NGU Report 2000.141

Field notes for stream sediment collection
Bamble - Arendal

NGU
Norges geologiske undersøkelse
Geological Survey of Norway

Geological Survey of Norway
N-7441 Trondheim, Norway
Tel.: 47 73 90 40 00
Telefax 47 73 92 16 20

REPORT

Report no.: 2000.141 | ISSN 0800-3416 | Grading: Åpen

Title:
Field notes for stream sediment collection Bamble - Arendal

Authors:
Tor Erik Finne

Client:
Rio Tinto

County:
Telemark, Vest-Agder

Commune:

Map-sheet name (M=1:250.000)
Arendal, Skien

Map-sheet no. and -name (M=1:50.000)
1611-4 Arendal, 1612-1 Gjerstad, 1612-2 Tvedestrand, 1612-3 Nelaug, 1712-4 Kragerø, 1713-2 Porsgrunn, 1713-3 Kilebygd

Deposit name and grid-reference:

Number of pages: 8 Price (NOK): 30,-
Map enclosures:

Fieldwork carried out:	Date of report:	Project no.:	Person responsible:
03-07.10.2000	20.12.2000	284700	

Summary:

Stream sediment samples were collected at 80 sites located in the vicinity of known rutile deposits in the Bamble Region, Southern Norway. This report only provides information on sampling methodology and field observations, such as coordinates and site documentation.

Keywords: Geochemistry	Stream sediments	

CONTENTS

1. INTRODUCTION 4
2. METHODS AND RESULTS 4

FIGURES

Figure 1. Sieve used in the field for sieving stream sediments. 5
Figure 2. Map showing stream sediment sampling sites; October 2000. 6

APPENDIX

Appendix 1
Coordinates and field notes of stream sediments Bamble region October 2000.

1. INTRODUCTION.

As part of the cooperation between Rio Tinto and the Geological Survey of Norway (NGU) on rutile deposits in Norway, NGU was asked to carry out fieldwork for a feasibility study in the Bamble Region of Southern Norway. This study focuses on heavy mineral separation of stream sediments to locate rutile prospects. Based on Rio Tinto's experience in other topographical and climatic regimes, and NGU's present knowledge of rutile-bearing deposits in the area, the following outline for the field campaign was determined:

1. Sample 100 stream sediments along about ten profiles oriented NW-SE, i.e. perpendicular to the major strike orientation in the area.
2. Sampling method:

- 90 samples of 300 - 500 g medium to fine sand, collected from 3 - 5 sites along a distance of 10 m,
- 10 samples of 300 - 500 g medium to fine sand each collected from a single site, and
- One 3 - 5 kg stream sediment sample from one stream site (project standard).
- Sieve samples in the field <2mm.
- Sieve samples in the lab >0.045mm

Results are confidential in maximum 5 years from report date.

2. METHODS AND RESULTS.

During the fall of 2000, precipitation in the area of interest was extraordinary high, and flood warnings were issued several times. Fortunately, NGU was able to match staff availability with a relatively dry period, such that the sampling could be conducted in an efficient manner.

The fieldwork was carried out during the period 03-07.10.2000 by Rolf Chr. Lynum and Tor Erik Finne of NGU. Sampling adhered to the outline above, with some modifications. A total of 80 sites were visited. From each of these sites, a sample collected by "single scoop", i.e. sample material retrieved from one sediment deposit in the stream channel, was collected. Sometimes more than one deposit was used for collection, as the first was depleted, but sampling was kept within 2 – 3 m along the stream. At 10 of the 80 sites, a duplicate sample was collected, using the same "single scoop" approach. This duplicate sample was taken from the same 2 – 3 m of the stream, and the sample named <site>D. Also from the same 10 sites, a composite sample was collected from a minimum of 5 sediment deposits within a 30 – 50 m distance along the stream in upstream direction. These samples were named <site>C. From one site, a large sample was collected and stored in 4 unmarked large polyethylene bags. All samples were first collected in a small, white polyethylene bucket (and composite samples homogenized), before sieving on a 2 mm nylon cloth/aluminium frame sieve (see Figure 1). The sieve was rinsed in stream water between each sample.

