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Investigation of the mechanical properties of the bedrock within the Gulestø area, Bremanger.

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REPORT

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Title:
Investigation of the mechanical properties of the bedrock within the Gulestø area, Bremanger.

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Summary:

Geological mapping of the planned extraction area for hard-rock aggregates named Gulestø in Bremanger, has earlier been carried out at for EUROVIA. The bedrock of the area consists of fine-grained, Devonian sandstone with thin beds of siltstone/claystone.

Six samples for mechanical testing were collected in the second phase of the investigation. The results of the testing shows very little variation in the mechanical strength. The mechanical properties of the bedrock within the Gulestø prospect are evaluated to be interesting for exporting to the European market.

Keywords: Resource mapping	Hard-rock aggregate	Mineral
Los Angeles value	PSV	

CONTENTS

1. INTRODUCTION

NGU has earlier carry out geological mapping in the Gulestø area in co-operation with EUROVIA. This first phase was reported in NGU Report 2001.097.

The second phase which involves investigation of the mechanical properties of the bedrock within the Gulestø prospect was carried out in October 2002. The sampling of the mechanical samples was done by Leif Furuhaug and Rolf Lynum, both NGU. This report deal with results of the mechanical investigation.

Trondheim, 12th of November 2002
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2. CONCLUSION

The bedrock within the Gulestø area are considered to be homogeneous also concerning the mechanical properties. Both the Los Angeles values and the PSV testing shows very little variation in the mechanical strength. The mechanical properties of the bedrock within the Gulestø prospect are evaluated to be interesting for exporting to the European market.

3. LOCATION OF THE MECHANICAL SAMPLES

Two samples have earlier been taken by NGU (July 1999) north of the planed extraction area of Gulestø (RC-road-cuts sample, BS-blasted sample). The location and the number of the new samples was discussed and decided together with Stein Erik Hansen, the Directorate of Mining, to achieve a optimum location for the samples concerning both the geology and the position of the planed extraction area and the storage area. Figure 1 shows the location of all the samples taken within the area. Samples G 1-4 were all blasted out, while G 5-6 were taken along the road-cuts approximate 20 meters to each side for the location points.

