The formation includes both the reefs and the immediate overlying and related beds as exposed along this section of the river. This report considers the reef member at the intermittent outcrops SR 21, 22 and 23 as the same as the reef member at SR 24, 25 and 26. However, detailed work may prove the formation to contain more than one reef member. The overlying beds are considered part of the Attawapiskat reef complex. (See Photos 17 to 24)

The biohermal "heads" of the reef are generally small, ranging upward from a few feet to an average maximum of 100 feet. They are generally ovoid in plan with the overlying beds filling the depressions between the heads and occasionally draping over the heads.

Reef

25' +

Limestone, cream, in part orange-cream to buff, microcrystalline but variable to coarsely crystalline, generally fragmental throughout, rudimentary bedding, porosity highly irregular from tight to excellent pinpoint and vuggy, no stain, generally no odor (a slight gassy odor was noted from freshly broken rock at SR 22). (See Photos 20, 22 and 23)

Overlying Beds

16' +

Limestone, cream, in part yellowish-cream and in part grey, generally microcrystalline, numerous coarse sugary textured bioclastic beds often with excellent intergranular and pinpoint porosity, occasional beds of reef rubble with good vuggy porosity. (See Photos 20, 22, 23 and 24)

STRUCTURE

The assumed gross structure of the Paleozoic area was that of the basement dipping gently to the northeast and overlain by increasing amounts of sediments. This report provides little to substantiate or disprove the concept except for one major contribution: the Ordovician was found present and the areal distribution of Precambrian, Ordovician and Silurian rocks suggest the concept is correct. While the relative positions of

the Silurian Severn River, Ekwan River and Attawapiskat formations would corroborate this conclusion if the sequence is correct as presented by Savage and Van Tuyl, the present work failed to illustrate the relationship of these formations. It should be noted, however, that the general concept and the specific stratigraphic sequence are both acceptable and adhered to in this report.

Very little knowledge of local structural conditions was obtained. In general, the strata are nearly flat-lying or, as in the case at Jubilation Rapids and again at Long Portage Rapide, dipping approximately as the river gradient. Locally, attitudes were taken but were found to be highly questionable and not valid for regional considerations. This data is therefore not presented in the text but may be found in the accompanying field notes. The small folds mentioned by earlier workers were observed and are quite striking along the river bank. In all the "folds" observed, there was an obvious relationship to reefs and the apparent flexures appear to be small biohermal build-ups with draping of the overlying beds. In some cases, these "flexures" could conceivably be tectonic but this presently appears unlikely.

Faulting was noted at one locality only, at SR 19. Here minor vertical faults were noted striking N. 80° E. The maximum displacement was five feet with the north block upthrown.

RESERVOIR POTENTIAL

An insufficient amount of Ordovician beds outcrop to judge their reservoir potential. No basal sandstone is present, but the tendency to sandiness at the base might forecast the down-dip development of such a sand. Very minor horizons in the outcrop showed some tendency towards vugginess.

The Silurian strata are highly encouraging in terms of reservoir potential. In fact, there can be little doubt that excellent reservoirs exist in beds of this age. Almost the entire outcropping section illustrated strong tendencies towards one or more of the following textures: bioclastic, colitic, reef. All of these textures will produce excellent reservoirs under proper conditions. All strata except the platy "Middle Beds" of the Ekwan River show reservoir potential, some more than others. The "Middle Beds" of the Severn River show a strong tendency to develop as algal and stromatoporoidal biostromes with local small bioherms. The "Upper Beds" of the Severn River contain excellent colite beds. The "Upper Beds" of the Ekwan River are at least locally a rough-water accumulation with excellent but variable reservoir potential. All these of course appear somewhat minor compared with the apparently extensive tabular reef, the Attawapiskat coral reef.

Porosity within this reef will undoubtedly vary markedly from place to place. However, at this stage the Attawapiskat reef must be considered the major known exploration objective.

SEEPS, ETC.

Enquiries regarding any possible oil or gas seeps were made of the band of Cree camped at the mouth of the Sachigo River and again of the Cree at Fort Severn. They had no knowledge of any occurrences of this type in the area. Similar enquiries were made of the Hudson Bay men at Fort Severn and the Provincial Department of Forestry people at Sioux Lookout without results. As yet, no bonafide leads have been found suggesting the existence of oil or gas seeps in the Hudson Bay Lowlands.

ROCK and FAUNA SAMPLES

Sampling for lithological and faunal purposes was carried out at each geological station. While the collection had to be kept within reasonable limits in order to fly out from Fort Severn, a considerable amount of material was collected. Lithological samples are available for each outcrop together with large hand samples for particularly important porosity zones. The faunal collection is quite complete for each station. The samples, both lithological and faunal, should be of considerable help for future comparative studies with further surface and subsurface work.

COASTAL TRAVERSE

A one-day traverse was made on foot north from the mouth of the Severn River to the Pipowitan River, some five miles to the north. The purpose of this traverse was to gain some knowledge of surface conditions in the low barren ground adjacent to the bay. By this date, June 26, all anchor-ice was gone from the coast with only occasional chunks stranded at low tide. The bay ice was out of sight from the coast.

Surface walking conditions were quite firm although wet and slippery (Photo 27). The lagoonal channels which fill at high tide, although narrow, are four to six feet deep and can be troublesome. The only old beach feature encountered was perhaps twenty feet wide with a relief of three feet. This beach ridge is smooth and flat but cut by the

occasional lagoon (Photo 28). The feature which is composed of very fine limestone gravels and sands with abundant clam shells, provides firm and dry travelling conditions.

Our experience would indicate that the ice leaves the coastal area in late June. Travel along the raised beaches is probably excellent for any size of vehicle; however, fill work and bridging would be required. The major and perhaps insurmountable problem would be traversing the gaps between beach features under summer conditions. Any sort of wheeled vehicle travel during the summer period would at present seem impractical.

It was learned that a Hudson Bay boat of fair size supplies Fort Severn late each summer. This vessel enters the Severn River and goes upstream as far as the Fort. It is possible therefore that the easiest supply route to the Cape Tatnam area may be first to ship to Fort Severn and then up the barren coast after freeze-up. There would be a limit to the size of equipment, governed by the capacity of the vessel and the lack of landing facilities to handle heavy pieces at Fort Severn. Surface conditions indicate that travel along the coast would be easy after freeze-up.

DISCUSSION

The results of this traverse suggest that the geological maps of the area, both Federal and Provincial are incorrect, and too generalized in the Severn River area. The occurrence of the Ordovician at Jubilation Rapids is in an area marked as Precambrian. Indeed, the presence of Ordovician in this area is not marked on either map. It should be noted that no Precambrian outcrop occurs downstream from Jubilation Rapids. The division of the known Paleozoic outcrop area into Ordovician upstream from the Witegoe River and Silurian downstream, is as yet speculative. Again, exception is taken to the generalized mapping of the coastal area downstream from Long Portage Rapids. This coastal strip is thirty miles wide and while it may indeed be underlain by Silurian, there is no outcrop reported along the coast from the Silurian Attawapiskat outcrops of the Wabuk Point area near the mouth of the Winisk River to the Ordovician and Silurian occurrences on the Nelson River upstream from Port Nelson, a distance in excess of three hundred miles. The existence of this large area of no reported outcrop provides ample room to speculate on the presence of beds younger than the Attawapiskat reefs in the coast zone, including the Cape Tatnam area.

CONCLUSION

Paleozoic outcrop occurs along the Severn River for about thirty miles of the one hundred and sixty mile interval between the Precambrian area and Hudson Bay. There is no outcrop within thirty miles of the Bay. The exposed Paleozoic section has a minimum thickness of one hundred and thirty feet composed of ten feet of Ordovician and one hundred and twenty feet of Silurian. It is believed that the exposed rocks do not express the full sequence and that additional Ordovician and Silurian strata are present. There is no estimate of the stratigraphic thickness at the coast.

There is no evidence suggesting the presence of strata older than Ordovician or younger than Silurian. The Ordovician strata are tentatively correlated to the Portage Chute formation of the Churchill River area. The Silurian strata are placed into the Severn River, Ekwan River and Attawapiskat formations. The Severn River and Ekwan River are given a three-fold division, while the Attawapiskat is given a two-fold division.

