

## BEDROCK-AGGREGATE ASSESSMENT OF THE NORTHERN PENINSULA OF NEWFOUNDLAND

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### ABSTRACT

The 1991 field season consisted of an evaluation of bedrock-aggregate potential of the Northern Peninsula. This is a continuation of a reconnaissance aggregate assessment started in 1985, to determine the bedrock-aggregate potential of the different rock groups and formations in the region.

A total of 368 sites were visited and 233 samples collected. A petrographic number was assigned to each sample (based on preliminary petrographic examination). A total of 127 samples are considered to be of high quality, 34 samples are considered to be of marginal quality and 72 samples are considered to be of low quality based on their petrographic numbers.

Further analysis such as Los Angles Abrasion, Magnesium Sulphate Soundness and Alkali-Aggregate Reactivity testing are planned for selected samples.

### INTRODUCTION

During the 1991 field season, an evaluation of bedrock-aggregate potential from Deer Lake to St. Anthony on the Northern Peninsula (Figure 1), excluding Gros Morne National Park, was undertaken. This assessment was conducted in order to determine the quantity and quality of bedrock aggregate in the area for local industrial use, such as road construction and bridge repair or replacement. This inventory should help to eliminate the use of poor-quality aggregate such as alkali-reactive rock that reacts with cement to cause premature destruction of concrete, and friable rock that has been used as a form of rip-rap or armour stone, or in asphalt mix.

An additional objective was to locate potential sites for further detailed investigation in order to find a suitable replacement for sand, which is presently being transported from Deer Lake.

### FIELD WORK

Field work consisted of a detailed examination of all rock quarries, road-cuts and natural outcrops along all highways and side roads in the study region. Each site investigation entailed rock identification, representative sampling, the recording of all geological features present, and the determination of petrographic number, following the methods outlined by Bragg (1989).

At least one representative sample (1 kg) was collected from all quarry sites and selected samples were collected from road-cuts or natural outcrops if the rock types were consistent for these sites. However, between 2 and 5 samples were commonly taken if the site was larger than 400 m<sup>2</sup>, if there

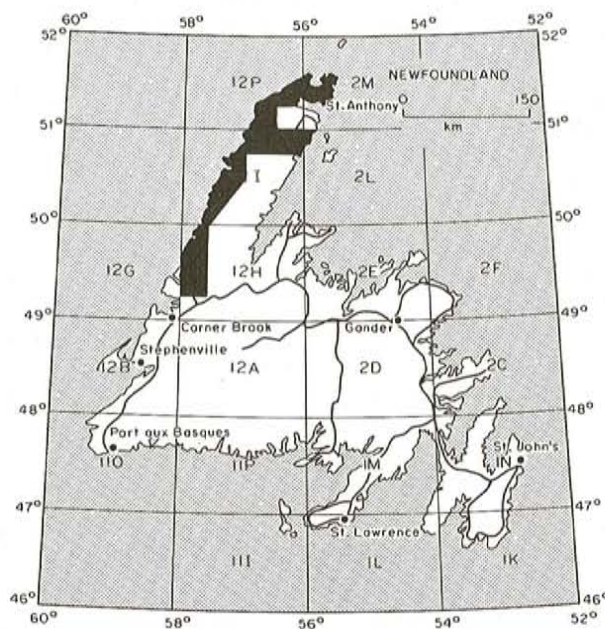


Figure 1. Location of study area.

were a number of different rock types present, if the degree of weathering varied, or if veining and alteration zones were observed. Much larger samples (50 kg) were taken at selected sites based on rock type, quantity and freshness of the sample for more extensive laboratory analyses.

### GENERAL GEOLOGY

The geology of the study area, which is briefly summarized below, has been studied in detail by Schuchert

and Dunbar (1934); Knight and James (1987); Chow (1985); Cumming (1983); Knight and Boyce (1987); Kindle and Whittington (1958); James and Stevens (1986); Klappa *et al.* (1980); Stenzel *et al.* (1990); Cooper (1937); Phair (1949); Williams and Smyth (1983); Stouge (1982) and Cooper (1937).

The St. George Group consists of six formations, but, only four formations, the Catoche (rubbly, blue-grey, bioturbated, micritic limestone), Boat Harbour (biomicritic and stromatolitic limestone and laminated dolostone), Watts Bight (dark-grey to black, cherty, crystalline dolomite having large stromatolite mounds), and the Southern Arm (bioturbated micritic limestone, minor dolostone and abundant black chert) are found in the field area. A total of 52 samples were collected from this group.

The Port Au Port Group consists of two formations; the Petit Jardin Formation comprises shale, limestone and dolostone, which Levesque (1977) divided into three informal members, and the March Point Formation, which consists of grey, bioturbated limestone and shale. A total of 53 samples were collected from the Port Au Port Group.