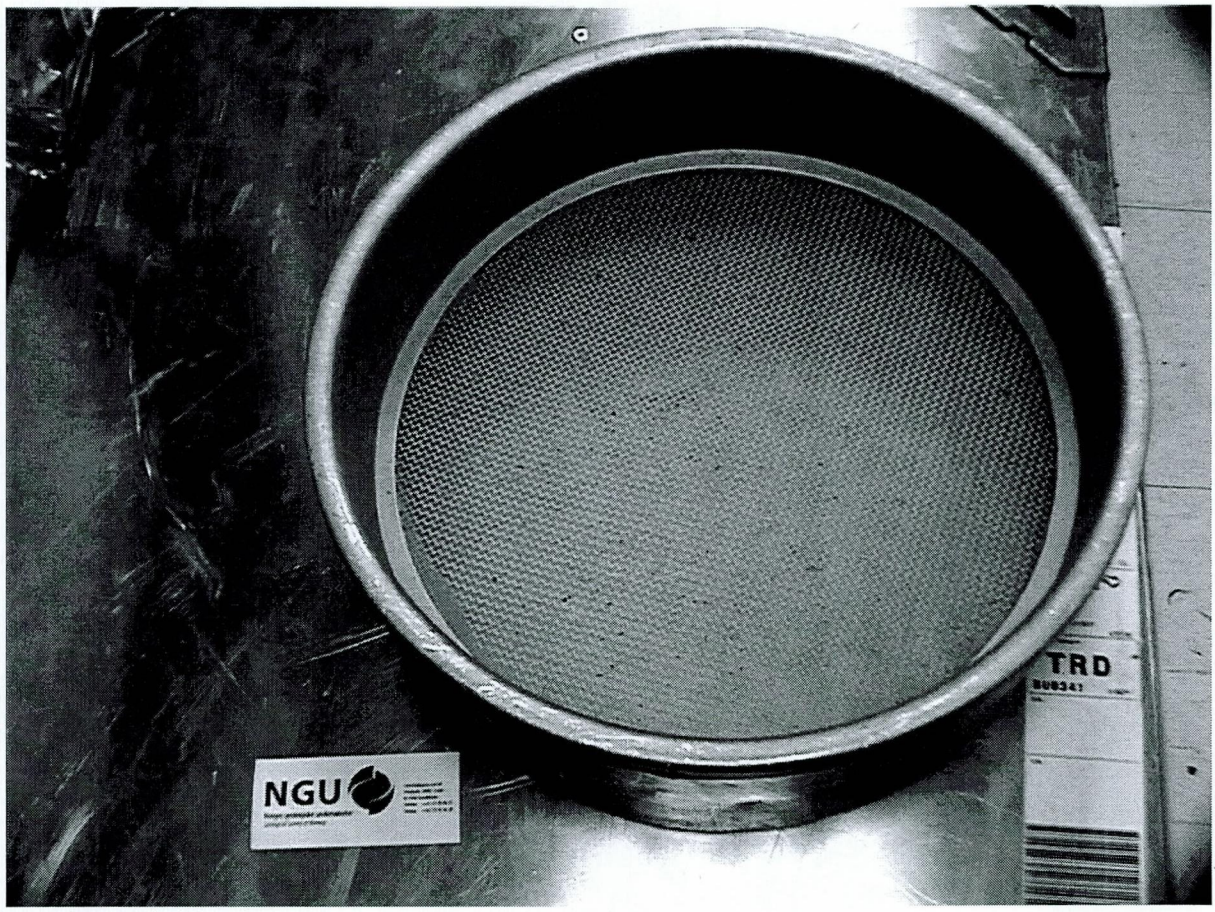

Figure 1. Sieve used in the field for sieving stream sediments.