All the rocks exposed are limestones. There are no shales found in the sequence, the nearest lithology being the platy beds of the middle Ekwan River formation. No sandstone beds were found, however, the basal beds of the Ordovician show definite tendencies towards sandiness.

The main economic conclusion is that there can be no doubt as to the reservoir potential of the Silurian sequence. The main textural feature of the limestones is their bioclasticity, which is further enhanced by the presence of oolitic zones and local tendencies to algal and stromatoporoidal reefing. However, the main apparent objective must be the Attawapiskat reef. As exposed, this reef appears to be an extensive, thick, tabular reef with irregular porosity. The Attawapiskat reef is truly a prime objective.

The structural findings were minor. The general concept of Paleozoic strata dipping gently to the northeast is unchanged. The arches and folds reported by earlier workers appear to be purely the result of beds draping over bihermal developments.

APPENDIX II

FIELD NOTES

FIELD NOTES

SEVERN RIVER TRAVERSE

S. J. Nelson and R. D. Johnson

- June 16. Calgary - Winnipeg via TCA
17. Winnipeg - Sioux Lookout via CNR
18. Sioux Lookout - Big Trout Lake via Transair Beaver.
19. Big Trout Lake - Severn River via Transair Beaver (2 trips)

Guides: Absolom McKay and Josey McKay, brothers from Big Trout Lake (Ojibwan)

Camp 1 - this camp established by Josey McKay evening of June 18 when first load flown in by Beaver. Camp on south bank below lowermost Precambrian rapid.

- Nelson, Johnson and Absolom arrived at Camp 1 at 7 a.m., Wednesday, June 19.

- river high, at a low flood level, apparently falling

- banks to thirty feet of river clay and gravel with mixed deciduous and conifer (spruce) cover to thirty feet

SR 1 - Gravel bar on north side of river about one mile below lower Precambrian rapids

- very numerous limestone fragments— near outcrop condition

- general lithology

Limestone, light grey-brown, fine to medium crystalline, slightly dolomitic, mottled, tight. Lithology suggests Portage Chute or Caution Creek formations in many places.

fossils - Receptaculites

- *Hormatoma winnipegensis* type (very very suggestive of Portage Chute formation)

- most common fossils however are: strophomenids and Leptaena - at first these thought to be Silurian, however above evidence now suggests Surprise Creek formation

- Summary: probably the rubble is from both Portage Chute and Surprise Creek formations. Fossils are labelled SR 1A, etc.

- SR 2
- on north bank at Jubilation Rapids (the name herein given to the lowermost rapids off the Precambrian topography)
 - the north bank from the top to bottom of these rapids is a nearly continuous outcrop of Portage Chute (?) formation
 - total exposed section estimated 10' +
 - upper break in rapids caused by breakover apparent, but not proven, Precambrian outcrop exposed 20' offshore and under water (appears Precambrian) with limestone on shore
 - no basal sandstone observed but sandstone could exist to an amount estimated not to exceed 4'. N.B. - minor drift suggests the presence of a thin basal sandy limestone to limy sandstone
 - limy sandstone drift observed along SR 2, but is rather sparse and never a majority in rubble
 - sandstone lithology collected from drift and labelled SR 2
 - limestone collection from outcrop
 - lithological description
 - Limestone, light brown-grey, fine to crypto and mainly micro-crystalline, pelmatozoan fragments, brown fucoidal mottling. Probably Portage Chute formation but could tend to be a little browner
 - fossils rare - one Receptaculites in place (SR 2A)
 - an orthocone cephalopod and a Maclurites from rubble labelled SR 2A Rubble
 - note on porosity:
 - Outcrop macroscopically tight, however, minor selected horizons show coarse vuggy porosity. This porosity may be totally related to differential erosion of the lighter colored mottling branches or may involve some primary porosity (not proven). Two samples included with "sandy" lithological sample SR 2.
- SR 3
- clay banks on north side of river downstream from SR 1
 - limestone rubble suggesting Portage Chute formation as at Jubilation Rapids
 - Receptaculites (SR 3A) collected

- SR 4 - south bank of Severn River at Jubilation Rapids
- extensive outcrops of orthoclase granites with minor drift of Portage Chute type lithologies including minor sandy carbonates (none in place)
 - further evidence that assumption that the basal sandstone, if present, is very thin is correct (see SR 2)
 - no samples taken
- SR 5 - North bank of river above mouth of Witegoo River
- banks to forty feet of bouldery clay
 - abundant rounded rubble suggesting Portage Chute formation (doesn't lock in place)
 - no samples taken
 - banks from SR 3 to SR 5 are clay, no outcrop occurs and only minor bouldery areas
- Camp 2 - camp on island at mouth of Witegoo River, evening, Wednesday, June 19
- Note: some days later Absolom McKay who traps parts of the Witegoo River mentioned the presence of rocks that have a slight gassy odor when broken (presumably petroliferous carbonates). He mentioned this after being introduced to the rocks above Long Portage. The suggestion is that Ordovician (?) rocks occur on the Witegoo River and at least some of these rocks have a slight gassy odor.
- June 20 - Ran up Witegoo River, then continued traverse down Severn R.
- SR 6 - Cutbank on the lower Witegoo River
- banks to fifty feet, apparently clay and boulder clay
 - the clay is a near-shale with coarse nutty fractures and is calcareous; but carries inclusions of Paleozoic and Precambrian lithologies from grit to boulder size

- sample SR 6 taken for lithology of clay
 - boulders in creek include highly fucoidal limestones with fauna suggestive of Silurian (SR 6A taken)
- SR 7
- Between the Witegoe and Black Bear Rivers on north bank
 - rubble and boulders on banks are not near-outcrop
 - the above have gross affinities suggestive of Silurian
 - lithological samples taken:
Limestone, light brown-cream, medium to coarsely crystalline, coarse crinoidal fragmental texture, tight (SR 7)
 - cup coral (fauna sample SR 7A)
- SR 8
- Between Witegoe and Black Bear rivers on north bank
 - bouldery bank
 - banks to forty feet
 - boulders both limestone and Precambrian
 - limestones suggest Silurian. No fossils collected
 - lithology:
Limestone, cream to light brown-cream, in part sugrose, in part high clay content, some good primary porosity in occasional boulder (SR 8)
- Camp 3
- camp at mouth of Sachigo River on small island along north bank
- June 21
- Continue traverse down Severn River
- SR 9
- Stony bank on north side of Severn upstream from mouth of Rocksand Creek

- high percentage of limestone rubble of two types: one sub-lithographic, the other reefal "A"
- lithological description of fine material:
Limestone, in part light cream-buff, homogeneous, very fine to fine sucrose texture, sub-chalky, occasional bands of ostracods, in part pinkish.
- lithological description of reefal "A" type:
Limestone, light grey-brown, finely crystalline, largely stromatoporoidal and includes pentamerids, brachiopods and Favosites (SR 9A)
- a general lithological sample was taken which includes a yellowish-buff medium crystalline limestone, with excellent stringy vuggy porosity

- SR 10
- On west side of first small island in Severn River below mouth of Rocksand Creek
 - outcrop of limestone suggests Silurian
 - attitude not possible but strike generally north with dips five to twenty degrees westward
 - lithological description:
Limestone, light cream, slightly buff, bleached appearance, microcrystalline, fine sucrose texture, platy blocks, no odor. At intervals in the above is the same lithology with abundant nodules of light brownish microcrystalline limestone which may have been stromatoporoidal. These intervals appear to be no more than 1 inch thick and laterally appear intermittently continuous suggesting reefoid lenses. Immediately overlying beds show micro-draping. The porosity is generally tight but minor patches of weathered highly vugular porosity with much solution and calcite infilling and recrystallization. The exposed thickness is ten to fifteen feet.
 - lithological sample SR 10 and fauna sample SR 10A (stromatoporoids)
 - note that the age of this outcrop is unknown

** Later consideration after the downstream section was observed suggests that SR 10 is the same as Bed No. 1 of the Severn River formation as described by Savage and Van Tuyl.