The Labrador Group consists of five formations, however, only three formations, the Hawke Bay Formation (white quartzite, minor shale, sandy dolomite, and oolitic limestone), the Forteau Formation (shale, calcareous siltstone, minor limestone, oolitic limestone and quartz sandstone), and the Bradore Formation (red to buff arkosic sandstone, minor conglomerate and hematitic sandstone) were sampled in the field area. A total of 36 samples were collected from this group.

The Cow Head Group, which is undivided, consists of interbedded limestone breccia, lime mudstone, calcarenite, red, green and purple shale and chert. Only 4 samples were collected from this group. The Table Head Group, which is undivided in the field area, consists of limestones, shales, ribbon limestones, breccias, sandstones and siltstones. A total of 15 samples were collected. The Goose Tickle Group, also undivided, consists of greywacke and slate; only 1 sample was collected from this group.

The Maiden Point Formation consists of coarse-grained greywacke, red and green slate, quartz-pebble conglomerate, massive basalt flows, mafic agglomerate, tuff, minor pillow lava and medium- to coarse-grained diorite and gabbro. A total of 43 samples were collected from this formation.

The Long Range Complex consists of quartzofeldspathic gneiss and schist, psammitic to pelitic schist, amphibolite and granite; a total of 3 samples were taken from this area.

The Goose Cove Formation consists of epidote, amphibolite and greenschist facies, metavolcanic rocks and minor metasedimentary rocks; psammite and pelite are at the base of the formation. A total of 11 samples were taken from this area.

The Epine Cadoret Formation consists of greywacke and brown-weathering slate, and minor pebble conglomerate. A total of 4 samples were collected from this formation.

The Northwest Arm Formation consists of black, green and grey shale with calcareous siltstone beds and limestone; only 1 sample was collected. Melange-type material consists of ultramafic and sandstone blocks in a black shale-slate matrix; a total of 10 samples were collected.

## RESULTS

Table 1 shows the initial assessment of the quality of the different rock groups—formations based on field observations and petrographic numbers. Petrographic factors (Canadian Standards Association, 1973) are assigned to different rock types with 1 (best), 3 (fair), 6 (poor) and (10 deleterious). The St. George, Port Au Port and Table Head groups and the Long Range Complex are all considered to be of high-quality aggregate potential and should be investigated further. The majority of samples (123) come from these units, and 99 samples were considered to be of high potential (P.N. 105 to 150) and 24 samples were considered to be of marginal quality (P.N. 160 to 245). There were no poor-quality samples taken from these areas. The Cow Head Group, Epine Cadoret Formation and Goose Tickle Group are considered to be of marginal quality, with sporadic occurrences of high-quality material. The Labrador Group, Maiden Point and Goose Cove formations range from high- to poor-quality aggregate (P.N. 110–625). The melange unit is considered to be of poor quality (P.N. 310–450) for construction aggregate.

**Table 1.** Petrographic numbers for selected areas on the Northern Peninsula (Deer Lake to St. Anthony)

Group/Formation	# of Samples	Petro. # Range	Petro. # <150	Petro. # >150
St. George Gp.	1	110	1	0
Catoche Fm.	11	115-325	10	1
Boat Harbour Fm.	15	110-155	15	0
Watts Bight Fm.	20	110-145	20	0
Southern Arm Fm.	5	110	1	0
Port au Port Gp.	0	0	0	0
Petit Jardin Fm.	33	125-175	23	10
March Point Fm.	20	110-185	13	7
Labrador Gp.	8	110-625	5	3
Hawke Bay Fm.	3	120-250	2	1
Forteau Fm.	23	115-455	17	6
Bradore Fm.	2	180	0	2
Cow Head Gp.	4	185-255	0	4
Table Head Gp.	15	110-165	13	2
Long Range Cpx.	3	120	3	0
Melange	10	310-450	0	10
Maiden Point Fm.	43	115-450	9	34
Epine Cadoret Fm.	4	185-210	0	4
Northwest Arm Fm.	1	110	1	0
Goose Tickle Gp.	1	355	0	1
Goose Cove Fm.	11	125-265	3	8

## SUMMARY

The carbonate rocks of the St. George, Port Au Port, and Table Head groups and the igneous rocks of the Long Range Complex have the highest potential for use as high-quality aggregate. The sedimentary rocks of the Labrador Group, Maiden Point Formation and Goose Cove Formation range from high to poor quality and further study or investigation such as Los Angeles Abrasion, Magnesium Sulphate Soundness and Alkali-Reactivity testing are recommended on these rocks. The melange unit, which is considered to be of poor quality (P.N. 310-450), should not be considered for aggregate use.

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