All samples were sieved in the laboratory to discard the fine fraction. The polycarbonate frame/nylon sieve cloth (0.049mm) was rinsed in an ultrasound bath between different samples to prevent grains from cross contaminating samples. All samples were stored wet following collecting and sieving and including their shipping to Canada, leading to Fe-Mn (hydr)oxides precipitating on the polyethylene sample bag wall for some of the samples.

All sites were initially laid out on 1:50,000 maps taking into account the known occurrence of existing rutile-bearing deposits, as well as accessibility and stream and topographical considerations. In the field, GPS was used to record each site's coordinates, and all sites were photographed by digital camera. The fieldwork period coincided with moose hunting for some days/areas season, a fact that slowed down some of the work. However, this also provided a benefit that some of the closed, private forestry roads were open (to the public), thereby counteracting the fact that not all road bars are shown in the map.

The map in Figure 2 shows the sampling area and all the stream sediment sampling sites. All notes taken in the field are given in Appendix 1, and are enclosed as an Excel spreadsheet. All photos taken are enclosed on a subdirectory in jpg/EXIF format.

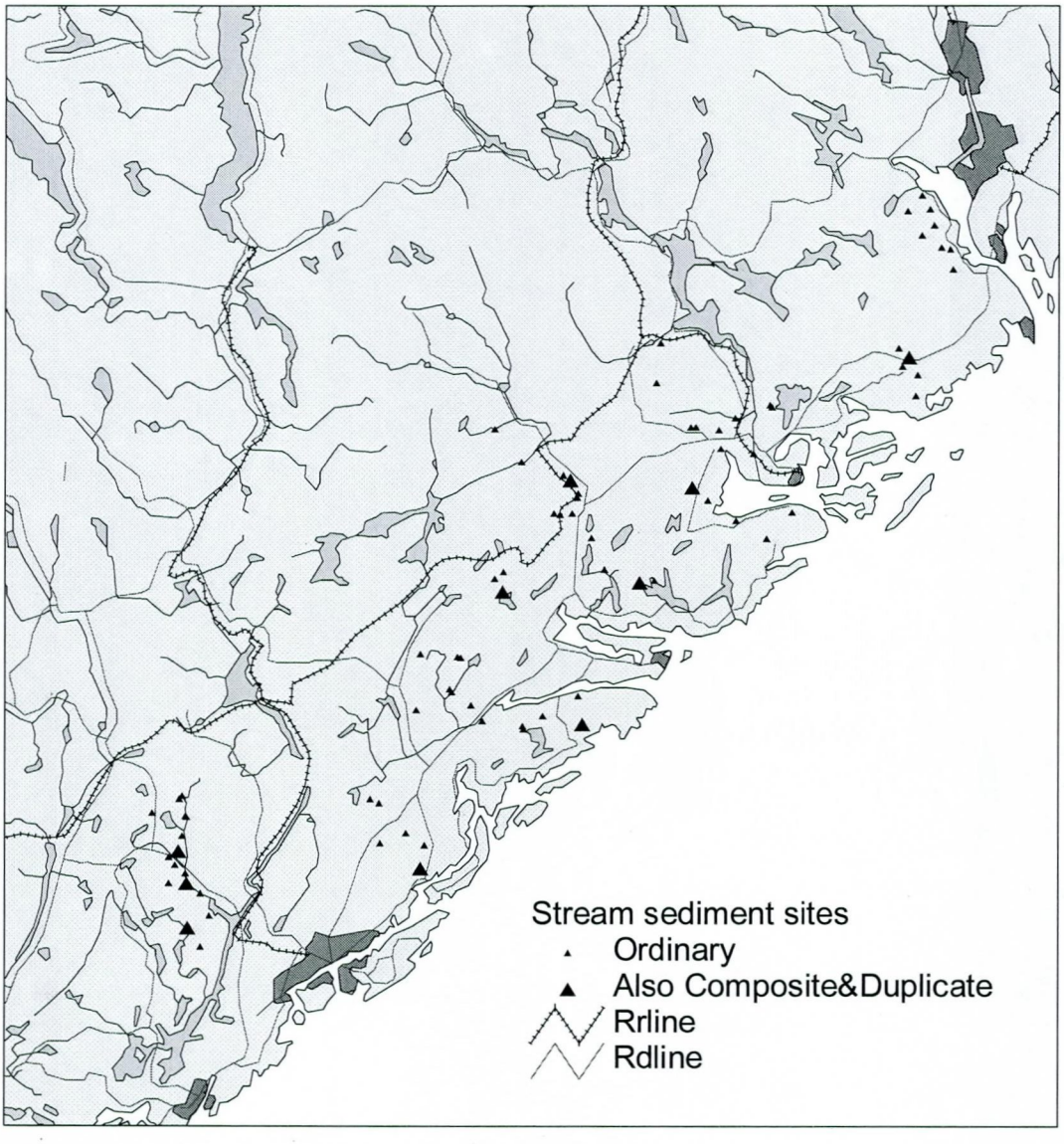

Figure 2. Map showing stream sediment sampling sites; October 2000.