- SR 11 - downstream from SR 10 on east bank of river along rapids
- continuous exposure of 16' 6" of stratigraphic section
- geographic position suggests the exposure is stratigraphically subjacent to exposure at SR 10
- no fossils, age unknown
- gross lithology suggests Silurian
- total stratigraphic thickness of SR 10 and 11 is approximately twenty-five feet
- description of section at SR 11: (outcrop divided into 4 units)
 - Unit No. 1 (lower unit). 7 feet
Limestone, very light grey, micro to cryptocrystalline, very fine sucrose texture, blocky fracture, tight, light grey weathering. Sample SR 11-1
 - Unit No. 2 3 feet
An algal bed
Limestone, light grey, microcrystalline, very very fine micro banding with highly undulating bands, tight.
Sample SR 11-2
 - Unit No. 3 3 feet
Similar to Unit No. 1
Limestone, very light grey, micro to cryptocrystalline, tight with spotty occasional minor vugs.
 - Unit No. 4 (upper unit). 3 feet 6 inches +
Top of unit not exposed
Limestone, light yellow-grey to orange-buff, fine to microcrystalline, very vuggy with vugs running in stratigraphic lenses, vugs in part organically controlled developing on algal structures.
N.E.- really excellent porosity, no stain, no smell. Sample SR 11-4 (bags and large sample)

** Later consideration suggests our units 1, 2, and 3 at SR 11 to be the same as Savage and Van Tuyl Bed No. 2 of the Severn River formation. Our Unit No. 4 would then be the same as Savage and Van Tuyl Bed No. 3 of the Severn River formation.

- SR 12 - just downstream from SR 11 the outcrop becomes intermittent. Through this stretch a different lithology appears which Nelson thinks has some lithological affinities to the Ordovician Churchill River Group.
- ** After seeing SR 19 and 20 downstream, SR 12 appears to be the lower resistive unit of SR 19 and 20 (Unit A at SR 19 and 20)
- lithological description at SR 12:
Limestone, medium light grey-brown, micro to cryptocrystalline, in part weathers light grey mottled light brown, rare brachiopod and coral fragments.
- SR 13 - excellent outcrop
- same succession as SR 11 (identical including 4' + of a porous upper unit, Unit No. 4)
- no samples taken
- Camp 4 - On east bank of Severn River about 9 miles above the mouth of the Fawn River.
- June 22 - Examined outcrop SR 14 a few hundred yards upstream from Camp 4, then continued the downstream traverse.
- SR 14 - outcrop east bank of the Severn River
- about twenty-five feet exposed and scree covered
- lower three feet suggests Unit 4 of SR 11. Sample SR 14-1 taken from this unit.
- overlain by twelve feet of scree covered, mainly lime mud types of lithologies with minor horizons of fragmental types with primary porosity. This middle section in an oolitic zone at the top.
- the middle section is overlain by ten feet of lime mud types with minor fragmental zones
- lithological description for outcrop:
Limestone, light grey-brown, micro to finely crystalline, in part sub-chalky (muds); in part fragmental with nil to good primary porosity; in part medium fine

oolitic, oolites well formed, very little matrix, excellent porosity in oolites, no stain, no odor. Main oolite bed may be as much as four feet thick. Samples SR 14-2 and SR 14. Oolites taken.

SR 15 - outcrop on west bank of Severn River about eight miles above Fawn River

- low long biohermal mound (8' high by 100' long) overlain by microcrystalline limestone in three-inch to six-inch beds. Exposed stratigraphic interval approximately ten feet.

- porosity is nil to poor in the bioherm at the top improving to spotty good vuggy porosity at the base. Sample SR 15-1

- lithology material overlying the bioherm:
Limestone, microcrystalline, largely thin-bedded (1-3") (SR 15-2) with occasional thin lenses of oolitic to suboolitic material with excellent porosity in part (SR 15-3) near top of outcrop.

- SR 15A samples of small brachiopods from bioherm near base of outcrop. Also, Favosites, age Silurian

SR 16 - Outcrop on east bank of Severn River about six miles above Fawn River

- outcrop comprises a lower talus slope covering ten feet of section and an upper vertical exposure of fifteen feet. Exposed section approximately twenty-five feet.

- well developed bedding, beds 1" to 9"; mainly 3" to 4" thick

- lithological description of lower ten feet (talus slope):
Limestone, cream to light buff, microcrystalline contains beds of fragmental limestones, medium to coarsely fragmental in part suboolitic, porosity fair to good. SR 16-1 lithological sample of crinoidal-fragmental zone.

- lithological description of upper exposed section (vertical pt.):
Limestone, light cream to light buff, in part microcrystalline, in part suboolitic, in part very finely fragmental, porosity nil to fair, no stain. Sample SR 16-2

** All dips and strikes from SR 10 to SR 17 at least are meaningless. Without precision measurements, the exposures can generally be considered as flat-lying.

- SR 17 - Outcrop on west bank of Severn River about three miles above the Pawn River.
- excellent exposure of limestone beds 2' to 1' thick (average 1"-3")
 - outcrop grey-buff weathering
 - detailed lithological section from one-foot samples starting from base of section:
 - Basal Foot
Limestone, light medium brown, micro to finely crystalline, moderately fragmental, tight.
 - Second Foot
Limestone, light medium brown, micro to finely crystalline, in part very fragmental and suboolitic, tight to trace fair porosity.
 - Third Foot
Limestone, much the same, very fragmental, tight.
 - Fourth Foot
Limestone, much the same, very fragmental, in part suboolitic tight to trace poor porosity.
 - Fifth Foot
Limestone, very fragmental and suboolitic, tight to poor porosity.
 - Sixth Foot
Limestone, in part the same, in part only moderately fragmental, tight.
 - Seventh, Eighth and Ninth Foot are much the same.
 - Samples SR 17-1 are of section described above
 - Samples SR 17-2 are selected samples of a crinoidal horizon and also samples of chert which is spotty throughout the section
 - strike is generally north with dips of 5° - 15° eastward
 - fossil samples SR 17A include Favosites, Caloonoceras, strophomenids
- ** - SR 17 is reminiscent of SR 12, and suggests SR 12 overlays SR 10, 11 and SR 13 to 16
- ** - later consideration suggests that SR 17 is the lower outcrop of the Elkwan River limestone of Savage and Van Tuyl

- SR 18 - On north bank of Severn River across from mouth of Fawn River
- perhaps twenty feet of stratigraphic exposure
 - attitude means very little as both dip and strike appear highly variable. One possible attitude would be north fifty-five east, fifteen degrees south
 - grab sample of lithology taken as SR 18
 - general lithological description:
Limestone, medium light grey-brown, micro to crypto and finely crystalline, in part dense, in part moderately to very fragmental, tight.
 - fauna sample SR 18A contains Favosites collected from rubble and Monoceras and stromatoporoidea collected from in place

- SR 19 - On north bank of Severn River at top of upper series Limestone Rapids
- same location as Savage and Van Tuyl give for their Skwan River limestone Bed No. 7
 - exposes 24' of strata
 - it appears more logical to divide the outcrop into three stratigraphic units; Unit "a" (basal), Unit "b" (middle), Unit "c" (upper).
 - description of units:
Unit "a" 8 feet exposed
 - a basal resistive unit suggestive of SR 18
 - Limestone, light medium-brown, cryptocrystalline, moderately fragmental, tight with trace of spotty poor pinpoint porosity near top, abundant fossils, nubby weathering effect, trace blue-grey chert, bedding 4" to 10".
 - grab sample SR 19-1
Unit "b" 10 feet exposed
 - a middle regressive unit of platy carbonates, 1" beds and less.
 - Limestone, slightly dolomitic, cream to orange-buff and grey, in part mottled, microcrystalline, sub-chalky but hard, sacrose in part, tight, non-fossiliferous.
 - grab samples SR 19-2

- Unit "c" 6 feet exposed
- a thin resistive unit at the top of the outcrop
 - Limestone, light brown to cream, microcrystalline, very very fragmental texture in part becoming coarsely fossil-fragmental at top, spotty fair porosity at top
 - grab sample SR-19-3

** - Essentially flat-lying (attitudes are meaningless). Noted small vertical faults striking north 80° east with 5' upthrow on north block.

