

NGU rapport nr. 1228B

GEOKJEMISKE UNDERSØKELSER AV KALEDONSKKE VULKANITTER OG
INTRUSIVER I MIDT- OG SYD-NORGE: Del II - Analytiske data.

September 1971 - Oktober 1973

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Reconnaissance Geochemical Survey of Caledonian volcanics and intrusives in Central and South Norway: Part II-Analytical Data.

1. Introduction

This report is a compilation of data on Caledonian volcanics and intrusive rocks collected and analysed during the period Sept. 1971 to Oct. 1973. An interpretation of the data given herein will be presented in Report 1228 A "Reconnaissance Geochemical Survey of Caledonian Volcanics and intrusives in Central and South Norway: Part I-Interpretation" (in prep). Sample location coordinates only are given here, however, the locations are plotted on 1:50 000 topographic sheets which are placed on file in the NGU archives. A card deck with the analyses is stored with P.R. Graff.

Dr. David Roberts cooperated in the collection of samples in the Støren and Løkken areas, and berging. Reid Kvien assisted in the collection of samples in the Grong area in 1971. The analyses were performed in the analytical laboratories of NGU by G. Faye, M. Ødegård and P.R. Graff and this report is mainly a testament of their professional expertise and labours. G. Drolsum assisted in the writing of programs for presentation of the data.

2. Analytical techniques

Rock samples were collected with the aid of a 4 kg sledge hammer. Where possible a sample consisted of many rock fragments collected over a 5 - 10 m² area, however, this was often not practical due to the nature of the sampling surface and thus many samples consisted of several large fragments irregularly distributed over the outcrop surface. Each sample submitted for analysis consisted of approximately 1 kg of material after trimming to remove weathered and dirty surfaces. All samples were washed in hot running water.

The rock fragments were reduced to under 1 cm chip-sized fragments in a steel jaw crusher. A 150 - 250 gm portion of the sample was pulverized for approximately 1.5 minutes in an agate TEMA swing mill.

Na₂O, K₂O, P₂O₅ and loss on ignition were determined by P.R. Graff, Geologisk Avdeling, NGU.

Na₂O and K₂O were determined. Using a flamephotometer and P₂O₅ was determined spectrophotometrically. Loss on ignition was determined by

heating the sample powders in an electric furnace at 1100°C for two hours. A number of whole rock analyses were performed using the wet chemical methods described by (Langmyhr and Graff (1965).

The determinations of SiO_2 , Al_2O_3 , TiO_2 , MgO , CaO and MnO were made by G. Faye at the kjemisk afdeling of NGU using an ARL-quantometer with a tape-machine feed attachment. 0,25 gm of rock powder was thoroughly mixed with 3 gm of spectrographic pure flux (60% $\text{Li}_2\text{B}_4\text{O}_7$ + 30% SrB_4O_7 + 10% Cobalt oxide) and melted in a Pt-Au crucible at 1000°C for 5 minutes. The resulting glass was ground with 0,5 gm of powdered paper for 1 minute in a Cr-coated steel swing mill. The glass and paper mixture was analysed using synthetic rock standards in constructing analytical working curves. International rock standards were used to check the analytical working curves. An idea of the precision of the quantitative analyses can be obtained from Table 1 which is based on 7 repeat analyses of a greenstone sample over a period of 2 months (G. Faye, pers. comm.).

The trace elements Zr, Y, Sr, Rb, ZN, Cu, Ni, Cr and Ba were determined by G. Faye and M. Ødegård at the kjemisk afdeling, NGU. The samples and standards were homogenized by fusion with $\text{Li}_2\text{B}_4\text{O}_7$ in the ratio 2:1,

Synthetic standards were prepared from spec pure chemicals. After fusion the glasses were ground to a fine powder in an agate mill.

Net X-ray fluorescence intensities were measured in a Philips PW 1540 X-ray spectrophotograph with W-tube and LiF-crystal. Matrix corrections for secondary X-ray absorption were performed by means of a computer program.

The method was applied to 8 international reference samples and an accuracy of $\pm 10\%$ relative was obtained, except near the detection limit where the accuracy was understandably lower.

Table 1. Precision of 7 quantitative analyses of a greenstone lava (G. Faye, unpublished data).

	SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MgO	CaO
Mean	48,80	13,70	5,40	0,69	6,40	10,00
Std Dev	0,70	0,27	0,23	0,038	0,25	0,17
Coefficient of variation	1,40	2,0	4,3	5,5	3,9	1,7

Table 2. Comparison of quantometric and wet chemical analyses.

	288 ^x	288 ^{xx}	316 ^x	316 ^{xx}
SiO ₂	48,70	48,81	54,50	54,18
Al ₂ O ₃	15,10	16,64	13,00	14,90
Fe ₂ O ₃	8,70	8,13	11,50	10,68
TiO ₂	0,82	0,67	2,24	2,56
MgO	6,70	7,10	3,30	3,66
CaO	8,70	8,59	6,40	6,89

x Quantometric

xx Wet chemical

The sample description information is reported as:

71-27-1 Rock sample No.

R(874 227) R identifies the 1:50 000 map sheet (see map code on following page) (874 227) are North and East coordinates.

Basic Brief field description of sampled material

Trondheim 15/3/74 JH/ale

MAP CODE

G	Grong	1823 IV
HA	Harrand	1824 III
And	Andersjøen	1823 I
R	Røyrvik	1924 IV
T	Tunnsjøen	1924 III
Hud	Huddingsvatnet	1924 I
N	Namsskogan	1824 II
H	Hølonda	1521 II
S	Støren	1621 III
B	Bømlo	1114 II
A	Askvoll	1117 IV
D	Dale	1117 I
O	Onarheim	1214 IV
F	Fitar	1114 I
L	Løkken	1521 III

Samples collected in the Grong Area, 1971

71-6		Andesite, Skorovass mine
71-27-1	R(874 227)	Andesitic lava (?) associated with agglomerate
71-182	Hud(944 496)	Basic pillow lava
71-201	R(941 210)	Basic pillow lava
71-202	R(940 221)	Basic pillow lava
71-203	R(940 227)	Trondhjemite dike, fine grained
71-GjB	R(937 259)	Basic lava, footwall of Gjersvik ore body
71-GjC	R(937 258)	Basic lava, footwall of Gjersvik ore body, approx. 5% FeS ₂

Samples collected in the Grong Area, 1972

1122/40	G(507 845)	Basic lava, fine grained, massive
1122/46	And(514 937)	Silicic volcanic (tuff?). 20 cm thick horizon
1122/76	H(585 776)	Diabase, fine grained
1122/183	G(544 825)	Trondhjemitic, medium grained
1122/91A	HA(573 752)	Basic lava, massive
1122/192	HA(574 752)	Pillow lava
1122/195	HA(574 752)	Pillow lava
1122/306	R(927 207)	Silicic lava/tuff overlying agglomerate
1122/308	R(931 212)	Basic pillow lava
1122/309	R(930 212)	Basic pillow lava
1122/313	R(942 209)	Basic lava
1122/314	R(941 211)	Basic pillow lava
1122/316	R(939 212)	Basic lava, no pillow outlines observed
1122/317	R(939 213)	Andesitic agglomerate, large fragments in a fine grained chloritic matrix. 10 m east of sample 316
1122/318	R(939 213)	Basic lava. 50 m east of sample 316
1122/319	R(940 216)	Basic lava
1122/320	R(940 224)	Basic lava, with several pillow outlines
1122/324	R(937 256)	Basic lava, massive
1122/325	R(936 257)	Basic lava/dike, fine grained, massive.
1122/327	R(937 259)	Basic lava (?), mottled appearance, schistose margins
1122/328	R(918 243)	Silicic volcanic/intrusive, fine grained
1122/330	R(913 244)	Basic lava (?)
1122/331	R(911 244)	Tondhjemitic dike, fine grained
1122/335	T(729 372)	Pillow lava
1122/336	T(729 372)	Pillow lava
1122/337	T(726 371)	Pillow lava
1122/340	R(940 233)	Trondhjemitic, fine grained schistose
1122/341A	T(806 102)	Keratophyre, fine grained
1122 342	N(707 110)	Basic lava, massive
1122/343	Hud(925 475)	Greenstone, drill core from Joma Mine
1122/343A	Hud(925 475)	Greenstone, drill core from Joma Mine
1122/K ₁	R(827 177)	Keratophyre, fine grained collected
1122/K ₂	R(827 177)	by S. Kollung in 1972. Location given
1122/K ₃	R(827 177)	as 1600 m NNE of Holmmo Sr.