Site	SampleCount	ddN	ddE	mE32wg84	mN32wgs84	MapNo	MapName	Width [dm]	Depth [cm]	Speed	Waterl evel	OIU	Sampler	Writer	Note	Photo
601	1	59,10079	9,56604	532346	6551357	1713-3	Kilebygd	15	5	M	N	I	RCL,TEF	TEF	Side bar	f:\data\bamble2000\foto\Site601
602	1	59,08697	9,54666	531248	6549809	1713-3	Kilebygd	13	10	H	N	I	RCL,TEF	TEF	Below boulder	f:\data\bamble2000\foto\Site602
603	1	59,08979	9,57996	533154	6550139	1713-3	Kilebygd	13	20	L	N	U	RCL,TEF	TEF	Eddy	f:\data\bamble2000\foto\Site603
604	1	59,07707	9,58722	533582	6548726	1713-3	Kilebygd	15	40	L	N	U	RCL,TEF	TEF	Midtstream below grass	f:\data\bamble2000\foto\Site604
605	1	59,06847	9,57116	532670	6547760	1713-3	Kilebygd	20	15	L	N	I	RCL,TEF	TEF	Side bar	f:\data\bamble2000\foto\Site605
606	1	59,06067	9,60070	534371	6546907	1713-2	Porsgrunn	15	35	L	N	U	RCL,TEF	TEF	Midstream bar	f:\data\bamble2000\foto\Site606
607	1	59,05938	9,61506	535196	6546771	1713-2	Porsgrunn	10	20	M	N	U	RCL,TEF	TEF	Eddy	f:\data\bamble2000\foto\Site607
608	1	59,04363	9,62188	535604	6545020	1713-2	Porsgrunn	30	35	M	N	U	RCL,TEF	TEF	Midstream bar	f:\data\bamble2000\foto\Site608
609	1	58,97904	9,54893	531477	6537791	1712-4		15	20	M	N	U	RCL,TEF	TEF	Midstream bar	f:\data\bamble2000\foto\Site609
610	3	58,97269	9,56651	532493	6537093	1712-4		10	15	M	N	U	RCL,TEF	TEF		f:\data\bamble2000\foto\Site610
611	1	58,96468	9,55845	532037	6536197	1712-4		15	40	M	N	U	RCL,TEF	TEF	Midstream bar	f:\data\bamble2000\foto\Site611
612	1	58,95961	9,58234	533416	6535644	1712-4		25	40	M	N	U	RCL,TEF	TEF	Midstream bar	f:\data\bamble2000\foto\Site612
613	1	58,94310	9,58050	533326	6533805	1712-4		20	15	M	N	U	RCL,TEF	TEF	Side bar, immediately below waterfall	f:\data\bamble2000\foto\Site613
614	1	58,90394	9,24521	514047	6529325	1712-4		35	70	L	H	U	RCL,TEF	TEF	Midstream among organic debris	f:\data\bamble2000\foto\Site614
615	1	58,90435	9,25253	514468	6529372	1712-4		15	25	M	N	U	RCL,TEF	TEF	Side, in grass & debris	f:\data\bamble2000\foto\Site615
616	1	58,82088	9,37394	521515	6520110	1712-4		20	35	M	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site616
617	1	58,84334	9,40860	523502	6522623	1712-4		12	10	M	N	U	RCL,TEF	TEF	Midstream bar	f:\data\bamble2000\foto\Site617
618	1	58,83350	9,32508	518687	6521501	1712-4		15	20	L	N	U	RCL,TEF	TEF	Midstream bar, debris	f:\data\bamble2000\foto\Site618