- fauna from Unit "a" (SR 19A).
Halysites, Avcolites, stromatoporoids, cephalopods

** - Note siphuncles as at Cape Churchill, also note lack of Favosites (Nelson)

** Nelson suggests SR 17 and 18 are the same as the lower unit at SR 19 and 20. The above rechecks okay except 17 and 18 may be different horizons of the same unit with SR 17 slightly lower than SR 18. The geomorphology at Limestone Rapids is controlled by the lower resistive unit, Unit "a", with no marked addition in section.

Beds at SR 11 and 13 are presumably towards the top of the Severn River formation because Ekwan River rubble occurs at SR12. Above SR 11 and 13 is the upper section of SR 14, still in the Severn River formation. Therefore, probably SR 14 and SR 16 are in the same general sequence with SR 16 slightly higher than SR 14 (e.g. the talus situation). Therefore, the discussion resolves itself except for the position of the bioherm of SR15. Arguing on the super position of the platy rock overlying the bioherm, one would have to place the bioherm as equivalent to either Unit 4 of SR 11 (Severn River) or Unit "a" of SR 19 (Ekwan River). I tend to put the bioherm as the same as Unit "a" of SR 19. Nelson feels the bioherm of SR 15 is Severn River mainly because of gross lithological appearances. Paleontological work on the Favosites collected may help.

Camp 5 - On gravel bar at first creek on east bank below Limestone Rapids

June 23 - worked area of Limestone Rapids above Camp 5

SR 20 - major outcrop on east bank of Severn River in Limestone Rapids at the "gate" above the lower island

- outcrop similar to SR 19 with three-fold division, units "a", "b", and "c" as at SR 19; that is, a lower resistive unit (Unit "a") a middle regressive unit (Unit "b"), and an upper resistive unit (Unit "c").

- detailed section at SR 20

Unit "a" (basal unit) 12 $\frac{1}{2}$ + feet

-gross appearance: light grey to cream and buff-grey weathering, pronounced bedding generally 2" to 5", general nubbly appearance.

-estimated 6' of outcrop obscured below present river level

-next five feet above water line sample SR20-1 representative chips:

Limestone, light grey and cream, in part light brown-grey, microcrystalline, variably fragmental from fine to moderate to very coarse, tight, no odor, minor stringers of blue-grey chert near top.

-next five feet representative chips sample SR 20-2:

Limestone, medium light brown and grey-brown, microcrystalline, thin-bedded, varies from pelmatocyan and fragmental to slightly fragmental, slight trace blue-grey chert nodules, tight.

-next two and a half feet (top of Unit "a") representative chips sample SR 20-3:

Limestone, medium brown and grey-brown, microcrystalline, variably fragmental but mainly slightly to moderately fragmental, slight trace small blue-grey chert nodules, tight with trace minor stringy small vugs in top few inches of Unit "a".

- note Unit "a" measures 12' 6" exposed plus what is the below river level a minimum of three feet

- contact between Unit "a" and Unit "b" is sharp and conformable

Unit "b" 11 feet

-gross characters: a regressive weathering unit well bedded in thin beds one-half inch to two inches, yellowish weathering, platy, tight

-lower five feet of Unit "b" representative chips sample SR20-4

Limestone, slight to moderately dolomitic, yellowish-brown, microcrystalline, hard chalk texture, occasional very thin fragmental beds, hard, tight

-upper six feet representative chips sample SR 20-5

Limestone, as in lower five feet

-note contact between Unit "b" and Unit "c" is quite sharp but some mixing of lithologies over a one-foot interval

Unit "c" 6 feet +

-gross character: unit is resistive, bedding is irregular in beds 1" - 4" unit appears rubbly but holds up in a sharp cut. Unit "c" is not as resistive as Unit "a".

-basal two feet representative chips sample SR 20-6
Limestone, light grey-brown in part cream, microcrystalline, very highly and coarsely fragmental, a very rough-water rock and includes whole small stromatoporoids and broken Favosites as fragments, porosity poor to good but irregular.

-upper four feet representative chips sample SR 20-7
Limestone, much as before but slightly less rough-water in origin, still contains large pieces of coral, generally tight with minor poor porosity.

- **
- duplicate sets of representative rock sets taken of Units "a", "b" and "c"
 - fossils SR 20A from Unit "a" are predominately coralline, mainly Favosites, Alveolites, stromatoporoids, Halysites, Siringopora
 - fossils sample SR 20B from Unit "b", fossils are rare, mainly Strophomena types
 - fossils sample SR 20C from Unit "c" are a similar coralline assemblage as in Unit "a" plus Eridophyllum and Pachyphyllum types.

June 24 - stayed overnight at Camp 5. Supply and check plane arrived at noon, continued traverse downstream in p.m.

- SR 21
- Outcrop on east bank of Severn River about ten miles above Long Portage Rapids and about two hundred yards below a very small island of outcrop—presumably Limestone Island of Savage and Van Tuyl
 - the outcrop therefore is presumably the first outcrop examined of the Attawapiskat coral reef of Savage and Van Tuyl
 - SR 21 is a large low outcrop extending for perhaps half a mile downstream but rising only about six feet above the water
 - the river here has marked rapids

- gross description of SR 21:

The exposure shows about six feet of limestone in a rudely bedded hummocky outcrop. The limestone weathers grey to yellow-buff with a nubby weathering habit. The overall effect is a gross reefal appearance.

- lithological description for SR 21

Limestone, buff to cream, generally microcrystalline, generally fragmental throughout from very finely sacroidal to very coarsely fragmental. Abundant Favosites, Halysites and stromatoporoids (difficult to extract). Some general aspects similar to Unit "c" SR 20 only much more rudely bedded, hummocky in appearance with more and larger stromatoporoids.

- outcrop SR 21 is possible lateral equivalent of Unit "c" ?

- sample SR 21-1 is a lithological grab sample representative of the outcrop

- samples SR 21-2 and SR 21-3 are large samples of the best of the porosity

- the outcrop is generally quite tight with minor vugginess, occasional areas showing marked excellent local porosity as in samples SR 21-2 and SR 21-3

- no oil stain, nor odor

** - Notes on outcrops downstream from SR 21. Outcrop abundant but appear as at SR 21. All outcrops moundish in outline reveal stratigraphic thicknesses to twelve feet. All appear the same as SR 21 but rude bedding makes stratigraphic placement impossible. Stratigraphic thickness unknown but probably less than twenty feet.

SR 22 - typical outcrop on east side of river

- main unit appears as at SR 21, that is, it is moundish in outline and reefal in character—one gets the impression that the unit is a biostromal reef complex.

- lithological description of SR 22:

Limestone, cream and yellow-cream, coarser than at SR 21, now fine to medium crystalline, very fragmental, generally tight but good to very good spotty vuggy porosity, no stain. Representative grab sample SR 22-1.

The above is overlain by a bedded unit with beds 1" to 3" thick, which appears lithologically similar to the lower unit. The lithological description is much as for the underlying material only more yellow-buff and more thinly bedded. The upper material is representative in grab sample SR 22-2

- grab sample SR 22-3 is representative of the best porosity of the lower (main) unit
- fauna is same as SR 21
- stratigraphic thicknesses at SR 22 are possibly twenty-five feet for the lower massive unit and five feet for the upper bedded unit
- ** - downstream from SR 22 the same moundish outcrops continue-- the same formation. Many rapids.

SR 23 - East side Severn River about four miles above Long Portage Rapids

- excellent exposure of several small flexures with dips to 30° with apparent general axial direction north 60° west, separation of flexures about 100 feet.
- origin of flexures unknown but seems probably related to reefing rather than tectonics, however, tectonics possible
- centres are massive blocky material like SR 21 and SR 22. These show no folding and therefore suggest the overlying bedding is draped as on reef
- overlying material shows fair to good bedding

H.S. - very slight petroliferous odor noted (Nelson)

- general lithologies as at SR 21 and 22. Representative grab sample SR 23-1 taken. Sample SR 23-2 is specimen of best porosity.