Samples collected in the Støren Area, 1972

1228/H1	S(938 651)	Basaltic lava: roadcut opposite bridge.
1228/H2	S(939 651)	Basaltic lava: fine grained. 20 m north of bridge.
1228/H3	S(940 650)	Basaltic lava: fine grained. 40 m north of bridge.
1228/H4	S(938 654)	Basaltic pillow lava: fine grained. Chip samples from east end of road cut.
1228/H5	S(938 653)	Basaltic pillow lava: fine grained. Chip samples from western part of road cut.
1228/H6	S(938 653)	Basaltic pillow lava: center of road cut.
1228/Trond	S(899 669)	Trondhjemite: medium grained intrusive. Quarry.
1228/Grøt 1	H(019 572)	Basaltic lava: fine to medium grained, overlain by tuffs.
1228/Grøt2	H(020 573)	Basaltic lava: fine grained.
1228/B1	H(047 600)	Basaltic lava: fine to medium grained.
1228/B2	H(047 600)	Basaltic lava: fine grained.
1228/B3	H(047 600)	Basaltic lava: fine grained several small quartz veins.
1228/B3A	H(047 600)	Basaltic lava: fine to medium grained.
1228/B4	H(054 605)	Basaltic pillow lava.
1228/B5	H(063 609)	Basaltic lava: medium grained.
1228/B6	H(072 610)	Basaltic lava?: medium grained.
1228/B7	H(073 611)	Basaltic lava: fine to medium grained.
1228/XXA	S(939 651)	Basaltic lava.
1228/A Haga	S(940 651)	Basaltic lava.
1228/B Haga	S(938 651)	Basaltic lava.
1228/Hø1 1	H(986 506)	Andesitic porphyry: Hølanda porphyrite blocks in limestone matrix.
1228/Hø1 2	H(986 507)	Andesitic porphyry: Hølanda porphyrite intrusive.

Samples collected in the Løkken area 1973

- 1228/Løk 1 L(010277) Basaltic lava: Chip sample over 20 m² area, fine grained, several arcuate shapes but no definitive pillow shapes.
- 1128/Løk 2 L(009279) Basaltic lava: medium grained.
- 1128/Løk 3 L(009279) Basaltic lava fine grained. 0,5 m acidic dyke cuts the outcrop.
- 1128/Løk 4 L(998280) Basaltic lava. fine to medium grained, many epidote veins.
- 1128/Løk 5 L(994286) Greenstone: medium grained, massive, probably an intrusive.
- 1128/Løk 6 L(991293) Basaltic lava; fine grained, calcite filled amygdales. 40 cm thick jasper vein cuts the outcrop.
- 1128/Løk 7 L(988294) Basaltic lava: fine to medium grained, massive
Trace of epidote.
- 1128/Løk 8 L(985 297) Basaltic lava: fine grained.
- 1128/Løk 9 L(988292) Greenstone: medium grained. (Syn-volcanic intrusive).
- 1128/Løk 10 L(979312) Pillow lava: fine grained, chips from several pillows.
- 1129//Løk 11 L(979312). Pillow lava: Rim, epidotized section and core of one pillow.
- 1128/Løk 11A (979312) Epidotized rim of pillow only.
- 1228/Løk 12 L(983 311) Dolerite: medium grained, massive.
- 1228/Løk 13 L(989 312) Dolerite: medium grained, massive.
- 1228+Løk 14 L(996 314) Basaltic lava: fine grained.
- 1228/Løk 15 L(996 314) Basaltic lava: medium grained.
- 1228+Løk 16 L(996 314) Basaltic lava: fine grained, epidotization producing 'agglomerate-like' structures.
- 1228/Løk 17 L(999 319) Dolerite: fine-medium grained.
- 1228/Løk 18 L(000 320) Dolerite: fine grained, 30 cm thick. Intrudes coarse grained gabbro.
- 1228/Løk 19 L(000 320) Gabbro: coarse grained.
- 1228/Løk 20 L(004 322) Gabbro: medium to coarse grained, contains an unidentified light brown mineral.
- 1228/Løk 21 L(005 332) Keratophyre dike?
- 1228/Løk 22 L(005 332) Basaltic lava: fine grained.

- 1228/Løk 23 L(006 336) Basaltic pillow lava.
- 1228/Løk 24 L(006 336) Basaltic lava: pillowed ?
- 1228/Løk 25 L(004 340) Basaltic pillow lava.
- 1228/Løk 26 L(000 354) Basaltic pillow lava: chip sample over 10 m.
- 1228/Løk 27 L(000 354) Dolerite: 2 m thick .
- 1228/Løk 28 L(000 354) Basaltic pillow lava: chip sample over 5 m.
- 1228/Løk 29 L(000 354) Basaltic pillow lava: chip sample over 10 m.
- 1228/Løk 30 L(009 358) Basaltic pillow lava: inverted.
- 1228/Løk 31 L(005 359) Basaltic lava: fine grained with fragmental tops.
- 1228/Løk 32 L(008 360) Basaltic pillow lava: amygdaloidal. Pillow lava at north end of roadcut, lavas at south end.
- 1228/Løk 33 L(010 360) Basaltic lava: amygdaloidal. Scattered blocks of chert throughout the outcrop. Chip sample over 25 sq. m.
- 1228/Løk 34 L(012 360) Basaltic lavas several pillow outlines. Amygdaloidal. Chip sample across 20 m section.
- 1228/Løk 35 L(015 362) Basaltic lava and pillow lava: 50 m section at south end of outcrop.
- 1228+Løk 36 L(015 362) Basaltic lava and pillow lava: 50 m section from center of outcrop.
- 1228+Løk 37 L(015 362) Basaltic lava and pillow lava: 50 m section north end of outcrop.
- 1228/Løk 38 H(017 363) Basaltic - andesitic agglomerate: coarse fragments >10 cm. Traces of tuffaceous material observed but not sampled.
- 1228+Løk 39 H(008 389) Basaltic lavas.
- 1228+Løk 40 H(017 407) Basaltic agglomerate: coarse fragments in a tuffaceous matrix. Sample taken from coarse fragments omitting interfragment matrix.
- 1228+Løk 41 H(017 407) Basaltic pillow lava.
- 1228/Løk 41C (017 407) Acidic volcanic Boulder: fragmental, a possible gas breccia, photos 73-1-8, 73-1-9, 73-1-10, 73-1-11.
- 1228/Løk 42 H(016 406) Basic lava: pillow lava in part contains pyroxene phenocrysts.
- 1228/Løk 43 H(017 406) Basic lava: scattered pillow forms. Contains feldspar phenocrysts.

- 1228/Løk 44 H(017 405) Basic lava:
- 1228/Løk 45 H(018 403) Basic lava: scattered pillow forms.
- 1228/Løk 46 H(018 402) Basaltic volcanic: probably lavas:
- 1228/Løk 47 H(019 400) Basaltic agglomerate: fragments > 10 cm.
- 1228/Løk 48 H(020 400) Silicic lava (?); small road cut.
- 1228/Løk 49 H(020 400) Andesitic lava:
- 1228/Løk 50 H(008 392) Basaltic agglomerate: fragments > 5 cm, sample may not be representative due to poor sampling surface.
- 1228/Løk 51 H(004 478) Andesitic porphyry: Hølanda porphyrite western lava.
- 1228/Løk 52 H(004 478) Andesitic porphyry: Hølanda porphyrite. Eastern lava, i. e. east of the agglomeratic porphyrite (blocks > 1 m) in the center of the road cut.
- 1228/Løk 53 H(965 510) Andesitic porphyry: Hølanda porphyrite (outcrop 20 m from the road) pale greenish colour distinct from that of samples 51 and 52.

Samples collected in Southwest Norway 1972.

Bømlo

1228/ 1	B(127 875)	Basaltic lava: feldspar phenocrysts. Interlayered with basic sediments.
1228/ 2	B(126 874)	Fold hinge in basic sediment. 30 m north-east of sample 1.
1228/ 3	B(126 875)	Acidic pyroclastic mixed with basic sediment, collected from excavation for a new house.
1228/ 4	B(134 863)	Acidic fragmental: mixed with basic tuffs.
1228/5	B(134 861)	Acidic tuff: probably mixed with basic tuff, chloritized quartz phenocrysts.
1228/ 6	B(127 847)	Acidic volcanic: intrusive into slate and siltstone.
1228/ 7	B(129 851)	Acidic volcanic: probably lava. Flow banded.
1228/ 8	B(138 862)	Basic agglomerate: scattered pillows.
1228/ 8A	B(138 862)	Acidic tuff: 25 cm thick layer.
1228/ 9A	B(141 859)	Greywacke: interbedded with chert.
1228/ 9B	B(141 859)	Greywacke: medium grained.
1228/ 9D	B(141 859)	Greywacke: tuffaceous?
1228/ 9E	B(141 859)	Clastic sediment: chert clasts in greywacke matrix with porphyroblastic (?) feldspar.
1228/10A	B(144 857)	Greywacke: with chert clasts.
1228/10B	B(144 857)	Basaltic lava: medium grained, several small (1 mm) epidote veinlets.
1228/10C	B(145 857)	Greywacke: epidotized feldspar.
1228/11	B(160 854)	Conglomerate:
1228/12	B(174 857)	Acidic volcanic: intrusive. Base of Borgefjellet mass.
1228/13	B(179 857)	Basaltic pillow lava:
1228+14	B(179 857)	Basaltic lava: Pillowed (?) 50 m east of sample 13.
1228/15	B(179 857)	Basaltic pillow lava 10 m east of sample 13.
1228/16	B(180 861)	Basic lava: pillowed (?)
1228/17	B(182 862)	Basic lava: pillowed (?)
1228/18	B(183 863)	Basic lava: Pillowed.
1228/19	B(181 859)	Basic lava: Pillowed.
1228/20	B(172 854)	Basic lava: epidotized.
1228/21	B(175 853)	Gabbro: medium grained.