619	1	58,84705	9,28013	516085	6522998	1712-4		8	30	L	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site619
620	3	58,85654	9,25403	514575	6524049	1712-4		8	30	M	N	U	RCL,TEF	TEF	Midstream; D Side	f:\data\bamble2000\foto\Site620
621	1	58,90341	9,28828	516529	6529276	1712-4		35	15	H	N	U	RCL,TEF	TEF	Mid& side. Map wrong?	f:\data\bamble2000\foto\Site621
622	1	58,88881	9,29359	516842	6527651	1712-4		15	20	M	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site622
623	1	58,92478	9,36375	520864	6531677	1712-4		25	15	L	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site623
624	1	58,92643	9,36142	520729	6531860	1712-4		12	20	L	N	U	RCL,TEF	TEF	Side bar	f:\data\bamble2000\foto\Site624
625	1	58,91389	9,31114	517840	6530449	1712-4		65	15	M	N	I	RCL,TEF	TEF	Side behind rock	f:\data\bamble2000\foto\Site625
626	1	58,88673	9,34228	519649	6527433	1712-4		20	15	L	N	I	RCL,TEF	TEF	Side/behind debris	f:\data\bamble2000\foto\Site626
627	1	58,66651	9,06011	503406	6502862	1612-2	Tvedestrand	20	30	M	H	U	RCL,TEF	TEF	Side - bend	f:\data\bamble2000\foto\Site627
628	1	58,65727	9,03122	501731	6501832	1612-2	Tvedestrand	20	15	M	H	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site628
629	1	58,65505	9,03342	501858	6501585	1612-2	Tvedestrand	25	25	L	H	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site629
630	3	58,66301	9,11968	506862	6502477	1612-2	Tvedestrand	20	60	L	H	U	RCL,TEF	TEF	Midstream at confluence. New channel?	f:\data\bamble2000\foto\Site630
631	1	58,68480	9,10954	506270	6504903	1612-2	Tvedestrand	20	15	L	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site631
632	1	58,65807	8,97066	498217	6501921	1612-2	Tvedestrand	20	15	M	N	U	RCL,TEF	TEF	Midstream bar	f:\data\bamble2000\foto\Site632
633	3	58,77813	9,18785	510781	6515305	1612-1	Gjerstad	20	30	L	N	U	RCL,TEF	TEF	Midstream, side	f:\data\bamble2000\foto\Site633
634	1	58,78084	9,21032	512080	6515611	1612-1	Gjerstad	25	40	L	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site634
635	1	58,78566	9,13361	507643	6516136	1612-1	Gjerstad	20	25	M	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site635
636	1	58,80991	9,10877	506203	6518834	1612-1	Gjerstad	25	25	M	N	U	RCL,TEF	TEF	Side bank behind rock	f:\data\bamble2000\foto\Site636