** - outcrops downstream continue as at SR 23 with local fairly high dips involved

Camp 6 - on north bank of Severn River less than a mile above Long Portage Rapids.

June 25 - continued traverse downstream, guides portaged around Long Portage Rapids (four hours)

- we traversed north bank of Rapids over nearly continuous outcrop, far better than south bank

SR 24 - north bank at top of Long Portage Rapids

- outcrop appears as a broad shelf on the north side of the Severn, of little stratigraphic thickness

- nick-point in river is very sharp.

- mostly rudely bedded, hummocky, reefal limestone material seen upstream, in places quite porous

- mainly flat and hummocky but at least one location dips to twenty degrees on well-bedded flank (?) material (similar to SR 23)

- SR 24 appears as the same stratigraphic unit as SR 23

- slight differences in lithology suggest SR 22 may be either slightly lower stratigraphically or, more likely, just a lateral variation of SR 23 and SR 24

- SR 24 Alpha HDJ Roll 3, nos. 4 and 5 are photos of the core of a reefy mass several feet in diameter. Hammer on slope of reefy mass with steel hook on adjacent general bedding.

- sample SR 24-1 is from the core of the above

- sample SR 24-2 is from a one-foot steeply dipping bed flanking the core

- SR 24-3 is from the adjacent rude flat-lying bedding

- lithology appears the same in SR 24-1, -2 and -3:
Limestone, orange-cream, coarse grained, fragmental, excellent vuggy porosity, no stain, no smell

- sample SR 24-4 is a grab sample from the few feet (approximately 3 feet) of beds that locally overlay the reefy materials of SR 24-1, -2 and -3

- lithological descriptions of SR 24-4:

Limestone, very light grey to cream, coarse sugary texture in part, in part tight, in part excellent pinpoint and small vuggy porosity, bedding good in approximate 3" thick beds

SR 25

- on same outcrop, downstream from SR 24
- core of a reefal structure exposed on the north bank of the Severn
- this station is typical of the reefal masses occurring everywhere throughout this outcrop along Long Portage Rapids
- in general, the reefal heads appear to be roughly oval to circular in areal layout and in the order of fifty to one hundred feet across. These heads are separated by swale-like depressions.
- the heads are highly reefal
- the beds in the depressions are bioclastic with very minor platy beds
- roughly, the outcrop divides itself into the reefal beds, Unit X, and the overlying bedded unit, Unit Y

** Note - the stream gradient in the rapids is roughly the apparent formation dip and is in the order of a few feet per mile, perhaps ten to twenty feet per mile with a general northward dip. The folds or swales appear to lack orientation but detail mapping could prove otherwise.

- description of SR 25:

core of reef (Unit X)

- exposed six feet of rudely bedded limestone (SR 25-1)
- Limestone, cream to light buff, microcrystalline, highly fossil fragmental, irregular porosity from tight to excellent pinpoint and small vuggy porosity

overlying beds (Unit Y)

- described from base to top in following notes:

SR 25-2 (directly overlying Unit X) 3'

Limestone, cream to buff, micro to finely, highly fossil fragmental, well bedded, light to good intergranular and pinpoint porosity.

SR 25-3 1'
Limestone, medium orange-brown, microcrystalline, thin-bedded, platy, hard, tight.

SR 25-4 2' 6"
Limestone, cream, microcrystalline, well-bedded, highly fossil fragmental, tight with zones of coarse bioclastic texture exhibiting good to excellent intergranular and pinpoint porosity.

SR 25-5 1'
Limestone, cream and yellow-brown, microcrystalline, reefoid with spotty fair to excellent vuggy porosity

SR 25-6 3'
Limestone, medium grey to orange-brown, microcrystalline, hard, thin platy with a middle bioclastic unit, tight

SR 25-7 3'+ (top of exposure)
Limestone, similar to SR 25-2 and 4

** The overall aspect of this outcrop is that the reefal core, Unit X, is distinguished from Unit Y mainly by the better bedding in the latter.

** Note that SR 25 is very similar to outcrop SR 23.

** Fauna notes: all fossils are from reef core, predominantly large, concentric stromatoporoids with rare Favosites (SR 25-A).

SR 26 - mainly a photo station along same series of outcrops downstream along Long Portage Rapids

- this may be the location of Savage and Van Tuyl's picture

** - sample SR 26 are random samples of the best porosity found between SR 25 and 26

** - Note: it appears that through the Long Portage Rapids outcrop probably 35 feet of stratigraphic section are exposed. This may be as high as fifty feet but no more.

** Note that Long Portage Rapids are a definite portage and cannot be safely run.

- traverse downstream from Long Portage is through glacial till banks with two or three separate layers. Banks rise to fifty feet in places. The clay banks continue to Fort Severn. Several checks were made and no sign of shale was found, only clays and boulder tills.

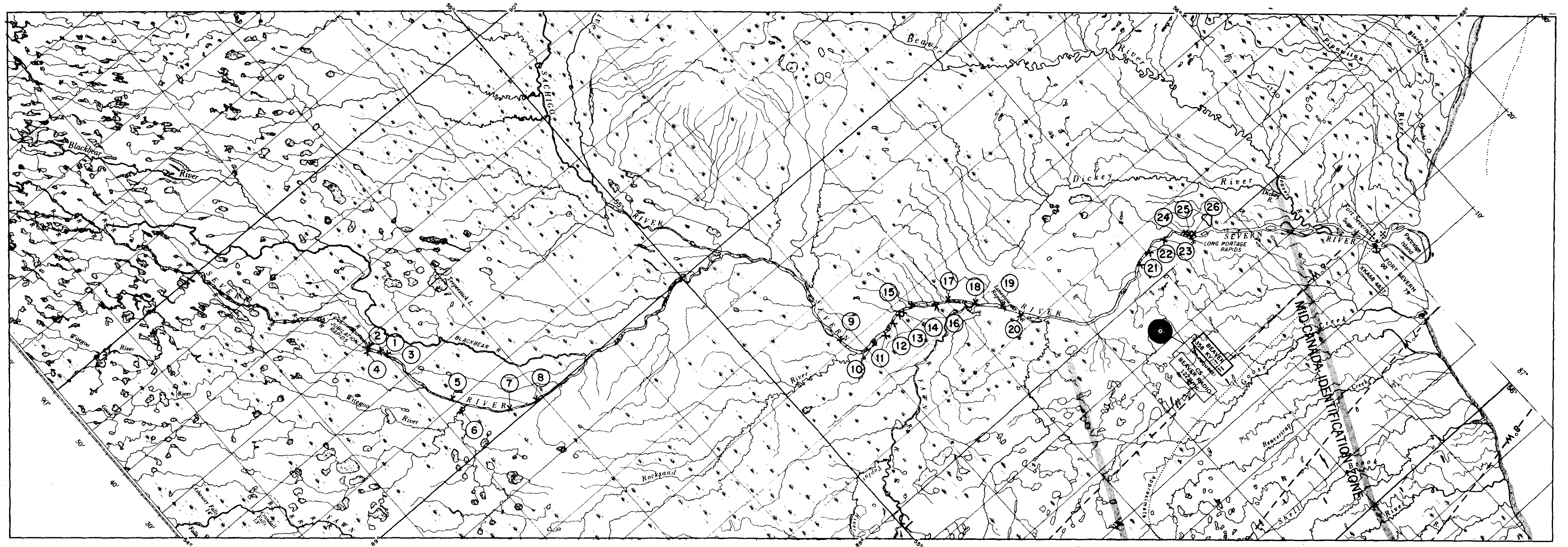
- Camp 7 - Arrive Fort Severn 6 p.m. this day
- about one hundred Indians and five whites (3 Hudson Bay men, 1 parttime school teacher, one Catholic Church helper)

**H.B. no outcrop found on Severn River below Long Portage Rapids

- June 26
- traverse to mouth of Severn River
 - beached canoe at the navigation tower on north bank
 - traversed northward across the marsh flats to the mouth of the Pipowitan River
 - local land relief to 3 feet
 - ice now all out, but was reported in last week. Ice out perhaps twenty or thirty miles, probably out due to high west winds during past few days. Ice out beyond view from tower (30' off ground and visibility perfect). No ice on coast.
 - glacial till, a blue gumbo, not boulder-strewn
 - large sand bars and areas around and off the mouth of the Severn show several hours before low tide and for several miles offshore
 - outer bars are either strewn with scattered ice cakes or large blocks of rock
 - followed beach ridge approximately one mile near mouth of Pipowitan. Maximum relief of the beach ridge over the adjacent marshes was perhaps three feet. The ridge was composed of very fine limestone gravels and sand with abundant clam shells.