1228/22	B(185 843)	Basic lava: fine grained, pyroxene phenocrysts.
1228/22A	B(185 843)	Basic agglomerate: 10 cm fragments.
1228/23	B(186 842)	Basic lava: 40 m west of sample 22.
1288/23A	B(186 842)	Basic agglomerate: 10 m west of sample 23.
1228/24	B(187 842)	Basic lava: feldspar phenocrysts. 90 m west of sample 23.
1228/25	B(189 841)	Basic lava: fine grained.
1228/26	B(190 840)	Basic lava: fine grained.
1228/27	B(194 842)	Basic lava:
1228+28	B(205 847)	Basic lava:
1228/28A	B(205 847)	Basic agglomerate: 2, 5 to 16 cm fragments.
1228/28B	B(205 848)	Basic lava: pyroxene phenocrysts.
1228/29	B(212 843)	Basic lava: pyroxene phenocrysts.
1228/29A	B(212 843)	Basic lava.
1228/30	B(211 843)	Basic lava: amygdaloidal.
1228/31	B(211 843)	Basic lava: amygdaloidal. Pyroxene phenocrysts.
1228/32	B(214 844)	Basic lava: amygdaloidal. Pyroxene phenocrysts.
1228/32A	B(214 844)	Basic lava: amygdaloidal.
1228/33	B(221 850)	Tuffaceous sediments: fine grained.
1228/34	B(227 854)	Conglomerate:
1228/35	B(227 854)	Silicic lava: epidotized feldspar phenocrysts.
1228/36	B(227 854)	Silicic tuff:
1228/37	B(228 854)	Silicic lava:
1228/38	B(227 854)	Clastic: tectonized layer underlying conglomerate
1228/39	B(229 853)	Silicic lava: feldspar phenocrysts.
1228/40	B(231 853)	Silicic lava (?): locally tuffaceous.
1228/40A	B(231 853)	Silicic tuff: ignimbritic:
1228/41	B(232 852)	Silicic lava: flow breccia.
1228/42	B(288 883)	Basic lava:
1228/43	B(267 851)	Quartz keratophyre: 1 - 3 mm phenocrysts of quartz, (intrusive?).
1228/44	B(267 851)	Dolerite dike: intrudes keratophyre.
1228/45	B(267 851)	Silicic volcanic: intrusive, chloritized.
1228/46	B(260 848)	Quartz keratophyre:
1228/47	B(254 846)	Quartz gabbro: intrudes keratophyre.
1228/48	B(248 850)	Serpentine: tectonic breccia.
1228/49	B(251 862)	Basic lava:
1228/50	B(253 861)	Basic tuff.

1228/51	B(286 870)	Basic dike: 30 cm thick, intruded into keratophyre.
1228/52	B(286 870)	Keratophyre: aphanitic.
1228/53	B(275 874)	Basic dike: intruded into keratophyre.
1228/54	B(273 875)	Keratophyre:
1228/55	B(273 876)	Acidic volcanic: aphanitic, probably intrusive.
1228/56	B(272 876)	Basic lava.
1228/56A	B(272 876)	Basic lava.
1228/57ADCD	B(264 882)	Basic lava: 4 grab samples over 50 m section.
1228/58A	B(280 884)	Basic lava:
1228/58B	B(280 884)	Silicic volcanic: contacts not exposed.
1228/59A	B(283 883)	10 cm pyrite vein.
1228/59B	B(283 883)	Basic lava.
1228/59C	B(283 883)	Dolerite dike: 2 m thick.
1228/59D	B(283 883)	Dolerite dike: 1 m thick.
1228/60	B(286 884)	Dolerite dike: plagioclase phenocrysts.
1228/61	B(294 889)	Dolerite dike:
1228/62	F(308 907)	Silicic volcanic:
1228/63A	B(295 901)	Basic lava:
1228/63B	B(295 901)	Basic lava:
1228/64	F(296 904)	Basic lava:
1228/65	B(294 899)	Doleritic intrusive: blocky, ellipsoidal structures have pillow-like outlines but do not have chilled margins.
1228/66	((294 897)	Basic volcanic: probably intrusive.
1228/67	F(313 887)	Trondhjemite:
1228/68	F(322 876)	Basic lava.
1228/69	F(353 868)	Quartz-biotite gneiss.
1228/69A	F(353 868)	Sediment: fine to medium grained lense in biotite gneiss.
1228/69B	F(353 872)	Quartz - biotite gneiss.
1228/70	F(341 851)	Granodiorite: 2 - mica pre-tectonic mass.
1228/71	F(337 854)	Dolerite:
1228/72	F(329 853)	Sediment: distinct layering.
1228/73	F(325 861)	Basic volcanic: intrusive.
1228/74	F(324 864)	Dolerite: fine grained.
1228/75	F(317 883)	Basic volcanic: lava (?), fine grained, massive.

1228/76	B(286 904)	Basic lava: 1 m thick flow.
76A	B(286 904)	
1228/77	B(287 105)	Basic lava: amygdaloidal, 10 m east of 76.
1228/78	B(285 905)	Basic lava: amygdaloidal, , road cut 30 m from 77,
1228/79	B(282 905)	Basic lava: amygdaloidal.
1228/80	B(281 906)	Basic lava:
1228/81	B(279 906)	Basic lava:
1228/82	B(277 907)	Silicic lava/tuff
1228/83	B(287 906)	Silicic lava: aphanitic.
1228/84	B(275 907)	Conglomerate: ultramafic pebble.
1228/85	B(not located)	Silicic intrusive: intrudes basic schists.
1228/86	F(307 932)	Gabbro:
1228/87	F(301 932)	Basic lava:

Stord.

1228/88	F(347 972)	Dolerite: fine grained.
1228/89	F(339 965)	Silicic, massive rock: shown on maps as a conglomerate?
1228/90	F(335 965)	Silicic lava.
1228/91	O(346 060)	Garnetiferous mica schist and gneiss.
1228/92ABC	O(434 054)	Basic lava: schistose.
1228/93	O(434 054)	Silicic tuffs:
1228/94	O(439 053)	Basic tuffs: chloritized, layered.
1228/95	O(445 052)	Basic lava.
1228/96	O(463 045)	Granodiorite: medium grained.
1228/97	O(473 037)	Gabbro medium grained.

Stavfjord. (Stavenes)

1228/98	D(197 934)	Pillow lava: chips of pillows over 10 m ² area.
1228/99	D(197 934)	Pillow lava: center of pillow 4 x 1 m.
1228/100	D(195 935)	Pillow lava:
1228/101	D(193 934)	Basaltic tuff:
1228/103	A(193 914)	Dolerite dike: fine grained.
1228/104	A(192 911)	Basaltic lava: interlayered with tuffs.

1228/105	A(177 888)	Basaltic lava:
1228/106	A(177 887)	Basic lava/intrusive ?:
1228/107	A(179 886)	Basaltic lava: center of flow, enclosed in hyaloclastite.
1228/108	A(180 888)	Basaltic pillow lava:
1228/109	A(181 889)	Basaltic pillow lava:
1228/110	A(183 894)	Basaltic lava: scattered pillow forms.
1228/111	A(183 902)	Basaltic tuff:
1228/112	A(179 901)	Basaltic lava:
1228/113	A(176 902)	Basaltic lava: feldspar phenocrysts.
1228/114	A(176 907)	Basaltic lava: feldspar phenocrysts.
1228/115	A(176 906)	Basaltic lava: feldspar phenocrysts. 20 m west of sample 114.
1228/116	A(175 908)	Basaltic tuff: dark green, laminated, schistose, pyritic.
1228/117	A(173 908)	Doleritic dike:
1228/118	A(173 910)	Basaltic lava:
1228/119	A(171 910)	Basic volcanic: probably intrusive, medium grained, with several fine grained lenses.
1228/120	A(169 912)	Conglomerate: polymict.
1228/121	D(197 051)	Sediment: clastic quartz unit.
1228/122	D(194 991)	Basaltic lava: poorly developed pillow outlines.
1228/123	D(194 991)	Basic tuff: underlies lava of sample 122.
1228/124	D(194 989)	Basaltic lava: schistose.
1228/125	D(190 985)	Basaltic lava:

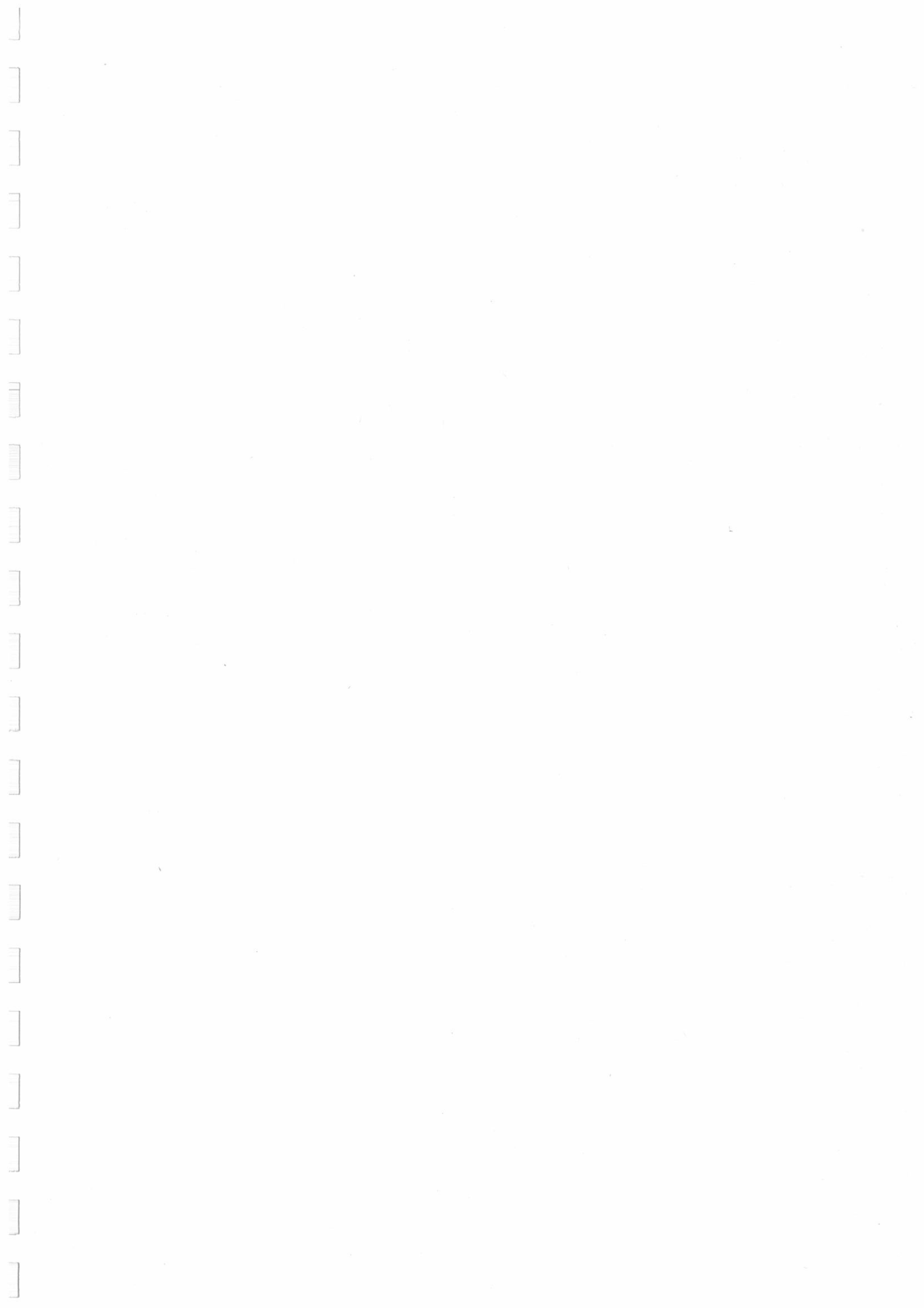


TABLE 4.1-2 GRONG

	130	131	132	133	134	135	136	137	138
	1122/40	1122/76	1122/91A	1122/192	1122/195	1122/308	1122/309	1122/313	1122/314
SiO2	51.50	46.20	48.00	46.60	50.70	46.20	45.00	51.20	50.50
AL2O3	15.60	19.10	15.40	16.00	15.10	14.90	15.00	15.20	15.60
FE2O3	12.80	11.80	10.20	12.80	10.60	11.60	12.00	14.20	15.60
TiO2	1.06	1.80	1.38	2.08	1.70	1.01	1.00	1.52	1.42
MGO	5.40	5.30	10.70	7.30	7.40	7.80	9.20	3.30	5.20
CAO	7.70	9.70	10.40	10.40	8.90	6.70	9.20	6.60	2.80
NA2O	4.65	4.15	2.70	3.45	3.55	3.25	3.05	5.25	6.25
K2O	.23	.33	.32	.28	.34	.12	.44	.08	.10
MNO	.25	.22	.18	.20	.18	.22	.20	.30	.23
P2O5	.04	.16	.05	.09	.09	.06	.05	.13	.06
L.O.I.	1.01	2.38	1.52	1.09	.91	7.38	3.83	2.01	2.61
TOTAL	100.24	101.14	100.85	100.29	99.47	99.24	98.97	99.79	100.37

PPM

ZR	63	203	80	145	119	44	53	87	61
Y	27	23	26	39	38	17	14	35	21
SR	98	1026	173	215	158	140	177	106	57
RB	0	0	2	0	3	0	6	0	0
ZN	114	102	75	90	80	120	88	126	130
CU	31	3	16	74	79	52	58	38	43
NI	13	10	174	183	118	142	125	6	7
CR	27	28	381	374	303	516	436	16	29
BA	28	222	14	28	25	6	47	29	-27

TABLE 4.-3 GRONG

	139	140	141	142	143	144	145	146	147
	1122/316	1122/317	1122/318	1122/319	1122/320	1122/324	1122/325	1122/327	1122/330
SI02	49.80	55.80	49.70	50.40	50.10	55.20	58.40	47.00	72.60
AL203	14.90	13.70	15.00	14.30	15.20	14.20	13.60	15.80	12.00
FE203	14.00	14.30	15.50	13.10	14.90	13.40	11.20	10.90	6.10
TI02	1.68	1.53	1.33	1.19	1.37	1.10	1.34	.96	.66
MGO	3.50	4.80	4.90	3.90	4.70	3.90	2.40	7.80	1.30
CAO	5.30	3.40	4.80	6.50	4.30	5.70	3.80	10.10	1.10
NA2O	5.65	3.55	4.80	5.30	5.90	4.95	5.50	2.85	6.05
K2O	.09	.27	.09	.30	.26	.39	.29	.46	.08
MNO	.28	.24	.24	.22	.25	.26	.36	.19	.11
P2O5	.13	.06	.06	.06	.06	.05	.15	.04	.03
L.O.I.	4.24	3.38	5.42	6.10	1.89	2.34	3.28	4.52	1.71
TOTAL	99.57	101.03	101.84	101.37	98.93	101.49	100.32	100.62	101.74

PPM

ZR	109	91	66	56	63	42	78	41	123
Y	36	25	23	19	25	16	39	15	18
SR	55	145	39	65	60	191	122	408	58
RB	2	0	0	0	1	4	0	4	2
ZN	133	128	165	91	123	101	121	73	121
CU	2	26	22	31	18	32	99	73	-10
NI	6	8	8	4	12	10	-2	71	10
CR	16	29	23	22	27	27	5	275	3
BA	19	118	51	55	82	115	118	54	19

TABLE 4-4 GRONG

	148	149	150	252	253	254	270	271	272
	1122/342	1122/343	1122/343A	1122/K1	1122/K2	1122/K3	1122/321	1122/46	1122/83
SI02	48.30	46.20	46.70	77.00	78.70	78.80	75.40	80.30	64.70
AL203	13.80	15.50	14.80	11.40	10.80	11.10	12.10	11.10	15.40
FE203	13.70	11.70	11.80	2.40	2.00	2.10	2.60	2.30	2.70
TI02	1.55	1.70	1.64	.40	.38	.38	.60	.48	.80
MGO	5.50	8.10	8.30	.40	.30	.20	.20	.20	1.10
CAO	7.30	11.50	11.90	.50	.50	.50	.50	.90	3.90
NA2O	5.45	2.55	2.30	5.90	6.00	6.05	6.60	5.90	6.25
K2O	.24	.46	.44	.25	.20	.21	.45	.16	1.54
MNO	.18	.19	.17	.02	.02	.02	.03	.00	.05
P2O5	.07	.07	.07	.04	.01	.01	.04	.06	.04
L.O.I.	4.30	2.79	2.79	.44	.47	.45	.78	.41	1.02
TOTAL	100.39	100.76	100.91	98.75	99.38	99.82	99.30	101.81	97.50

PPM

ZR	86	143	140	162	166	165	154	130	189
Y	30	64.25	25	41	37	43	45	30	10
SR	87	364	309	176	98	99	74	117	1227
RB	2	1	1	2	2	2	2	0	16
ZN	82	84	76	16	16	15	10	32	49
CU	11	65	96	7	0	1	-16	-17	-7
NI	13	130	135	-1	-3	-5	-3	-1	7
CR	45	345	332	-2	-1	-1	-2	1	15
BA	71	6	40	118	158	139	149	2	818

TABLE 4.1-5 GRONG

	273	274	284	285	332	333	334	335
	1122/340	1122/341A	1122/306	1122/331	1122/328	1122/335	1122/336	1122/337
SI02	74.60	76.90	73.40	74.80	76.20	45.40	42.90	43.40
AL203	12.00	11.20	12.00	10.90	11.30	15.30	15.90	14.50
FE203	2.30	3.80	4.70	5.20	4.50	10.30	10.80	10.50
TI02	.56	.33	.38	.42	.52	2.14	2.12	1.92
MGO	.50	.60	1.80	.60	.90	8.20	7.80	8.10
CAO	1.70	1.00	2.70	1.20	.90	8.20	11.00	11.10
NA2O	1.60	5.65	2.40	5.60	6.05	3.05	2.75	3.35
K2O	3.70	.10	1.19	.22	.23	1.59	.98	.69
MNO	.04	.04	.06	.07	.08	.18	.17	.17
P2O5	.04	.02	.03	.03	.04	.18	.20	.20
L.O.I.	2.68	.48	1.78	.09	1.12	5.76	6.58	7.49
TOTAL	99.72	100.12	100.44	99.13	101.84	100.30	101.20	101.42