637	1	58,88851	8,94781	496911	6527582	1612-1	Gjerstad	70	20	H	N	U	RCL,TEF	TEF	Side bank behind rock	f:\data\bamble2000\foto\Site637
638	1	58,86445	8,99394	499569	6524902	1612-1	Gjerstad	55	20	H	N	O	RCL,TEF	TEF	Side bank in humus/debris	f:\data\bamble2000\foto\Site638
639	1	58,85711	9,05761	503243	6524086	1612-1	Gjerstad	55	15	M	N	O	RCL,TEF	TEF	Side bank below abandoned bridge	f:\data\bamble2000\foto\Site639
640	3	58,85344	9,06932	503919	6523678	1612-1	Gjerstad	8	10	M	N	U	RCL,TEF	TEF	Comp: in small eddies; D&ordinary below 3m long concrete water pipe	f:\data\bamble2000\foto\Site640
641	1	58,84426	9,08261	504687	6522656	1612-1	Gjerstad	15	15	H	N	U	RCL,TEF	TEF	Side bank behind rock	f:\data\bamble2000\foto\Site641
642	1	58,84104	9,08261	504687	6522298	1612-1	Gjerstad	15	15	H	N	I	RCL,TEF	TEF	Side bank	f:\data\bamble2000\foto\Site642
643	1	58,82636	9,04916	502758	6520661	1612-1	Gjerstad	25	25	M	N	U	RCL,TEF	TEF	Behind big rock	f:\data\bamble2000\foto\Site643
644	1	58,82599	9,05874	503311	6520621	1612-1	Gjerstad	30	30	L	N	U	RCL,TEF	TEF	Immediately downstream of railway duct	f:\data\bamble2000\foto\Site644
645	1	58,82778	9,07732	504384	6520821	1612-1	Gjerstad	15	15	M	N	U	RCL,TEF	TEF	Midstream. Old tires dumped	f:\data\bamble2000\foto\Site645
646	1	58,96697	9,18784	510722	6536333	1612-1	Gjerstad	10	10	M	N	O	RCL,TEF	TEF	Side bank	f:\data\bamble2000\foto\Site646
647	1	58,93633	9,18762	510719	6532921	1612-1	Gjerstad	40	40	L	N	U	RCL,TEF	TEF	Midstream + side	f:\data\bamble2000\foto\Site647
648	1	58,77738	8,98179	498866	6515206	1612-1	Gjerstad	25	25	M	H	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site648
649	1	58,77115	8,96795	498065	6514513	1612-1	Gjerstad	20	20	M	H	U	RCL,TEF	TEF	Side bar inner turn	f:\data\bamble2000\foto\Site649
650	3	58,76116	8,98223	498891	6513400	1612-1	Gjerstad	25	25	H	H	U	RCL,TEF	TEF	D: 100m upstream	f:\data\bamble2000\foto\Site650
651	1	58,70677	8,92873	495789	6507346	1612-2	Tvedestrand	35	35	L	H	U	RCL,TEF	TEF	Below waterfall	f:\data\bamble2000\foto\Site651
652	1	58,70721	8,92514	495581	6507395	1612-2	Tvedestrand	55	55	M	H	U	RCL,TEF	TEF	Old beaver dam	f:\data\bamble2000\foto\Site652
653	1	58,70667	8,86855	492302	6507340	1612-2	Tvedestrand	35	35	M	H	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site653