- June 27
- at Ft. Severn awaiting aircraft
 - radio communications impossible for three days due to atmospheric conditions. Radio problems of this kind common in this area.

- June 28
- picked up by Transair Norseman at noon, arrived Sioux Lookout at 10 p.m.



SEVERN RIVER TRAVERSE
 SHOWING
GEOLOGICAL STATIONS
(SR) 1 to 26
 SCALE: 1 inch = 8 Miles
 R. D. JOHNSON
 SEPTEMBER 1963

APPENDIX I

PHOTOGRAPHS

PHOTO 1

Aerial view of Jubilation Rapids looking upstream and across at the south bank (SR 4). The Paleozoic north bank is not in the photograph. The rapids are Precambrian and mark the furthest downstream occurrence of these rocks.

PHOTO 2

At SR 2 on the north bank of Jubilation Rapids. Ordovician strata overlie Precambrian rocks in the water. The nick-point of the rapids marks the contact.

PHOTO 3

Near the Blackbear River. Typical steep clay and till banks along the Severn River.

PHOTO 4

An aerial view of the Severn River above the confluence with the Sachigo River. Note the typical banks and vegetation.

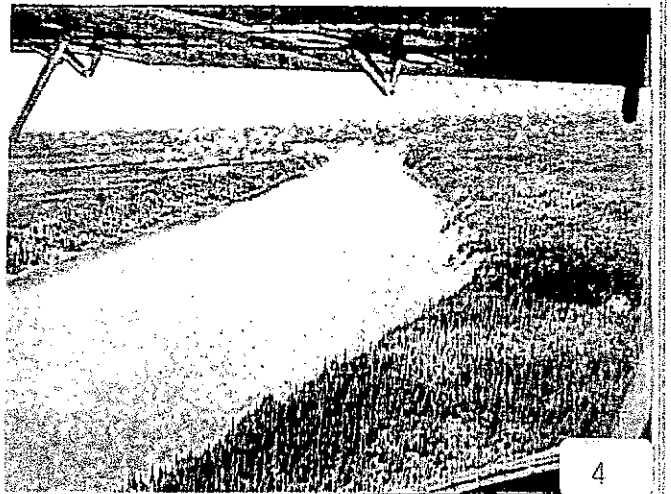
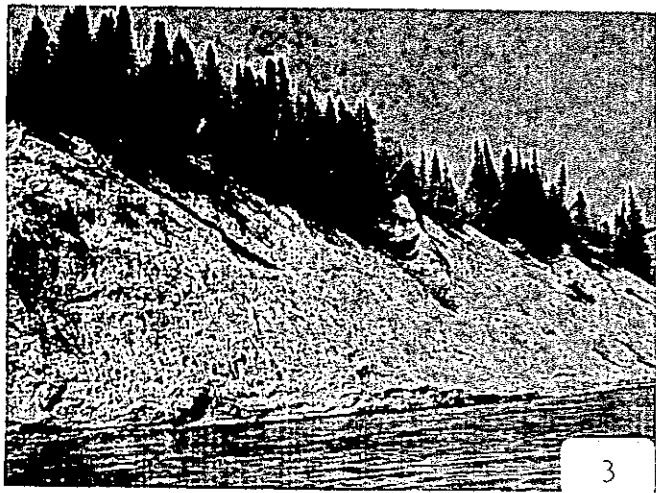
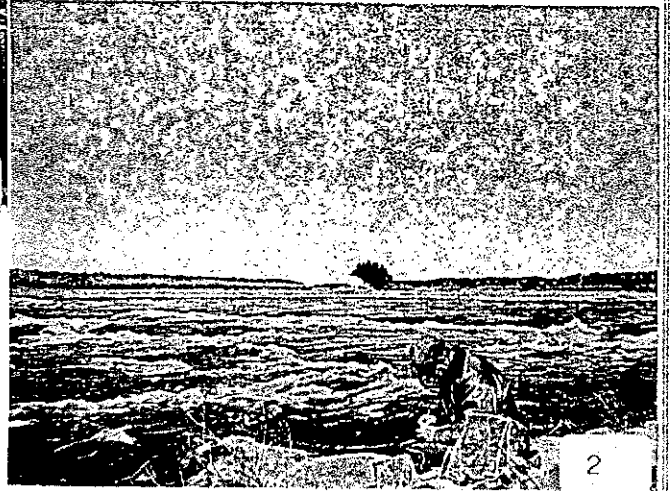


PHOTO 5

Outcrop of the lower and middle beds of the Severn River formation at SR 11. The hammer and pencil near Dr. Nelson's shoulder rest on the partially eroded porous middle member.

PHOTO 6

A close-up of part of Photo 5 showing the vuggy porosity of the middle beds of the Severn River formation.

PHOTO 7

Excellent outcrop of SR 13 exposes the lower and middle members of the Severn River formation. The outcrop colour is characteristic.

PHOTO 8

Beds of the upper member of the Severn River formation are well exposed at SR 16.

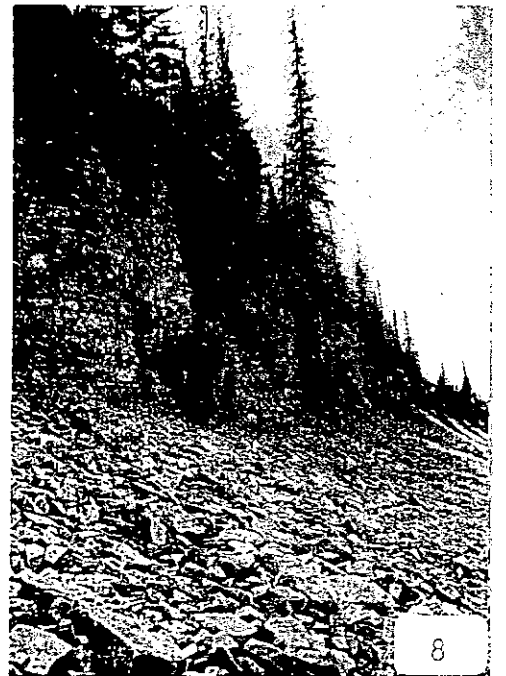
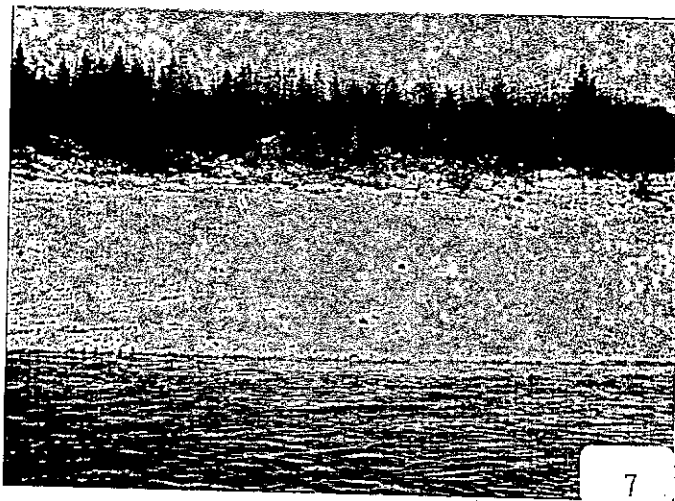
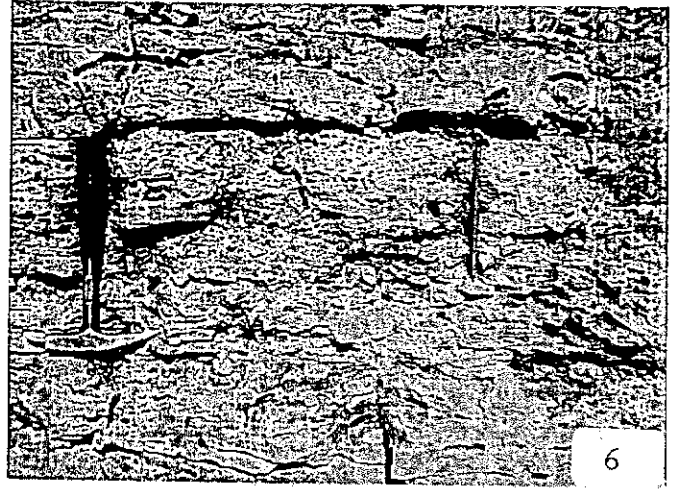


PHOTO 9

A biohermal mound at SR 15. Photo is taken from the upstream end of the mound, with the guides on top and Dr. Nelson at the far end.