PPM

ZR	147	165	168	143	143	187	199	186
Y	28	49	43	58	46	24	28	22
SR	34	110	232	84	46	186	276	217
RB	48	0	21	0	5	16	11	4
ZN	26	130	156	45	76	74	76	81
CU	122	-4	-9	10	-12	0	32	22
NI	-2	0	-2	1	-2	152	156	146
CR	0	-3	-1	1	0	391	396	375
BA	578	-1	228	82	48	246	70	91

TABLE 4.2-1 STØREN

	163	164	165	166	167	168	169	170	171
	1228/B1	1228/B2	1228/B3	1228/B3A	1228/B5	1228/B6	1228/B7	1228/H6	1228/H1A
SI02	48.50	48.20	48.20	47.30	49.10	48.80	47.40	48.70	47.20
AL203	14.40	14.20	14.30	14.80	15.20	16.70	16.20	14.00	15.30
FE203	12.70	13.10	10.40	11.00	11.50	11.50	10.80	10.80	11.40
TI02	1.91	1.84	1.80	1.92	1.73	1.44	1.32	1.66	1.78
MGO	8.90	9.60	7.10	7.20	8.60	7.80	7.80	10.10	6.50
CAO	7.40	6.70	8.60	9.00	7.00	7.90	8.50	9.70	12.50
NA2O	4.05	4.15	5.35	4.65	4.60	4.40	3.70	3.25	2.85
K2O	.07	.07	.12	.08	.11	.06	.06	.39	.08
MNO	.19	.20	.18	.18	.18	.18	.21	.19	.18
P2O5	.12	.12	.13	.14	.11	.07	.06	.10	.11
L.O.I.	3.38	3.61	5.78	4.73	3.38	3.14	4.16	3.09	2.52
TOTAL	101.62	101.79	101.96	101.00	101.51	101.99	100.21	101.98	100.42

PPM

ZR	159	153	140	156	151	100	91	129	137
Y	34	37	35	39	35	28	22	28	30
SR	157	106	150	238	219	207	172	227	269
RB	0	0	0	0	0	2	0	0	0
ZN	97	105	82	96	81	72	82	74	69
CU	44	46	36	39	59	47	44	40	76
NI	127	125	125	108	119	63	96	203	101
CR	312	308	303	285	267	205	271	644	292
BA	-33	3	-26	-13	13	18	15	29	-16

TABLE 4-2-2 STØREN

	172	173	174	175	176	177	178	179	180
	1228/H2	1228/H2B	1228/H2C	1228/H3	1228/H4	1228/H4A	1228/H4B	1228/H4C	1228/H5
SI02	49.90	45.40	49.60	45.40	46.10	49.40	47.50	46.00	49.00
AL203	15.30	15.50	14.30	15.80	14.80	14.40	15.20	15.60	14.60
FE203	10.10	8.60	8.80	7.40	10.40	10.00	11.40	11.30	11.30
TI02	1.24	1.72	1.59	2.04	1.69	1.75	1.76	1.83	1.64
MGO	5.40	5.40	5.90	4.20	7.90	7.60	7.50	7.50	7.40
CAO	12.50	13.30	11.80	12.30	11.60	11.90	11.50	12.20	11.00
NA2O	3.85	3.60	4.45	3.80	2.75	3.40	2.65	2.55	3.00
K2O	.50	.65	.29	1.39	.48	.25	.06	.10	.21
MNO	.12	.13	.14	.16	.17	.17	.17	.18	.18
P2O5	.05	.07	.08	.17	.09	.08	.11	.11	.09
L.O.I.	2.62	6.19	3.66	8.49	3.85	3.38	2.89	2.94	2.72
TOTAL	101.58	100.56	100.61	101.15	99.83	102.33	100.74	100.31	101.14

PPM

ZR	77	127	116	159	130	137	139	146	126
Y	22	30	27	29	31	26	26	30	27
SR	151	231	261	318	200	209	528	286	338
RB	5	8	0	18	4	1	0	0	0
ZN	57	53	52	56	69	62	80	70	71
CU	87	113	138	27	54	57	48	58	19
NI	194	169	153	89	123	115	142	136	146
CR	498	432	409	268	374	382	432	422	419
BA	20	-5	-67	214	114	53	-40	-1	14

TABLE 4-2-3 STØREN

	181	182	183	184	185	186	249	250	251
	1228/H5A	1228/XXA	1 GRØT	2 GRØT	A HAGA	B HAGA	1228/TROND	1228/HØL P1	1228/HØL P2
SI02	50.30	47.00	46.50	46.80	46.90	47.10	72.90	57.40	55.00
AL203	13.20	15.00	14.40	14.40	13.80	14.30	15.60	17.40	19.10
FE203	8.90	11.90	11.60	10.90	8.40	9.60	.90	7.00	7.20
TI02	1.54	1.81	1.65	1.78	1.66	1.64	.42	1.48	1.33
MGO	7.80	7.70	8.80	5.20	5.90	7.30	.30	2.70	3.00
CAO	11.40	6.80	7.30	7.20	10.90	13.80	3.00	2.70	4.80
NA20	2.70	4.50	2.40	4.10	3.85	2.45	5.90	7.00	5.65
K20	.55	.11	.00	.06	.20	.34	1.23	1.04	2.56
MNO	.14	.20	.17	.19	.12	.17	.00	.07	.10
P205	.10	.11	.10	.12	.09	.10	.04	.31	.28
L.O.I.	2.13	3.69	6.58	7.62	6.24	3.94	.70	2.21	2.93
TOTAL	98.76	98.82	99.50	98.37	98.06	100.74	100.99	99.31	101.95

PPM

ZR	132	155	131	140	149	157	109	272	247
Y	26	37	33	34	27	33	25	23	0
SR	192	146	416	119	112	117	697	602	617
RB	4	0	0	0	0	4	19	28	87
ZN	24	97	86	113	61	67	29	79	74
CU	48	50	63	63	34	42	-9	63	128
NI	93	113	94	60	153	161	12	12	18
CR	319	321	302	274	356	389	1	29	29
BA	112	19	-35	-7	-16	31	419	292	847

TABLE 4-2-4 STØREN

	404	405	406
	1228/LØK 51	1228/LØK 52	1228/LØK 53
SI02	54.90	54.90	49.90
AL203	18.80	17.50	17.50
FE203	6.60	6.30	10.40
TI02	1.35	1.25	1.48
MGO	2.30	1.70	4.70
CA0	5.80	9.70	4.40
NA20	4.00	3.65	5.00
K20	2.82	1.05	1.46
MNO	.09	.08	.18
P205	.23	.22	.28
L.O.I.	2.75	3.14	3.26
TOTAL	99.64	99.49	98.56

PPM

ZR	343	316	236
Y	26	23	31
SR	1111	871	523
RB	63	31	51
ZN	66	61	78
CU	70	46	140
NI	6	7	13
CR	18	11	66
BA	1132	339	619

TABLE 4-3-1 LØKKEN

	355	356	357	358	359	360	361	362	363
	1228/LØK 1	1228/LØK 2	1228/LØK 3	1228/LØK 4	1228/LØK 5	1228/LØK 6	1228/LØK 7	1228/LØK 8	1228/LØK 9
SI02	48.30	49.60	49.10	48.80	52.00	49.60	47.80	42.00	48.80
AL203	14.60	14.30	14.60	15.20	14.30	14.00	13.10	14.70	15.00
FE203	11.50	11.90	11.80	13.70	10.10	9.30	12.60	13.50	11.50
TIO2	1.40	1.74	1.42	1.62	1.06	.92	1.72	1.65	1.38
MGO	8.50	8.40	8.40	7.90	7.90	9.30	6.70	5.10	8.30
CAO	10.80	9.30	10.60	5.10	5.40	9.90	6.80	8.00	6.20
NA2O	3.15	3.75	3.25	4.80	5.60	3.75	3.35	4.70	4.60
K2O	.09	.09	.16	.10	.11	.38	.20	.36	.05
MNO	.21	.21	.20	.25	.20	.18	.43	.20	.18
P2O5	.08	.11	.09	.11	.06	.05	.11	.12	.08
L.O.I.	2.58	2.38	2.50	3.38	3.22	5.05	7.16	9.60	3.28
TOTAL	101.21	101.78	102.12	100.96	99.95	102.43	99.97	99.93	99.37

PPM

ZR	90	128	106	97	61	52	127	114	76
Y	31	28	25	32	20	14	30	31	25
SR	133	172	131	242	98	98	93	111	91
RB	0	0	0	1	0	6	0	4	1
ZN	98	82	81	149	103	68	194	115	84
CU	30	58	93	-2	49	46	38	40	53
NI	50	55	66	33	70	196	32	13	81
CR	265	289	350	93	220	501	31	30	234
BA	-19	40	-1	-4	18	36	-6	-19	17