NGU Report 2000.999
Appendix 1, page 1 of 2

Site	SampleCount	ddN	ddE	mE32wg84	mN32wgs84	MapNo	MapName	Width [dm]	Depth [cm]	Speed	Waterl evel	OIU	Sampler	Writer	Note	Photo
654	1	58,66251	8,87049	492405	6502423	1612-2	Tvedestrand	55	55	M	H	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site654
655	1	58,68091	8,91701	495107	6504467	1612-2	Tvedestrand	65	65	M	H	U	RCL,TEF	TEF	Midstream/side	f:\data\bamble2000\foto\Site655
656	1	58,67871	8,92100	495338	6504222	1612-2	Tvedestrand	45	45	H	H	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site656
657	1	58,67043	8,95145	497103	6503298	1612-2	Tvedestrand	35	35	H	H	I	RCL,TEF	TEF	Side bank, trapped in moss	f:\data\bamble2000\foto\Site657
658	1	58,56462	8,87244	492498	6491523	1612-2	Tvedestrand	25	25	M	H	U	RCL,TEF	TEF	Side bank	f:\data\bamble2000\foto\Site658
659	1	58,55673	8,90016	494109	6490641	1612-2	Tvedestrand	45	45	M	H	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site659
660	3	58,53797	8,89715	493931	6488553	1612-2	Tvedestrand	65	65	M	H	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site660
661	1	58,55468	8,83435	490279	6490421	1612-3	Nelaug	40	65	M	H	U	RCL,TEF	TEF	Side bank in sink	f:\data\bamble2000\foto\Site661
662	1	58,58904	8,81209	488994	6494250	1612-3	Nelaug	12	40	M	H	U	RCL,TEF	TEF	Midstream, down from 1 yr beaver dam	f:\data\bamble2000\foto\Site662
663	1	58,58625	8,82727	489876	6493937	1612-3	Nelaug	35	30	M	H	U	RCL,TEF	TEF	Mid/side bar with dead leaves	f:\data\bamble2000\foto\Site663
664	1	58,46085	8,58124	475484	6480037	1611-4	Arendal	20	30	L	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site664
665	1	58,48523	8,58990	476006	6482749	1611-4	Arendal	30	10	M	N	U	RCL,TEF	TEF	Braided stream	f:\data\bamble2000\foto\Site665
666	3	58,47459	8,55797	474136	6481576	1611-4	Arendal	15	10	M	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site666
667	1	58,47440	8,55457	473938	6481556	1611-4	Arendal	35	10	M	N	U	RCL,TEF	TEF	Side bank/behind rocks	f:\data\bamble2000\foto\Site667
668	1	58,50239	8,57308	475037	6484666	1612-3	Nelaug	40	10	H	N	U	RCL,TEF	TEF	Side, eddy. Steep, rocky	f:\data\bamble2000\foto\Site668
669	1	58,50784	8,52453	472212	6485291	1612-3	Nelaug	20	35	M	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site669
670	3	58,50924	8,54994	473694	6485437	1612-3	Nelaug	25	25	H	N	I	RCL,TEF	TEF	Side bar. D: from vegetation covered side. C: from varying environ	f:\data\bamble2000\foto\Site670
671	1	58,51668	8,54746	473555	6486266	1612-3	Nelaug	15	15	M	N	U	RCL,TEF	TEF	Behind rocks	f:\data\bamble2000\foto\Site671
672	1	58,52200	8,53182	472648	6486865	1612-3	Nelaug	8	20	H	N	U	RCL,TEF	TEF	In moss	f:\data\bamble2000\foto\Site672
673	1	58,52794	8,52070	472005	6487531	1612-3	Nelaug	12	25	H	N	U	RCL,TEF	TEF	Side bank in moss/behind rocks	f:\data\bamble2000\foto\Site673
674	1	58,56129	8,49108	470308	6491257	1612-3	Nelaug	10	10	L	N	I	RCL,TEF	TEF	Fresh sediment with organic debris; mid + side	f:\data\bamble2000\foto\Site674
675	1	58,57710	8,53216	472710	6493000	1612-3	Nelaug	20	30	H	N	I	RCL,TEF	TEF	Midstream + side	f:\data\bamble2000\foto\Site675
676	1	58,57458	8,52769	472449	6492721	1612-3	Nelaug	20	30	L	N	U	RCL,TEF	TEF	Midstream	f:\data\bamble2000\foto\Site676
677	1	58,56187	8,53911	473103	6491301	1612-3	Nelaug	20	15	H	N	I	RCL,TEF	TEF	In rocky bar	f:\data\bamble2000\foto\Site677
678	1	58,56076	8,54136	473233	6491177	1612-3	Nelaug	20	25	M	N	U	RCL,TEF	TEF	Side bar inner turn. STD 4kg here	f:\data\bamble2000\foto\Site678
679	1	58,54564	8,53693	472964	6489495	1612-3	Nelaug	10	10	M	N	U	RCL,TEF	TEF	Side bar and midstream	f:\data\bamble2000\foto\Site679
680	3	58,53340	8,53382	472773	6488134	1612-3	Nelaug	15	55	L	N	U	RCL,TEF	TEF	Midstream. D: midstream. C: midstream, 6 subsamples	f:\data\bamble2000\foto\Site680

NGU Report 2000.999
Appendix 1, page 1 of 2