PHOTO 10

Outcrop at SR 17 shows ten feet of well-bedded strata of the lower unit of the Ekwan River formation.

PHOTO 11

Nelson at SR 19, standing on the contact between the resistive lower beds and the middle regressive beds of the Ekwan River formation.

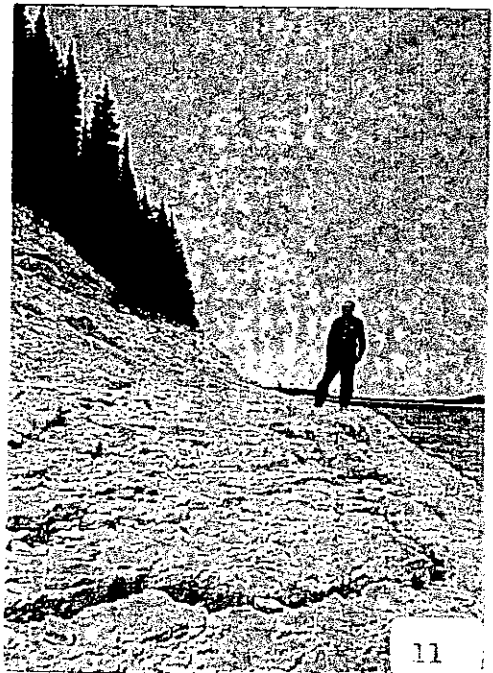
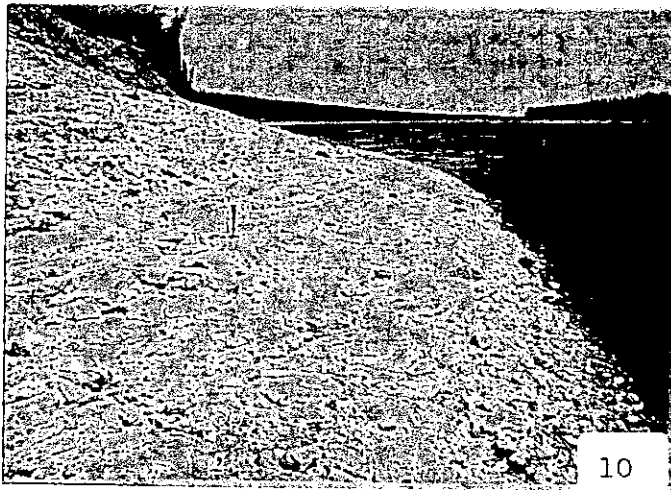
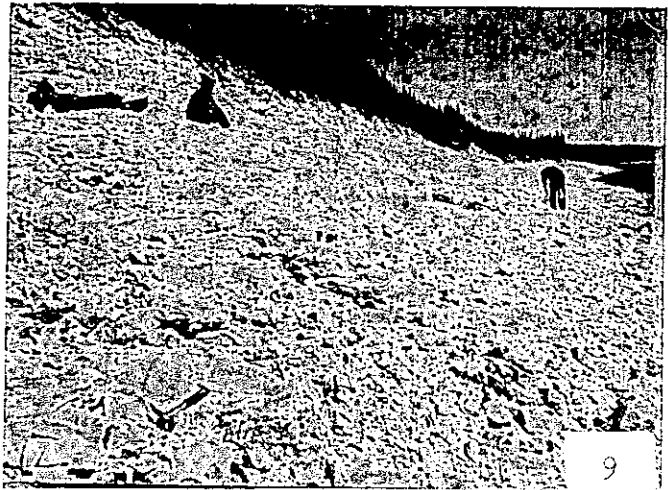


PHOTO 12

Offshore view of SR 20 illustrating the three-fold subdivision of the Ekwan River formation. The lower beds are partially concealed by the river and the upper beds are partially eroded.

PHOTO 13

A profile view of SR 20 showing the regressive nature of the middle beds and the resistive nature of the upper beds.

PHOTO 14

A profile clearly illustrating the very resistive nature of the lower member of the Ekwan River formation. This unit appears to control the geomorphology of the Limestone Rapids area.

PHOTO 15

A close-up of the upper beds of the Attawapiskat formation. The hammer head rests at the top of the transitional contact between the upper and middle beds.



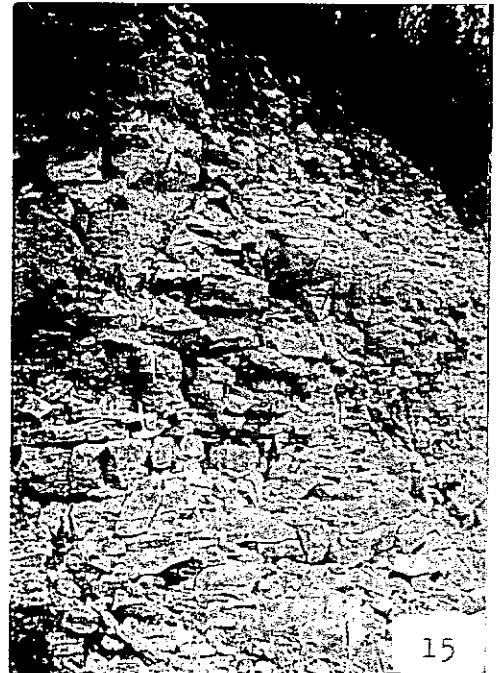
12



13



14



15

PHOTO 16

"Limestone Island" of Savage and Van Tuyl. This small barren rock island in mid-stream marks the furthest upstream occurrence of the Attawapiskat formation (just slightly upstream from SR 21).

PHOTO 17

A downstream view of SR 21, a low extensive outcrop of the reefal Attawapiskat formation.

PHOTO 18

At SR 22. The overlying beds of the Attawapiskat formation dip gently on the flank of a bioherm (not shown).