TABLE 4-3-2 LØKKEN

	364	365	366	367	368	369	370	371	372
	1228/LØK 10	1228/LØK 12	1228/LØK 13	1228/LØK 14	1228/LØK 15	1228/LØK 16	1228/LØK 17	1228/LØK 18	1228/LØK 19
SI02	47.00	50.00	51.70	54.00	53.00	54.30	50.80	45.80	48.80
AL203	15.30	14.70	14.70	13.30	13.20	12.90	14.40	15.20	14.50
FE203	11.80	10.70	13.20	11.80	11.20	11.40	9.80	11.50	10.00
TI02	1.36	1.37	1.49	1.34	1.30	1.31	1.23	1.45	1.08
MGO	7.50	8.00	5.40	5.10	5.50	5.70	6.30	9.70	9.40
CAO	7.70	9.60	6.90	6.80	5.70	6.30	7.90	6.20	10.40
NA2O	4.15	4.15	4.55	5.95	6.00	5.90	5.20	4.35	2.60
K2O	.40	.15	.27	.11	.16	.14	.05	.00	.88
MNO	.18	.19	.22	.21	.22	.19	.24	.14	.18
P2O5	.09	.09	.09	.08	.09	.07	.07	.08	.08
L.O.I.	4.15	2.19	2.74	2.29	2.22	1.52	2.54	4.66	2.40
TOTAL	99.63	101.14	101.26	100.98	98.59	99.73	98.53	99.08	100.32

PPM

ZR	81	71	85	79	68	79	70	82	65
Y	28	27	15	23	25	17	20	24	20
SR	96	127	199	47	53	50	150	54	148
RB	17	1	3	0	0	0	3	0	8
ZN	88	60	103	82	88	78	88	80	53
CU	46	30	40	16	24	28	57	85	16
NI	106	74	28	16	22	20	73	72	167
CR	286	248	36	41	49	51	210	325	275
BA	48	38	83	9	33	43	46	-11	100

TABLE 4-3-3 LØKKEN

	373	374	375	376	377	378	379	380	381	
	1228/LØK	201228/LØK	211228/LØK	221228/LØK	231228/LØK	241228/LØK	251228/LØK	261228/LØK	271228/LØK	28
SiO2	51.20	78.00	48.40	47.00	47.00	44.90	47.80	50.10	49.40	
AL2O3	16.40	11.00	15.00	15.30	15.40	16.40	14.70	14.20	14.30	
FE2O3	7.80	1.80	10.60	11.20	11.10	11.60	13.00	14.40	12.00	
TiO2	1.08	.46	1.31	1.32	1.41	1.26	1.52	1.62	1.45	
MgO	7.50	.70	8.00	7.10	8.70	7.50	8.60	4.60	7.50	
CaO	12.90	.70	4.20	10.70	8.20	10.00	7.50	5.80	8.50	
NA2O	3.15	4.00	4.65	3.45	3.20	2.85	3.95	5.00	4.35	
K2O	.40	2.24	.45	.35	.70	1.00	.15	.09	.11	
MNO	.13	.01	.18	.16	.16	.16	.20	.21	.18	
P2O5	.04	.01	.08	.08	.09	.09	.08	.12	.07	
L.O.I.	1.79	1.49	6.40	3.21	3.52	5.99	2.98	2.47	2.86	
TOTAL	102.39	100.41	99.27	99.87	99.48	101.75	100.48	98.61	100.72	

PPM

ZR	42	226	73	90	95	60	113	125	113
Y	15	45	20	30	31	19	22	37	28
SR	151	44	119	347	267	186	238	280	300
RB	2	35	8	0	15	13	0	0	0
ZN	27	44	97	81	93	90	74	88	77
CU	34	-10	40	34	47	46	5	8	4
NI	66	1	74	151	127	100	86	12	76
CR	172	-5	247	378	339	261	204	21	197
BA	44	477	60	64	162	95	8	1	6

TABLE 4.3-4 LØKKEN

	382	383	384	385	386	387	388	389	390
	1228/LØK 29	1228/LØK 30	1228/LØK 31	1228/LØK 32	1228/LØK 33	1228/LØK 34	1228/LØK 35	1228/LØK 36	1228/LØK 37
SI02	50.50	46.40	48.80	47.20	44.60	43.10	46.40	47.00	46.40
AL203	14.70	16.20	14.80	15.60	15.70	15.70	15.00	15.30	14.80
FE203	11.80	10.50	12.30	10.50	11.90	9.70	9.90	9.10	9.00
TI02	1.56	1.44	1.66	1.37	1.38	1.31	1.26	1.16	1.18
MGO	8.20	8.20	7.00	7.90	10.80	7.00	7.50	6.30	7.10
CAO	8.50	9.60	8.00	8.80	9.30	10.40	10.40	9.80	9.00
NA2O	3.60	2.45	3.90	3.95	1.90	3.50	3.25	4.55	4.60
K2O	.34	.95	.38	.15	.16	1.03	1.12	.53	.46
MNO	.18	.15	.25	.16	.19	.15	.17	.14	.14
P2O5	.09	.08	.08	.09	.09	.07	.08	.08	.07
L.O.I.	2.72	4.65	2.54	4.54	4.23	8.58	4.74	5.47	6.12
TOTAL	102.19	100.62	99.71	100.26	100.25	100.54	99.82	99.43	98.87

PPM

ZR	111	97	119	96	98	81	83	72	63
Y	30	24	24	23	24	26	25	22	24
SR	209	139	167	127	184	191	317	137	85
RB	1	18	1	0	1	10	10	7	0
ZN	59	80	78	83	91	80	77	64	79
CU	3	45	48	46	50	46	38	28	37
NI	81	80	56	108	191	96	117	123	131
CR	190	290	194	265	458	282	345	286	358
BA	27	41	-2	-1	9	32	63	38	47

TABLE 4-3-5 LØKKEN

	391	392	393	394	395	396	397	398	399
	1228/LØK 38	1228/LØK 39	1228/LØK 40	1228/LØK 41	1228/LØK 42	1228/LØK 43	1228/LØK 44	1228/LØK 45	1228/LØK 46
SI02	51.60	48.70	51.40	51.20	48.90	47.00	47.00	49.10	49.80
AL203	13.80	15.00	13.70	13.80	14.80	14.90	16.00	14.10	14.80
FE203	9.70	9.90	15.00	14.00	12.50	12.50	10.90	11.50	14.40
TI02	1.17	1.28	1.98	1.86	1.81	1.76	1.50	1.70	1.80
MGO	8.70	7.00	4.70	4.30	6.40	6.40	7.30	7.10	6.90
CAO	5.50	8.60	5.90	7.20	10.90	11.30	13.20	12.30	4.40
NA2O	4.80	3.60	5.65	5.60	3.65	3.10	2.60	3.10	5.45
K2O	.19	.13	.42	.17	.18	.14	.16	.36	.08
MNO	.14	.18	.24	.23	.22	.21	.19	.22	.22
P2O5	.10	.10	.14	.13	.11	.09	.07	.09	.11
L.O.I.	3.09	5.34	1.65	2.06	2.01	2.29	2.82	2.31	3.44
TOTAL	98.79	99.83	100.78	100.55	101.48	99.69	101.74	101.88	101.40

PPM

ZR	73	83	131	122	137	134	112	124	119
Y	21	24	39	31	36	30	26	29	31
SR	75	118	50	110	202	181	281	208	77
RB	1	0	8	1	7	0	0	0	0
ZN	73	79	112	100	81	85	70	78	122
CU	38	39	21	22	51	70	68	71	30
NI	78	87	12	15	39	51	100	49	17
CR	221	277	34	35	95	128	226	288	35
BA	34	19	75	80	-23	3	9	-4	-12

TABLE 4.3-6 LØKKEN

	400	401	402	403
	1228/LØK	471228/LØK	481228/LØK	491228/LØK
SI02	50.50	70.50	47.60	45.00
AL203	14.70	15.70	14.90	16.40
FE203	11.90	2.10	11.00	9.60
TI02	1.52	.72	1.60	1.31
MGO	6.20	.90	8.20	6.80
CAO	4.50	2.00	10.10	9.40
NA2O	4.10	6.35	3.55	4.10
K2O	.18	1.19	.00	.08
MNO	.17	.00	.20	.15
P2O5	.11	.07	.09	.09
L.O.I.	4.71	1.26	2.45	5.45
TOTAL	98.59	100.79	99.69	98.38

PPM

ZR	114	139	96	75
Y	29	1	25	23
SR	118	320	95	201
RB	1	17	0	0
ZN	104	39	105	79
CU	19	-8	87	39
NI	5	3	74	116
CR	19	10	338	295
BA	14	207	3	-1