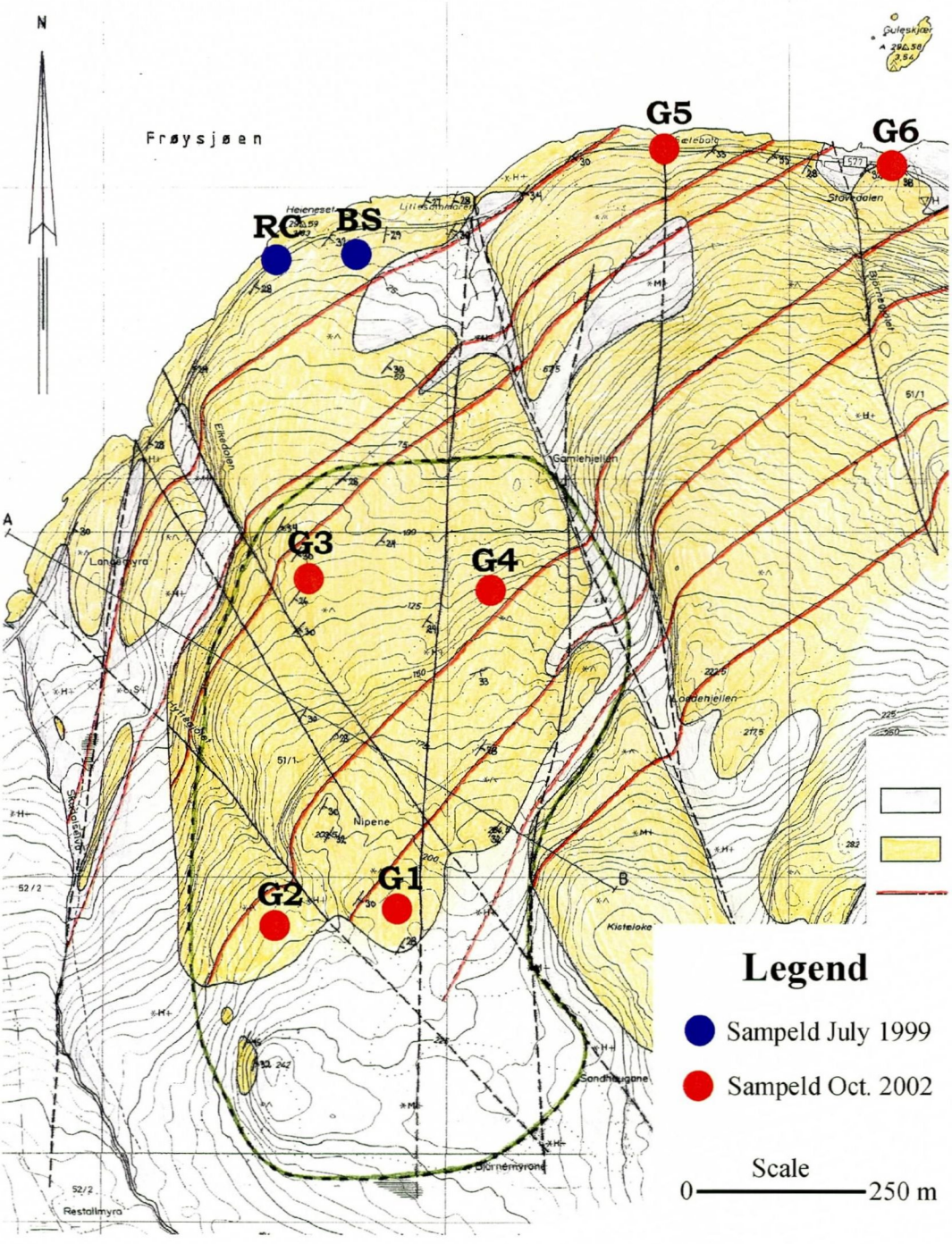

Figure 1. Location of the samples.

4. RESULTS OF THE TESTING

4.1 Mechanical properties

The results of the mechanical properties are given in table 1.

Table 1. Mechanical properties.

Sample	Lab. number	Los Angeles value	PSV*
RC	990046	12,4	57
BS	990047	12,9	58
G 1	2002118	11,6	57
G 2	2002119	11,5	59
G 3	2002120	11,5	59
G 4	2002121	11,4	57
G 5	2002122	10,2	59
G 6	2002123	10,8	59

* The PSV results are reported to the nearest whole number according to EN 1097-8.

The results of the testing indicate that the bedrock within the prospect shows very little variation in the mechanical strength. The homogeneous appearance of the rocks described in the NGU Report 2001.097, seems also to reflect on the mechanical properties.

The Los Angeles values can be classified as "very good" and more than adequate concerning the requirements for material for building proposes. In general the Los Angeles value ought to be less than 20 for exporting to the European market which are satisfied for all the samples.

There are a small but significant difference in the Los Angeles values for the samples. The samples taken in 1999 shows the highest values, while the new samples taken along the road-cuts are slightly lower. The new blasted samples shows values in an intermediate position. The reason for the differences are believed to bee an effect of weathering. The new road-cuts samples have been taken on a greater depth below the surface, while the blasted samples have been taken more near the surface. The weathering is more pronounced near the surface which can be an explanation for the different tests results for the Los Angeles values. The same explanation is not valid for the samples taken in 1999.

The results of the PSV testing are within the same range as earlier reported. The requirements to the PSV vary between the different European countries, but values > 55 are evaluated to be interesting for the European market.

4.2 Microscopic examination of thin-sections

It was produced a representative thin-sections for each mechanical test sample. A visual estimation of the mineral content are shown in table 2. All the samples are classified as sandstone. The thin-sections show that the grain size is fin grained (less than 1 mm).

Table 2. Mineral content.

Sample	Lab. number	Qt	Feld	Mus	Chl	Epi	Cal	Sph	Opa
G 1	2002118	54	14	8	10	6	6	2	x
G 2	2002119	64	4	8	8	8	4	4	x
G 3	2002120	48	8	28	4	8	4	x	x
G 4	2002121	68	8	16	x	4	4	x	x
G 5	2002122	50	8	14	20	8	x		x
G 6	2002123	59	4	20	1	8	4	4	x

Qt - quartz, Feld - feldspar, Mus - muscovite, Chl - chlorite, Epi - epidote, Cal - calsite, Sph - sphene, Opa - opaque.

5. REFERENCE

Gjelle, S. 2001: Geological mapping of a potential extraction area for hard-rock aggregates, Gulestø, Gremanger, Sogn og Fjordane. NGU Report 2001.097.