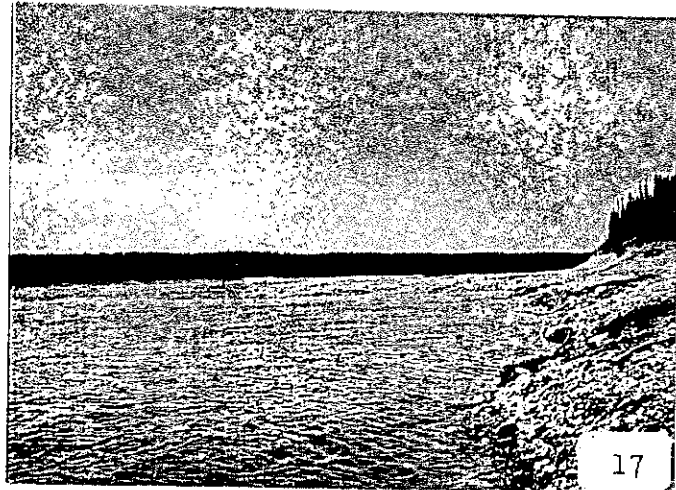
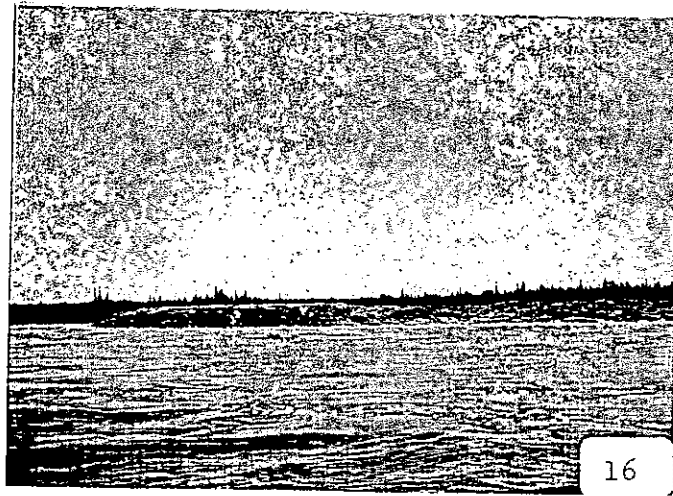


PHOTO 19

Aerial view of Long Portage Rapids and the north bank. Three geological stations are along the north shore: SR 24 at the break of the rapids (top left-hand side), SR 25 midway down the rapids, SR 26 near the foot of the rapids (at right-hand side). The outcropping formation is the Attawapiskat coral reef.

PHOTO 20

At SR 24. Close-up of a small coral head in the Attawapiskat formation. The hammer rests against the rounded coral head on a rudely bedded steeply dipping flank-bed, while the note book lies on rudely bedded nearly flat-lying inter-reef beds.

PHOTO 21

At SR 26. The overlying beds of the Attawapiskat formation well exposed as they break off a small biohermal mound.

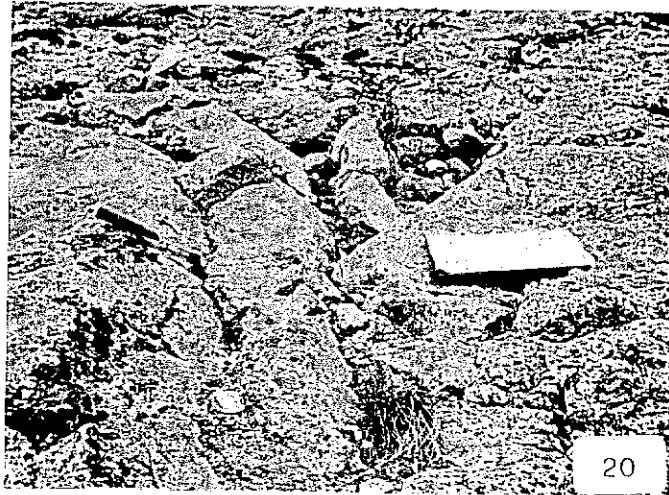
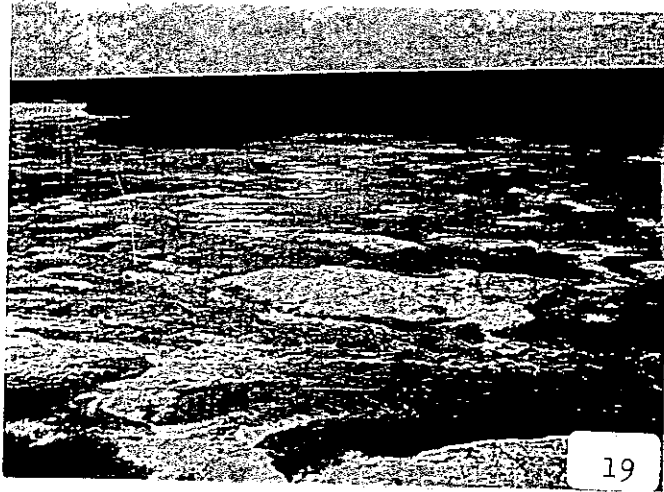


PHOTO 22

A composite photograph of the reef head and overlying beds at SR 25. In the foreground the more resistive reef head is worn smooth. The overlying beds are gently draped.

PHOTO 23

Again at SR 25. A view of the upstream side of the same feature as shown in Photo 22.

PHOTO 24

A close-up of the beds immediately overlying the reef head at SR 25.

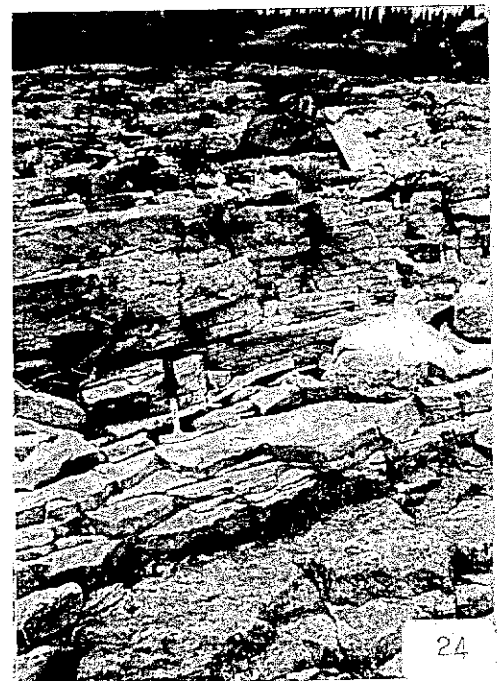
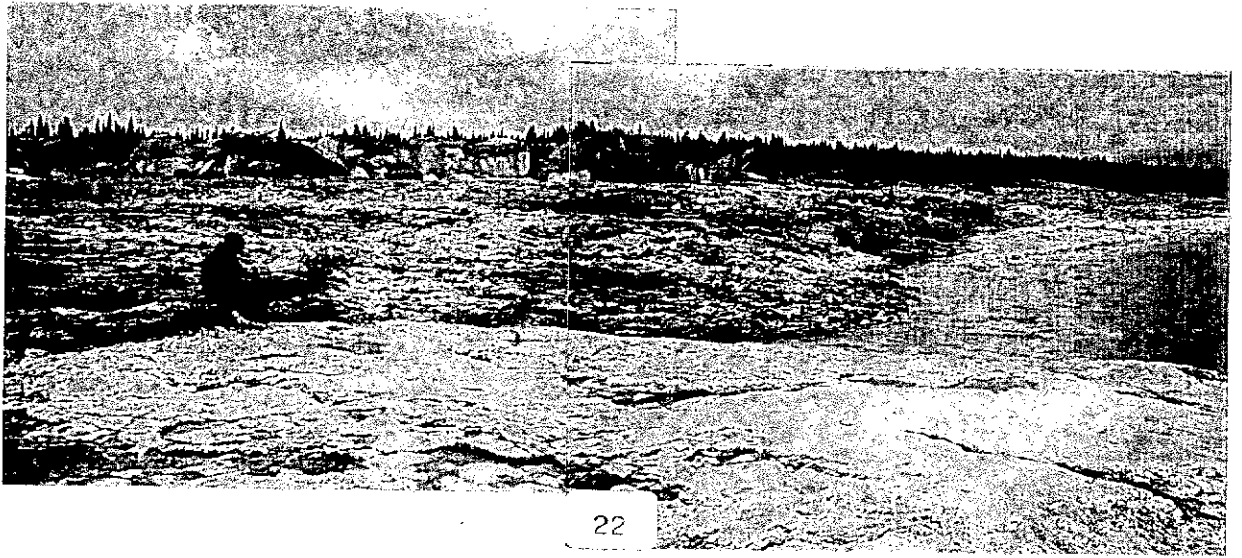


PHOTO 25

Aerial view of typical clay and till banks downstream from Long Portage Rapids.

PHOTO 26

General view of the lower Severn River in the braided area near Beaver River. Note vegetation.

PHOTO 27

Typical view of the coastal strip of barren ground along Hudson Bay. Note the Bay in background.

PHOTO 28

A cross-section view of an old beach ridge between the Severn and Pipovitan rivers. Note the salt water lagoon in the foreground and the arid conditions on the ridge.