TABLE 4.4-1 B0MLO

	151	152	153	154	155	156	157	158	159
	1228/10B	1228/17	1228/18	1228/19	1228/22C	1228/23	1228/24	1228/25	1228/27
ZR	53.70	48.40	51.40	50.60	48.70	48.10	47.00	51.30	53.10
Y	16.00	14.00	14.00	15.40	15.50	16.60	17.80	14.40	15.50
SR	8.20	9.30	10.70	8.70	11.00	11.60	11.40	12.20	10.70
RB	.78	.69	.70	.82	1.90	2.07	2.04	1.98	2.18
ZN	5.10	8.30	11.00	8.10	4.30	5.40	3.70	5.80	4.20
CU	10.00	11.20	7.00	7.60	9.40	10.70	10.60	6.70	8.00
NI	1.55	3.40	3.75	3.90	3.45	3.10	2.95	4.65	3.05
CR	1.45	.25	.15	.75	.45	.10	.45	.43	2.15
BA	.12	.15	.18	.15	.15	.18	.15	.17	.16
	.09	.03	.02	.03	.14	.14	.13	.13	.14
	2.52	3.99	3.12	2.81	5.78	3.32	4.36	2.44	2.20
TOTAL	99.51	99.71	102.02	98.86	100.77	101.31	100.58	100.20	101.38
PPM									
SI02	36	35	33	41	183	193	168	182	238
AL203	16	13	13	8	24	21	20	27	31
FE203	617	138	50	172	378	476	510	255	355
TI02	43	3	0	12	11	0	14	8	47
MGO	62	67	92	75	97	109	108	118	105
CAO	65	74	77	79	46	52	73	47	31
NA2O	33	200	265	75	66	72	60	31	21
K2O	83	683	841	120	108	115	78	42	59
MNO	783	3	42	56	142	17	122	149	423

TABLE 44-2 BOMLO

	160	161	162	255	256	257	258	259	260
	1228/29	1228/29A	1228/31	1228/6	1228/7	1228/12	1228/35	1228/36	1228/37
ZR	49.60	52.80	52.40	73.90	77.10	75.30	74.90	75.80	73.40
Y	16.20	16.50	16.80	12.10	10.80	13.20	12.40	12.50	12.60
SR	11.50	10.80	9.30	3.80	3.40	2.40	1.70	1.40	2.00
RB	1.94	2.23	2.36	.60	.53	.55	.55	.45	.58
ZN	4.00	4.20	2.90	.20	.10	.60	.40	.10	.50
CU	5.20	8.80	7.70	.00	.80	.70	.00	.80	.90
NI	4.00	2.15	3.85	4.30	5.45	6.95	2.60	2.15	1.30
CR	1.97	1.20	.87	5.02	1.69	.08	5.90	6.34	7.90
BA	.14	.19	.14	.00	.01	.04	.00	.00	.02
	.09	.17	.20	.05	.03	.02	.05	.04	.05
	3.76	3.05	2.62	.26	.50	.75	1.08	1.07	1.18
TOTAL	98.40	102.09	99.14	100.23	100.41	100.59	99.58	100.65	100.43
PPM									
SI02	180	262	256	1522	1362	195	242	273	284
AL203	25	33	32	135	116	24	21	25	22
FE203	210	330	356	54	66	157	61	69	68
TI02	83	51	35	60	19	0	260	228	354
MGO	90	104	100	241	166	31	39	29	43
CAO	34	17	78	-18	-17	-6	-8	-4	-6
NA2O	79	11	36	-1	-2	1	3	-1	0
K2O	134	25	60	-4	-3	3	3	0	0
MNO	305	212	227	679	254	88	627	693	1715

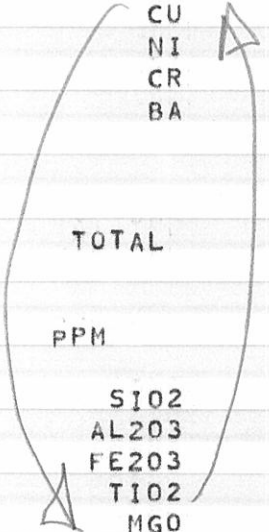


TABLE 4.4-3 BOMLO

	261	262	263	264	265	266	267	268	269
	1228/39	1228/40	1228/41	1228/43	1228/54	1228/62	1228/83	1228/83A	1228/96
ZR	74.20	71.80	70.40	81.50	79.40	62.00	54.90	70.90	61.20
Y	12.80	13.20	12.90	10.30	10.60	10.50	14.30	13.30	16.90
SR	1.70	3.20	5.40	1.50	1.50	1.50	12.90	3.80	5.40
RB	.43	.60	.75	.20	.38	.27	2.70	.76	.99
ZN	.00	.30	.40	.10	.60	1.00	3.00	.50	.70
CU	.50	.70	.40	.40	.10	1.60	6.60	2.10	2.20
NI	3.65	3.00	2.95	5.75	3.90	3.95	3.75	3.45	4.20
CR	4.86	6.00	5.72	.08	1.13	.44	2.00	4.67	7.06
BA	.00	.03	.07	.00	.00	.00	.21	.05	.08
	.03	.03	.05	.00	.02	.02	.18	.09	.11
	.87	.97	1.06	.52	1.15	.75	1.14	.91	.57
TOTAL	99.04	99.83	100.10	100.35	98.78	102.03	101.68	100.53	99.41

Si
Al.
Fe₂O₃
TiO₂
Mg

PPM

SI02	242	547	744	340	182	238	271	293	1175
AL2O3	18	44	67	120	25	50	41	36	19
FE2O3	62	101	75	34	40	75	270	135	216
TI02	213	247	242	3	25	7	77	171	107
MGO	28	78	98	2	9	54	125	55	60
CAO	-8	-4	-16	-11	-7	-6	18	0	-13
NA2O	4	1	2	-3	-2	4	5	0	1
K2O	4	-1	-4	-5	-2	3	26	2	-1
MNO	563	999	1039	37	53	62	414	451	2463

TABLE 4-4-~~5~~ B0MLO

	275	276	277	278	279	280	281	282	283
	1228/13	1228/16	1228/20	1228/22A	1228/23A	1228/26	1228/28	1228/28A	1228/28B
ZR	50.50	52.20	48.80	46.80	46.20	54.00	47.60	50.00	54.30
Y	16.20	14.10	16.40	16.20	15.40	15.80	17.30	16.00	14.90
SR	9.30	9.80	9.60	10.90	11.50	9.90	11.70	11.20	9.50
RB	.91	1.06	1.01	2.04	2.02	1.76	2.11	2.02	1.88
ZN	6.00	8.20	7.00	4.50	4.60	5.00	5.10	4.90	4.20
CU	8.70	8.00	9.30	10.40	11.00	7.70	8.70	7.10	7.90
NI	4.90	4.05	3.40	2.85	1.80	3.15	4.00	2.75	3.45
CR	.08	.21	.46	.63	.80	1.32	.67	1.00	1.09
BA	.11	.18	.13	.16	.19	.14	.19	.17	.14
	.05	.07	.08	.14	.13	.13	.15	.14	.15
	2.34	2.64	3.30	4.03	5.39	2.94	2.93	3.69	2.92
TOTAL	99.09	100.51	99.48	98.65	99.03	101.84	100.45	98.97	100.43

PPM

SI02	47	48	75	195	193	182	220	220	221
AL203	17	13	22	33	23	23	25	28	23
FE203	158	57	372	523	497	279	398	294	341
TI02	0	0	8	22	31	53	18	31	34
MGO	59	86	77	87	93	87	97	98	79
CA0	68	62	41	49	51	43	41	27	37
NA20	73	139	44	67	90	24	55	62	60
K20	150	376	79	121	103	142	70	146	83
MNO	14	39	83	140	213	252	145	192	346

TABLE 4.4-5 BOMLO

	286	287	288	290	291	292	293	294	295
	1228/1	1228/14	1228/15	1228/22	1228/30	1228/32	1228/42	1228/44	1228/50
ZR	46.60	49.80	48.70	48.80	55.50	52.50	46.00	51.60	47.90
Y	15.90	15.50	15.10	15.80	15.30	15.90	13.60	12.50	14.90
SR	12.00	9.30	8.70	10.00	9.90	9.60	14.20	13.50	10.70
RB	1.93	.82	.82	1.89	1.86	1.62	1.87	2.79	1.38
ZN	4.90	7.90	6.70	4.00	3.30	5.00	5.20	2.80	5.00
CU	12.60	8.30	8.70	10.80	8.20	7.10	7.50	6.50	9.30
NI	2.30	4.15	5.25	4.35	2.85	4.00	4.30	2.60	2.85
CR	.50	.22	.06	.57	1.00	.86	.13	1.59	.88
BA	.17	.14	.12	.15	.14	.15	.23	.22	.20
	.15	.06	.05	.15	.15	.13	.10	.24	.11
	3.78	2.86	4.68	5.60	3.36	3.01	5.18	4.60	8.73
TOTAL	100.83	99.05	98.88	102.11	101.56	99.87	98.31	98.94	101.95

PPM

SI02	157	43	46	185	212	209	138	371	171
AL203	18	12	14	24	28	24	39	48	24
FE203	867	95	110	326	322	424	146	233	309
TI02	3	3	0	12	47	34	0	56	37
MGO	84	81	63	80	91	88	155	141	114
CAO	73	131	77	43	35	36	39	17	-1
NA2O	37	81	70	91	53	76	10	9	5
K2O	60	119	144	116	98	110	21	19	212
MNO	144	17	34	114	258	317	26	457	359

TABLE 4.4-6 BOMLO

	296	297	298	299	300	301	302	303	304
	1228/53	1228/56	1228/56A	1228/56BCD	1228/58B	1228/59B	1228/60	1228/61	1228/63A
ZR	54.10	45.60	43.90	58.40	75.80	47.50	55.70	48.60	51.30
Y	14.30	13.00	13.20	12.90	11.50	12.60	13.90	16.70	16.20
SR	11.30	14.80	14.80	10.80	3.20	14.30	9.70	10.30	9.20
RB	2.36	1.86	2.00	1.52	.36	1.38	1.50	1.64	1.67
ZN	2.90	5.30	5.10	1.40	.80	4.40	2.10	6.00	5.10
CU	5.00	7.40	8.30	4.70	.50	6.90	5.10	10.20	8.80
NI	2.75	3.65	3.40	4.50	4.75	1.70	3.65	2.80	2.15
CR	1.72	.05	.18	.61	1.12	1.10	2.20	.87	1.00
BA	.23	.35	.30	.20	.03	.34	.18	.19	.19
	.27	.14	.15	.22	.02	.14	.26	.16	.12
	5.74	8.33	8.62	5.44	1.31	7.99	4.45	1.81	2.36
TOTAL	100.67	100.48	99.95	100.69	99.39	98.35	98.74	99.27	98.09

PPM

SI02	292	134	137	343	239	94	333	217	190
AL203	35	38	40	42	49	21	48	34	30
FE203	143	158	229	297	70	100	208	355	313
TI02	49	0	0	23	16	18	104	24	26
MGO	103	92	75	134	77	110	116	77	83
CAO	4	55	36	-5	-13	-4	-2	-3	11
NA2O	3	12	14	2	-6	5	3	29	14
K2O	13	23	31	2	3	21	18	272	154
MNO	286	-18	2	177	169	174	475	195	297

TABLE 4.4-B BOMLO

	305	306	307	308	309	310	311	312	313
	1228/63B	1228/64	1228/65	1228/65A	1228/66	1228/68	1228/74	1228/75	1228/77
ZR	49.40	59.80	48.60	46.20	50.50	55.50	48.90	49.60	66.50
Y	17.80	17.00	14.20	17.80	15.90	13.00	14.50	13.30	13.80
SR	8.50	7.00	13.30	8.90	11.00	14.60	11.50	15.00	7.10
RB	1.68	1.56	1.50	1.20	1.60	2.34	1.88	3.12	.88
ZN	5.30	1.70	6.60	5.30	4.90	2.60	6.20	3.90	.40
CU	8.40	2.80	8.20	10.30	9.10	6.40	9.30	8.00	3.10
NI	2.15	2.30	3.30	4.05	4.40	3.15	2.40	1.90	5.75
CR	.85	3.16	1.46	1.15	.17	1.65	1.24	1.55	2.52
BA	.15	.11	.21	.09	.29	.23	.19	.24	.16
	.12	.13	.14	.05	.11	.30	.17	.20	.09
	3.78	3.34	1.51	4.40	.90	.63	2.14	1.24	1.20
TOTAL	98.13	98.90	99.02	99.44	98.87	100.40	98.42	98.05	101.50

PPM

SI02	202	334	90	58	115	339	202	259	560
AL203	28	28	25	22	31	44	30	31	58
FE203	287	188	157	248	243	237	316	296	222
TI02	29	123	39	13	2	75	46	66	103
MGO	77	79	140	62	150	149	117	127	98
CA0	-2	-9	12	77	2	40	11	13	-8
NA20	8	26	30	190	26	9	22	5	2
K20	192	191	77	459	35	9	140	33	-2
MNO	130	707	173	29	19	406	321	279	596

TABLE 4.4-8 BOMLO

	314	315	316	317	318	319
	1228/78	1228/78A	1228/81	1228/88	1228/95	1228/97
ZR	51.60	48.00	54.50	52.80	45.40	54.00
Y	16.00	13.70	13.00	15.00	13.80	16.10
SR	10.40	11.20	11.50	9.50	15.40	12.20
RB	1.63	1.67	2.24	1.65	2.40	2.08
ZN	3.80	5.50	3.30	6.10	7.10	2.40
CU	7.40	8.60	6.40	7.40	10.70	6.40
NI	2.55	1.65	3.10	3.55	2.75	3.85
CR	1.15	2.00	2.00	1.75	.15	2.95
BA	.18	.17	.20	.15	.25	.24
	.12	.15	.19	.14	.17	.39
	4.28	6.36	1.68	2.05	2.07	.55
TOTAL	99.11	99.00	98.11	100.09	100.19	101.16

PPM

SI02	175	170	240	173	190	640
AL203	26	27	34	24	52	34
FE203	353	193	624	261	158	455
TIO2	33	61	93	85	0	63
MGO	91	97	115	87	121	130
CAO	10	4	19	26	62	0
NA2O	13	10	7	61	61	2
K2O	228	147	21	203	182	7
MNO	402	512	340	313	21	1542

TABLE 44-9

STAVENES (WET CHEMICAL METHODS)

	9	10	11	12	13	14	15
	1228/99A	1228/98A	1228/98D	1228/105A	1228/108	1228/112	1228/117
SI02	46.50	46.72	48.13	47.29	48.05	47.85	47.70
AL203	14.48	14.43	14.90	14.17	18.49	15.43	15.79
FE203	13.13	12.85	10.87	13.42	9.90	10.46	10.95
TIO2	2.40	2.30	1.75	2.41	.54	1.99	2.03
MGO	7.17	6.56	7.60	6.92	6.15	7.93	6.50
CAO	11.57	12.30	11.73	11.27	10.48	11.03	12.06
NA2O	2.56	2.64	3.09	2.69	1.76	3.78	3.26
K2O	.12	.13	.12	.14	1.30	.30	.12
MNO	.23	.21	.21	.30	.15	.19	.17
P2O5	.14	.12	.12	.12	.11	.13	.17
L.O.I.	3.15	3.32	2.74	3.11	3.86	2.75	2.28
TOTAL	101.45	101.58	101.26	101.84	100.79	101.84	101.03

PPM

ZR	0	0	0	0	0	0	0
Y	0	0	0	0	0	0	0
SR	0	0	0	0	0	0	0
RB	0	0	0	0	0	0	0
ZN	0	0	0	0	0	0	0
CU	0	0	0	0	0	0	0
NI	0	0	0	0	0	0	0
CR	0	0	0	0	0	0	0
BA	0	0	0	0	0	0	0

TABLE 4.4-10 STAVENES

	320	321	322	323	324	325	326	327	328
	1228/98B	1228/98C	1228/100	1228/105	1228/107	1228/109	1228/110	1228/113	1228/114
SI02	48.00	49.60	47.10	48.60	48.40	47.60	48.10	47.30	49.50
AL203	13.60	13.10	13.50	13.60	13.40	13.50	14.40	15.20	16.20
FE203	12.80	13.90	14.30	14.70	14.40	14.60	12.70	11.40	9.90
TI02	1.92	2.31	2.41	2.40	2.47	2.30	1.88	1.90	1.62
MGO	6.90	6.50	6.10	6.60	6.70	6.40	7.00	5.80	7.60
CAO	11.60	11.20	10.80	11.60	11.60	12.00	12.60	12.20	11.80
NA2O	2.75	2.85	2.90	2.55	2.95	2.70	2.60	2.40	2.85
K2O	.14	.14	.11	.09	.11	.11	.09	.32	.41
MNO	.21	.27	.27	.27	.26	.24	.22	.19	.17
P2O5	.11	.13	.12	.13	.14	.14	.09	.11	.09
L.O.I.	1.50	1.76	1.27	1.53	1.52	1.18	1.61	2.59	2.29
TOTAL	99.53	101.76	98.88	102.07	101.95	100.77	101.29	99.41	102.43

PPM

ZR	151	185	200	185	190	194	147	152	121
Y	42	48	52	51	47	48	37	32	28
SR	164	128	162	153	165	166	175	224	212
RB	0	2	0	0	0	0	0	1	1
ZN	98	112	110	111	107	91	92	79	67
CU	38	19	41	36	26	47	41	51	79
NI	61	56	46	70	67	57	64	69	73
CR	232	180	142	203	229	169	304	181	308
BA	-12	15	-16	-21	-25	21	14	55	65

TABLE 4.4-10 STAVENES

	329	330	331
	1228/119	1228/122	1228/125
SI02	49.90	49.20	49.70
AL203	14.90	13.20	15.20
FE203	10.50	14.30	9.70
TI02	1.84	2.54	1.38
MGO	7.40	3.30	9.00
CA0	10.70	9.50	10.90
NA20	3.50	3.65	3.10
K20	.12	.15	.09
MNO	.20	.28	.17
P205	.12	.14	.07
L.O.I.	2.13	1.70	2.34
TOTAL	101.31	97.96	101.65

PPM

ZR	167	216	99
Y	23	52	32
SR	227	160	135
RB	0	0	0
ZN	70	120	60
CU	31	34	58
NI	64	67	113
CR	356	180	361
BA	4	42	21